

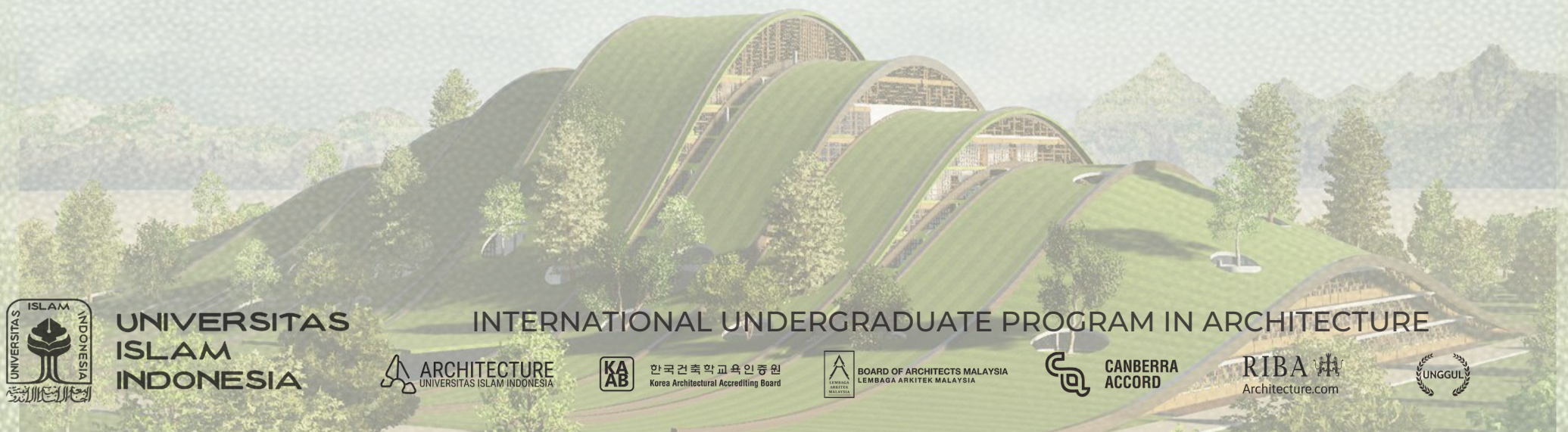
| The Design Prototype of

# Community Housing

in IKN with Regenerative Architecture

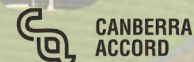
Perancangan Desain Prototipe Rumah Susun Komunitas di IKN dengan Arsitektur Regeneratif

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UNIVERSITAS  
ISLAM  
INDONESIA

INTERNATIONAL UNDERGRADUATE PROGRAM IN ARCHITECTURE





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I declare that all parts of this work are my own work, except the works mentioned by reference and that there is no assistance from other parties, either wholly or partially in the process of making it.

I also declare that there is no conflict of intellectual ownership of this work, so that all thoughts and writings contained in this work are the main author and supervisor. The final results are submitted to the Department of Architecture, Universitas Islam Indonesia to be used for educational and publication purposes.

Sleman, July 30th 2024  
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A handwritten signature in black ink, written in a cursive style. The signature appears to be 'Ni'mal Abdu Prihatmaji'.

Ni'mal Abdu Prihatmaji

**THE DESIGN PROTOTYPE OF COMMUNITY HOUSING IN IKN WITH REGENERATIVE ARCHITECTURE**  
**PERANCANGAN DESAIN PROTOTIPE RUMAH SUSUN KOMUNITAS DI IKN DENGAN ARSITEKTUR REGENERATIF**

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## **preface**

Praise and gratitude are offered to Allah SWT, along with prayers and greetings to our Prophet Muhammad SAW, his family, and companions. By Their grace, the author was able to complete the Final Architectural Design Studio titled “The Design Prototype of Community Housing in IKN with Regenerative Architecture” to the best of their ability. The author received considerable help, input, guidance, and support from various individuals during the preparation of this undergraduate final project. The author wishes to express their appreciation and gratitude to:

1. Allah SWT, for His mercy and grace, which facilitated the writing of this Bachelor’s Final Project with ease and blessings.
2. The author’s parents, Abi Yulianto Purwono Prihatmaji and Ibu Lim Roati, for their unwavering support and endless love.
3. The author’s siblings, Ahsani, Indana, and Siroja, for their constant support and presence throughout the author’s academic journey.
4. Prof. Dr. Ing. Ar. Ir. Ilya Fadjjar Maharika, M.A., IAI, the author’s project advisor, for his guidance, motivation, input, direction, and patience, which enabled the completion of this final project.
5. The examiners, Ir. Wiryono Raharjo, M.Arch., Ph.D., and Ma’am Johanita Anggia Rini, S.T., M.T., Ph.D., for their guidance, motivation, critiques, and suggestions that advanced the project.
6. Ir. Hanif Budiman, M.T., Head of the Architecture Study Program at FTSP UII, and all lecturers and staff who have guided and provided valuable knowledge.
7. Fellow friends, Mas Faiz and Hajid, for their companionship in finishing the project.
8. Bacbicbuc, for the dedication, tears, sweat, coffee, and life lessons.
9. Fellow friends of Jimi Holiday, Abid, and Zaqy, for their presence in both joyful and challenging times, maintaining the author’s sanity throughout the academic experience.
10. Fellow friends of Komisi Ahsan, for their friendship until the end.
11. Friends from the Architecture Class of 2020, for their valuable views, ideas, suggestions, and support during the study.

For all the prayers, support, and assistance given, may it be rewarded by Allah SWT. The author acknowledges that this work is not perfect and welcomes constructive criticism and suggestions to improve this undergraduate final project. It is hoped that this project will increase knowledge and experience for readers, serve as a reference, and provide learning materials and corrections for future improvements.

## **abstract**

The designation of Kalimantan as the new capital of Nusantara (IKN) presents challenges in harmonizing development with environmental preservation. Kalimantan, known as one of the world's lungs due to its tropical forests, faces criticism regarding construction that may damage its ecosystem. Meanwhile, the Indonesian government urges the acceleration of IKN development to make it operational as soon as possible. In this context, the concept of regenerative architecture emerges as a solution to address both demands. By utilizing the latest technologies such as 3D printing construction and prefabrication methods, accelerated development can be achieved without neglecting the efforts of natural regeneration. The slow yet steady growth of the forest can be integrated with technological innovation, creating synergy between humans and nature.

Furthermore, the concept of radical indigenism is introduced, emphasizing the freedom to utilize nature while minimizing dependency on high-end technology. Here, nature is allowed to grow organically, with humans playing a role in wisely managing it, not destroying it. In the context of community housing, this approach can result in living environments that support both ecological and social balance, where human development aligns with environmental regeneration efforts.

Through the implementation of regenerative architecture and radical indigenism, expected to create a sustainable mutualistic relationship between humans and nature, meeting the needs of both in a balanced and harmonious manner.

Key words: regenerative architecture, radical indigenism, community housing

## abstrak

Penetapan Kalimantan sebagai Ibu Kota Nusantara (IKN) membawa tantangan dalam mengharmonisasikan pembangunan dengan pelestarian lingkungan. Kalimantan, yang dikenal sebagai paru-paru dunia karena hutan tropisnya, menghadapi kritik terkait pembangunan yang berpotensi merusak ekosistem alam. Sementara itu, pemerintah Indonesia mendesak percepatan pembangunan IKN agar segera dapat difungsikan. Dalam hal ini, konsep arsitektur regeneratif menjadi solusi untuk menangani kedua kebutuhan tersebut. Dengan memanfaatkan teknologi terbaru seperti konstruksi cetak 3D dan metode prefabrikasi, percepatan pembangunan dapat dicapai tanpa mengabaikan upaya regenerasi alam. Perlahan namun pasti, pertumbuhan alami hutan dipadukan dengan inovasi teknologi yang mempercepat pembangunan, sehingga menciptakan sinergi antara manusia dan lingkungan.

Selain itu, konsep radical indigenism diperkenalkan, yang menekankan kebebasan menggunakan alam dengan meminimalkan ketergantungan pada teknologi tinggi. Di sini, alam dibiarkan tumbuh secara alami, dengan manusia hanya berperan dalam mengaturnya secara bijaksana, bukan menghancurkannya. Dalam konteks community housing, pendekatan ini dapat menghasilkan lingkungan hunian yang mendukung keseimbangan ekologis dan sosial, di mana pembangunan manusia sejalan dengan upaya regenerasi lingkungan.

Melalui penerapan arsitektur regeneratif dan radical indigenism, diharapkan dapat menciptakan hubungan mutualisme yang berkelanjutan antara manusia dan alam, memenuhi kebutuhan kedua belah pihak secara seimbang dan harmonis.

Kata kunci: arsitektur regeneratif, radical indigenism, community housing

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# 01

## I | introduction

Design premise

Project title

Ibu Kota Nusantara (IKN)

Kalimantan as the lungs of the world

Location of IKN in Kalimantan

Forest city as the solution

Conflict of forces: speedy development VS slow growth of nature

Political urgency

Architectural context

Exploration of design goals

Bryan Lawson matrix of design problem

General problem formulation

Design goals and benefits

Table of abductive reasoning

Problem mapping

Force based design framework for housing

Excellency, originality, and novelty

## | Project Title

*“— The Design of Community Housing in IKN with Regenerative Architecture”*

### - Community Housing

Community Housing is a concept in architecture and urban planning that emphasizes the development of homes and residential neighborhoods that strengthen and promote social interaction, community well-being, and environmental sustainability. The main focus is not only on the physical structure of the houses themselves, but also on the way the houses are organized and connected in a functioning community. Everyone has the right to live in physical and spiritual prosperity, to have a place to live, and to have a good and healthy environment. (Constitution Article 28H paragraph 1) Creating spaces that can be connected to each other in creating interaction within them.

### - Ibu Kota Nusantara (IKN)

“Ibu Kota Nusantara” is the concept or idea of moving Indonesia’s capital city from Jakarta to a more strategic and sustainable location. This idea had already been proposed in 1957 during the leadership of president Soekarno to be moved to Palangka Raya City. Then it was initiated again in 1997 by President Soeharto to be moved to Jonggol City but still not implemented. Then in 2013 by President Susilo Bambang Yudhoyono it was initiated again but also still not implemented. Until 2019 by President Joko Widodo, the idea of moving began to be taken seriously again seeing that Jakarta had begun to have many problems. The idea has been proposed as a response to various problems faced by Jakarta, such as traffic congestion, flooding, air pollution, and pressure on the city’s overcrowded infrastructure. The Nusantara Capital City concept involves relocating the center of government as well as developing infrastructure and facilities in the chosen new location.

### - Regenerative Architecture

Regenerative Architecture is a concept that emphasizes the development of buildings and environments that are not only ecologically sustainable, but also strive to improve ecosystem health, restore environmental damage, and improve the quality of human life. This approach differs from conventional approaches that only focus on reducing negative environmental impacts, while regenerative strives to create positive impacts that are active in the process of ecological regeneration. Regenerative design holds great promise for a new era of sustainable and positive impact architecture, sparking considerable interest among architects, building professionals and their clients.

## - design premise -

This project is an exploration of ideas for developing community housing in “Ibu Kota Nusantara” or IKN. Community Housing is a concept in architecture and urban planning that emphasizes the development of homes and residential neighborhoods that strengthen and promote social interaction, community well-being, and environmental sustainability. The main focus is not only on the physical structure of the houses themselves but also on the way the houses are organized and connected in a functioning community. Everyone has the right to live in physical and spiritual prosperity, a place to live, and a good and healthy environment. (Constitution Article 28H paragraph 1) Creating spaces that can be connected in creating interaction within them.

“Ibu Kota Nusantara” or IKN is the concept or idea of moving Indonesia’s capital city from Jakarta to a more strategic and sustainable location. This idea had already been proposed in 1957 during the leadership of President Soekarno to be moved to Palangka Raya City. Then it was initiated again in 1997 by President Soeharto to be moved to Jonggol City but still not implemented. Then in 2013 by President Susilo Bambang Yudhoyono it was initiated again but still not implemented. Until 2019 by President Joko Widodo, the idea of moving began to be taken seriously again seeing that Jakarta had begun to have many problems. The idea has been proposed as a response to various problems faced by Jakarta, such as traffic congestion, flooding, air pollution, and pressure on the city’s overcrowded infrastructure. The Nusantara Capital City concept involves relocating the center of government as well as developing infrastructure and facilities in the chosen new location.

In this project Regenerative Architecture is proposed as a concept that emphasizes the development of buildings and environments that are not only ecologically sustainable, but also strive to improve ecosystem health, restore environmental damage, and improve the quality of human life. This approach differs from conventional approaches that only focus on reducing negative environmental impacts, while regenerative strives to create positive impacts that are active in the process of ecological regeneration. Regenerative design holds great promise for a new era of sustainable and positive impact architecture, sparking considerable interest among architects, building professionals, and their clients.

## | Ibu Kota Nusantara (IKN)



Figure 1.1 Lower cultivation  
(Source: detik.com)

“Ibu Kota Nusantara” is an idea to move Indonesia’s capital city from Jakarta to a new, more strategic location. Jakarta, as the current capital city, suffers from serious problems such as flooding, traffic congestion, and land subsidence caused by excessive groundwater drilling. This idea aims to address those issues and to distribute development evenly across Indonesia.

Some of the locations proposed as alternatives for the new capital city include Palangkaraya in Central Kalimantan, and several other areas such as Kutai Kartanegara and Penajam Paser Utara, also in Kalimantan. The main objective is to plan and build a more sustainable city, with better infrastructure and protection from the risk of natural disasters.

Moving the capital is also expected to help in economic development outside Java, as well as strengthen the country’s sovereignty by reducing the concentration of political and economic activities in one place. Although this idea is still in the planning and implementation stages, it is a topic of debate among Indonesians.

## - Kalimantan as the Lungs of the World

Borneo's tropical rainforests play a crucial role as the "lungs of the world". Covering 40.8 million hectares, these forests are a huge store of carbon and an invaluable producer of oxygen. The photosynthesis process that takes place in them produces oxygen essential for life on Earth, while the trees absorb carbon dioxide, helping to reduce the concentration of greenhouse gases in the atmosphere. The abundant biodiversity of Borneo's forests also supports the global ecosystem by maintaining ecological balance and providing habitat for a variety of plant and animal species, some of which are unique and rare. In addition, Borneo's tropical rainforests also regulate the water cycle, reduce soil erosion, and moderate the climate, making them one of the most valuable environmental assets for the well-being of the planet. Therefore, the protection of Borneo's tropical rainforests is not only a local concern but also a global responsibility in maintaining the balance of ecosystems and air quality around the world.



Figure 1.2 Flower cultivation  
(Source: mongabay.co.id)

Unfortunately, the rate of deforestation in Kalimantan is increasing rapidly. According to data from the Forestry Department, between 2000 and 2005, around 1.23 million hectares of forest in Kalimantan were lost to deforestation. This means that about 673 hectares of forest in Kalimantan were lost every day during that period. The total area of forest in the entire province of Borneo is estimated to be around 40.8 million hectares. However, according to Greenpeace, in 2010, only about 25.5 million hectares of forest remained in Borneo.

In addition to tropical rainforests, the island also contains production forests. Production forests in Kalimantan are forest areas that are sustainably managed for the production of timber and other wood materials. These production forests are usually managed by the government or timber companies with licenses granted by the competent authority. The main purpose of production forests is to utilize timber resources sustainably, meaning that timber cut down will be replaced by replanting to keep the forest sustainable. Production forest management in Kalimantan is often in the spotlight due to the challenges faced in maintaining a balance between timber utilization and environmental sustainability. There are problems such as illegal logging, conversion of forests to agricultural or plantation land, and conflicts between conservation and economic interests.

- Location of IKN in Kalimantan

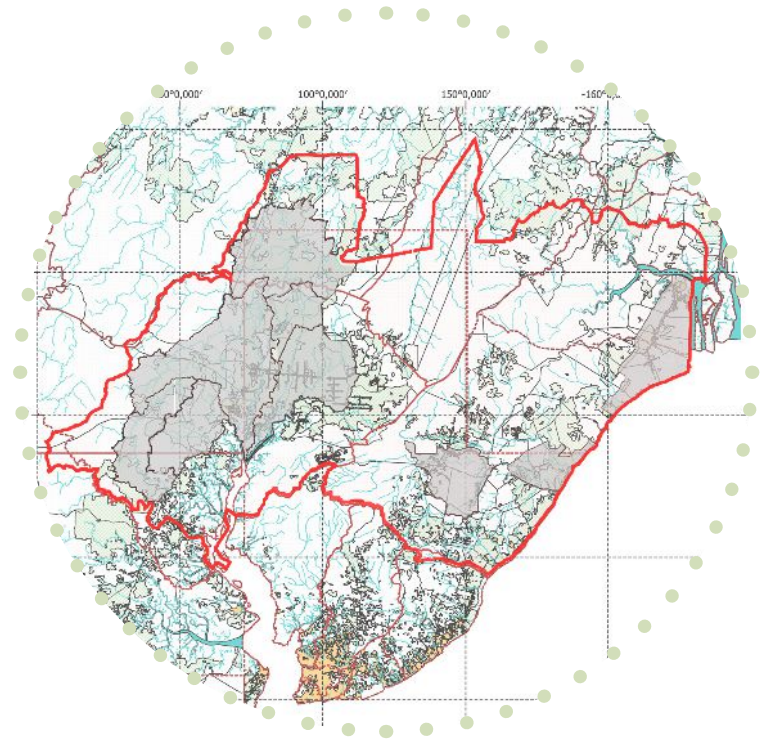


Figure 1.3 IKN administration  
(Source: mongabay.co.id)

The idea of moving Indonesia's capital city outside Java is one of the government's efforts to improve the life of the state in Indonesia. The location of the new capital city occupies most of the administrative area of North Penajam Paser and Kutai Kartanegara Regencies in East Kalimantan Province. This major government project aims to improve the governance of the capital city area to realise the goals of the state, namely protecting the entire Indonesian nation and the entire Indonesian blood sphere, promoting general welfare, educating the nation's life, and participating in implementing world order based on eternal peace and social justice (Javier, 2023). To realise these goals, the government established a ministry-level institution called the Nusantara Capital Authority. This institution is fully responsible for the preparation, development, and relocation of the National Capital City.

The development of IKN in Kalimantan forest is located in Production Forest. Production forest is a type of forest planted with one type of tree or monoculture. The type of trees planted in the IKN existing area are eucalyptus trees which are cut down every 6 to 7 years. Based on the description of President Joko Widodo in his speech at the IKN Pre-Market Sounding event, the design of IKN will actually restore the function of forests in Kalimantan as the lungs of the world with heterogeneous forests (Tambun, 2022). The trees planted in this forest will come from native and endemic trees from Kalimantan so that it is hoped that the function of tropical rainforests in Kalimantan will return (Hidayat, 2023). Overall, the IKN area reaches 250 thousand hectares with details of 25 per cent functioning as public operations, 65 per cent restored to its function as a tropical forest, while the remaining 10 per cent will be used as food reserve land.

### **- Forest City as the Solution**

IKN will be constructed gradually until 2045, keeping 50% of the land as a wooded region in accordance with the Forest City idea. A variety of municipal initiatives will continue to preserve the environment and forests via the use of an integrated landscape strategy. A forest ecosystem that shapes the framework of urban space by directing urban life and promoting connections between urban activities is referred to as a "forest city," or landscape-based city. Forest City's general guiding principles include the preservation of natural resources, the sustainability of nature, and the sustainability of forests in order to preserve important ecosystem areas for flora and fauna as well as forests and animal and plant habitats. IKN is designed as Forest City as a form of Indonesia's commitment to environmental and forestry issues that occur as explained in Law Number 32 of 2009 concerning Environmental Protection and Management "...that the declining quality of the environment has threatened the continuity of human life and other living things so that it is necessary to protect and manage the environment seriously and consistently by all stakeholders...".

## **| Conflict of Forces: Speedy Development vs Slow Growth of Nature**

The relocation and construction of the new Capital City of the Archipelago (IKN) is a big thing in realizing the dreams and targets of a country. This idea can respond to the existence of state problems to answer unrest in the community. Every state planning certainly has targets at every stage. In this case, the time aspect becomes a critical point. The government as the person in charge of this big project, wants the project to run on time.

One of the urgencies of moving the Capital City of the Archipelago (IKN) is inclusive economic development by disseminating new economic growth magnets so that it does not only rely on Java. In promoting rapid economic growth, IKN is urged to be built in an accelerated manner.

## - Political Urgency



Figure 1.4 Political conference  
(Source: setkab.co.id)

This aligns with the vision of an Indonesia Maju 2045, creating a more advanced, prosperous, and globally competitive country. Indonesia has set a goal to enter the ranks of the top five strongest economies in the world and have a per capita income of high-income countries by 2045. This is also supported by Law Number 3 of 2022 concerning the National Capital, which mandates the Government that the relocation of the National Capital is carried out as one of the strategies to realize Indonesia's Economic Target 2045, namely More Inclusive and Equitable Economic Growth through Accelerated Development of Eastern Indonesia.

The national capital has a central function and becomes a symbol of a country to show the identity of the nation and state. Therefore, the relocation and development of a new capital city needs to be based on the development of mature urban development principles as well as the needs and long-term vision of a nation. The planning paradigm and development principles of IKN are organized into important considerations in the development of the new location. So far, the progress of the IKN development itself consists of two stages. The first stage is physical work contracts and their signing. The second stage is where the contracted physical work packages and their construction. The achievement of the dream and vision of Indonesia 2045 is built on 4 pillars based on Pancasila and the 1945 Constitution as the basis of the nation, state, and constitution. The 4 pillars of Indonesia's Vision 2045 are:

- Human Development and Mastery of Science and Technology
- Sustainable Economic Development
- Strengthening National Resilience and Governance

Funding for the development of the Capital City of the Archipelago (IKN) comes from 20% of state budget funds and 80% funded by investors. Most of the development funds are dominated by investors. This makes the government offer various business facilities including licensing, taxation, land concessions, and so on to attract investors. The government has issued a special policy, namely Government Regulation No. 12 of 2023 concerning the Provision of Business Licenses, Ease of Doing Business, and Investment Facilities for Business Actors in IKN. The procurement of the regulation aims to provide certainty, opportunities, and greater participation to business actors in the context of accelerating development in IKN.

### Investasi Penting Tumbuhkan Ekonomi Kaltim, Songsong IKN Nusantara

RESA SEPTY | 14 APRIL 2022 | 9:42AM | PEMBANGUNAN | 805 KALI DILIHT

### Urgensi Pemindahan Ibu Kota Negara

Ayundari  
Selasa, 25 Januari 2022 | 275975

### Tingginya Minat Investor Terlibat dalam Pembangunan Ibu Kota Nusantara

Figure 3.3 News headline

Thus, the timing of development and acceleration of development are aligned and directly proportional. Where the faster the development of IKN is carried out, the more interested investors will be in coming and investing. Conversely, a high amount of investment will accelerate the development process in IKN. This is due to the need for a country to open up investment opportunities which will slowly grow the economy at large. Not only focusing on economic growth in the country's realm but also in the province's realm, namely Kalimantan itself.

The development of IKN in Kalimantan forest is located in the Production Forest. Production forest is a type of forest planted with one type of tree or monoculture. The type of tree planted in the IKN existing area is a eucalyptus tree cut down every 6 to 7 years. Based on the description of President Joko Widodo in his remarks at the IKN Pre-Market Sounding event, the design of IKN will restore the function of forests in Kalimantan as the lungs of the world with heterogeneous forests (Tambun, 2022). The trees planted in this forest will come from native and endemic trees from Kalimantan so it is hoped that the function of tropical rainforests in Kalimantan will return (Hidayat, 2023). Overall, the IKN area reaches 250 thousand hectares with details of 25 percent functioning as public operations, 65 percent restored to its function as a tropical forest, and the remaining 10 percent will be used as food reserve land.

## - Architectural Context

IKN development is a government project that has goals and targets. These goals and targets are the interests of the government that must be achieved appropriately. In this case, the target of IKN development is to achieve an Indonesia Maju 2045 with several indicators, such as economic equality and infrastructure.

Planning IKN requires many things to be considered, one of which is natural conditions. In this context, IKN is located in an area full of trees or state-owned production forests. In the process of data analysis, it is necessary to understand the nature of the forest which takes a long time to grow and develop.

Thus the need for accelerated development at IKN in terms of architecture is divided into 2 aspects, namely the speedy development of building construction and the context of forest sites that take a long time to grow and develop. These two forces are interrelated but also contradict each other. The acceleration needed in development and the slowness of nature in growing and developing are the main conflicts in the development problems in IKN.



Figure 1.5 3D print construction  
(Source: printtimber.org)

## Speedy Development

In the architectural context, the acceleration of development can be addressed by selecting construction planning methods that can help accelerate the development process. The development of IKN is the development of a city area with a very large and massive scope. With the need for accelerated development, the energy and energy required for its completion will be greater. This can be shown by more costs incurred to increase the number of workers, poor quality of work, increased risk of work accidents, and dependence on non-renewable resources. Thus, there is a need for architectural solutions in planning building methods. This supports the interest of acceleration by minimising the losses incurred.

The first method to support accelerated construction is fabrication. In architecture, fabrication is the process of producing structural elements or building components using various manufacturing methods, often using advanced technologies such as digital fabrication or 3D printing. The second method is the modular method in all building components. When designing and erecting structures, the modular method uses prefabricated modules or components that are manufactured off-site and assembled on-site. These modules can be produced and assembled quickly as their sizes and shapes are usually standardised. Overall, architectural modular systems are a contemporary and flexible way to design and construct buildings. The third method is construction using 3D printing, an emerging method in the development of technology that helps human work in saving time and effort. 3D printing allows customisation and adaptation for various architectural projects, from small-scale prototypes to large-scale buildings. The three methods above can be a solution to accelerate development in IKN in fulfilling the urgency of accelerating the relocation of IKN in Kalimantan. It is efficient in saving labour and time but requires careful and measurable planning.



Figure 1.6 Slow growth of nature  
(Source: Author, 2024)

### Slow Growth of Nature

Planning for the development of IKN is done by analysing the location of IKN, namely Kalimantan. This area is often known as the lungs of the world where almost most of this area is forest. Forests function to maintain biodiversity, which is essential for the balance of the global ecosystem and act as a large carbon store, helping to reduce the amount of carbon dioxide in the atmosphere and regulate the global climate. These are the main reasons that forests are so useful for the global ecosystem balance and human well-being.

Forests are slow growing and take a long time to fully function due to complex and diverse natural processes. Slow plant growth rates, soil rehabilitation processes that take time to restore soil fertility and structure, and complex biodiversity that takes time to develop and establish balanced interactions between different species characterise forests. In addition, nutrient cycling, which involves the circulation of nutrients between soil, plants and other living things, also takes a long time to occur and reach a stable balance, and forests take time to provide suitable habitats for various species of flora and fauna, with the formation of complex and diverse forest structures to support sustainable life. Thus, there is a need for architectural solutions that can still maintain the function of the forest in a building.

The existing condition of the IKN location is built filled with greenery in which there are production forests and protected forests. Resident Area

Displacing land that was previously one of the world's lungs.

Land clearing in preparation for the construction of IKN.

IKN (East Kalimantan)

Deforestation

IKN development process

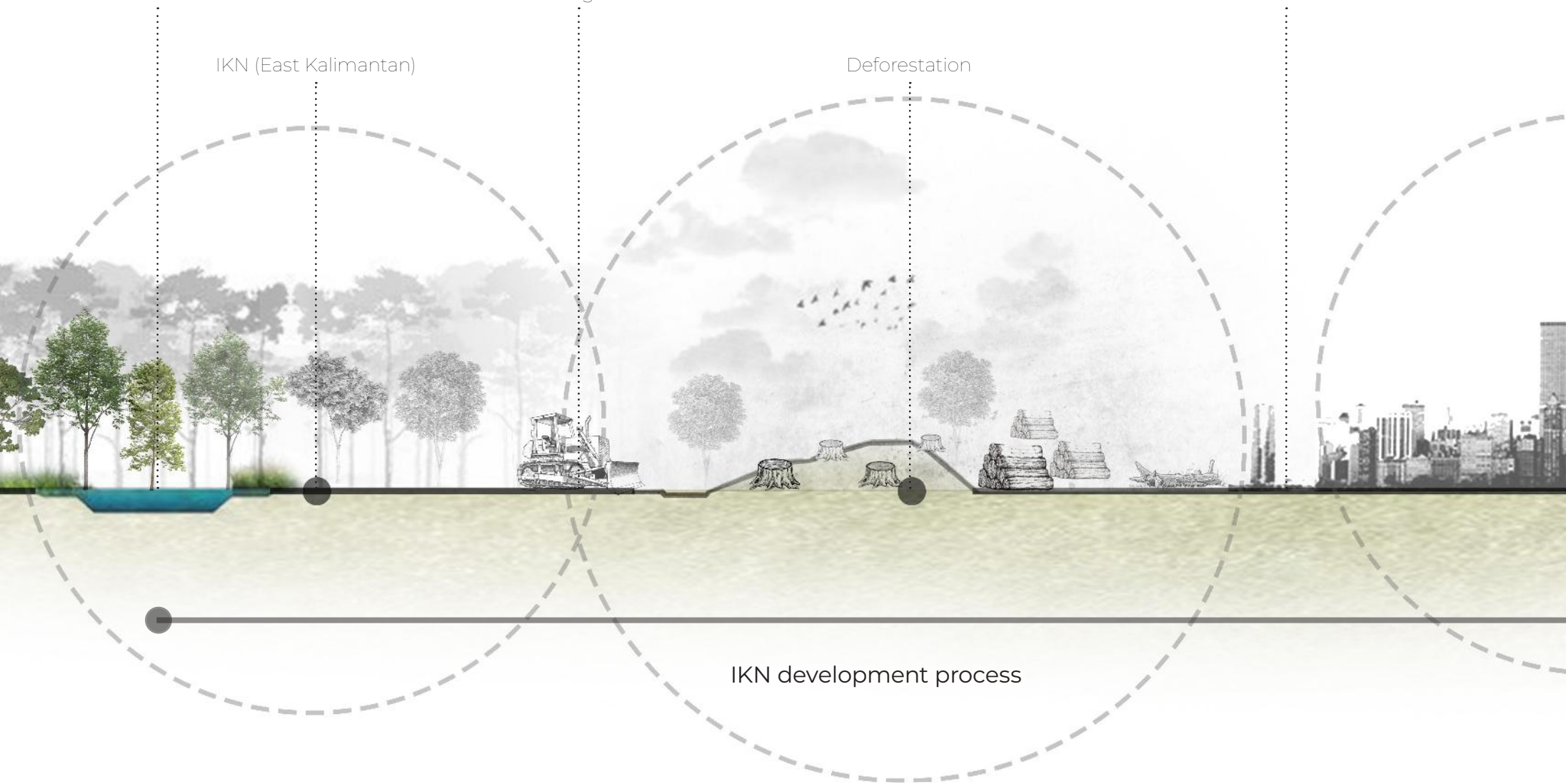
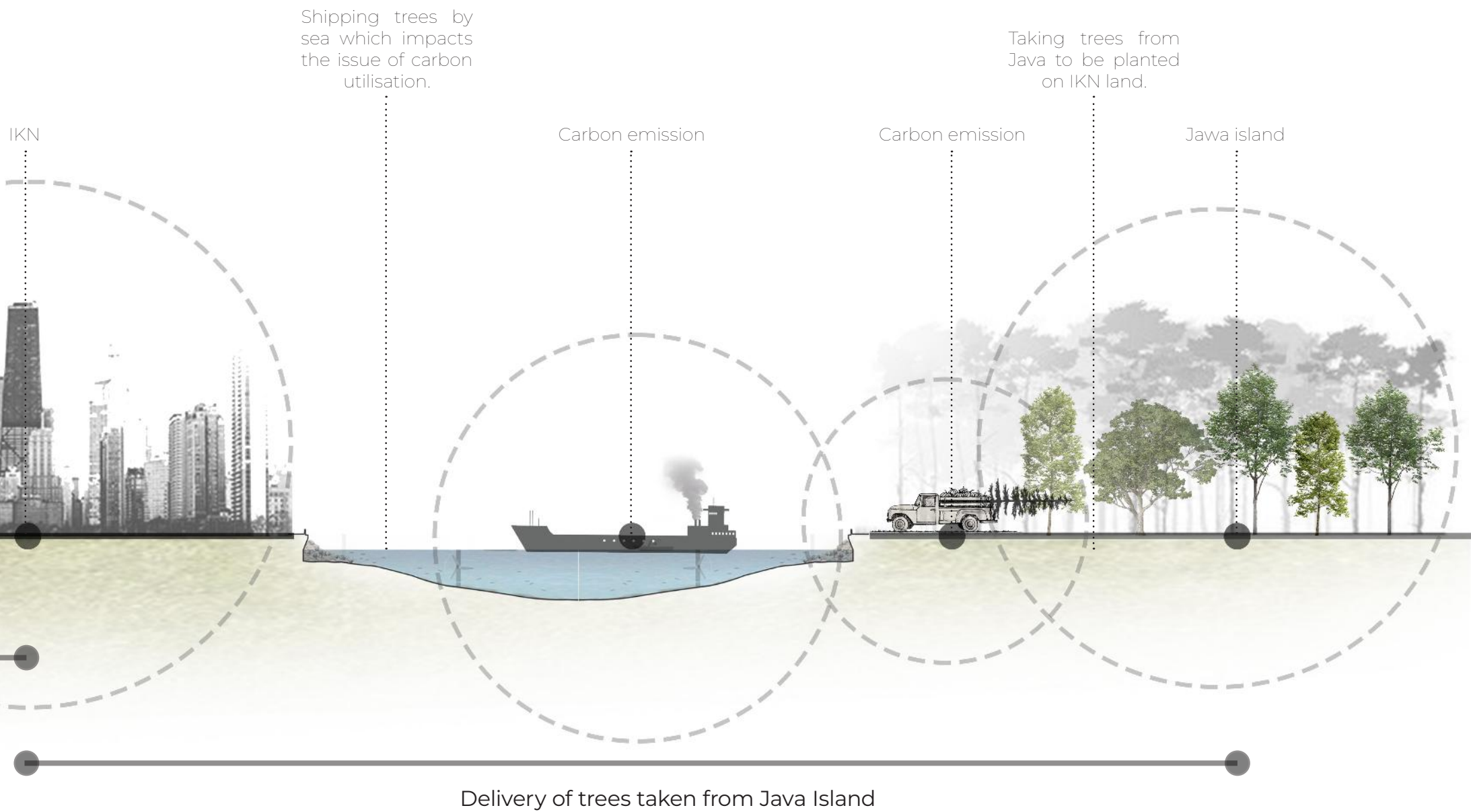


Figure 1.7 Kalimantan deforestation scene  
(Source: Author)



cheme and the use of trees from Java  
 (author, 2024)

## | Exploration of Design Goals

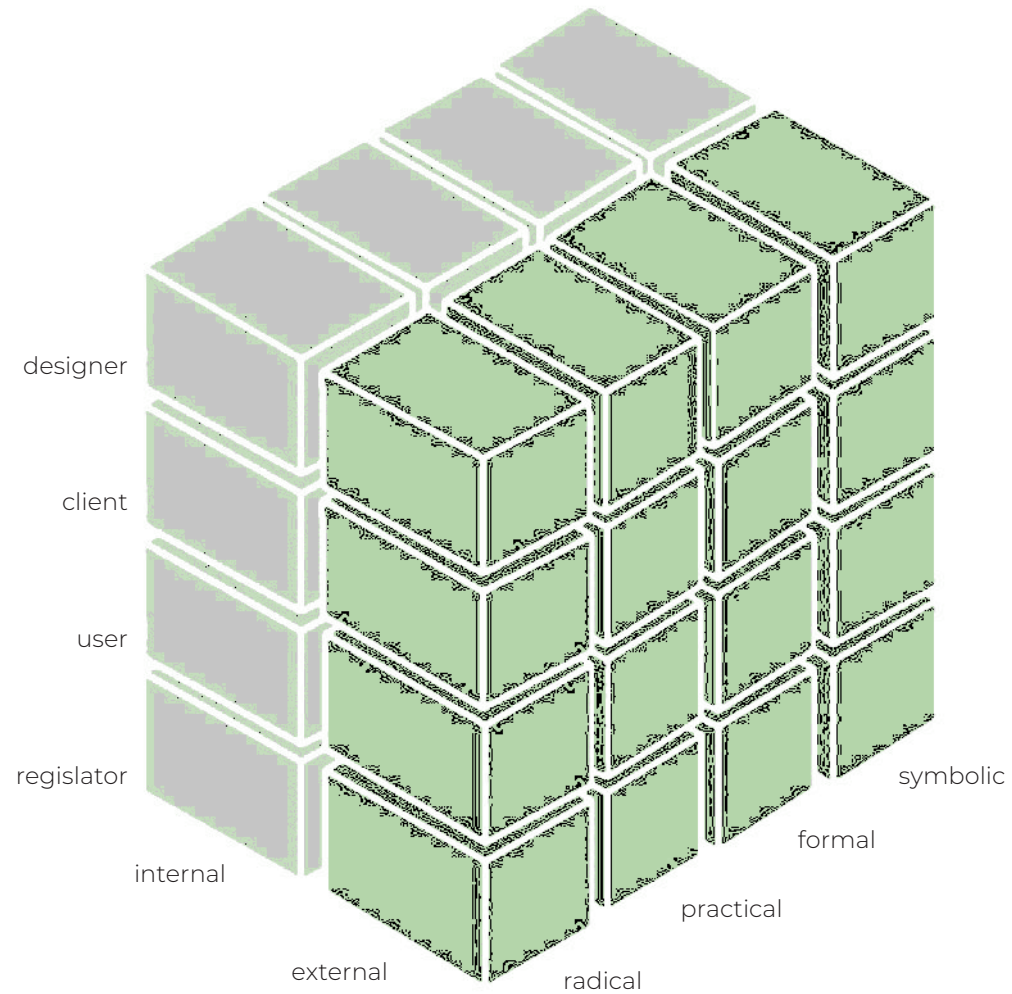


Figure 1.8 Lawsons model of design problem  
(Source: researchgate.net)

Designing community housing that accommodates Civil Administration's (ASN) housing needs and community adaptation in IKN with a Regenerative Architecture approach to restore natural functions by the site context based on the principle of radical indigenism to create a symbiotic mutualism between humans and the surrounding nature that grows in harmony and sustainability.

## **“Brian Lawson Matrix of Design Problem”**

The Design Problem Matrix, developed by Brian Lawson, is an analytical tool that helps architects identify and control the level of complexity associated with design problems. The matrix divides a design problem into identifiable parts: context, aesthetics, and function. By organising the problem systematically, architects can determine which elements are most important, how they relate to each other, and possible conflicts between different parts of the design. This matrix encourages a broad and thorough problem-solving approach. It ensures that all important elements are considered and balanced. This method creates creative solutions, increases the effectiveness and efficiency of the design process, and results in a more mature and integrated architectural outcome.

Reason to use the Brian Lawson Design Problem Matrix to systematically understand and address complex design challenges. This matrix helps decompose a design problem into manageable parts by considering function, aesthetics and context. Architects can identify priorities, relationships, and possible conflicts among various design elements by organising the problem in a structured form. The Lawson Matrix supports a thorough and holistic problem-solving approach, which ensures that all important elements are considered and balanced. This method creates creative solutions, increases the effectiveness and efficiency of the design process, and ultimately results in a more thoughtful and well-integrated architectural outcome.

	Formal Problem	Practical Problem	Symbolic Problem	Radical Problem
<b>Regulation</b> <ul style="list-style-type: none"> <li>- Republic of Indonesia Regulation No 3 Year 2022 about IKN Article 18 Section 3</li> <li>- Regulation of the Head of the IKN Authority No. 1 of 2023 about the Detail Spatial Plan of the Planning Area of the Core Area of the Government Centre of the Archipelago Capital City</li> <li>- Regulation of the Minister of Public Works and Public Housing Number 21 of 2021 concerning Performance Assessment of Green Buildings</li> <li>- Regulation of the Minister of Public Works and Public Housing (PUPR) of the Republic Indonesia number 7 of 2022</li> </ul>	<p>Republic of Indonesia Regulation No 3 Year 2022 about IKN Article 18 Section 3</p> <p>Environmental protection and management as referred to in paragraph (1) includes but is not limited to:</p> <ul style="list-style-type: none"> <li>- establishment of green areas that support environmental balance and biodiversity;</li> <li>- application of renewable energy and energy efficiency;</li> <li>- management of environmentally oriented urban functional areas; and</li> </ul>	<p>Regulation of the Head of the IKN Authority No. 1 of 2023 about the Detail Spatial Plan of the Planning Area of the Core Area of the Government Centre of the Archipelago Capital City</p> <ul style="list-style-type: none"> <li>- FAR maximum 5 (five);</li> <li>- Maximum BCR 70%</li> <li>- Minimum TOD area public open space includes GOS of at least 20% and non-green public open space of at least 10% of the development area.</li> </ul>	<p>Regulation of the Minister of Public Works and Public Housing Number 21 of 2021 concerning Performance Assessment of Green Buildings</p> <ul style="list-style-type: none"> <li>- Site Management</li> <li>- Energy use efficiency</li> <li>- Water use efficiency</li> <li>- Indoor air quality</li> <li>- Use of environmentally friendly materials</li> <li>- Waste management</li> <li>- Waste water management</li> </ul>	<p>Regulation of the Minister of Public Works and Public Housing (PUPR) of the Republic Indonesia number 7 of 2022</p> <p>Provide all user needs with infrastructure, facilities, and public utilities that are harmonious, organized, planned, and sustainable. (urgensi kebutuhan rusun berdasarkan IKN)</p>
<b>Users</b> <ul style="list-style-type: none"> <li>- Civil Administration (ASN)</li> </ul>	<p><b>Site Contextual Design</b></p> <p>The value of housing designs that integrate with the surrounding forest environment to create a harmonious relationship between built structures and the forest landscape.</p>	<p><b>15 Minute City</b></p> <p>The provision of convenient access to amenities to enhance the quality of life for residents and promote a sense of community cohesion.</p>	<p><b>Community Identity</b></p> <p>The provision of shared spaces as symbolic focal points for social interaction, cultural exchange, and collective celebration, strengthening bonds among residents and fostering a spirit of cooperation and mutual support.</p>	<p><b>User Participation</b></p> <p>Explore alternative housing models where residents actively participate in the design, management, and governance of their living environment.</p>
<b>Clients</b> <ul style="list-style-type: none"> <li>- Indonesian's Government</li> </ul>	<p><b>Forest City</b></p> <p>The design that symbolize the principles of sustainability and environmental stewardship as the government's commitment to regenerative architecture and forest conservation.</p>	<p><b>Flexible Design</b></p> <p>The design of community housing that is scalable and flexible to accommodate future growth and changing demographicsto ensure that the development can evolve over time to meet evolving needs.</p>	<p>Community housing designs that symbolize its leadership in sustainability and environmental responsibility that serve as symbolic expressions of the government's commitment to regenerative architecture and carbon neutrality, inspiring citizens and stakeholders to embrace similar principles in their own lives and communities.</p>	<p>Enact policy innovations to incentivize and mandate regenerative building practices in community housing projects.</p>
<b>Designers</b> <ul style="list-style-type: none"> <li>- the Architects</li> </ul>	<p><b>Sustainable Design</b></p> <p>Design a community housing that integrate sustainable landscaping features that complement the architectural design and enhance ecological resilience.</p>	<p><b>Regenerative Architecture</b></p> <p>Utilizing locally sourced materials and construction practices suitable for the forest city environment to minimize environmental impact and promote cultural heritage. Designing resilient infrastructure that can withstand the unique challenges of the forest environment, such as heavy rainfall, humidity, and biodiversity preservation with green infrastructure solutions.</p>	<p><b>Radical Indigenism</b></p> <p>Integrate artistic elements into the architectural and landscape design of community housing to evoke emotional responses and provoke contemplation about humanity's relationship with nature.</p>	<p><b>Biodiversity Resilience</b></p> <p>Embrace a biocultural approach to design that integrates ecological and cultural considerations into every aspect of the built environment.</p>

## - General problem formulation

Based on the background and preliminary study previously described, the following problem formulation was obtained:

### - General problem

How to design housing for ASN that meets the social interaction needs of its users by utilising the surrounding natural context so as to create sustainable growth integration between nature and buildings?

### - Special problem formulation

1. How to design a building using a fast method by integrating nature and surrounding culture as the main solution so that the building is timeless?
2. How to create an appropriate social space by utilising the existing site context?
3. How to apply the context of the surrounding nature with buildings in terms of flora and fauna biodiversity habitat so as to create a symbiotic mutualism between humans, buildings, and nature?

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## - Design goals and benefits

### - Design goals

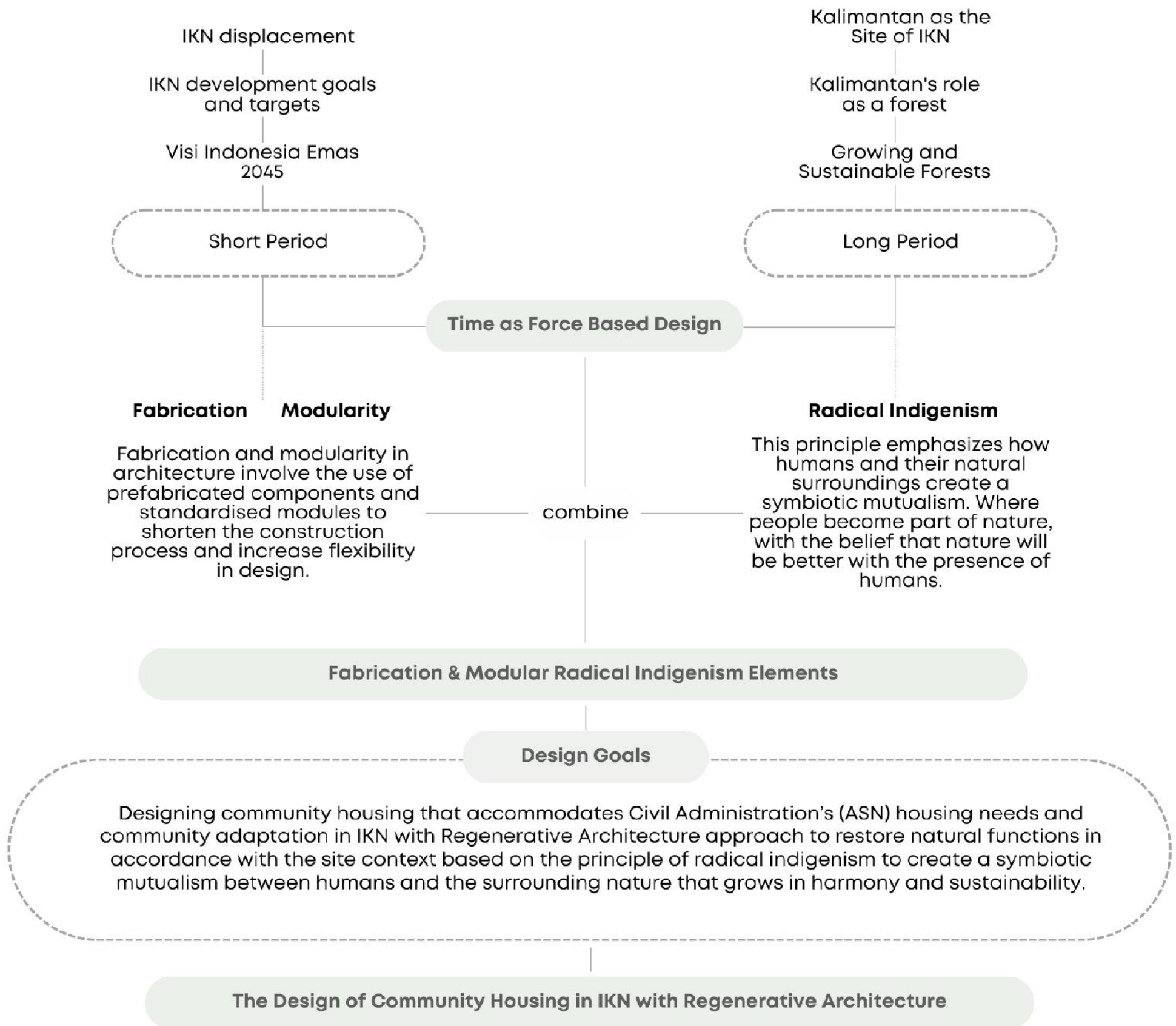
Designing community housing that accommodates Civil Administration's (ASN) housing needs and community adaptation in IKN with Regenerative Architecture approach to restore natural functions in accordance with the site context based on the principle of radical indigenism to create a symbiotic mutualism between humans and the surrounding nature that grows in harmony and sustainability.

### - Design benefits

1. How to design a building using a fast method by integrating nature and surrounding culture as the main solution so that the building is timeless?
2. How to create an appropriate social space by utilising the existing site context?
3. How to apply the context of the surrounding nature with buildings in terms of flora and fauna biodiversity habitat so as to create a symbiotic mutualism between humans, buildings, and nature?

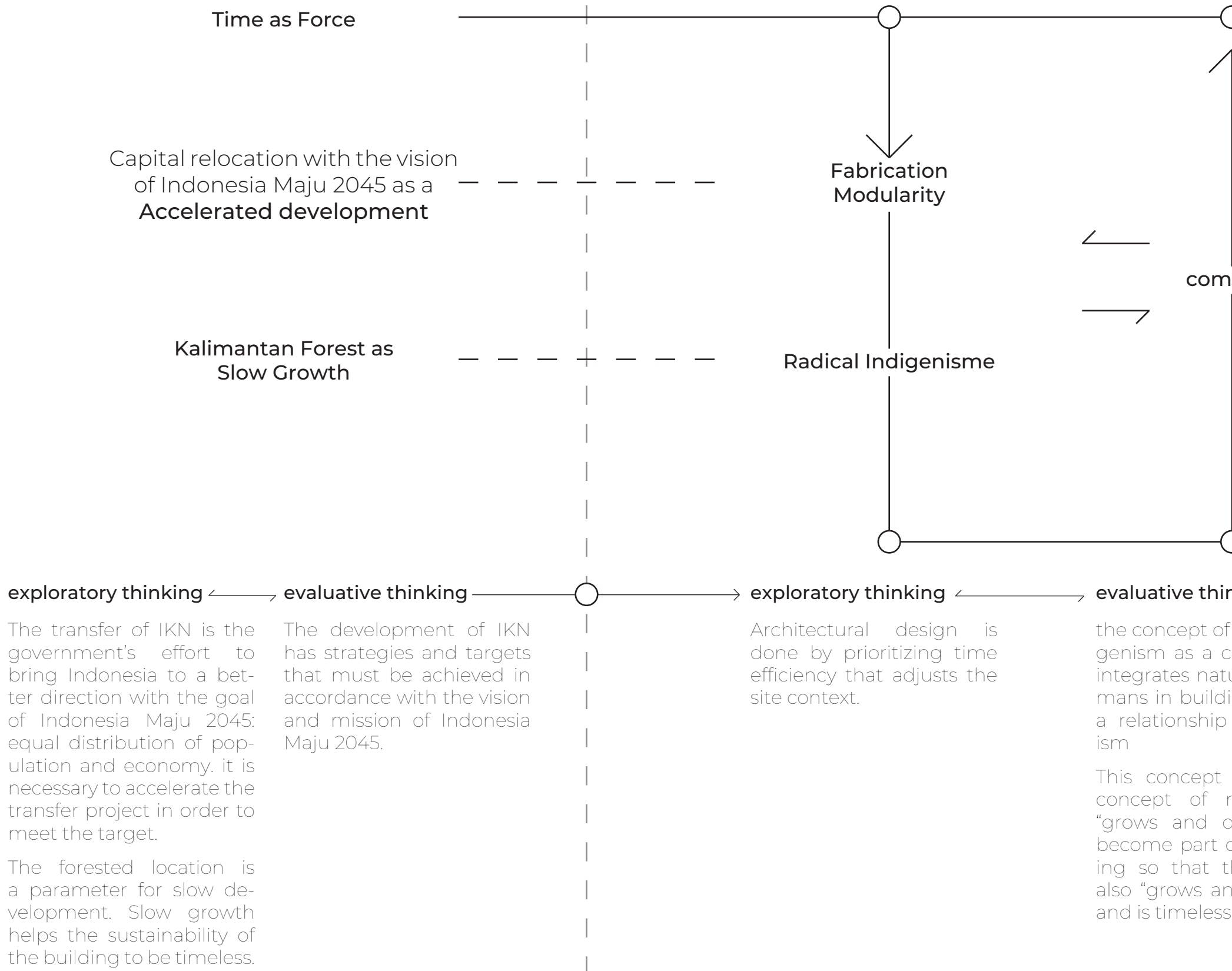
## “Table of Abductive Reasoning”

<b>WHAT</b> Describe “imaginative” building that full the most important design problem in the matrix	<b>HOW</b> Describe the design strategies/framework (pattern, force, and concept-based)	<b>VALUE</b> Describe expected value/additional value, goals with your design
<b>Alternative 1</b> Buildings with rapid construction methods are accompanied by the sustainability of buildings that go hand in hand with the slow growth of nature.	<ul style="list-style-type: none"> <li>· studying the symbiotic mutualism that can be applied to rapid construction methods between nature and humans.</li> <li>· create a prototype building with a certain period in response to each contour height found on the site.</li> <li>· Combine the design with the hill-like contour shape to reach the city in 15 minutes.</li> </ul>	<ul style="list-style-type: none"> <li>· Building a mutually beneficial integration between living things, namely between nature and humans. Sustainability will be created by understanding and responding to each other between the two subjects, uniting the needs of nature and humans.</li> <li>· Buildings that can be travelled through without being an obstacle for people who will pass by. So that the goal of 15 minutes of the city will be achieved even in a contoured site.</li> </ul>
<b>Alternative 2</b> Buildings that study contour heights and existing nature to support accelerated development in the utilisation of existing nature.		

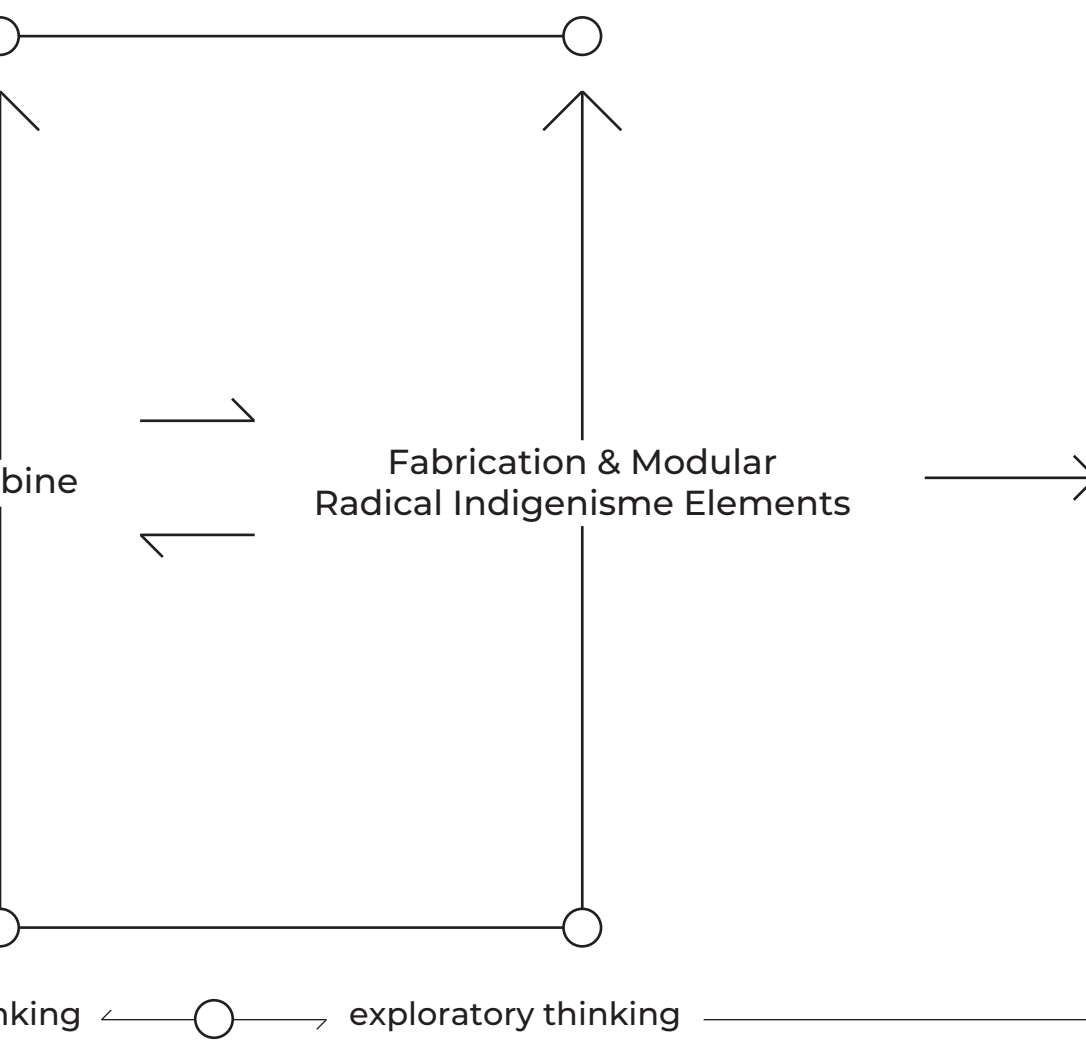


# | Force-Based Design Framework For Housing in IKN

Force-based design framework by Plowright in architecture is a holistic approach that emphasizes the understanding and seismic activity, and internal forces like human occupancy and usage patterns. By comprehensively analyzing these forces, comfort. Plowright's approach integrates principles of physics and structural engineering into architectural design, facilitating the force-based design framework, architects can create structures that harmoniously interact with their environment, adding



management of various forces acting upon structures. This framework considers external forces such as gravity, wind, and architects can develop designs that efficiently distribute loads, enhance structural stability, and ensure occupant safety and creating the creation of buildings that are not only aesthetically pleasing but also functional, resilient, and sustainable. Through addressing both the practical and aesthetic aspects of architecture while prioritizing structural integrity and efficiency.



### Regenerative Architecture as a Concept

Designing **community housing** that accommodates Civil Administration's (ASN) housing needs and community adaptation in IKN with **Regenerative Architecture approach** to restore natural functions in accordance with the site context based on the principle of radical indigenism to create a symbiotic mutualism between humans and the surrounding nature that grows in harmony and sustainability.

To achieve Indonesia Maju 2045, government center housing should prioritize rapid development and adapt to the existing site. This involves efficient time use and integrating radical indigenism principles for a mutualistic relationship with nature, allowing buildings to grow naturally. Implementing green building regulations by the government ensures environmental sustainability and ecosystem balance.

radical indigenism concept that nature, and humans to form of mutual-

utilizes the nature that "develops" to of the building the building "and develops"

strategies and the provision of regulations by the government in the development of IKN which prioritizes the concept of green buildings in an effort to maintain the context of the site in Kalimantan as the lungs of the world.

### evaluative thinking

designing supporting facilities for the government center in the form of housing

rapid development to realize the target of Advanced Indonesia 2045.

design with a system that prioritizes time efficiency and adjusts the site context

application of radical indigenism that integrates nature and humans in buildings so as to create a mutualistic relationship between the two and the building can "grow and develop" following nature.

government strategies in maintaining site context with green building regulations



Figure 1.9 Timeline of  
(Source: AU)



of IKN development  
(author, 2024)

## | Excellency, Originality, & Novelty

### - Title Description

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#### Affordable Students' Accommodation

This project was part of an organised students' competition that involved designing student accommodation facilities for the PAUSTI students in Jomo Kenyatta University of Agriculture and Technology. The challenges within the project included coming up with a design that provided an inclusive atmosphere while at the same time offering variety for the diverse African students enrolled in the Pan African University Institute for Basic Sciences, technology and Innovation. This is incorporated from the planning concepts all the way to the typologies.

(Nicholus, Teddy, Jessicah, 2022)

### - Concept

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Integration of communal spaces to increase interaction among the diverse students. Inverted design that maximizes on internal views, to ensure privacy among its residents. Utilization of local materials and the contextual brick clad to fit.

### - Difference

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Different approaches and target users

#### The Future Habitate Towards a Future Architecture

A prototype that can fit up to 100 occupants (including individual and family unit) to ease a better living quality and enable self-sustainable life in the future. With the support of data analysis which shows that human population growth will reach more than 10 billion in 2100 years. Humans will face a challenge of limited (since more land was needed to provide or produce food). Design an artificial habitat with at least hundred occupants instead of individual capsules to solve the issues being foreseen. The design of an artificial habitat will be based on specific spatial and function details. Green sustainable architecture and intelligent technology innovation.

(Diaa Ragab, 2018)

The future habitat development encompasses a vision to transfer the former construction technique to a faster, cost-saving, and easier proposal scheme that will provide:

- flexible and extendable new home
- new public transport interchange
- super farm
- new community facilities
- sky park
- automatic parking system
- reserve environment

Different concepts, building typologies, and target users

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## Groenmarkt Housing

The Groenmarkt initiative originated from a competition organized and evaluated by the city of Amsterdam in collaboration with its residents. The two recently constructed residential blocks are independent structures that form a secluded, car-free square within the neighborhood. The apartment block located on Marnixstraat is designed in harmony with the nineteenth-century protected cityscape concerning its materials and details. It comprises four apartments and features a compact commercial area on the ground floor. Access to all apartments is provided from the ground floor, each with its entrance situated along Marnixstraat. (Bastiaan, Buro, Ronald, 2022)

The residential complex situated along the Singelgracht embodies a modern and transparent architectural design. Departing from the conventional nineteenth-century enclosed building style of Amsterdam, this structure is innovatively transformed to embrace a green and informal character. Primarily emphasizing sustainability and prioritizing the well-being of people, plants, and animals, the building features its main entrance on the side facing the square. The ground-floor apartments are designed as semi-submerged maisonettes, each with an independent front door and outdoor spaces located on either the street or square side.

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Different concepts, and target users

## Eden District

The primary criterion emphasized was the elevated standard of living. The individual residences were required to exhibit superior quality, featuring optimal orientation and proportions. Moreover, a broad range of housing options was essential, particularly to support and maintain families within the urban setting. The objective was to create a block with a maximum number of entrance points along both the water-side and street level. The enclosed courtyard was designed to create a striking juxtaposition with the rugged character of the pier and the expansive waters of the Maas. (Arons, Gelauff, 2022)

Along the waterfront of the Schiehaven, crafted a segmented structure, reminiscent of a warehouse, featuring a classic configuration comprising a base, middle, and top, all infused with a contemporary aesthetic. The entire base is dedicated to two-story maisonettes, each opening up to a communal garden at the center. For the middle segment, we designed triplets: a staircase with three residences on each of the nine floors. This layout offers spaciousness, allowing homes to enjoy panoramic views in various directions. The residences along Loods Bali and Loods Borneo streets feature 'Maas-windows,' bay windows providing scenic views of the Maas.

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Different concepts, and target users

# 02

## II | exploration of design approach

Time as the Key Factor in the Development of IKN

Economic Transformation

Investment

Environmental Issue in Jakarta

Ibu Kota Nusantara (IKN)

Kalimantan as the Lungs of the World

Location of IKN in Kalimantan

Forest Land Destruction as Government Solution

## | Modularity for Housing

Community Housing is a concept in architecture and urban planning that emphasizes the development of homes and residential neighborhoods that strengthen and promote social interaction, community well-being, and environmental sustainability. The main focus is not only on the physical structure of the houses themselves but also on the way the houses are organized and connected in a functioning community. Everyone has the right to live in physical and spiritual prosperity, to have a place to live, and to have a good and healthy environment. (Constitution Article 28H paragraph 1) Creating spaces that can be connected in creating interaction within them.

This time it is focused on optimizing the provision of housing for civil administration (ASN) working in the capital city (IKN). This building will be made a middle-rise building to maximize land use and can accommodate all of the workers who will be moved and live there. To create an environment that can make workers easily adapt community housing becomes a place for them to fulfill their social needs. There are several important points regarding several things that must be considered in designing community housing, some of which are:

- Community engagement in projects  
Community consultation during the design phase, involvement of elders, design for manufacturing and assembly, use of local materials in construction, emphasizing a fair and competent process for local engagement rather than too much focus on outcomes, and a free-goal evaluation approach for evaluating local engagement
- Longevity and durability of buildings  
Reducing domestic violence through community involvement in engineering, construction, and vocational training; culturally appropriate designs; accessibility and affordability of repair resources; reduction of maintenance job delays; improved resource allocation and logistics; use of masonry materials; additional wall reinforcement; avoidance of steel frames; application of internal and external lining on walls; and, if practical, adoption of the temporality concept from Indigenous worldview.
- Retaining young people in communities  
Share a family's income and responsibilities, offer construction-related training sessions in your community, and maintain a flexible work schedule.

- Environmental integrity and carbon emission reduction  
Employing hydrogen to restore solar energy, utilizing reusable modular construction elements, creating local solar farms as opposed to standalone solar energy systems, employing renewable energy in transportation, keeping an eye out for new insulation solutions, lowering heat transfer from the roof and exterior walls, increasing structural flexibility, wattle and daub, reducing dependency on air conditioning, and providing general maintenance training to a local cluster of communities.

### Goals specific to planning and building design.

- Culturally aligned design  
Designing with sustainability in mind, decentralizing the key elements of a home, situating elderly people close to caregivers but away from the noise, designing around a central open or covered cooking area, opening up walls to the breeze, bringing family conflicts into the open, incorporating Indigenous spirituality and religious beliefs into the design through totemic design, etc.
- Resilience against the effect of climate change  
Lowering the reliance of communities on groundwater, utilizing fire-rated cladding, enhancing internal and external wall insulations, employing elevated building designs in flood-prone areas, and taking a greater safety factor into account when designing for the effects of fire and floods.
- Thermal comfort and energy efficiency  
Utilizing large eaves, and airways in the design, shrinking windows on the building's north side, orienting windows toward the wind, taking into account a veranda on that side, employing cool room-style materials for external walls and ceilings when feasible, lowering reliance on electrical cooling systems.
- Flexibility  
Consisting of outdoor spaces and yards, covered plazas, decreasing interactions between and within systems, enhancing physical accessibility, oversized slabs and eaves, and using off-site modular building.

### Phased installation/construction and simplified demolition

In the realm of architectural design and construction, anticipating and incorporating potential future alterations, whether they involve additions, modifications, or even demolitions, is paramount. This foresight enables architects and builders to create structures that are not only functional and aesthetically pleasing but also adaptable to evolving needs

and circumstances. By integrating flexibility into the initial design phase, such as incorporating modular components or utilizing easily reconfigurable spaces, buildings can more effectively accommodate future changes without requiring extensive renovations or reconstructions. Moreover, advancements in construction technologies, such as 3D printing and prefabrication, offer opportunities to streamline the process of implementing alterations, minimizing disruption and maximizing efficiency. Ultimately, by embracing a forward-thinking approach to design and construction, architects can create buildings that not only stand the test of time but also evolve alongside the communities they serve. (Rajabipour, 2023)

An example can be seen in DIPL's modular floor plan space function arrangement. The modular plan allows for the addition of new rooms in the future with minimal changes to the roofline.

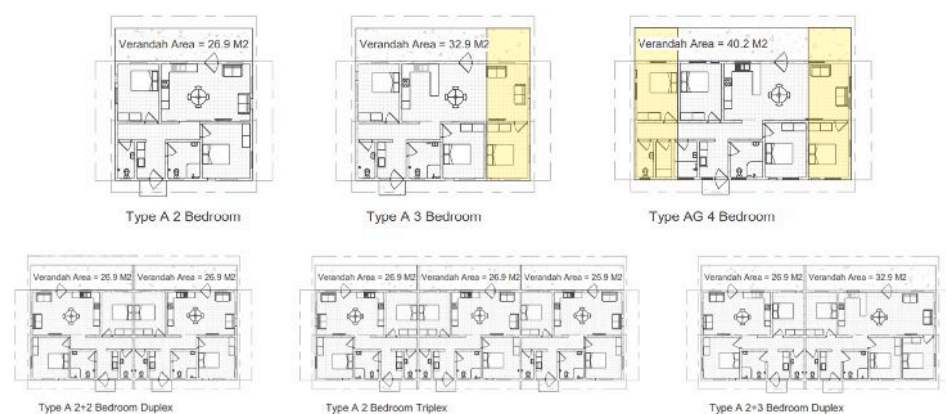


Figure 2.1 Module of plan  
(Source: Suryo, 2017)

The modular plan's inherent flexibility is particularly advantageous, as it permits the seamless addition of new rooms in the future while necessitating minimal adjustments to the existing roofline. This adaptability underscores the strategic foresight embedded within the architectural design, enabling spaces to evolve organically in response to changing needs or circumstances without compromising the overall integrity of the structure. By embracing a modular approach, architects can effectively future-proof buildings, ensuring they remain versatile and accommodating to the evolving demands of their occupants over time. Such foresight not only enhances the longevity and functionality of the built environment but also fosters a sustainable and responsive architectural ethos, capable of meeting the diverse needs of communities both now and in the future.

## | Regenerative Architecture

### Introduction

Based on the analysis that has been done on the issue and existing conditions, the regeneratif architecture approach is the solution to the problem. Regenerative architecture is an emphasis on approaches that aim to be able to create new mutually reinforcing relationships between humans and nature by utilising related technologies. This approach is considered the highest architectural design concept in terms of positive productivity towards the environment, that is, sustainability aims to minimise the destruction of nature and the environment. Therefore, there is a need for a change in mindset in producing regenerative designs that not only aim to minimise damage, but also create designs that contribute to keeping ecological systems healthy and productive. (Naboni et al., 2019)(Baper et al., 2020)

In considering the impact that architecture has on nature, the regenerative approach of architecture adapts currently available technologies with the aim of not generating negatively impacting waste but instead generating positive waste by integrating the physical properties of architecture with nature (soil, native plants, and neighbourhoods). This represents an important rethinking in architectural planning by controlling energy use, water, carbon emissions, and reducing waste generation. (Zari and Jenkin, 2010) Raymond J. Cole argues in his publication Sustainability: Restorative to Regenerative which explains the position of regenerative design.

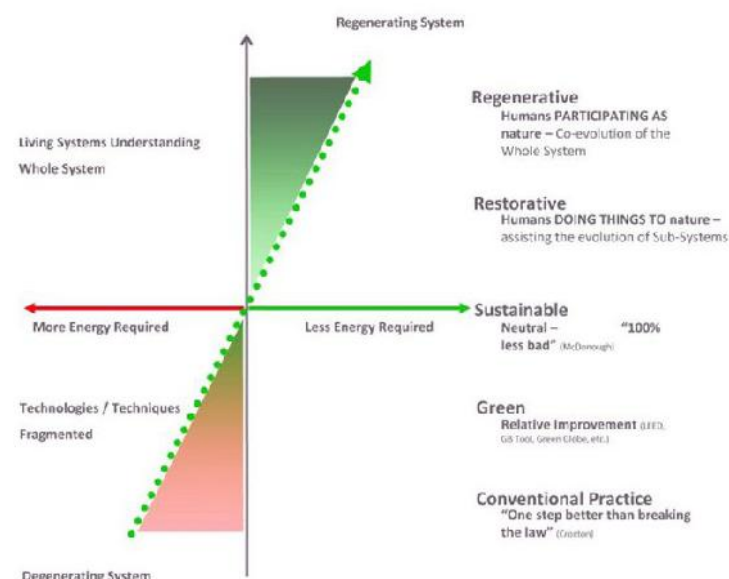


Figure 2.2 Regenerating system  
(Source: ribaj.com)

In planning buildings using a regenerative architecture approach, there are several factors that can support the success of regenerative architecture. There are 10 factors supporting its success, namely energy generation, water purification, thermal properties, local material sources, water management, non-toxic materials, limits to growth, building integrated agriculture, habitat exchange, and indoor environment. Each of these factors has parameters that are indicators of the successful application of the regenerative approach.

Figure 3.3 Flower cultivation  
(Source: setkab.co.id)

Factors	Possible Values
1 Energy Generation	Non-renewable-energy building
	Near-zero-energy building
	Net-zero-energy building
	Near-positive-energy building
	Net-positive-energy building
2 Water Purification	Non-reusable water purification
	Partial water purification
	Neutral water purification
	Near-positive water purification
	Positive water purification
Thermal properties	Material U-values higher than 0.13 W/m <sup>2</sup> K
	Material U-values between 0.1 and 0.13 W/m <sup>2</sup> K
	Material U-values less than 0.1 W/m <sup>2</sup> K
Local material source	Project material selection does not apply place-based
	Less than 10% sourced from 800 km
	10%–20% material construction budget sourced from 800
	20%–30% material construction budget sourced from 500 km
3 Waste management	More than 20% sourced from 500 km
	Open-loop waste managing
	Closed loop with zero waste management
	Closed loop with net-positive waste management
Non-toxic material	All project materials contain chemicals on the red list
	75% of project materials contain chemicals on the red list
	50% of project materials contain chemicals on the red list
	25% of project materials contain chemicals on the red list
	Project free from red-list material

Factors	Possible Values
Limits to growth	Project fully built on previously unused land
	25% of the project built on previously used land
	50% of the project built on previously used land
Building integrated agriculture	75% of the project built on previously used land
	Project fully built on previously used land
	Project does not achieve urban agriculture requirement zone
	25% of project achieves urban agriculture requirement zone
Habitat exchange	50% of the project achieves urban agriculture requirement
	75% of the project achieves urban agriculture requirement
	100% of the project achieves urban agriculture requirement
Indoor Environment	Project does not protect the ecosystem with zero offset area
	Offset area 75% lower than the developed area
	Offset area 50% lower than the developed area
	Offset area 25% lower than the developed area
	Project fully protects the ecosystem with 100% offset area
5 Indoor Environment	Project does not achieve regenerative requirements
	Project achieves regenerative requirements

In conventional practice it is seen that regenerative design is an advanced stage of design in conventional practice, green building design, sustainable design, and restorative design. Whereas regenerative design does not only focus on restoring ecosystems to their original state but can design systems and strategies so that humans and nature can thrive together creating a mutually beneficial relationship. Humans become part of nature, and vice versa (Mang & Reed, 2015). The regenerative approach changes the human view of nature, which previously saw nature only as an object but now becomes a relationship. The relationships created are integrated and can be measured or weighed, but can be mapped (Duarte, 2015).

Figure 3.3 Flower cultivation  
(Source: setkab.co.id)

Principles in Organic Architecture	Explanation	Source
Building as nature	Inspiration and Adaptation of design from properties that exist in nature	(Brestianto & Noerwasito, 2019)
Continuous present	The design is sustainable, not just designed for the moment.	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)
Form follows flow	It dynamically follows the energy flow of nature and its surroundings. In this case, nature is wind, heat, earth energy, water currents, etc.	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)
Of the people	Form and structural design based on the function and needs of humans as users	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)
Of the hill	The relationship between the design and the natural surroundings needs to be harmonious and blend in with the context.	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)
Of the materials	The use of materials needs to be considered in terms of colour, locality, and suitability of use.	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)
Youthful and unexpected	The existence of a strong character that is attractive and engaging	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)
Living music	Dynamic in nature and able to adjust harmony to the rhythm of the form, site, and overall proportions	(Brestianto & Noerwasito, 2019; Raza & Anisa, 2022)

There are three core aspects fundamental to mapping and applying regenerative design practices: (Brestianto & Noerwasito, 2019; Mang & Reed, 2015), comprehending the specific characteristics and patterns of a location, crafting designs that align harmoniously with the essence of the place, and fostering a symbiotic relationship between human intervention and the environment, known as Co-Evolution.

### Designing for harmony with place

In this aspect, it is important to understand how the design can adapt and co-exist with the existing natural conditions. In this context, elements such as the selection of technology and materials, construction methods, implementation, and maintenance must take into account the essence of nature. An architectural concept relevant to this aspect is organic architecture, which refers to architectural designs that are partially or fully inspired by the forms and principles of nature. According to David Pearson there are eight (8) basic principles in organic architectural design as described in the table below, namely:

### Designing for Co-Evolution

In this aspect, it is important to understand how design has the ability to evolve over time, able to grow and develop gradually over time. The regenerative approach in design maintains the dynamic potential for continuous evolution. In this context, design is expected not only as a temporary solution to the problem of environmental degradation, but also as a step towards better change in the future.

### Understand the place and its unique patterns

It is important to recognise how design can develop and mature over time, constantly evolving and adapting. A regenerative approach to design maintains its capacity for sustainable development. In this framework, design is not only a short-term solution to environmental problems, but also a catalyst for sustainable positive change in the future. An understanding of location not only provides knowledge of how existing conditions exist, but also reveals hidden things that would not be known by studying them alone. The behaviour of nature is an important aspect of regenerative design, but the behaviour of people created by their culture and belief in their ancestors is also important in maximising the understanding of the site context. This will result in a symbiosis that benefits both humans and nature as living things.

## | Radical Indigenism as Design Approach

Radical indigenism, as articulated by Julia Watson, refers to a design philosophy and approach that prioritizes indigenous knowledge systems, sustainable practices, and traditional ecological wisdom in contemporary architecture and urban planning. Watson, a landscape designer and academic, explores this concept extensively in her work, particularly in her book *Lo-Tek: Design by Radical Indigenism*. Here are the key elements of radical indigenism according to Watson:

**Celebration of Indigenous Technologies:** Watson highlights the advanced and sustainable technologies developed by indigenous peoples over centuries. These technologies, often overlooked by modern society, are highly adaptive and sustainable, demonstrating a deep understanding of local ecosystems and natural resources.

**Sustainability and Resilience:** Indigenous practices are inherently sustainable, as they have evolved in harmony with the environment. Watson argues that incorporating these practices can enhance the resilience of modern cities and communities, particularly in the face of climate change.

**Cultural Heritage and Knowledge:** Radical indigenism emphasizes the importance of preserving and integrating indigenous cultural heritage and knowledge systems into modern design. This involves recognizing and respecting the intellectual property and contributions of indigenous communities.

**Decolonizing Design:** Watson's approach advocates for a decolonization of design practices, challenging the dominance of Western paradigms in architecture and urban planning. It calls for a more inclusive and diverse perspective that values and incorporates indigenous ways of knowing and being.

**Innovative Applications:** The book *Lo-Tek* showcases numerous examples of how indigenous technologies can be applied in modern contexts. From the living root bridges of India to the floating gardens of Bangladesh, Watson presents these systems not just as historical artifacts but as viable solutions for contemporary environmental and social challenges.

**Collaborative Practices:** Radical indigenism encourages collaboration between designers, architects, and indigenous communities. This collaboration ensures that indigenous voices are central to the design process and that their knowledge is applied ethically and effectively.

By advocating for radical indigenism, Julia Watson challenges the conventional boundaries of design and architecture, urging a shift towards more sustainable, resilient, and culturally inclusive practices. Her work underscores the value of learning from indigenous wisdom to address the pressing ecological and social issues of our time.



Figure 2.3 Lo-TEK work with nature  
(Source: archdaily.com)

## - Nature as a Building Elements

*Julia Watson, Indigenous Technology, Regenerative Agriculture*

# Lo-TEK

**(Lo)cal + (T)raditional  
(E)cological (K)nowledge**

We are beginning to understand a great irony of climate change: that the people most affected by it often did little to cause it. What is rarely talked about is that many of these people also have the technologies, philosophies and knowledge that could prevent rising temperatures, uncontrollable forest fires and dying coral reefs.

They are people like the Khasi tribe in Meghalaya, India - known as the wettest place on earth - who have solutions to deal with heavy rains and monsoons: They have trained rubber fig trees to grow across rivers. Over the decades, its massive roots have grown, spread and strengthened into the only bridge - natural or otherwise - capable of withstanding surging water levels and violent storms.



Figure 2.4 Lo-TEK by  
(Source: Wa

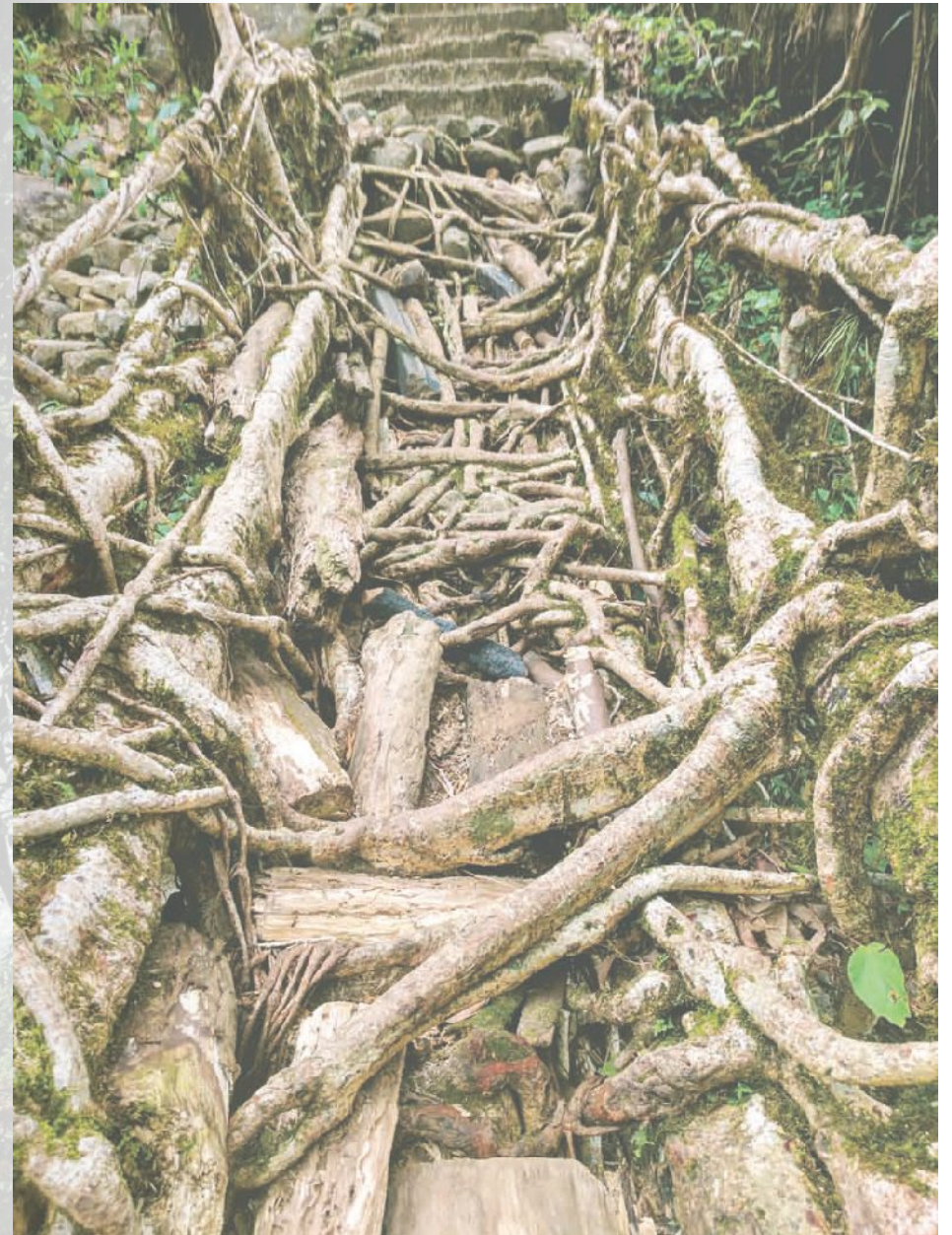


Figure 2.5 Radical indigenism  
(Source: Watson, 2019)

a deep symbiotic mutualistic relationship with their environment. They see themselves as part of the environment, not separate from it, and thus have no desire to harm it. (In many cases, nature is better off because of them—something no Westerner can say about their environment). There is often spiritual significance in their land as well: The rubber fig tree is sacred to the Khaxis, for example, and the Kayapo believe their ancestors learned from bees, so they have beehives that produce honey, pollinate their crops, and maintain biodiversity in the Amazon. (As bee colonies disappear around the world, Watson calls their approach “an inspiration for designers on how to collaborate with nature.”)

Process of Making Natural Bridge from Bamboo



Figure 2.5 Process of work with nature  
(Source: Watson, 2019)



Figure 2.6 Radi  
(Source: Wa



*“— a design movement to rebuild an understanding of indigenous philosophy and vernacular architecture to generate sustainable, climate resilient infrastructures. . . expanding the definition of contemporary technology.”*

This radical thinking emerges in response to the harmony of fellow living beings who can co-exist and complement each other. Limitations in the advancement of technology and knowledge are not an obstacle for them, thus triggering them to make the most of their surroundings. Maintaining and utilising knowledge from their ancestors by maintaining culture and utilising it to meet daily needs. Nature, which was previously only considered as a container or material, now goes hand in hand with humans and provides mutual benefits for both, creating a symbiotic mutualism. Nature that provides benefits in the long term and humans who need nature in the long term can complement each other and create things that sometimes for people who follow the times are unthinkable.

- Nature as a Form Inspiration

*Julia Watson, Indigenous Technology, Regenerative Agriculture*

# Zentrum Paul Klee

east Bern - Schosshalden vicinity

**Paul Klee's grave**

Zentrum Paul Klee is a museum designed by renowned Italian architect Renzo Piano dedicated to artist Paul Klee. The three hill-like buildings have different functions on each hill. With the Creaviva children's museum, the north hill is used for practical art education and there is an auditorium with acoustically perfect space. The center hill consists of two exhibition halls with an area of approximately 2,400 m<sup>2</sup>. The South Hill houses the administration and research facilities with a large library and archive.

Figure 2.6 Zentrum paul klee  
(Source: Archdaily.com)



The three hills are connected by the freely accessible Museumstrasse, which runs parallel to the highway - the highway, which abruptly abuts the building plot with a deep incision, was deliberately included in the project by Piano as a “life-line of civilization”. The existing conditions of the site being already hilly, Piano took the right steps in harmonizing its environmental conditions. On the other hand, the shape of the building that blends into the land makes the entire area fully accessible. Without any building barriers, the building instead becomes a link that can be accessed in its entirety. This really illustrates how the architect can harmonize the building with the surrounding conditions, so that without reducing the functionality of the building it actually has a positive impact on both.

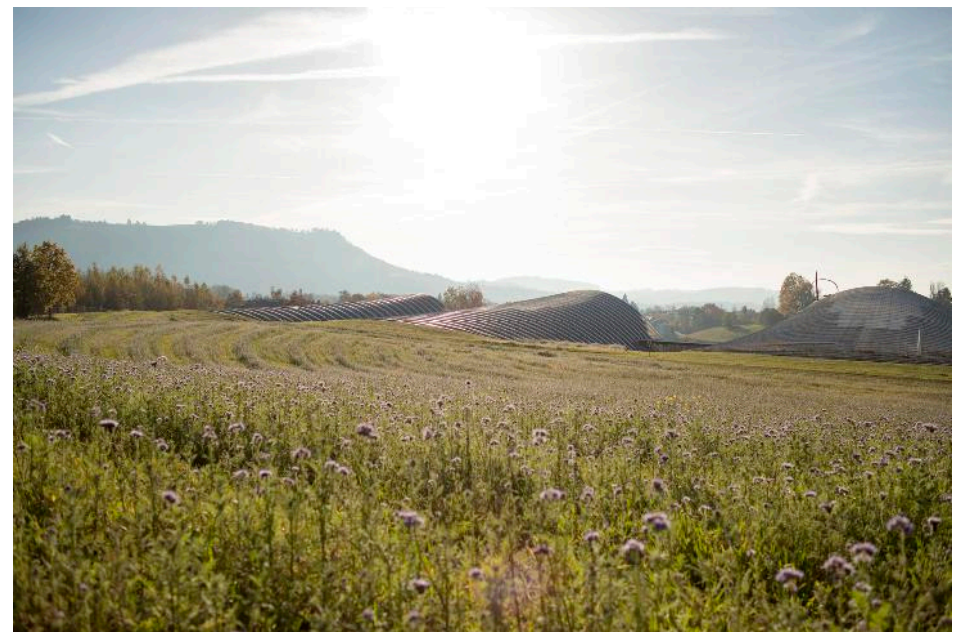


Figure 2.7 Exterior view of Zentrum Paul Klee Bern  
(Source: zpk.org)



Figure 2.8 3d model of building  
(Source: dfabnus.wordpress.com)

## - Nature as an Integration

*Social Spaciousness: MVRDV Reimagines the Future of Co-Living, Geneva, Switzerland*

Architect: Nour Fakharany

Year: 2024

MVRDV undertook a new design study that explores how communal living can help shape the future of housing. The study introduces a comprehensive study that explores various typologies, aiming to revolutionize communal living and vibrant neighborhoods. The study addresses the needs of modern housing, including flexibility, sustainability and community, while addressing issues of climate crisis and affordability. It offers customized solutions for a variety of co-living projects, catering to different demographics and lifestyles.

The current global housing crisis underlines the importance of innovative approaches. In the UK, where housing shortages are impacting social and environmental challenges, conventional solutions have failed. In fact, the MVRDV states that old models “cannot remedy the shortage or create enough affordable homes, or address the need for community or ameliorate loneliness.” The study seeks to address these challenges, by addressing how “we work, play and travel.”

*“— In addressing the needs of the housing sector, we looked closely at how society is changing – topics such as the increase in single households and loneliness, and a lack of community. The ideas we present in this book put co-living schemes on the agenda as vibrant points for their neighborhoods and cities by inviting the public in, not shutting it out. -- Winy Maas, MVRDV founding partner”*





Figure 2.9 Future of Co-living  
(Source: archdaily.com)

# Stacked Village

The stacked village explains that all kinds of environmental and human needs are already met in it. Each function space complements each other in meeting the needs of users and other habitats.

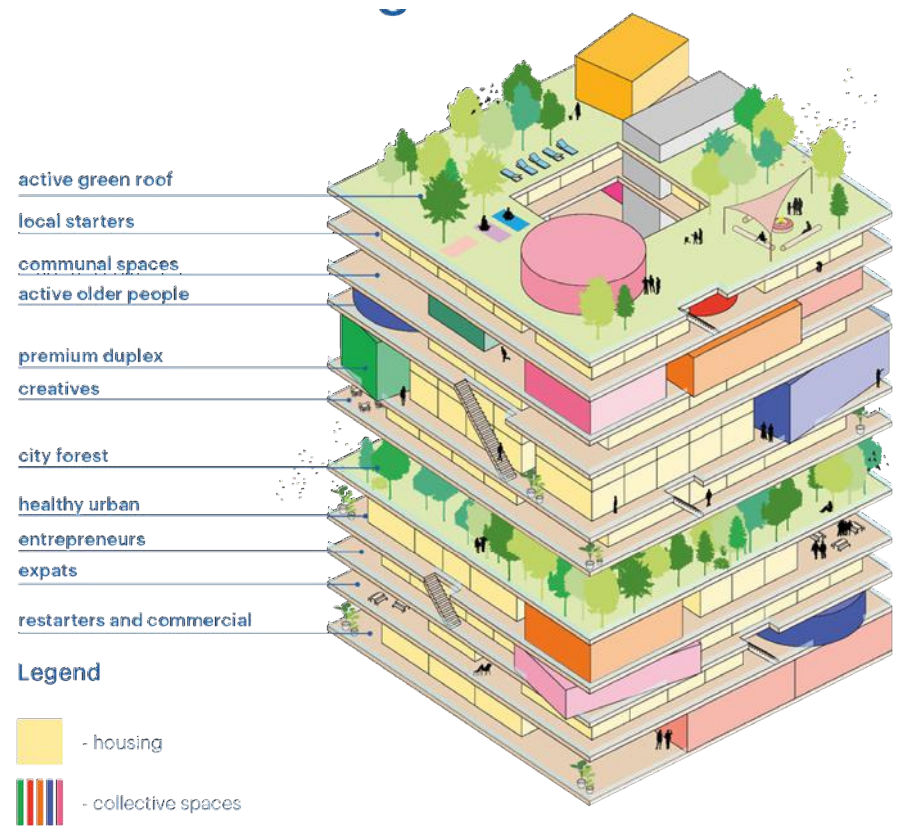


Figure 2.10 Future of Co-living  
(Source: archdaily.com)

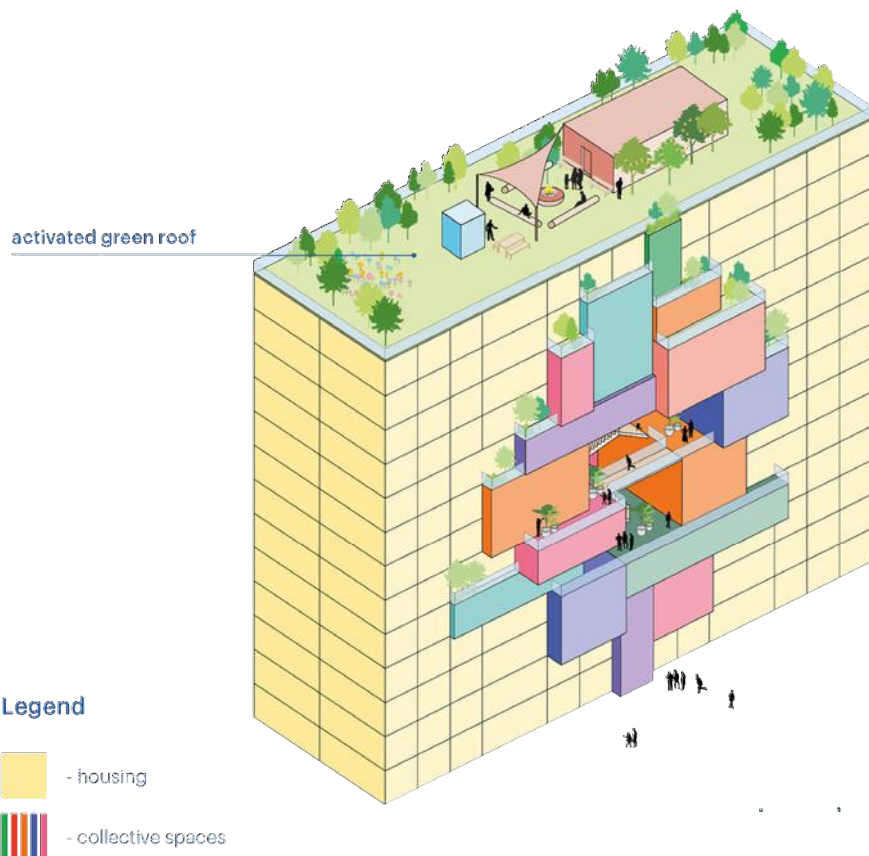


Figure 2.11 Vibrant hearth  
(Source: archdaily.com)

# Vibrant Hearth

Communal spaces that foster interaction, offer amenities beyond individual residences, and foster stronger community bonds are fundamental to this idea. They demonstrate how co-living complexes can cater to diverse communities by integrating communal living, socializing, and working areas to enrich the overall ambiance. The research presents a diverse array of architectural models, spanning from innovatively designed new developments to repurposed existing buildings, all aimed at promoting inclusiveness and community involvement.

# Biodiversity Tower

The tower functions as a vertical garden for both animals and plants. While the animal habitat remains out of reach for humans, the vertical spiral provides a distinct green terrace for human residents.

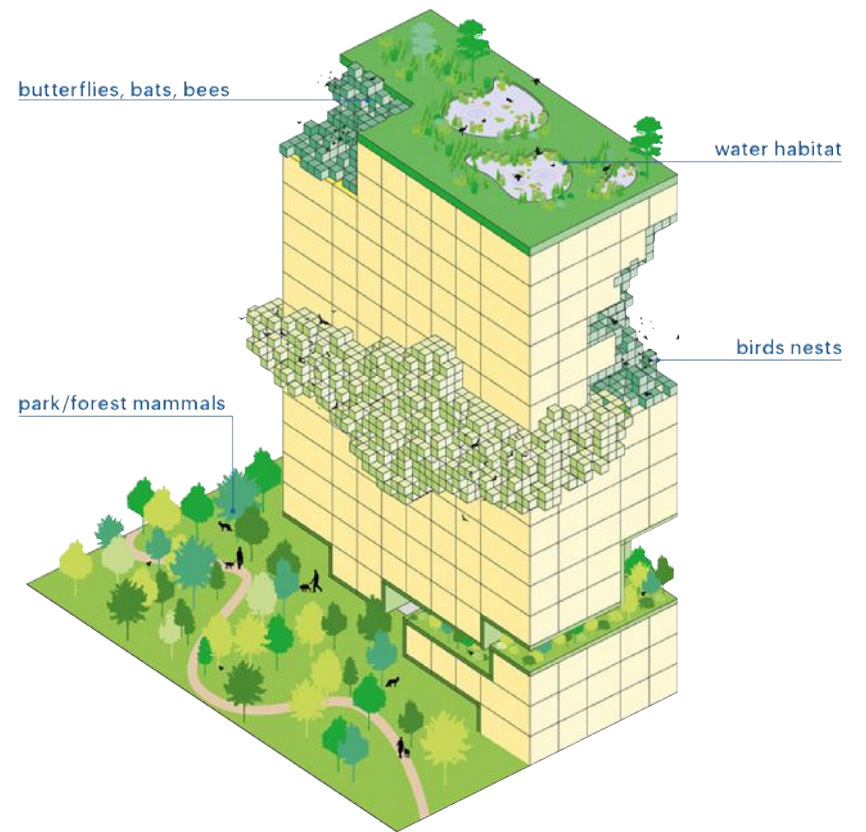


Figure 2.12 Biodiversity tower  
(Source: archdaily.com)

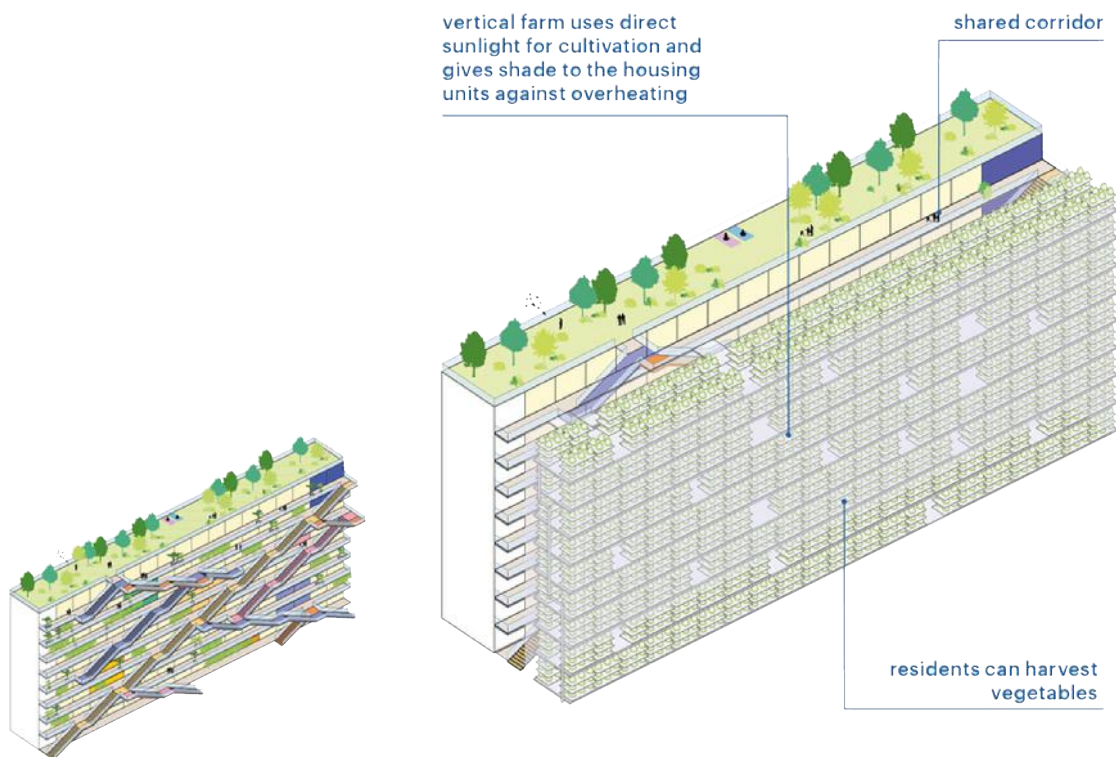


Figure 2.13 Vertical farm city  
(Source: archdaily.com)

# Vertical Farm City

Vertical farming represents a modern agricultural idea that can be tailored to urban settings, unlike conventional farming methods. This technique involves growing crops in vertically arranged layers, offering a notably efficient and space-conserving approach to farming.



## - Nature as a Unity

*Architecture Classics: Unite d' Habitation / Le Corbusier*

Architect: Le Corbusier

Year: 1952

Buildings constructed after World War 2, after the bombings in France the need for housing reached its highest point. A large-scale project intended to serve as multi-family housing after the effects of World War II. The building was designed by Le Corbusier to integrate all urban amenities into one building.

Figure 2.14 Unite d' habitation  
(Source: archdaily.com)

The Unite d'Habitation is a first, both for Le Corbusier and the methods used to build such a large complex that can accommodate around 1,600 people. more specifically because Le Corbusier did not create many large-sized buildings when compared to his villas. When designing for a large number of people, horizontal designs spread over the landscape are customary. However, Le Corbusier created a community that gathered in a neighborhood inside a modern and modernist high-rise building.

The larger villas were incorporated into Le Corbusier's concept of a "vertical garden city", which allowed residents to have private spaces but also places where they could shop, eat, exercise and gather together.

With nearly 1,600 residents, the design required an innovative approach to space organization to accommodate living spaces, public spaces and communal spaces. Interestingly enough, most of the communal spaces are located on the roof, rather than inside the building.



Figure 2.15 Roof top of Unite d' habitation  
(Source: archdaily)

## | Design Criteria

### - 3D Print with Natural Prefabricated Material

'Design, Print, and Built' is an apt slogan in describing how architectural modelling can be done with the development of technology. This has been discussed and researched further by an organisation from the university of Idaho that develops and researches 3d printing construction. Usually this construction is carried out using basic materials such as cement with a mixture that is arranged so that it is not too liquid so that it can dry quickly and does not collapse during construction. Researchers want to change how building construction is safe comfortable and cheap in cost and time. An interesting part of the research in creating 3d print technology at the University of Idaho is the base material used in the 3d print construction process. In this case, they used waste timber or what can also be referred to as sawdust.



Figure 2.16 Saw dust  
(Source: wikipedia.org)

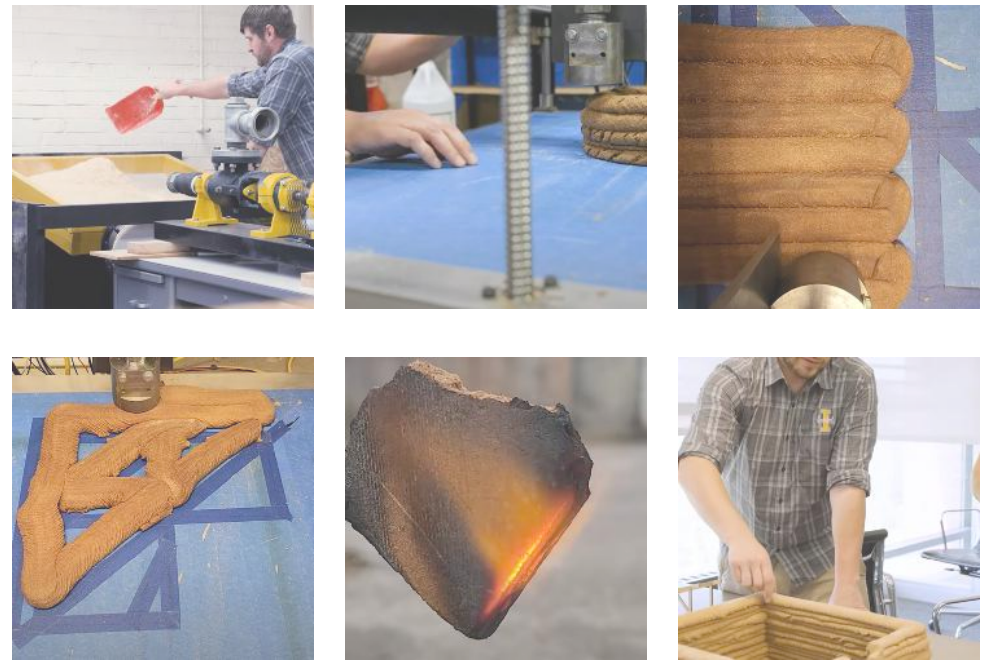


Figure 2.17 3D print timber methods  
(Source: statenews.org)

Sawdust, also known as sawdust, is waste from the sawmill industry and has caused many problems when handling it. So far, this waste has been left to rot, piled up, and burned, so it is necessary to think about handling it. Experiments were conducted in mixing adhesives with sawdust to determine the durability and strength of this material. After creating a sample that has been made with the use of 3d print construction, it is known that many benefits can be taken. That this material can withstand fire, which can rival other common materials that are often used in building construction. In addition to its fire resistance, this material also carries sustainability which is certainly friendly to the environment and can be recycled easily so as not to produce waste later. In response to rapid construction is the combination of 3d print timber technology and fabrication methods in a construction. The fabrication method is a method of building a building by designing it elsewhere and then installing it on the construction site. This can minimise and optimise the use of time in construction.

## - AI Prompting

### Design Parameters:

#### Regenerative Architecture:

**Social Spaciousness:** Emphasizes creating an environment within the building that promotes social interactions and a sense of community among residents. It involves designing common areas and pathways that encourage spontaneous social gatherings and connectivity.

**Form Inspiration:** The building's height and form are in harmony with the natural elevation of the surrounding hills. By doing so, the building complements the landscape rather than disrupting it, creating a visually cohesive and environmentally sensitive development.

**Mutualism Symbiome:** Utilize renewable energy sources, such as solar panels, for power.

### Functional Parameters:

**Communal Spaces:** Emphasizes creating an environment within the building that promotes social interactions and a sense of community among residents. It involves designing common areas and pathways that encourage spontaneous social gatherings and connectivity.

**Nature Integration:** Design the housing to include habitats for flora and fauna, such as green walls, rooftop gardens, and ponds. This integration supports biodiversity, enhances the aesthetic value of the living environment, and promotes the well-being of residents by providing natural spaces.

### Environmental Parameters:

**Site-contextual Form:** the building's height and form are in harmony with the natural elevation of the surrounding hills. By doing so, the building complements the landscape rather than disrupting it, creating a visually cohesive and environmentally sensitive development.

### Technical Parameters:

**3D Print Construction Method:** This use of advanced prefabrication and 3D printing technologies in the construction process. These methods can increase efficiency, reduce waste, and allow for more complex and customized architectural designs, ultimately contributing to more sustainable building practices.



Figure 2.18 AI visualization  
(Source: Bing.com)

# 03

### III | exploration of design approach

Time as the Key Factor in the Development of IKN

Economic Transformation

Investment

Environmental Issue in Jakarta

Ibu Kota Nusantara (IKN)

Kalimantan as the Lungs of the World

Location of IKN in Kalimantan

Forest Land Destruction as Government Solution

## | Site Analysis

The need for a lot of housing requires maximum arrangement and planning to optimize the land used and energy consumption in the environment. In this case, review and study every possible land situation which then makes a prototype of a residential building that can respond to all types of predominantly contoured land in the East Kalimantan area.

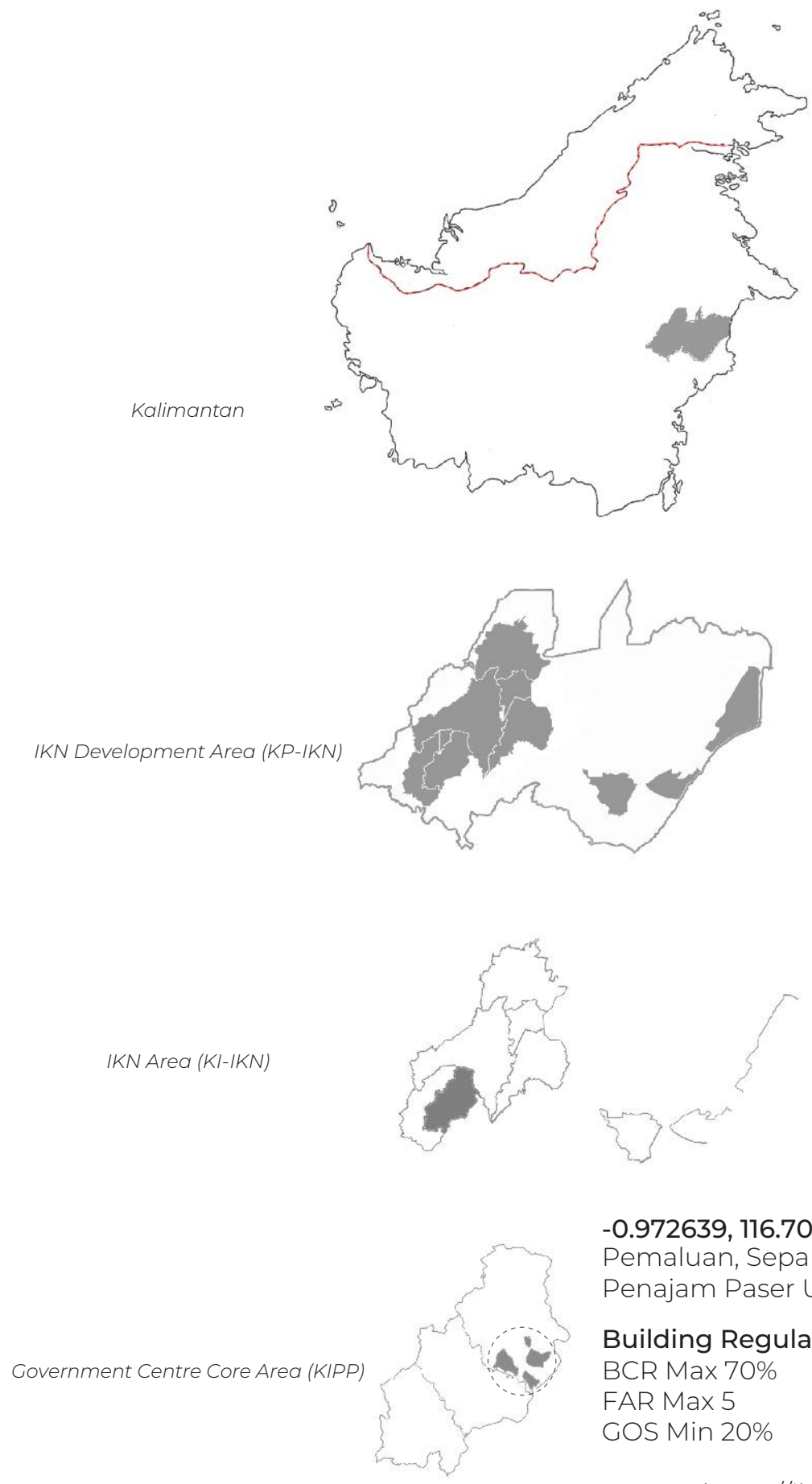


Figure 3.1 IKN administration  
(Source: statenews.org)

**-0.972639, 116.704569**  
 Pemaluan, Sepaku,  
 Penajam Paser Utara, Kalimantan Timur

**Building Regulation**  
 BCR Max 70%  
 FAR Max 5  
 GOS Min 20%

Source: <https://ikn.go.id>

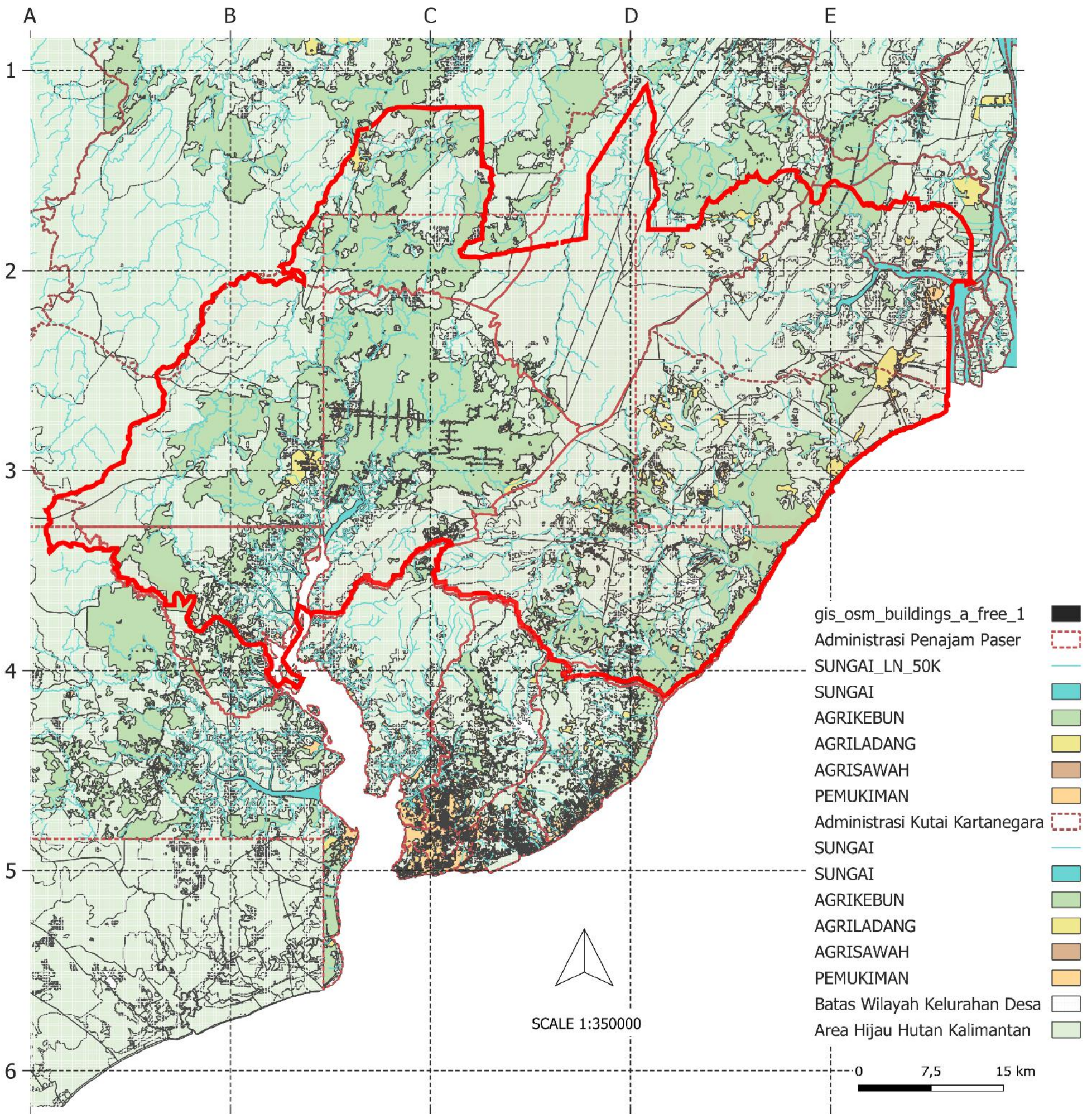


Figure 3.2 Administration of IKN in Kalimantan  
(Source: Author, 2024)

## - Macro Mapping

Macro mapping shows the Capital City of the Archipelago Planning Area (KP-IKN) as a whole. The IKN administration is located in the Penajem Paser and Kutai Kartanegara districts in East Kalimantan province. It can be seen on the mapping that the existing location is filled with green areas or green-fields. Water sources can also be seen in almost every area. The existing contour looks quite bumpy due to the many hills in the forest area.

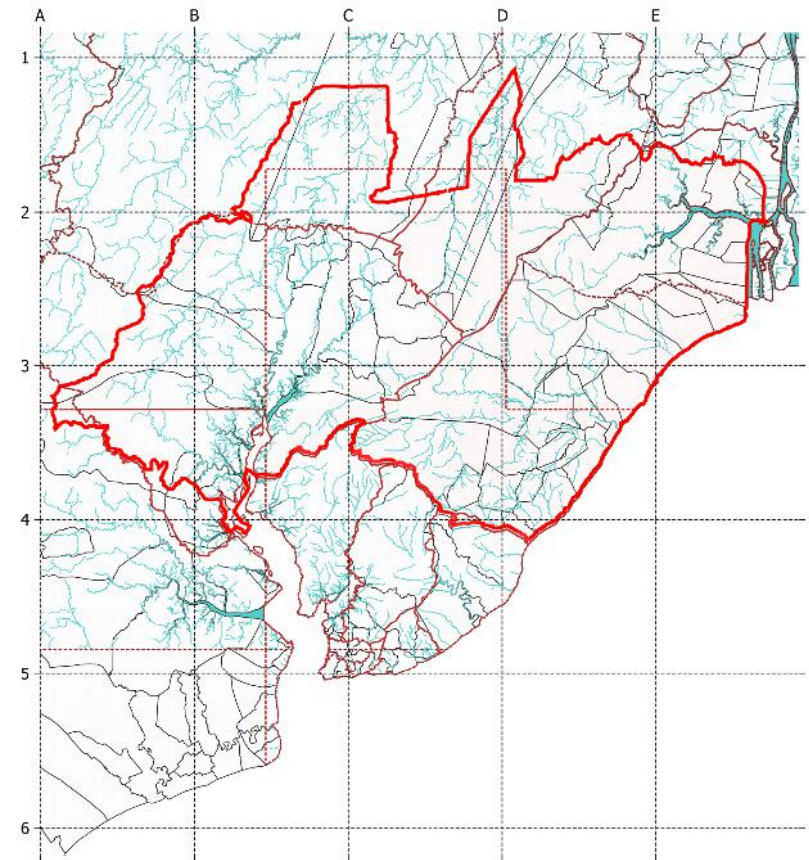


Figure 3.3 Waterway in IKN  
(Source: Author, 2024)

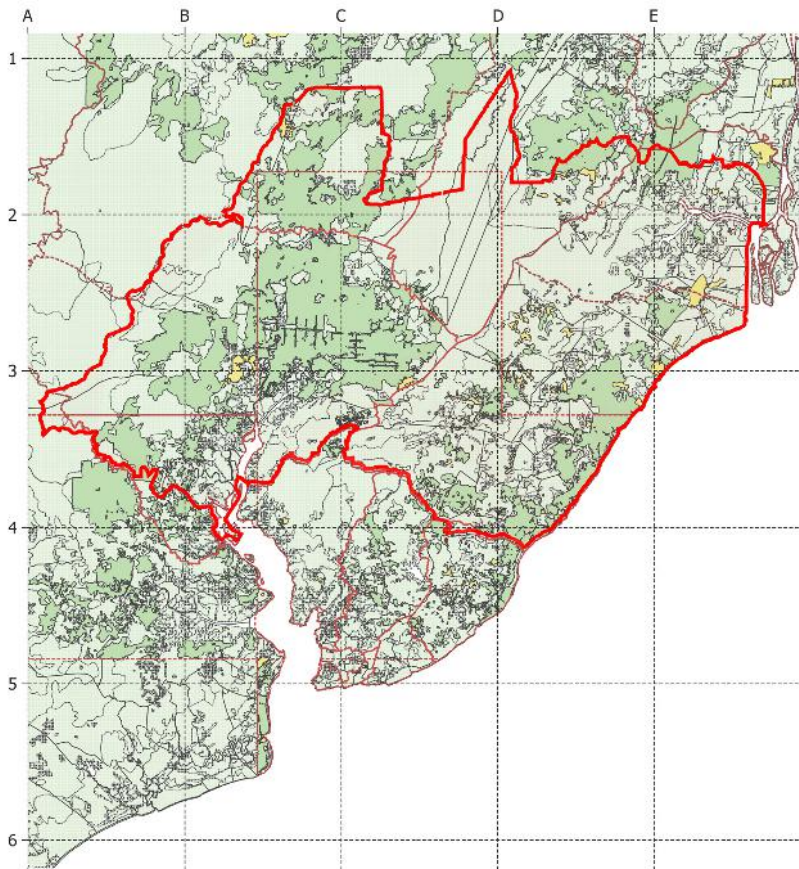


Figure 3.4 Greenfield area in IKN  
(Source: Author, 2024)

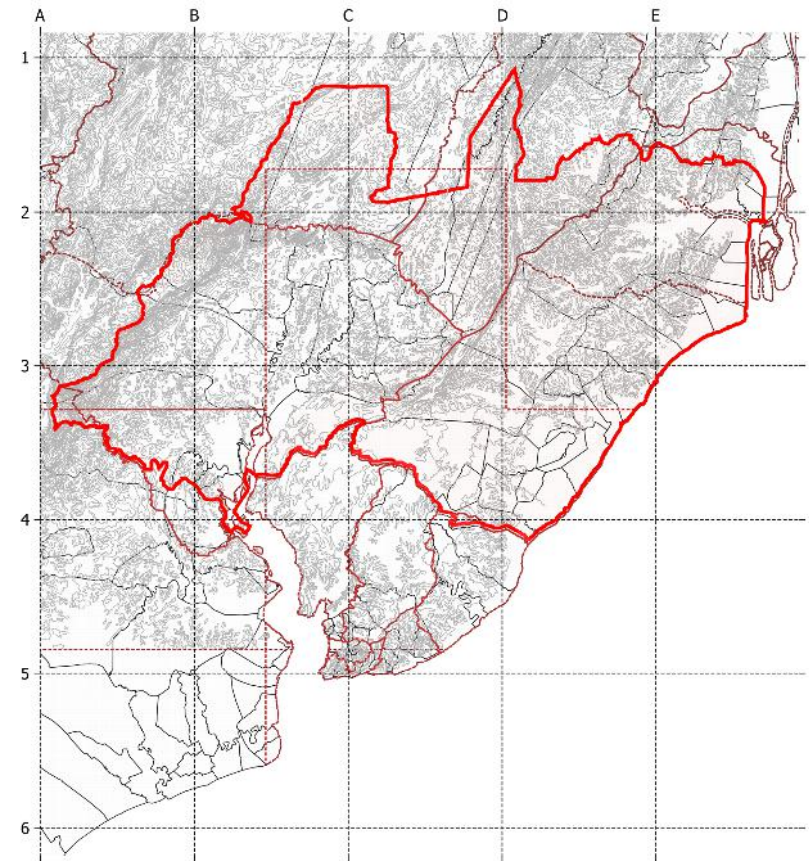


Figure 3.5 Contour in KI-IKN  
(Source: Author, 2024)

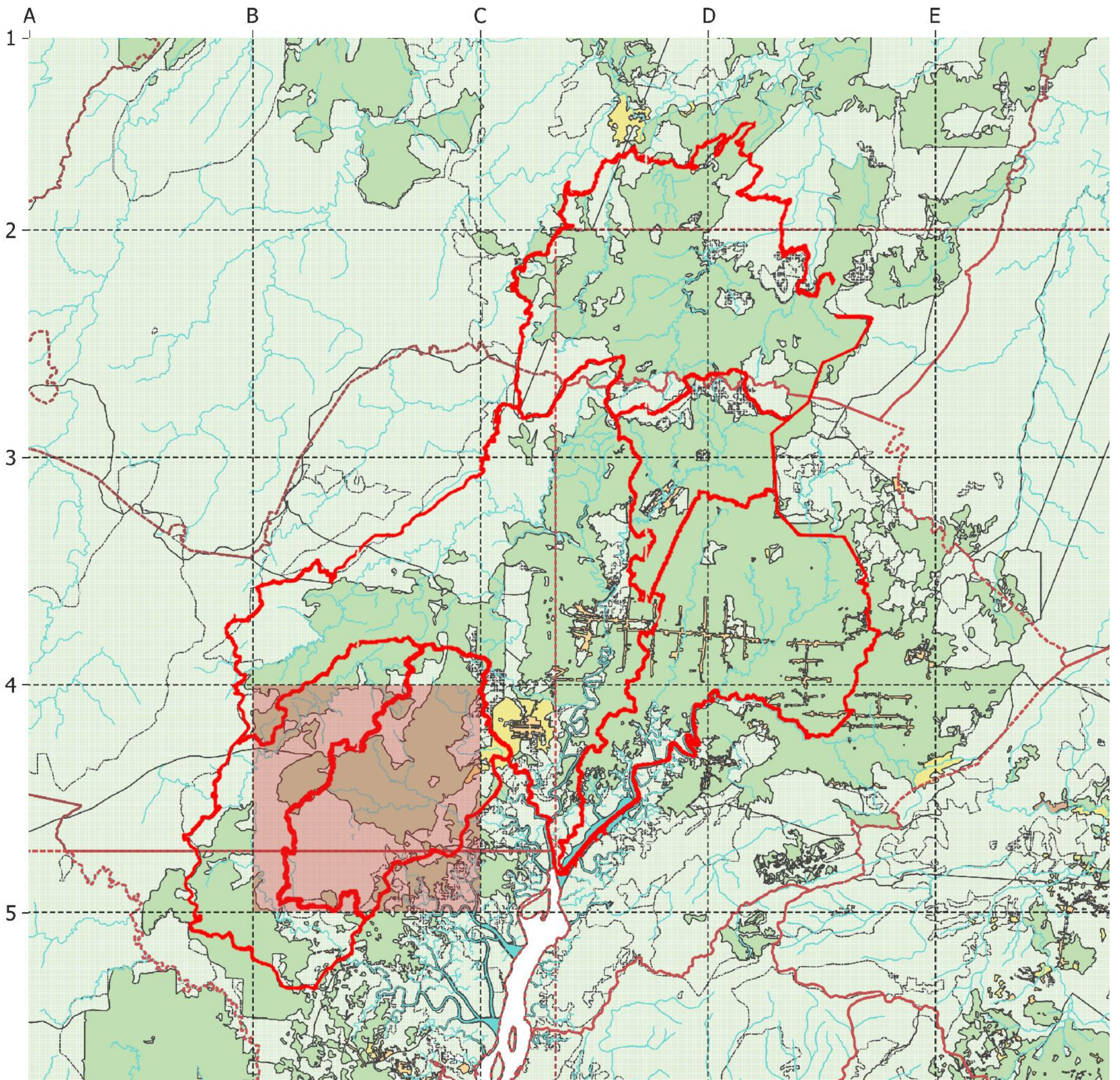

















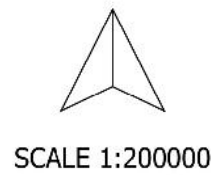


Figure 3.6 KI-IKN administration  
(Source: Author, 2024)

## - Mezzo Mapping

HOUSING	
Administrasi Penajam Paser	
SUNGAI_LN_50K	
SUNGAI	
AGRIKEBUN	
AGRILADANG	
AGRISAWAH	
PEMUKIMAN	
Administrasi Kutai Kartanegara	
SUNGAI	
SUNGAI	
AGRIKEBUN	
AGRILADANG	
AGRISAWAH	
PEMUKIMAN	
Batas Wilayah Kelurahan Desa	
Area Hijau Hutan Kalimantan	



The mezzo mapping covers the Core Area of the Capital of the Archipelago (KI-IKN). Dense greenery is due to the existence of the previous location as a production forest which is also one of the lungs of the world. Greenery is an icon of this location.

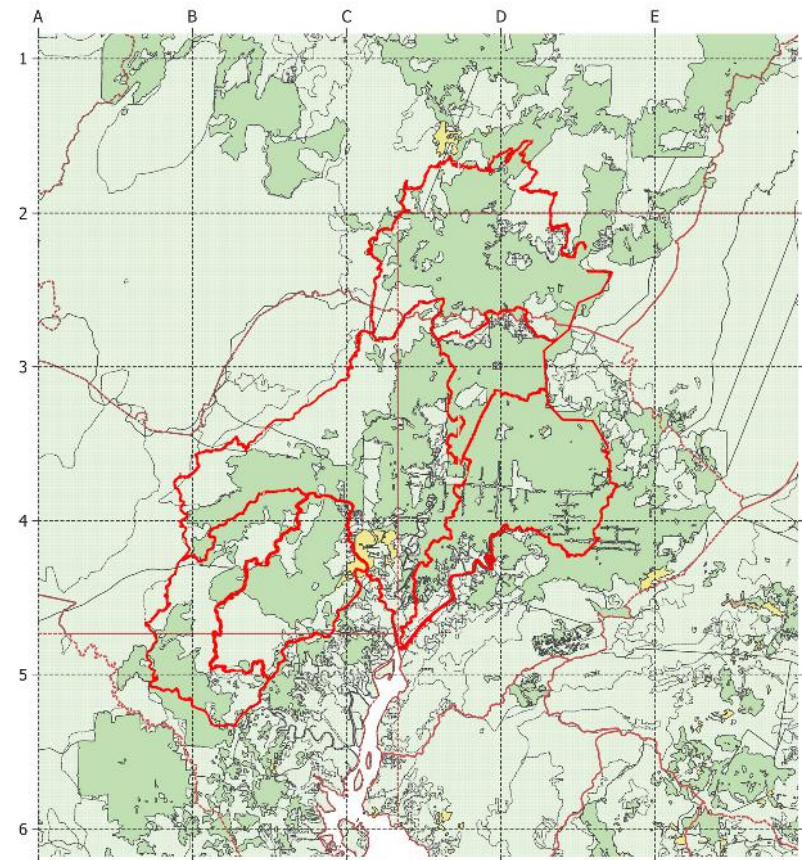


Figure 3.7 Greenfield in KI-IKN  
(Source: Author, 2024)

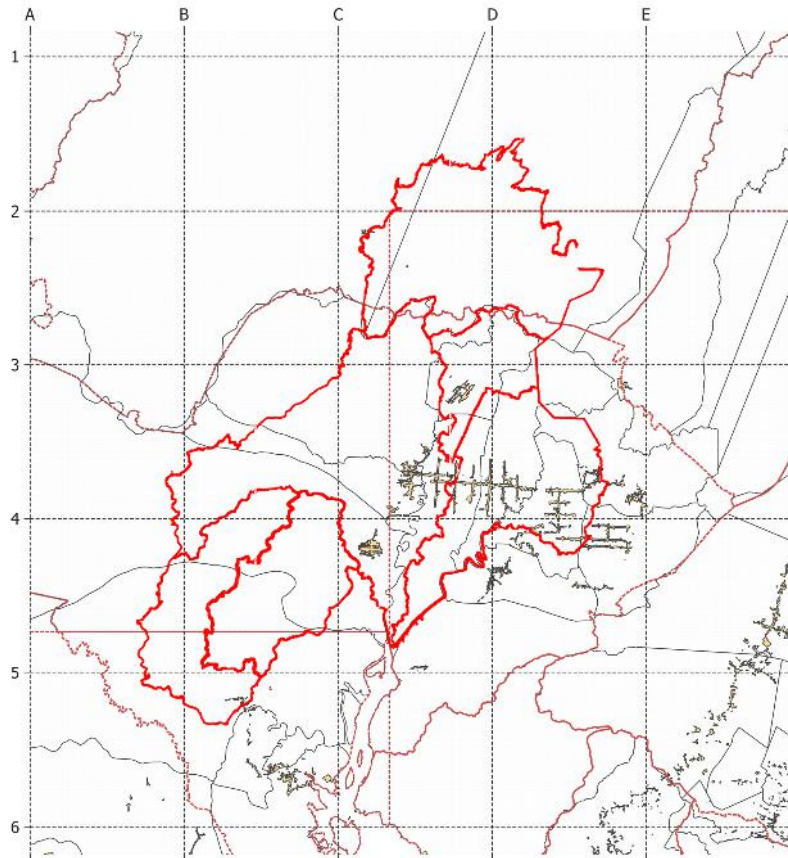


Figure 3.8 Housing area in KI-IKN  
(Source: Author, 2024)

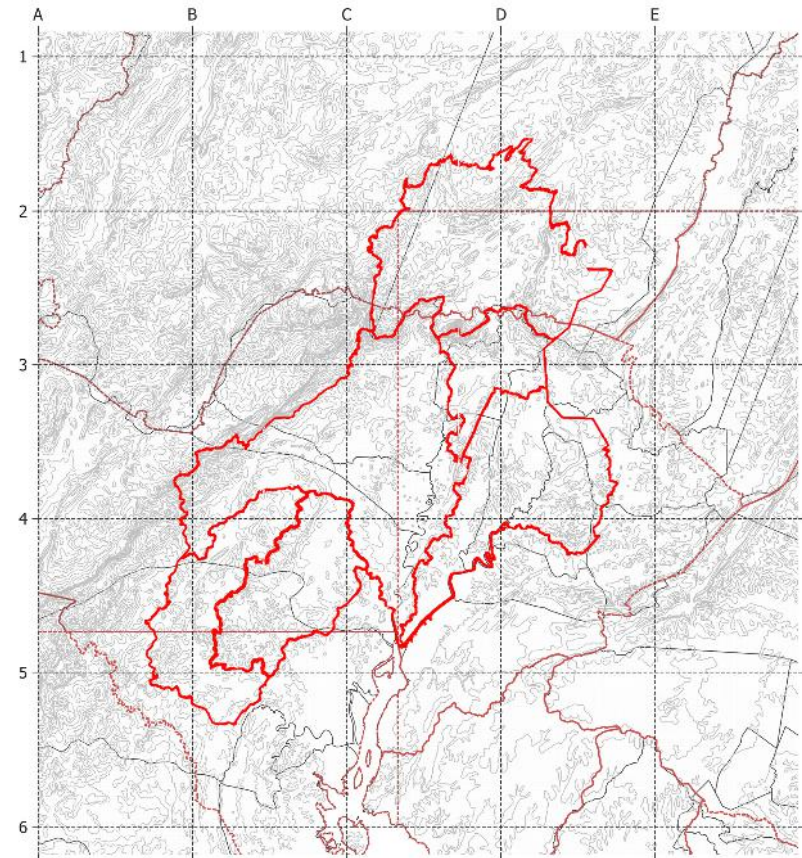


Figure 3.9 Contour in KI-IKN  
(Source: Author, 2024)

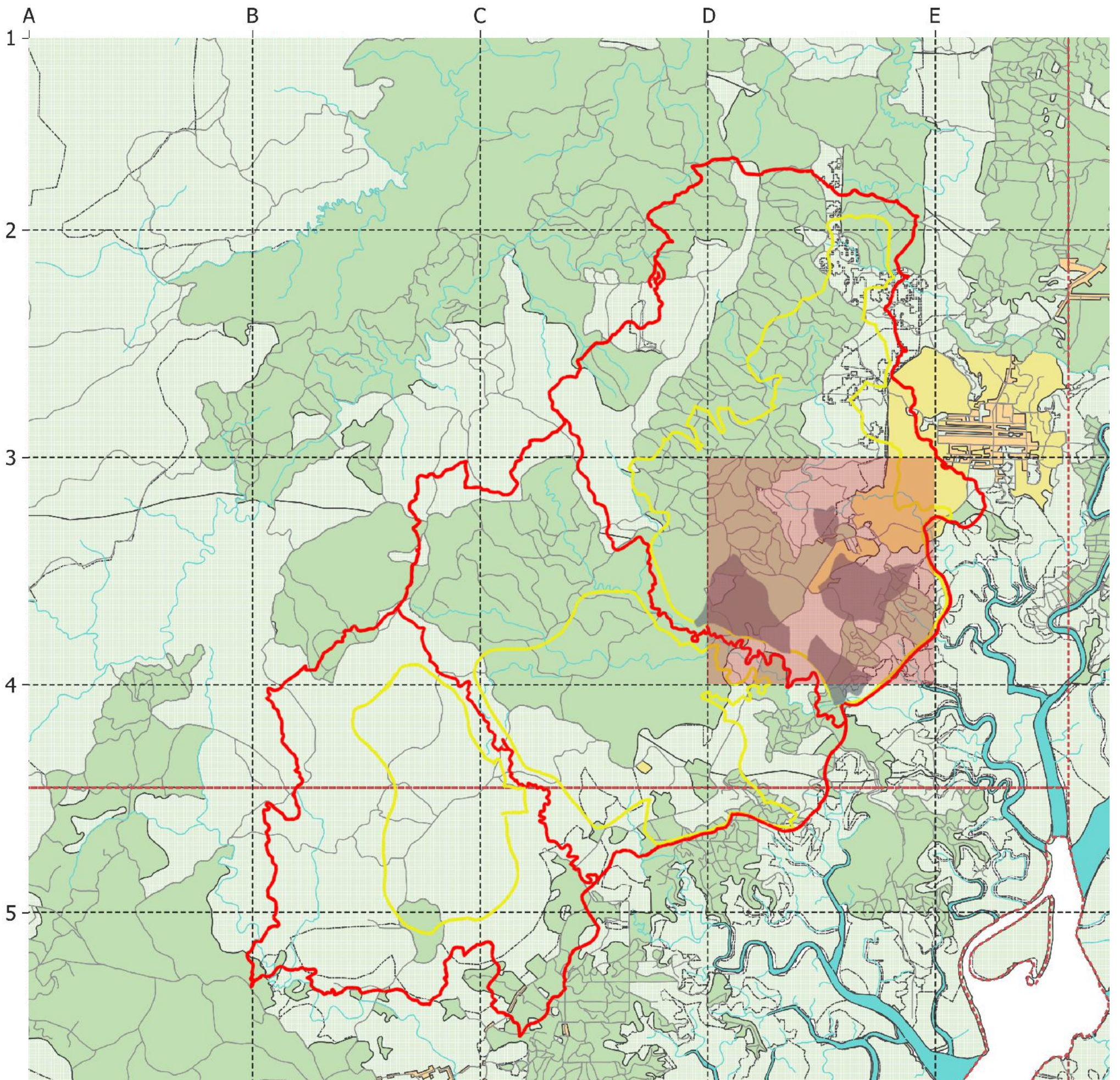
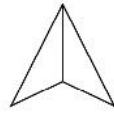


Figure 3.10 Community housing zonation  
 (Source: Author, 2024)

## - Micro Mapping



Micro-scale mapping shows the selected location of IKN planning to build as many as 47 towers for civil administration (ASN). From each potential site will be considered in the creation of the building form later.

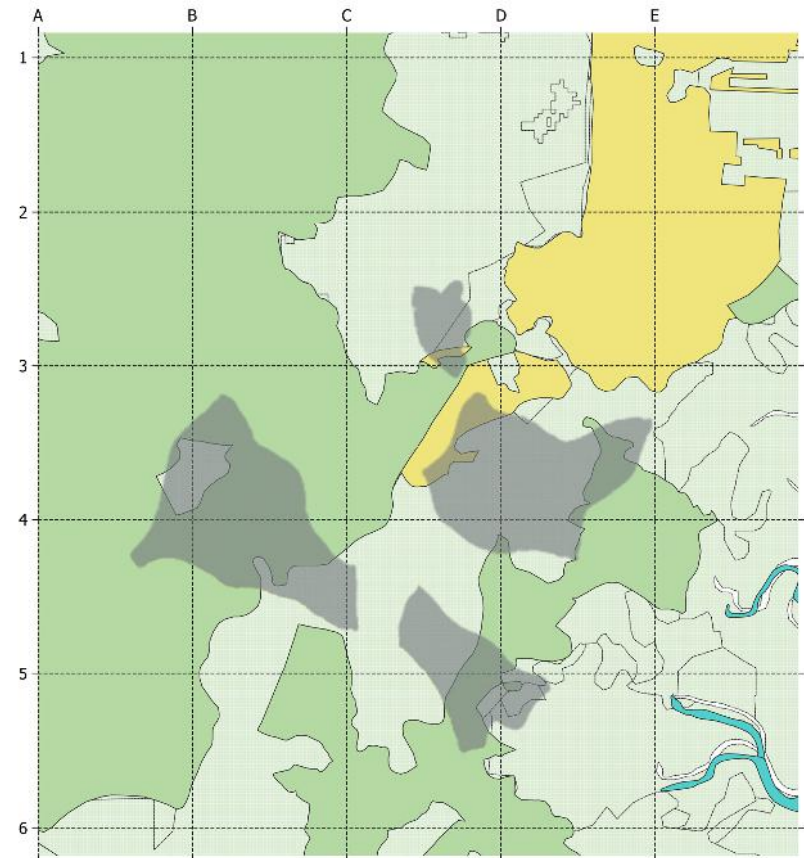


Figure 3.11 Greenfield area in surrounding site  
(Source: Author, 2024)

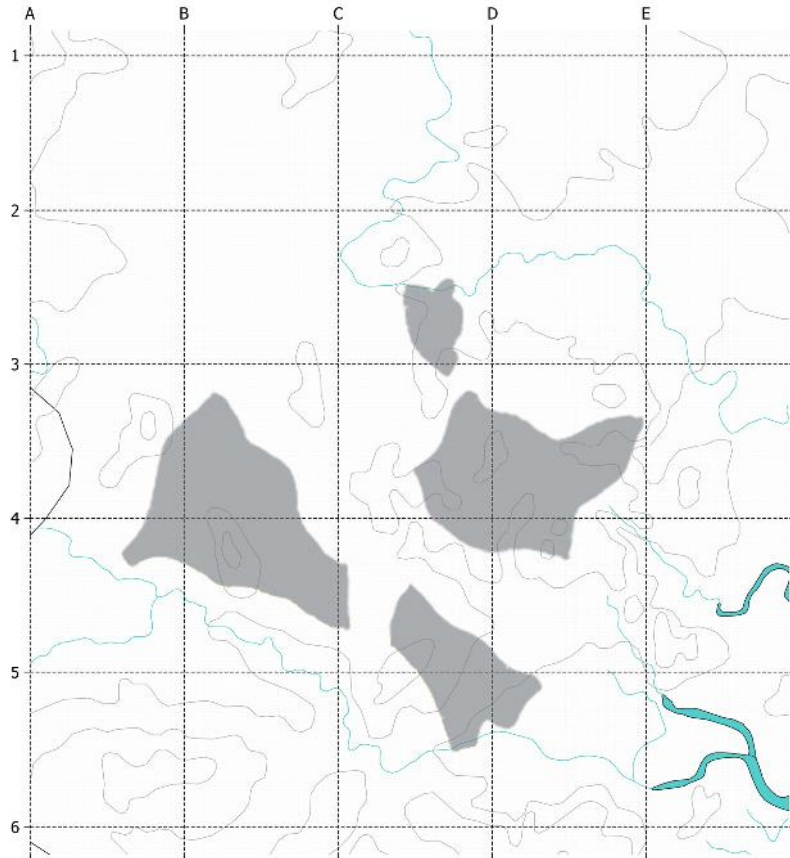


Figure 3.12 Waterway and contour in surrounding site  
(Source: Author, 2024)

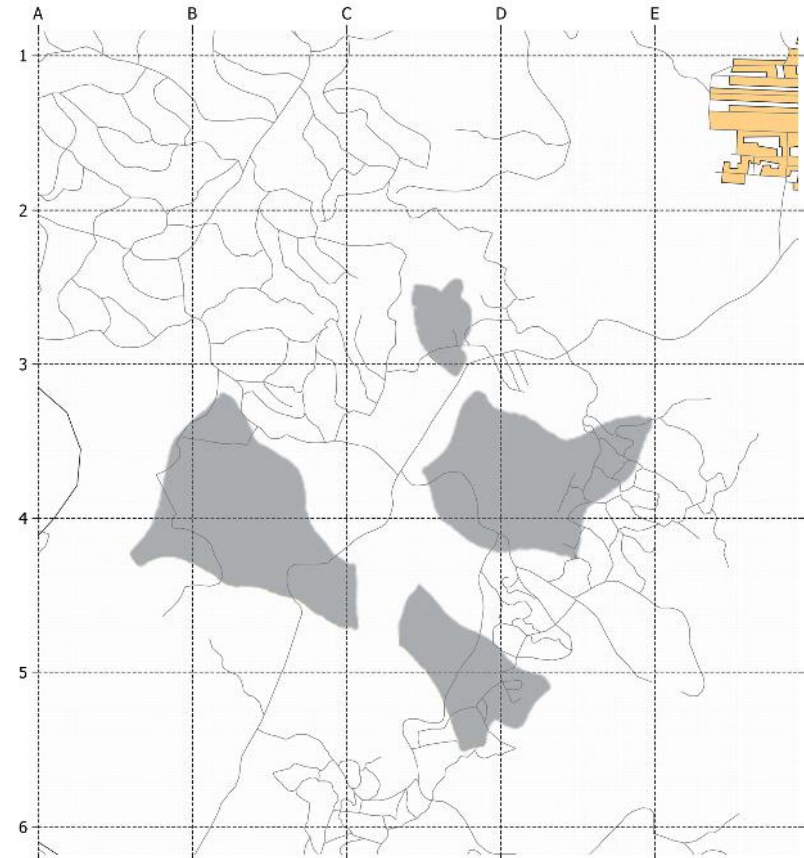


Figure 3.13 Accessibility in surrounding site  
(Source: Author, 2024)

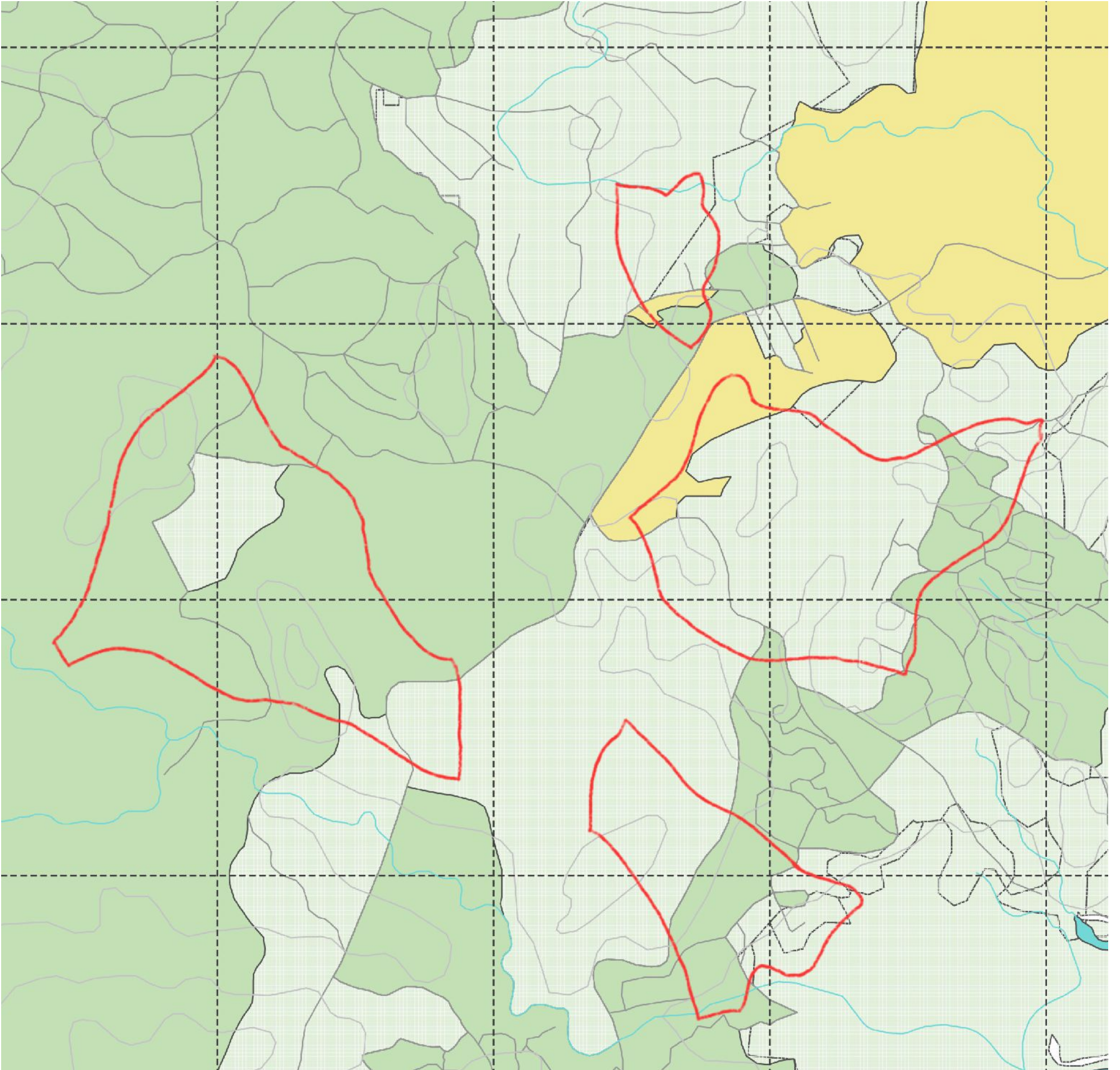


Figure 3.14 Community housing Zonation  
(Source: Author, 2024)



From the zoning for civil administration (ASN) housing, it is divided into 4 zoning, 2 of which are intended for ASN and 2 others for paspampres and POLRi. These two zoning will later be used as parameters in shaping the shape of the building in accordance with the concept planning later. So that the building can be built anywhere and become a prototype for other locations.

Figure 3.15 Community housing Zonation and data  
(Source: Author, 2024)

## - Topography Analysis

Zone 1 for ASN housing looks close to Mount Parung. So that the contour topography conditions tend to be high. On the other hand, due to the height of this location, it is superior in its fauna and flora habitat. It can be seen that there are very few existing residences, but transportation access can be reached easily because of adequate road infrastructure.

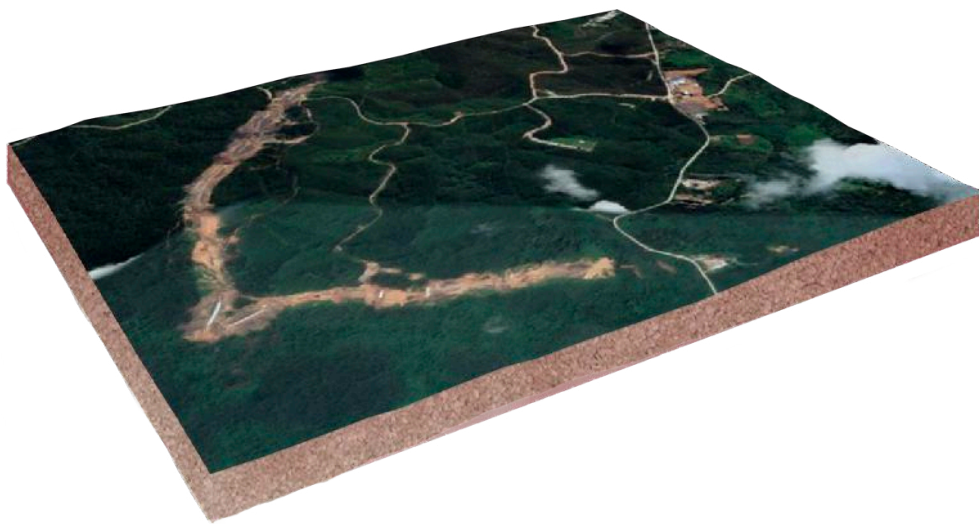


Figure 3.16 Topography condition zone 1  
(Source: Author, 2024)

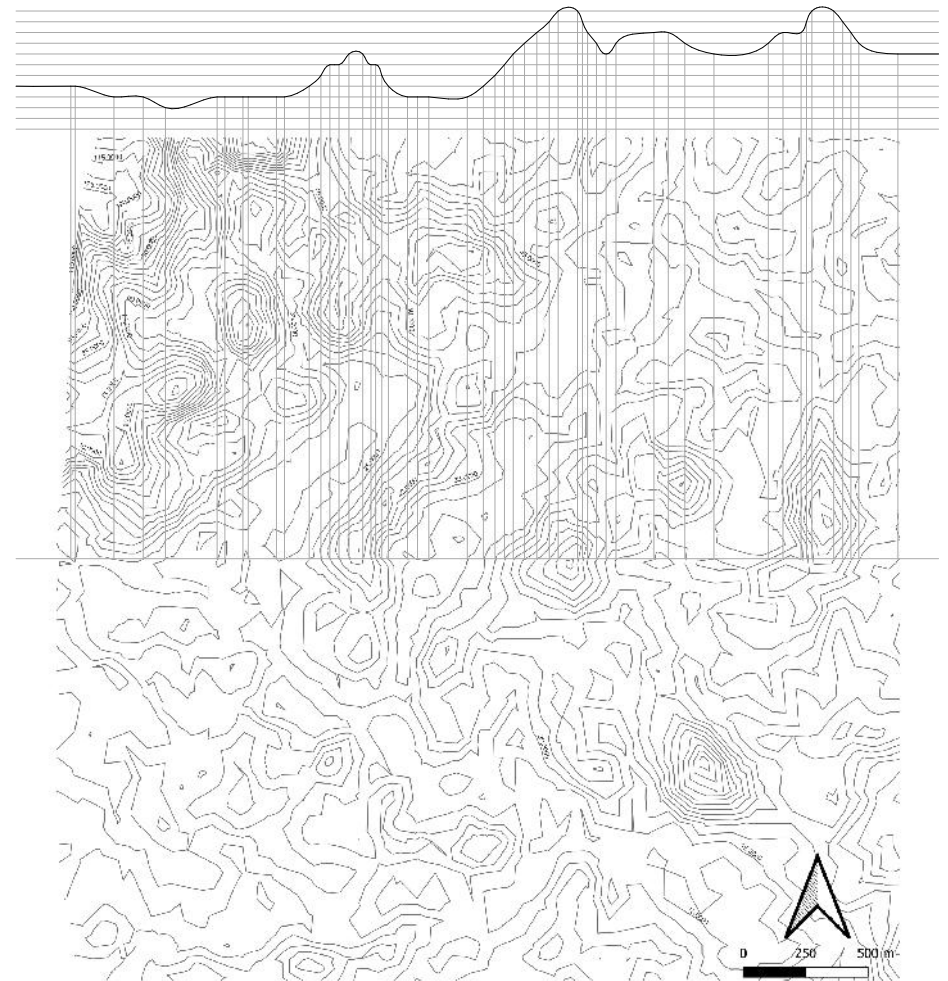


Figure 3.17 Analysis of contour line zone 1  
(Source: Author, 2024)

From the analysis using contour lines, it can show the cut of the local contour. It can be seen that the cuts created from the contour lines show the different heights of Parung Mountain. The varying contours will be a consideration in creating the form of building design in accordance with its function.

Zone 2 for housing for civil administration (ASN) is different from the topographic conditions shown in zone 1. The contour conditions at this location tend to be flat and not too significant in height. So that the location here can be more easily managed without having to damage the existing conditions of the contour shape. The contour shape is different because this location is below zone 1.



Figure 3.18 Topography condition zone 2  
(Source: Author, 2024)

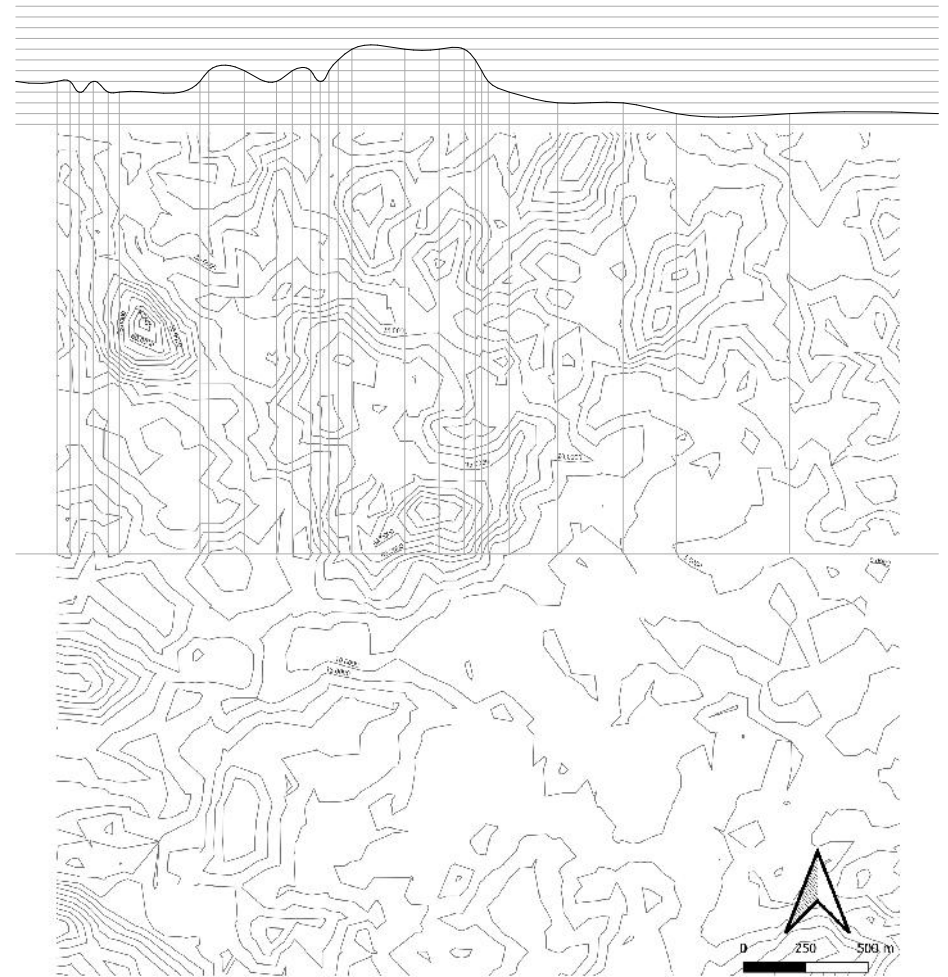


Figure 3.19 Analysis of contour line zone 2  
(Source: Author, 2024)

The cut of the contour line shows the contour conditions at the location are not very significant. The contour lines also show that there are not too many contours. At this height the design of the building on the site is more flexible and does not need to take much action to change the existing conditions.

Zone 3, which is intended for the residential zoning of the Kapolri and Paspampres, will only be used as parameters to study the existing contours which will later help in designing prototype buildings for housing for civil administration (ASN). The contour situation that shows at a glance there is a high area because there is a hill.

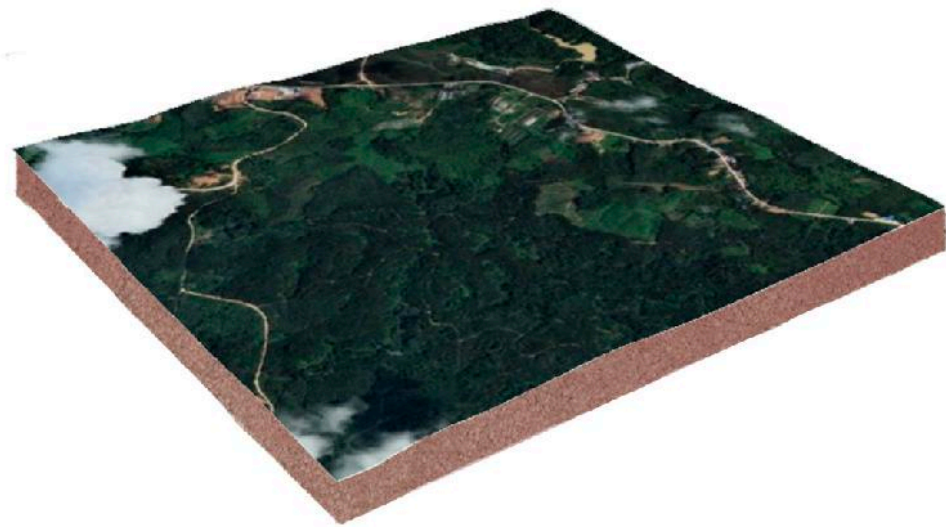


Figure 3.20 Topography condition zone 3  
(Source: Author, 2024)

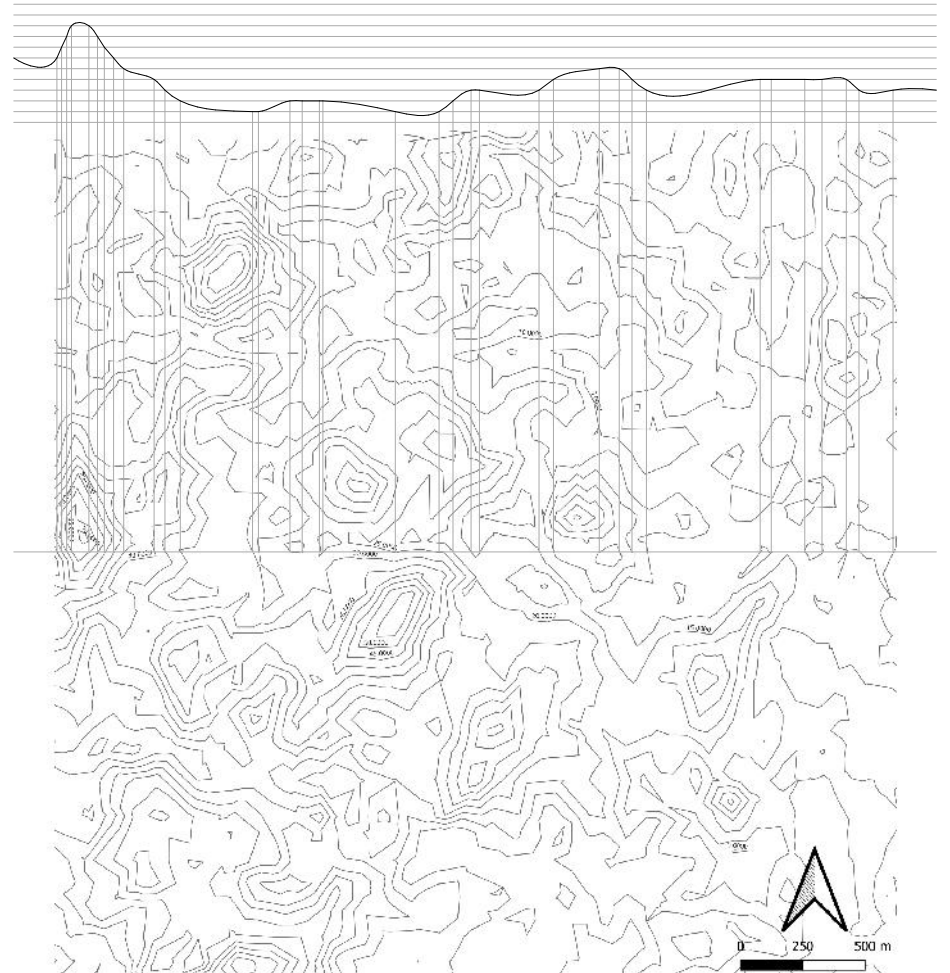


Figure 3.21 Analysis of contour line zone 3  
(Source: Author, 2024)

The northern part of the location of zone 3 shows a difference in height against the contour, namely the existence of a hill. This will be reconsidered in creating a building design that can blend and provide symbiotic mutualism between humans and nature. Minimising the destruction of nature and optimising functional needs for its users.

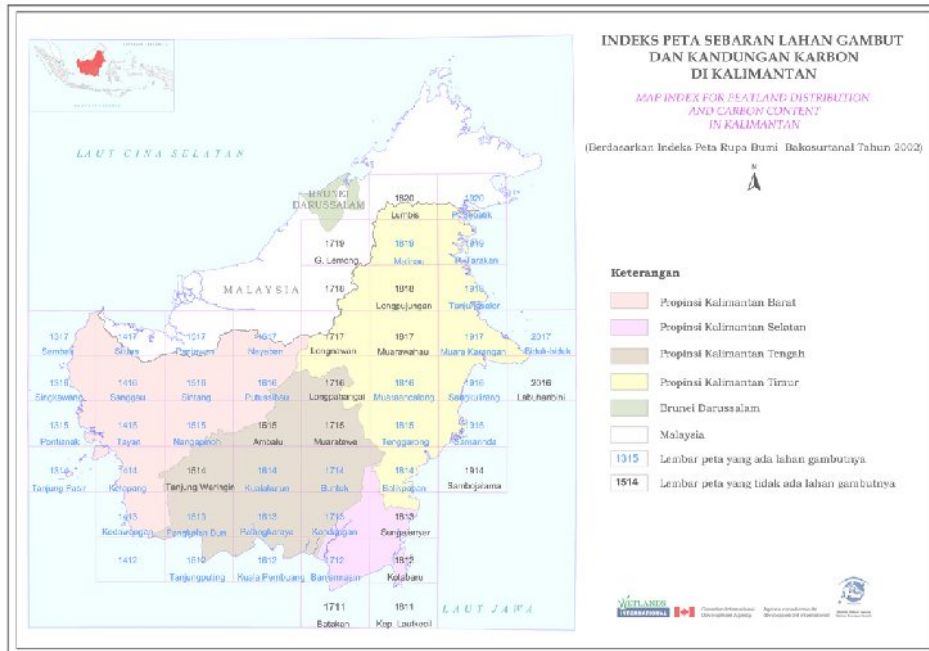


Figure 3.22 Map of peat soil distribution in Kalimantan (Source: Wahyunto, S. Ritung dan H. Subagjo (2004))

Due to the condition of the soil found in the IKN area tends to have peat soil, it is necessary to consider how deep the local soil is with peaty soil types until finding the hardest part of the soil and ready for development design.

Figure 3.3 Analysis of contour line (Site C).

TABEL 1 LUAS LAHAN GAMBUT DAN KANDUNGAN KARBON DI KALIMANTAN AREA OF PEATLAND AND CARBON CONTENT IN KALIMANTAN 2000 - 2002														
No.	Kedalaman/ Ketebalan Depth/ Thickness	Jenis gambut Peat Types	Proporsi (%) Proportion	Simbol Symbol	Luas dan kandungan karbon per Propinsi Area and carbon content in each Province								Total	
					Kalimantan Barat		Kalimantan Tengah		Kalimantan Timur		Kalimantan Selatan		Luas Area	Kandungan C C Content
					Luas Area	Kandungan C C Content	Luas Area	Kandungan C C Content	Luas Area	Kandungan C C Content	Luas Area	Kandungan C C Content		
1	Sangat Dangkal/Sangat Tipis Very Shallow/Very Thin (< 50 cm)	Hemistis/mineral	80/20	H0	36.673,00	0,98	75.930,00	2,02	--	--	76.785,00	2,04	189.448,00	5,04
2	Dangkal/Tipis Shallow/Thin (50-100 cm)	Hemistis/Fibratis	60/40	H1a	125.435,00	77,17	246.316,00	72,74	49.562,00	19,20	--	--	421.313,00	169,11
3		Hemistis/Fibratis/mineral	50/30/20	H1b	225.486,00	111,81	45.610,00	10,57	4.530,00	1,40	--	--	275.635,00	123,78
4	Dangkal/Tebal Shallow/Thick (100-200 cm)	Hemistis/mineral	80/20	H1c	44.484,00	24,49	79.055,00	13,12	24.121,00	6,97	--	--	147.660,00	44,58
5		Hemistis/Saprisis/mineral	40/30/30	H1d	8.793,00	3,82	124.974,00	43,99	--	--	--	--	133.667,00	47,81
6	Dalam/Tebal Deep/Thick (200-400 cm)	Hemistis/mineral	50/50	H1e	1.079,00	0,37	106.649,00	11,07	--	--	18.100,00	2,27	125.827,00	13,71
7		Hemistis/mineral	20/80	H1f	32.896,00	4,53	353.229,00	14,66	186.337,00	13,46	32.340,00	1,62	604.802,00	34,27
8	Sangat Dalam/Sangat Tebal Very Deep/Very Thick (400-800 cm)	Saprisis/mineral	20/80	S1f	--	--	2.753,00	0,29	--	--	28.928,00	1,22	31.681,00	1,51
9		Hemistis/Fibratis	60/40	H2a	737.111,00	1.067,09	459.371,00	301,41	25.528,00	18,18	--	--	1.222.010,00	1.386,67
10	Dalam/Sangat Tebal Deep/Very Thick (800-1200 cm)	Hemistis/Fibratis/mineral	50/30/20	H2b	--	--	--	--	86.983,00	53,71	--	--	86.983,00	53,71
11		Hemistis/Fibratis/Saprisis	40/30/30	H2c	--	--	3.028,00	3,00	--	--	--	--	3.028,00	3,00
12	Sangat Dalam/Sangat Tebal Very Deep/Very Thick (400-800 cm)	Hemistis/mineral	50/50	H2d	--	--	--	--	--	--	9.976,00	3,01	9.976,00	3,01
13		Saprisis/Hemistis/mineral	25/25/50	S2g	--	--	--	--	--	--	68.790,00	15,88	68.790,00	15,88
14	Dalam/Sangat Tebal Deep/Very Thick (800-1200 cm)	Hemistis/Fibratis	60/40	H3a	213.705,00	539,41	674.976,00	665,98	129.561,00	350,54	32.689,00	42,15	949.913,00	1.598,08
15		Hemistis/Fibratis/mineral	50/30/20	H3b	--	--	--	--	91.142,00	201,90	--	--	91.142,00	201,90
16	Sangat Dalam/Sangat Tebal Very Deep/Very Thick (400-800 cm)	Saprisis/Hemistis/mineral	30/30/40	S3f	--	--	--	--	--	--	64.041,00	17,74	64.041,00	17,74
17		Hemistis/Fibratis	60/40	H3a	304.319,00	1.795,52	661.093,00	3.088,36	100.224,00	546,55	--	--	1.065.635,00	5.408,42
18	Dalam Sekali/Tebal Sekali Extremely Deep/Extremely Thick (800-1200 cm)	Hemistis/Fibratis	60/40	H3a	--	--	277.694,00	2.146,72	--	--	--	--	277.694,00	2.146,72
19		Jumlah				1.729.980,00	3.625,19	3.010.640,00	6.361,82	696.997,00	1.211,91	331.629,00	85,94	5.769.246,00
						29,99	32,15	62,18	66,34	12,68	16,75	6,75	100,00	100,00

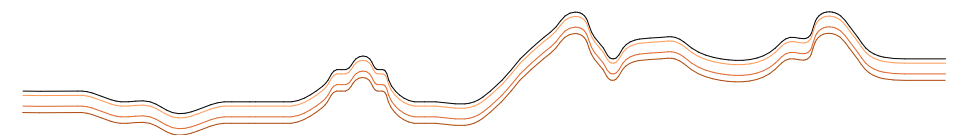


Figure 3.24 Peat soil depth analysis zone 1 (Source: Author, 2024)

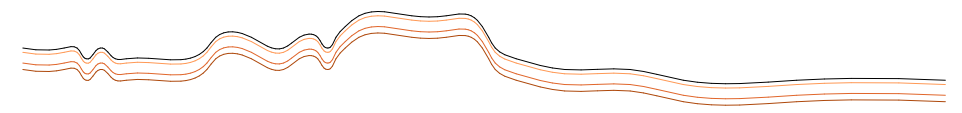


Figure 3.25 Peat soil depth analysis zone 2 (Source: Author, 2024)

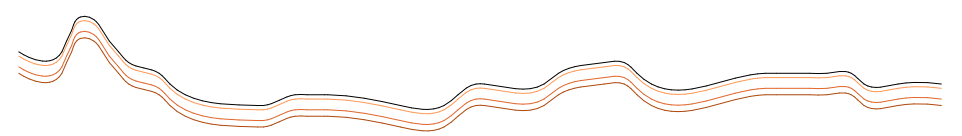


Figure 3.26 Peat soil depth analysis zone 3 (Source: Author, 2024)

In the context of the state of the peat soil in zones 1-3, the table above shows that in each section there is still a thickness from shallow to thick, with an estimated thickness of 50cm - 1200cm. Peat soils often cause construction failures due to their very soft nature, high organic composition and low bearing capacity, which can cause significant and uneven subsidence under building loads. This results in shifting or even structural collapse. To address this issue, possible solutions include the use of deep foundations such as piles that penetrate through the peat layer to reach more stable soil, as well as soil stabilisation techniques such as mixing peat with binding agents such as lime or cement to increase its strength. In addition, groundwater control through effective drainage systems is also needed to reduce the risk of soil subsidence due to changes in water content. By applying these techniques, the risk of construction failure on peat soils can be minimised.

## - Climate Analysis

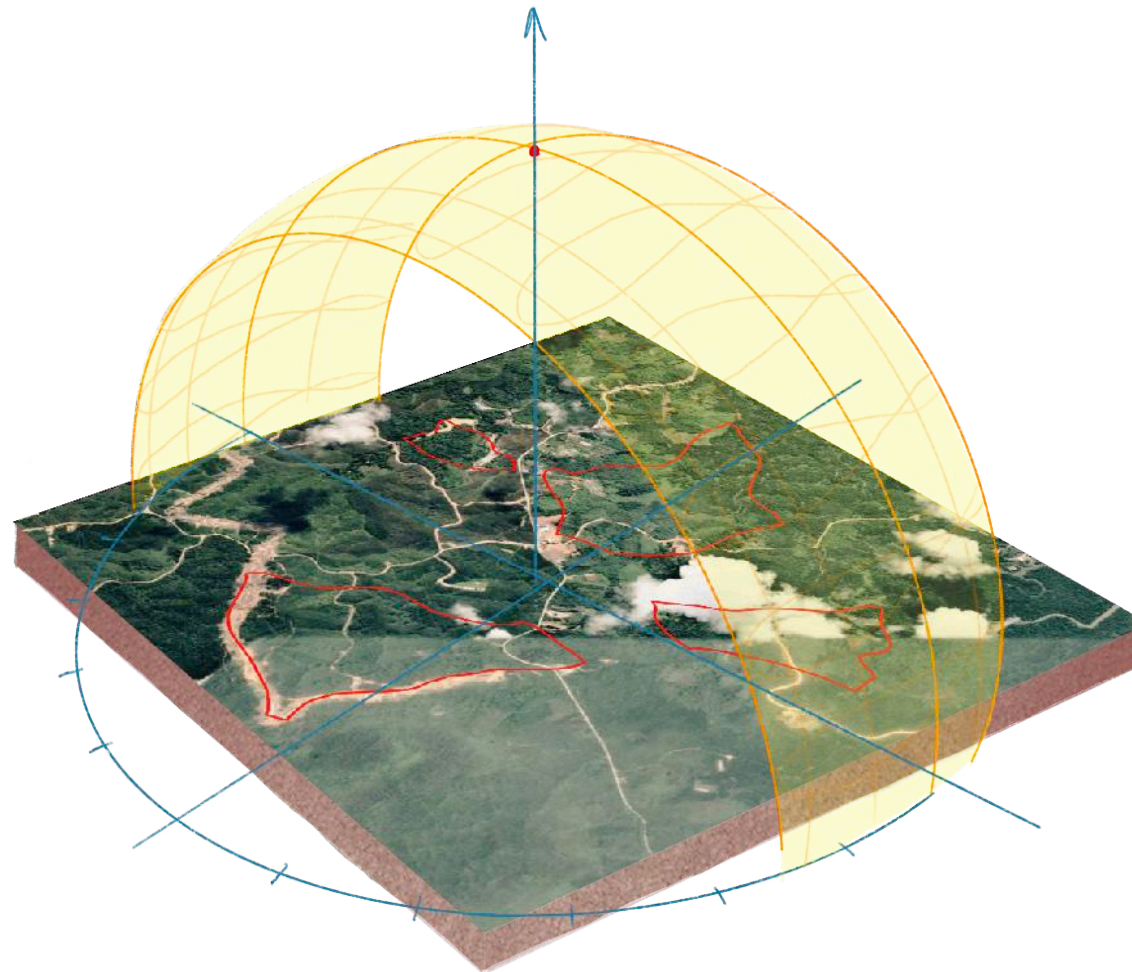


Figure 3.27 Sun path analysis  
(Source: Author, 2024)

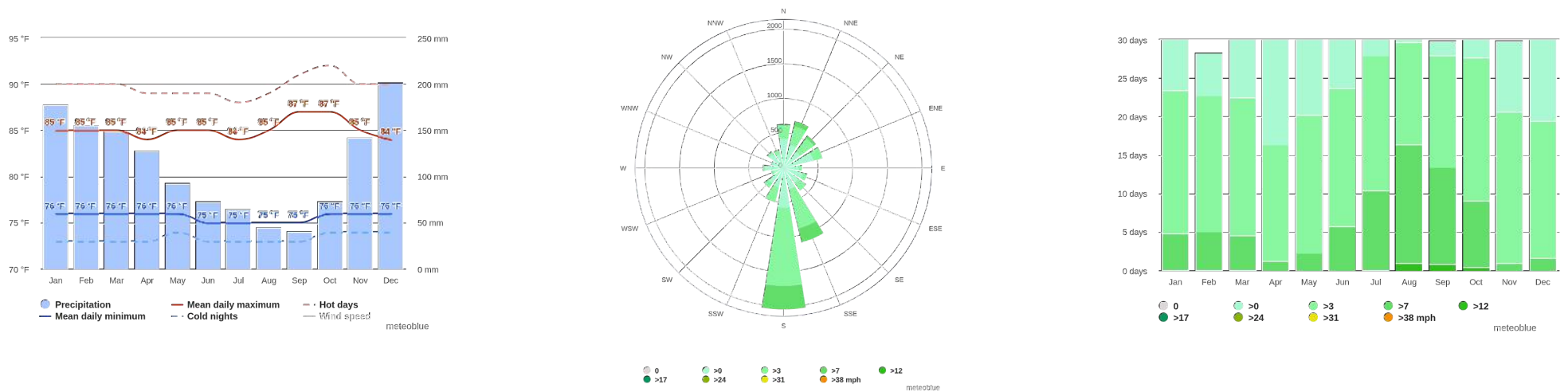


Figure 3.28 Sun path diagram  
(Source: sunchart.com)

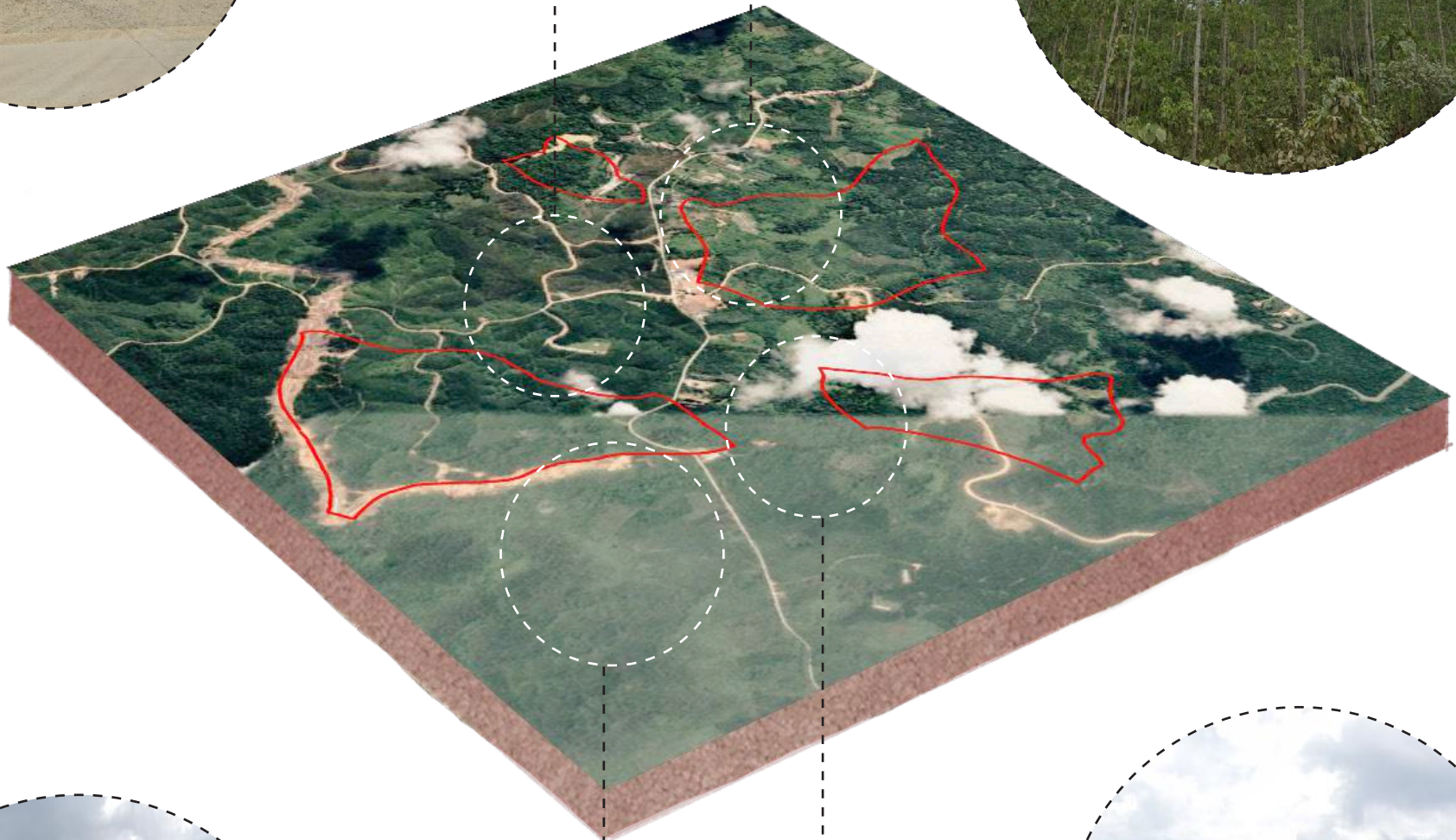
Based on the specific geographical location, it is recorded that the West Kalimantan area is right passed by the Equator line (latitude 0°) precisely above Pontianak City. This is directly opposite to the location of IKN which is on the border between Balikpapan City in East Kalimantan. This proves that the location is included in a tropical location with air and air that is quite high and relatively hot. It can be seen on the sun chart from Andrew Marsh that the sun line for one year looks right above.

## - Surrounding Existing



In the western part of the land condition there is already construction in the construction of one of the IKN buildings.

There is also in the western part of the greenery or existing that has not been constructed.



In the eastern part of the existing land is already in the construction stage

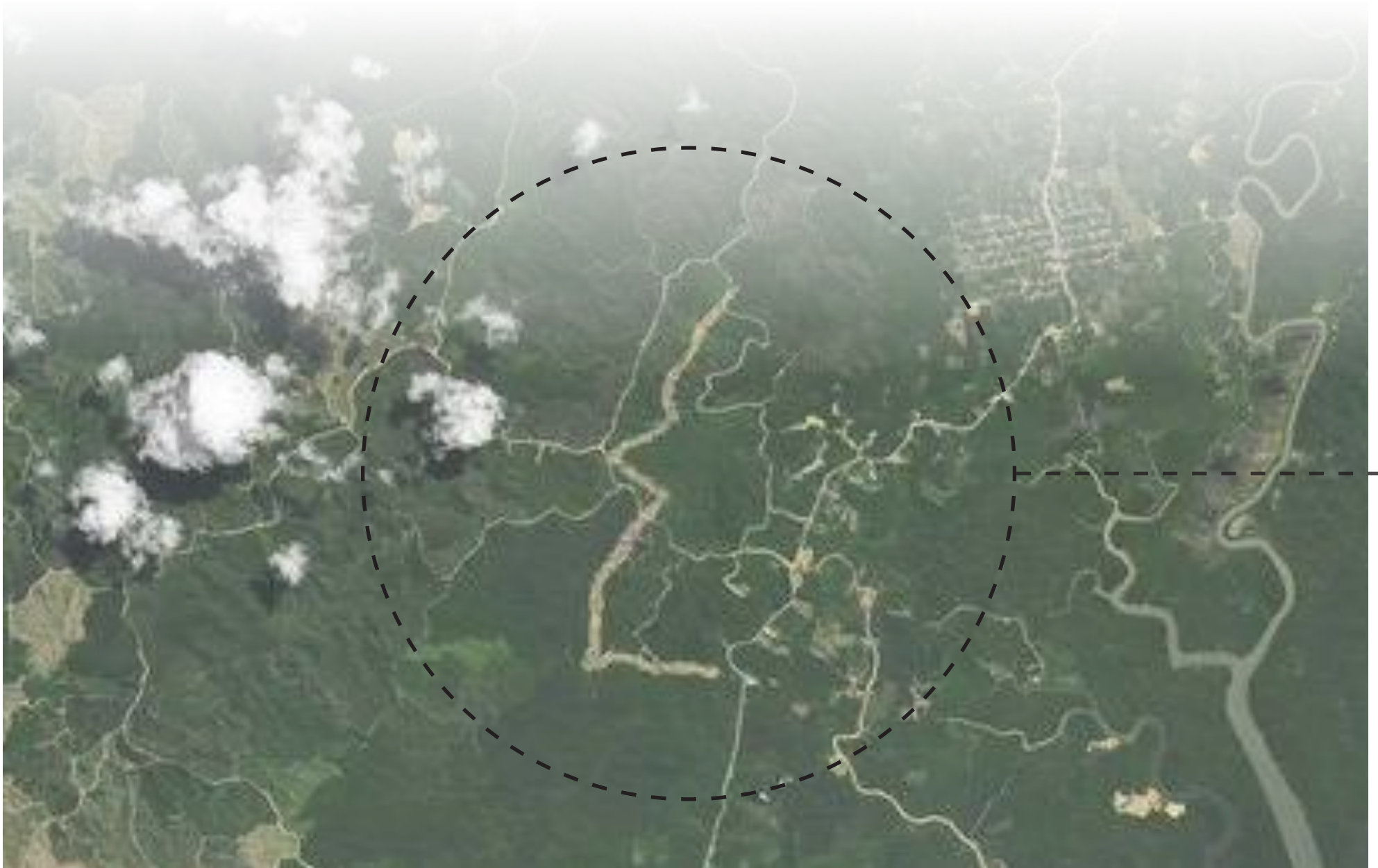
Existing road infrastructure with good quality



Figure 3.29 Site surroundings existing  
(Source: Author, 2024)

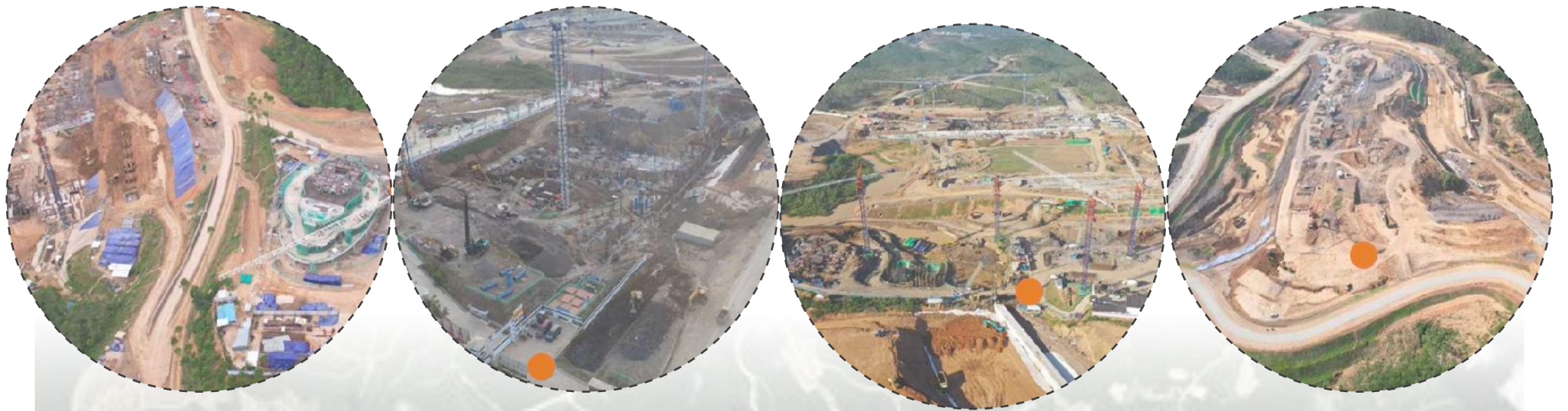
## - Site Morphology

IKN, which is located on the island of Borneo, used to be a production forest as well as a protected forest, which explains that this location is filled with forests. NASA captured images of the IKN location conditions before and after construction work for the relocation of the capital city. It can be seen in the image below how significant the changes to the greenery that previously existed. This explains that in the planning of the relocation there is still a need for forest conservation in order to continue to stabilize and preserve the forest for the good of humans and the environment.



16 April 2022 - before construction

Figure 3.30 Stelite view on IKN before construction  
(Source: cnnindonesia.com)



19 Februari 2024 - after construction

Figure 3.31 Stelite view on IKN after construction  
(Source: cnnindonesia.com)

# | Programs

## - User Analysis



Figure 3.32 User illustration  
(Source: cnnindonesia.com)

In the initial stage, the government plans to move as many as 3,246 State Civil Apparatus (ASN) to the State Capital (IKN). In the long-term planning on 2024-2029, the total ASN that will be transferred to IKN reaches 100,023 people, consisting of 956 state officials, 3,264 high leadership positions, and 95,803 functional positions.

Figure 3.3 Sun path analysis.



In the transfer of ASN to IKN, the Minister of Administrative Reform and Bureaucratic Reform (PANRB) said that the transfer of ASN was carried out together with all ministries with three priorities. Not certain ministries moved first, but all ministries moved gradually. The total ASN to be transferred is 32,937 people consisting of priority 1 transfer with 179 echelon 1 units totaling 11,916 people. In priority 2 mutations with 91 echelon 1 units totaling 6,774 people. Meanwhile, in wave 3, there are 59 ministries / institutions with 378 echelon 1 units and 14,237 ASNs who moved to IKN.

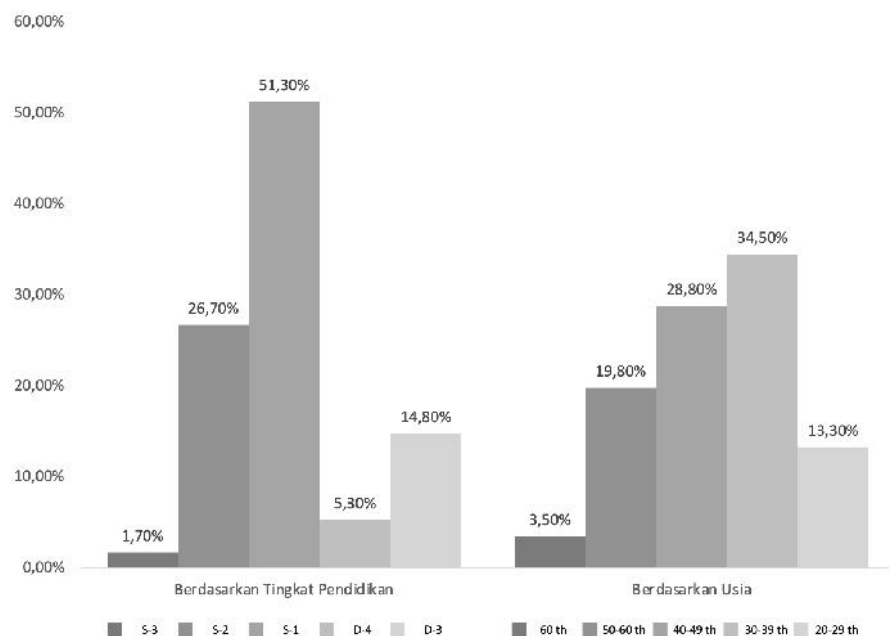


Table 3.3 Distribution of ASN Flats in Indonesia  
(Source: Arus.com, 2022)

In terms of gender, the majority of ASNs who will be transferred to IKN are male, with a percentage reaching 54%. After that, when viewed from the level of education, most Civil Servants (PNS) have an S1 educational background (51.3%), followed by S2 (26.7%), and DIII (14.8%). In addition, the majority of civil servants belong to the age group of 30-39 years (34.5%), followed by 40-49 years (28.8%), and 50-60 years (19.8%) (Adinda, 2022).

In the focus of this study, data is taken based on the provisions of the government regarding the population for ASN on towers in the planning zone. The two zones raised this time each have 26 towers and 5 towers with the same typical between the two. what is different is only the capacity of the number of towers in each zone.

#### Zona A

Allocation	ASN
Total Tower	26 Tower
Total Floor	10-12
Type 98	1.430 Units
Population	4.290

Total unit in a tower:  $1430 : 26 = 55$  units  
 Total floor: 10 (housing), and 2 (public/ social space)  
 Total unit in a floor:  $55 : 10 = 5,5 \sim 6$  units  
 Total person in a tower:  $4.290 : 26 = 165$  persons  
 Total person in a floor:  $165 : 10 = 16,5 \sim 17$  persons  
 Total person/ unit:  $= 165 : 55 = 3$  persons

#### Zona B

Allocation	ASN
Total Tower	5 Tower
Total Floor	10-12
Type 98	275 Units
Population	825

Total unit in a tower:  $275 : 5 = 55$  units  
 Total floor: 10 (housing), and 2 (public/ social space)  
 Total unit in a floor:  $55 : 10 = 5,5 \sim 6$  units  
 Total person in a tower:  $825 : 5 = 165$  persons  
 Total person in a floor:  $165 : 10 = 16,5 \sim 17$  persons  
 Total person/ unit:  $= 165 : 55 = 3$  persons



Figure 3.33 User description  
(Source: Author, 2024)

As for the transfer of ASN to IKN, it is also necessary to consider those who are married. From the ministry stated to bear and give permission for ASN to bring 1 wife, 2 children, and 1 person for household assistants. With the provisions that have been imposed in terms of financing and what will be borne by him and his family in the future. So that in providing adequate housing for each ASN, it is necessary to consider how the division of space and its provision in accommodating his family as well..

On the other hand, the government is also considering how to move ASNs who are single. At the stage of moving ASN to IKN, the government prioritises ASN with single status in its transfer because those who are married will definitely pay attention and consider how their children will go to school and others, so that at the initial stage single ASNs are prioritised first. Reported from the national news media kompas that in the first stage the government will transfer 11,916 ASNs, 50% of which are single ASNs.

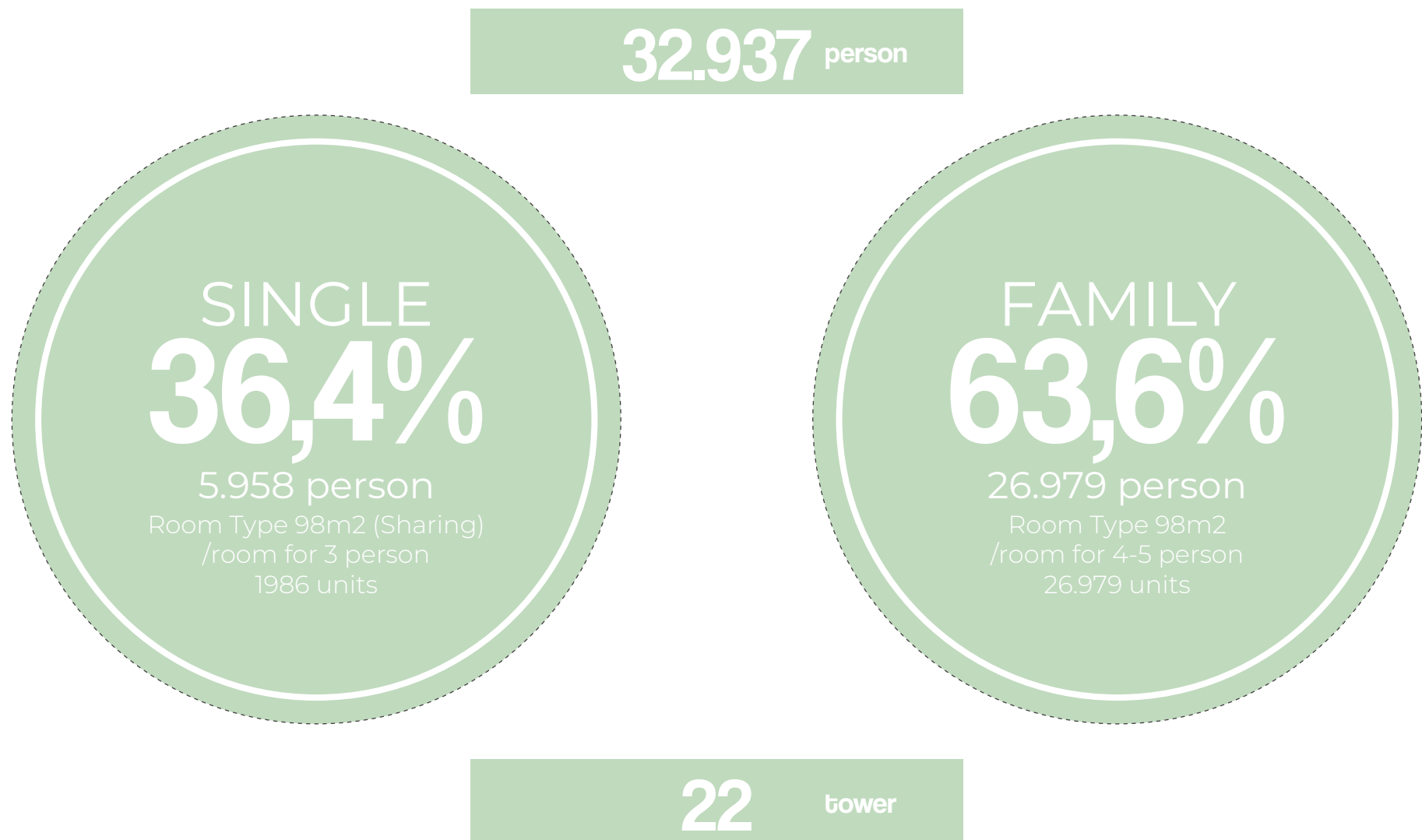


Figure 3.34 User type percentage  
(Source: cnnindonesia.com)

## - Space Requirements

The standard in determining the comfort of movement space for Indonesians was determined by research conducted by the Centre for Settlement Research and Development in 2010. research (2011) resulted in a minimum area of a simple house based on the simulation of movement comfort of 47.56 m<sup>2</sup> or 11.89 m<sup>2</sup> per person (assuming 1 family consists of 4 people).

Table 3.3 Standar Luas Lantai Per Jiwa.

	Standard/ Person (m <sup>2</sup> )	Housing Unit	Total Area (m <sup>2</sup> )
Minimum	7,2	28,8	60
Indonesia	9	36	60
International	12	48	60

Source: Pedoman Umum Rumah Sederhana Sehat (Nomor 403/KPTS/2002 Keputusan Menteri Kipraswil 2002 tentang RSH)

In the regulations stated by the IKN authority in terms of the number of families that can be brought into IKN for ASNs are ASN, wife (1), children (2), and household assistants (1). From the regulations set out above, the government provides a hunia for ASN with a unit type of 98 m<sup>2</sup>. This type of residence is based on the division of space with the following comfort.

Table 3.3 Residential Floor Area Per Person

Total Area	Minimum Area	Maksimum Area
Adult	7,2 m <sup>2</sup>	12 m <sup>2</sup>
Children	3,6 m <sup>2</sup>	6 m <sup>2</sup>
Occupancy area	48 m <sup>2</sup>	98 m <sup>2</sup>
Average residential area		98 m <sup>2</sup>
Occupancy per person (4 persons/house)		12 m <sup>2</sup>
Circulation		20%

The type of residence decided after considering the standard comfort area for people by considering other aspects of activities and also circulation, the type of residence with an area of 98m<sup>2</sup> can greatly optimise the comfort of movement space for its users. In residential work environments, it is very important for planners to pay attention to the selection of space in fulfilling the comfort of movement for its users.

## Needs of Space (Public)

Room	Space Requirement	Standard (sqm)	Capacity	Quantity	Area (sqm)
Lobby	Reception room	1	10	1	10
	Lounge	2	20	1	40
	Lobby area:				50
	Lobby + Circulation (20%):				60
Worship Space	Prayer room	2	10	1	20
	Ablution room	2	5	2	20
	Mushalla area:				40
	Mushalla + Circulation (20%):				48
Parking Area	Residents area	2/ motorbike			-
		13/ car			-
	Parking area:				-
	Parking +Circulation (20%):				-
Public Toilet	Female toilet	3	1	5	15
	Male toilet	3	1	5	15
	Difable toilet	4	1	2	8
	Area:				38
	Area + Circulation (20%):				46
Public Health Clinic	Pharmacy	2	4	1	8
	Poly-clinic	4	6	1	24
	Receptionist	3	4	1	12
	Waiting area	2	10	1	20
	Area:				64
	Area + Circulation (20%):				77
Mini Market	Retail	3	10	1	30
	Storage	3	2	1	6
	Casheer	2	2	1	4
	Area:				40
	Area + Circulation (20%):				48
Communal Space	Play ground	5	10	1	50
	Garden	4	10	1	40
	Seating area	2	15	1	30
	Area:				120
	Area + Circulation (20%):				144

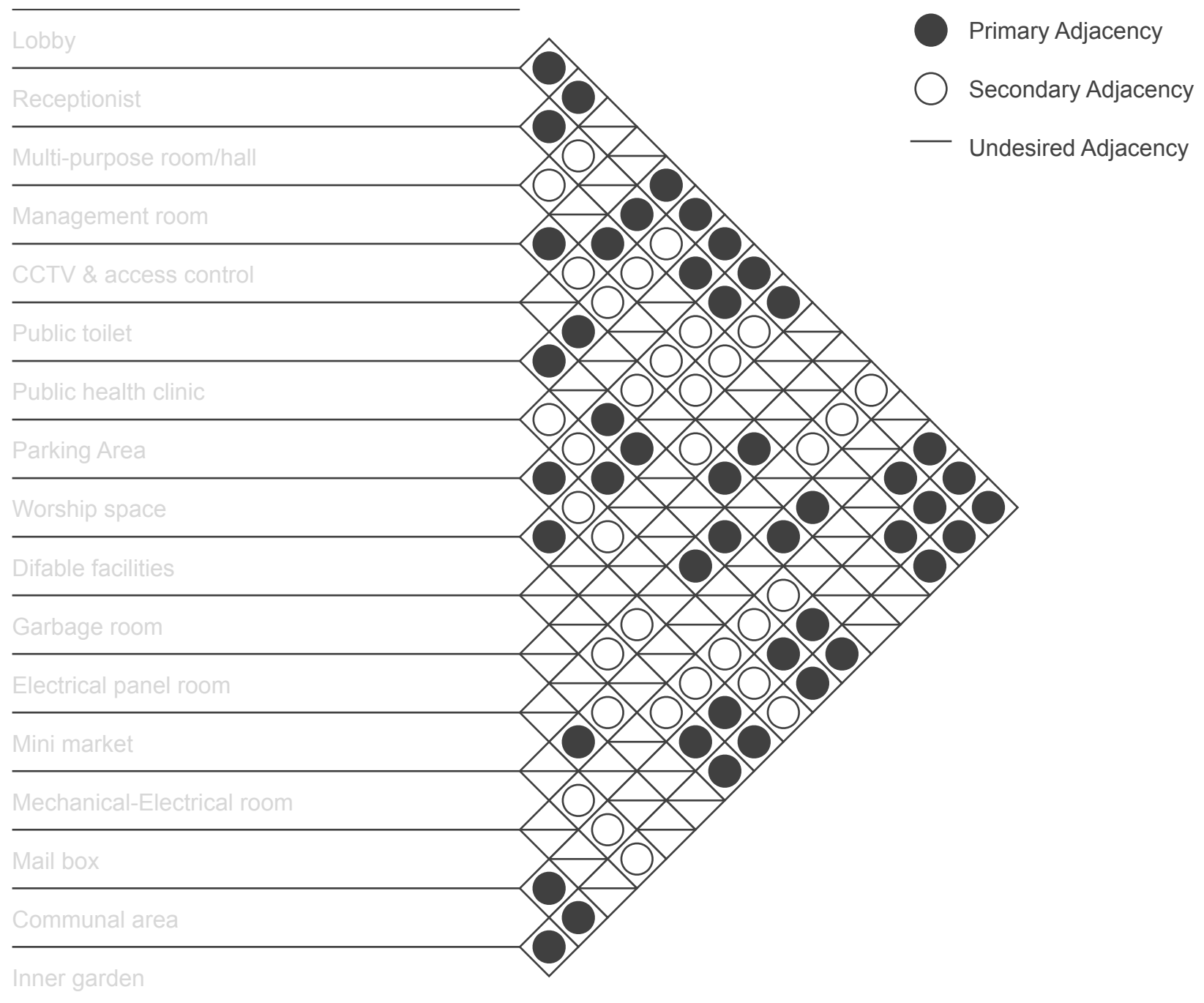
### Needs of Space (Semi-Public)

Room	Space Requirement	Standard	Capacity	Quantity	Area
Management Room	Desk office	4	1	10	40
	Locker room	3	1	10	30
	Meeting room	3	10	1	30
	Front office	2	2	1	4
	Area:				104
	Area + Circulation (20%):				125
CCTV & Access Control	Control room	3	3	1	9
	Area:				9
	Area + Circulation (20%):				11
Garbage Room	Trash separation room	3	3	1	9
	Area:				9
	Area + Circulation (20%):				11
M.E Room	Control Room	3	3	1	9
	Area:				9
	Area + Circulation (20%):				11
Ware House	Storage	3	3	1	9
	Area:				9
	Area + Circulation (20%):				11

### Needs of Space (Private)

Room	Space Requirement	Standard	Capacity	Quantity	Area
Residential Units	Living room	4	4	1	16
	Dining room	3	4	1	12
	Kitchen	5	4	1	20
	Bed room	5	2	3	30
	Bath room/ Toilet	2	1	2	4
	Laundry room	3	1	1	3
	Storage	3	1	1	3
	Area:				88
	Area + Circulation (20%):				106

## Room Adjacency



## | Form, Structure & Construction

### - Spatial Organization

#### Designing with space syntax

The space syntax for space programming in Grasshopper involves utilising algorithmic design techniques to analyse and optimise spatial configurations. Using Grasshopper, a visual programming tool within Rhino, it is possible to script and manipulate spatial elements to evaluate aspects such as visibility, accessibility, and connectivity within a given architectural space. This approach uses graph theory and computational geometry to create models that help in understanding the spatial relationships and flows between different spaces. By inputting certain parameters and criteria, such as intended use of space and movement patterns, Grasshopper can generate layouts that maximise efficiency and user experience, facilitating data-driven decision-making in the architectural design process.

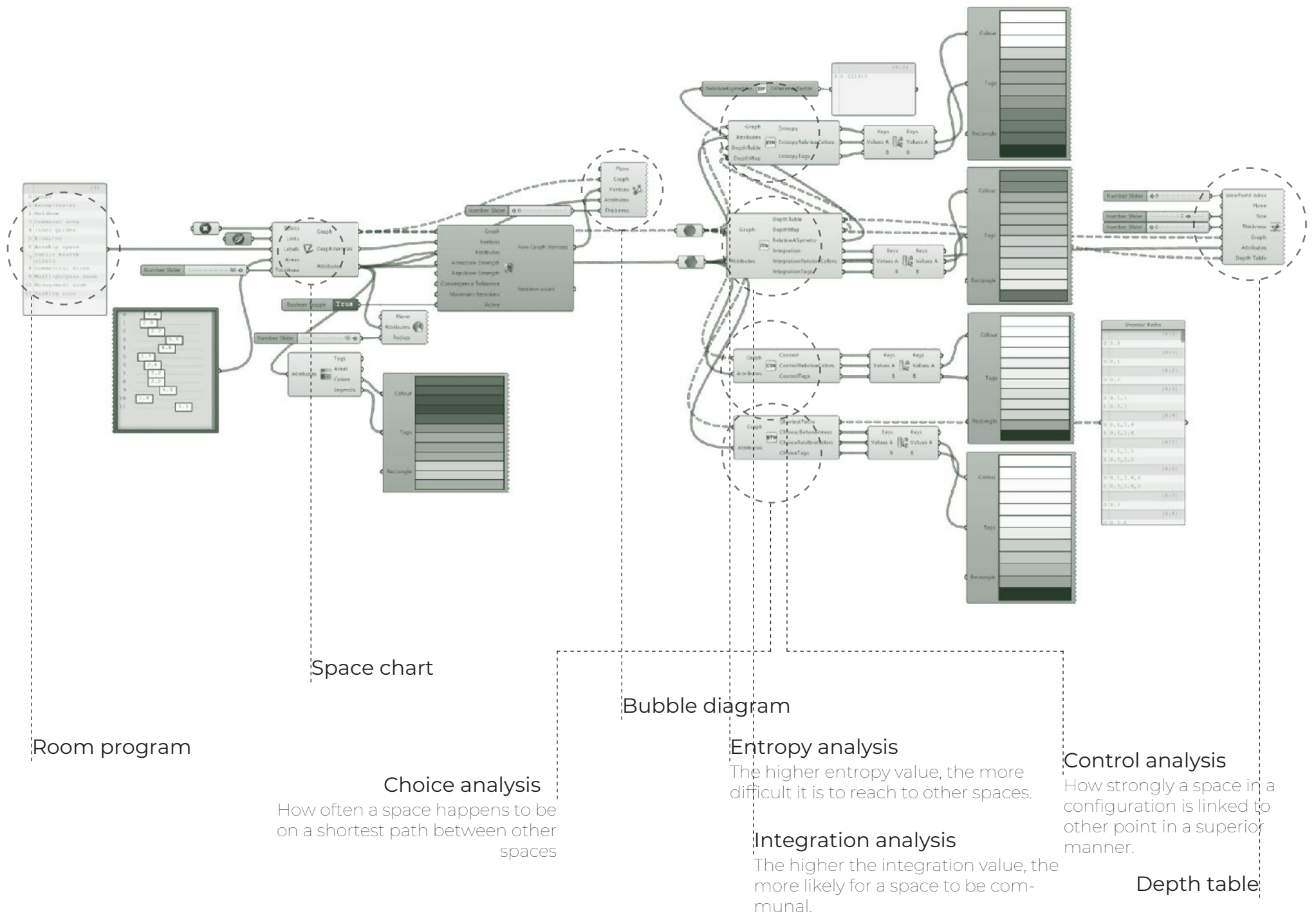
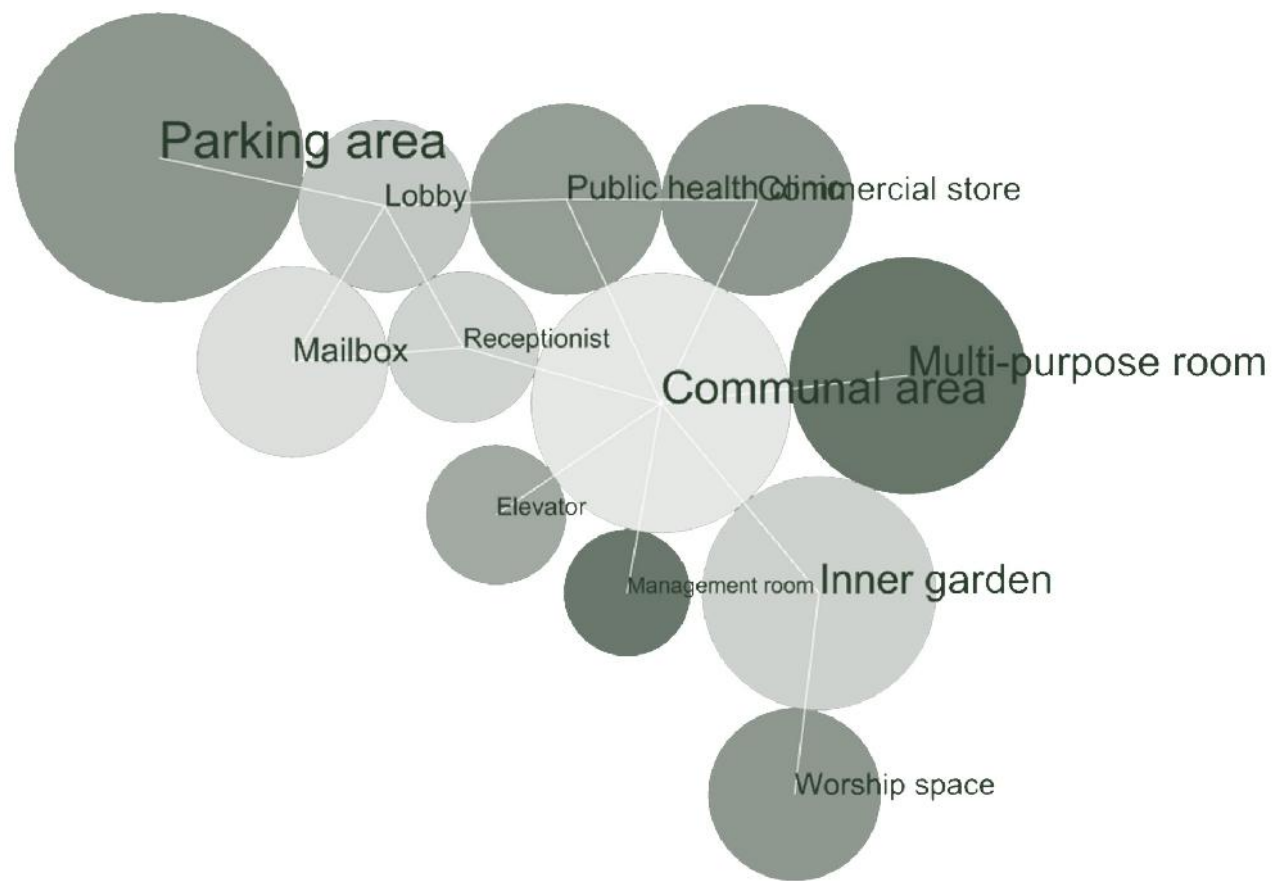
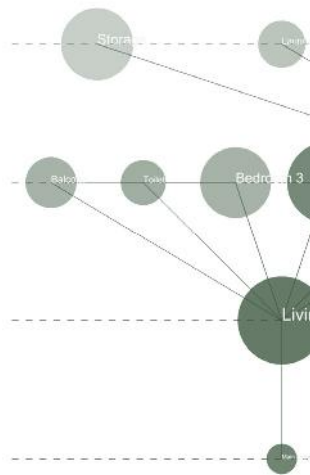
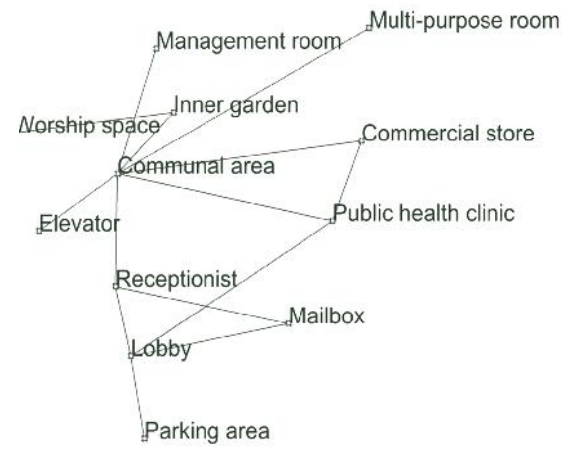


Figure 3.35 Space syntax grasshopper script  
(Source: Author, 2024)

## Spatial Organization Analysis 1

In the first alternative, the spatial organisation analysis organises the building functions using a standard area to provide comfort for users. Circulation is arranged by analysing users in a community housing and also fulfilling rooms that can help users meet their needs. The chart on the side shows how the space programme within the scope of the building is arranged. By making the user cycle and space requirements according to the standard as parameters in producing a space programme that is more efficient in all respects. Of course, this is obtained by connecting interrelated space functions to each other.



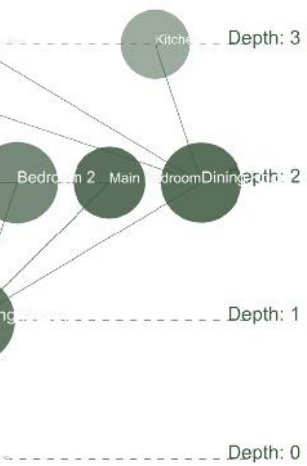
The bubble diagram above explains the correlation and interrelationship between spaces by showing their relationship through lines. Then the radius of the bubble diagram shows the scale area of the space. The more lines connected to the bubble is considered a room with a high level of communal.

The table on the side explains the higher the value of a room obtained, the higher the possibility in between the space is difficult to reach. Then the next table explains the value of integration between spaces in the function space of this building scope.

Colour	Communal area: 1.252
	Receptionist: 1.252
	Public health clinic: 1.252
	Commercial store: 1.252
	Multi-purpose room: 1.252
	Management room: 1.252
	Elevator: 1.597
	Inner garden: 1.66
	Mailbox: 1.756
	Lobby: 1.786
Rectangle	Worship space: 1.827
	Parking area: 2.057

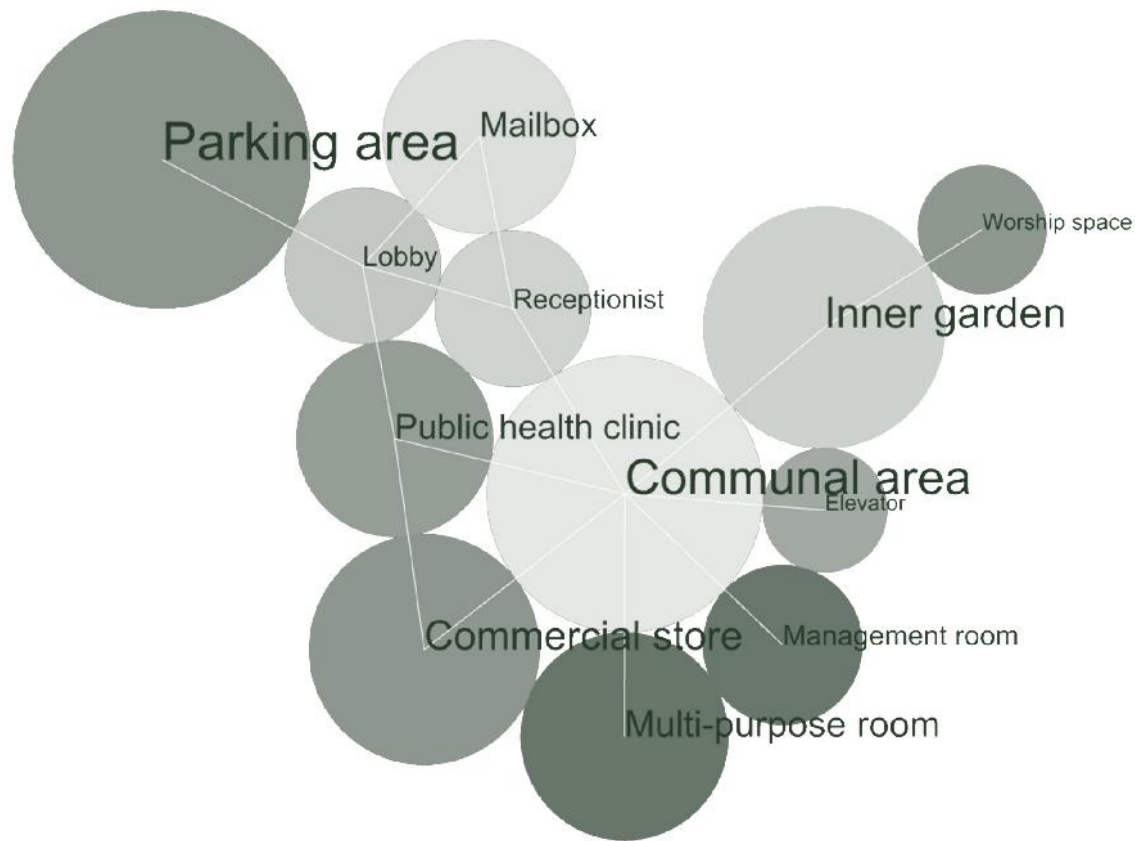
Colour	Kitchen: 0.885
	Laundry Area: 0.885
	Storage: 0.885
Tags	Bedroom 3: 1.106
	Toilet: 1.106
	Main Entrance: 1.106
	Bedroom 2: 1.106
	Balcony: 1.206
Rectangle	Main Bedroom: 1.206
	Dining Room: 2.212
	Living Room: 4.423

Figure 3.36 Space synt...  
(Source: Au...)



## Spatial Organization Analysis 2

The second alternative shows how if the space provided is still remaining or if previously referred to the comfort standard, in this alternative explains the optimisation of the use of available space. So it can be concluded by looking at the programming between the two alternatives to create connectivity and relationships between rooms can be optimised.



Colour	Toilet : 21
	Kitchen: 21
	Laundry Area: 21
	Balcony: 21
	Storage: 21
Tags	Bedroom 3: 21
	Main Entrance: 21
	Main Bedroom: 21
	Bedroom 2: 21
Rectangle	Dining Room: 69
	Living Room : 97

Colour	Living Room : 0.926
	Dining Room: 1.008
Tags	Toilet : 1.303
	Kitchen: 1.303
	Storage: 1.303
	Laundry Area: 1.303
	Main Entrance: 1.303
	Bedroom 2: 1.303
	Bedroom 3: 1.303
	Balcony: 1.475
Rectangle	Main Bedroom: 1.475

The correlation between spaces is denser and makes it easier for users to understand the function of space by planning the flow from function to function according to the function of spaces that have a close correlation in function. Then the table beside explains the closest route in reaching other spaces along with an explanation of the attachment and relationship between one function and the other.

## Unit Scope

The space syntax for space programming in Grasshopper involves utilising algorithmic design techniques to analyse and optimise spatial configurations. Using Grasshopper, a visual programming tool within Rhino,

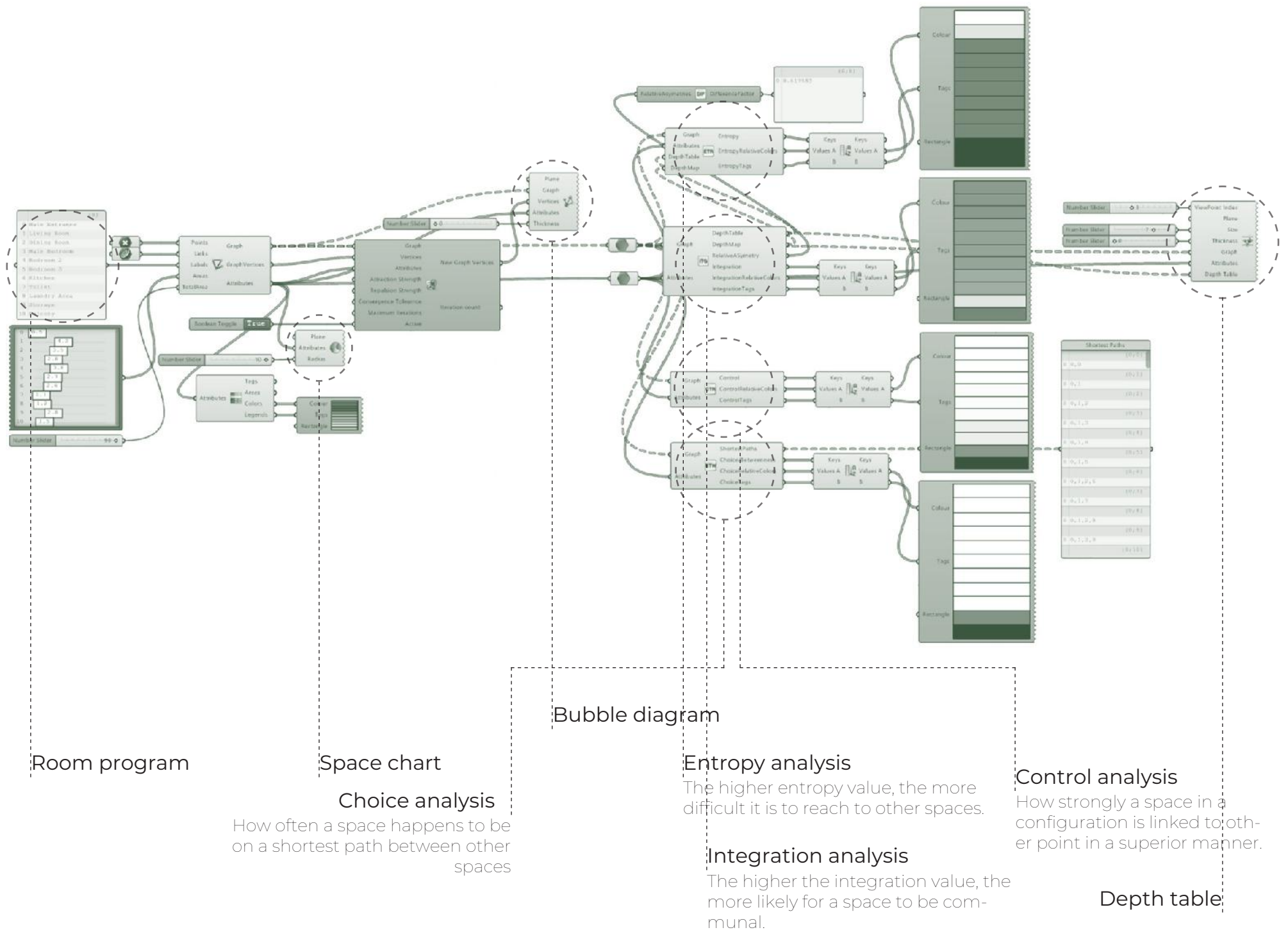
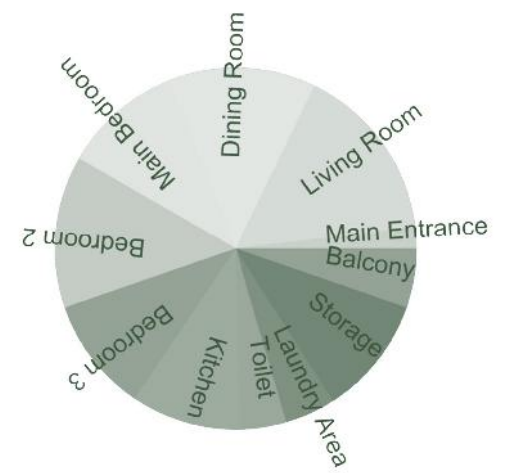
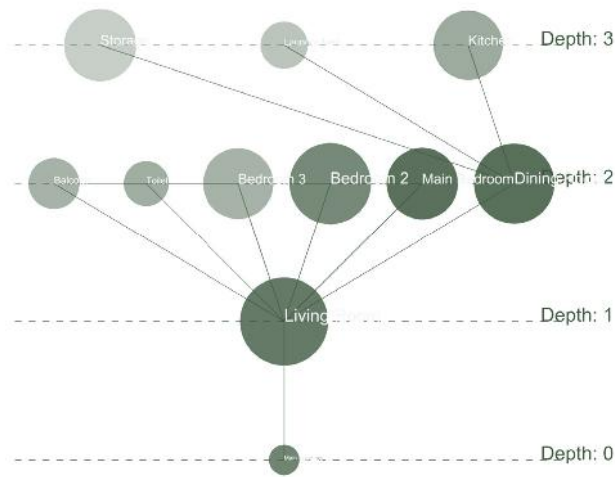
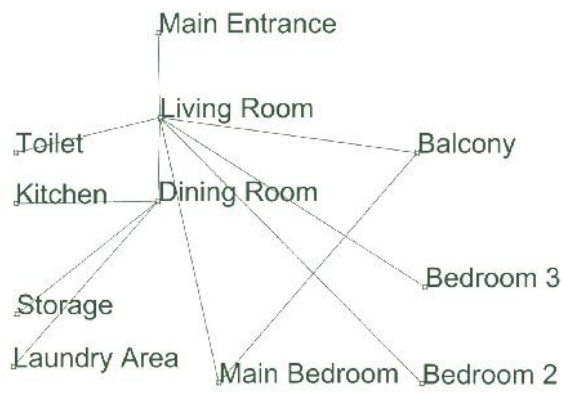


Figure 3.37 Space syntax grasshopper script  
(Source: Author, 2024)



Colour	Bedroom 2: 0.143
	Bedroom 3: 0.143
Tags	Toilet: 0.143
	Main Entrance: 0.143
	Laundry Area: 0.25
	Kitchen: 0.25
	Storage: 0.25
	Balcony: 0.643
	Main Bedroom: 0.643
Rectangle	Dining Room: 3.143
	Living Room: 5.25

Colour	Kitchen: 0.885
	Laundry Area: 0.885
	Storage: 0.885
	Bedroom 3: 1.106
Tags	Toilet: 1.106
	Main Entrance: 1.106
	Bedroom 2: 1.106
	Balcony: 1.206
	Main Bedroom: 1.206
	Dining Room: 2.212
Rectangle	Living Room: 4.423

Colour	Toilet: 21
	Kitchen: 21
	Laundry Area: 21
	Balcony: 21
	Storage: 21
Tags	Bedroom 3: 21
	Main Entrance: 21
	Main Bedroom: 21
	Bedroom 2: 21
	Dining Room: 69
Rectangle	Living Room: 97

Colour	Living Room: 0.926
	Dining Room: 1.008
	Toilet: 1.303
Tags	Kitchen: 1.303
	Storage: 1.303
	Laundry Area: 1.303
	Main Entrance: 1.303
	Bedroom 2: 1.303
	Bedroom 3: 1.303
	Balcony: 1.475
Rectangle	Main Bedroom: 1.475

Figure 3.38 Space syntax grasshopper result  
(Source: Author, 2024)

- Module of Plan

Description	Size (m2)	Quantity	Total (m2)
Sharing Type			
Standard per person	9	3	27
Circulation (20%)			5,4
Total			32,4
Family Type			
Standard per person	9	4	36
Circulation (20%)			7,2
Total			43,2

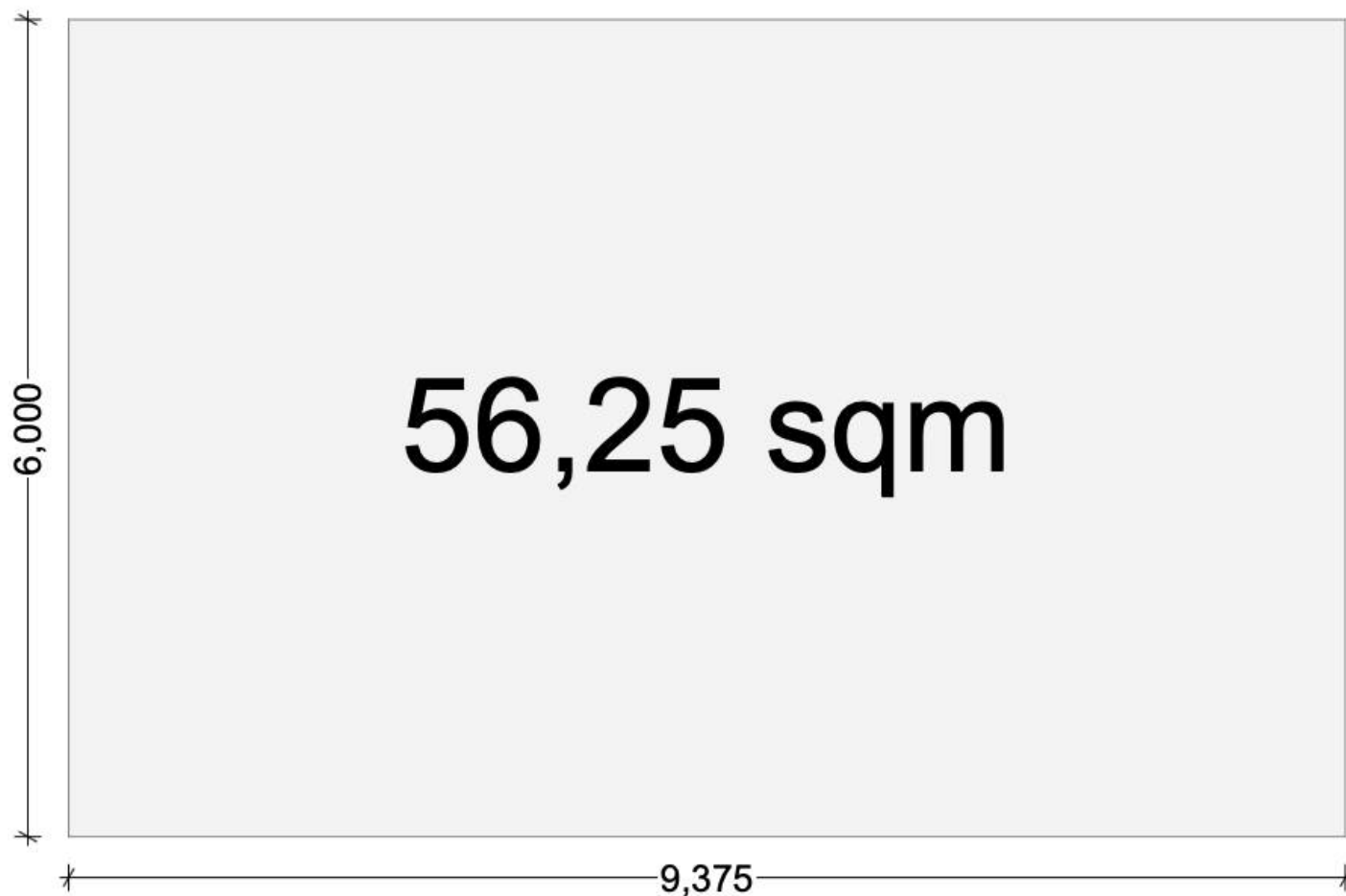


Figure 3.39 Total area of housing plan  
(Source: Author, 2024)

MODULE A			
Description	Size (m2)	Quantity	Total (m2)
1st Floor	56,25	56	3150
2nd Floor		40	2250
3rd Floor		40	2250
4th Floor		30	1687,5
5th Floor		20	1125
6th Floor		12	675
7th Floor		6	337,5
Total		204	11475
Circulation		20%	2295
Subtotal			13770

MODULE B			
Description	Size (m2)	Quantity	Total (m2)
1st Floor	56,25	56	3150
2nd Floor		56	3150
3rd Floor		40	2250
4th Floor		28	1575
5th Floor		14	787,5
Total		194	10912,5
Circulation		20%	2182,5
Subtotal			13095

MODULE C			
Description	Size (m2)	Quantity	Total (m2)
1st Floor	56,25	72	4050
2nd Floor		56	3150
3rd Floor		36	2025
4th Floor		20	1125
Total		184	10350
Circulation		20%	2070
Subtotal			12420

Occupancy Capacity		
MODULE A		
Description	Family	Sharing
Total unit in a building	204	
Total person in a unit	4	3
User percentage	63,60%	36,40%
Total unit	129,744	74,256
	130	74
Total occupants for each unit type	520	222
<b>Total occupants</b>	<b>742</b>	

Occupancy Capacity		
MODULE B		
Description	Family	Sharing
Total unit in a building	194	
Total person in a unit	4	3
User percentage	63,60%	36,40%
Total unit	123,384	70,616
	123	71
Total occupants for each unit type	492	213
<b>Total occupants</b>	<b>705</b>	

Occupancy Capacity		
MODULE C		
Description	Family	Sharing
Total unit in a building	184	
Total person in a unit	4	3
User percentage	63,60%	36,40%
Total unit	117,024	66,976
	117	67
Total occupants for each unit type	468	201
<b>Total occupants</b>	<b>669</b>	

Total ASN	32937	Building Module	Total Occupants
Occupants in ABC	2116	A	742
Total ABC Module	15,56568998	B	705
	16	C	669
		Total	2116

## - Site Contour Parameter

### Site Contour Parameter

The space syntax for space programming in Grasshopper involves utilising algorithmic design techniques to analyse and optimise spatial configurations. Using Grasshopper, a visual programming tool within Rhino,

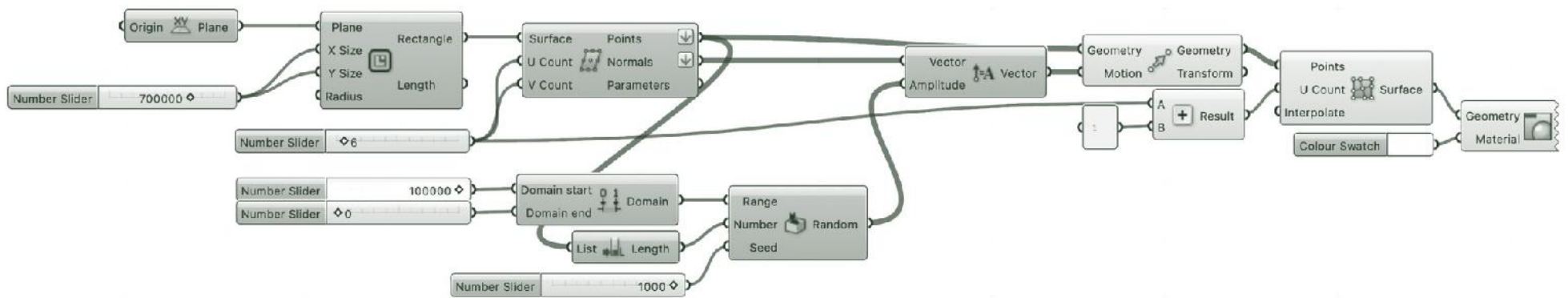
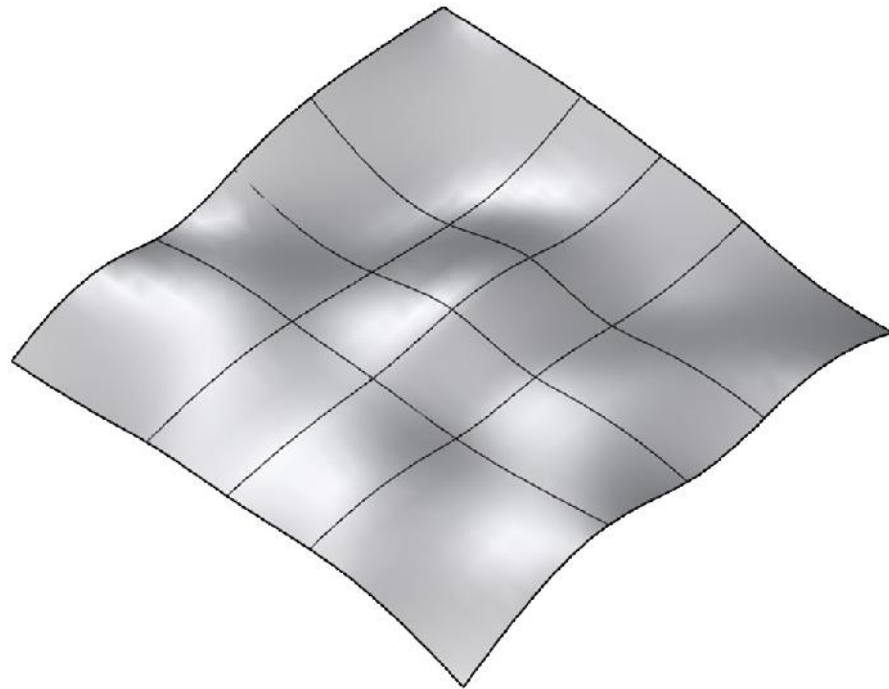
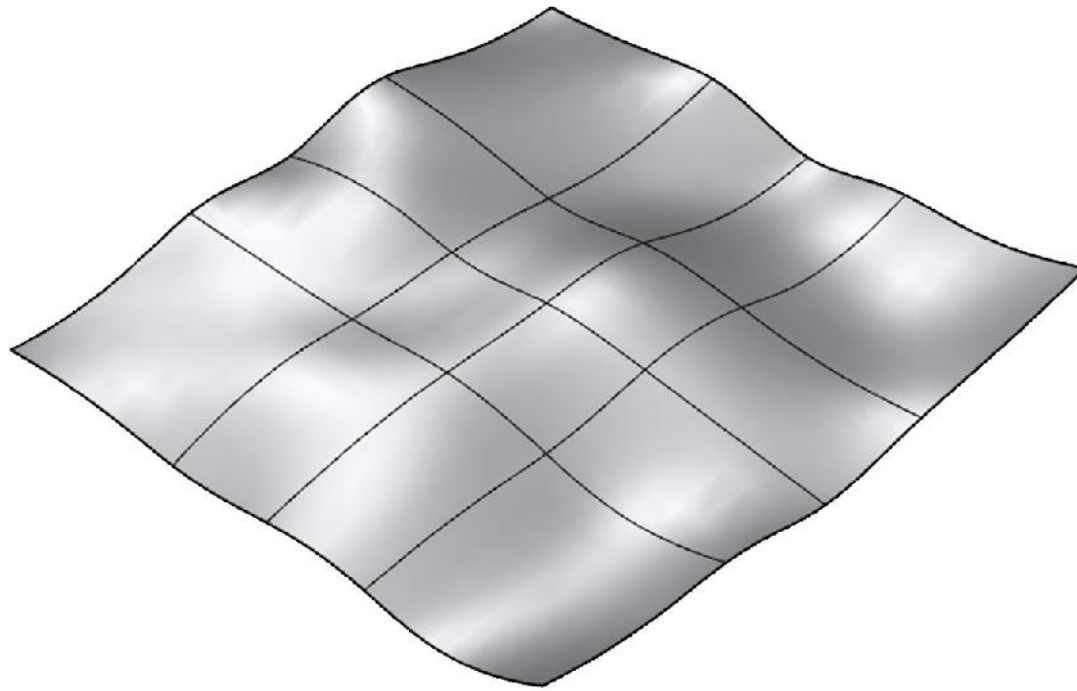


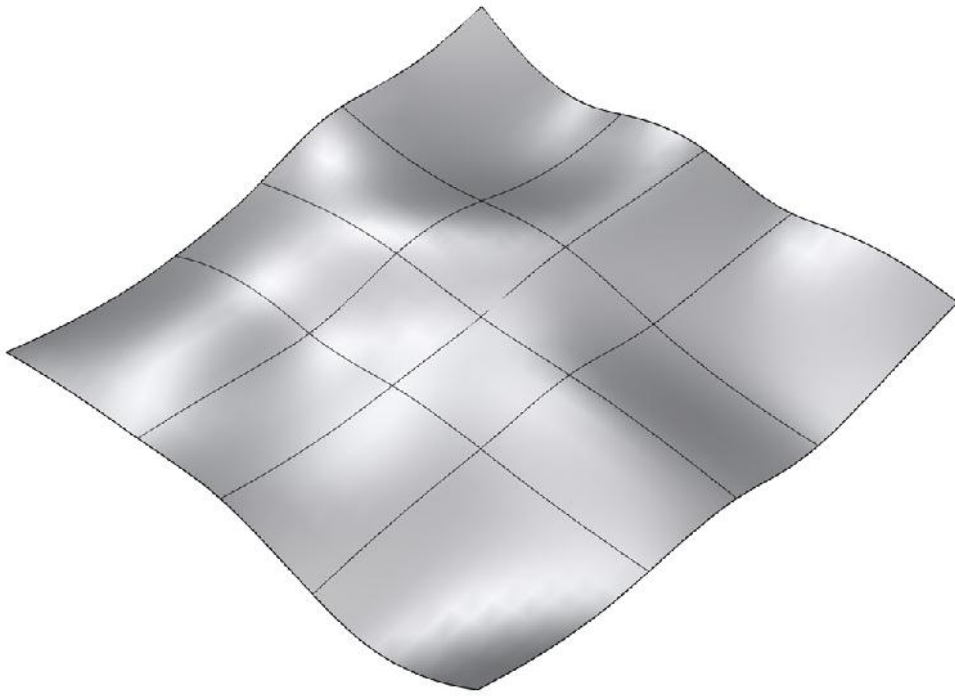
Figure 3.40 Site contour parameter grasshopper script  
(Source: Author, 2024)



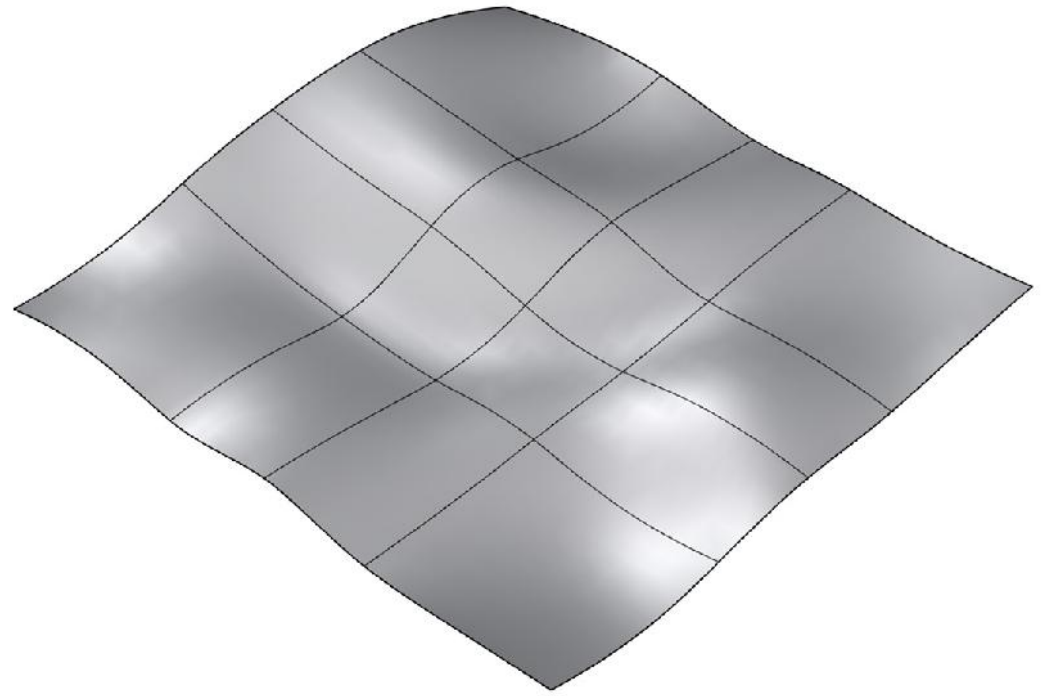
Study cntour 1



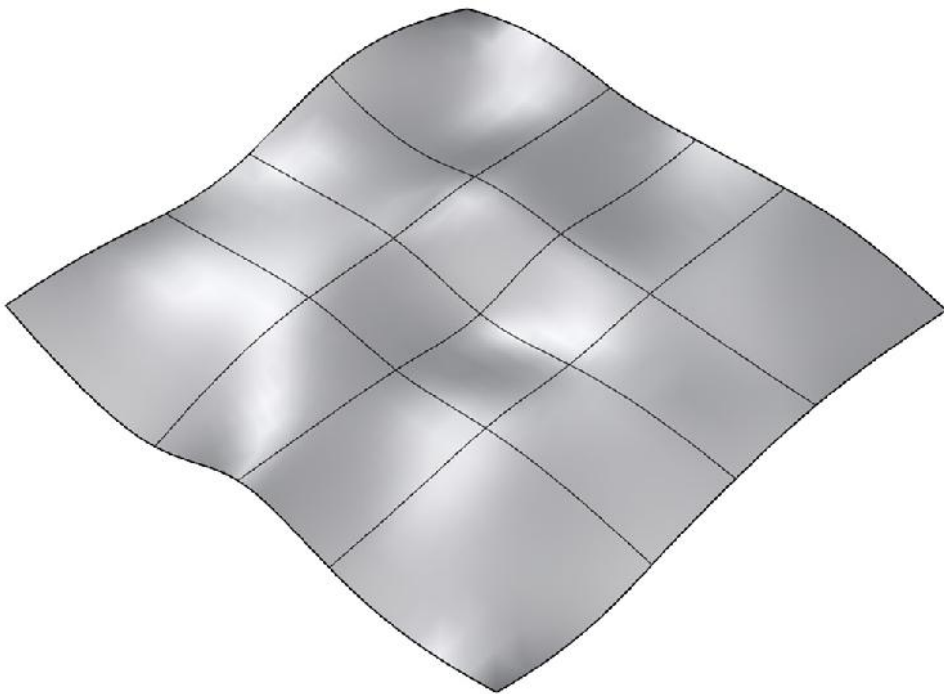
Study cntour 2



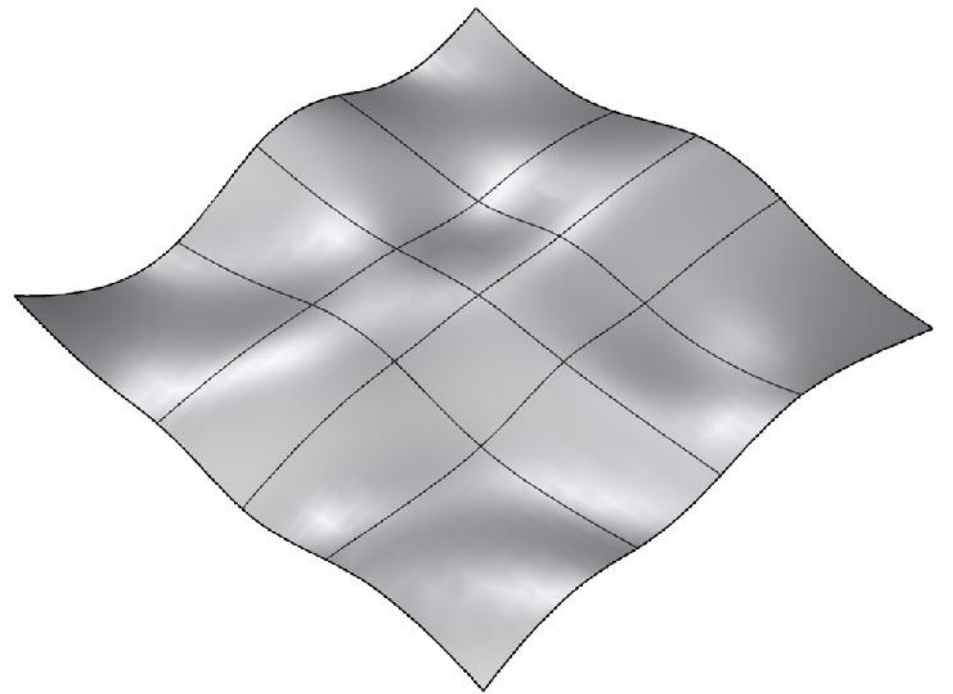
Study cntour 3



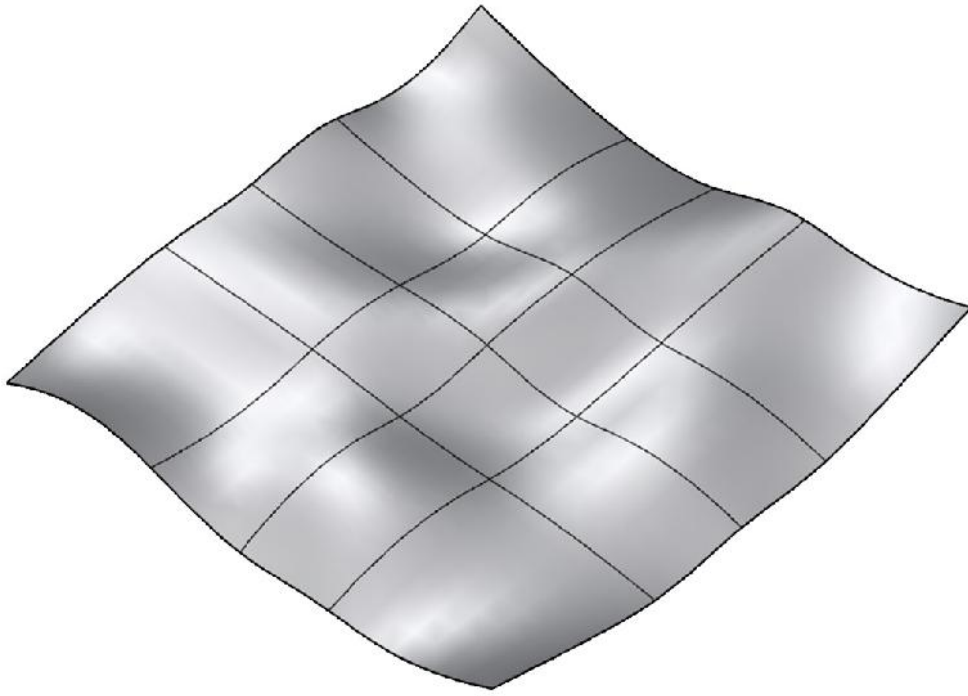
Study cntour 4



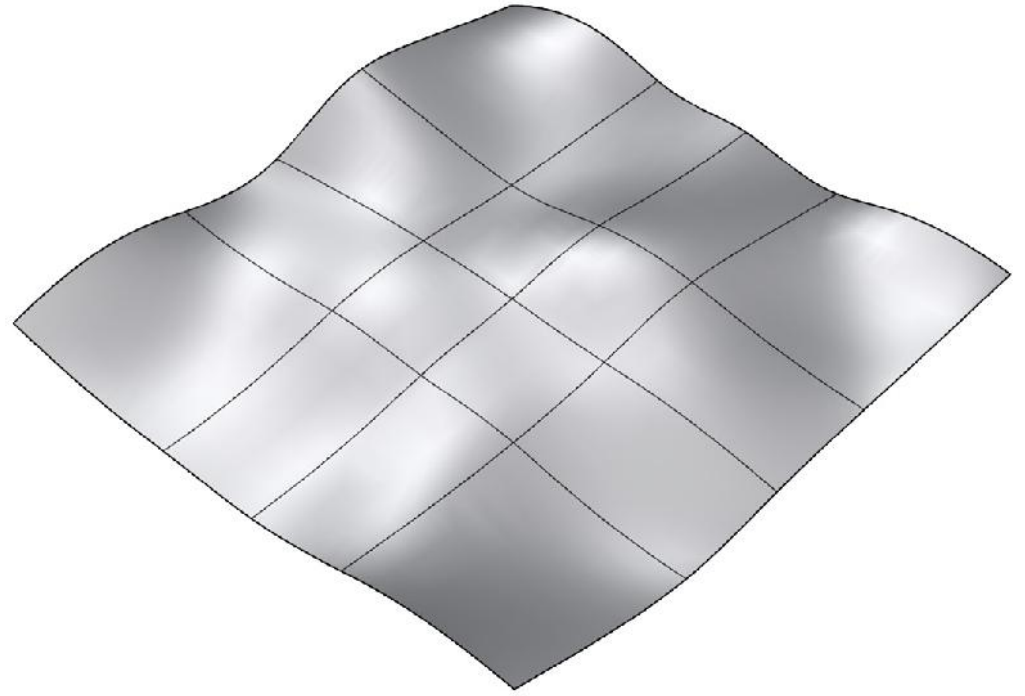
Study cntour 5



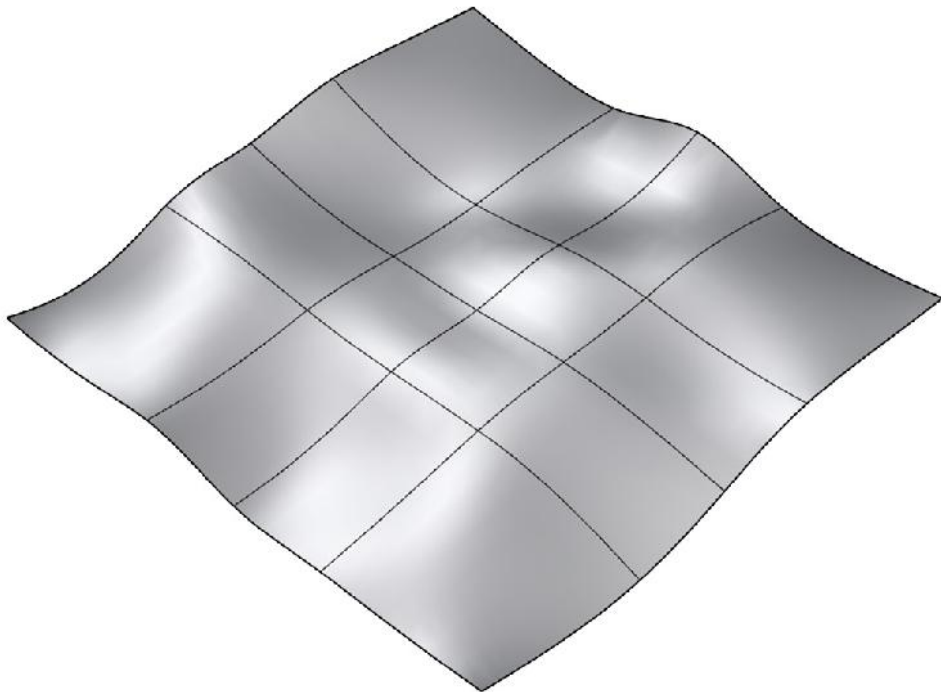
Study cntour 6



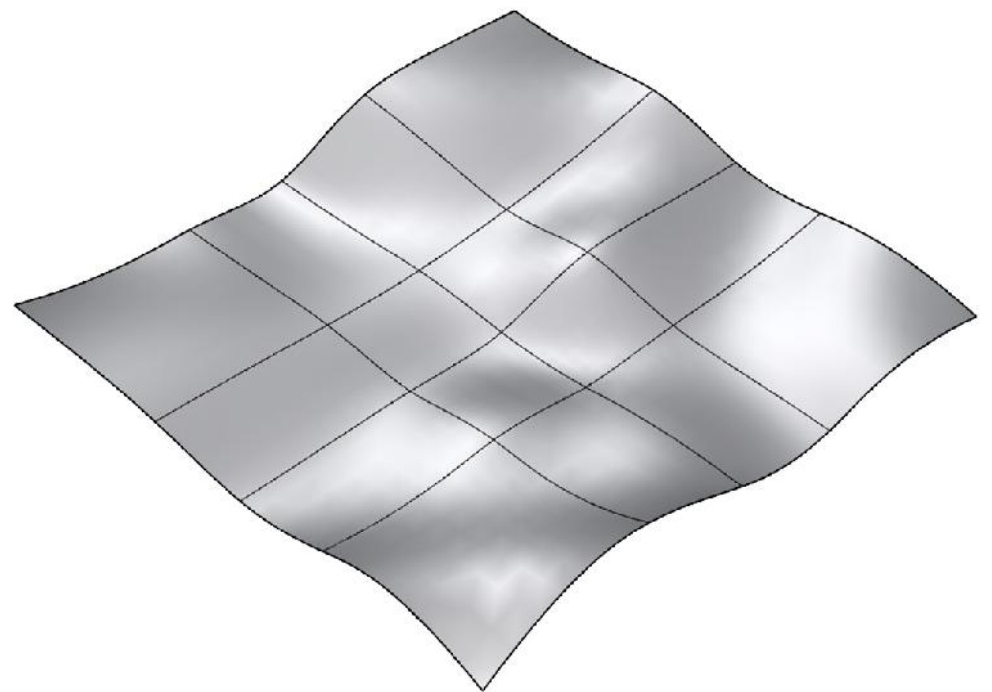
Study cntour 7



Study cntour 8



Study cntour 9



Study cntour 10

Figure 3.41 Site contour study  
(Source: Author, 2024)

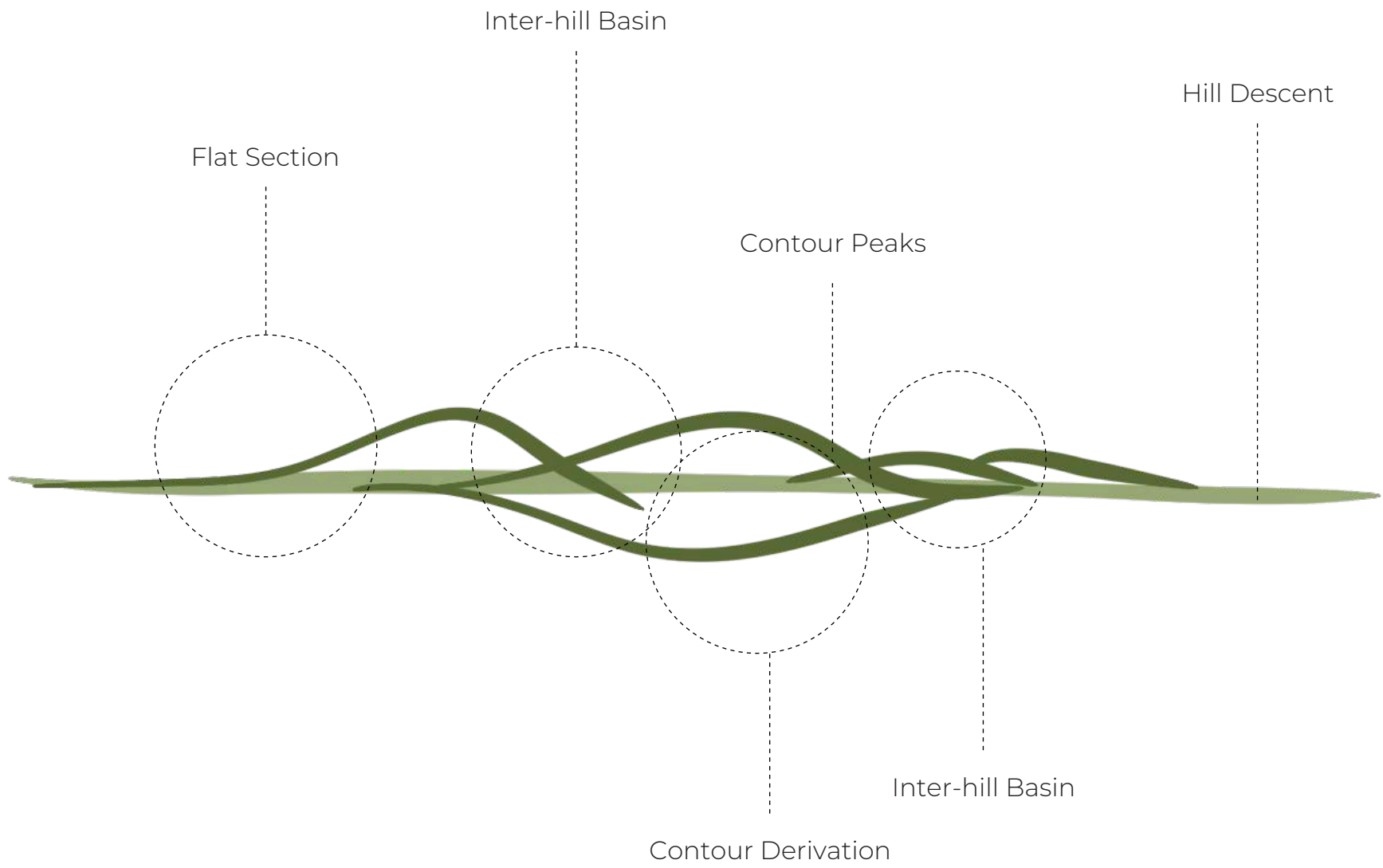


Figure 3.42 Design exploration  
(Source: Author, 2024)

Placement 1



Placement 2



Placement 3

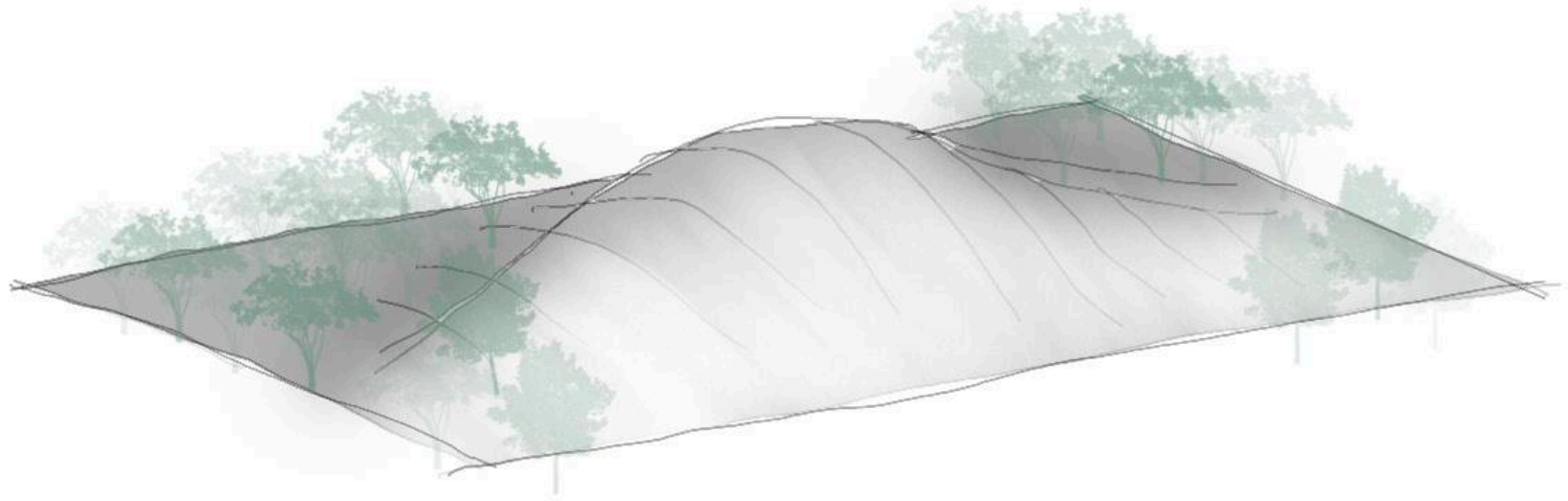


Placement 4

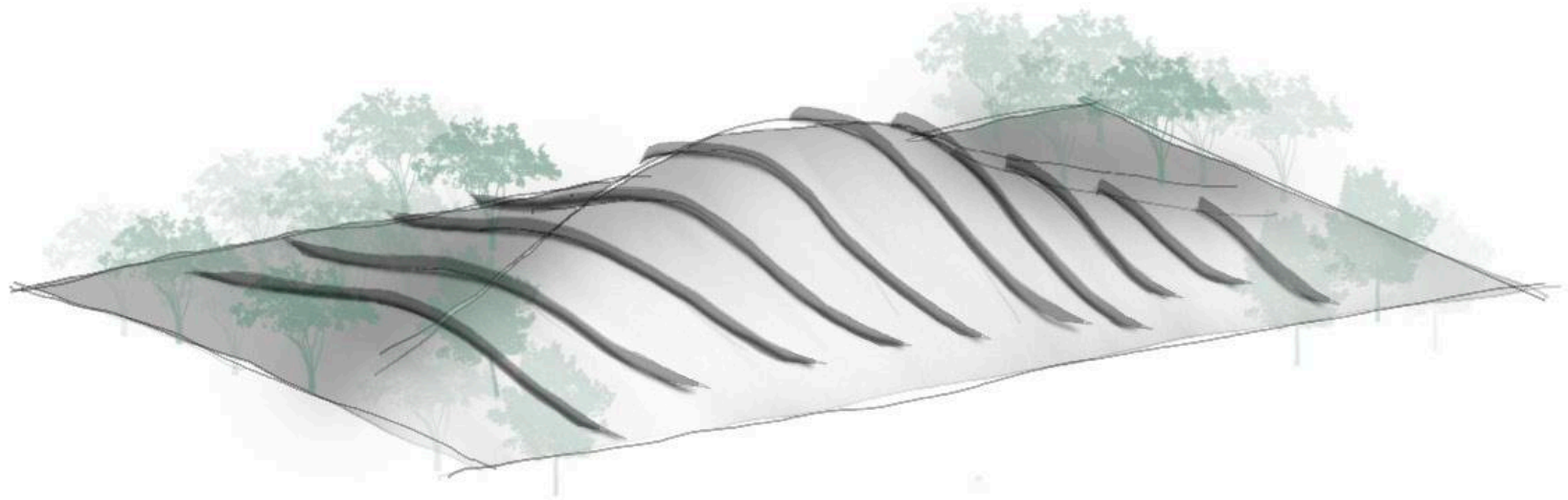


Figure 3.43 Placement of building  
(Source: Author, 2024)

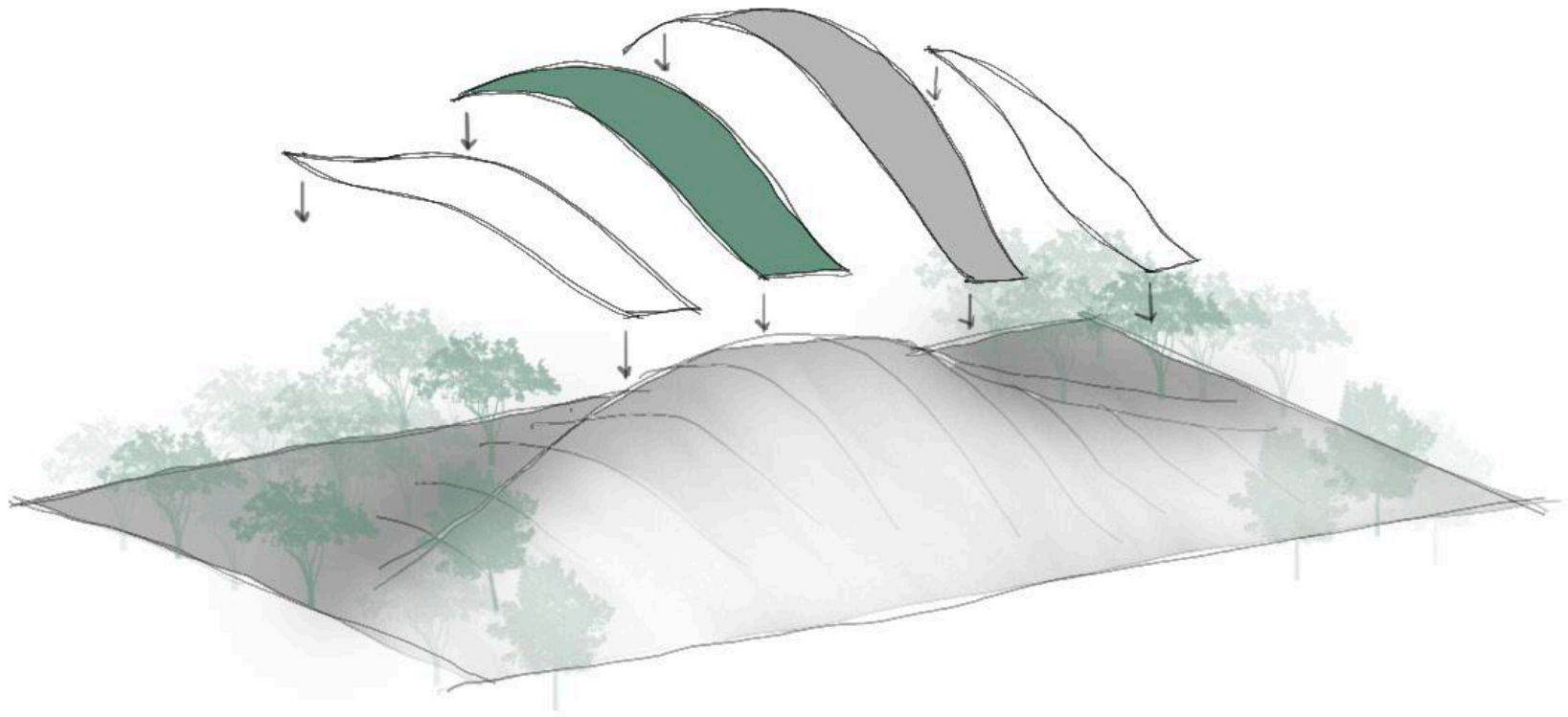
- Building Mass Exploration with Contour-based Parametric



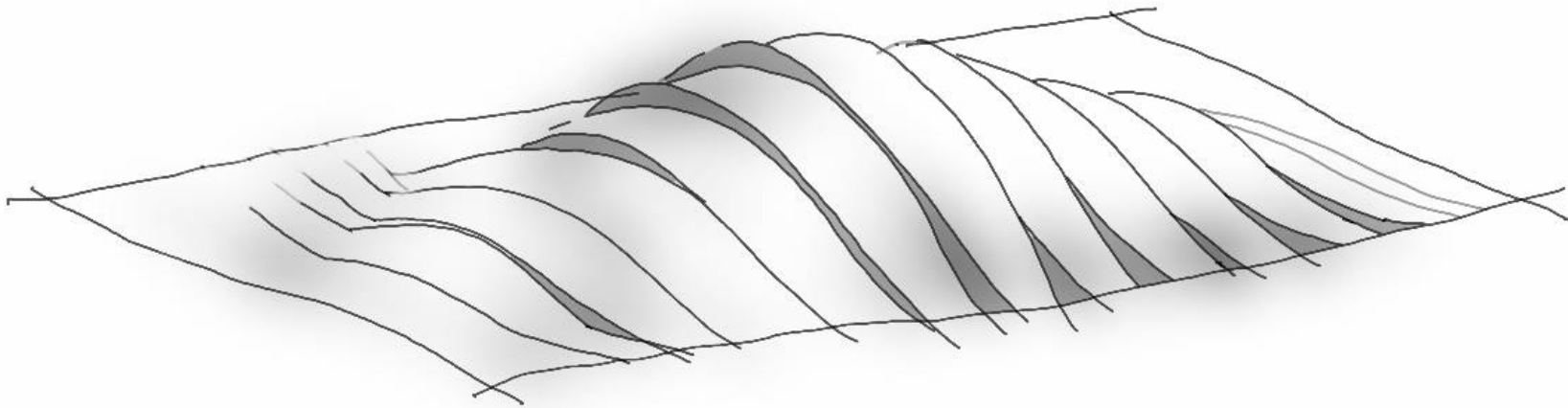
Contour Based Form



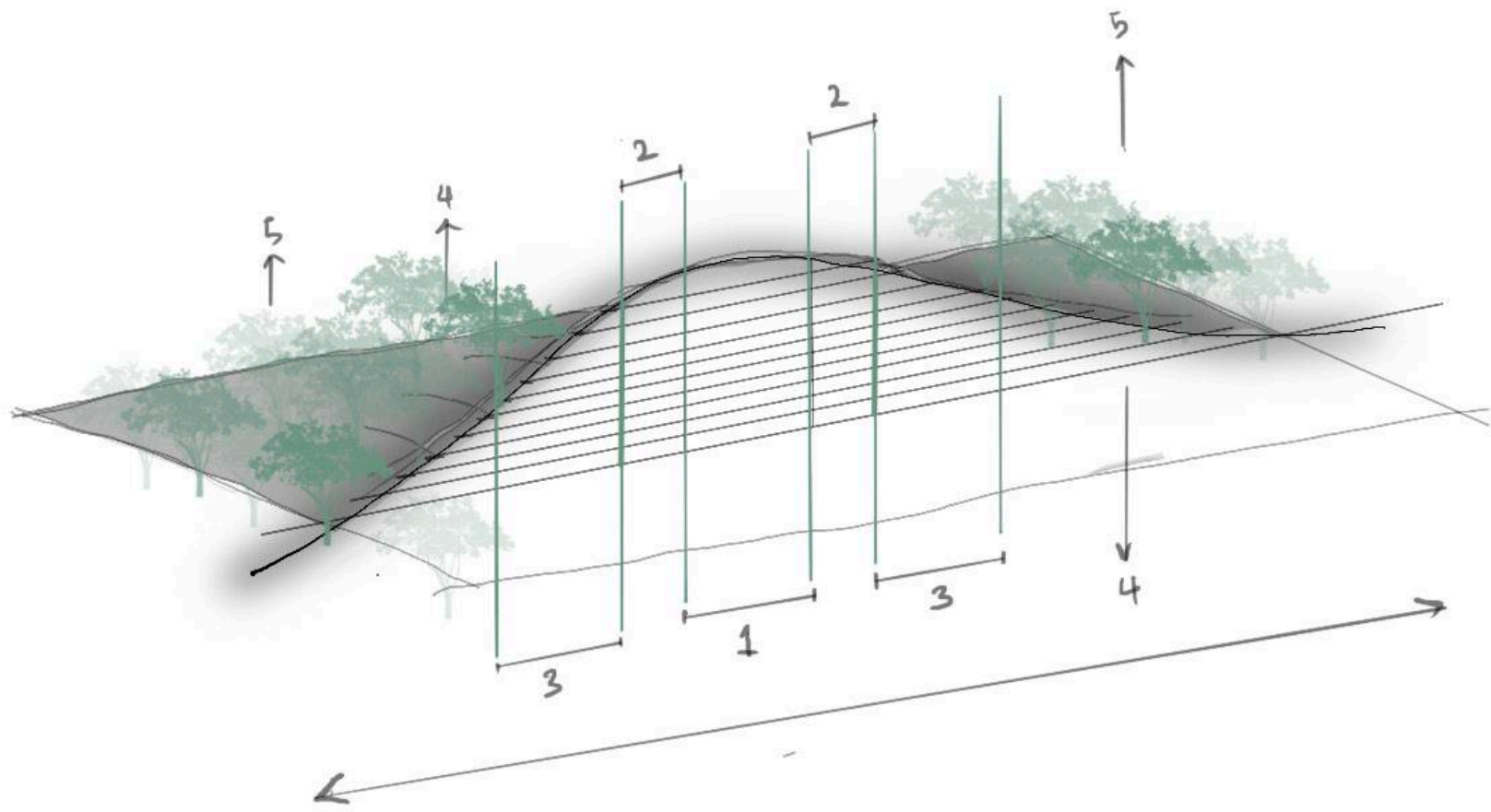
Structure Form



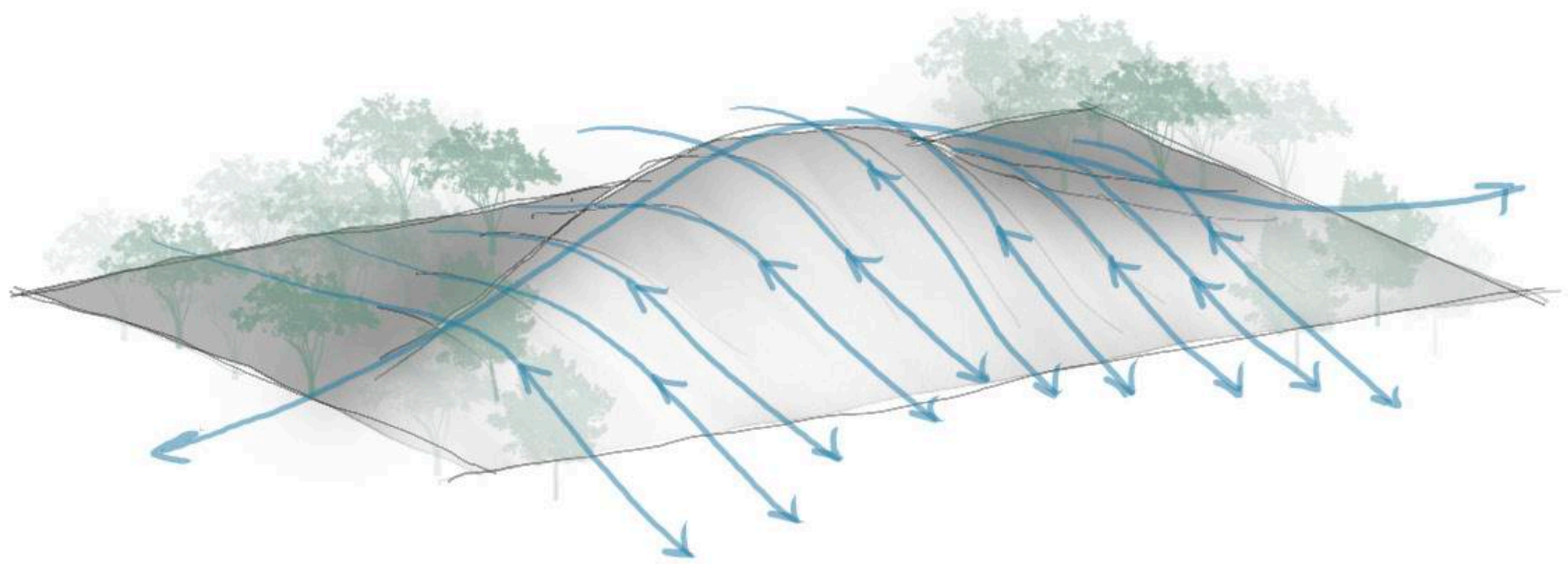
Fabricated Building Skin



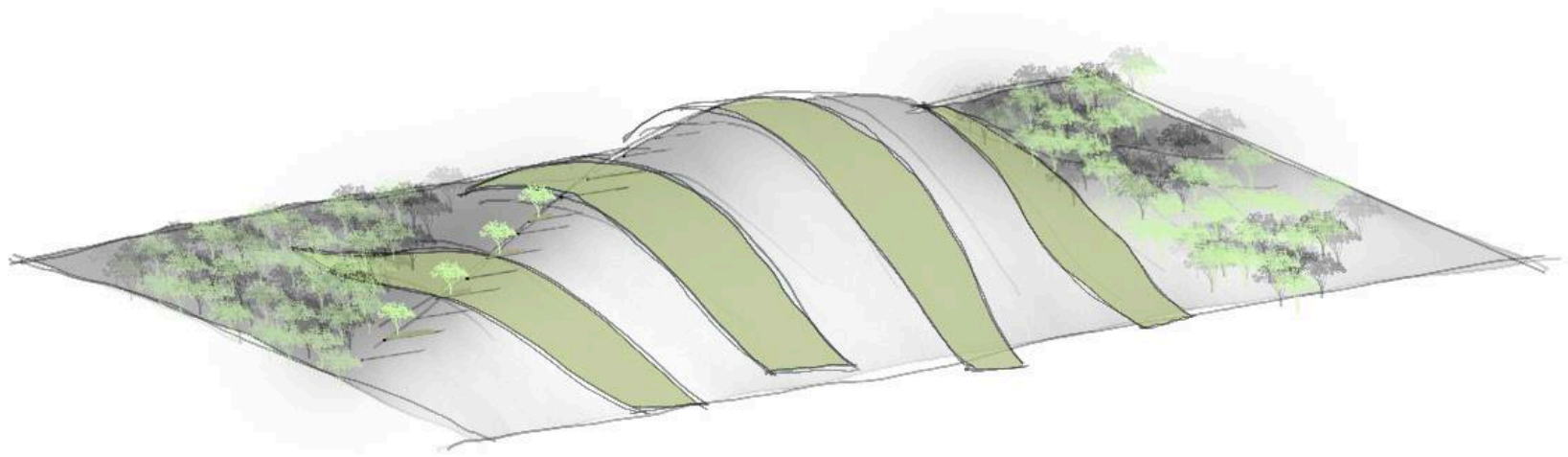
Layering Building Skin



Building Zone

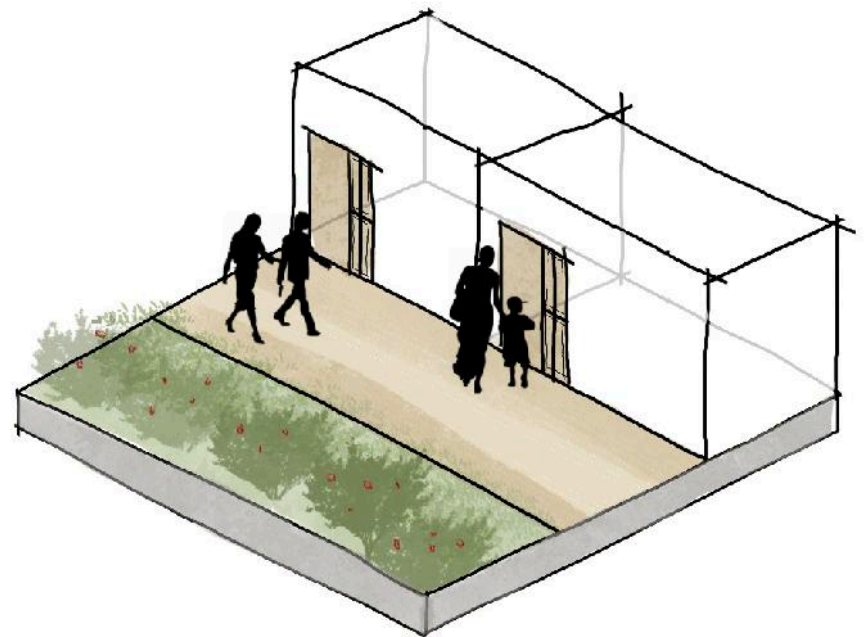
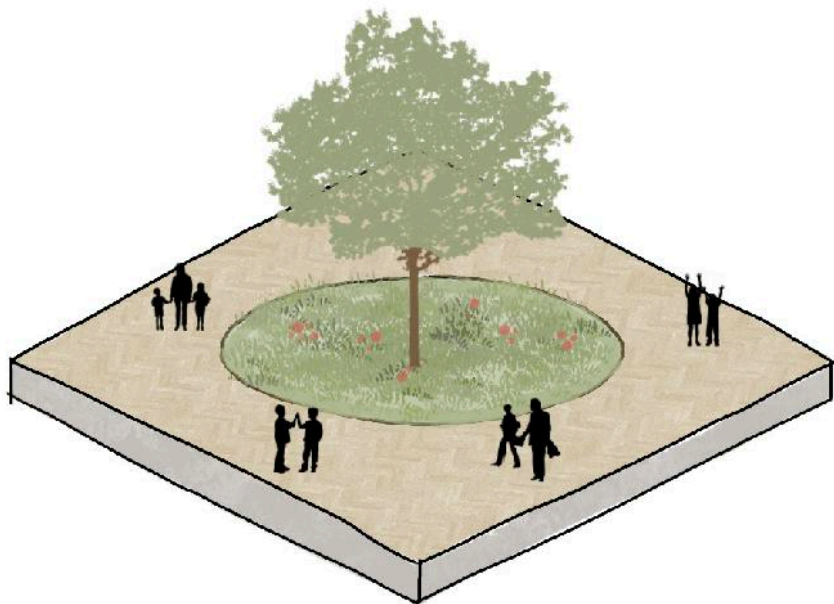
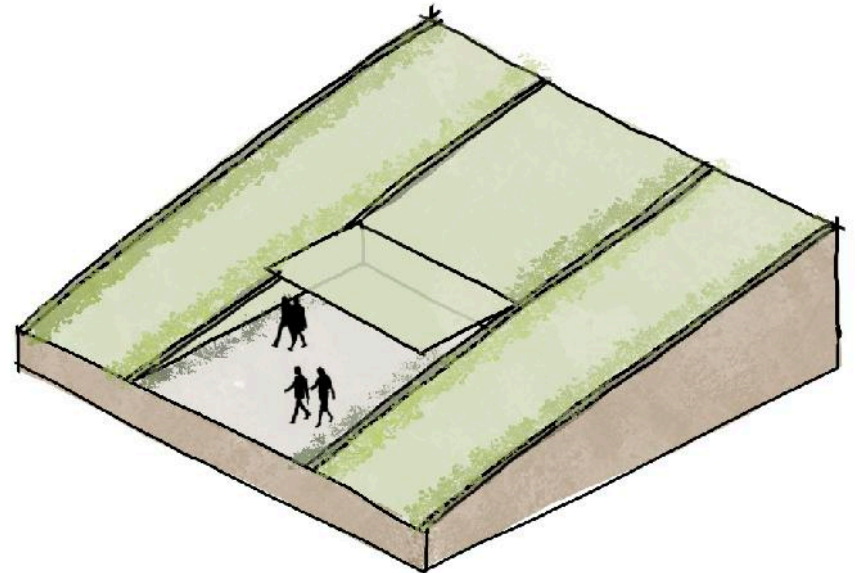
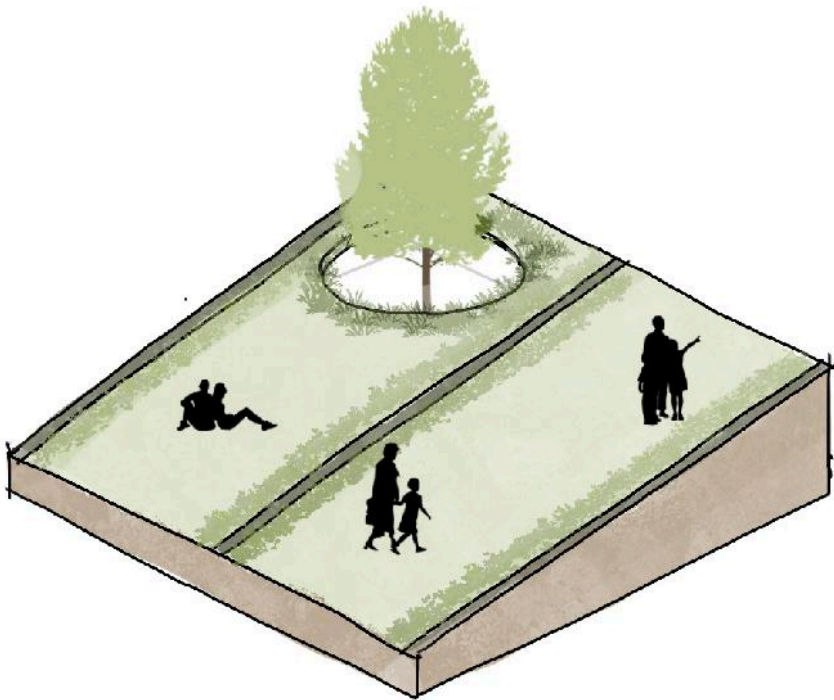


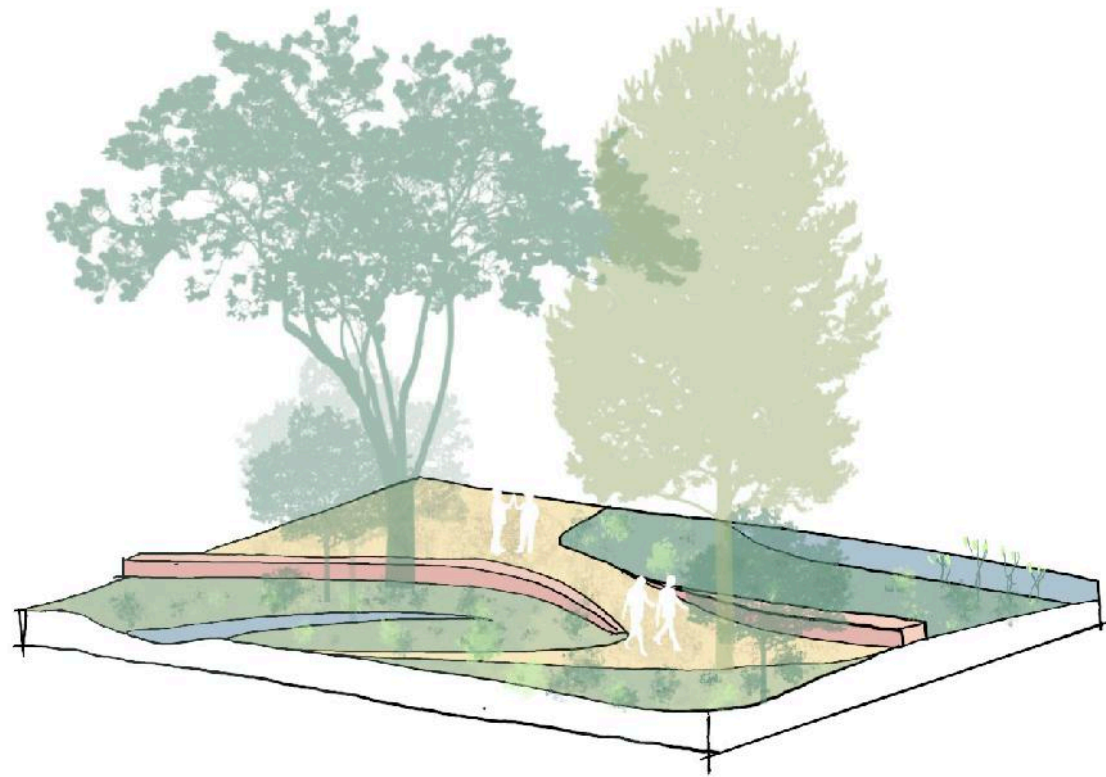
Accessible Building Roof



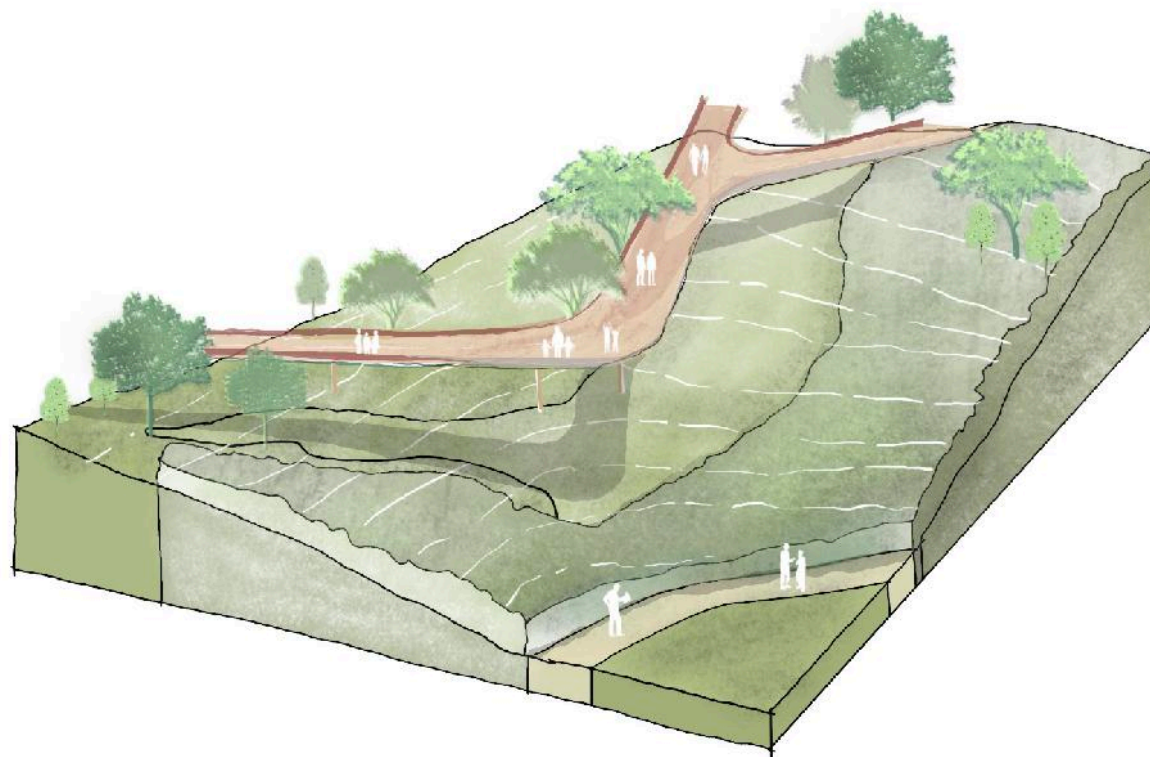
### Accessible Roof Garden

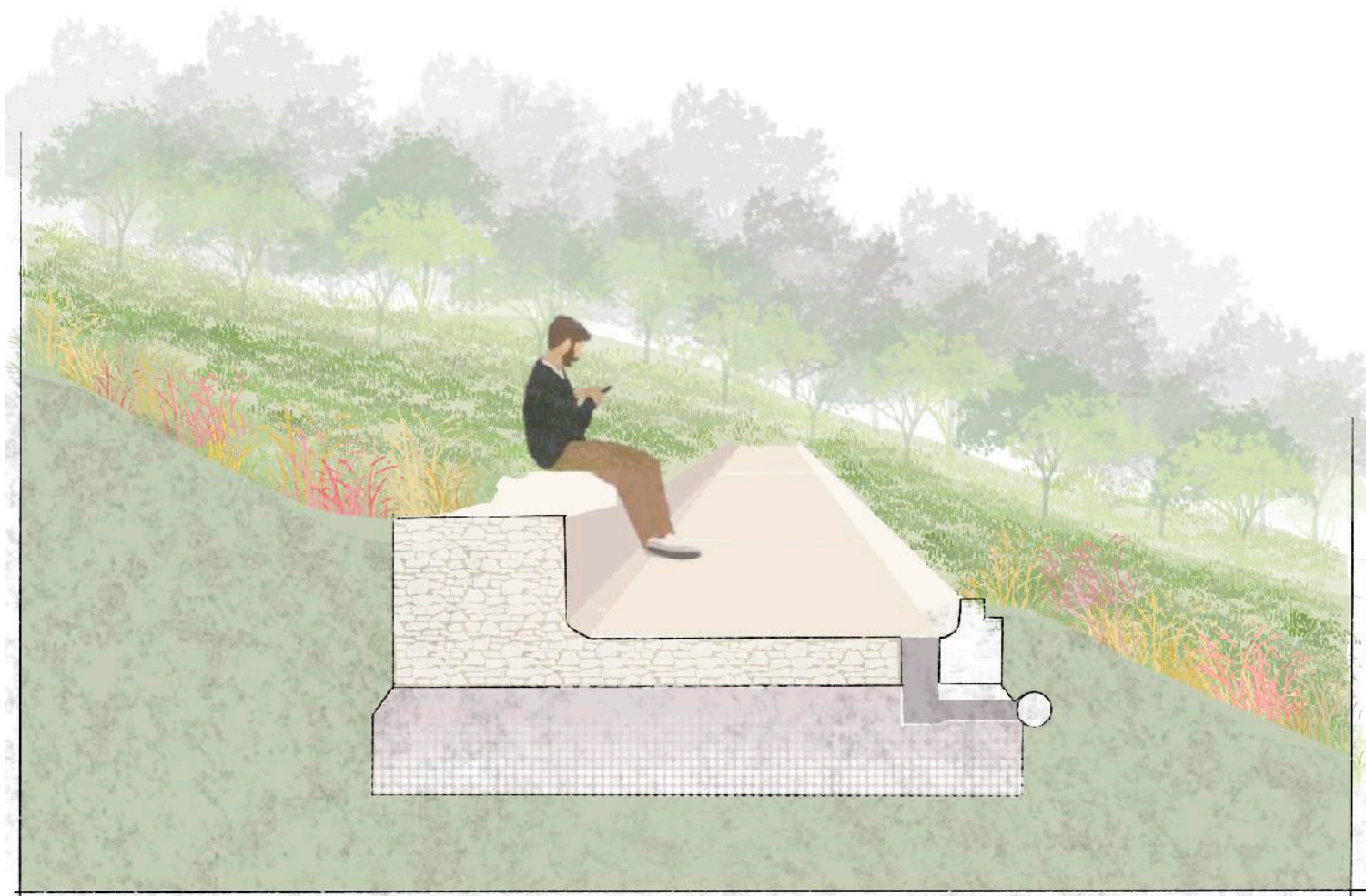
Figure 3.44 Design transformation  
(Source: Author, 2024)





Roof Garden View





Section of Access Way in Roof



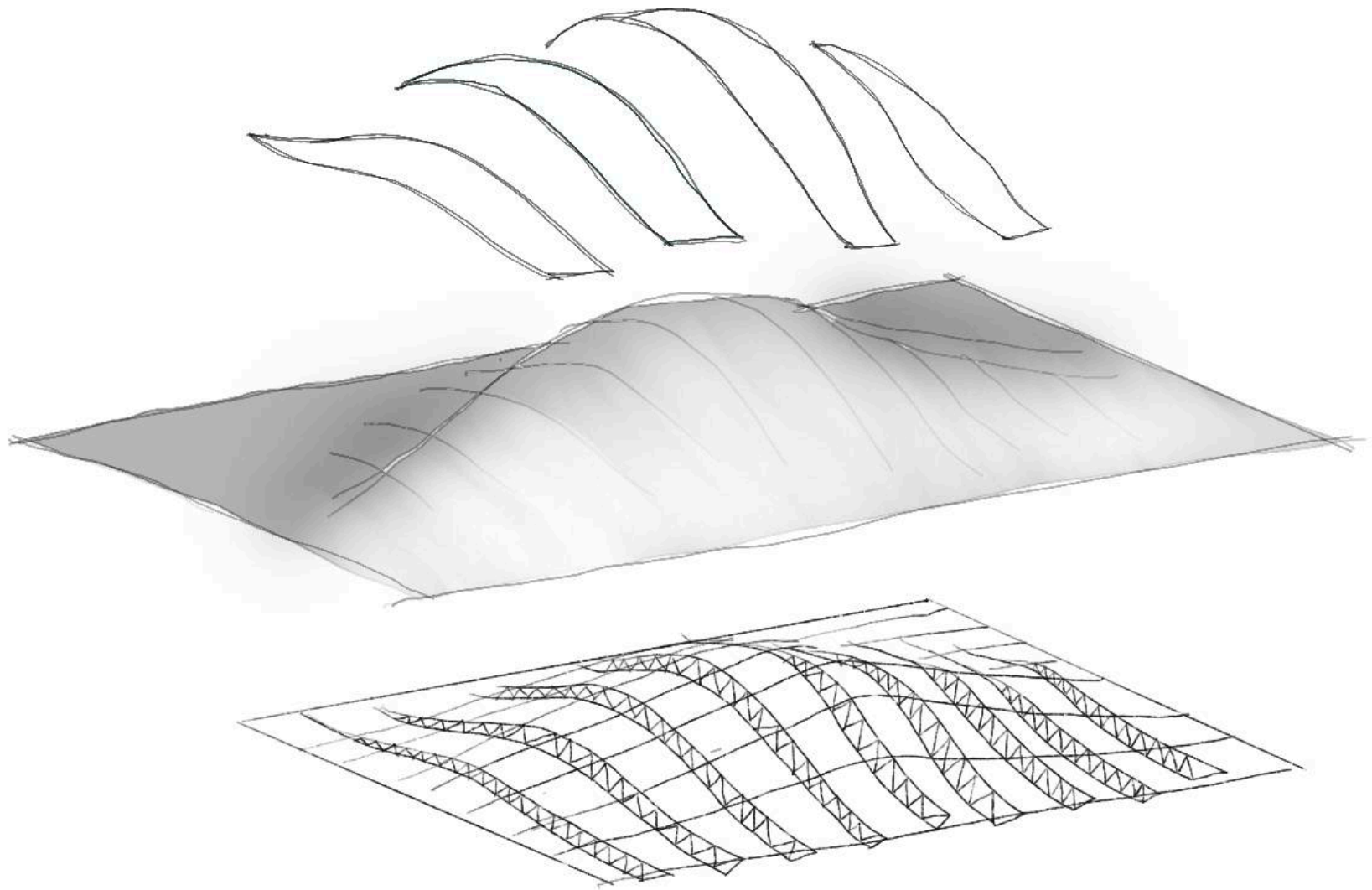
Section of greenery inside Building

Figure 3.45 Design Concept  
(Source: Author, 2024)

## **- Pre-fabricated 3D Printimber Construction**

The University of Idaho conducted a study on the use of sawdust (waste timber) as a base material for construction using 3D printing. Wood material is one of the main materials that are often used in construction. In the process of using wood into a timber, it will definitely produce waste timber or sawdust produced from cutting wood. The use of this material is also included in sustainable materials and can be recycled later.

In using 3D printimber, there are two advantages that help in the construction process. The first advantage is that 3D printing can help construction quickly. This is assisted by the pre-fabrication method which will be more efficient in fast and maximum construction methods. The second advantage is that the wood material used as raw material by 3D printimber is environmentally friendly and has a small carbine content. So that the sustainability of the building can support where the context of the location this time is also located in the vicinity of wood producers from production forests.



### Prefabricated Building Part

Figure 3.46 Design Concept on construction method  
(Source: Author, 2024)

# 04

## IV | response and analysis

Time as the Key Factor in the Development of IKN

Economic Transformation

Investment

Environmental Issue in Jakarta

Ibu Kota Nusantara (IKN)

Kalimantan as the Lungs of the World

Location of IKN in Kalimantan

Forest Land Destruction as Government Solution

# | Site Study Responses

## - Site Study Visualization

Chosen site based on significant contour level differences

From the examples presented in the contour study in the previous discussion, one site was selected that showed significant contour differences. Significant which means that there is an extreme contour difference at one location that exists from the contour with a minimum height of 0m and a maximum of 80m. This was done in the early stages of design to prove that the prototype made in facing and responding to contour conditions can be declared passed or feasible, and is considered capable of being built against any type of contour in the intended zoning area.

From several contours, one was selected that could show significant differences in contour height.

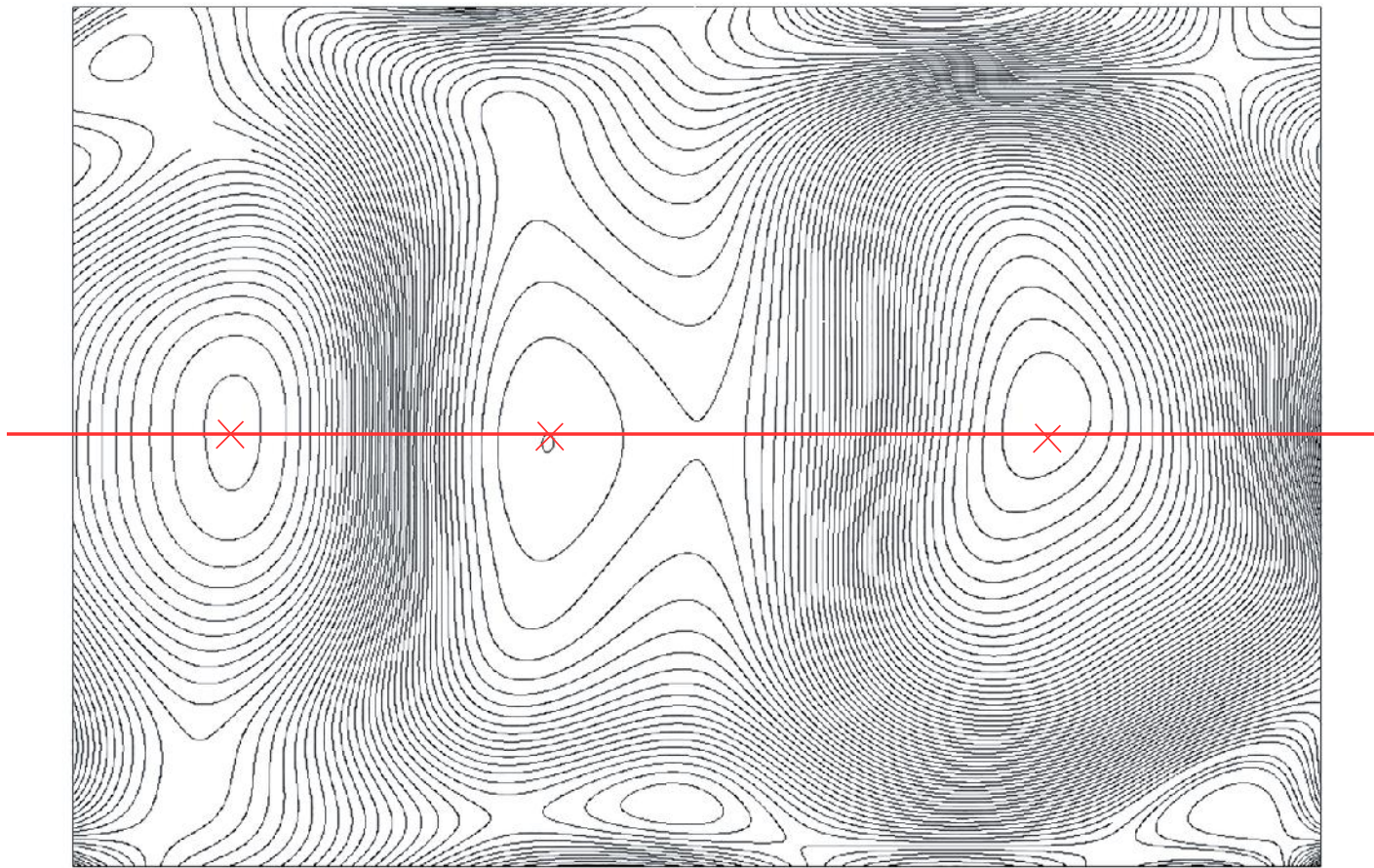


Figure 4.1 Contour study analysis  
(Source: Author, 2024)

The contour drawing above shows that there are 3 significant height differences between 0-80 metres of contour height. There are parts that are steep inwards as well as steep upwards. This shows how the building form response will be able to be built anywhere in the contour conditions.

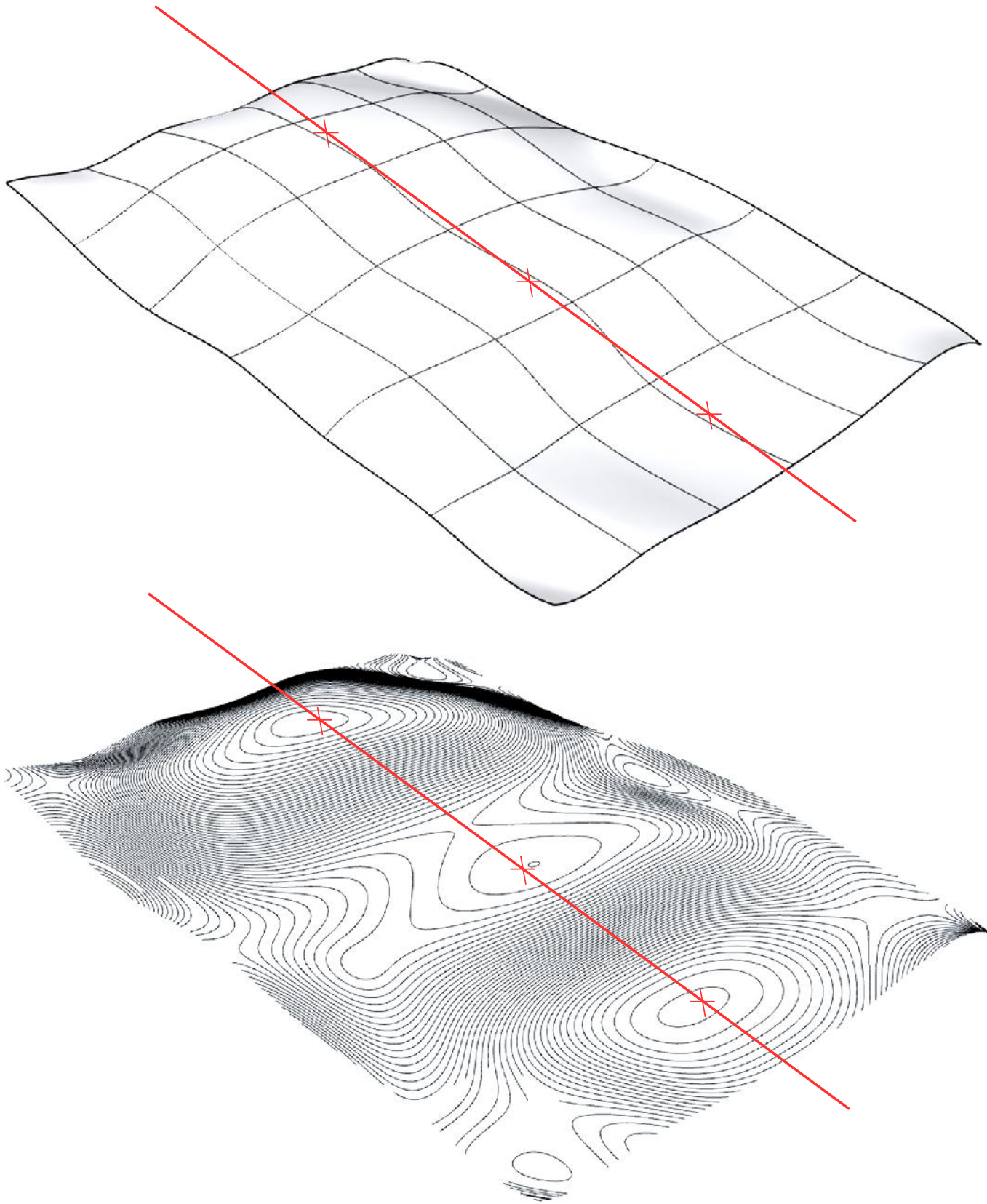


Figure 4.2 Placement on site contour  
(Source: Author, 2024)

After mapping 3 locations for building placement, these three locations will also form the basis of the building form parameters. The shape of the building will be adapted from the shape of the hill which is the basic shape in the vicinity where the place is filled with hills. The number 3 here means to lock the parameters of the building type shape in response to the contour conditions. Each building height will be set to adjust the contour height conditions. Where on a high contour will be occupied by the lowest building, while the opposite if the contour conditions are lower then the building height will be higher, these three basic parameters will be the key to the parameters used in this case.

## - Distribution Parameters

### Chosen site based on significant contour level differences

From the examples presented in the contour study in the previous discussion, one site was selected that showed significant contour differences. Significant which means that there is an extreme contour difference at one location that exists from the contour with a minimum height of 0m and a maximum of 80m. This was done in the early stages of design to prove that the prototype made in facing and responding to contour conditions can be declared passed or feasible, and is considered capable of being built against any type of contour in the intended zoning area.

From several contours, one was selected that could show significant differences in contour height.

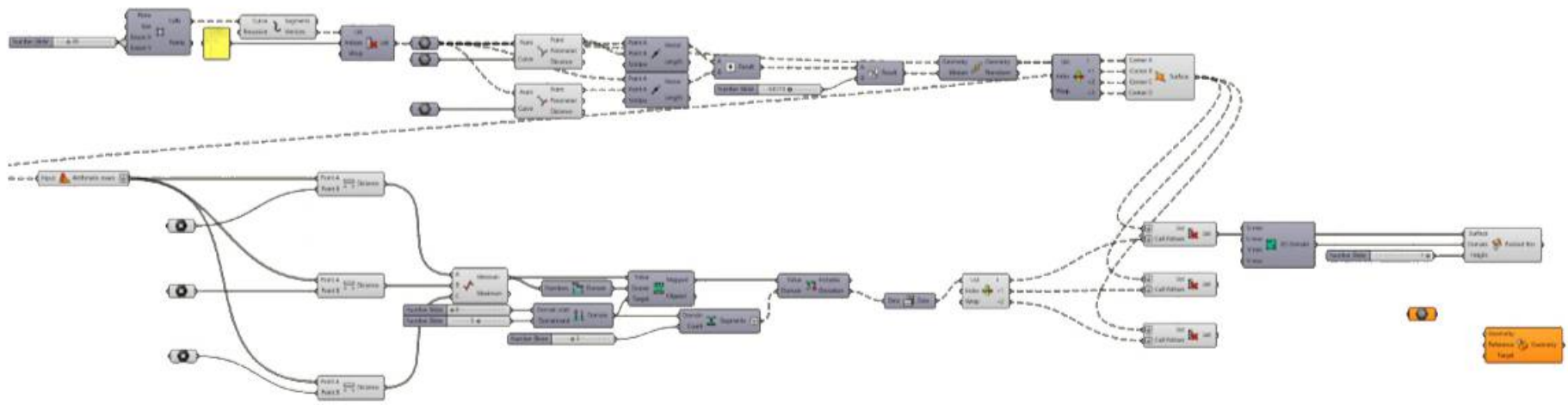


Figure 4.3 Distribution parameters grasshopper script  
(Source: Author, 2024)

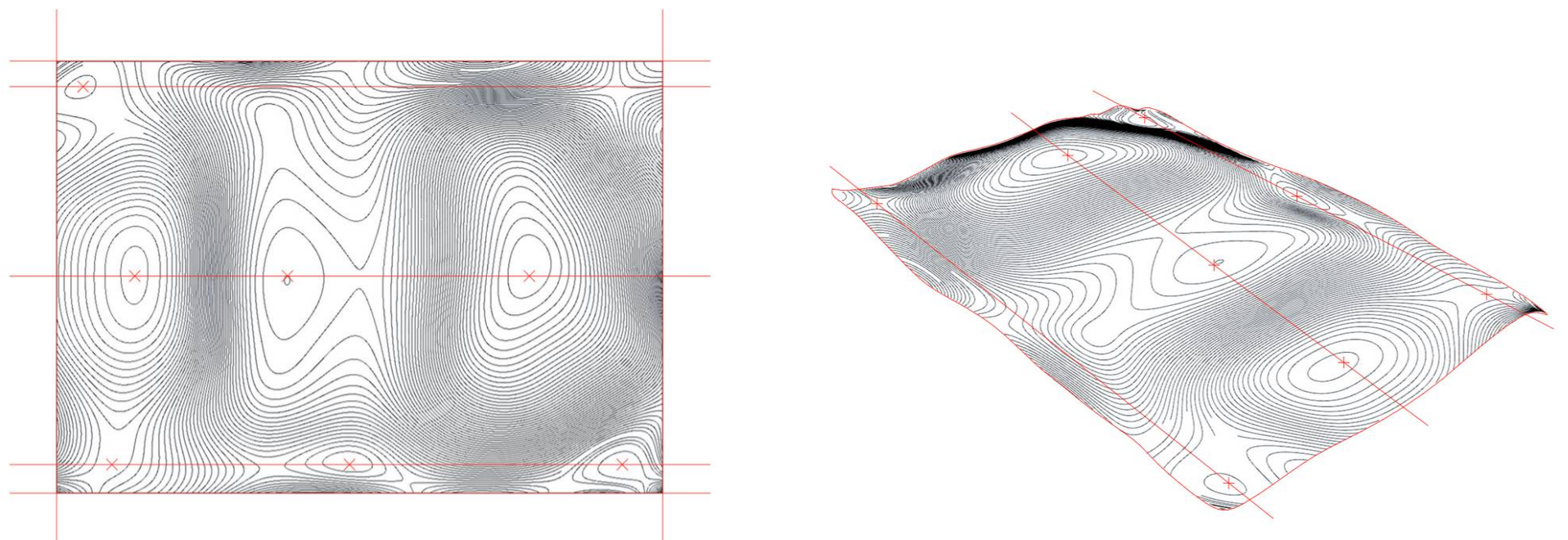


Figure 4.4 Distribution parameters rhino  
(Source: Author, 2024)

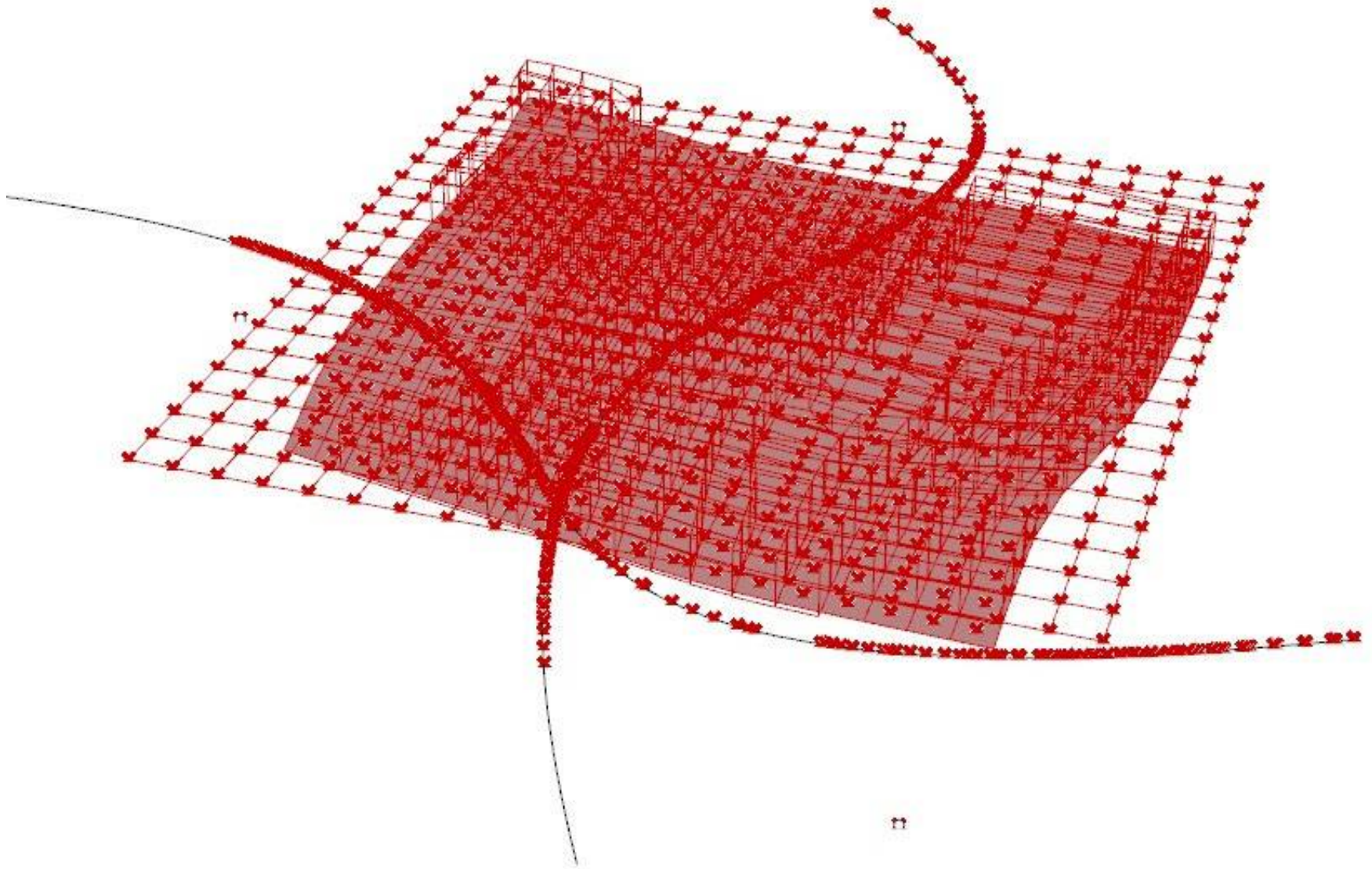


Figure 4.5 Distribution parameters 3d rhino  
(Source: Author, 2024)

By using the 'Rhino7 / Grasshopper' machine as a medium in pouring thoughts to provide parameters for the initial idea that will be poured into a design design. With contour height parameters to limit the spread of building placement along with the shape of the building that will determine each building will have different heights. After entering the study contour with a maximum height parameter of 80m and entering the three types of buildings with different heights. Then the machine will help distribute each type of building to each point of the distribution location according to the local contour height. The higher the contour the lower the building height.

$$80\text{m} / 3 = 27\text{m}$$

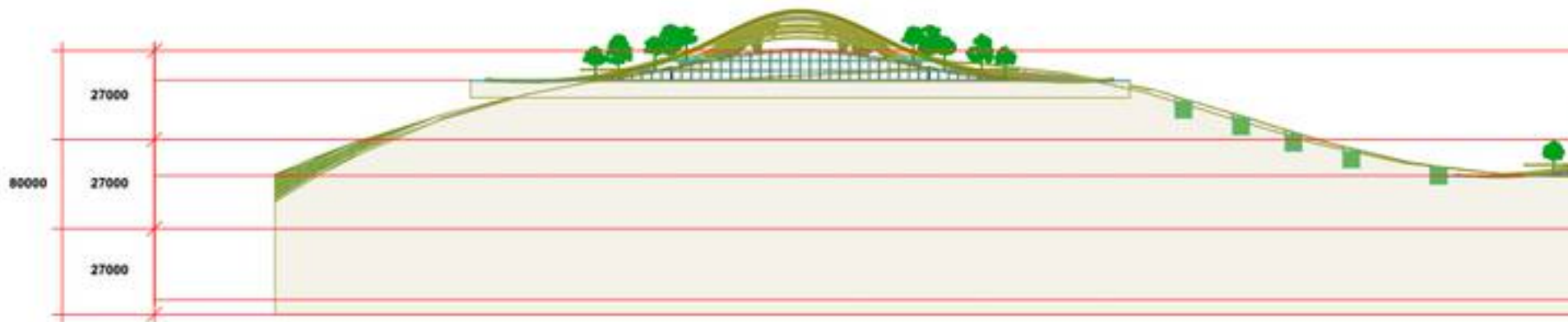
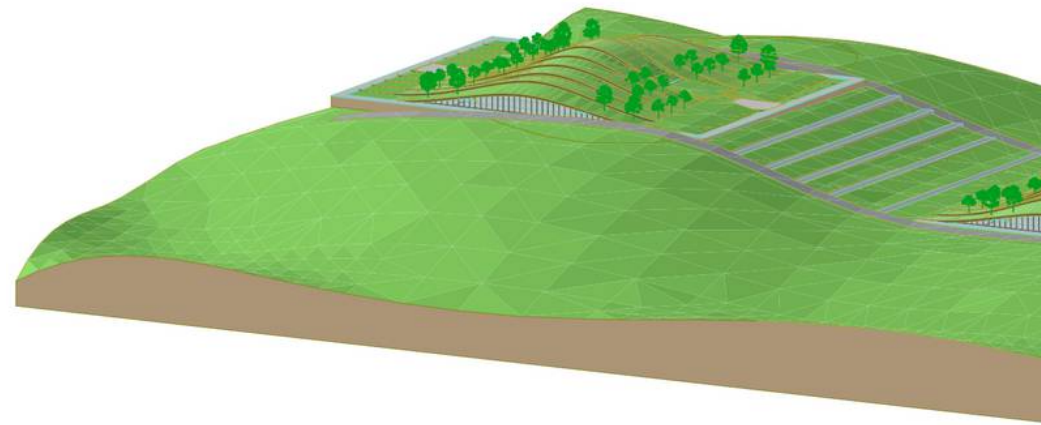


Figure 4.7 Schematic desain Section  
(Source: Author, 2024)

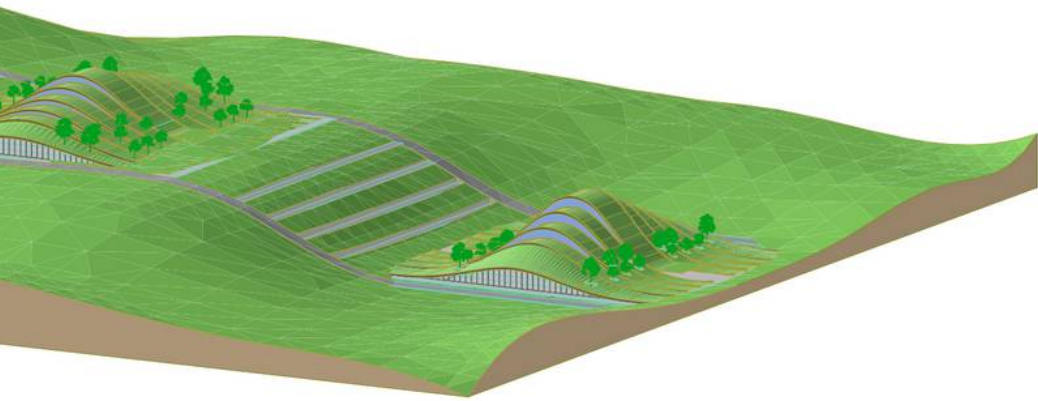
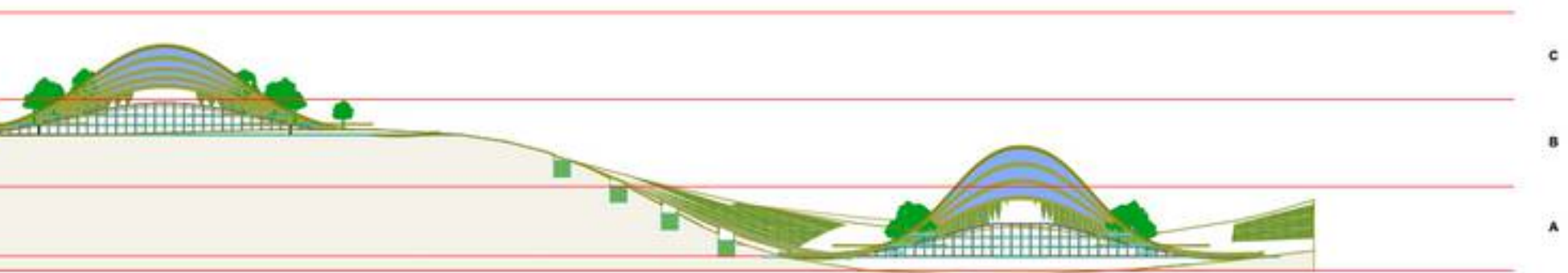


Figure 4.6 Schematic desain perspective  
(Source: Author, 2024)



The parameters of the distribution and shape of buildings locked in 3 building types that have different heights are determined by dividing 80m by 3. After dividing by 3, a number of 27m will be found, each contour height will have a different building type. This will help the planner in locking in the terms and conditions to establish the applicable prototype system.

# | Schematic Design

## - Building Mass Prototype

### Building type a

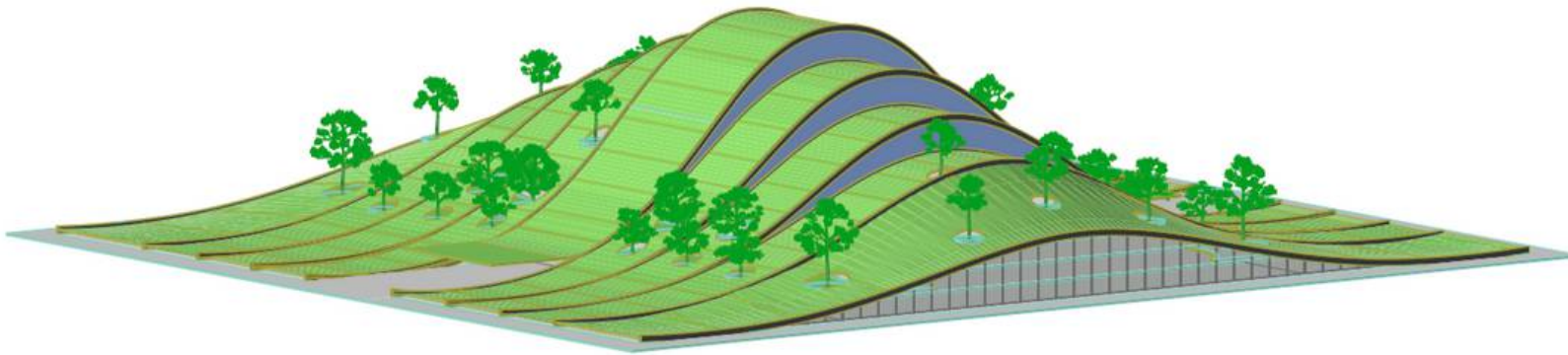
Type A buildings are the tallest buildings that will have the maximum capacity to accommodate users in the community housing facilities at IKN. Buildings with a total of 10 floors in which the ground floor is intended for public facilities. On the 2nd floor to the 8th floor is intended for residential space for ASN. On the 9th floor is intended for office facilities and on the top floor for building utility needs.

### Building type b

Type B buildings have 8 storeys with a medium height or midway between types A and C. Type B will be located on a contour that is centred between 27m to 54m in height. The ground floor is intended for public facilities, the next floor up to the 6th floor will be used for residential space, the 7th floor for offices, and the 8th floor for building utility needs.

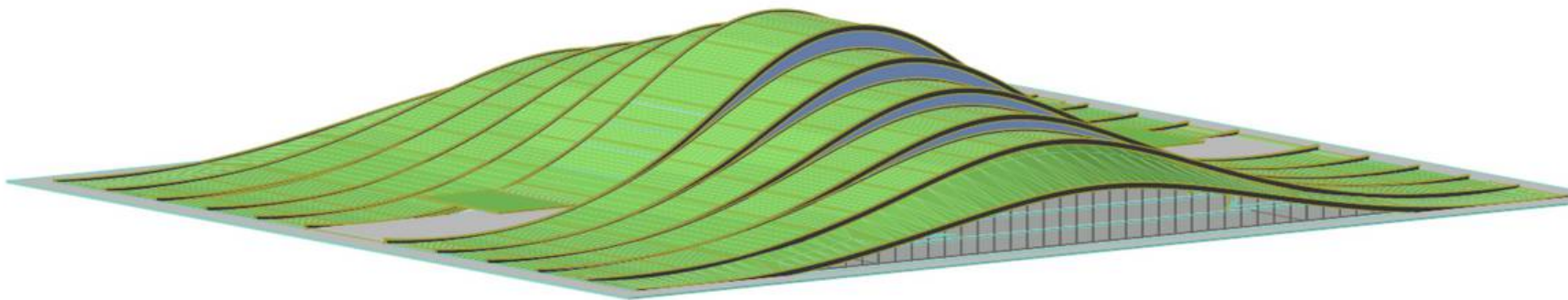
### Building type c

Building type C has 6 floors and is the lowest building but has the widest span among the other types. 2nd floor to 4th floor are for residential facilities. This type is placed on the highest contour situation. All types are formed with different heights to respond to the shape of the site context which is also surrounded by hills.



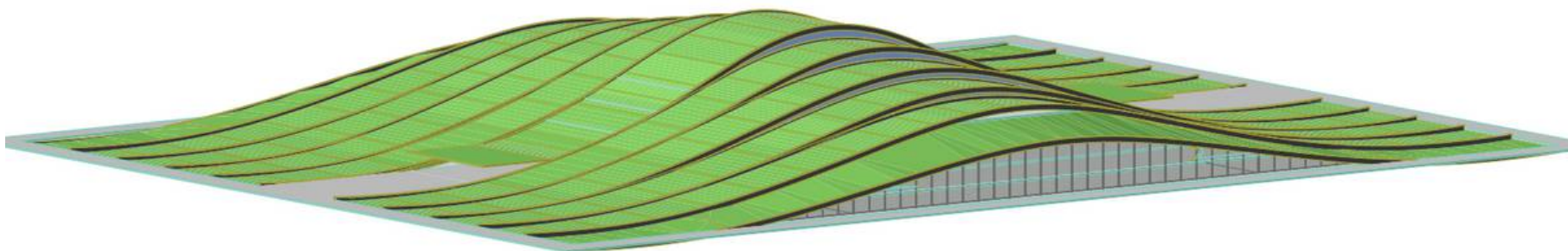
A

Figure 4.8 Schematic desain perspective building type A  
(Source: Author, 2024)



B

Figure 4.9 Schematic desain perspective building type B  
(Source: Author, 2024)

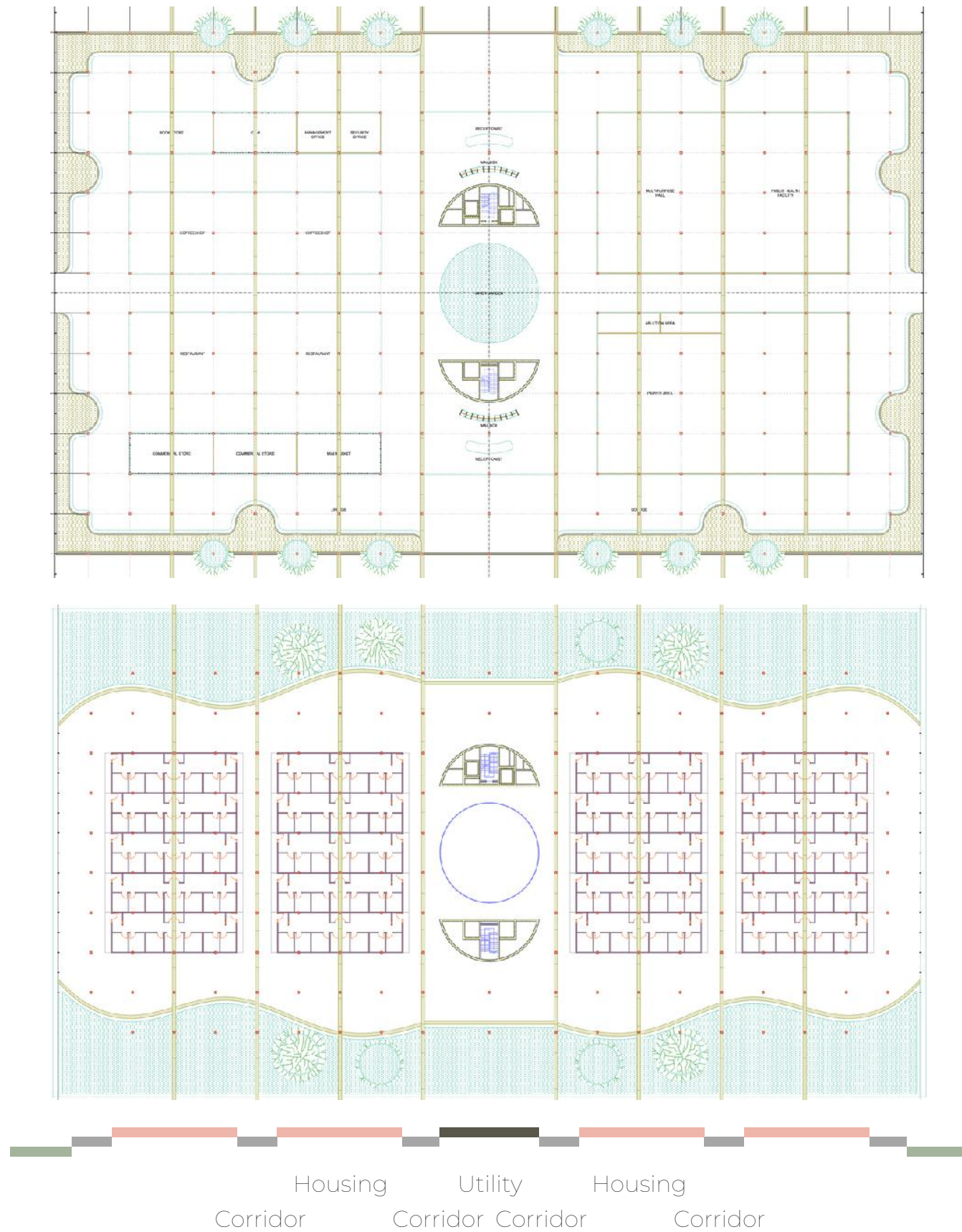


C

Figure 4.10 Schematic desain perspective building type C  
(Source: Author, 2024)

## Public facilities

The ground floor, which functions as the centre of public facilities, contains facilities that can support social needs. There are facilities such as coffee shop, health centre, prayer room, restaurant, mail box, management, and other general needs.



Housing Utility Housing

Corridor Corridor Corridor Corridor

Figure 4.11 Schematic public facilities plan  
(Source: Author, 2024)

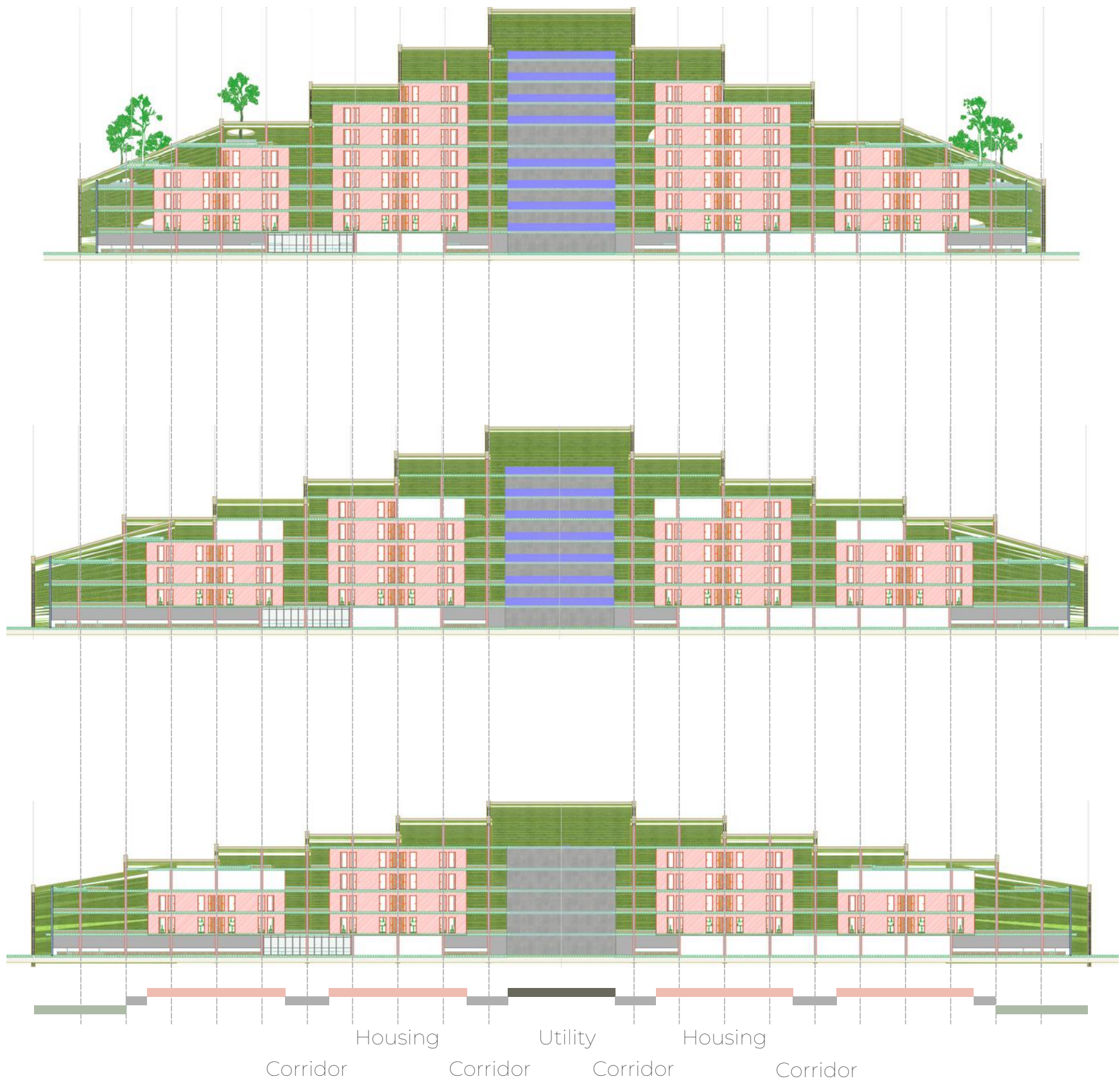


Figure 4.12 Schematic public facilities section  
 (Source: Author, 2024)

### 3D print timber construction

In answering the problem that the fact that the project at IKN requires speedy development, it is necessary to combine technology with construction methods that can maximise and optimise development time. So using the 3d print method combined with sustainable materials, namely dust that has been mixed with adhesives that can provide reinforcement in building parts. This time it is intended for construction methods in curved structures.

A

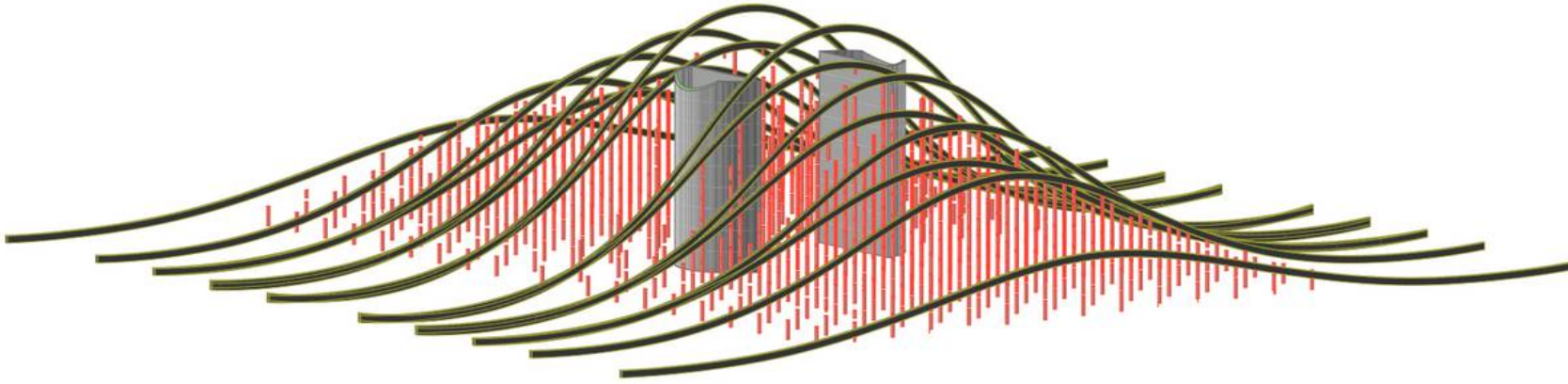


Figure 4.13 Schematic construction method building type A  
(Source: Author, 2024)

B

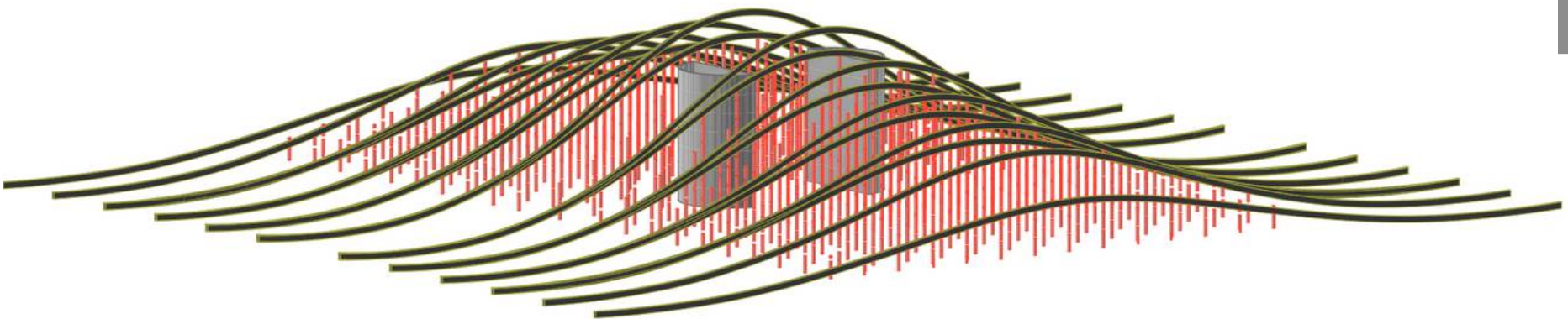


Figure 4.14 Schematic construction method building type B  
(Source: Author, 2024)

C

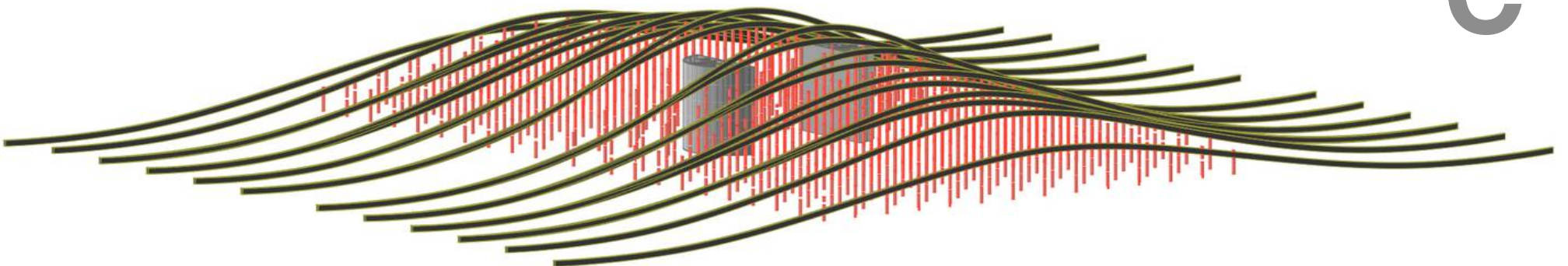


Figure 4.15 Schematic construction method building type C  
(Source: Author, 2024)

# | Schematic Design Responses

- Air Circulation Response

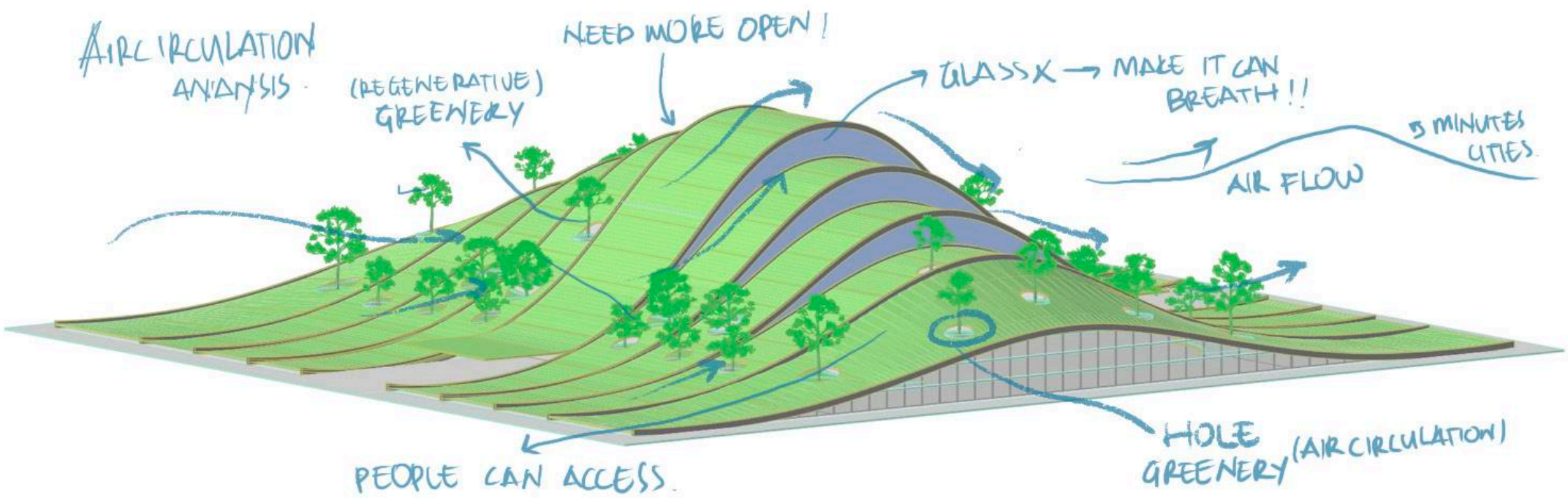


Figure 4.16 Air circulation response 1  
(Source: Author, 2024)

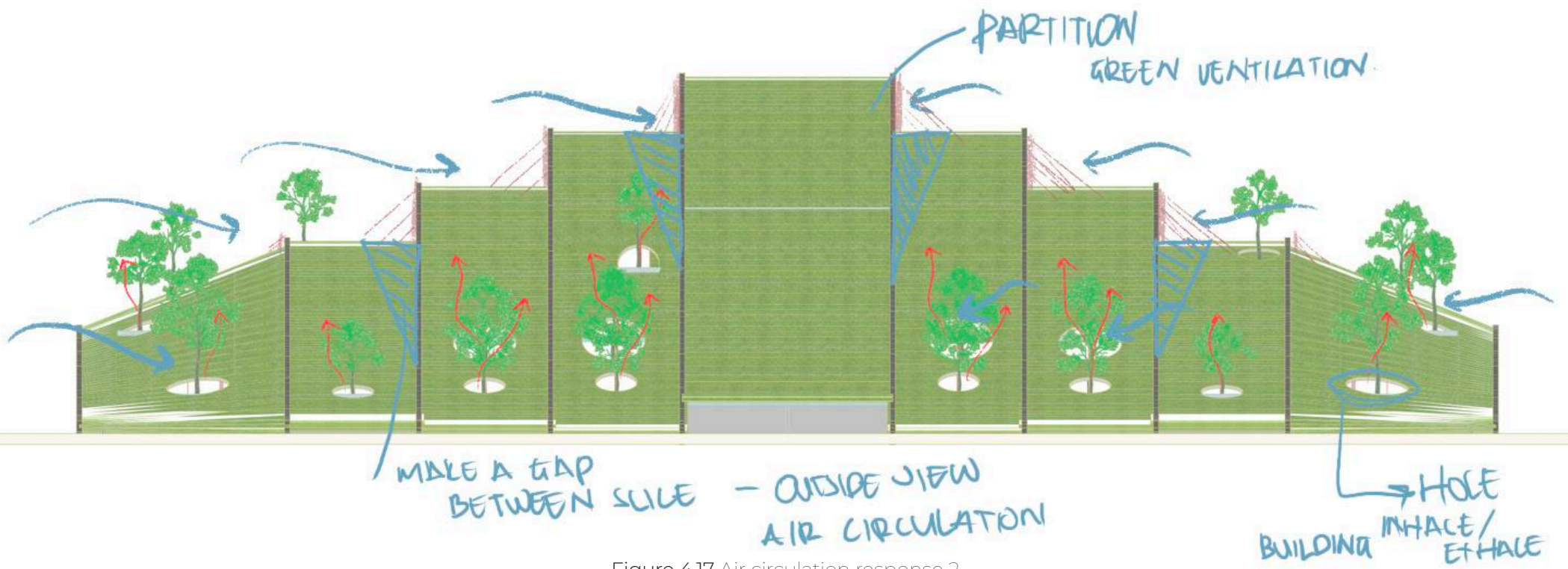


Figure 4.17 Air circulation response 2  
 (Source: Author, 2024)

CURVE STRUCTURE

GREEN ROOF HANGER

PART / PART  
TO SOLVE LONG STRUCTURE

JOINT BEAM

ACCESSIBLE  
ROOF

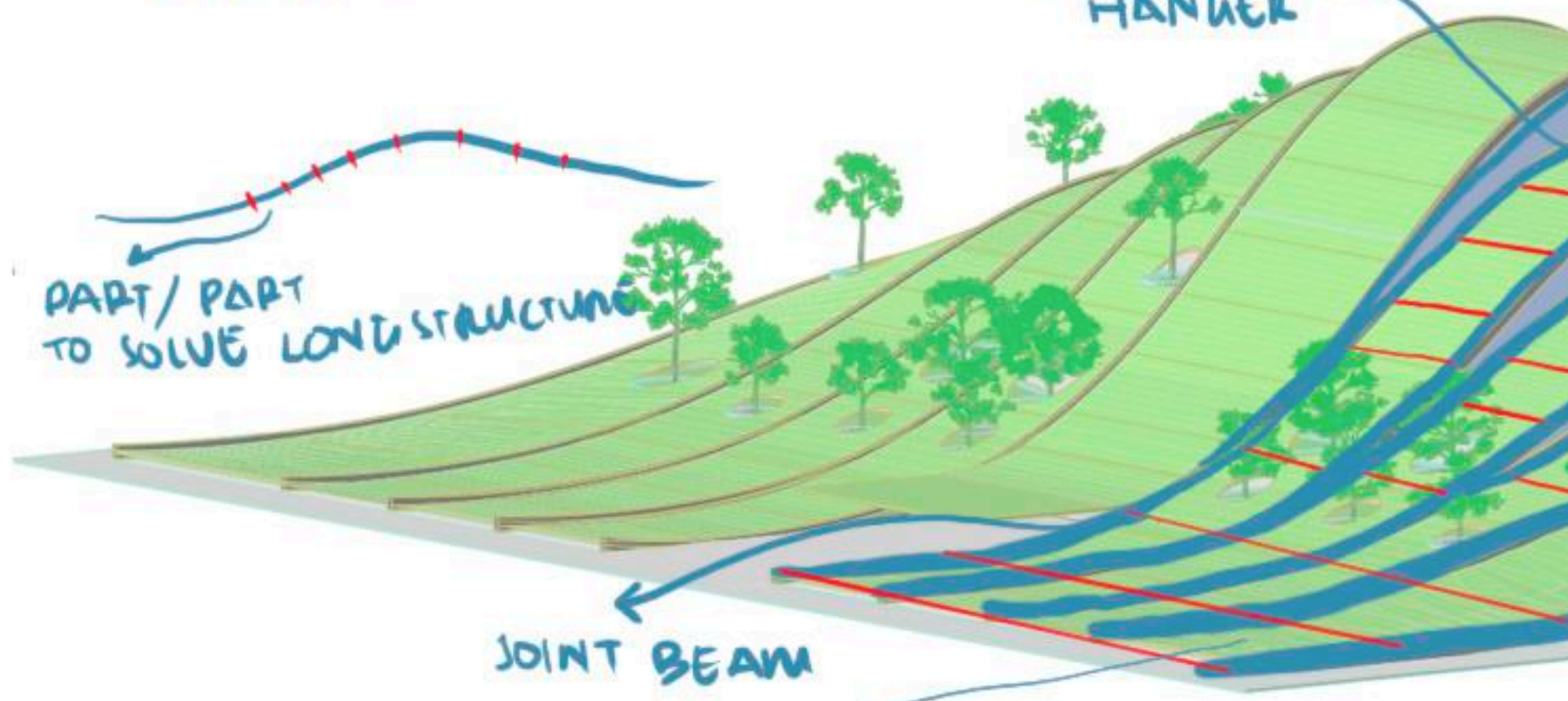
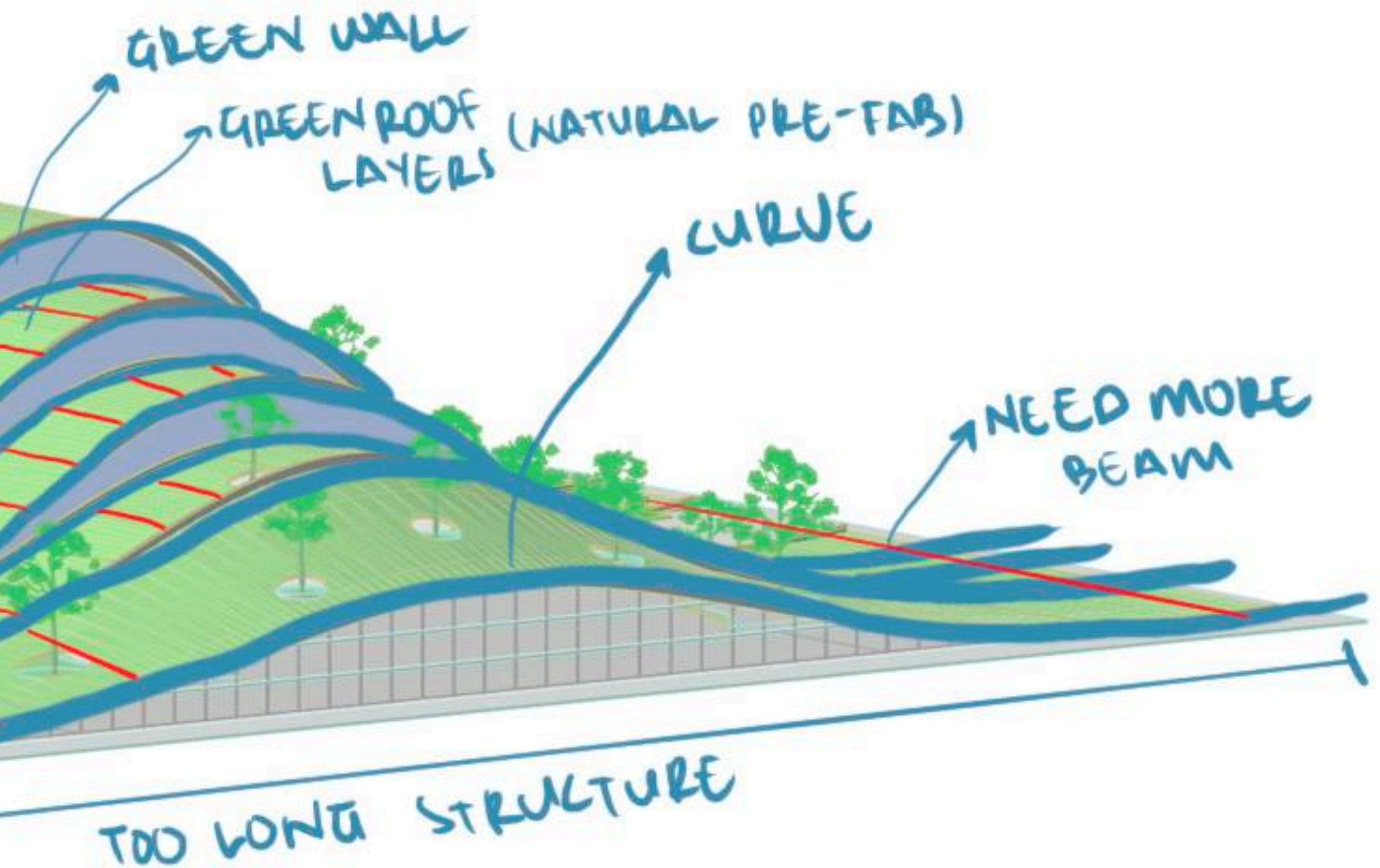


Figure 4.18 Curve structure response  
(Source: Author, 2024)



### Green wall

Green wall to carry out a natural ventilation system, so that the incoming cool air can be maximised and absorb dirt from the air.

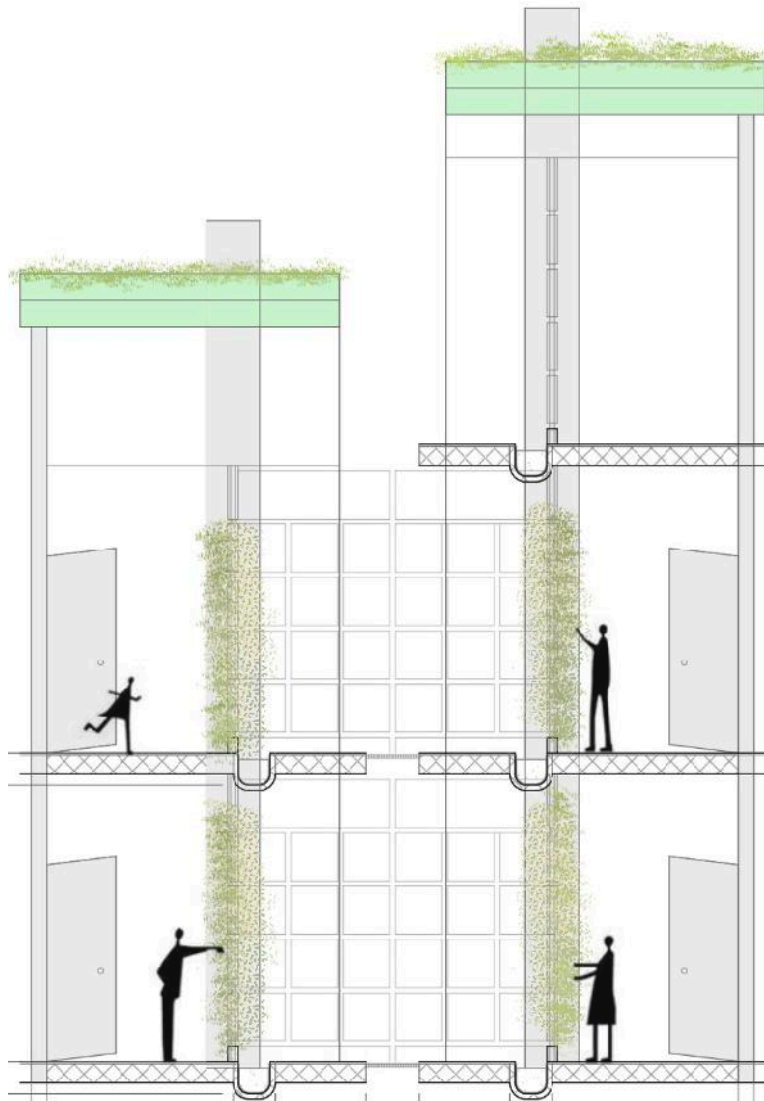


Figure 4.19 Building gap response  
(Source: Author, 2024)

### Natural ventilation

The stuck effect provides 2 flows for the air, fresh air can enter through the green wall system, then dirty air can exit through the openings that have the stack effect.

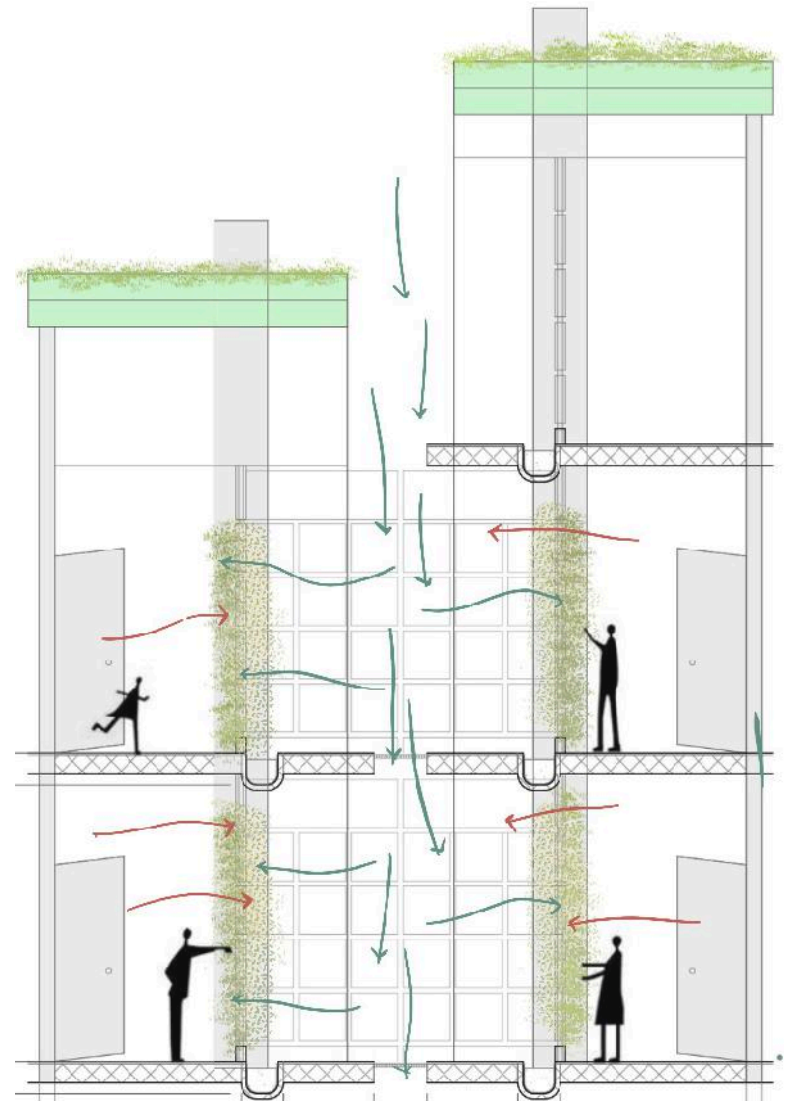


Figure 4.20 Air circulation flow response  
(Source: Author, 2024)

### Water flow

When it rains, water entering the building area can be minimised by passing through the vines on the green wall.

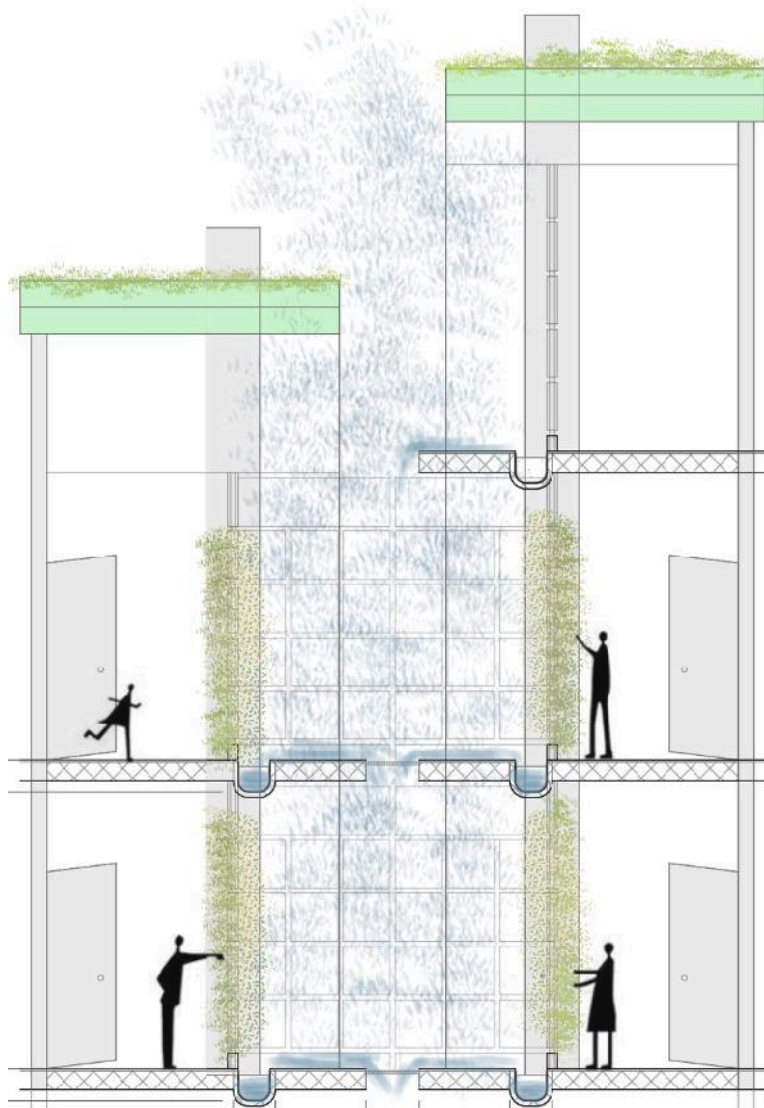


Figure 4.21 Water flow response  
(Source: Author, 2024)

### Stuck effect natural sunlight

The stuck effect helps reflect daylight into the deepest parts of the building, optimising its distribution. The resulting glare can be reduced by the topmost wooden panel on the green wall.

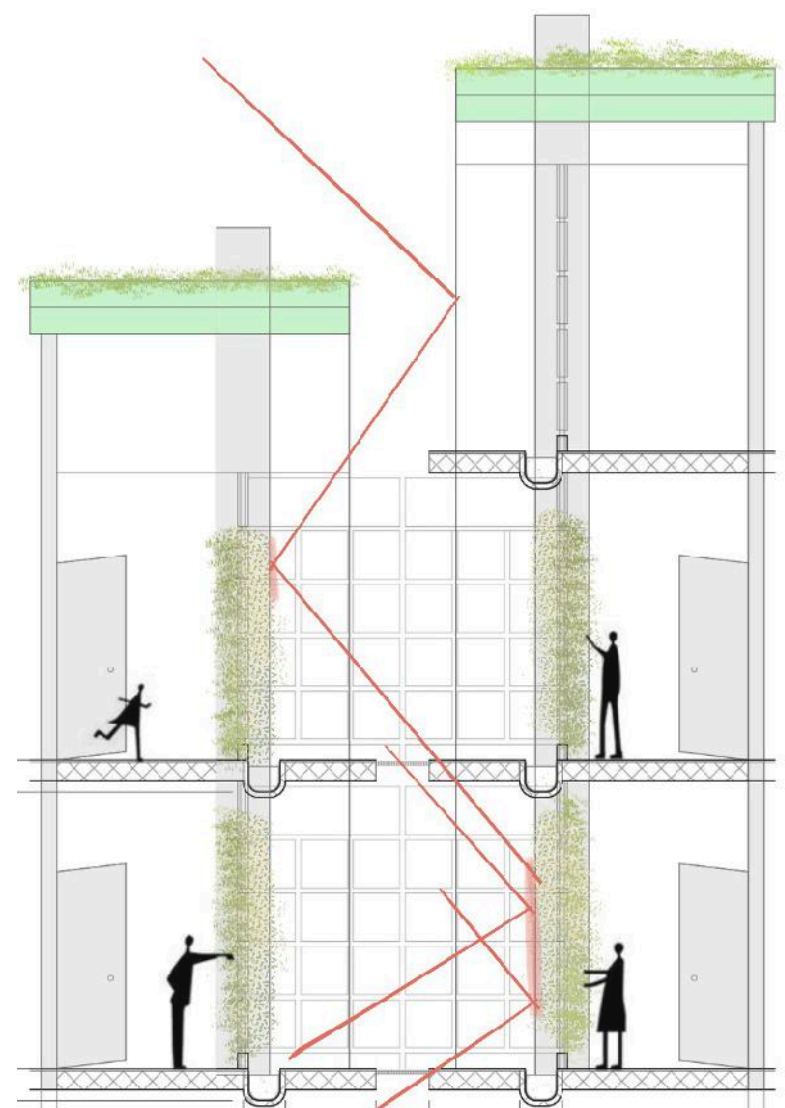


Figure 4.22 Natural lighting response  
(Source: Author, 2024)

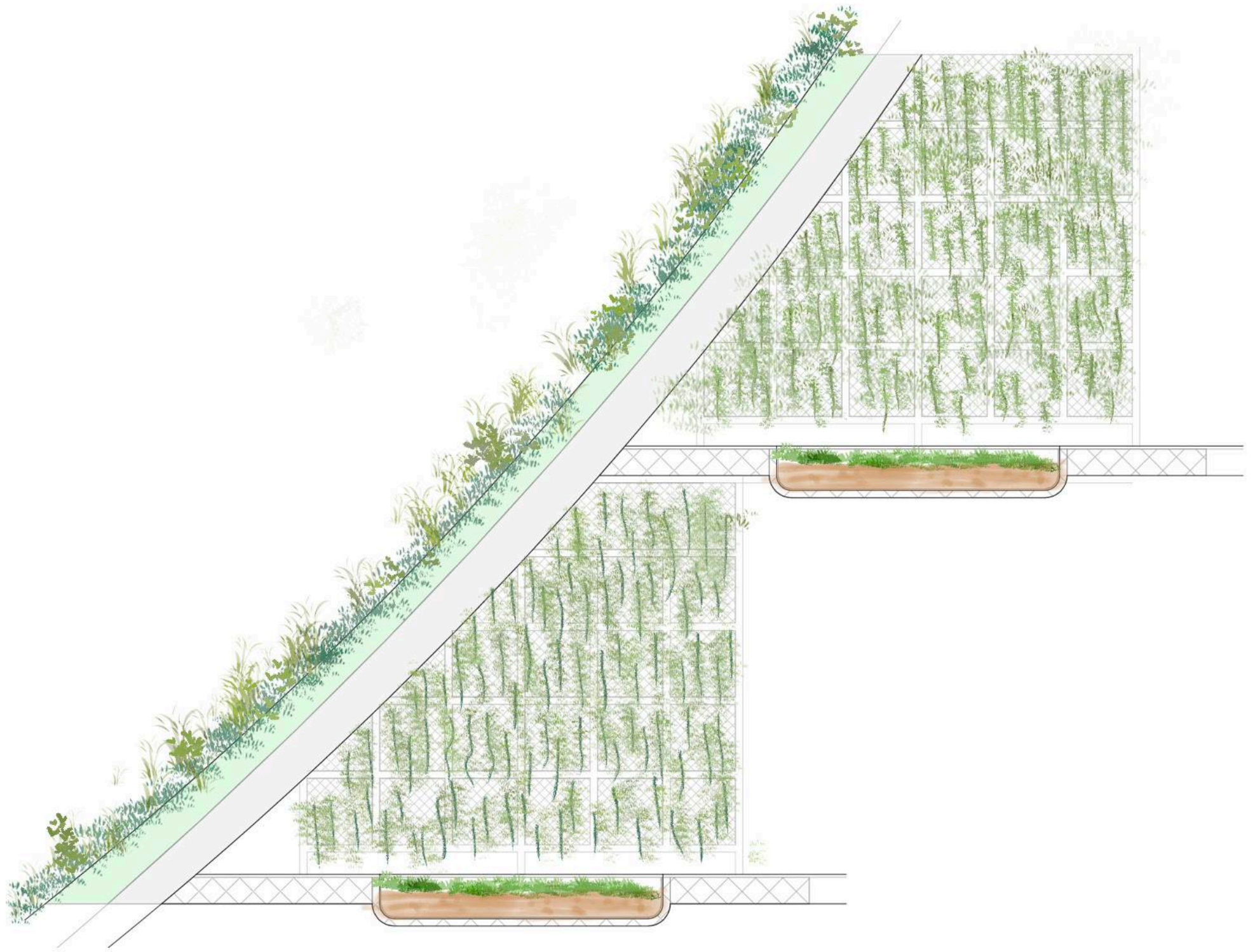


Figure 4.23 Green wall response  
(Source: Author, 2024)

### **Green wall function**

Green walls in buildings serve as ecological and architectural elements that provide a variety of benefits, both for the environment and the comfort of occupants. In the context of a wall with wire mesh overgrown with hanging plants and panels at the top that prevent direct light from entering the building, this wall helps to improve the thermal efficiency of the building by creating a natural insulation layer. The hanging plants on the wire mesh act as a natural shade that reduces the temperature around the wall and minimises direct heat radiation to the building surface, thereby reducing energy use for space cooling. In addition, the plants absorb carbon dioxide and produce oxygen, helping to improve the air quality around the building, while providing a fresher natural atmosphere. The panels at the top of the walls are designed to prevent direct sunlight from entering the building, reducing the effects of glare and overheating, without blocking the overall natural lighting. The combination of plants and panels can also serve as natural sound absorbers, improving acoustic comfort within the building. In addition to the functional benefits, these green walls also provide aesthetic value, presenting a more attractive visual element that blends in with the surrounding environment. Overall, green walls not only passively improve building performance, but also support the concept of sustainability by creating healthier and more environmentally friendly spaces.





The Design Prototype of Community Housing in IKN with Regenerative Architecture

05

## V | design description

Time as the Key Factor in the Development of IKN

Economic Transformation

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Ibu Kota Nusantara (IKN)

Kalimantan as the Lungs of the World

Location of IKN in Kalimantan

Forest Land Destruction as Government Solution

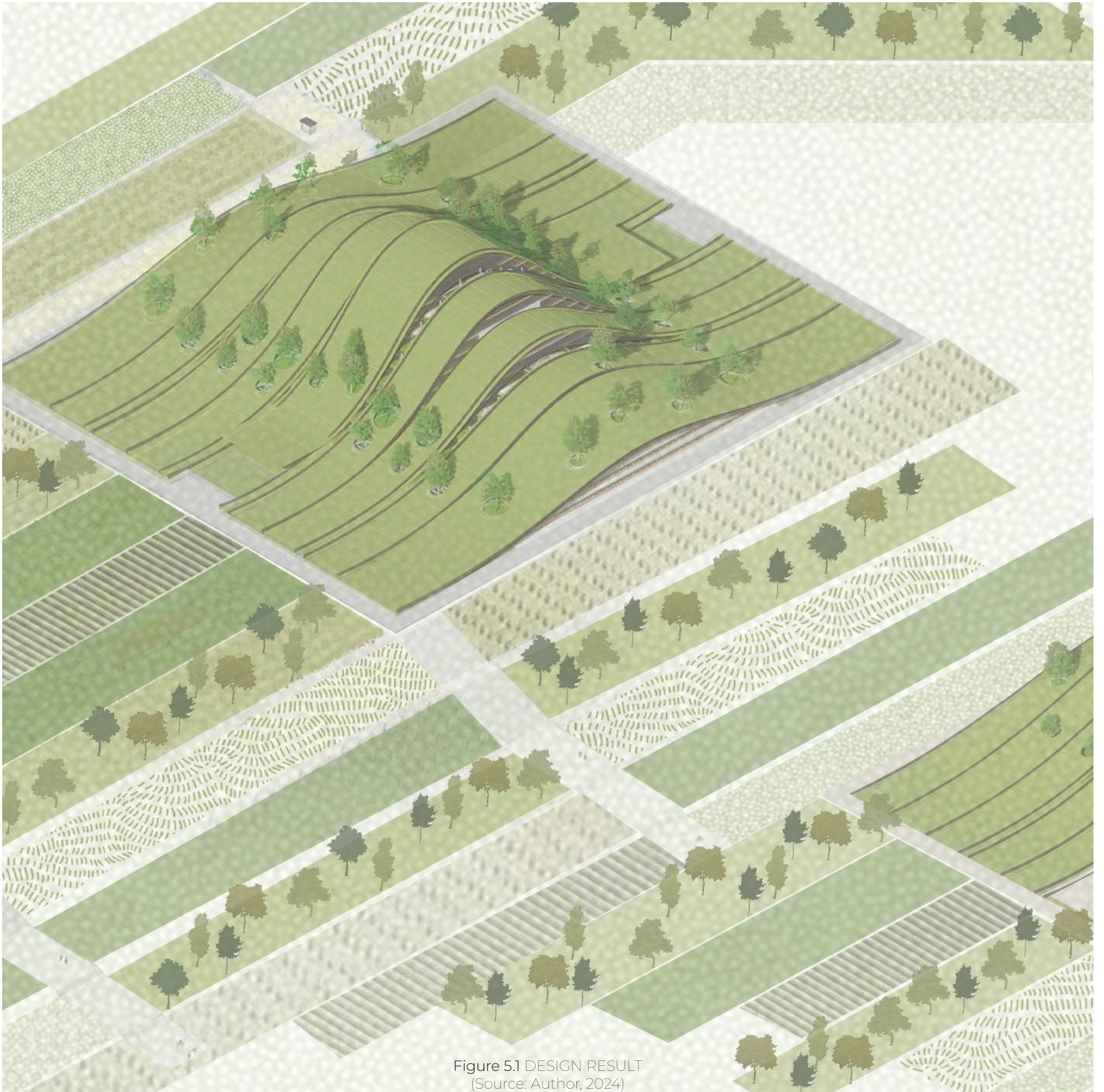


Figure 5.1 DESIGN RESULT  
(Source: Author, 2024)

## | Spatial Requirements

MODULE A			
Description	Size (m2)	Quantity	Total (m2)
1st Floor	56,25	56	3150
2nd Floor		40	2250
3rd Floor		40	2250
4th Floor		30	1687,5
5th Floor		20	1125
6th Floor		12	675
7th Floor		6	337,5
Total		204	11475
Circulation		20%	2295
<b>Subtotal</b>			<b>13770</b>

MODULE B			
Description	Size (m2)	Quantity	Total (m2)
1st Floor	56,25	56	3150
2nd Floor		56	3150
3rd Floor		40	2250
4th Floor		28	1575
5th Floor		14	787,5
Total		194	10912,5
Circulation		20%	2182,5
<b>Subtotal</b>			<b>13095</b>

MODULE C			
Description	Size (m2)	Quantity	Total (m2)
1st Floor	56,25	72	4050
2nd Floor		56	3150
3rd Floor		36	2025
4th Floor		20	1125
Total		184	10350
Circulation		20%	2070
<b>Subtotal</b>			<b>12420</b>

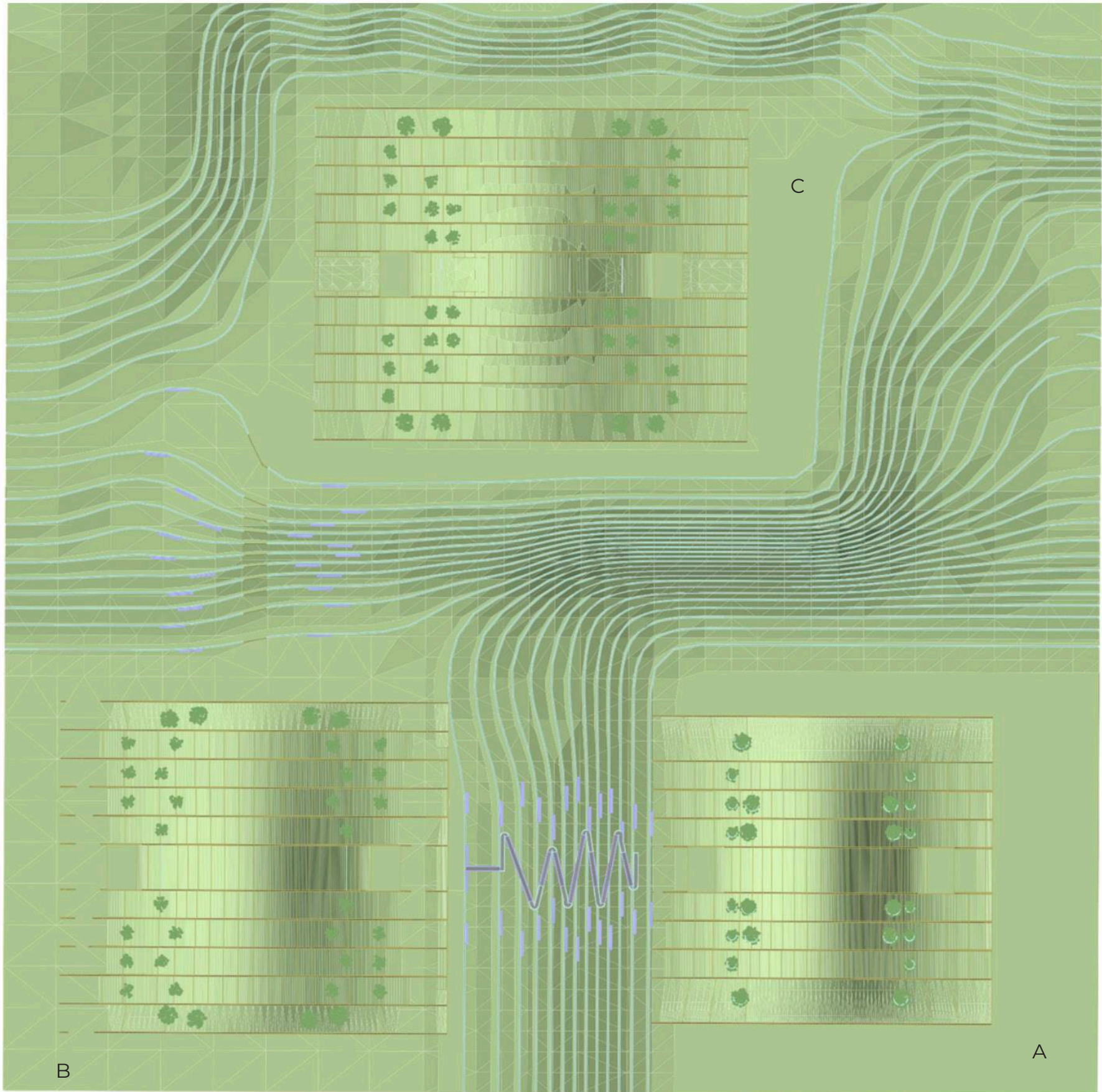
Occupancy Capacity		
MODULE A		
Description	Family	Sharing
Total unit in a building	204	
Total person in a unit	4	3
User percentage	63,60%	36,40%
Total unit	129,744	74,256
	130	74
Total occupants for each unit type	520	222
<b>Total occupants</b>	<b>742</b>	

Occupancy Capacity		
MODULE B		
Description	Family	Sharing
Total unit in a building	194	
Total person in a unit	4	3
User percentage	63,60%	36,40%
Total unit	123,384	70,616
	123	71
Total occupants for each unit type	492	213
<b>Total occupants</b>	<b>705</b>	

Occupancy Capacity		
MODULE C		
Description	Family	Sharing
Total unit in a building	184	
Total person in a unit	4	3
User percentage	63,60%	36,40%
Total unit	117,024	66,976
	117	67
Total occupants for each unit type	468	201
<b>Total occupants</b>	<b>669</b>	

Total ASN	32937	Building Module	Total Occupants
Occupants in ABC	2116	A	742
Total ABC Module	15,56568998	B	705
	16	C	669
		Total	2116

## | Design Result




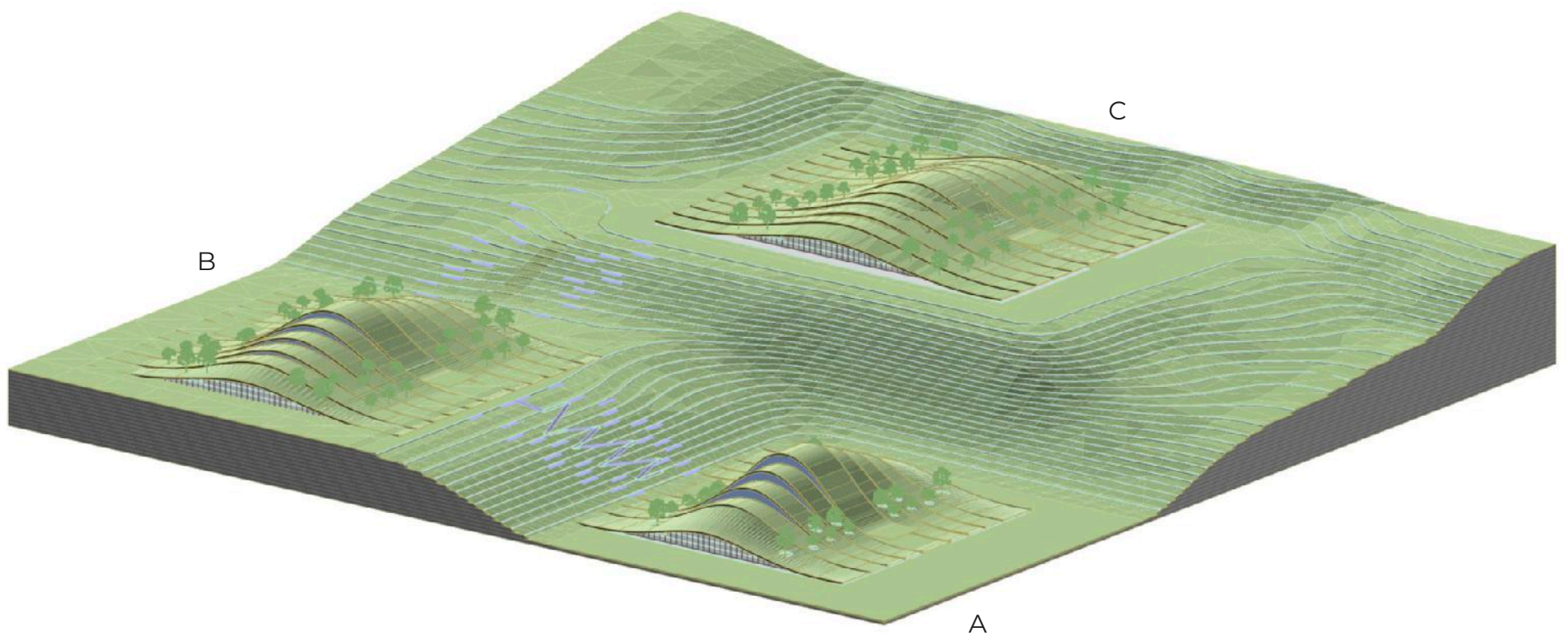
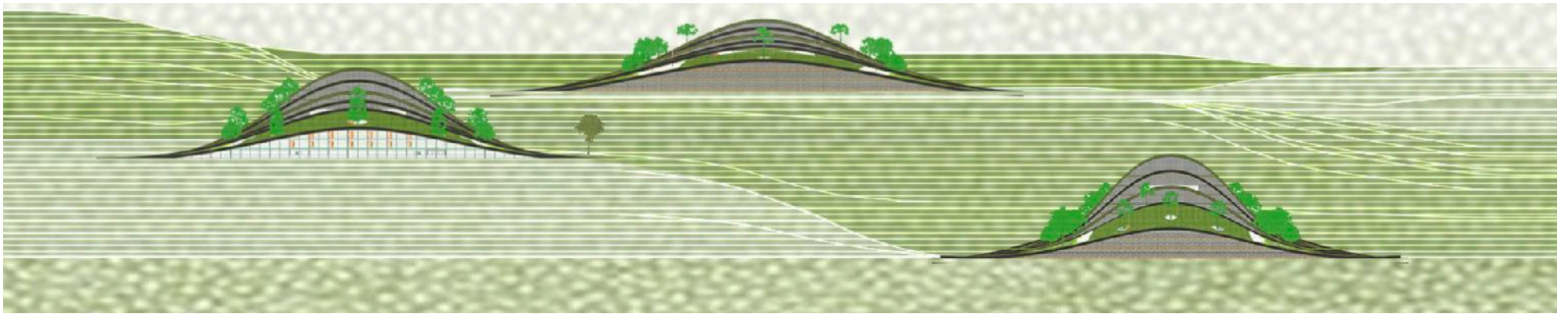
 SITUATION  
SCALE: 1200

Figure 5.2 Situation  
(Source: Author, 2024)



 SITUATION PERSPECTIVE  
SCALE: 1200

Figure 5.3 Situation Perspective  
(Source: Author, 2024)



Each building type is differentiated by the typical contours of the place where the building stands. Each 27 metre height will use a building type from all three building prototypes.

 SITUATION ELEVATION  
SCALE: 1200

Figure 5.4 Situation Elevation  
(Source: Author, 2024)

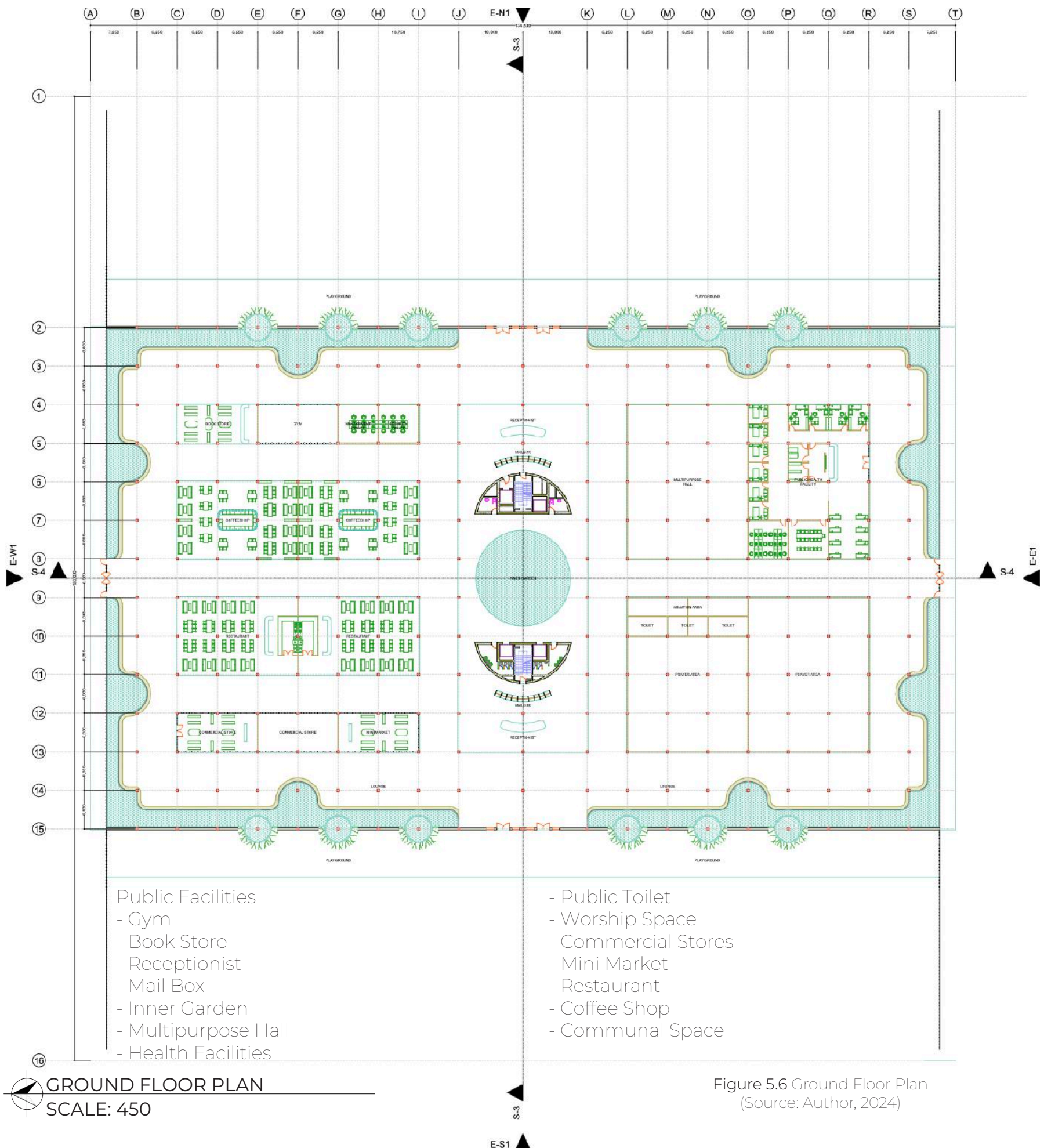


Figure 5.5 Building type A perspective  
(Source: Author, 2024)



## - BUILDING TYPE A

Building Type:	Building Type A
Amount of Floors:	9th Floors
Amount of Housing:	204 Units
Amount of Users:	1020 Occupants

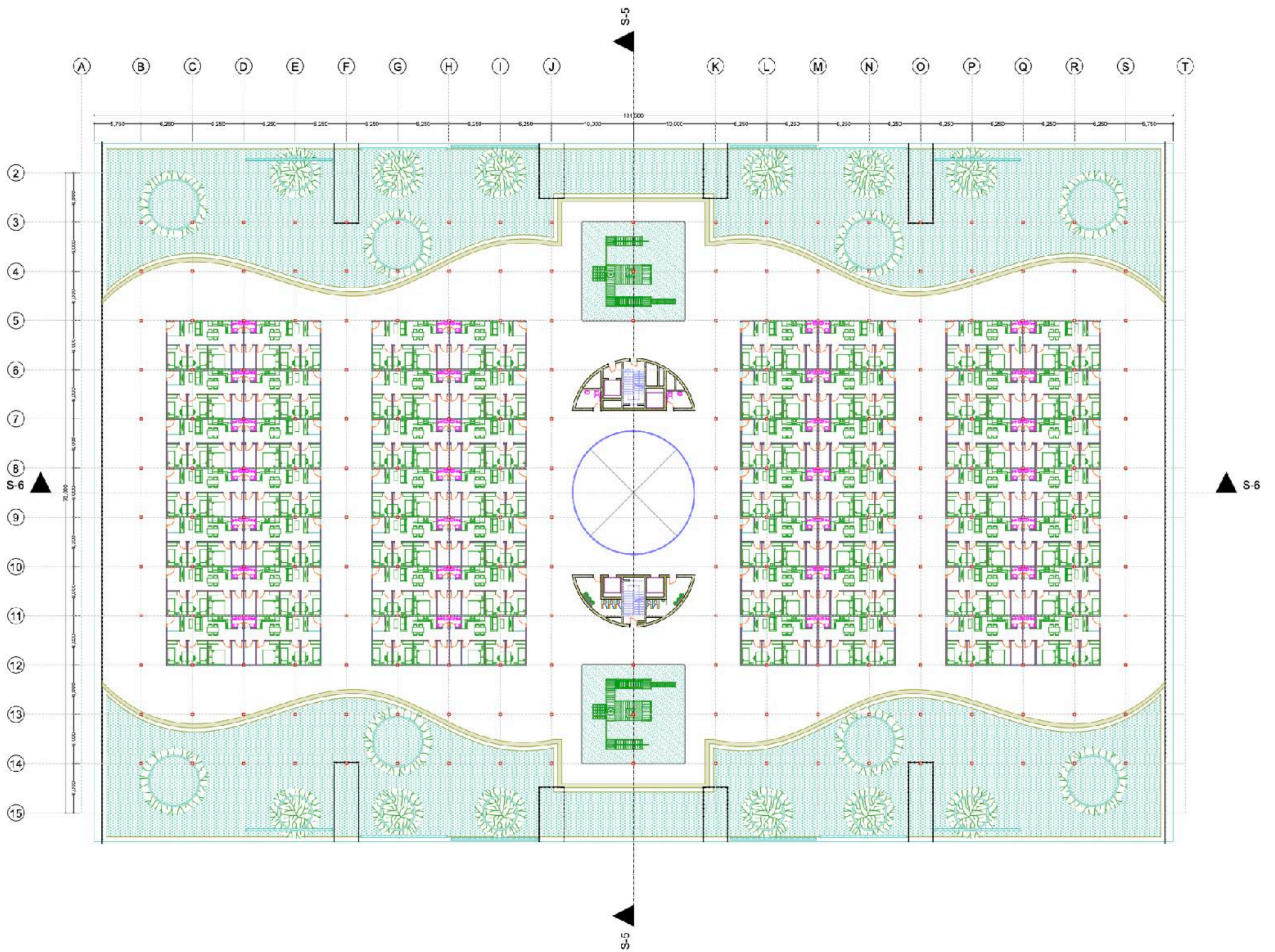


- Public Facilities
- Gym
  - Book Store
  - Receptionist
  - Mail Box
  - Inner Garden
  - Multipurpose Hall
  - Health Facilities

- Public Toilet
- Worship Space
- Commercial Stores
- Mini Market
- Restaurant
- Coffee Shop
- Communal Space

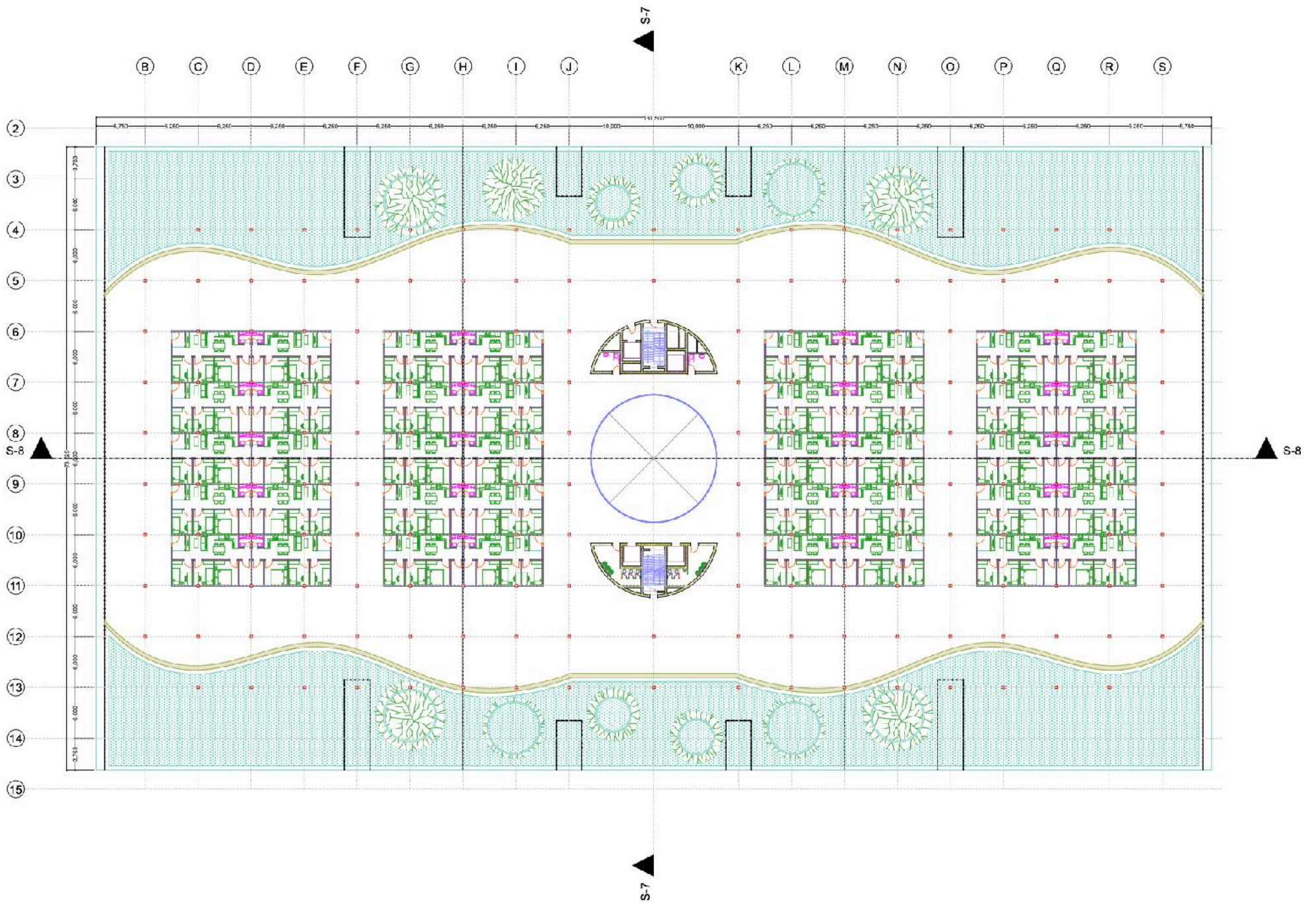
**GROUND FLOOR PLAN**  
SCALE: 450

Figure 5.6 Ground Floor Plan  
(Source: Author, 2024)



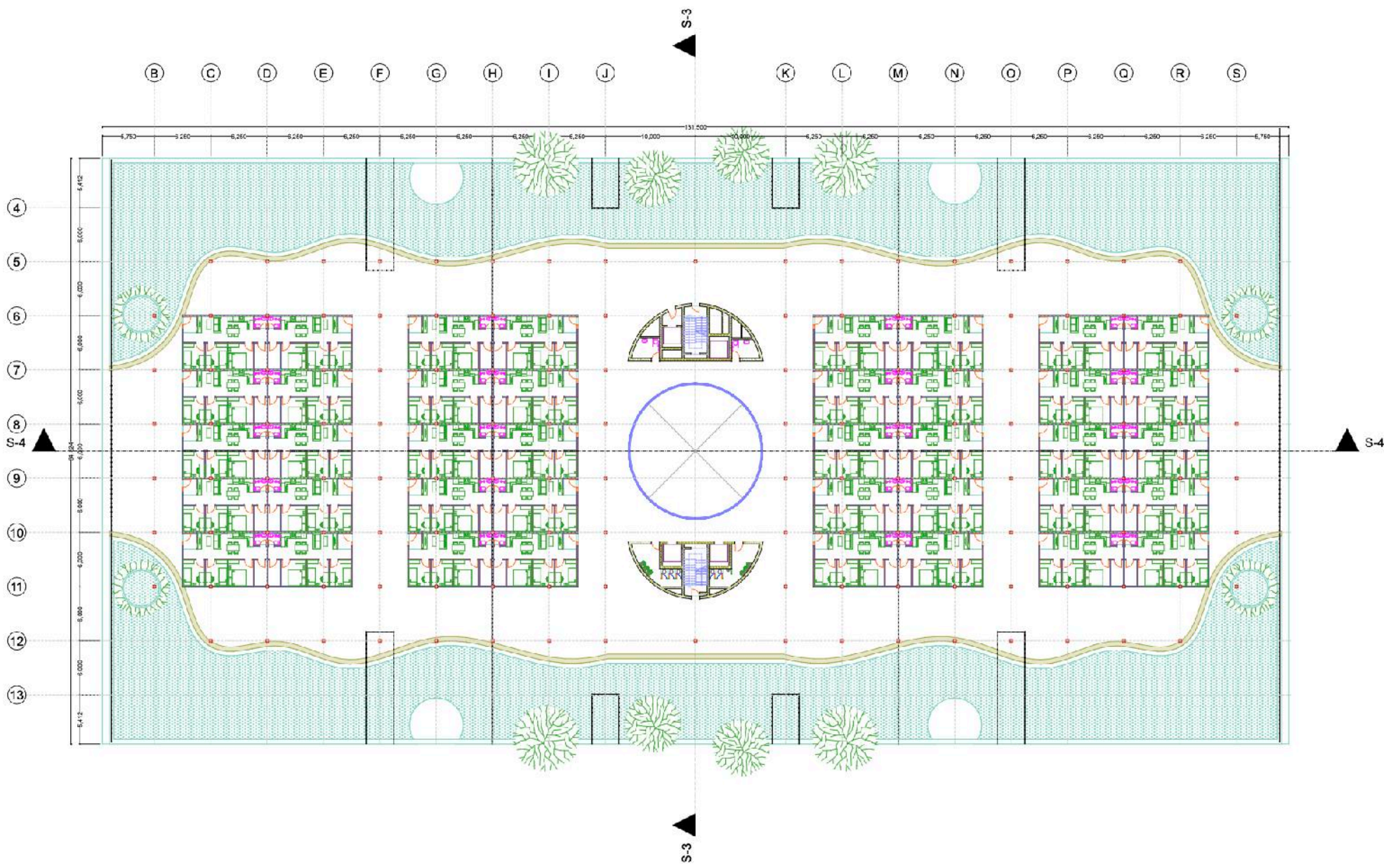
1ST FLOOR PLAN  
SCALE: 450

Figure 5.7 1st Floor Plan  
(Source: Author, 2024)



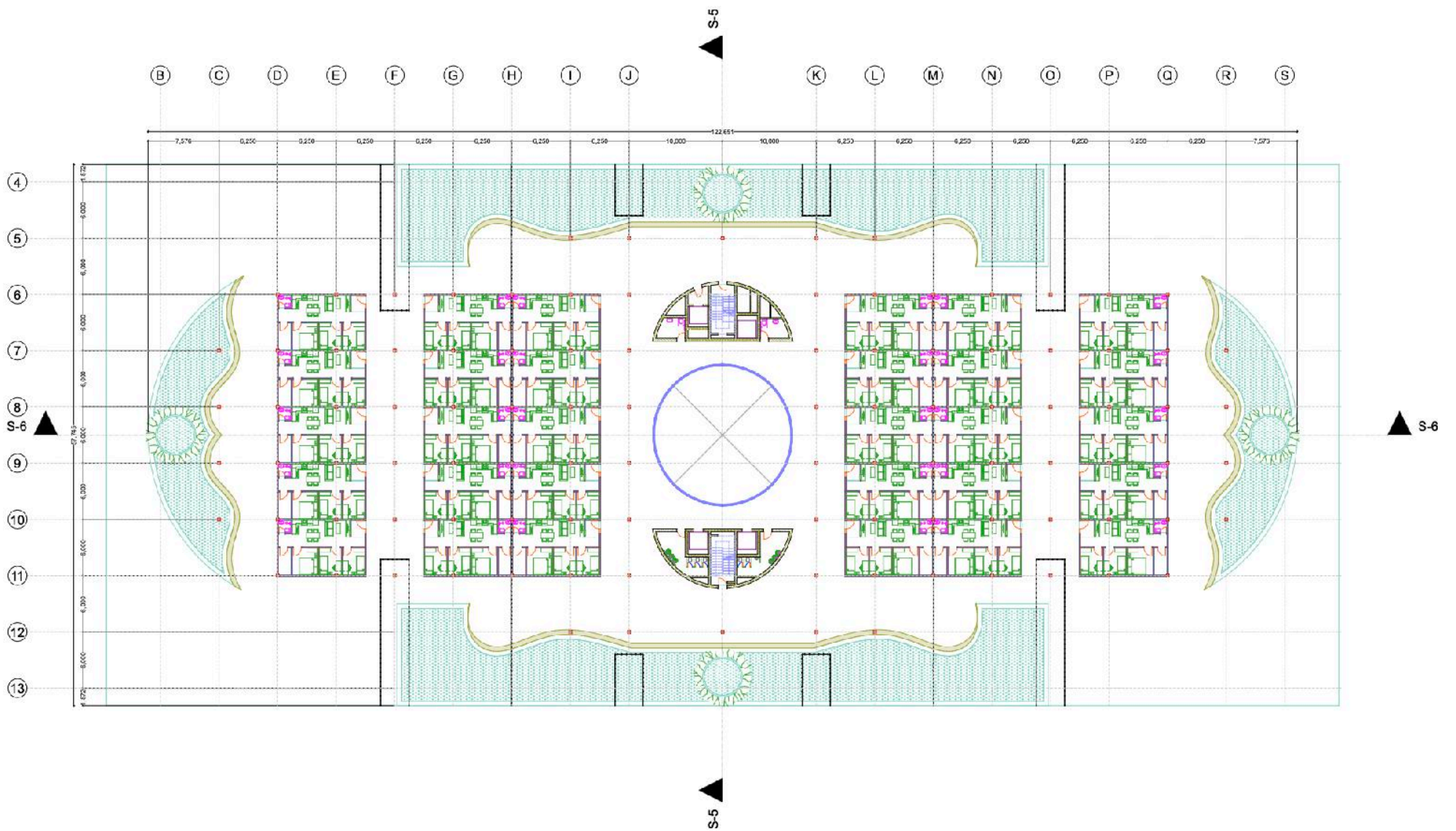
2ND FLOOR PLAN  
SCALE: 450

Figure 5.8 2nd Floor Plan  
(Source: Author, 2024)



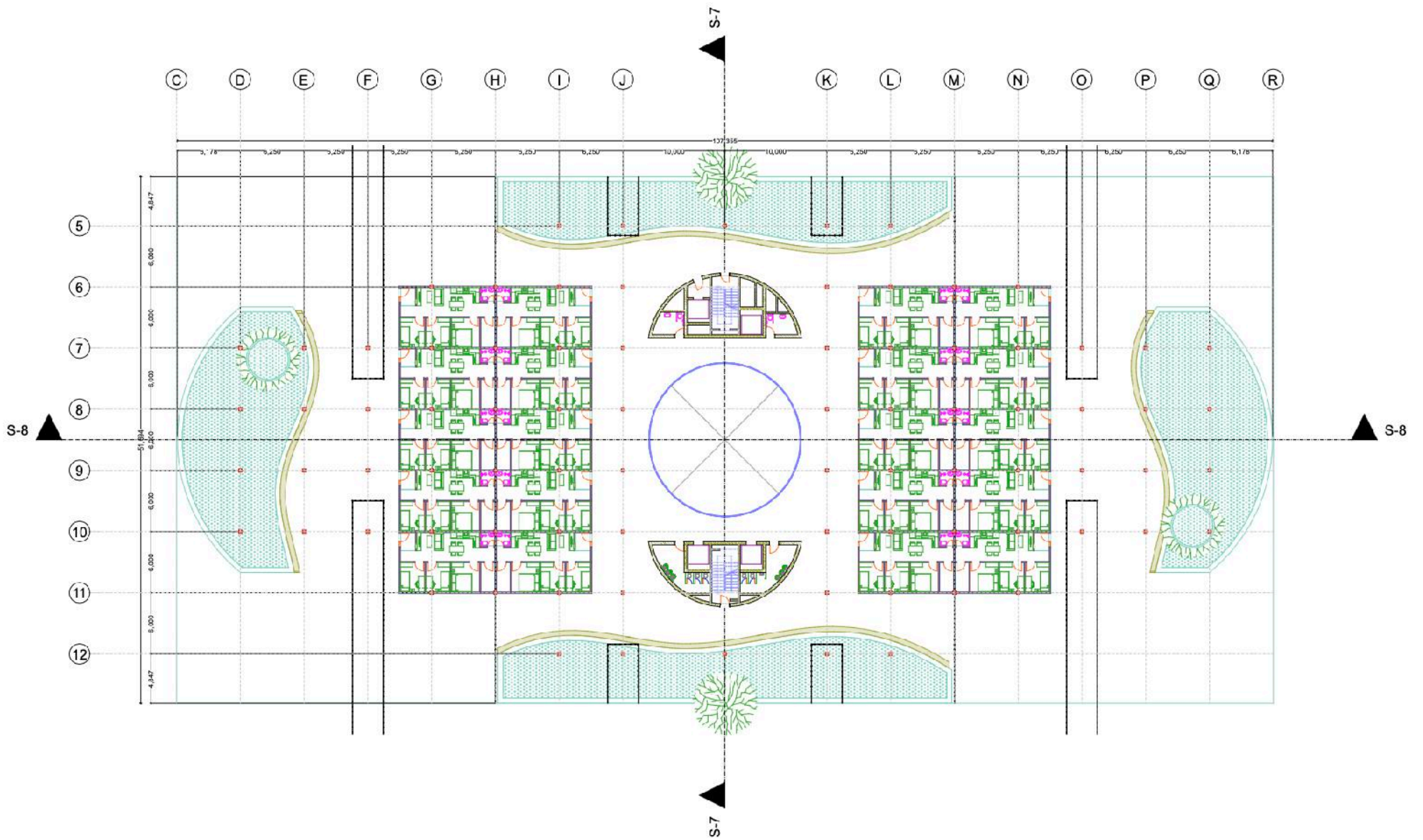
3RD FLOOR PLAN  
SCALE: 450

Figure 5.9 3rd Floor Plan  
(Source: Author, 2024)



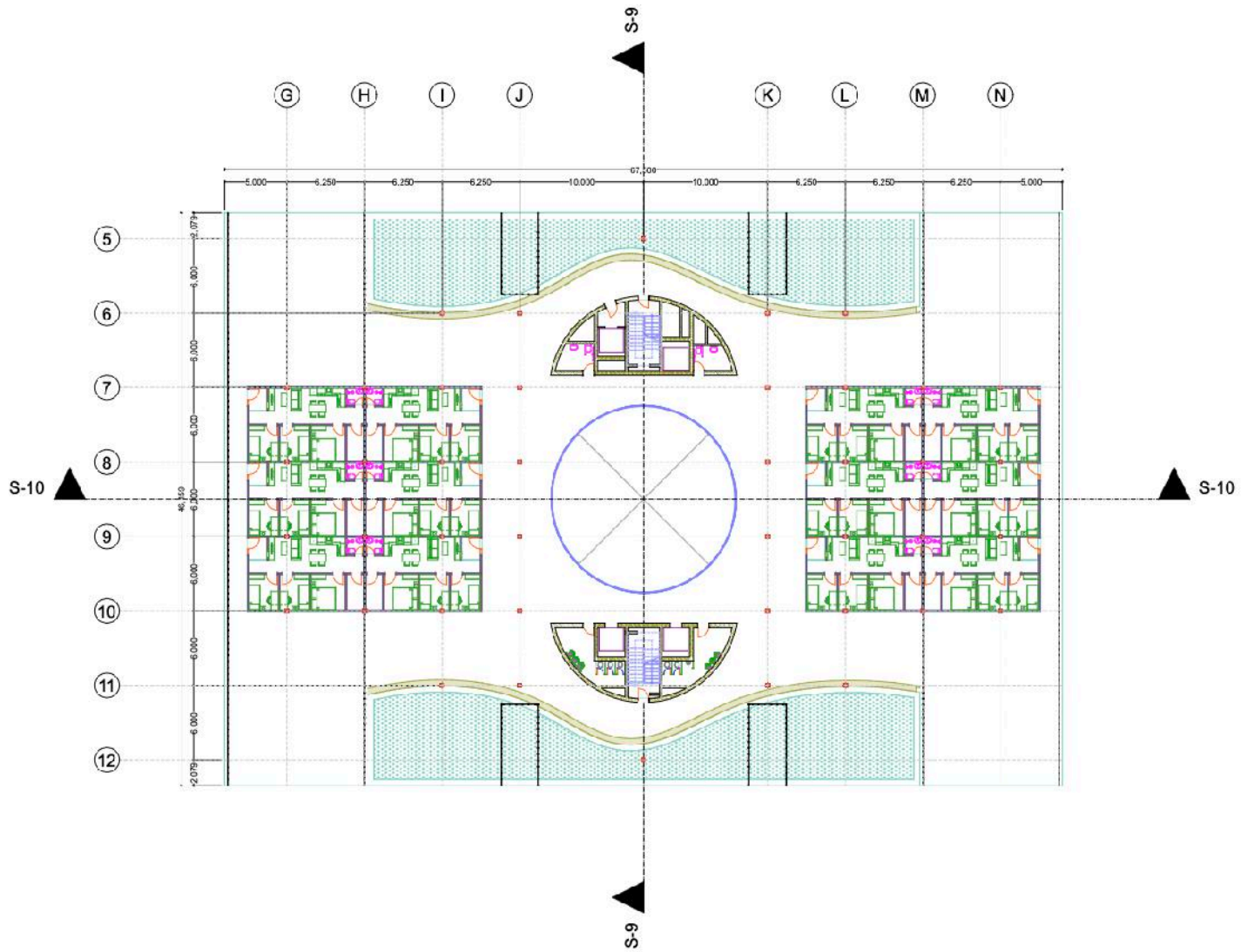

**4TH FLOOR PLAN**  
 SCALE: 450

Figure 5.10 4th Floor Plan  
 (Source: Author, 2024)



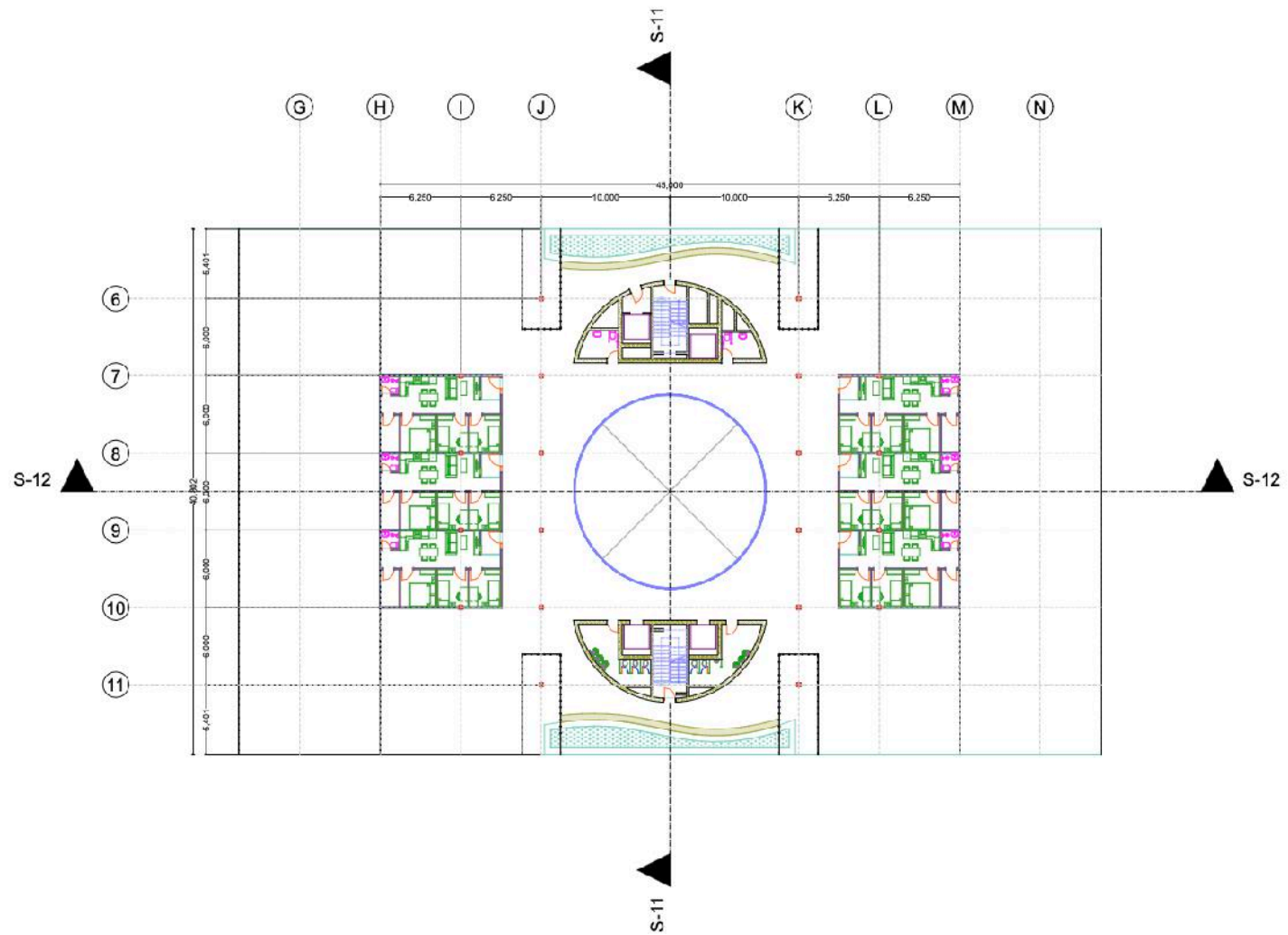
5TH FLOOR PLAN  
SCALE: 450

Figure 5.11 5th Floor Plan  
(Source: Author, 2024)



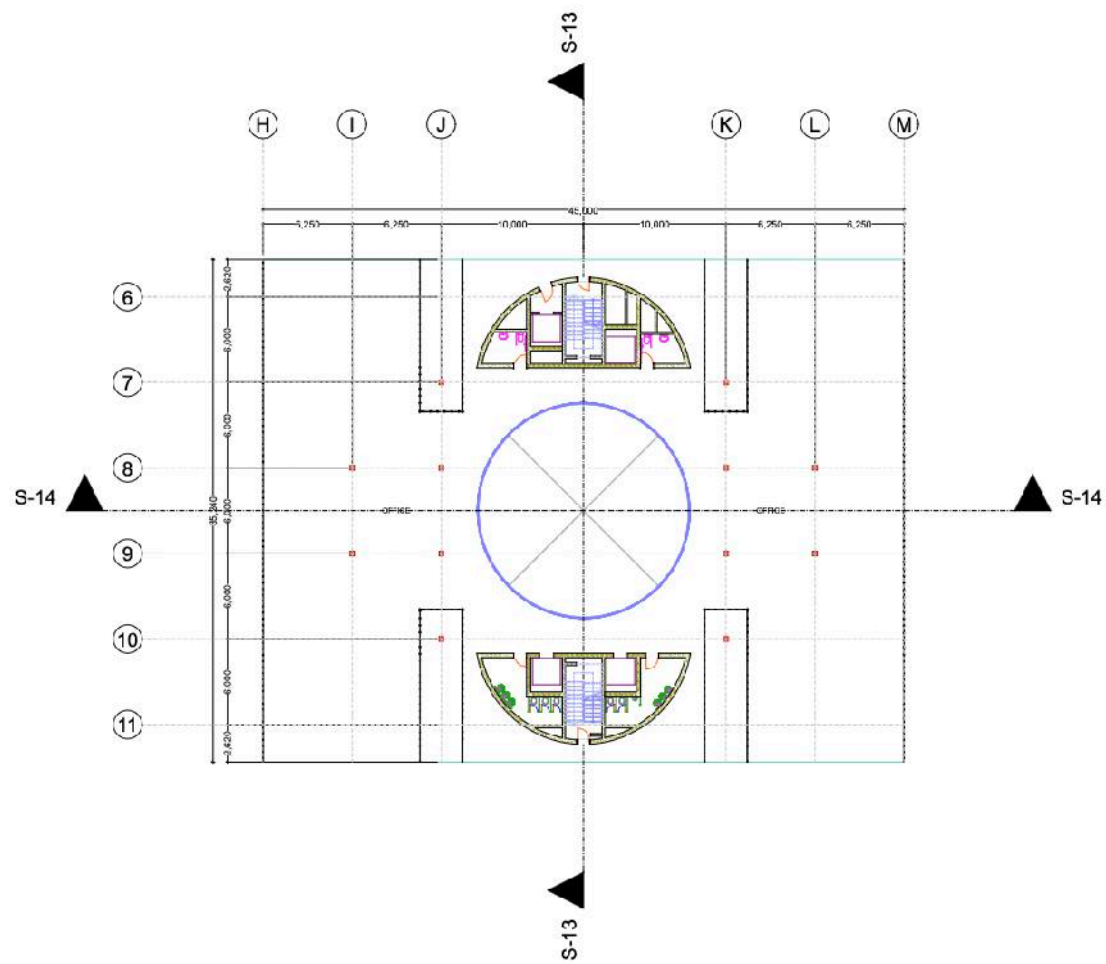
6TH FLOOR PLAN  
SCALE: 450

Figure 5.12 6th Floor Plan  
(Source: Author, 2024)



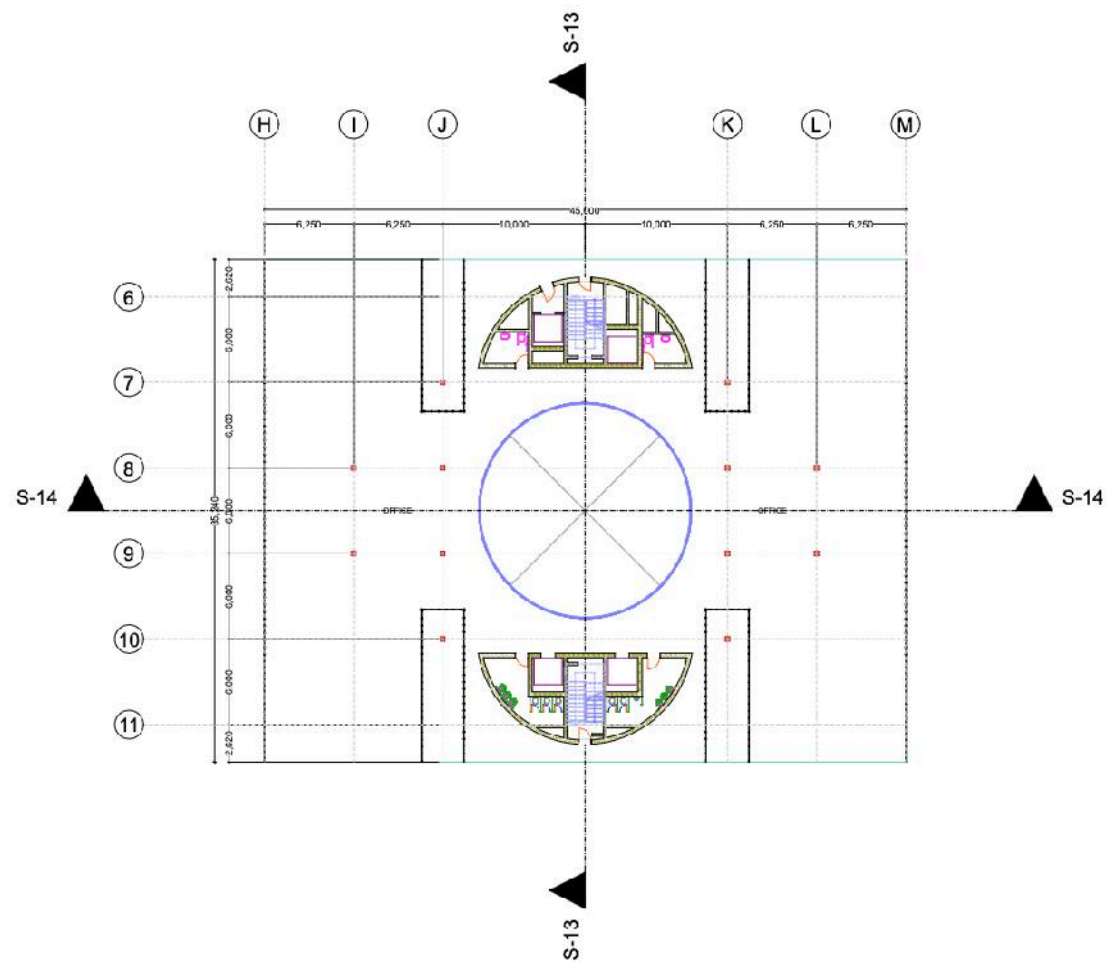
7TH FLOOR PLAN  
SCALE: 450

Figure 5.13 7th Floor Plan  
(Source: Author, 2024)



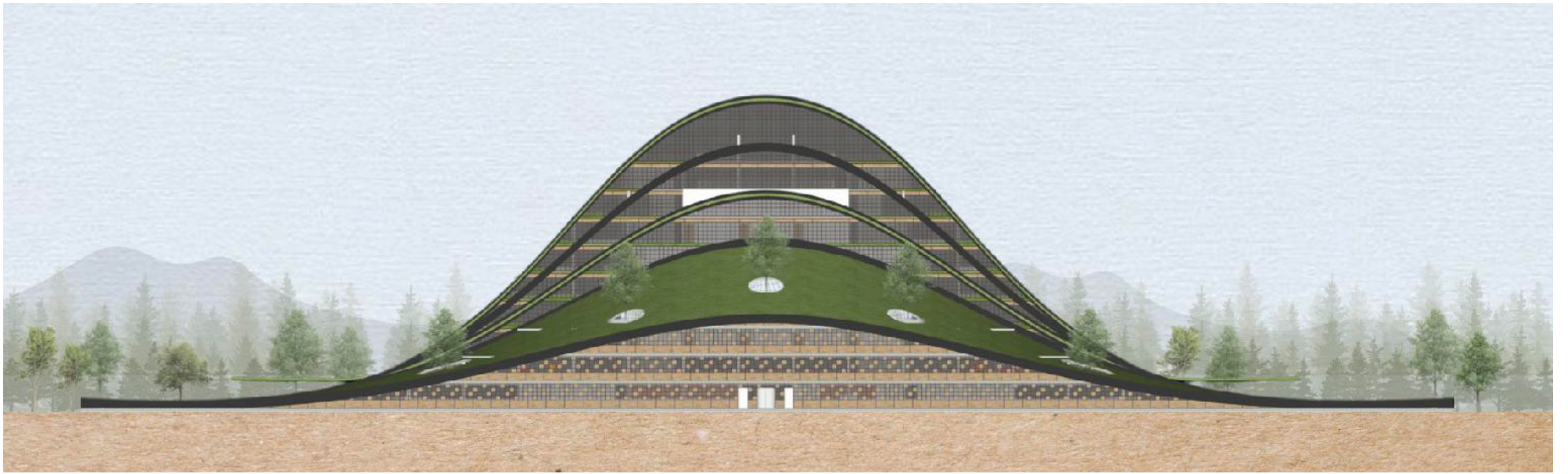

**8TH FLOOR PLAN**  
 SCALE: 450

Figure 5.14 8th Floor Plan  
(Source: Author, 2024)



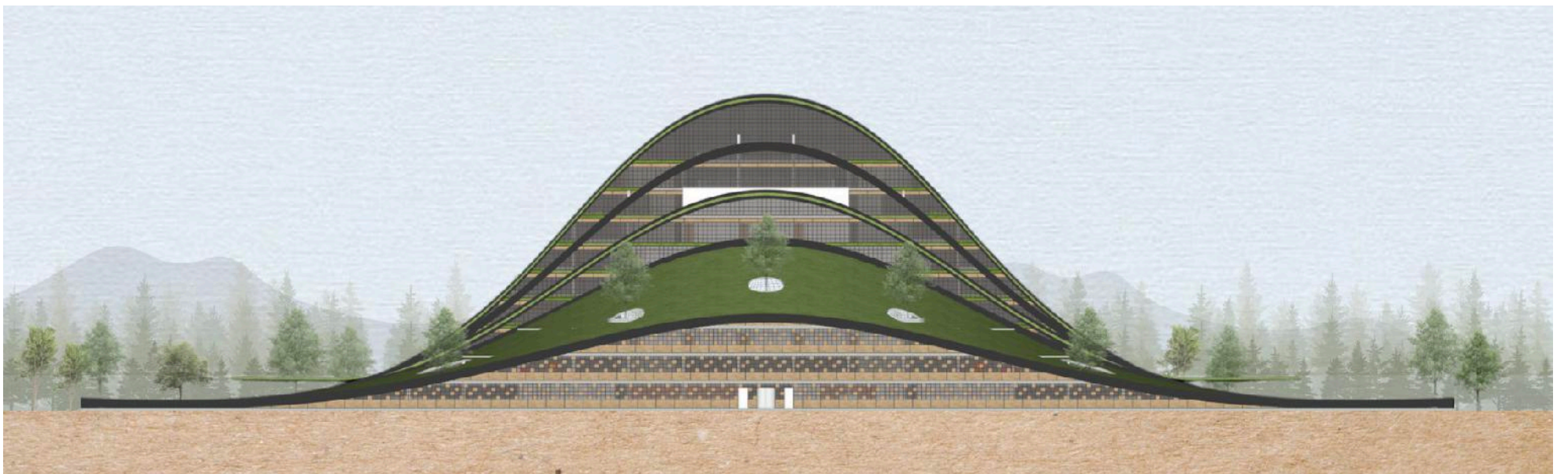

**9TH FLOOR PLAN**  
 SCALE: 450

Figure 5.15 9th Floor Plan  
 (Source: Author, 2024)



 NORTH ELEVATION  
SCALE: 450

Figure 5.16 North Elevation  
(Source: Author, 2024)



 WEST ELEVATION  
SCALE: 450

Figure 5.18 West Elevation  
(Source: Author, 2024)



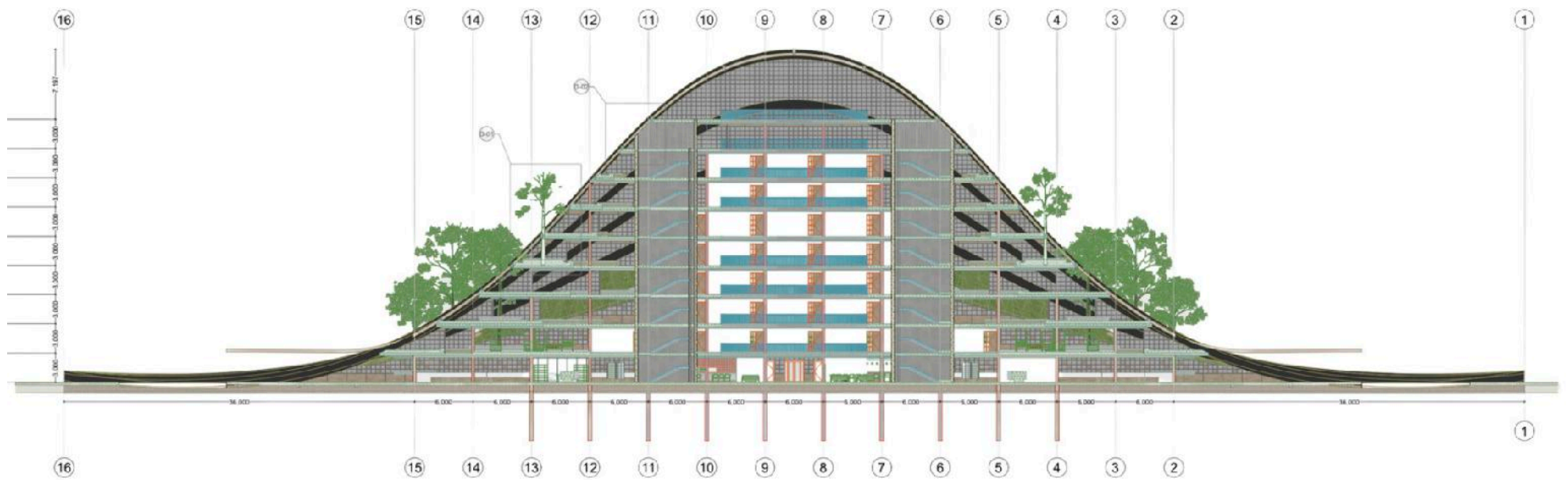
 SOUTH ELEVATION  
SCALE: 450

Figure 5.17 South Elevation  
(Source: Author, 2024)



 EAST ELEVATION  
SCALE: 450

Figure 5.19 East Elevation  
(Source: Author, 2024)



SECTION A-A'  
SCALE: 450

Figure 5.20 Section A-A'  
(Source: Author, 2024)



SECTION B-B'  
SCALE: 450

Figure 5.21 Section B-B'  
(Source: Author, 2024)

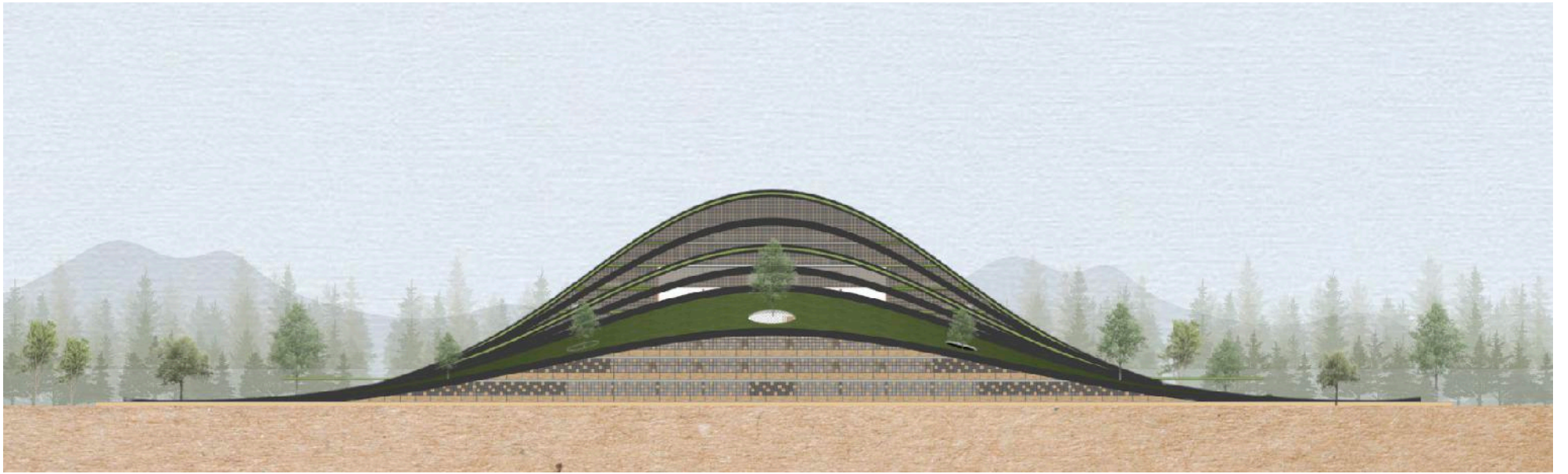


Figure 5.22 Building type B perspective  
(Source: Author, 2024)



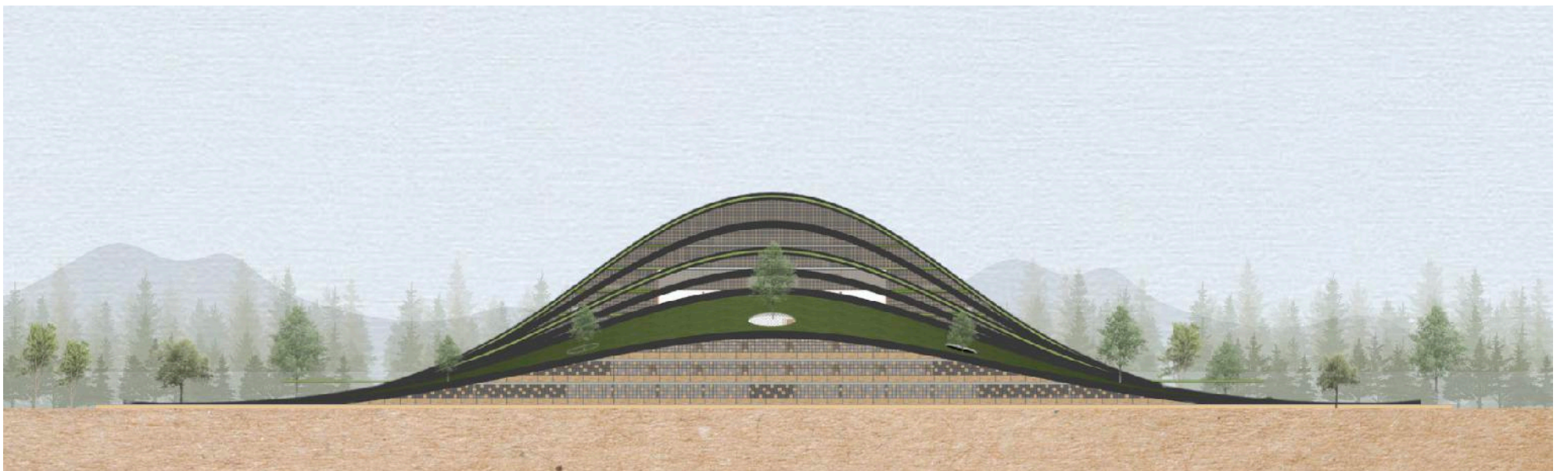
## BUILDING TYPE B

Building Type:	Building Type B
Amount of Floors:	7th Floors
Amount of Housing:	194 Units
Amount of Users:	970 Occupants



 NORTH ELEVATION  
SCALE: 450

Figure 5.23 North Elevation  
(Source: Author, 2024)



 WEST ELEVATION  
SCALE: 450

Figure 5.25 West Elevation  
(Source: Author, 2024)



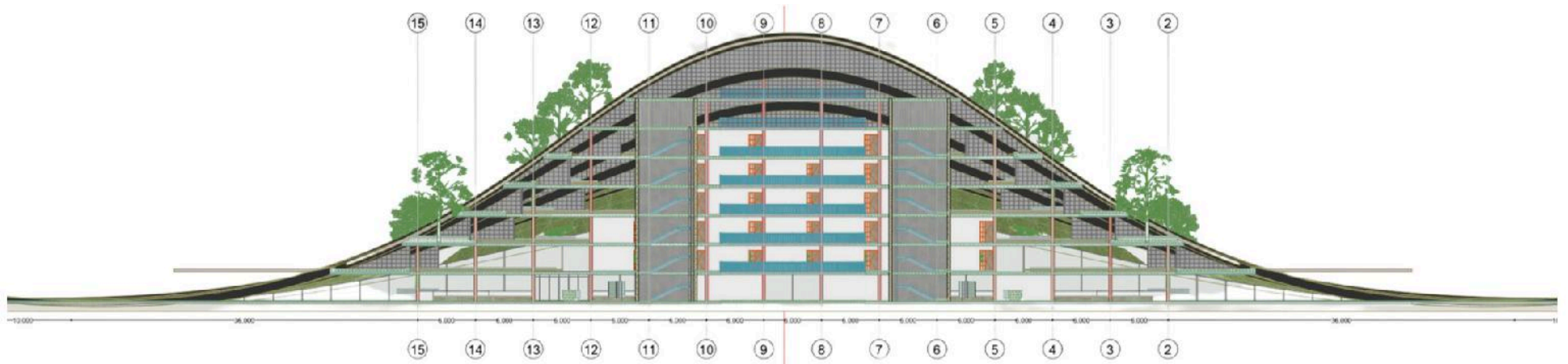
 SOUTH ELEVATION  
SCALE: 450

Figure 5.24 South Elevation  
(Source: Author, 2024)



 EAST ELEVATION  
SCALE: 450

Figure 5.26 East Elevation  
(Source: Author, 2024)



SECTION A-A'  
SCALE: 450

Figure 5.27 Section A-A'  
(Source: Author, 2024)



SECTION B-B'  
SCALE: 450

Figure 5.28 Section B-B'  
(Source: Author, 2024)

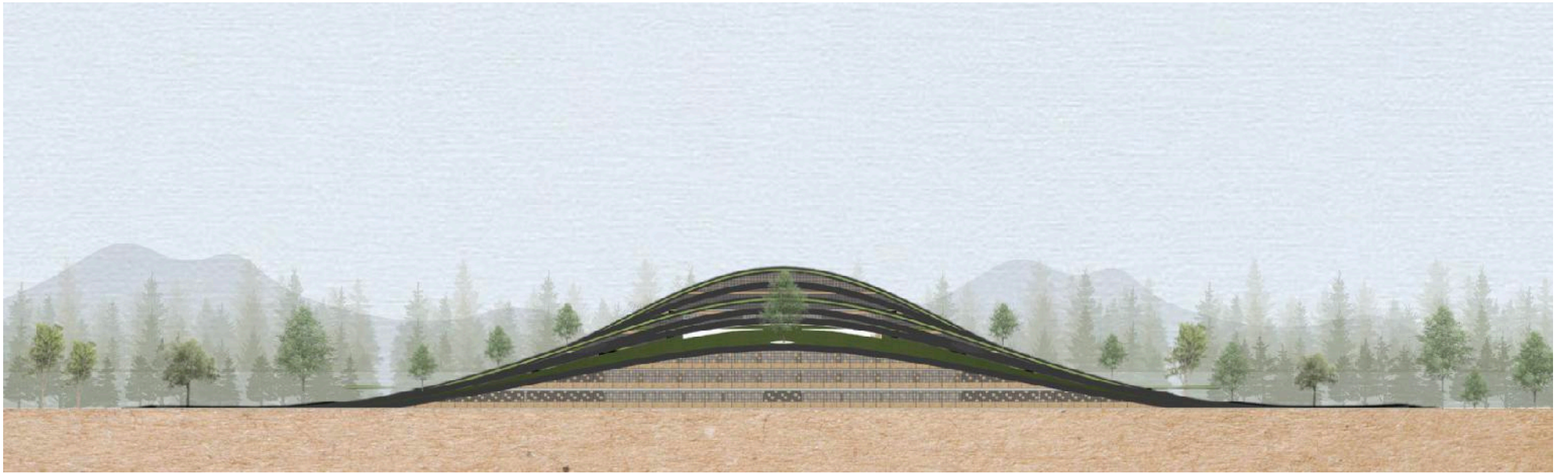


Figure 5.29 Building type C perspective  
(Source: Author, 2024)



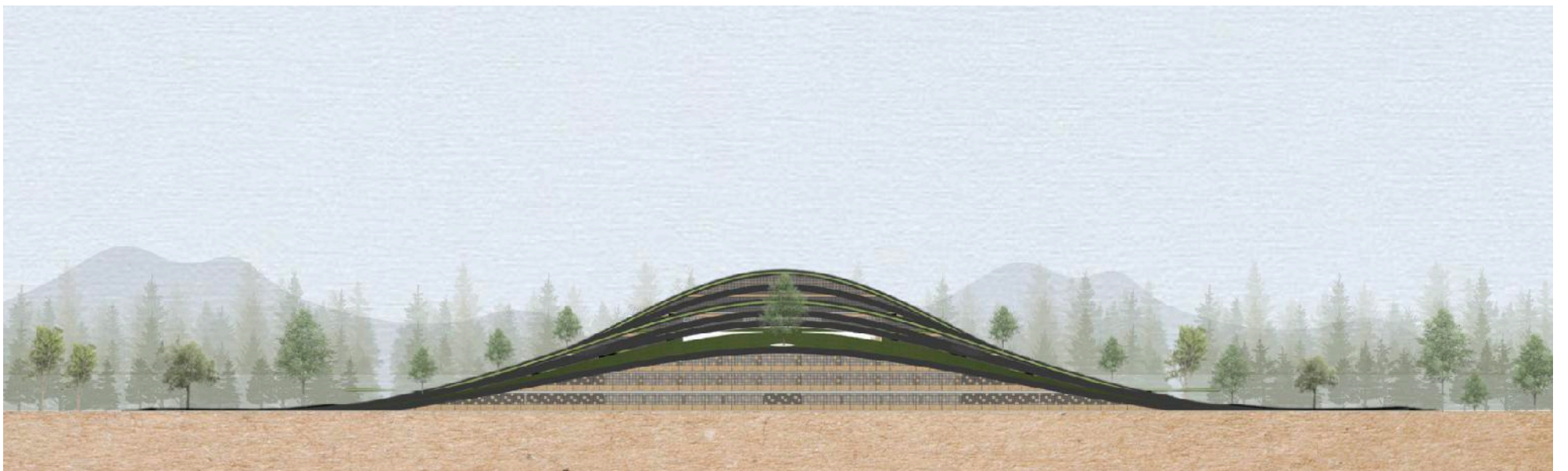
## - BUILDING TYPE C

Building Type:	Building Type C
Amount of Floors:	5th Floors
Amount of Housing:	184 Units
Amount of Users:	920 Occupants



 NORTH ELEVATION  
SCALE: 450

Figure 5.30 North Elevation  
(Source: Author, 2024)



 WEST ELEVATION  
SCALE: 450

Figure 5.32 West Elevation  
(Source: Author, 2024)



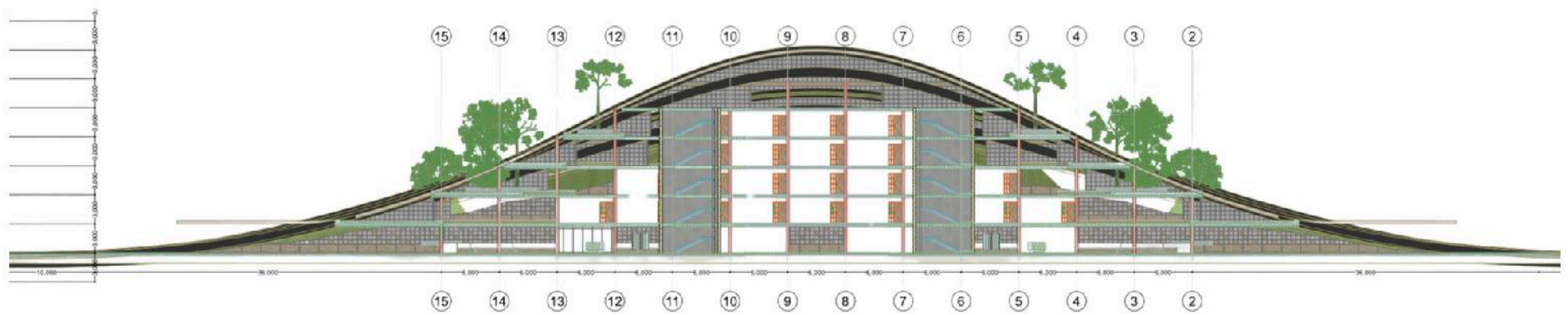
 SOUTH ELEVATION  
SCALE: 450

Figure 5.31 South Elevation  
(Source: Author, 2024)



 EAST ELEVATION  
SCALE: 450

Figure 5.33 East Elevation  
(Source: Author, 2024)



SECTION A-A'  
SCALE: 450

Figure 5.34 Section A-A'  
(Source: Author, 2024)

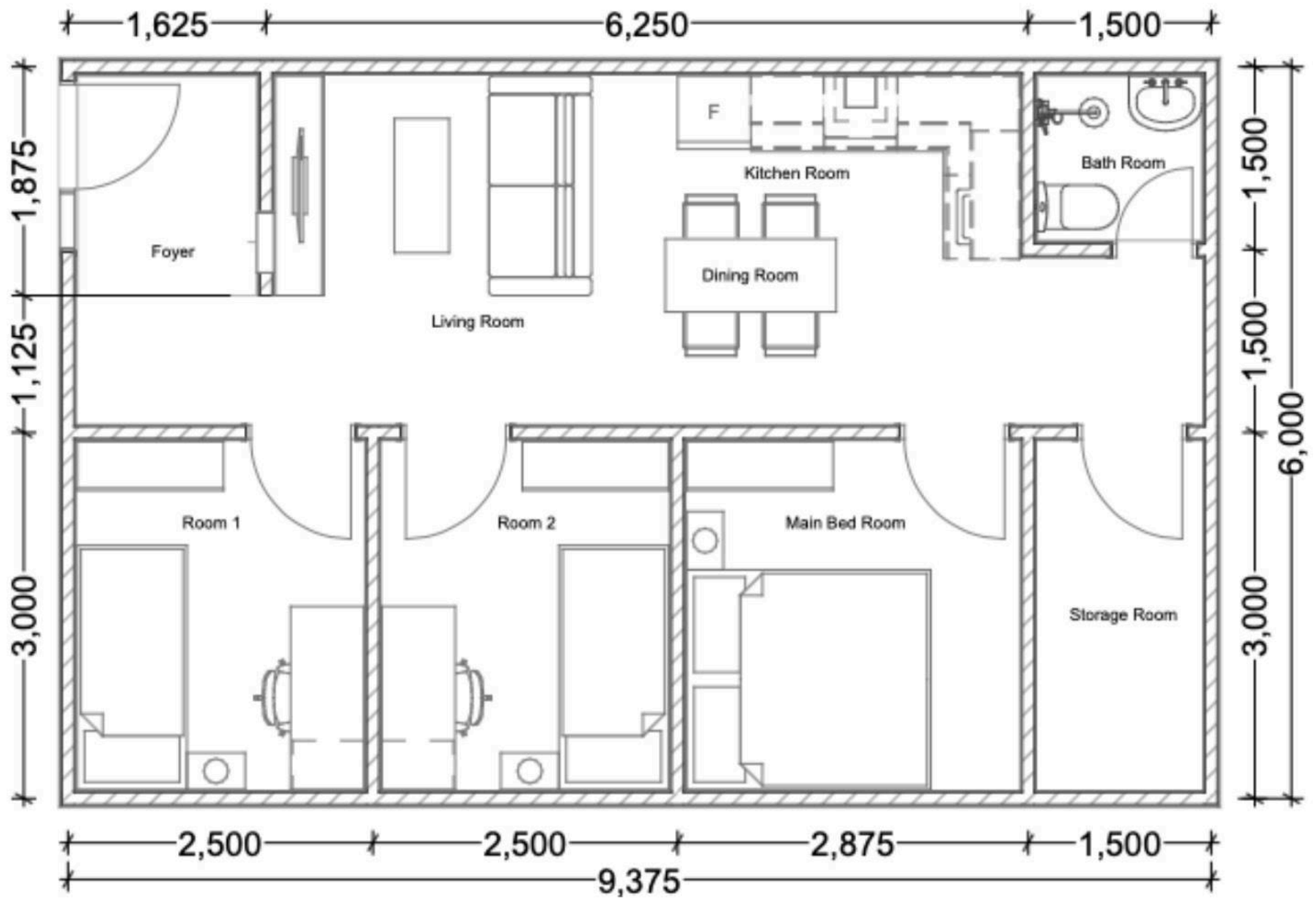


SECTION B-B'  
SCALE: 450

Figure 5.35 Section B-B'  
(Source: Author, 2024)

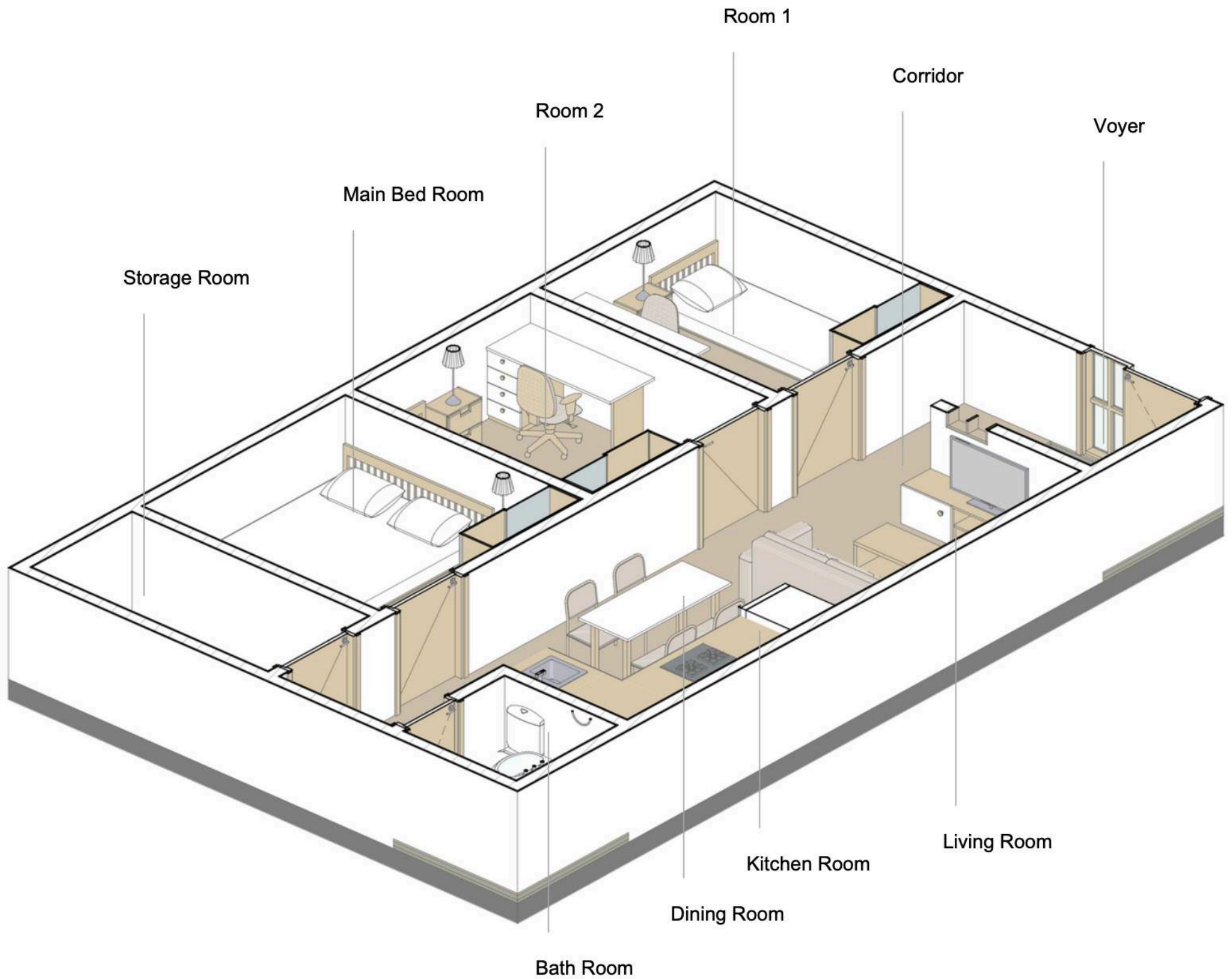
- PARTIAL PLAN, ELEVATION, SECTION





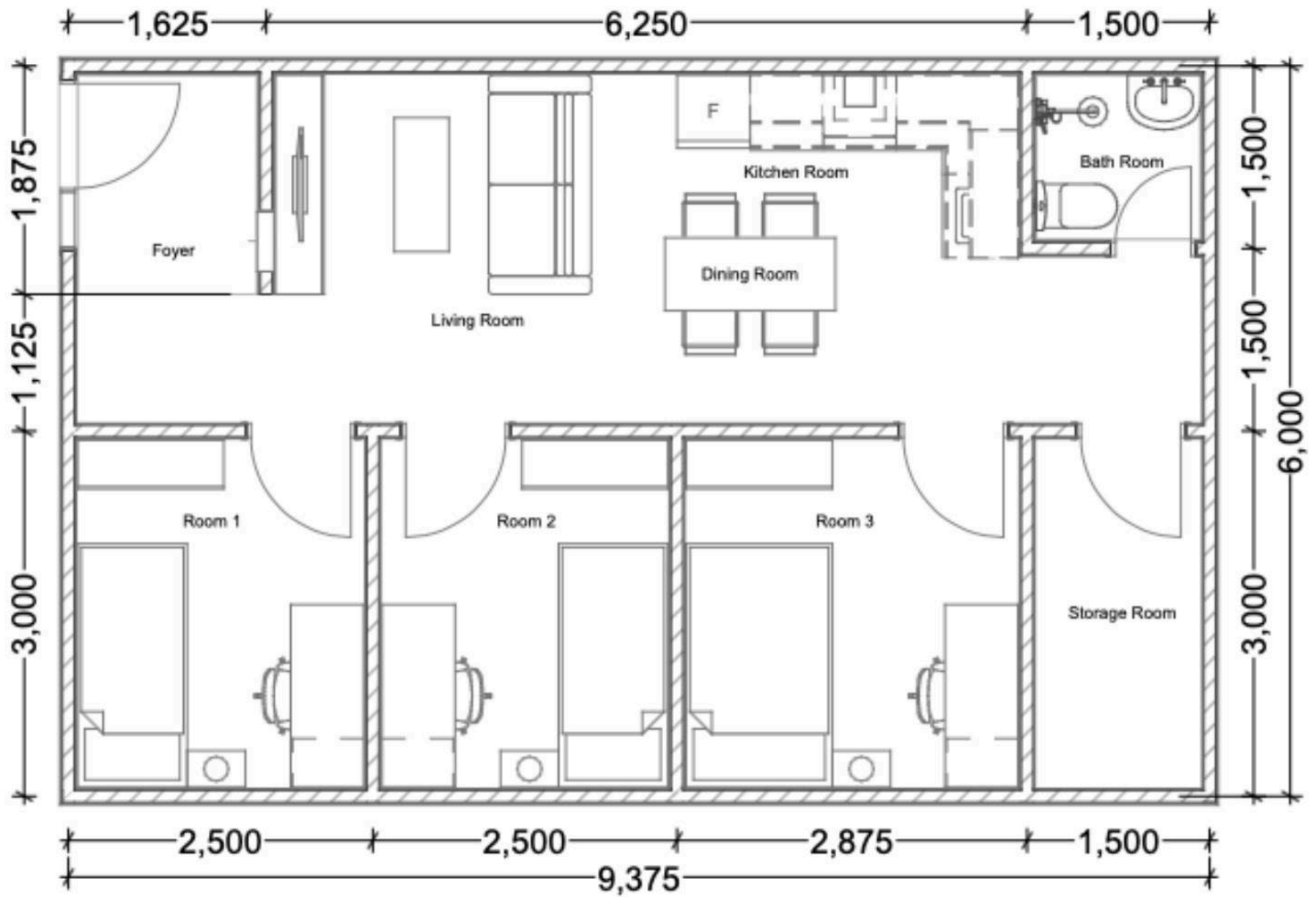

 MODULE OF PLAN (FAMILY)  
 SCALE: 450

Figure 5.36 Module of Plan (Family)  
 (Source: Author, 2024)



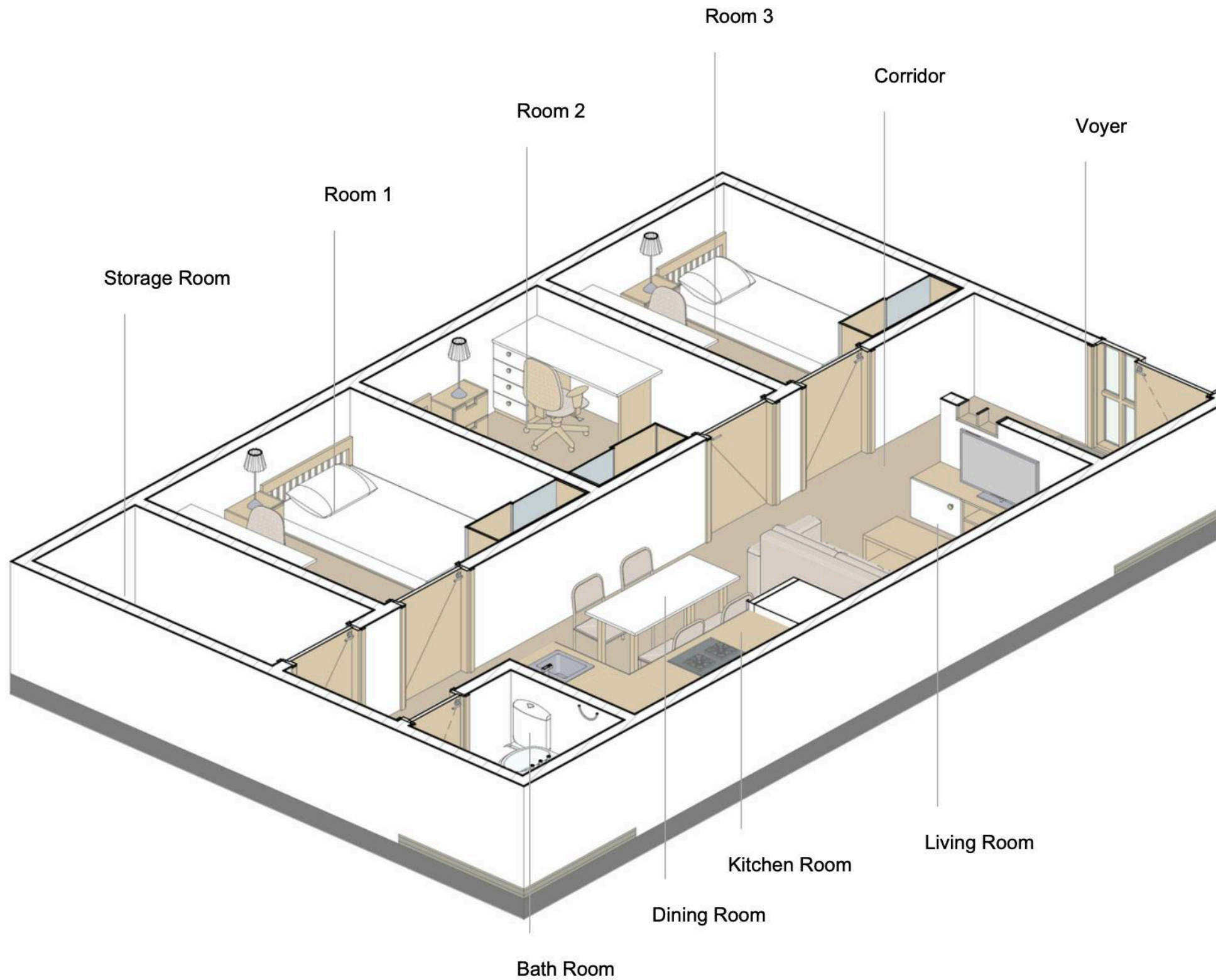
ROOM PERSPECTIVE (FAMILY)  
SCALE: 450

Figure 5.37 Room Perspective (Family)  
(Source: Author, 2024)




**MODULE OF PLAN (SINGLE)**  
 SCALE: 450

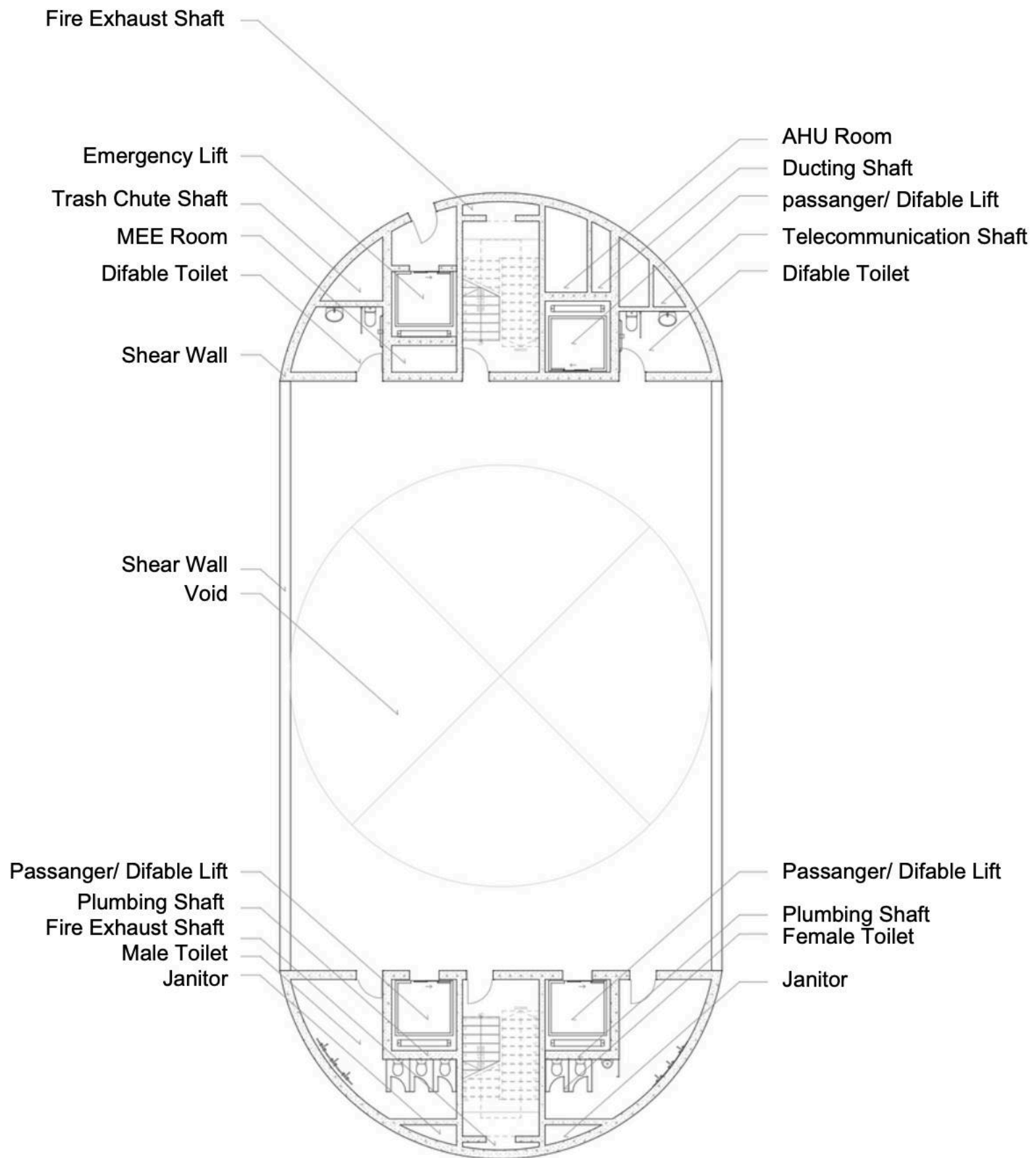
Figure 5.38 Module of Plan (Single)  
 (Source: Author, 2024)




**ROOM PERSPECTIVE (SINGLE)**  
 SCALE: 450

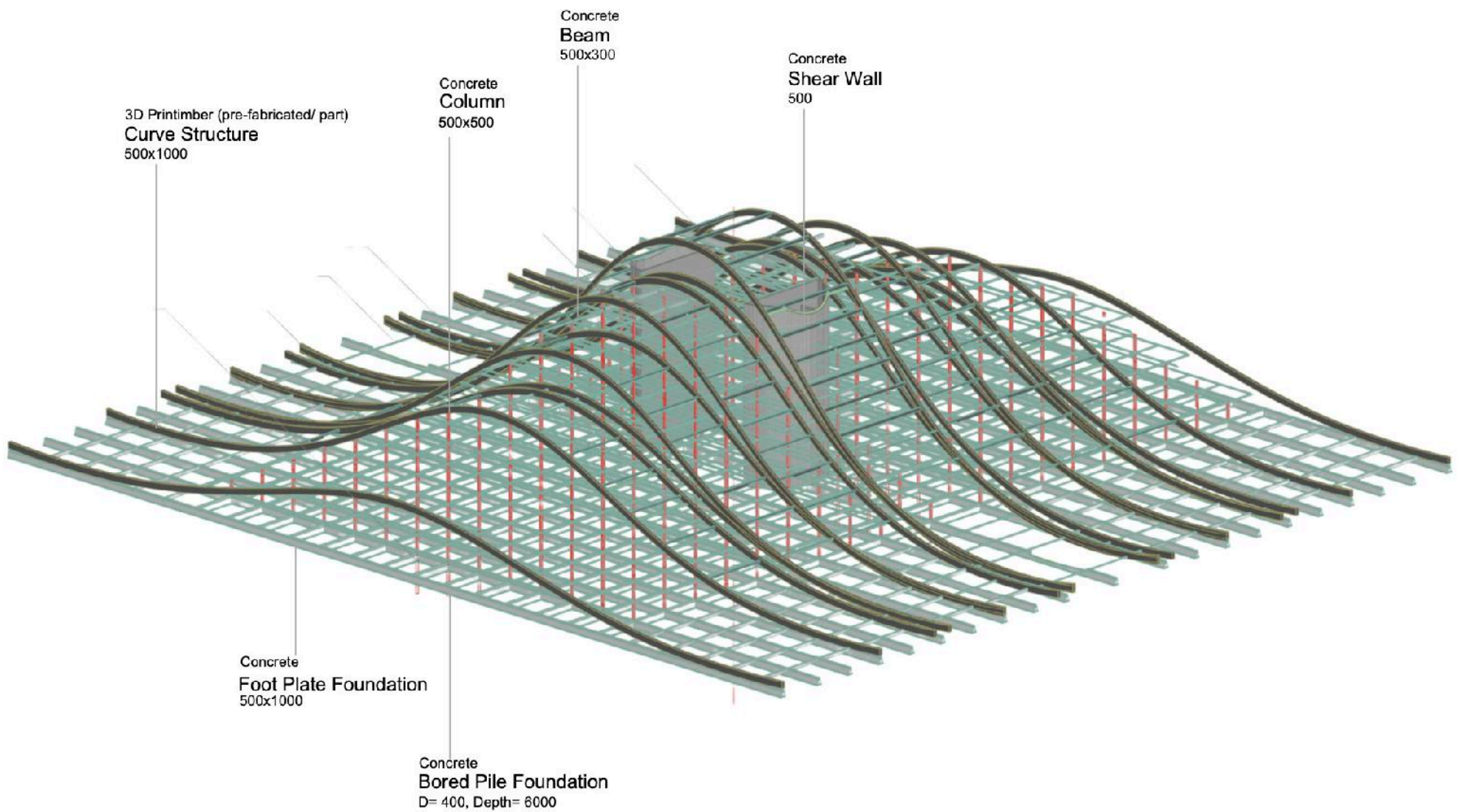
Figure 5.39 Room Perspective (Single)  
 (Source: Author, 2024)

- STRUCTURE SCHEME  
- SPECIAL ARCHITECTURE DETAIL



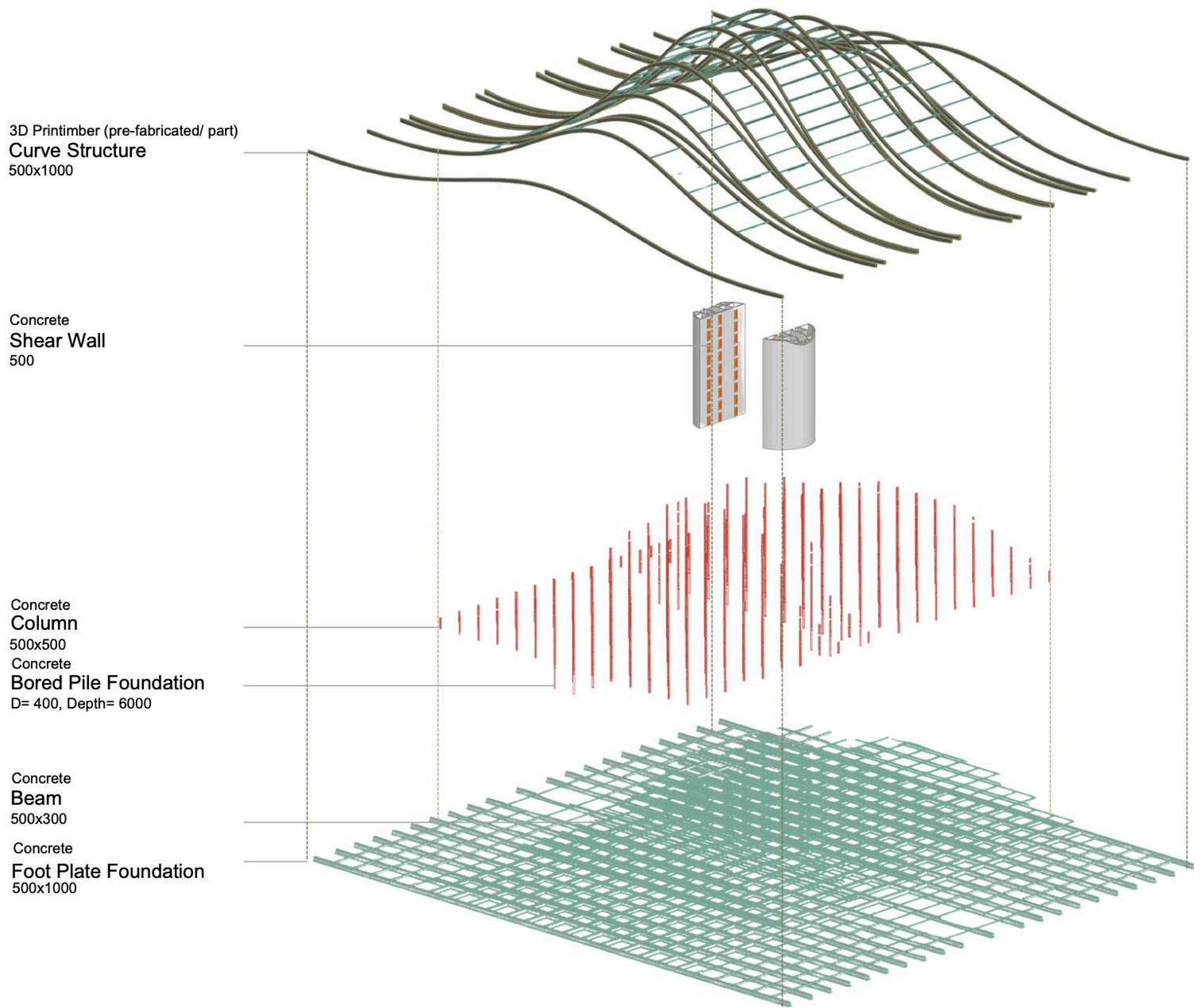

**CORE PLAN**  
 SCALE: 450

Figure 5.40 Core Plan  
 (Source: Author, 2024)



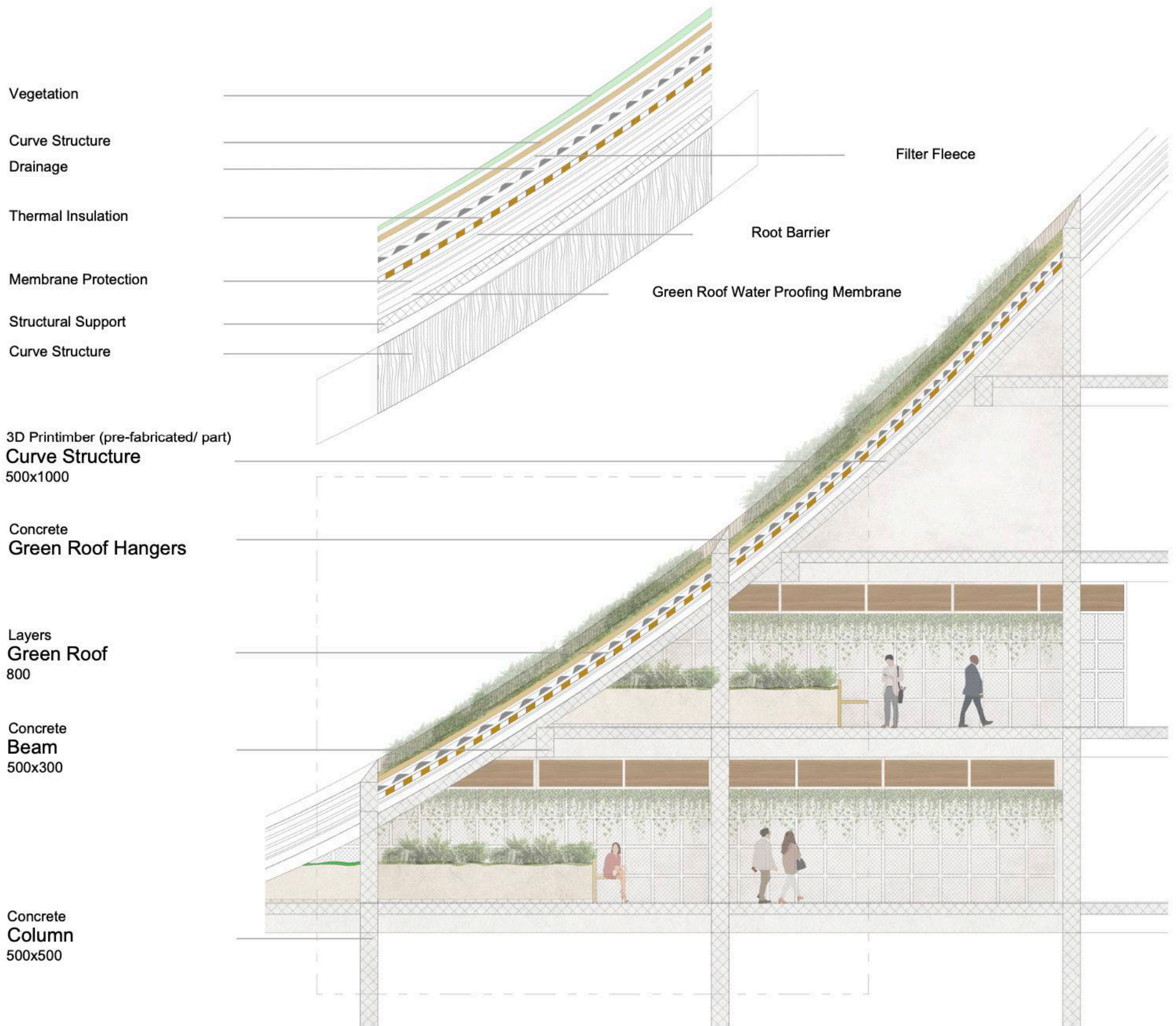
AXONOMETRY STRUCTURE  
SCALE: 450

Figure 5.41 Axonometry Structure  
(Source: Author, 2024)



EXPLODED STRUCTURE  
SCALE: 450

Figure 5.42 Exploded Structure  
(Source: Author, 2024)




**DETAIL OF GREEN ROOF**  
 SCALE: 450

Figure 5.43 Detail of Green Roof  
 (Source: Author, 2024)

Sun Protection  
**Wood Panel**  
1500x500

Hanging Vegetation  
**Vines**

Modular  
**Wire Mesh**  
500x500

Frame  
**Wood Frame**  
100




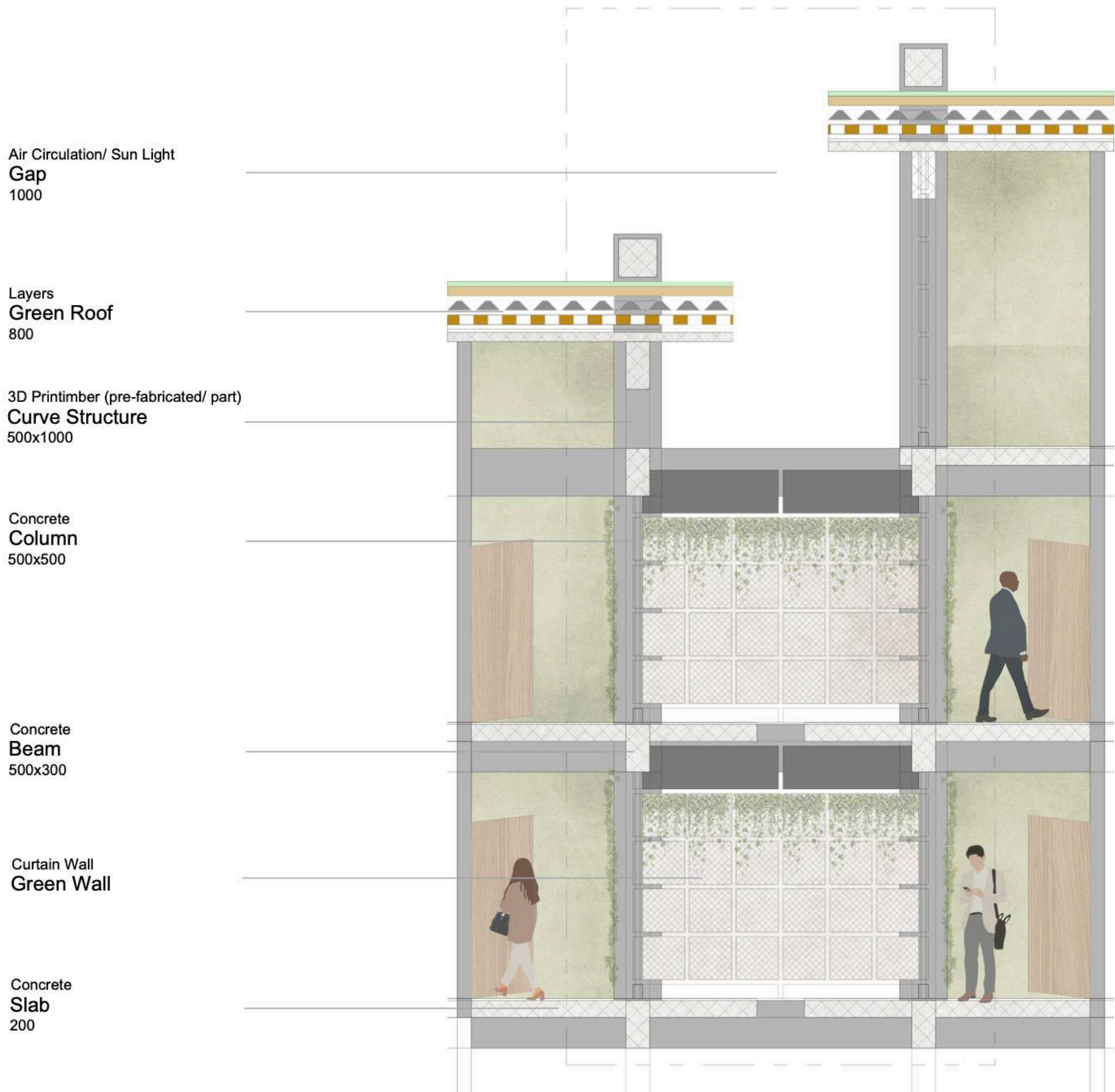
 **DETAIL OF GREEN WALL**  
SCALE: 450

Figure 5.44 Detail of Green Wall  
(Source: Author, 2024)




**DETAIL OF BUILDING GAP**  
 SCALE: 450

Figure 5.45 Detail of Building Gap  
 (Source: Author, 2024)

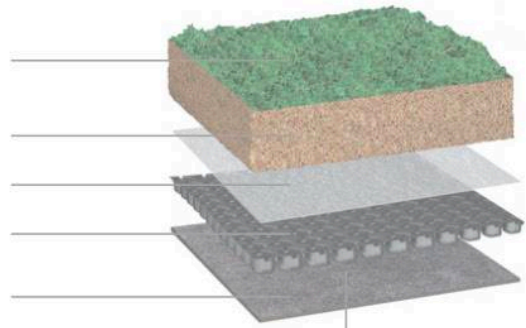
Layers  
**Inner Garden**  
800

Vegetation

Substrate

Filter Fleece

Protection Layer



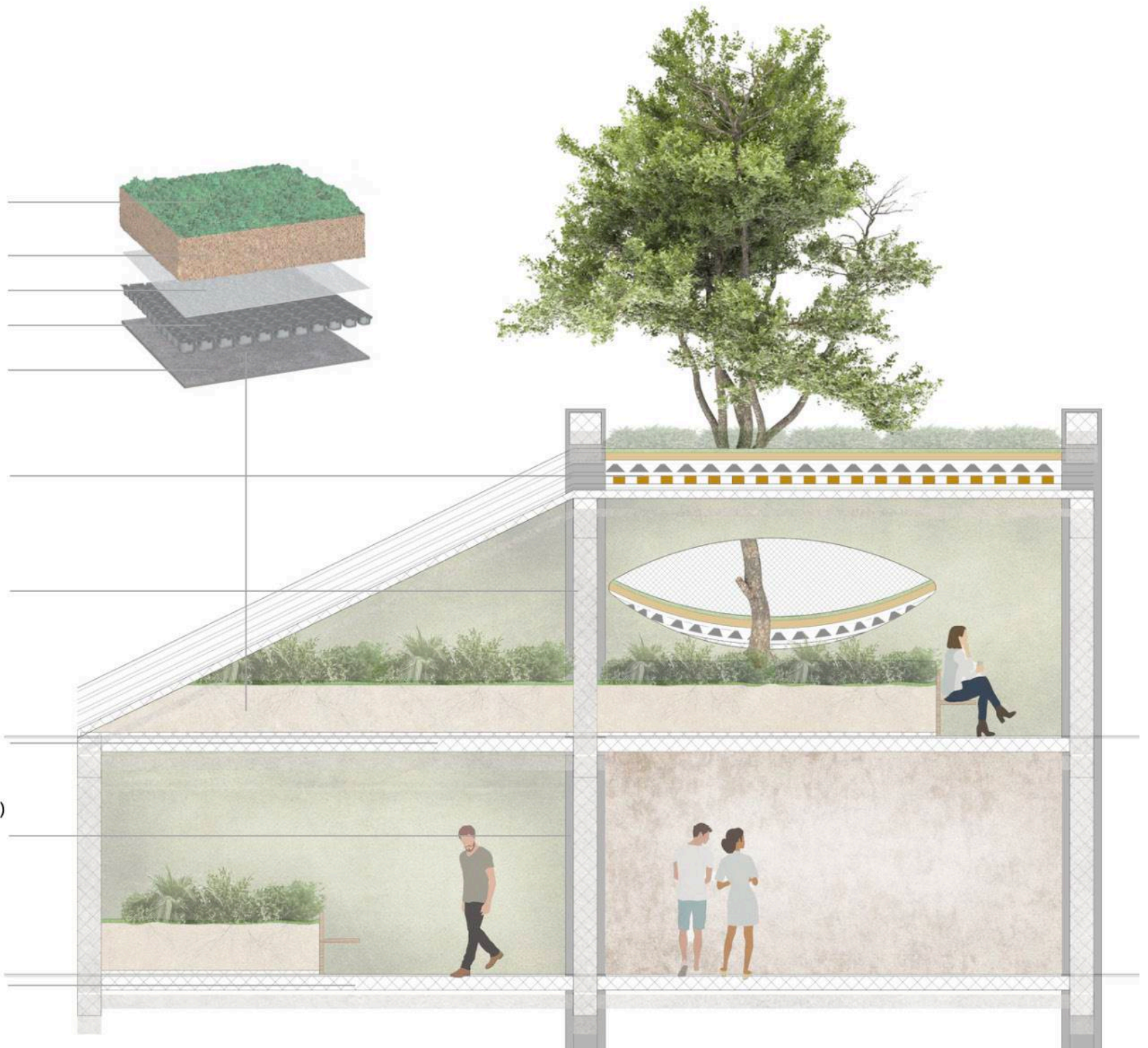
Layers  
**Green Roof**  
800

Concrete  
**Column**  
500x500

Concrete  
**Beam**  
500x300

3D Printimber (pre-fabricated/ part)  
**Curve Structure**  
500x1000

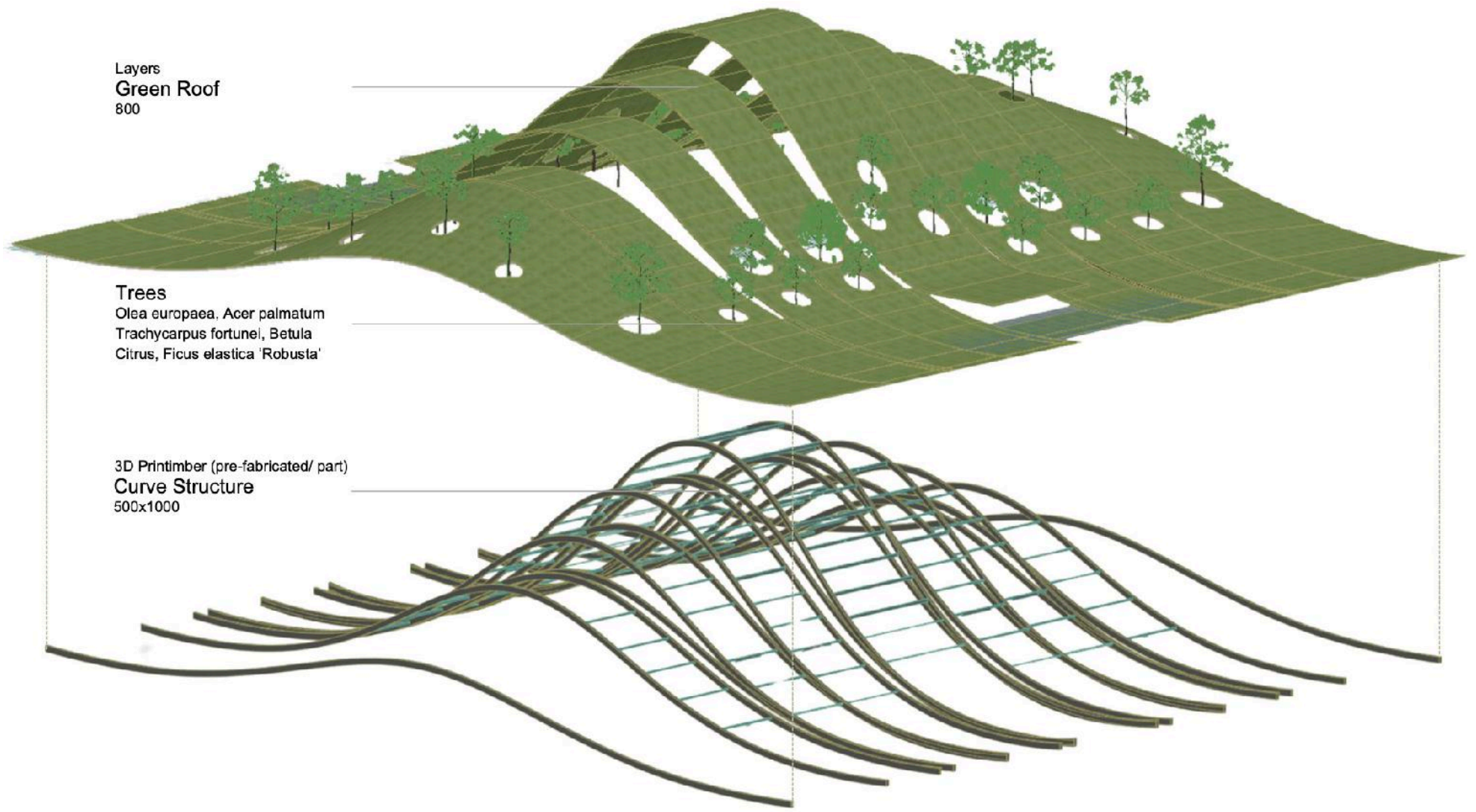
Concrete  
**Slab**  
200



 **DETAIL OF BIOPORE ENVELOPE**  
SCALE: 450

Figure 5.46 Detail of Biopore Envelope  
(Source: Author, 2024)

- BUILDING ENVELOPE DETAIL



 BUILDING ENVELOPE DETAIL  
SCALE: 450

Figure 5.47 Building Envelope Detail  
(Source: Author, 2024)

- PERSPECTIVE EXTERIOR





Figure 5.48 Exterior 1  
(Source: Author, 2024)





Figure 5.49 Exterior 2  
(Source: Author, 2024)

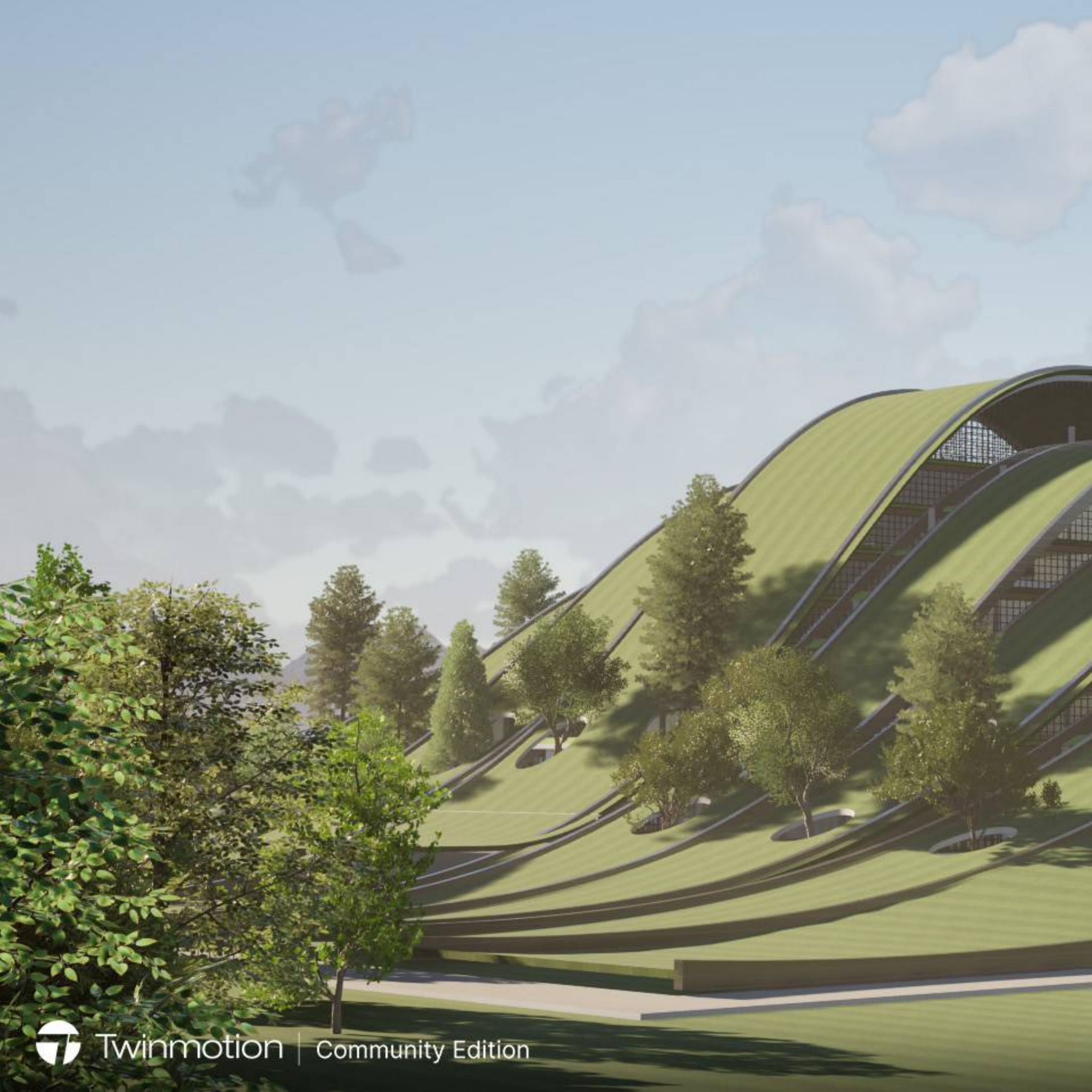




Figure 5.50 Exterior 3  
(Source: Author, 2024)





Figure 5.51 Exterior 4  
(Source: Author, 2024)

- PERSPECTIVE INTERIOR



Figure 5.52 Interior 1  
(Source: Author, 2024)



Figure 5.53 Interior 2  
(Source: Author, 2024)



Figure 5.54 Interior 3  
(Source: Author, 2024)



Figure 5.55 Interior 3  
(Source: Author, 2024)

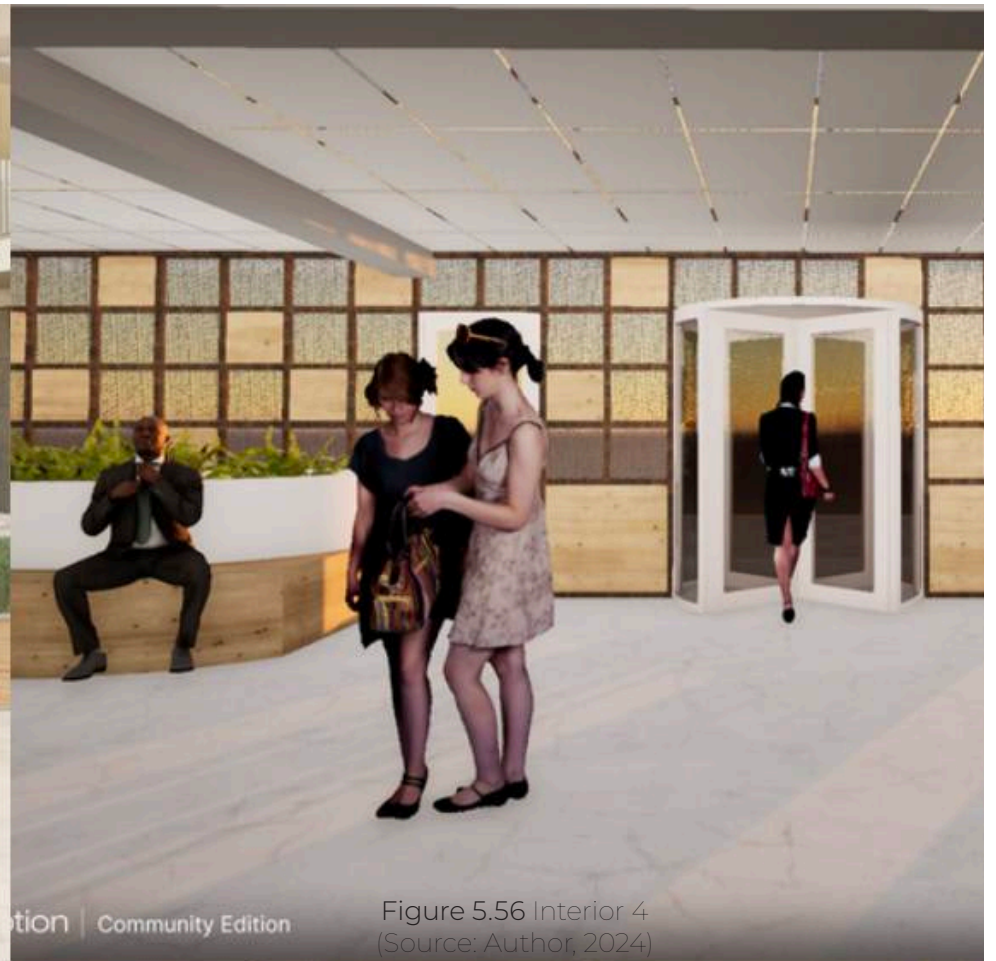


Figure 5.56 Interior 4  
(Source: Author, 2024)



Figure 5.57 Interior 5  
(Source: Author, 2024)

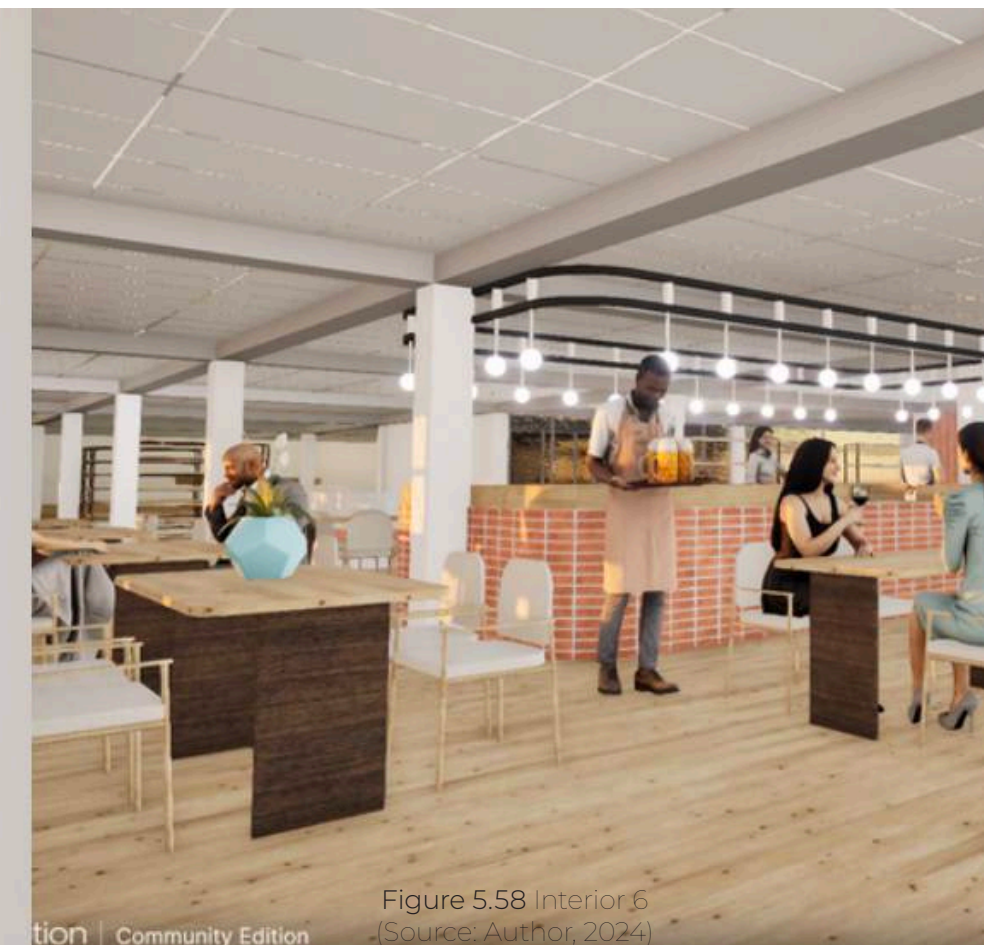


Figure 5.58 Interior 6  
(Source: Author, 2024)

- UTILITY NETWORK SCHEME

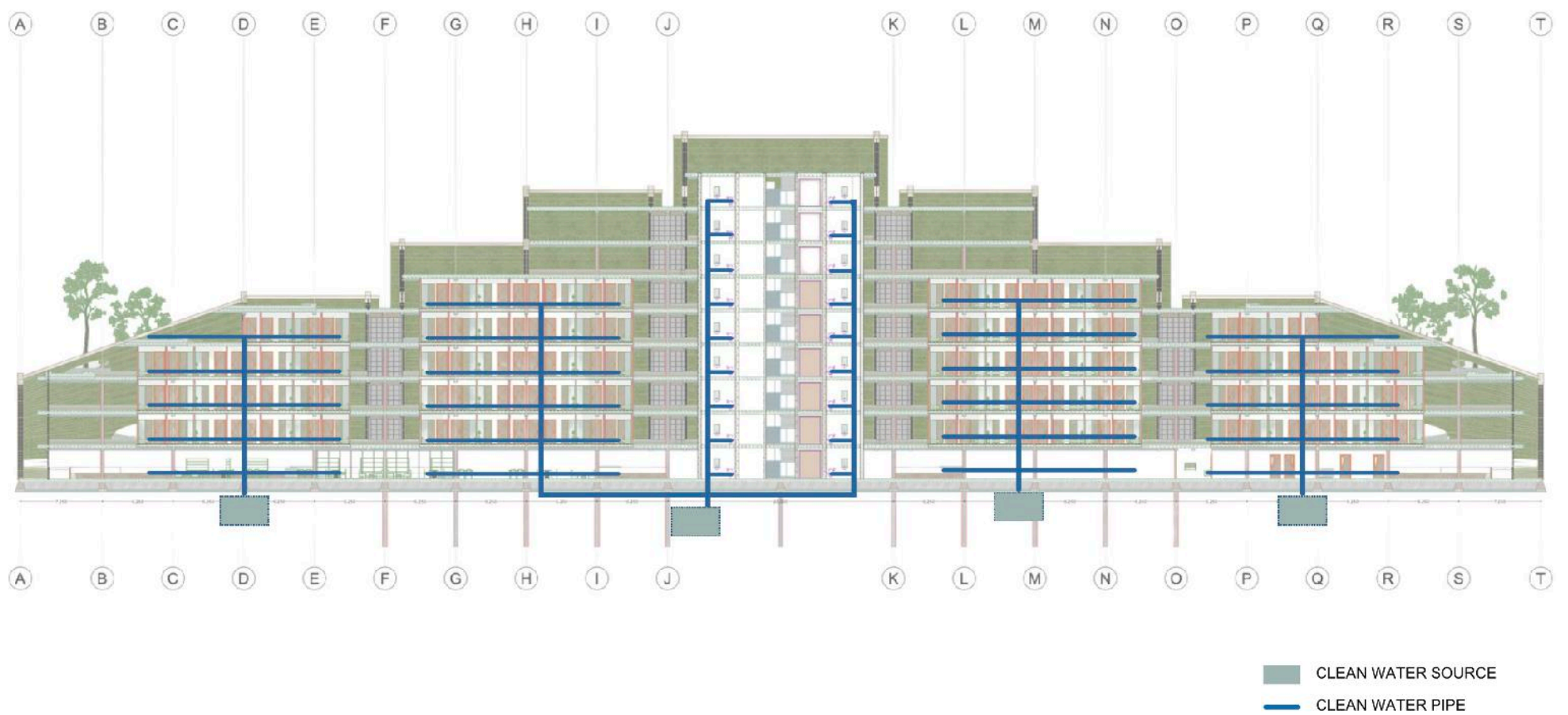


Figure 5.59 Clear Water Management  
 (Source: Author, 2024)



Figure 5.60 Black Water Management  
(Source: Author, 2024)

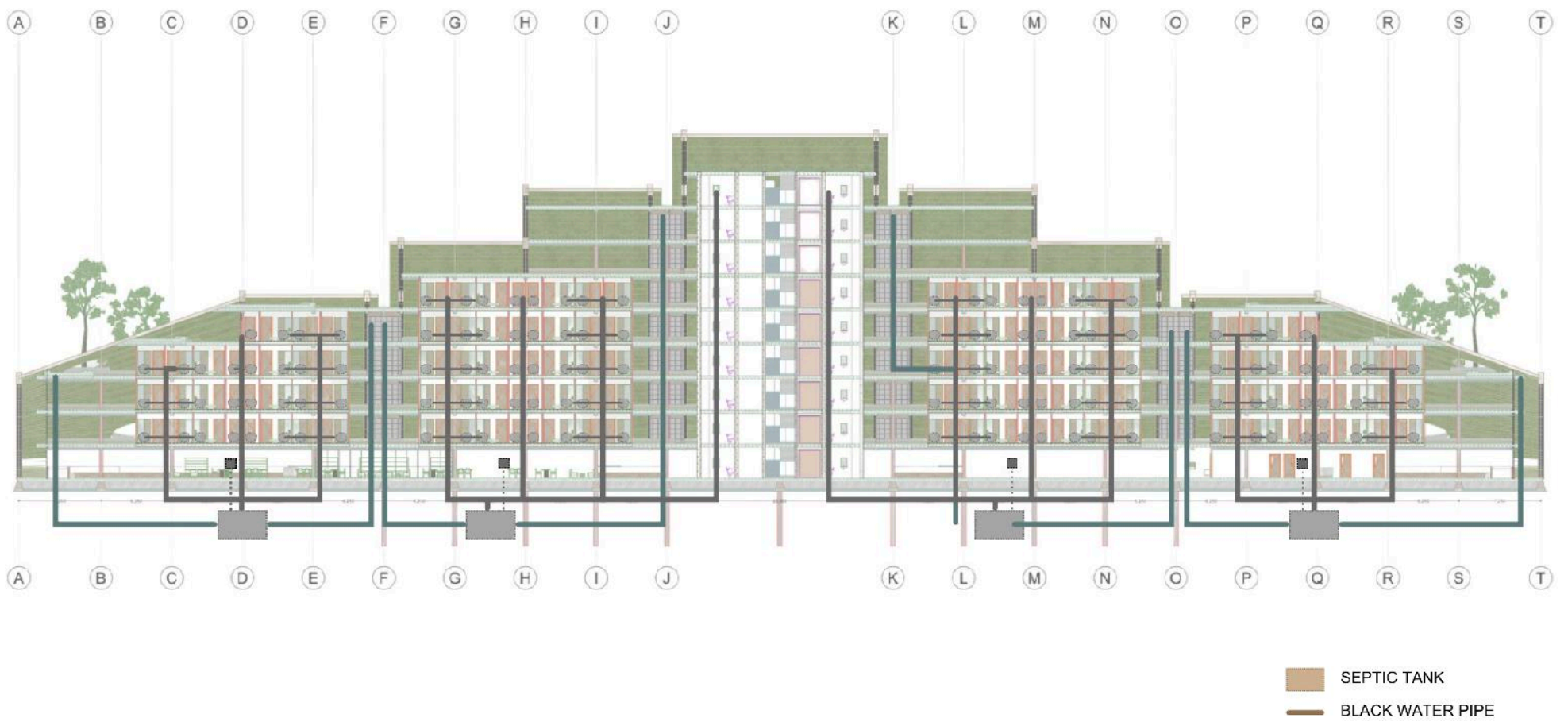


Figure 5.61 Grey Water Management  
 (Source: Author, 2024)



Figure 5.62 Natural Ventilation  
(Source: Author, 2024)

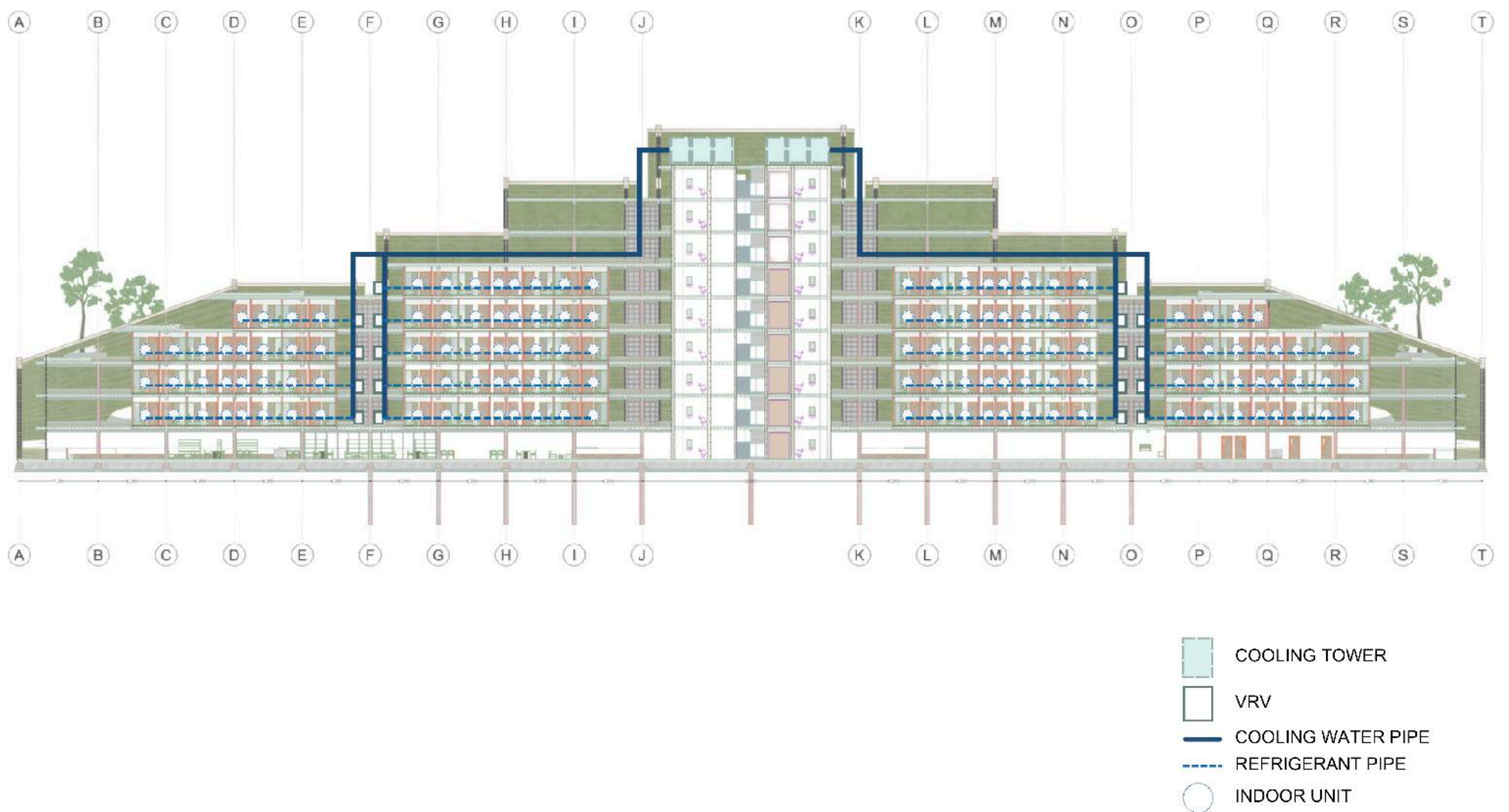


Figure 5.63 Artificial Ventilation  
(Source: Author, 2024)

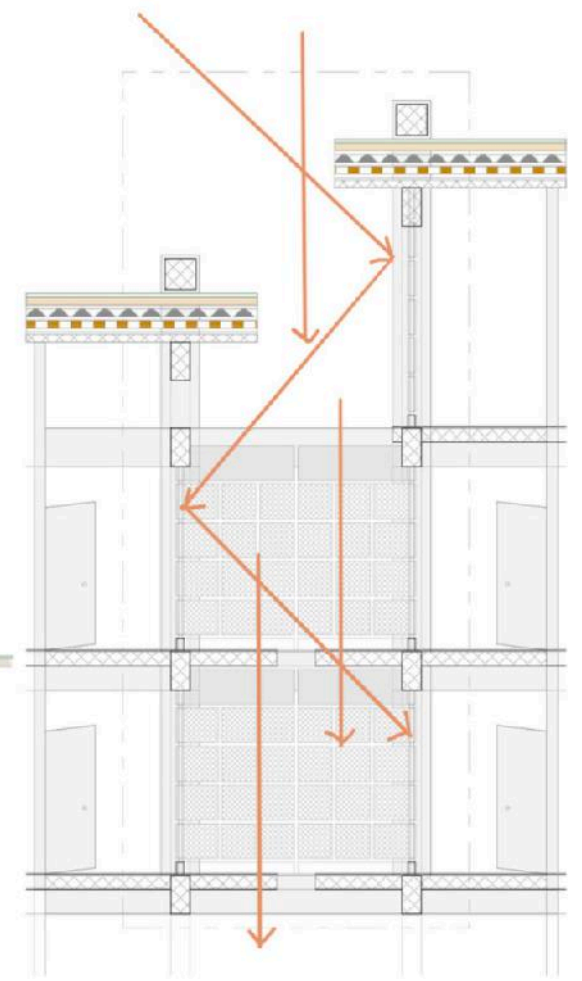
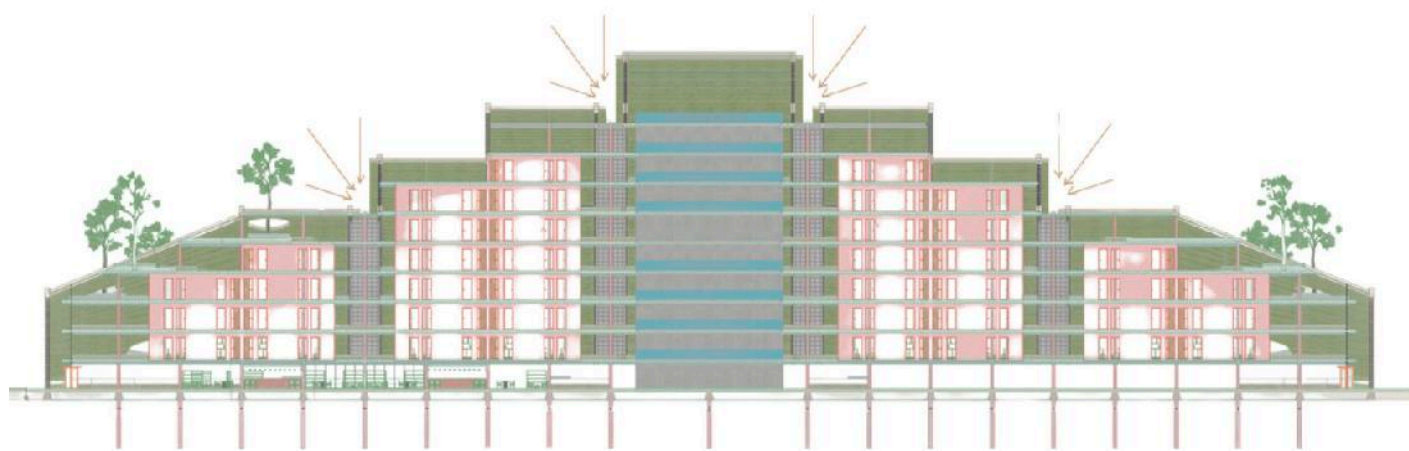
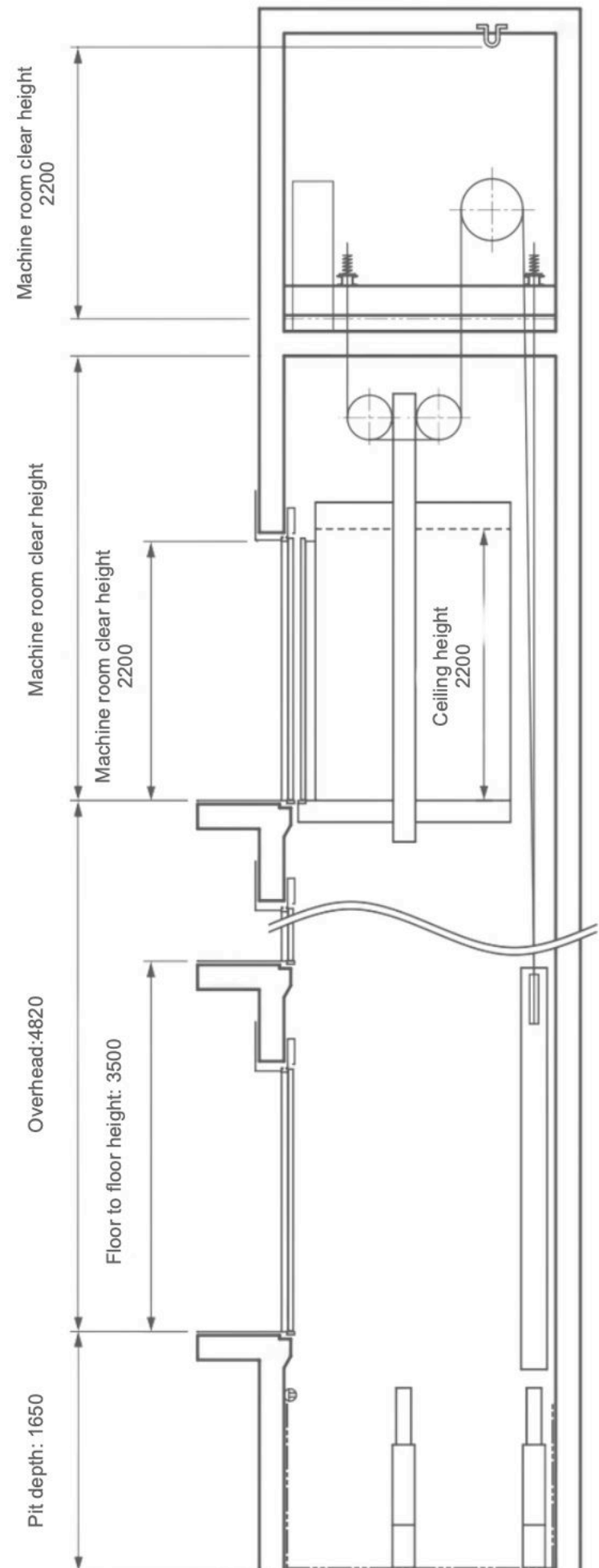
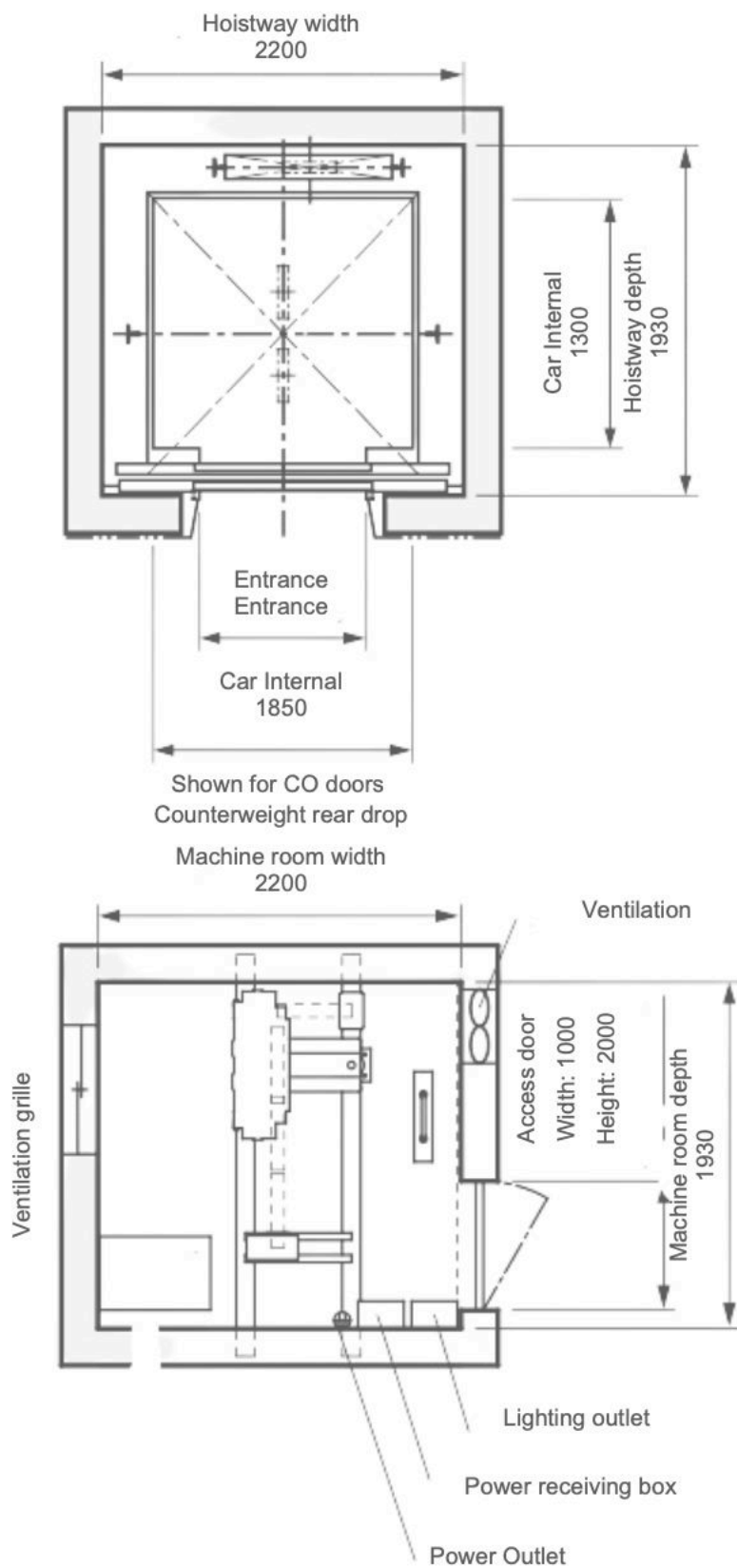


Figure 5.64 Natural Lighting  
(Source: Author, 2024)



-VERTICAL TRANSPORT SCHEME




**PASSANGER/ DIFABLE LIFT**  
 SCALE: 450

Figure 5.65 Passanger/ Difable Lift  
 (Source: Author, 2024)

-FIRE SUPPRESSION & EMERGENCY STAIRS

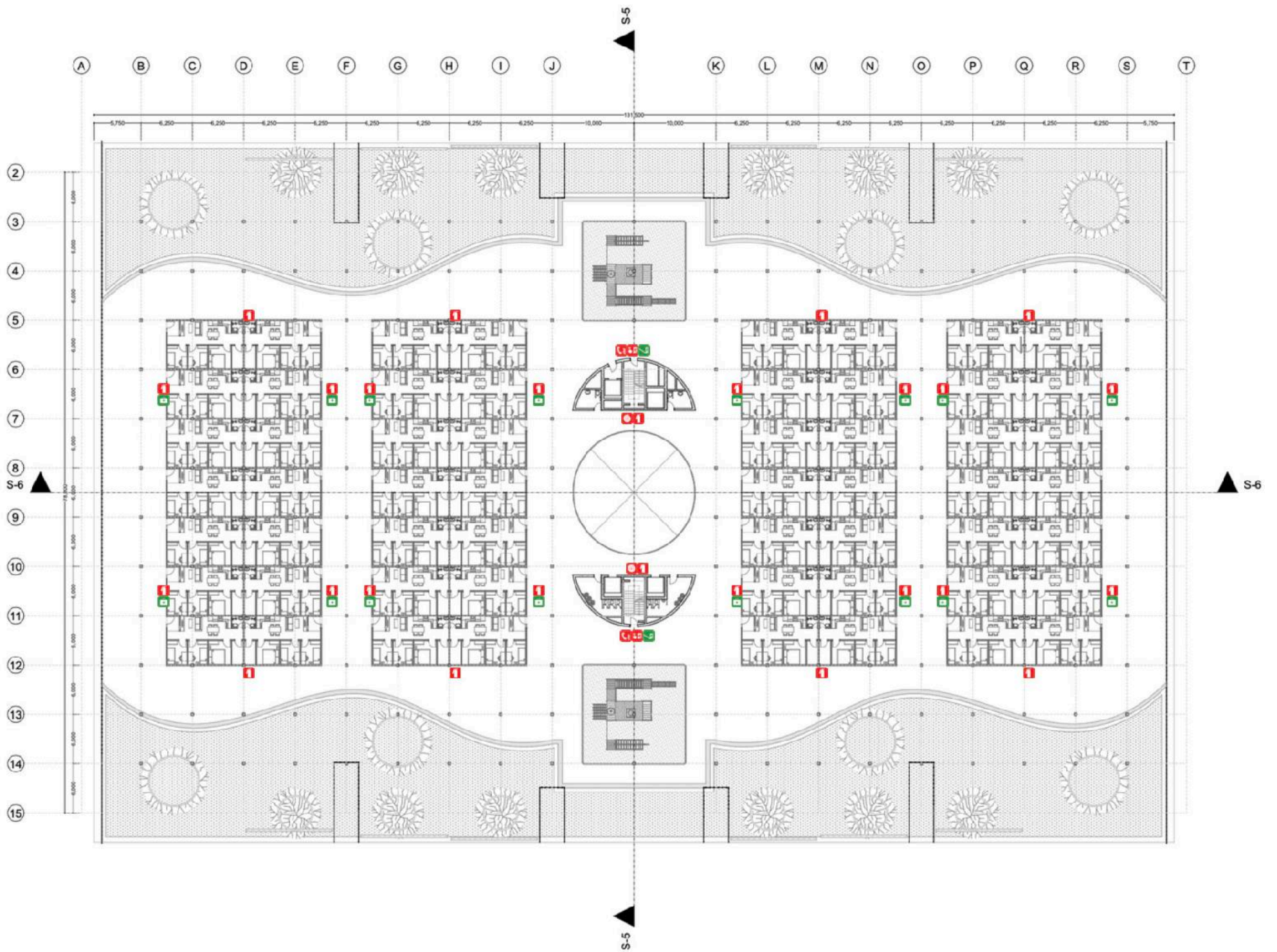








Figure 5.66 Passenger/ Difiable Lift  
 (Source: Author, 2024)

- |  |                 |   |                |   |                    |
|--|-----------------|---|----------------|---|--------------------|
|  | FIRE ALARM      |  | EMERGENCY EXIT |  | FIRE EXTINGUISHERS |
|  | EMERGENCY PHONE |  | FIRE HOSE REEL |  | MEDICAL KIT        |

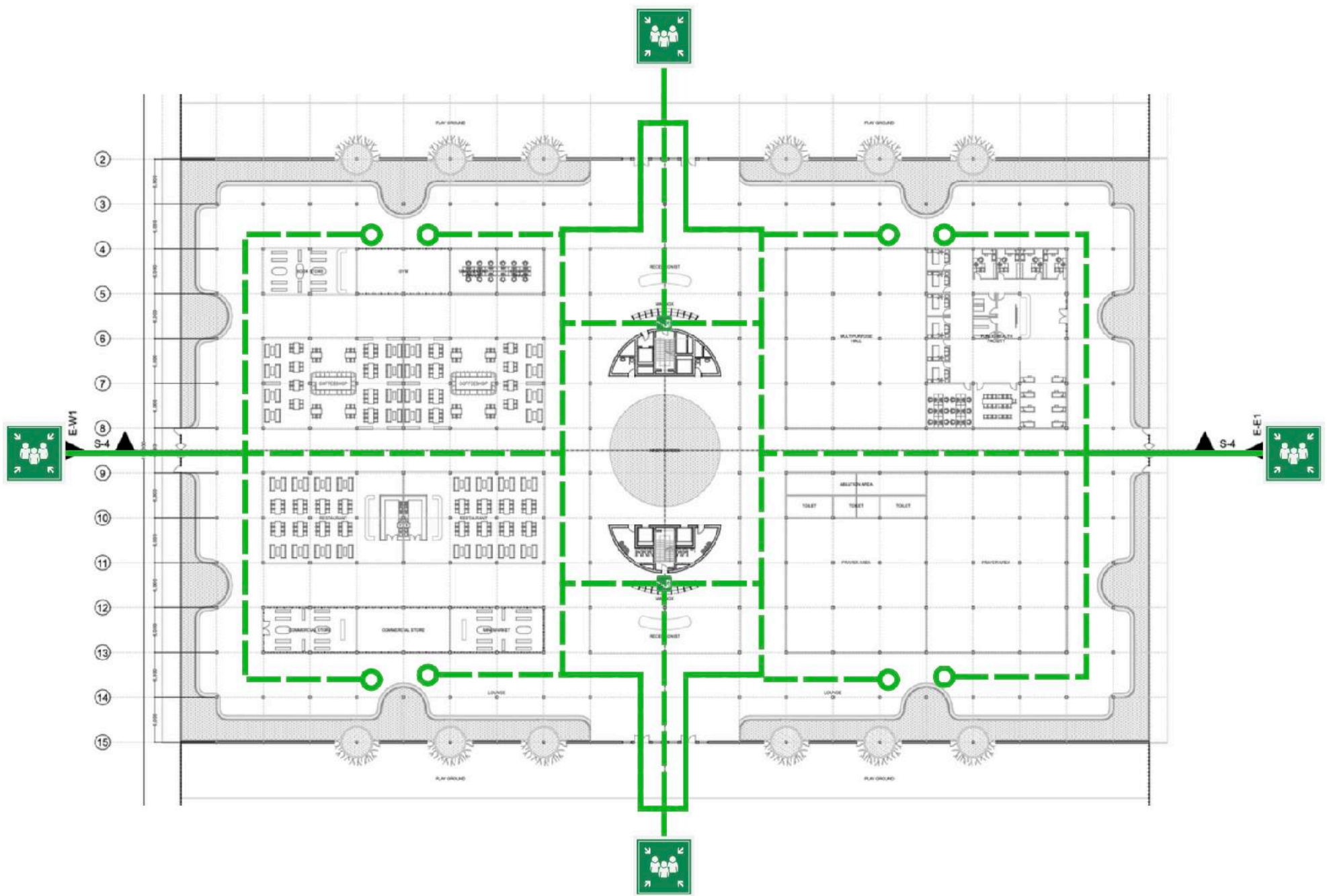
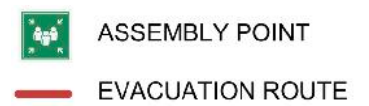


Figure 5.67 Passenger/ Difiable Lift  
 (Source: Author, 2024)





06

## VI | design evaluation

Time as the Key Factor in the Development of IKN

Economic Transformation

Investment

Environmental Issue in Jakarta

Ibu Kota Nusantara (IKN)

Kalimantan as the Lungs of the World

Location of IKN in Kalimantan

Forest Land Destruction as Government Solution

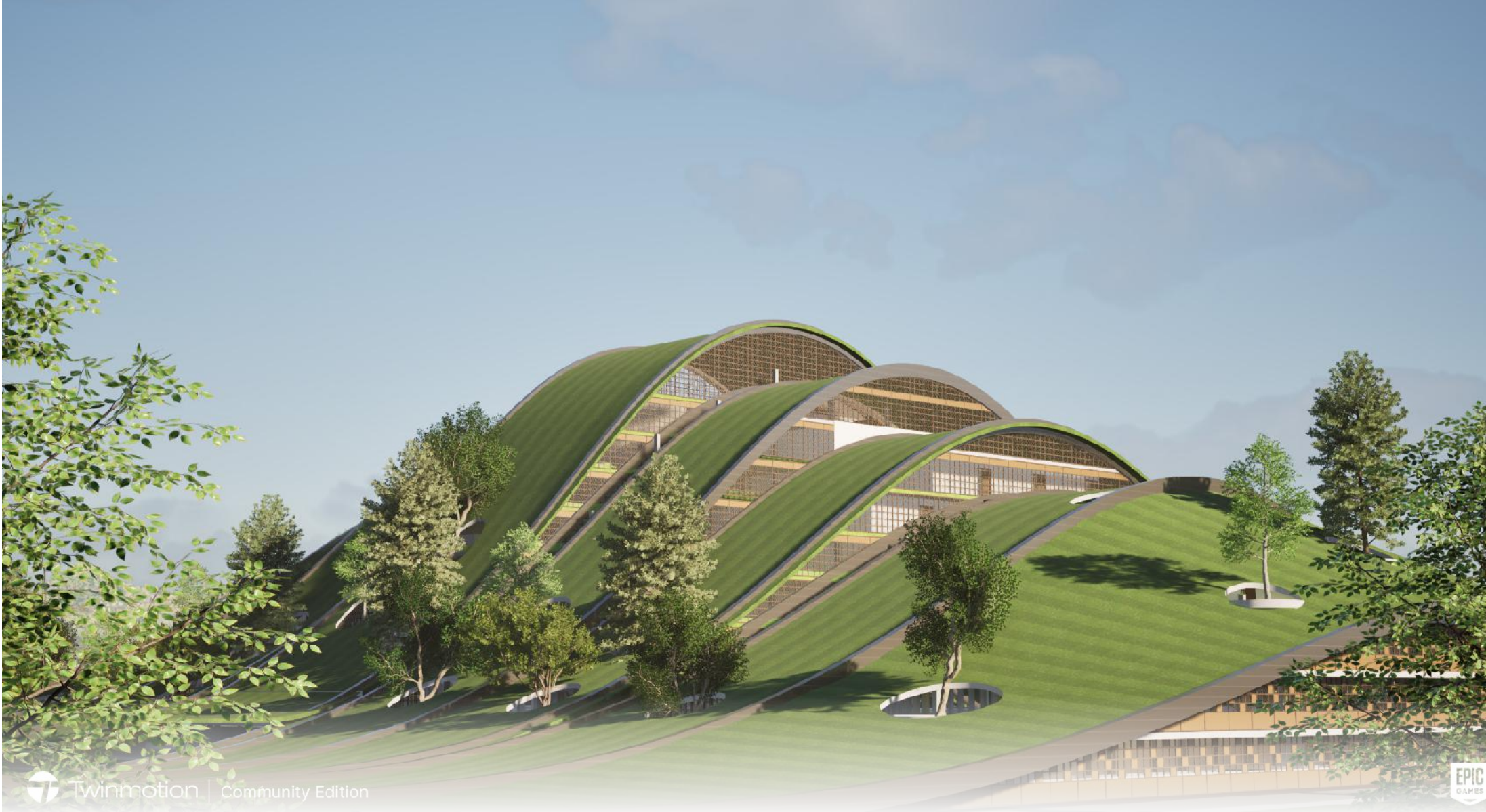


Figure 5.68 Perspective  
(Source: Author, 2024)

## | Conclusion Review

Based on the review given by the examiners and supervisors, the prototype design requires clear terms and conditions to facilitate understanding of the prototype building will be able to be built anywhere. Strengthen the initial design ideas and principles that prioritise the regenerative concept along with radical indigenism, that this building design can work together with nature to recover each other's needs.

Guidelines and principles for applying the prototype

A more detailed regenerative concept combined with radical indigenism

Emergency exits that face directly outside the building

## - Guidelines and Principles for Applying the Prototype

### 1. Parametric Contour Design

**Responsive Architecture:** Design the building to adapt to the site's varying topographical contours. By using parametric design, the height of the contour will determine the building type (A, B, or C).

**Type A:** Could be low-lying areas that require minimal intervention.

**Type B:** Mid-level elevations where the building adapts more dynamically to the land.

**Type C:** Higher elevations where the building requires more lightweight and minimal disturbance to the natural surroundings.

**Smooth Transitions:** Ensure the transition between different building types based on contour height is seamless, integrating the architecture smoothly into the landscape.

### 2. Regenerative Design Principles

**Net-Positive Design:** Aim for a design that doesn't just minimize damage to the site but actively improves it. The building should regenerate and enhance the environment, restoring ecological balance.

**Biodiversity Support:** Incorporate green roofs, vertical gardens, and outdoor terraces with local plant species to support and enhance biodiversity.

**Ecological Restoration:** If the site has undergone deforestation or damage, focus on planting native species and restoring ecosystems that enhance soil quality, water retention, and wildlife habitats.

### 3. Deforestation Mitigation & Forest Integration

**Minimal Impact Construction:** Use lightweight, modular construction techniques that allow for minimal site disturbance and reduce the need for heavy machinery. This approach reduces the need for deforestation.

**Building on Stilts:** For higher contour areas (Type C), consider elevating the structure on stilts to allow for water drainage and maintain the natural forest floor.

**Integrate with Forest Canopy:** Use the building design to interact with the existing forest canopy rather than removing it. Create elevated walkways, treehouse-like structures, and terraces that allow for human use while keeping the forest intact.

**Reforestation Initiatives:** For any areas where trees are removed, replanting and forest regeneration efforts must follow. This can involve working with local ecologists to restore the forest post-construction.

### 4. Sustainable Building Materials

**Locally Sourced Materials/Plantations:** Use materials sourced locally to reduce the environmental footprint of transportation. Choose sustainably harvested wood, recycled materials, and low-impact concrete alternatives.

**Renewable and Biodegradable Materials:** Use materials that are renewable, like bamboo, and biodegradable, such as mycelium insulation, to ensure the building's construction and eventual deconstruction leave minimal impact.

### 7. Nature-Centered User Experience

**Enhance Biophilic Design:** Incorporate natural elements like water features, plant walls, and views of the surrounding forest to enhance the connection between occupants and nature.

**Minimal Visual Impact:** The building should blend into its natural surroundings by using materials and colors that match the forest and reduce visual disruption.

### 8. Site-Specific Analysis

**Comprehensive Site Analysis:** Perform an in-depth environmental analysis of the forest ecosystem, soil health, hydrology, and wildlife before designing the building. This analysis will guide decisions on which areas to protect, restore, or develop.

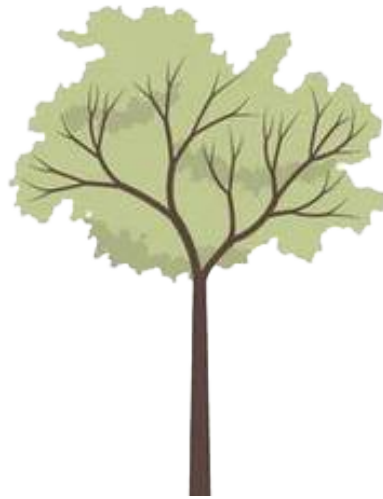
**Conservation Buffer Zones:** Create buffer zones around sensitive ecological areas such as water bodies, steep slopes, or endangered species habitats to avoid unnecessary damage.

By applying these principles, one can apply the above prototype by ensuring that the prototype building not only respects the contours of the site and adapts to different heights, but also actively contributes to environmental regeneration, helping to restore and preserve the forest ecosystem.

## - A More Detailed Regenerative Concept Combined with Radical Indigenism

### 1. Ulin (*Eusideroxylon zwageri*) Common Name: Ironwood

**Regenerative Value:** Ulin trees are slow-growing and endangered due to overharvesting, so incorporating sustainable practices such as sourcing reclaimed Ulin or promoting reforestation efforts for Ulin can help regenerate local ecosystems.



### 4. Kempas (*Koompassia malaccensis*) Common Name: Kempas

**Regenerative Value:** Promoting responsible sourcing and planting of Kempas can help restore degraded areas, as it is an important species for tropical ecosystems.



### 2. Meranti (*Shorea spp.*) Common Name: Meranti, Red Meranti

**Regenerative Value:** As part of the Dipterocarpaceae family, Meranti plays an essential role in the rainforest ecosystem. Sustainable harvesting practices and reforestation initiatives can ensure the species continues to thrive and support biodiversity.



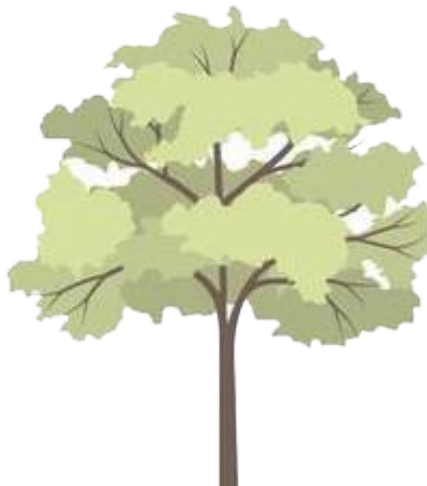
### 5. Borneo Teak (*Intsia bijuga*) Common Name: Merbau

**Regenerative Value:** Though highly sought after, Merbau trees are at risk due to unsustainable logging. Promoting reforestation and the sustainable use of Merbau can support both the building industry and forest health.



### 3. Bengkirai (*Shorea laevis*) Common Name: Yellow Balau

**Regenerative Value:** Supporting sustainable management and replanting of Bengkirai forests helps maintain the ecological balance and prevents habitat destruction.



### 7. Agathis (*Agathis borneensis*) Common Name: Borneo Kauri, Damar Minyak

**Regenerative Value:** Agathis is an important tree for local forest ecosystems. Its resin-producing ability also makes it valuable for sustainable production.



- Emergency Exit that Face Directly Outside the Building

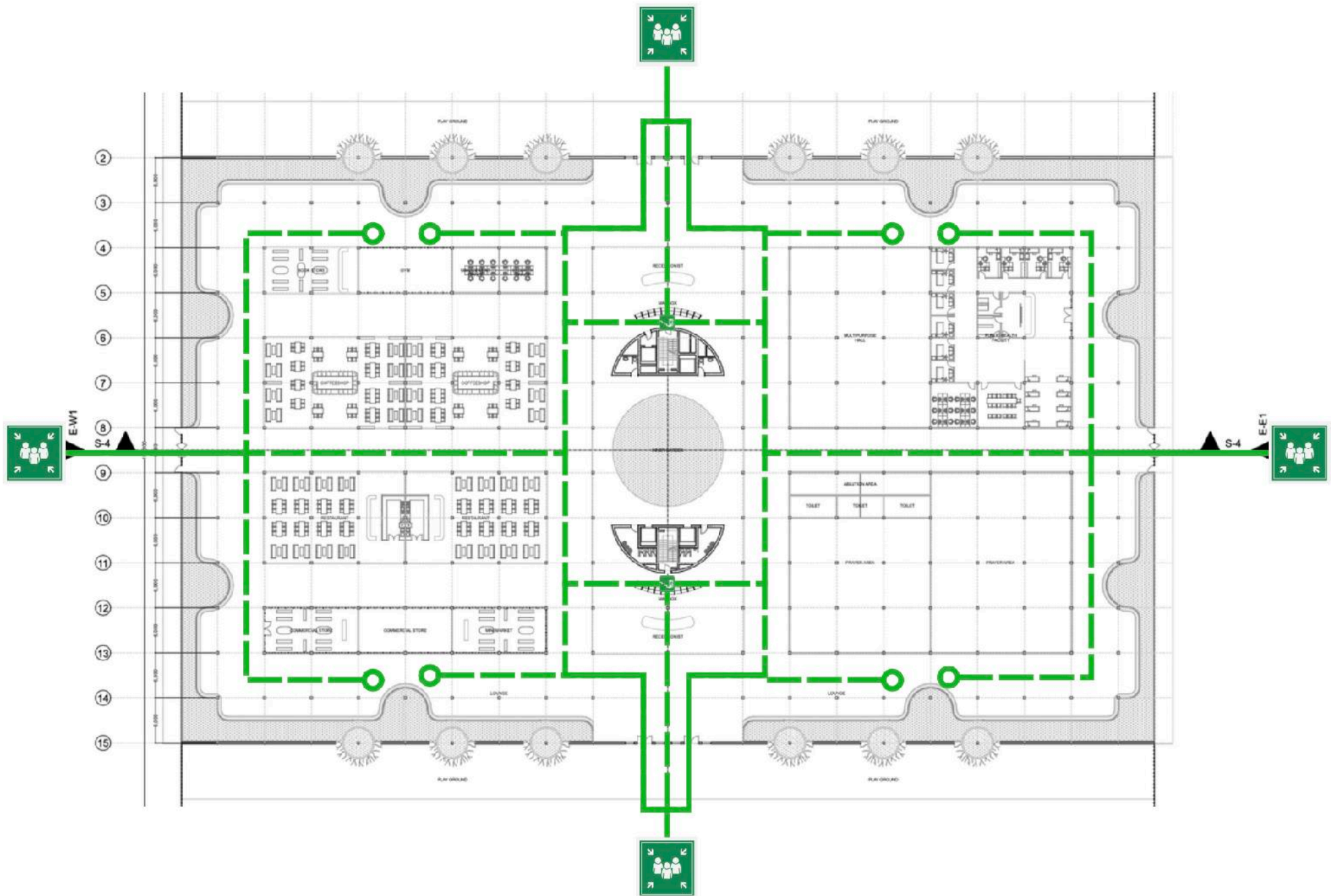




Figure 5.69 Passenger/ Difiable Lift  
(Source: Author, 2024)

 ASSEMBLY POINT  
 EVACUATION ROUTE

07

VII | attachment

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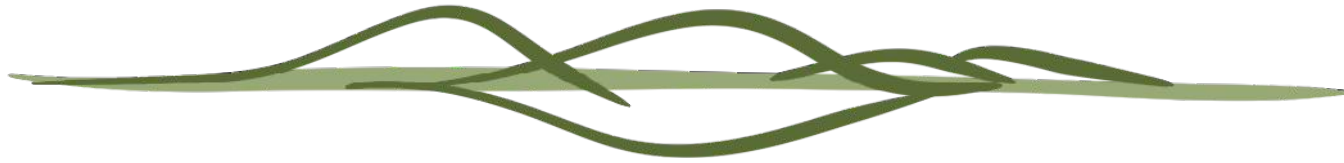
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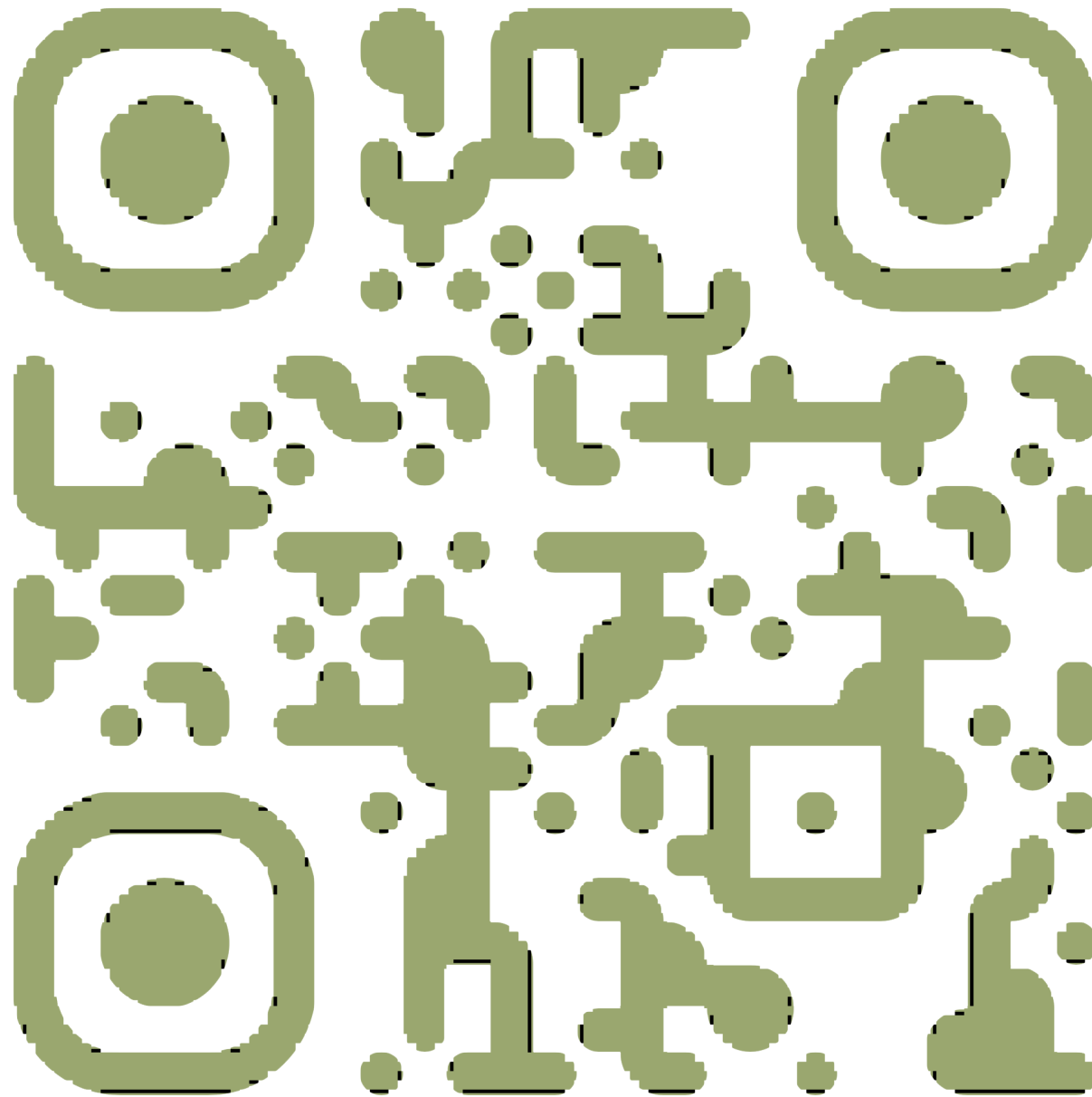
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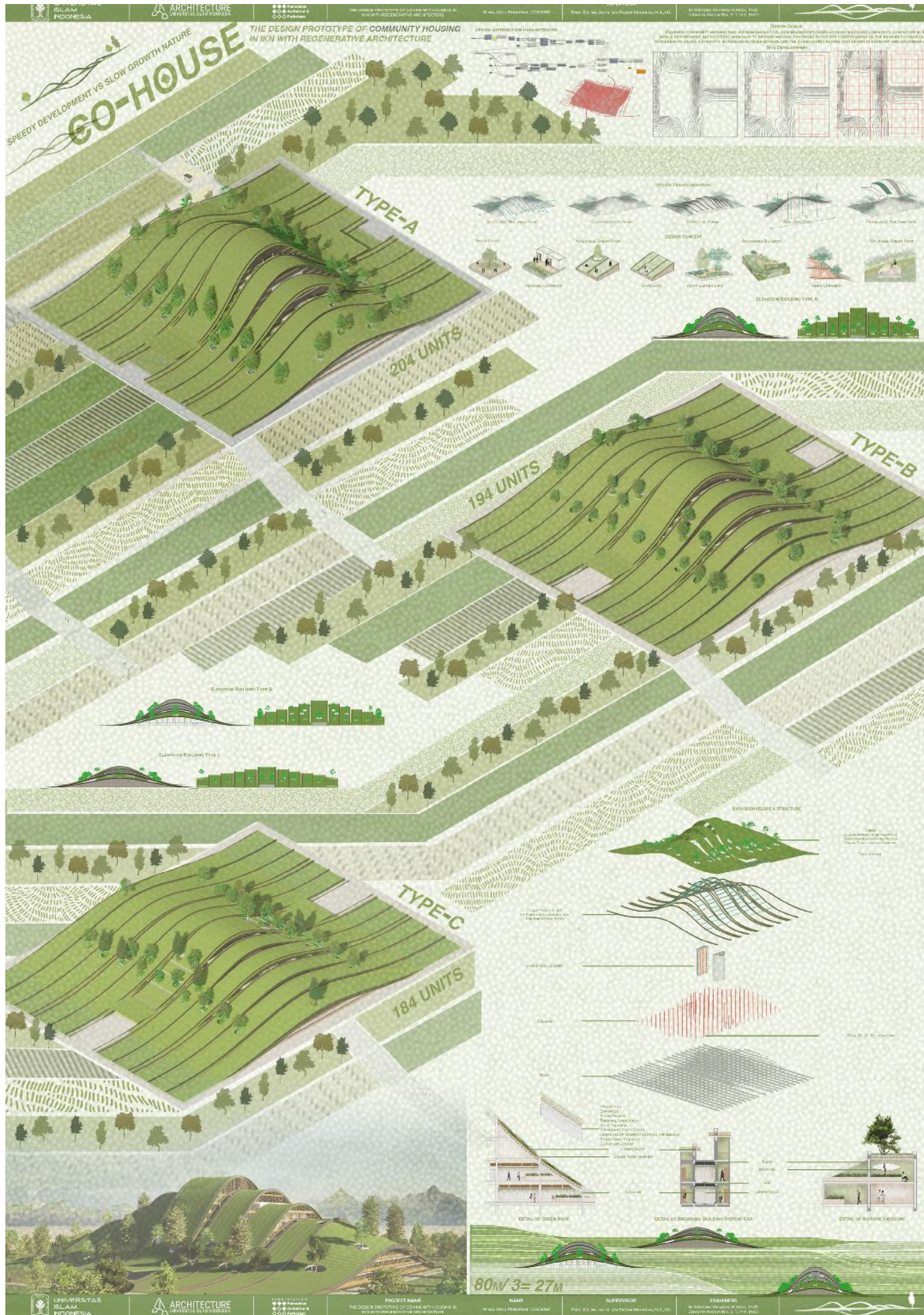
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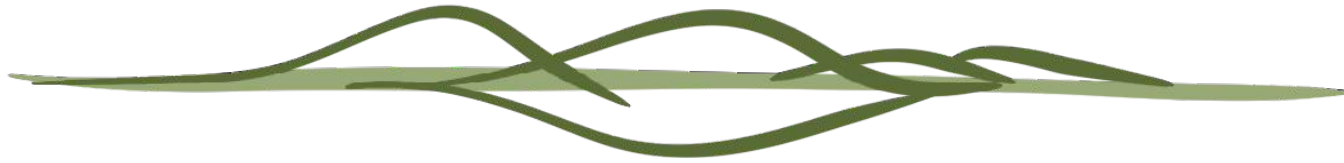
## Architectural Presentation Board



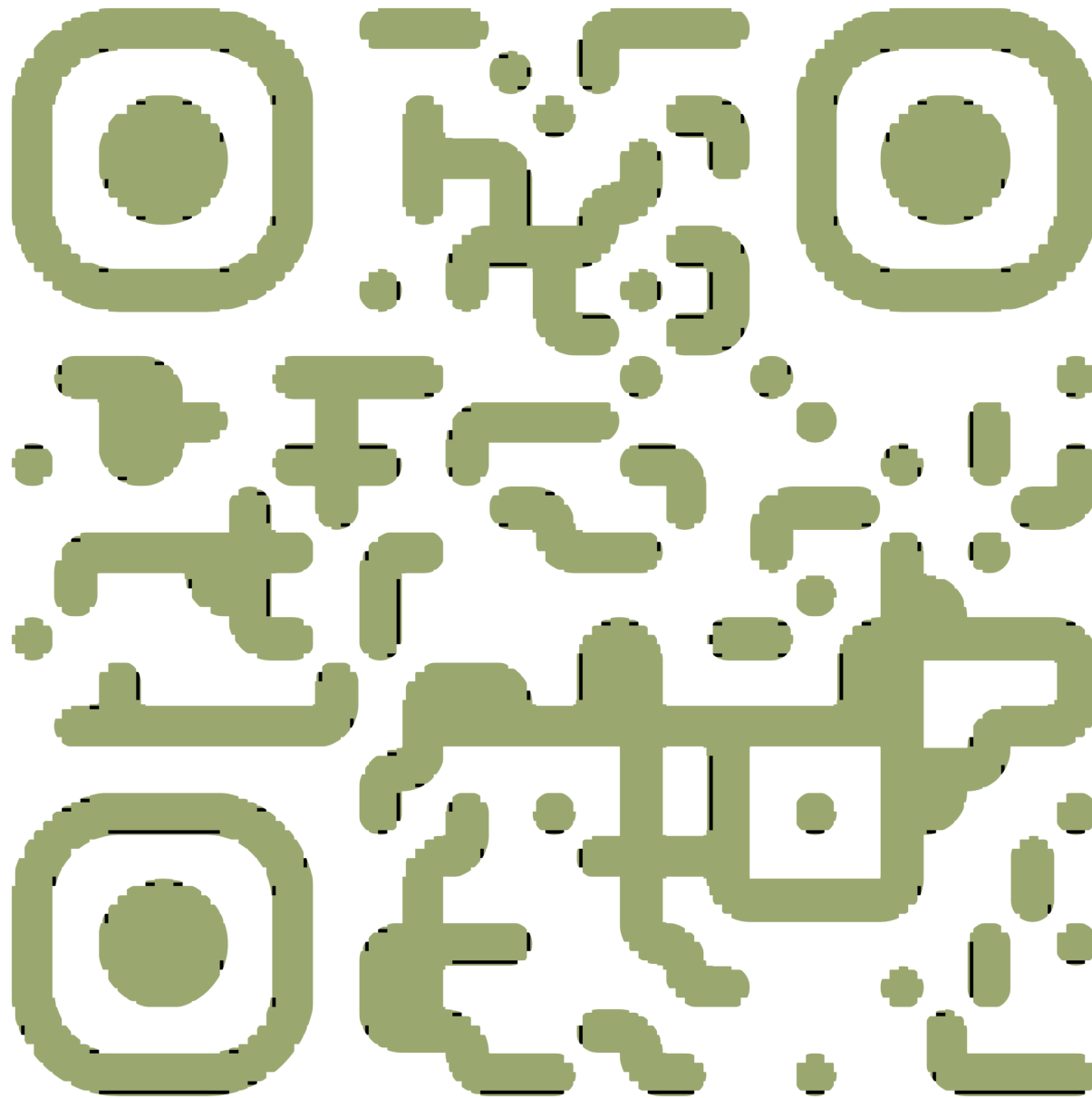
Scan to See Closely !!



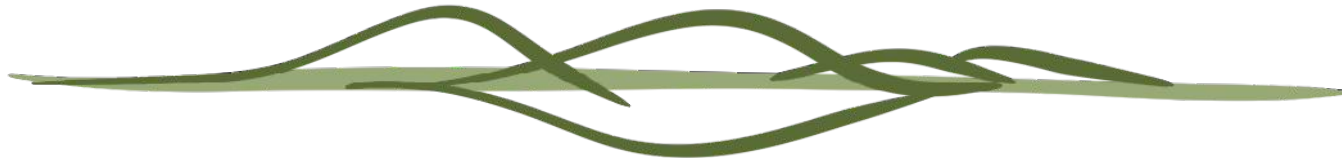
The Design Prototype of Community Housing in IKN with Regenerative Architecture



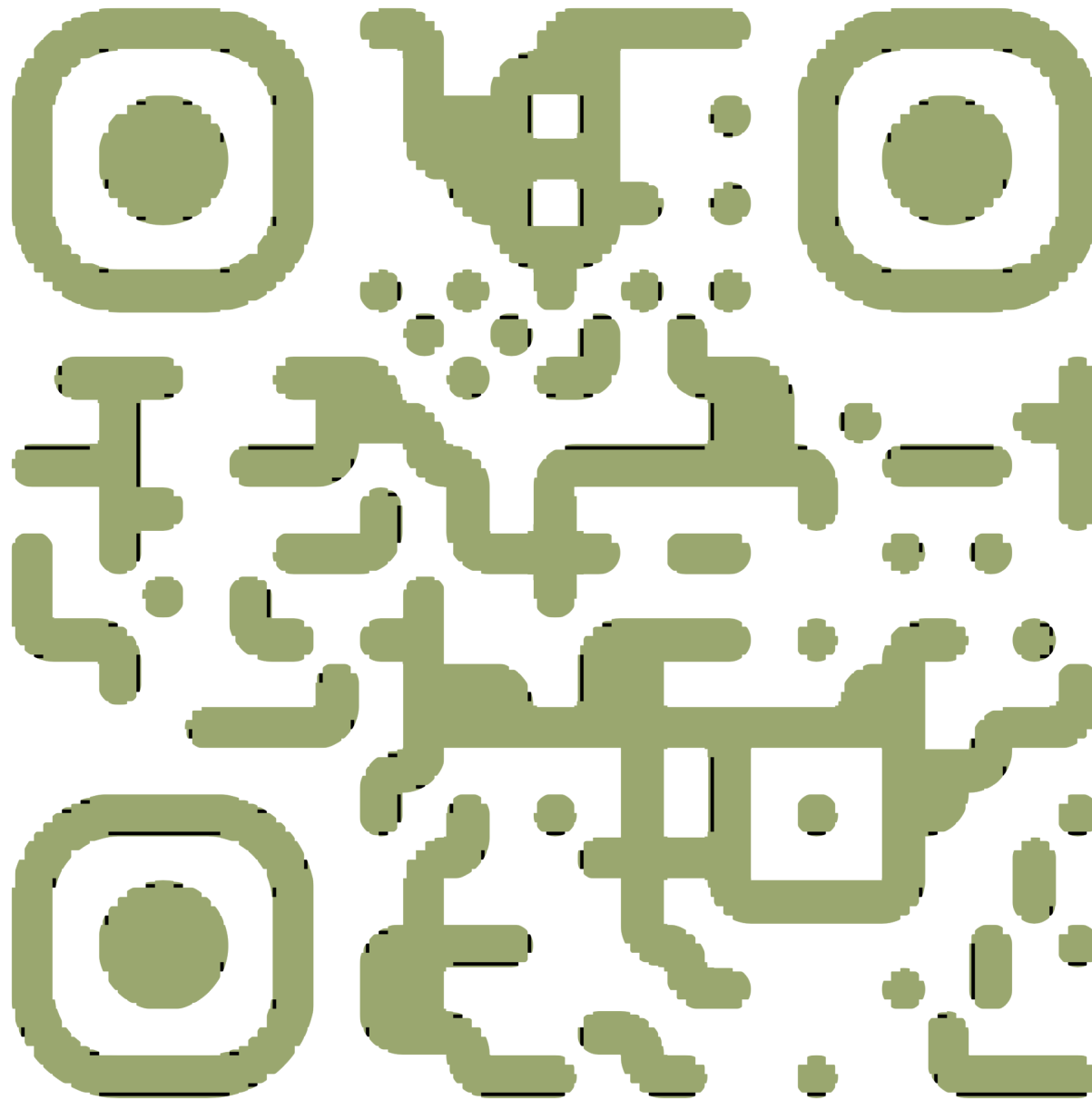
## Technical Drawing



Scan to See Closely !!



3D Model (Mockup)



Scan to See Closely !!



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