

DESIGN OF

INCLUSIVE MODULAR HOUSING

WITH OPEN BUILDING APPROACH RESPONDING TO
FLOOD DISASTER IN KEMANG, SOUTH JAKARTA

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Supervisor

Ilya Fadjar Maharika, Dr.-Ing., Ar., Ir., MA., IAI.





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PERANCANGAN

PERUMAHAN MODULAR INKLUSIF

DENGAN PENDEKATAN BANGUNAN TERBUKA UNTUK
MERESPON BANJIR DI KAWASAN KEMANG, JAKARTA SELATAN

الجمعة، الأستد، الأندو



Authentication Sheet

Final Architectural Design Studio entitled:

Design of Inclusive Modular Housing with Open Building Approach Responding to Flood Disaster in Kemang, South Jakarta

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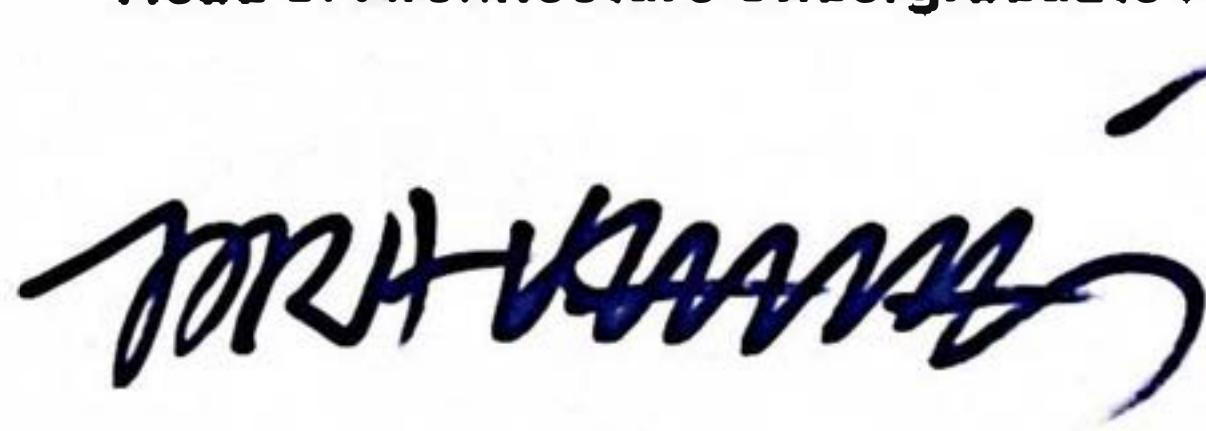
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Acknowledged by:
Head of Architecture Undergraduate Program



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Statement of Authenticity

I declare that all parts of this work are my own work except the work mentioned in the reference and there is no assistance from other parties in whole or in part in the process of making it. I also declare that there is no conflict of intellectual property rights over this work and submit it to the Department of Architecture, Universitas Islam Indonesia to be used for educational and publication purposes.

Yogyakarta, August 8th 2022



Abdur Rahman



Acknowledgement

First and foremost, I would like to praise **Allah**, the Almighty, the Merciful, and the Compassionate, for the blessings He has given me throughout my studies and in the completion of this final project.

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Thank you to my classmates and group members, especially my *kos* mates, for their help in editing, their nightly feedback sessions, and their moral support.

I could not have completed this final project without all of you. Thank you for believing in me.



Abstract

Kemang area located in South Jakarta is one of the elite areas in Jakarta that often experiences flood disasters. The flood comes from the Krukut River overflow that happens when heavy rains come, usually occurring once a year but the impact causes many losses. Houses are submerged, access in and out of Kemang is paralyzed. This situation was exacerbated by the reduction of water catchment areas in the Kemang area. Most of the Kemang area was covered by the buildings and pavement which reduced the chance of the ground to work as a water absorption. On the other hand, Kemang is an elite area developed to meet the needs of certain groups, not all groups of people can enjoy the development in Kemang. Social inequality began to be created and enlarged as development progressed. There are many phenomena where tall and luxurious buildings are side by side with dense housing behind or beside them, but the access is closed or limited by high walls and other barriers. The upper class is growing in Kemang while the lower class is increasingly marginalized. Regarding the social and environmental issue that happens in Kemang, the design was aiming to increase the social and environmental value along Krukut river in Kemang. The Krukut riverside was developed with reforestation along with the development of public spaces where the rich and the poor can interact together, so that the barrier between the rich and the poor can be dissolved. Residents' housing is also reorganized to respond to flood disasters. Using Modular Housing method with Open Building approach to increase the inclusive value among the community.

Keyword: Kemang, flood, inclusivity, open building, housing

Kawasan Kemang yang terletak di Jakarta Selatan merupakan salah satu kawasan elit di Jakarta yang sering mengalami bencana banjir. Banjir berasal dari luapan Kali Krukut yang terjadi saat hujan deras datang, biasanya terjadi setahun sekali namun dampaknya menimbulkan banyak kerugian. Rumah-rumah terendam, akses keluar masuk Kemang lumpuh. Keadaan ini diperparah dengan berkurangnya daerah resapan air di kawasan Kemang. Sebagian besar wilayah Kemang tertutup oleh bangunan dan perkerasan jalan yang mengurangi kesempatan tanah untuk bekerja sebagai resapan air. Di sisi lain, Kemang merupakan kawasan elit yang dikembangkan untuk memenuhi kebutuhan kelompok tertentu, tidak semua kelompok masyarakat dapat menikmati pembangunan di Kemang. Kesenjangan sosial mulai tercipta dan membesar seiring dengan berjalannya pembangunan. Banyak fenomena di mana gedung-gedung tinggi dan mewah berdampingan dengan perumahan padat di belakang atau di sampingnya, tetapi aksesnya tertutup atau dibatasi oleh tembok tinggi dan pembatas lainnya. Kelas atas tumbuh di Kemang sementara kelas bawah semakin terpinggirkan. Berdasarkan masalah sosial dan lingkungan yang terjadi di Kemang, perancangan ini bertujuan untuk meningkatkan nilai sosial dan lingkungan di sepanjang Kali Krukut di Kemang. Bantaran kali Krukut dikembangkan dengan penghijauan disertai pengembangan ruang publik dimana masyarakat kaya dan miskin dapat berinteraksi bersama, sehingga sekat antara si kaya dan si miskin dapat terurai. Perumahan warga juga ditata ulang untuk merespon bencana banjir. Menggunakan metode Modular Housing dengan pendekatan Open Building untuk meningkatkan nilai inklusif di antara masyarakat.

Keyword: Kemang, banjir, inklusif, bangunan terbuka, perumahan

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01

Introduction

Design Premise

Kemang Function Transformation

Kemang Exclusivity



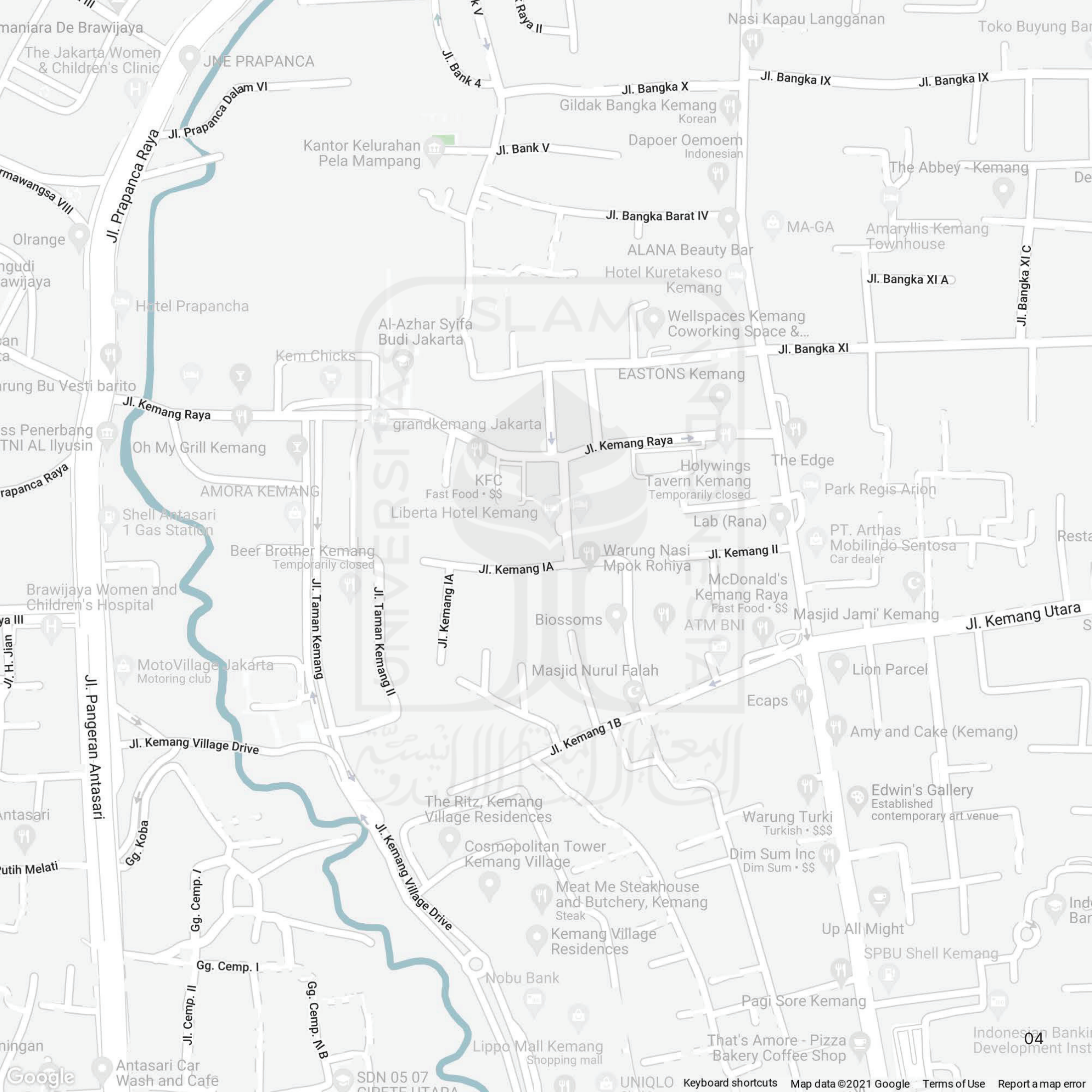
Design Premise

Kemang area located in South Jakarta is one of the elite areas in Jakarta that often experiences flood disasters. The flood comes from the Krukut River overflow that happens when heavy rains come, usually occurring once a year but the impact causes many losses. Houses are submerged, access in and out of Kemang is paralyzed. This situation was exacerbated by the reduction of water catchment areas in the Kemang area. Most of the Kemang area was covered by the buildings and pavement which reduced the chance of the ground to work as a water absorption.

On the other hand, Kemang is an elite area developed to meet the needs of certain groups. Not all groups of people can enjoy the development in Kemang. Social inequality began to be created and enlarged as development progressed. There are many phenomena where tall and luxurious buildings are side by side with dense housing behind or beside them, but the access is closed or limited by high walls and other barriers. The Krukut river is even used by developers in the Kemang area to separate luxury and high-rise buildings from dense housing of the lower-middle class. Direct access that connects high-rise buildings and dense residential areas is rarely found. Most public spaces can only be enjoyed by the upper class. The upper class is growing in Kemang while the lower class is increasingly marginalized.

Regarding the social and environmental issue that happens in Kemang. The design approach should increase the environmental value of the Krukut river in Kemang Area, along with inclusivity development that helps low income people to grow. It can be achieved by creating the design where rich people and poor people are connected with the same public space, along with the development of decent housing that responds to the flood for the lower income people.

Figure 1.1 Kemang Map (Author, 2021). Data generated from Google Maps.



BACKGROUND

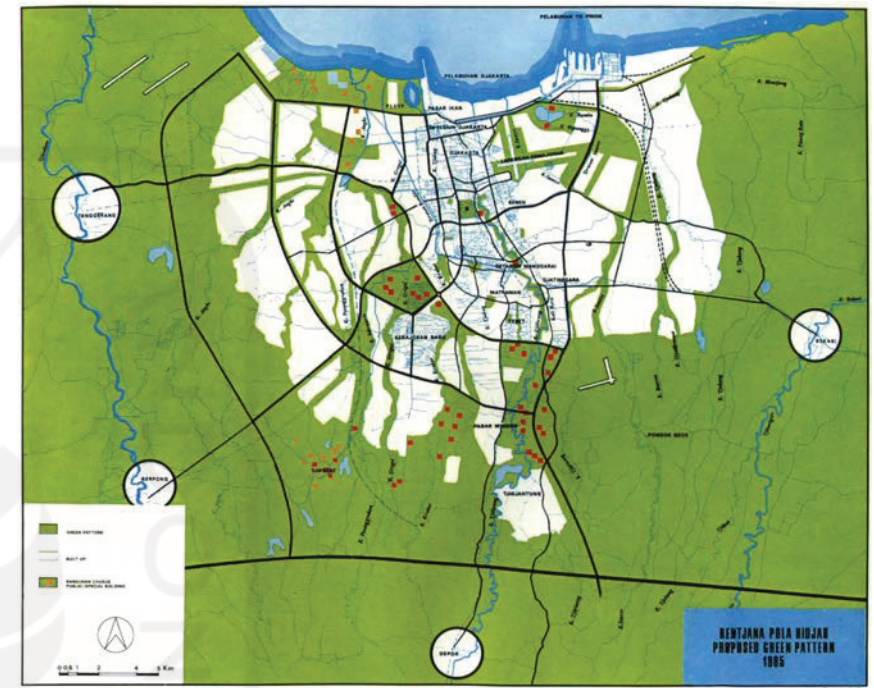
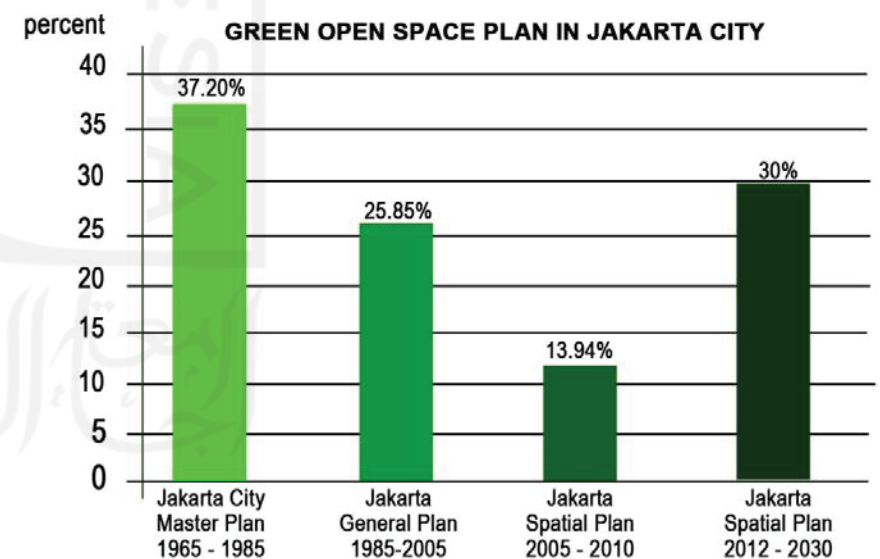
Kemang Function Transformation

In the masterplan Jakarta 1965-1985 , green areas in Jakarta are targeted to cover 37.2% of the total area of Jakarta. In the 1985-2005 master plan, the target for green areas in Jakarta decreased to 25.85%. And in urban and spatial planning for 2005-2010, the target for green areas has decreased again to 13.94%. The regional spatial planning in Jakarta which refers to the Law on Spatial Planning of the Republic of Indonesia number 26 of 2007, determine target green open space in Jakarta by 30% or 165 square km of the total area of the Jakarta city. Now in the year 2004 green open space is at 9% or 50 square km, from this condition we can assume that Jakarta's green open space area decreases through the years both in quantity and quality. (Manan, R. H. 2016)

Figure 1.2 Jakarta Masterplan 1965-1985 (Manan, 2016)

Figure 1.3 Decrease in green area planning in the Jakarta Masterplan from period to period (Manan, 2016)

Figure 1.4 (Right) Decrease in green area planning in the Jakarta Masterplan from period to period (Manan, 2016)



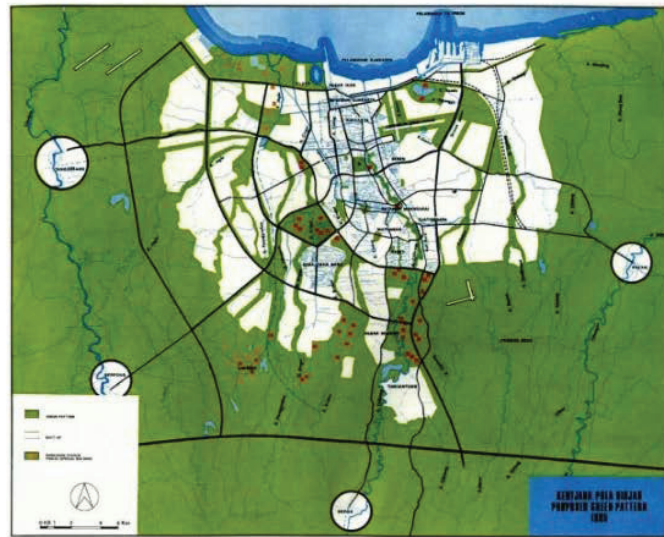
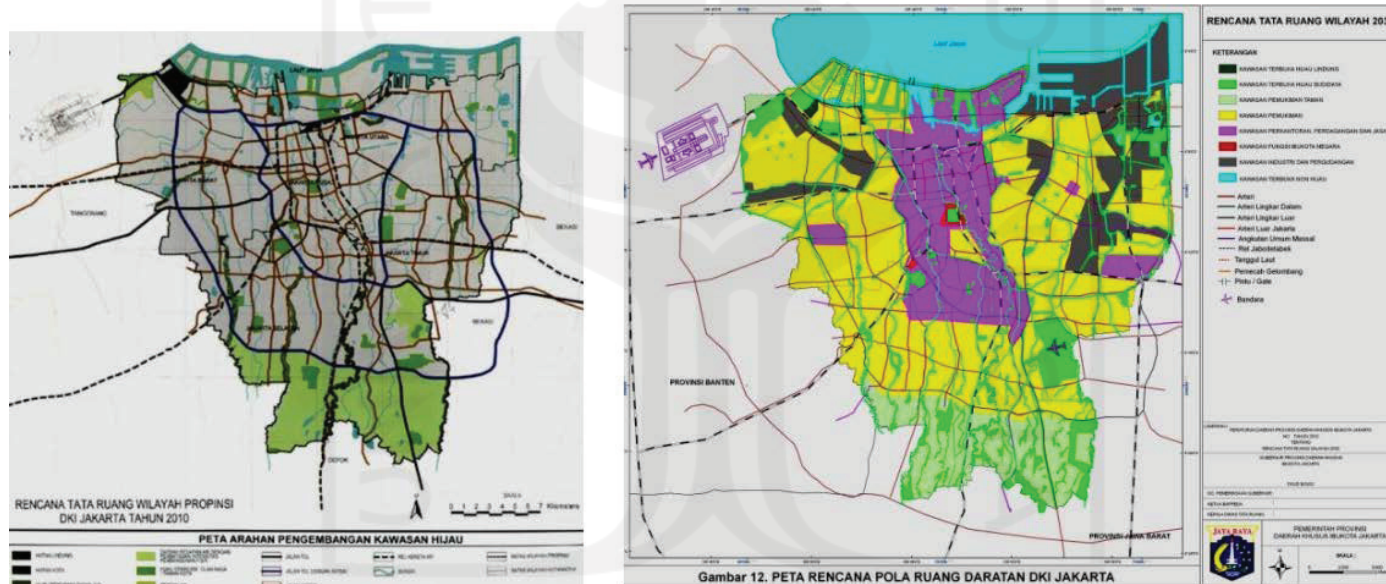


Fig 1.2 Green Open spaces Plan 1965-1985



Fig 1.3. Green Open spaces Plan 1985-2005



Gambar 12. PETA RENCANA POLA RUANG DARATAN DKI JAKARTA

The decrease in green areas in the Jakarta master plan also affected the Kemang area, in the 1965-1985 master plan the Kemang area was planned to become a green area and a river water catchment area because it is directly adjacent to the Krukut River. (Policy Analysis of Urban Green Open Space Management in Jakarta City, Indonesia. Rustam Hakim Manan. 2016). However, in 1998, the Governor of DKI Jakarta, Sutiyoso, changed the designation of Kemang from a residential area (as stated in the 1985-2005 Jakarta masterplan) to a commercial area. Then, in 1999, Kemang was designated as a modern village which is part of the history of the city of Jakarta through the Decree (SK) of the Governor of DKI No. 144/1999.

Kemang Flood Area in 2021



The change in the Kemang area from a green area to a residential area which then turned again into a commercial area brought many changes to the Kemang area, both positive and negative changes. The negative impact of this change in function can be seen in recent events that often befall Kemang. Almost every year, the Kemang area experiences severe flooding, especially at the peak of the rainy season where the river water discharge becomes very high and the lack of green areas that can function as a reservoir for river water overflow. In early 2021, Kemang experienced severe flooding with a height of almost 2 meters. At that time, almost all activities in the Kemang area were paralyzed because there was no access to activities in Kemang, the electricity was also turned off to avoid electrical shorts which could cause a more serious disaster. Heavy flood happen at Kemang in Jan 2021. The flood range is calculated as far as 300 m from Jl. Prapanca Raya with 2 meters maximum height. (Source: Ihsanudin (2021).

The current critical condition of Kemang can also be exacerbated by the current conditions in Jakarta. Jakarta was reported will be drowning by the sea due to overuse of groundwater. Environmental experts from UNAIR state that overusing groundwater makes Jakarta ground

level go down and predicted it will drown in 2030. Land subsidence in Jakarta could worsen the condition of Kemang in the future. Floods that strike every year combined with declining land surface conditions can make the prediction of Jakarta sinking in 2030 come true. Preventive measures to save the Kemang area are needed to deal with the existing crisis. The redevelopment of green areas in Kemang is one of the steps needed to prevent Kemang from deteriorating conditions. In addition, handling of existing buildings is also needed so that Kemang can assist Jakarta in dealing with long-term problems that occur.

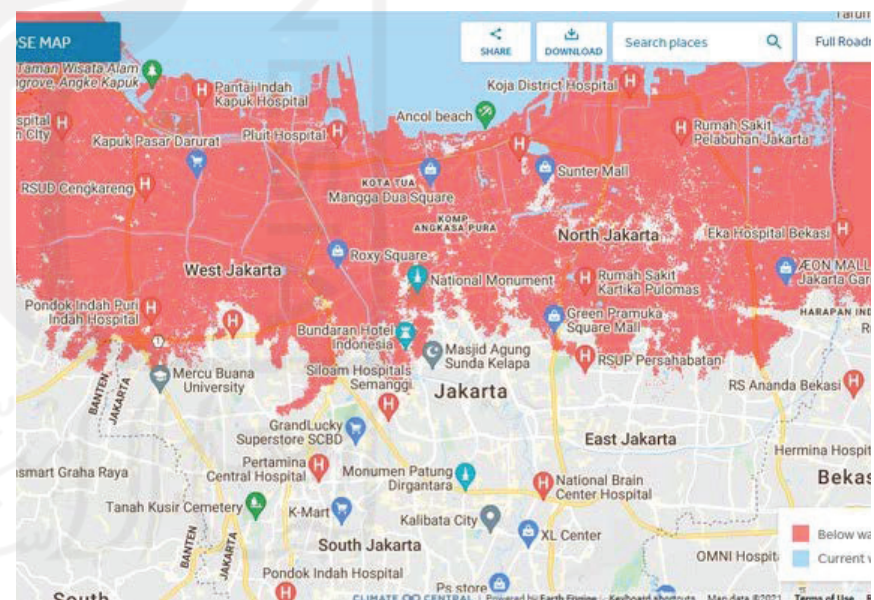


Figure 1.5 (Left) Early 2021 Kemang flood diagram. (Author, 2021). Data from (Ihsanudin, 2021)

Figure 1.6 Early 2021 Kemang flood diagram. (Tim detikcom, 2021)

BACKGROUND

Kemang Exclusivity

Kemang, Mampang Prapatan is one of the famous areas by the community. It was known as an exclusive area with its high class restaurants and stores. It can be seen that the activity that was held in that area was a high class activity, such as a nightclub, fancy restaurant, elegant cafe, etc. Beside those exclusivity in Kemang, local people around it only live in dense settlements with narrow alleys as their entrance. The neighborhood also can be said to be far from a proper living being.

The exclusive phenomenon in Kemang does not only happen in one certain area in Kemang. That phenomenon can be found in any street in Kemang, high class buildings upfront, but deeply not liveable on the back.

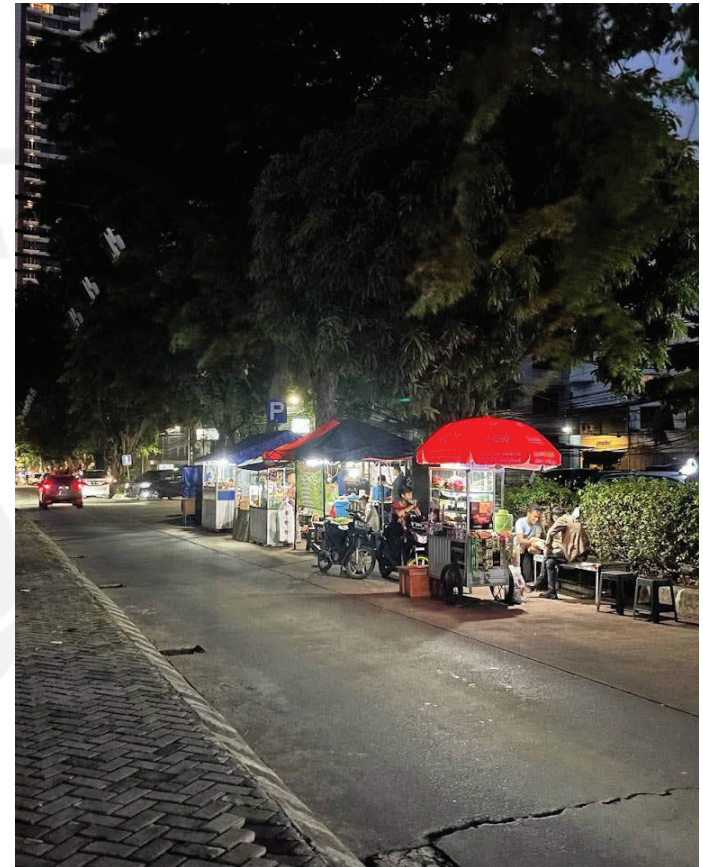


Figure 1.7 Street vendors in Kemang. (Author, 2021).

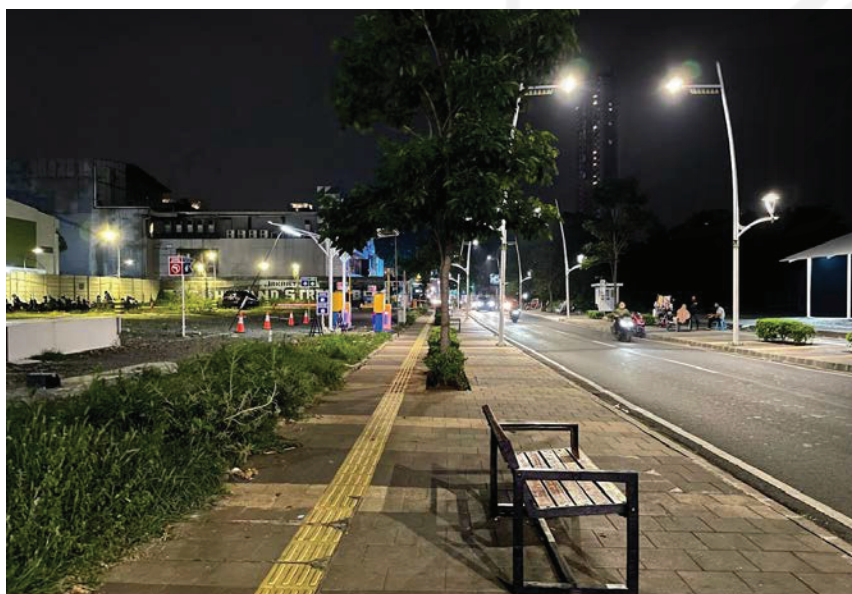


Figure 1.8 Kemang Pedestrian. (Author, 2021).



Figure 1.9 Explicit exclusivity in Kemang. (Author, 2021).

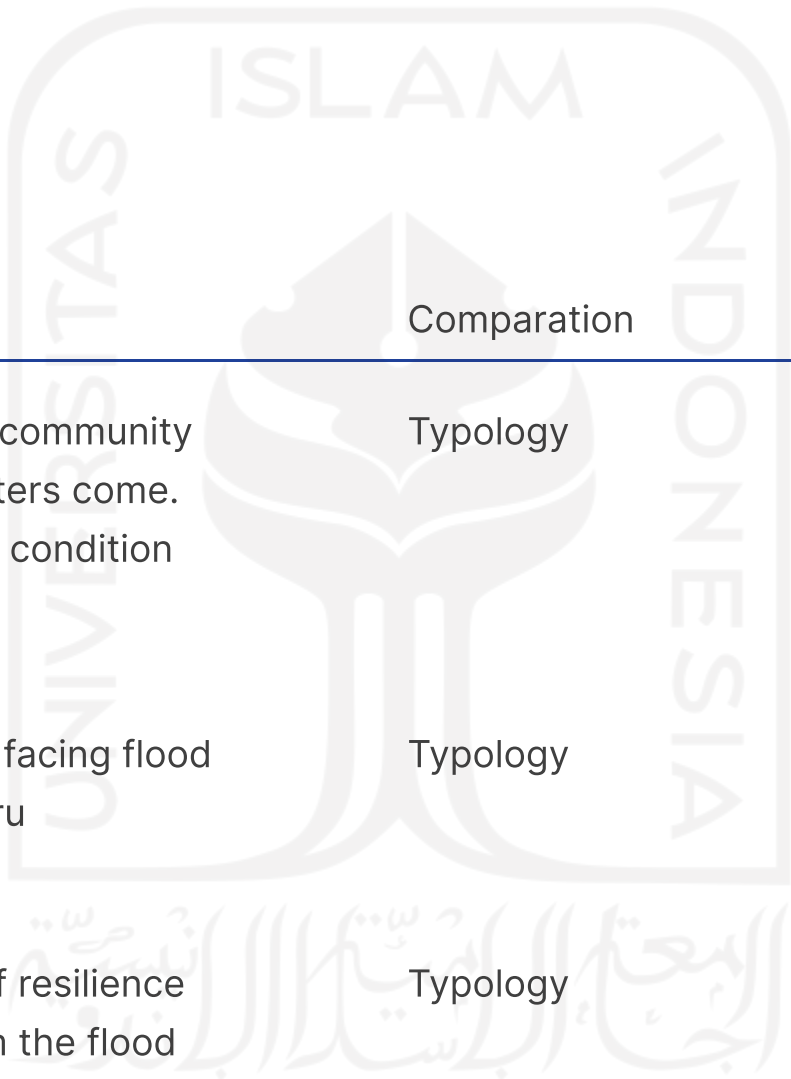


ORIGINALITY

Excellence, Originality, Novelty,

Design of Inclusive Modular Housing with Open Building Approach Responding to Flood Disaster in Kemang, South Jakarta has never been done by any party. Some themes that specifically or indirectly use Open Building as an approach can be found. Issue and focus on the project differ from each other from the author proposed title. To avoid plagiarism in the process of preparing report and planning, these are some reference use:

Writer	Title
Prasetyo Adi Nugroho, 2020	Simpul Bertahan Hidup Jogoyudan+ Perancangan Jalinan Jaringan Pemukiman Kampung Jogoyudan, Yogyakarta sebagai Sistem Responsif dengan Pendekatan Arsitektur Survival
Afif Wahyudi Lubis, 2021	Perancangan Kampung Melayu Riau, Sri Meranti dengan Pendekatan Resilient Arsitektur
Abdul Abid Suhendra, 2016	Kampung Vertikal Kawasan Aliran Sungai Ciliwung, Kampung Melayu, Jakarta Timur Desain Konsep Arsitektural Penanggulangan Banjir dengan Pendekatan Pemanfaatan Air



Topic

Comparation

Designing a survival hub where the community can use the shelter whenever disasters come. The shelter can be used in a normal condition as well

Typology

Planning on resilient architecture to facing flood issue in Kampung Melayu, Pekanbaru

Typology

Vertical housing with the concept of resilience from flooding by utilizing water from the flood

Typology



02

Design Study

Site Study

Design Study: Flood Control

Structural: Embankment

Non-Structural: Reforestation & Erosion Control

Combination of Structural and Non-Structural Flood Control

Design Study: Residential Open Building

Open Building Parameter

Housing Typology Study

Customer-Oriented

Precedent Study

Problem Mapping



SITE DATA

Site Location



Figure 2.1 Indonesia Map

The site was located in **Kemang Area** along **Krukut River**. Some area in Kemang mostly getting flooded every year. The house, the retail, and the building was flooded by 60cm up to 300cm in heavy rain season. The design intervension in Kemang and Krukut River can help the area to deal with flood disaster

Kecamatan Mampang Prapatan & Kebayoran Baru

Figure 2.2 Jakarta Map

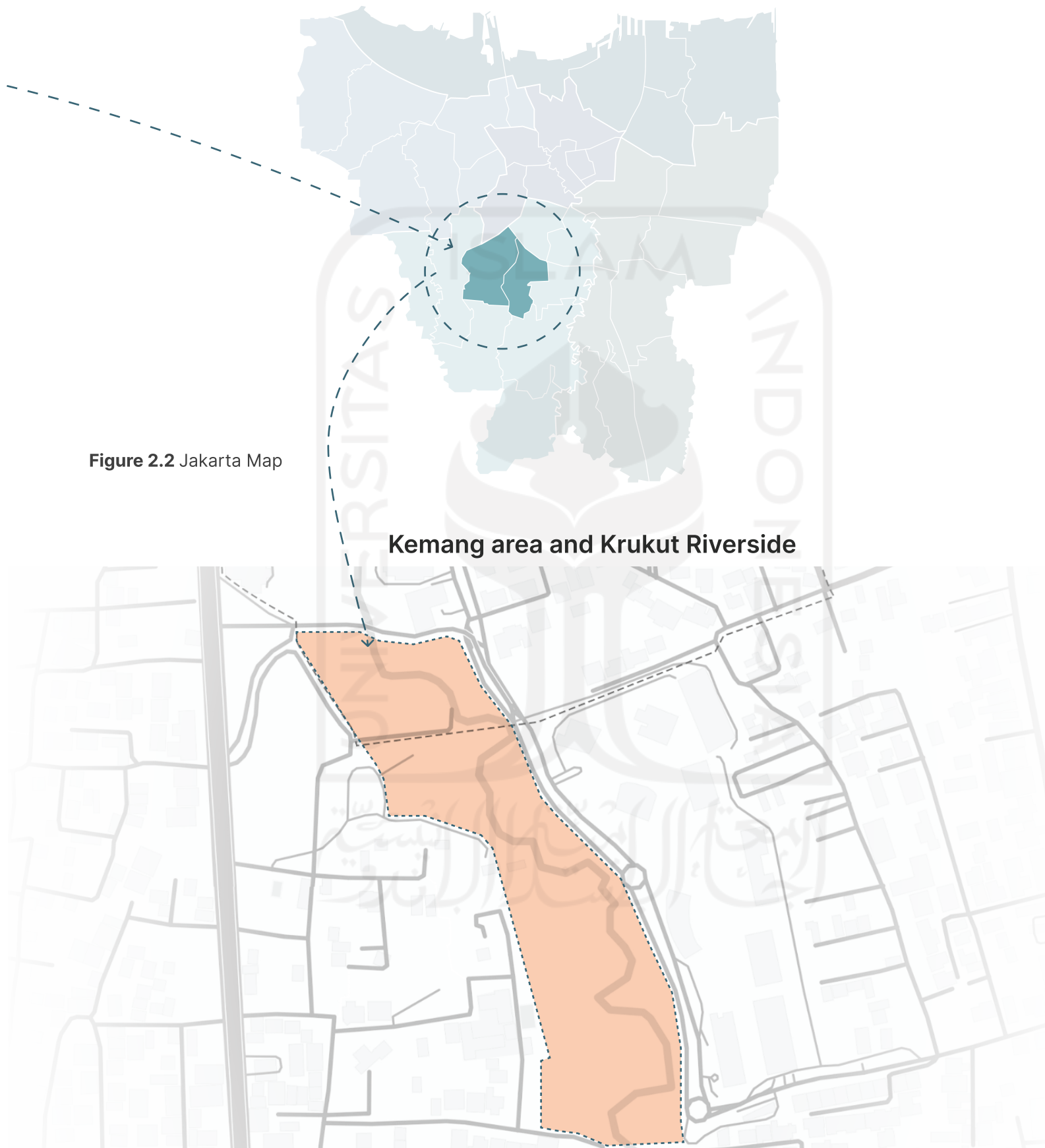


Figure 2.3 Site Location

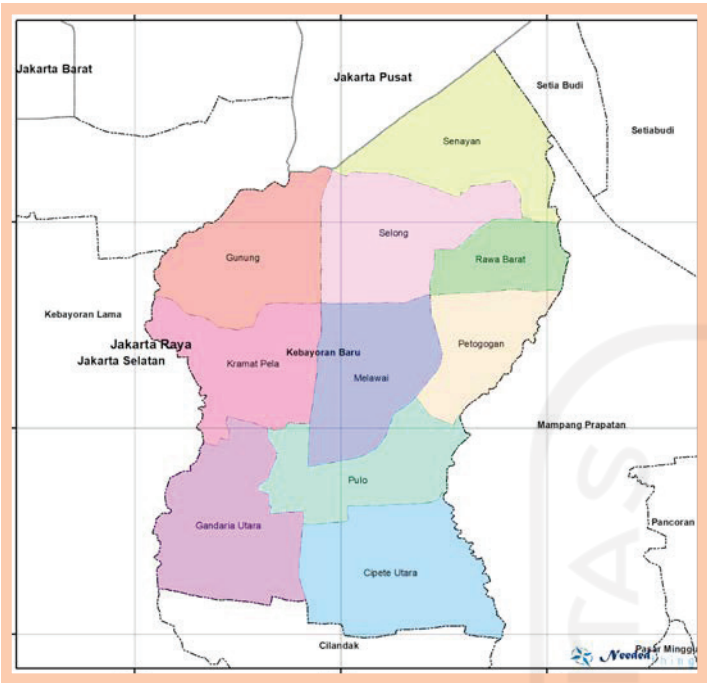


Figure 2.4 Kecamatan Kebayoran Baru Map

- Kecamatan Kebayoran Baru
- Kecamatan Mampang Prapatan

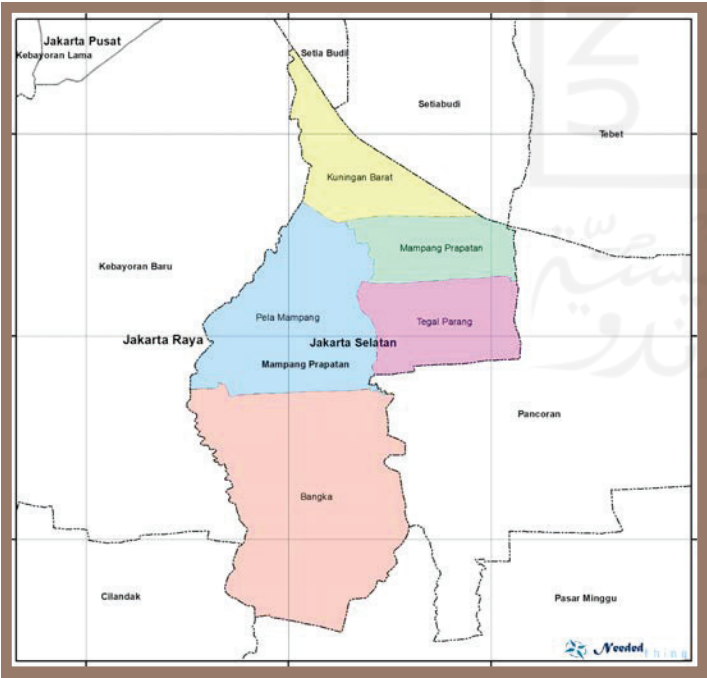


Figure 2.5 Kecamatan Mampang Prapatan Map

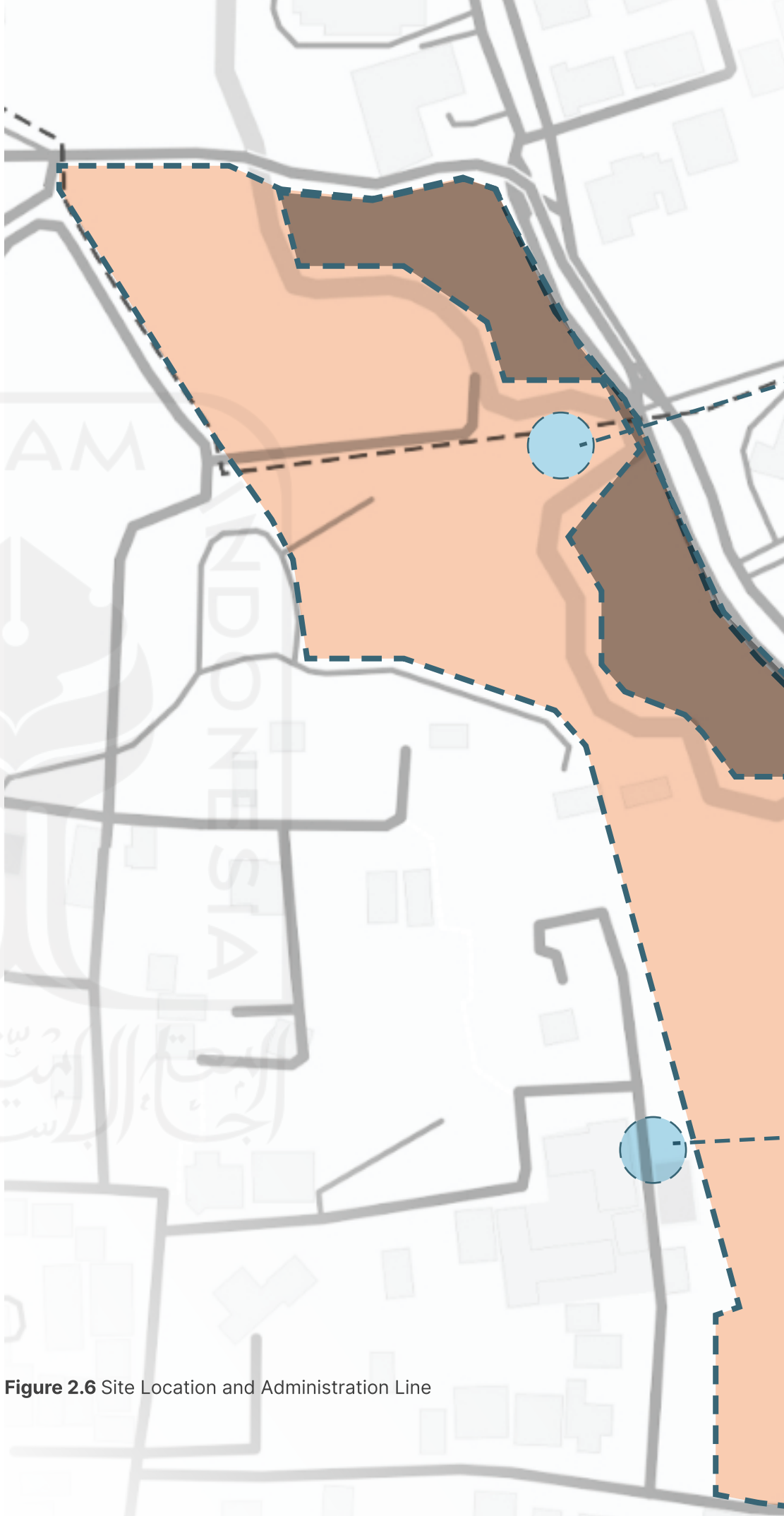
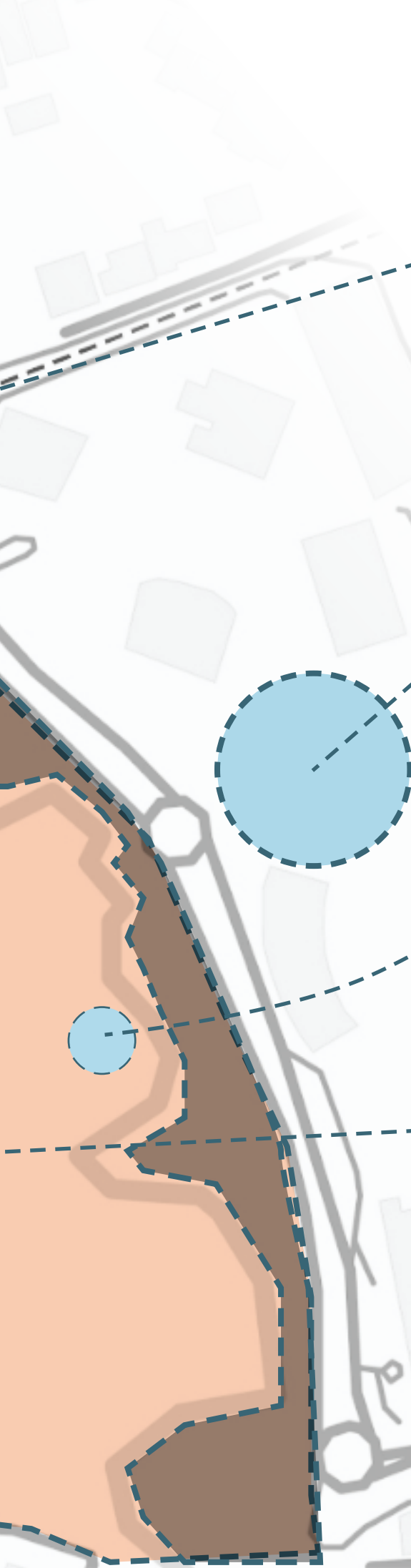


Figure 2.6 Site Location and Administration Line



The north side of the area was occupied by high density settlement. Some houses also facing directly to the river



There's a multi high-rise building with high wall work as a "fortress" and segregate between high-income people with low-income people



Some area along Krukut River was used by the community as a littering the home trash



The gap between rich and poor can be seen directly from the field on west side of Krukut river

Figure 2.7 High dense settlement in site (Author, 2022)

Figure 2.8 High-rise building along the river

Figure 2.9 Littering greenery area by settlement community (Author, 2022)

Figure 2.10 High-rise building viewed from settlement area across the river (Author, 2022)

SITE ANALYSIS

Site Housing & Greenery



- Site Border
- Site Greenery
- Site Housing
- Soft Soil

Housing on the site

Most of the riverside area was covered by greenery area. But some of the area are still covered by people house. The houses also covered in most critical riverside which almost blocking riverflow and has a high risk of the flood

Figure 2.11 Map of site housing and greenery area (Author, 2022)

Littering

In some part of greenery areas in the site. People was use it as a place for littering. It's not directly blocking the riverflow, but when the river volume increase, the trash might hindering the riverflow which later on create more flood

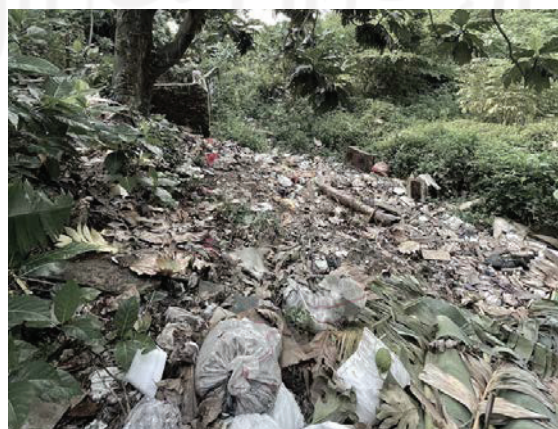


Figure 2.12 and Figure 2.13 Greenery area that get littered by the people (Author, 2022)

SITE ISSUE

Site Issue: Exclusivity

Boundaries between rich and poor

The Krukut River used by rich people as their boundaries from poor people. East side of the river was high class area, which west side of the river was mostly occupied by middle-low income people. From the west side, there's a contrast between poor people area and high class area.



Figure 2.14 High-rise building viewed from settlement area across the river (Author, 2022)



Figure 2.15 Public toilet around the settlement (Author, 2022)

SITE ISSUE

Flood on the Site

Flood sinking the house

Some houses on the site was effected to the flood. Mainly the houses that facing directly to the river. In early 2021, Kemang experienced severe flooding with a height of almost 2 meters. (Ihsanudin, 2021).

Based on interview with local people. They stated that on yearly flood, their houses was sinking due to flood. And more houses will sink on 5 years flood cycle.

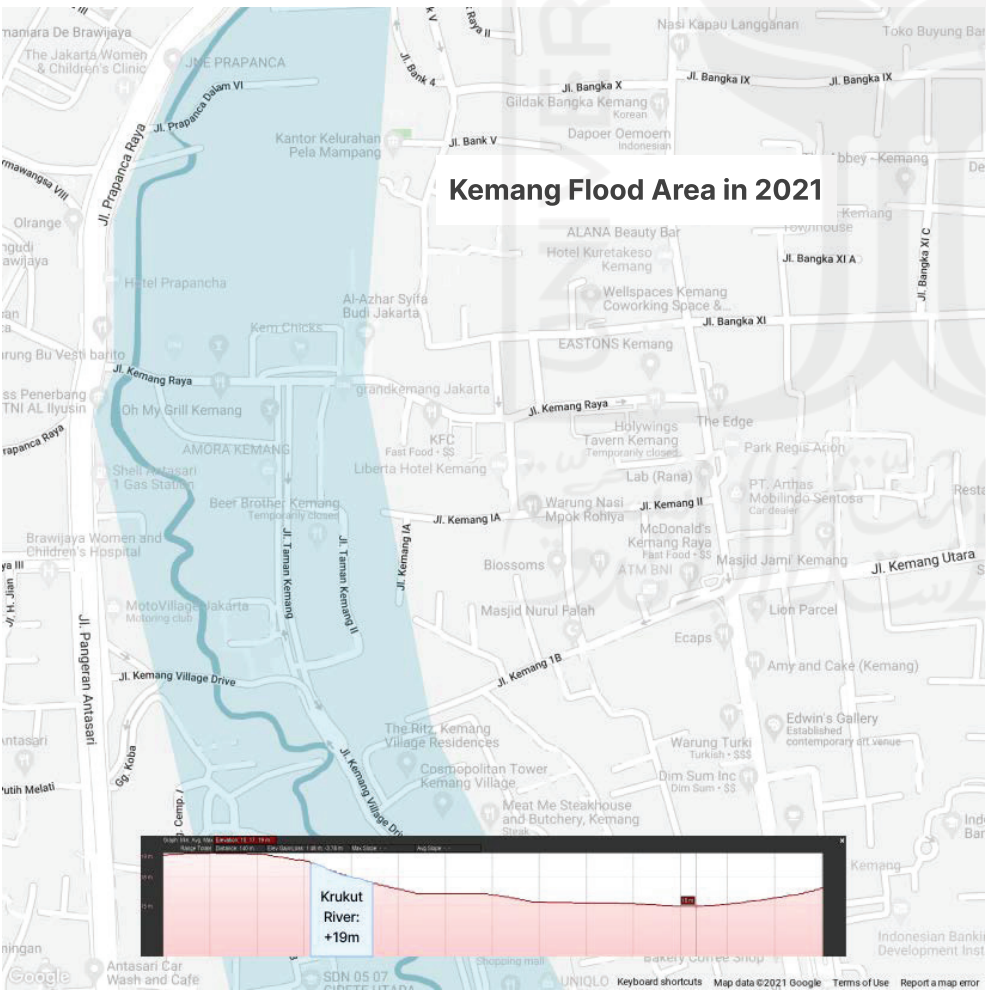


Figure 2.16 (Left) Early 2021 Kemang flood diagram. (Author, 2021). Data from (Ihsanudin, 2021)

Figure 2.17 Map of site flood (Author, 2022)

Figure 2.18 Diagram of flood high on the site (Author, 2022)

LOCAL METHOD ON AVOIDING FLOOD

Local people in Kemang area has been using the method of embankment to avoiding the flood on their settlements.

Unfortunately, the house was too close with the river.

Meanwhile, the river flow on heavy rain season was bigger than the embankment itself.

The embankment that created by the community is temporary embankment. On heavy flood, the embankment was broke due to heavy load from the water



Figure 2.19 Existing embankment on the site (Author, 2022)



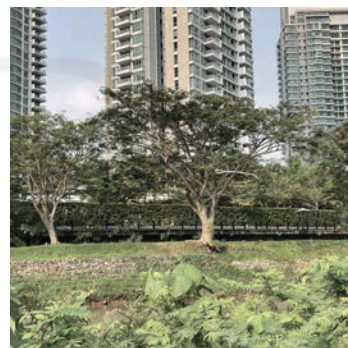
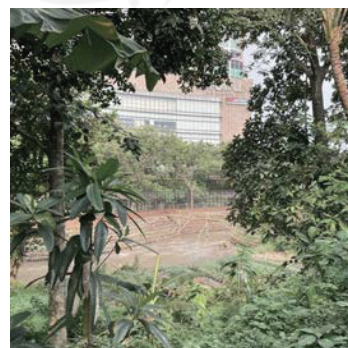
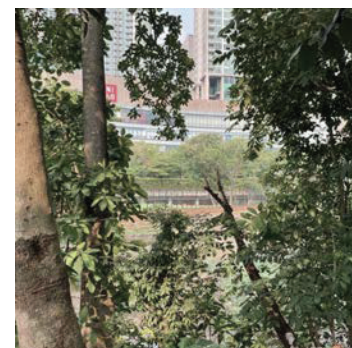
Figure 2.20 Existing embankment on the site (Author, 2022)

GALLERY

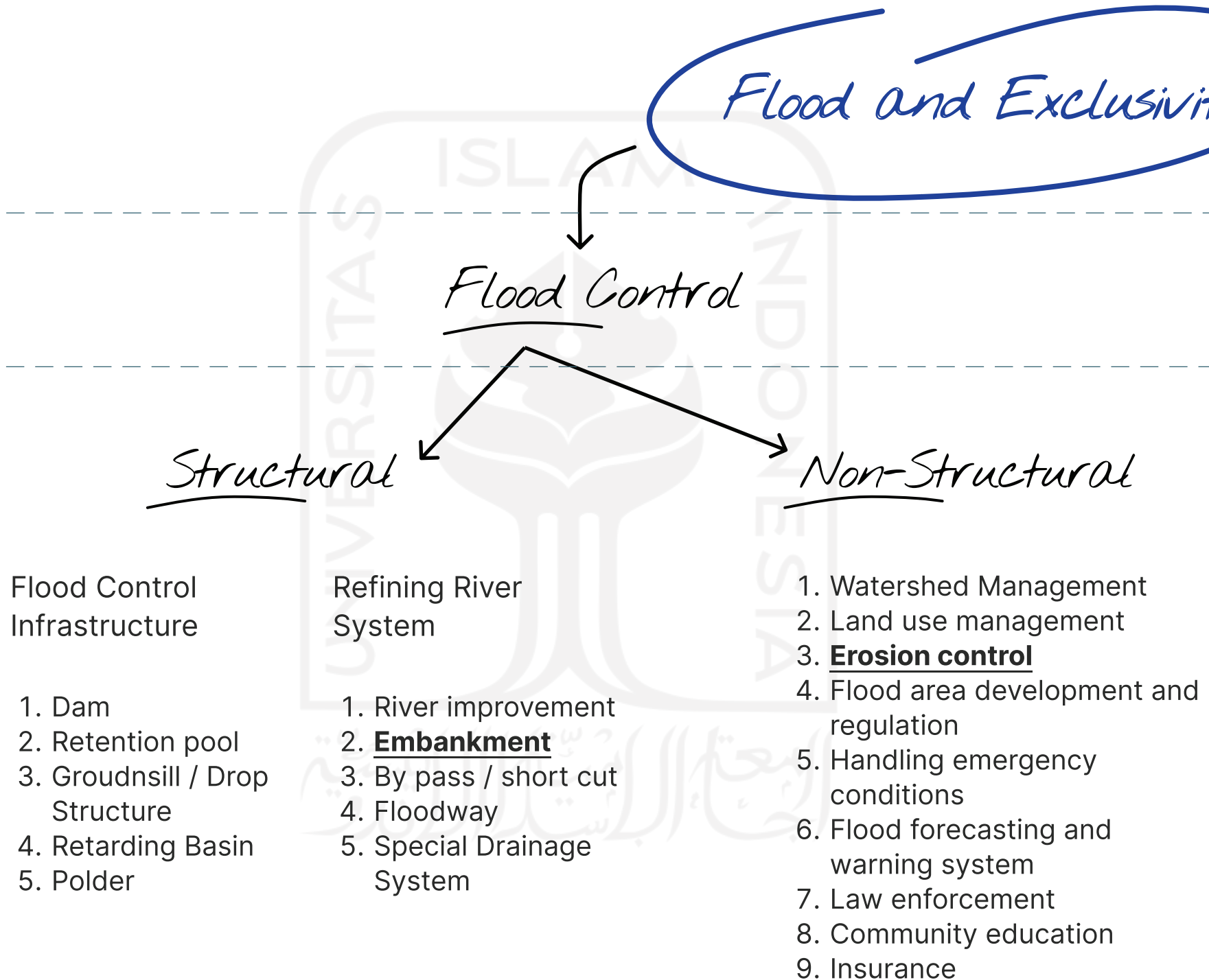
Site Context



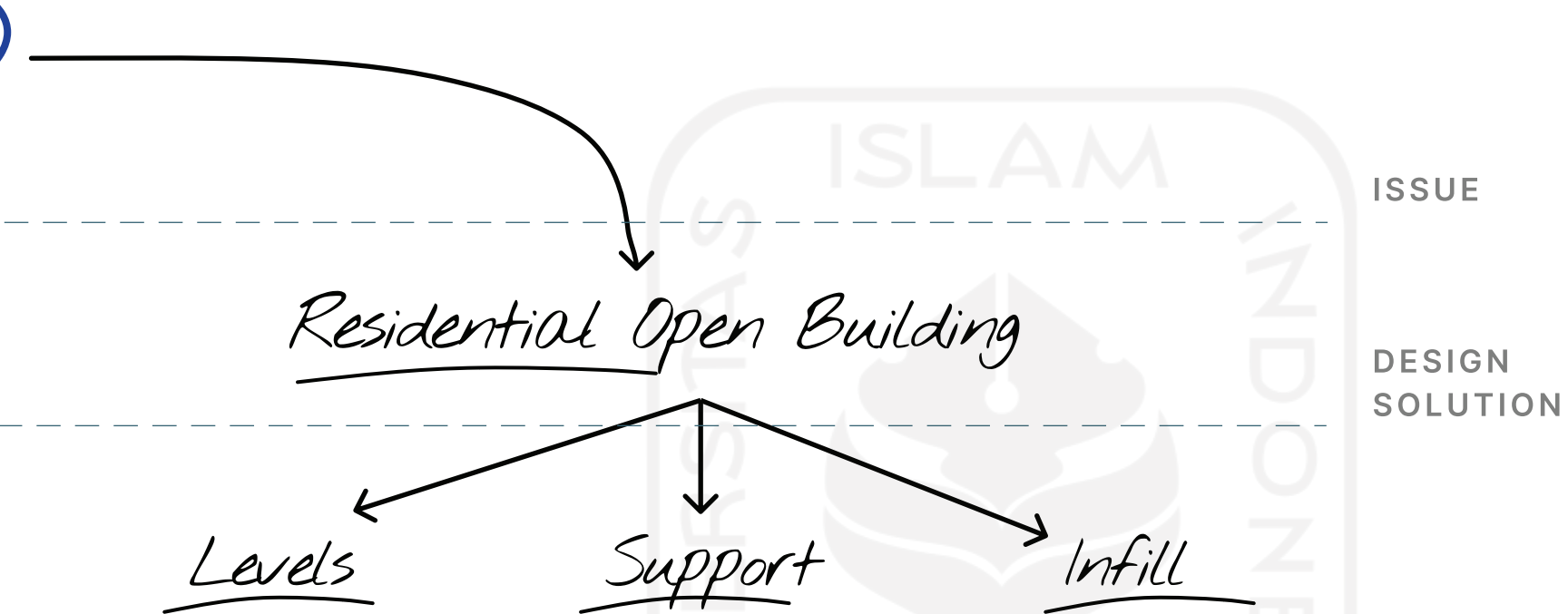
Figure 2.21 - Figure 2.34 Site galleries (Author, 2022)



Design Problem Map

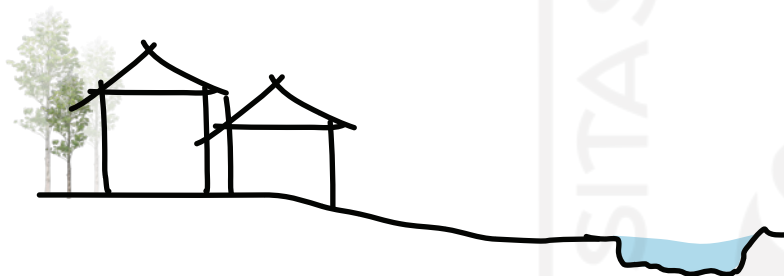


(Pusat Pendidikan Dan Pelatihan Sumber Daya Air Dan Konstruksi, 2017)

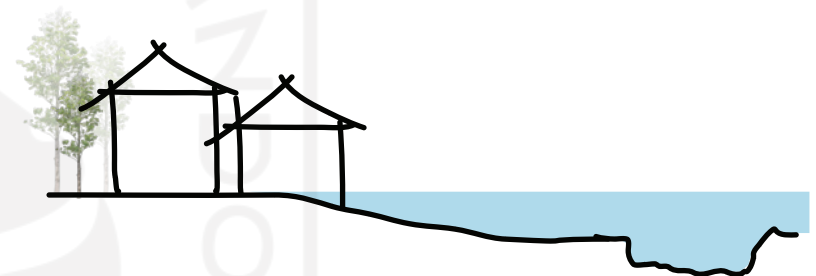


Structural Flood Control

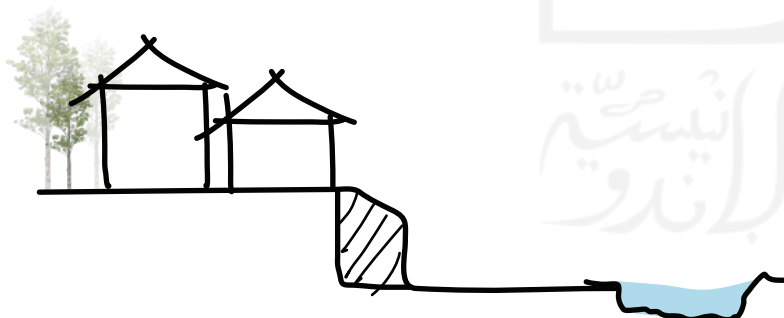
Embankment



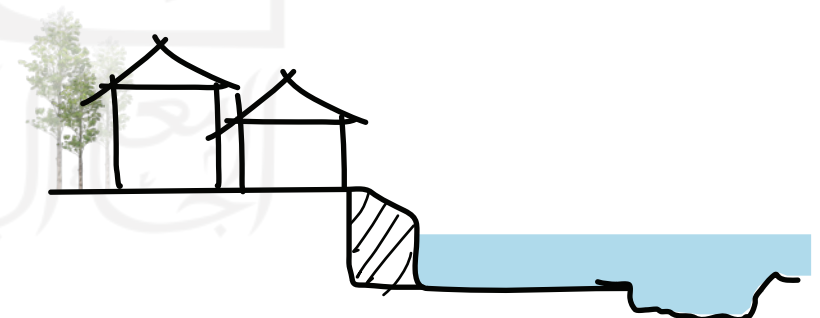
The river in normal condition where the water surface only covering the river surface



The river in flood condition without embankment effecting the settlement to get flooded



The river in normal condition with embankment.



The river in flood condition with the embankment to hold the water overflow to the settlement

EXISTING EMBANKMENT METHOD

Local people in Kemang area has been using this method to avoiding the flood on their settlements



Unfortunately, the house was too close with the river. Meanwhile, the river flow on heavy rain season was bigger than the embankment itself.

Figure 2.35 Existing embankment on the site (Author, 2022)

Figure 2.36 Existing embankment on the site (Author, 2022)

Figure 2.37 (Bottom) Diagram of flood high on the site (Author, 2022)

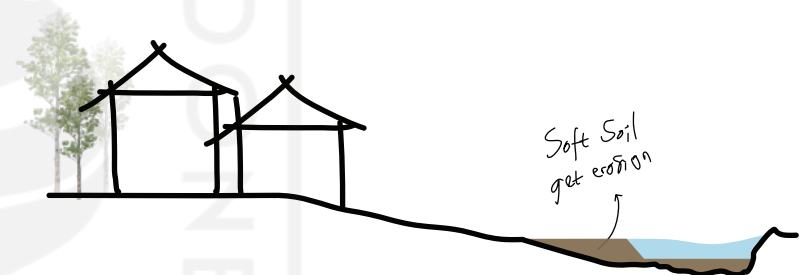
Non-Structural Flood Control

Reforestation - Erosion Control

Reforestation help the land to absorb more water. Less tree on the land, it will easier for the land to get erosion due to soft soil without any firm from the root of the trees



The land without vegetation. Will create a soft soil which is easy to collapse and get erosion



When the land become too soft. It collapse and make the river surface increasing. Increasing water surface means it will easier to make an overflow which causes the flood



The land with vegetation has more strength rather than without vegetation



On the heavy rain season or when the water river overflow, the land still stiff because the water was absorded by the water so the land not become too soft.



Figure 2.38 Existing greenery area on the site (Author, 2022)

Existing Greenery

In some part of Krukut riverside, it was covered by the house. In some part also already become a soft soil

Future Greenery Development

The development of Krukut riverside was focusing on increasing the number of greenery and vegetation along riverside. Along with it, the hardscape also planned to be develop, in order to help the land not to get erosion easier

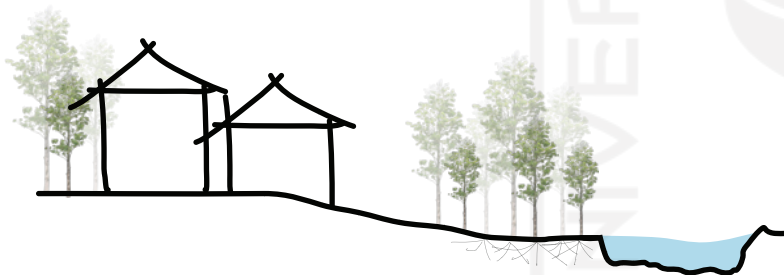


Figure 2.39 Future greenery development (Author, 2022)

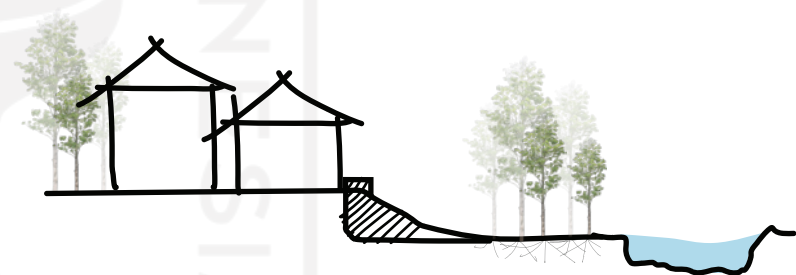
Combination of Structural and Non-Structural Flood Control

Reforestation and embankment

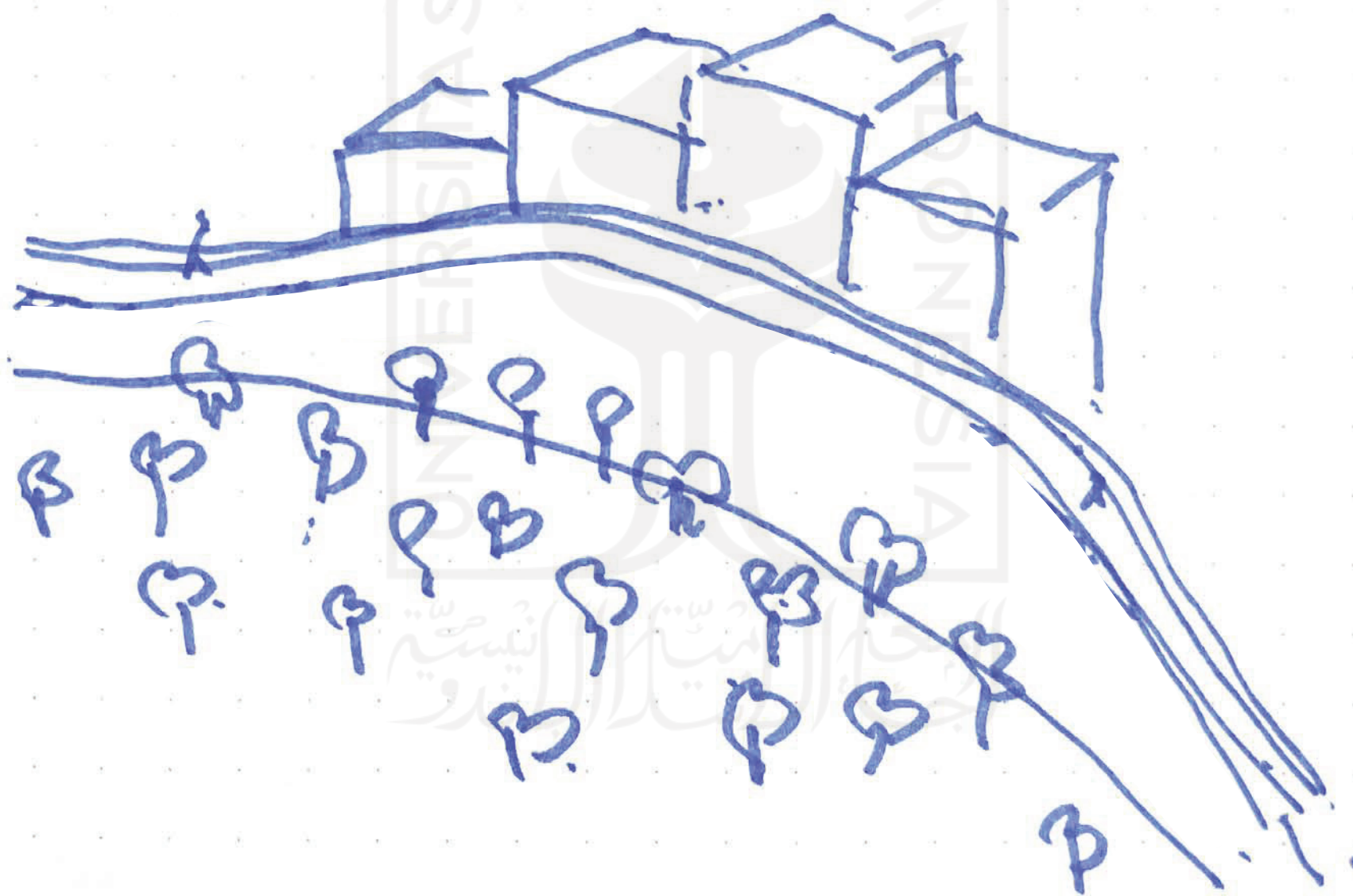
In order to avoid the flood disaster, reforestation was indeed needed as a natural solution to deal with the flood disaster. On top of it, the embankment development also required to become a last fortress for the settlement to protect from the flood disaster



The river with reforestation



The river, the vegetation, and the embankment



DESIGN STUDY

Residential Open Building

Residential Open Building is an innovative multi-disciplinary approach to architectural building design, finance, construction, fit-out, and long-term management procedures, including mixed-use structures. Its objectives include developing a diverse, fine-grained, and sustainable environment, as well as enhancing human choice and responsibility within it. Decision-making authority is delegated at multiple levels in Open Building.

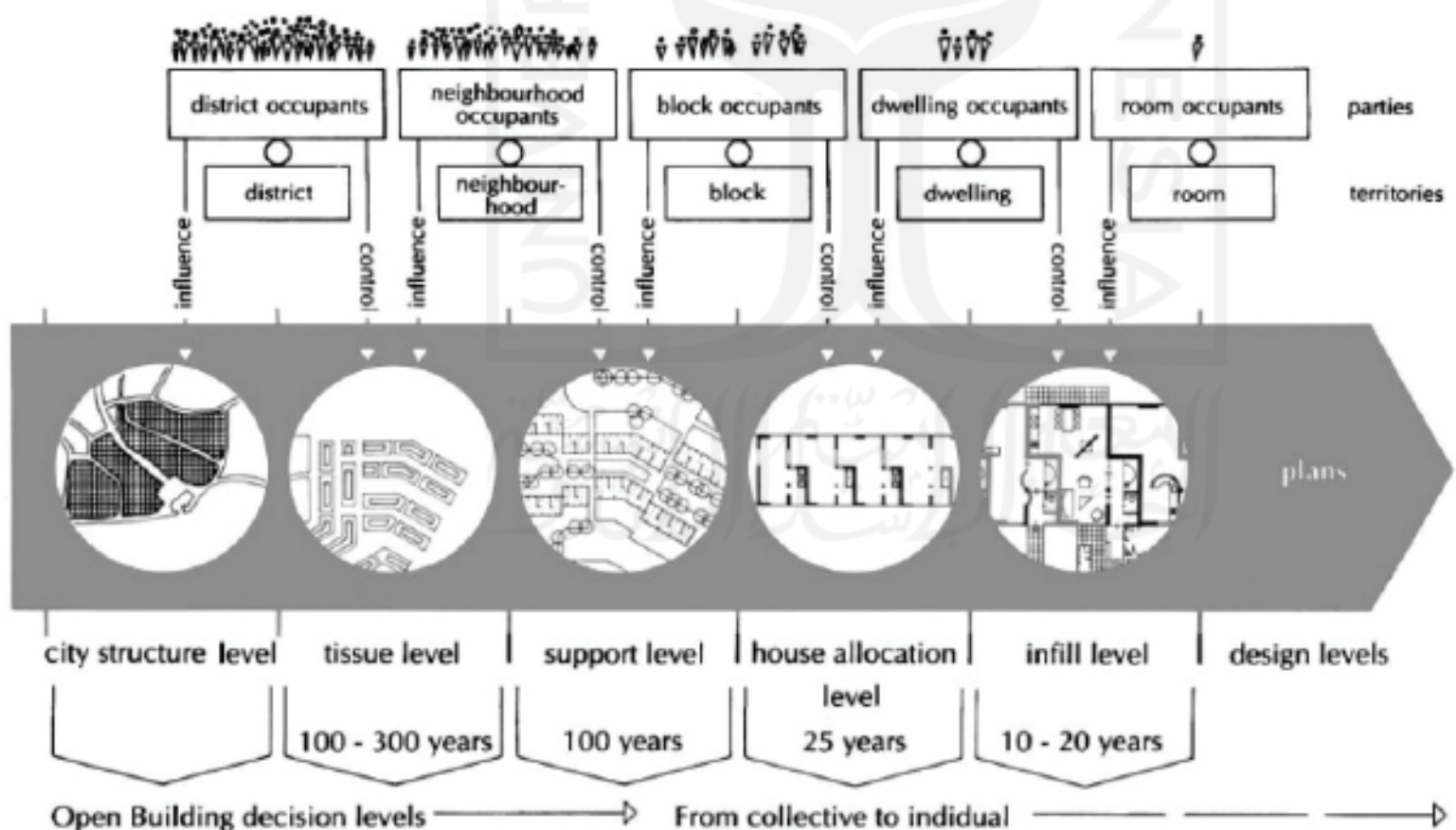


Figure 2.40 Levels in Open Buildings (Kendall, 2000)

Levels

Habraken highlights the need of understanding who controls form in order to build long-term residential architecture that is fulfilling and responsive.

The use of levels helps environmental professionals to identify critical design needs such as regulating environmental agents (who controls what and when). Thus, the levels systems enable distinctions to be made in terms of locus of control between individuals, groups, and organizations.

Although levels may adapt and occasionally disappear through time and from places to places, their presence is continuous across the built environment: levels are universal. Levels describe themselves as the points at which certain groups of physical components and space may be observed to change in an orderly and iterative approach. They arise naturally at areas where the boundaries of construction, social structure, and geography collide.

The environmental profession and its scope of action are defined by the tiers: urban planning (tissue), architecture (base building), interior design (infill), and furnishing.

*“In Open Building, responsibility for decision-making is distributed on various **levels**.”*

Support

In the most basic interpretation of the Support concept, a Support is a finished building that is ready to be inhabited by a changeable infill, just like a highway is a finished product whose way is open to be used by many types and sizes of cars. However, the design and dimensions of individual dwellings—residences, workplaces, etc.—are not specified.

The Support in Open Building is a permanent element that serves as a sharing element to create space for living. When discussing multi-family building terms (real estate or apartments), sharing components such as public ways (elevators, staircases, hallways, and galleries) and commons (laundry rooms, public rooms, common rooms, and so on) are included in the Support.

The Support is not a skeleton. **The Support is designed to accommodate and endure infill developments**, remaining mainly independent of individual occupant preferences while adapting changing living situations. It embodies shared values and preferences, as defined by the initial developer.

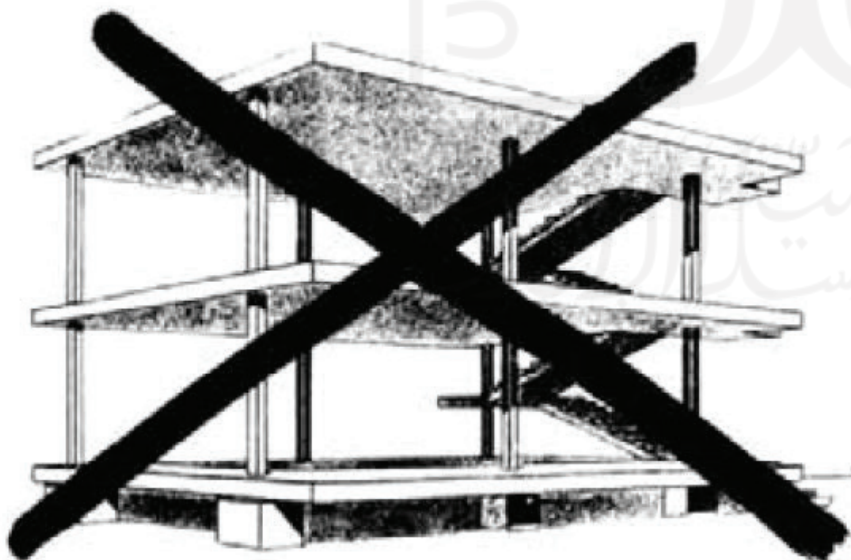
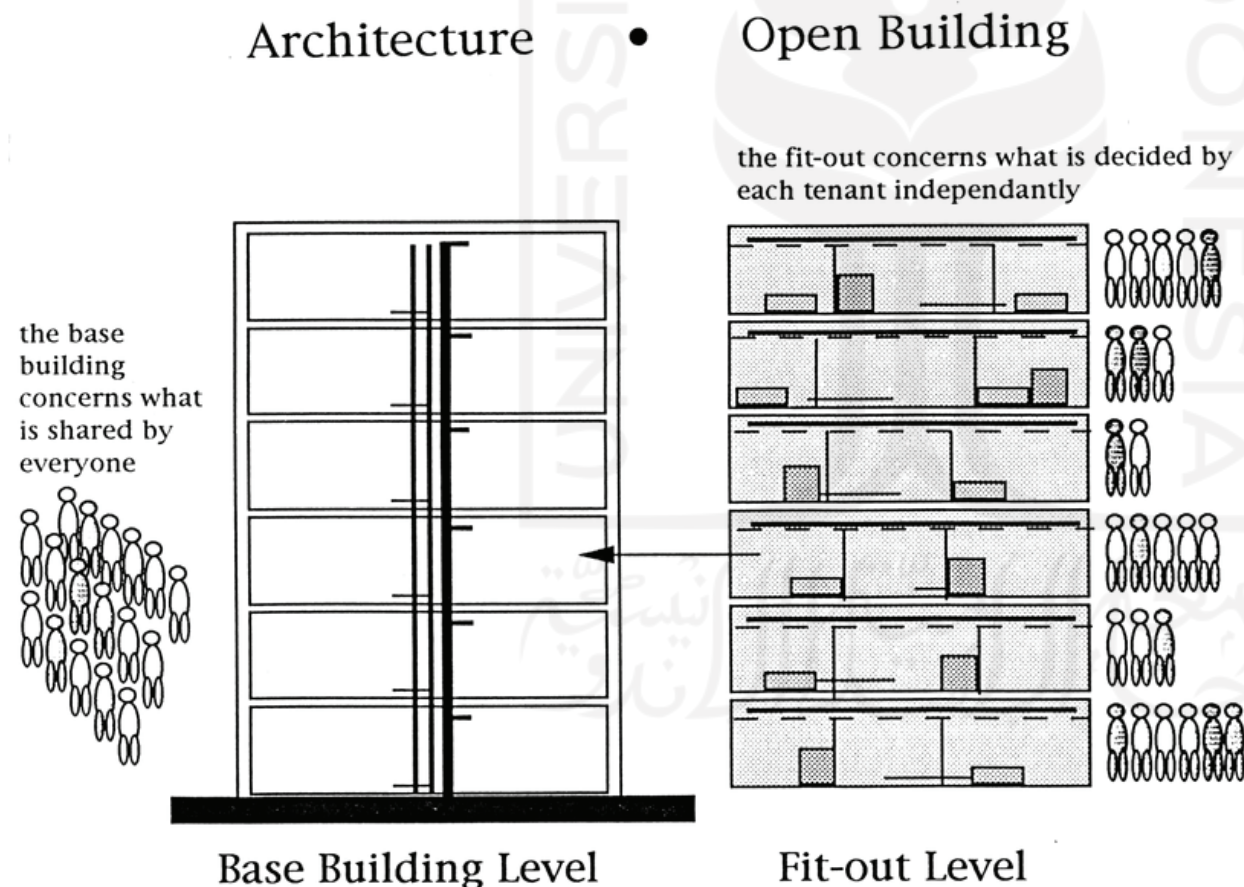


Figure 2.41 (Left) A support is not skeleton (Kendall, 2000). Image courtesy of N.J.Habraken

Figure 2.42 (Right) Infill of the building diagram (Kendall, 2016)

Infill

The use of infill has emancipated the architecture from the constraints of plumbing, wires, and conduit. Most of these building elements' technical and organizational difficulties transfer to lower infill levels in the Open Building, with significant consequence. The use of an infill strategy substantially altered the responsibilities of architects and consultants. Their work grew more focused on architecture, which is described as the broad, long-lasting components of a structure. Each tenant of the house is, by definition, self-sufficient. Whether purchased or rented, **it is under the authority of the occupants.**



Open Building Parameter

Based on Capolongo, 2016. There's eight evaluation parameters that can be used in the attempt to establish to what extent a building follows the principles of the Open Building approach.

- Shape
- Structure
- Façade
- Building Plant
- Expandability
- Restrictions
- Technologies
- Exchangeability Of Large Equipment.

The shape of the building has a significant impact on the project's flexibility and the possibilities of functional and spatial reconfiguration.

Structures are permanent elements that must be developed with dimensional criteria in mind. As a result, the regularity, form, scale, and modularity of the structural grid are critical to ensuring that Open Building principles are followed.

The façade should be composed of modular panels that are as independent of the interior plan as feasible, allowing for changes to the latter without affecting the former.

The building plant should be chosen with the necessity for future flexibility in mind, such as shaft positioning as well as other features.

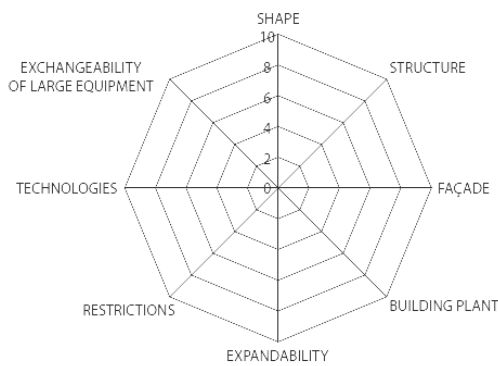
Expansion must be found inside the building itself, organizing the space to react to the demands of functional change and rearrangement through time.

The project's restrictions and the technologies employed during the development process both are crucial on Open Building. The former is important for knowing how many adjustments are conceivable, while the latter, together with material selection, has a significant influence on how fast and easily these changes can be accomplished.

Another essential consideration in the evaluation is the **interchangeability of heavy equipment**, as the size and frequency with which it must be updated can make the procedure highly hard and expensive, even requiring partial disassembly in certain cases.

To make the assessment tool easier to use and fill out, these factors are organized onto a page. The assessment tool includes a documentation, and each parameter has its own page with basic definitions and a full description, as well as a list of all conceivable solutions that may be utilized in a project. These statistics were gathered during the research and case study analysis phases, which were also utilized to evaluate the flexibility of each alternative. The scoring method assigns a score between 0 and 10 points to each parameter.

The output of this evaluation tool was classified in eight different marks and therefore could not be univocal or straightforward. In order to achieve that, it was essential to take into consideration that some features can be more critical and have a deeper impact on the overall flexibility of the project.



EVALUATION TOOL			
	Points	Options	Score
SHAPE	10	100% Compact	
	8	70% Compact or Vertical	
	6	50% Compact or Linear	
	4	Articulated	
	2	Horizontal	
	0	Detached buildings	
Total score			/10
STRUCTURE	1	Span < 7 m	
	2	Span > 8 m	
	4	7 m ≤ Span ≤ 8 m or Open floor plan	
	+1	Regular	
	+1	Squared	
	+1	Oversized elements	
	+1	Concrete slabs with removable portion for vertical circulation	
	+1	Hollow pillars for wiring and plumbing	
Predalles			Total score /10
FAÇADE	+6	Curtain Wall	
	+4	Modular Panels	
	0	Ventilated façade	
	0	Traditional brickwall	
Total score			/10
BUILDING PLANT	+2*	Spread out plant infrastructure in false ceiling*	
	+1*	Condensed plant infrastructure (varying height of false ceiling)*	
	+1*	Technical Interfloor*	
	+1	Distribution in raised floors	
	+1	In view, when advisable	
	+1	Plant tower	
	+1	Size of service shafts: shafts total surface/floor surface ≥ 0,01	
	4	Distance in between service shafts: d ≤ 35 m	
	2	Distance in between service shafts: 35 m < d ≤ 70 m	
0 Distance in between service shafts: d > 70 m			Total score /10
EXPANDABILITY	+5	Internal: already equipped spaces	
	+3	Internal: shell spaces	
	+2	External: volumes "hanging" from the façade	
Total score			/10
RESTRICTIONS	8	Only fixed vertical elements (connections and service shafts)	
	6	Up to 10%	
	4	Up to 30%	
	2	Up to 50%	
	0	Up to 50%	
	+2*	Drain pipes placed in service shafts*	
	+1*	Drain pipes run next to pillars*	
Total score			/10
TECHNOLOGY	4	Dry assembly technique	
	2	Mixed assembly technique	
	0	Wet assembly technique	
	+2	Internal partitions: modular panels	
	+2	Internal partitions: panels set up with plant infrastructure	
	+2*	Internal partitions: prefabricated panels*	
	+1*	Internal partitions: dry walls built in situ*	
Total score			/10
EXCHANGEABILITY OF LARGE EQUIPMENT	8	Only needs disassembly of façade panels	
	4	Disassembly of façade panels and of internal partitions	
	0	Partial demolitions	
	+2	Large equipments located on the ground floor	
Total score			/10

* Points can be given for only one of these options

Figure 2.43 Open Building parameter table (Capolongo, 2016).

(continues)

Typology: Housing

Basic Room Need

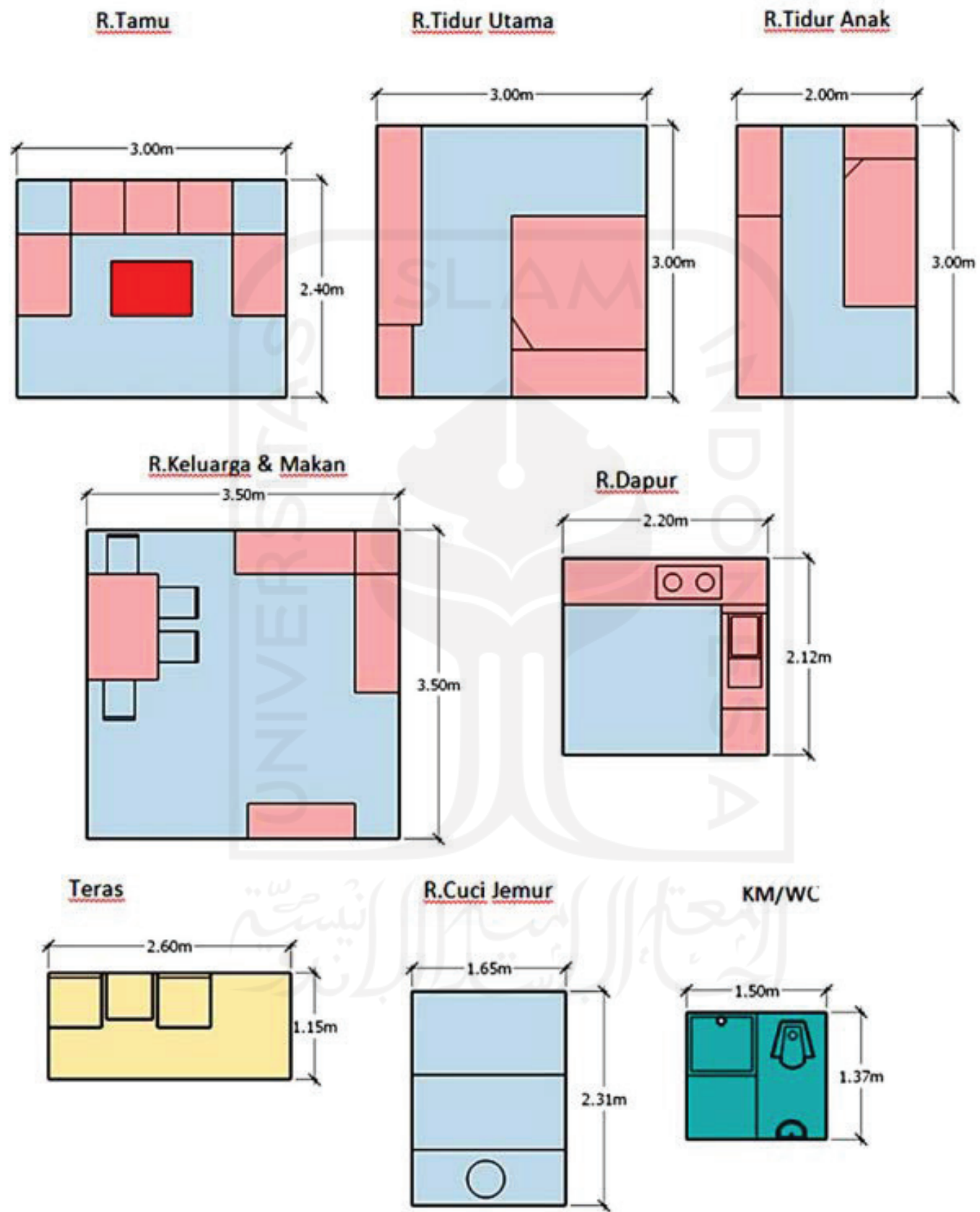
Basic room need for housing is 9m² based on SNI 03-1733-2004. The minimum area requirement is calculated based on the need for human fresh air in indoor activities

Floor Area	Minimum area	Maximum area
Adult	6.4 m ²	9.6 m ²
Children	3.2 m ²	4.8 m ²
Residential area	28.28 m ²	43.2 m ²
Average occupancy area		36 m ²
Residential area per person		9 m ²

Source: (SNI 03-1733-2004)

Table 2.1 Basic room need table (SNI 03-1733-2004).

Figure 2.44 Diagram of basic room need (Puslitbang Permukiman, 2011 in Suryo, 2017).



Source: Puslitbang Permukiman (2011) in Suryo (2017)

DESIGN STUDY

Customer-Oriented

Case Study: Pettit and Sevitt

Pettit and Sevitt's goal was to make architect-designed houses affordable to the public while maintaining the aestheticism and practical layout of well-designed homes at the time. This was not merely a desire of their customer, but also a cultural trend at the time that commodified design and the intrinsic value it gave to architecture.

Customers wanted flexibility and personalization of their homes, not simply outstanding design. This entailed being able to adapt to unique locations as well as being able to accommodate to the various lives of their younger professional clientele. This was to be the driving force behind most of the Pettit and Sevitt Range's modularization of floor designs.

In addition to site flexibility, Pettit and Sevitt offered a selection of seven to eleven basic houses, each with four or five conventional modifications that enlarged (or lowered) the size of the house, added more bedrooms, or performed a mix of both, in order to cater to a wide variety of buyers. This also attempted to assure the "individuality" of the residences, with consumers feeling as though their home was custom-made for them and their family. (McRobert, 2018)

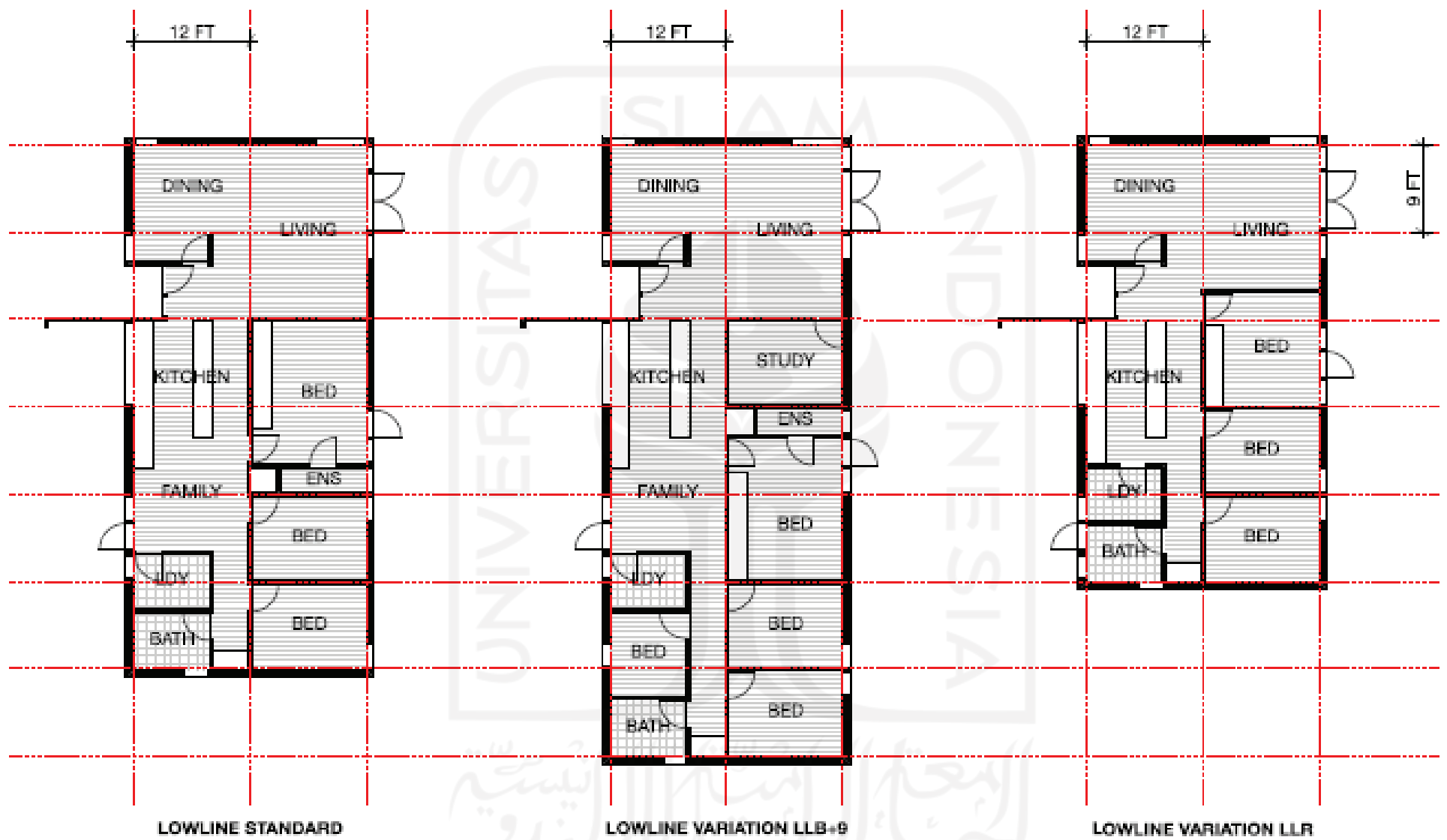


Figure 2.45 Lowline B Standard plan with expanded and reduced variations (McRobert, 2018).

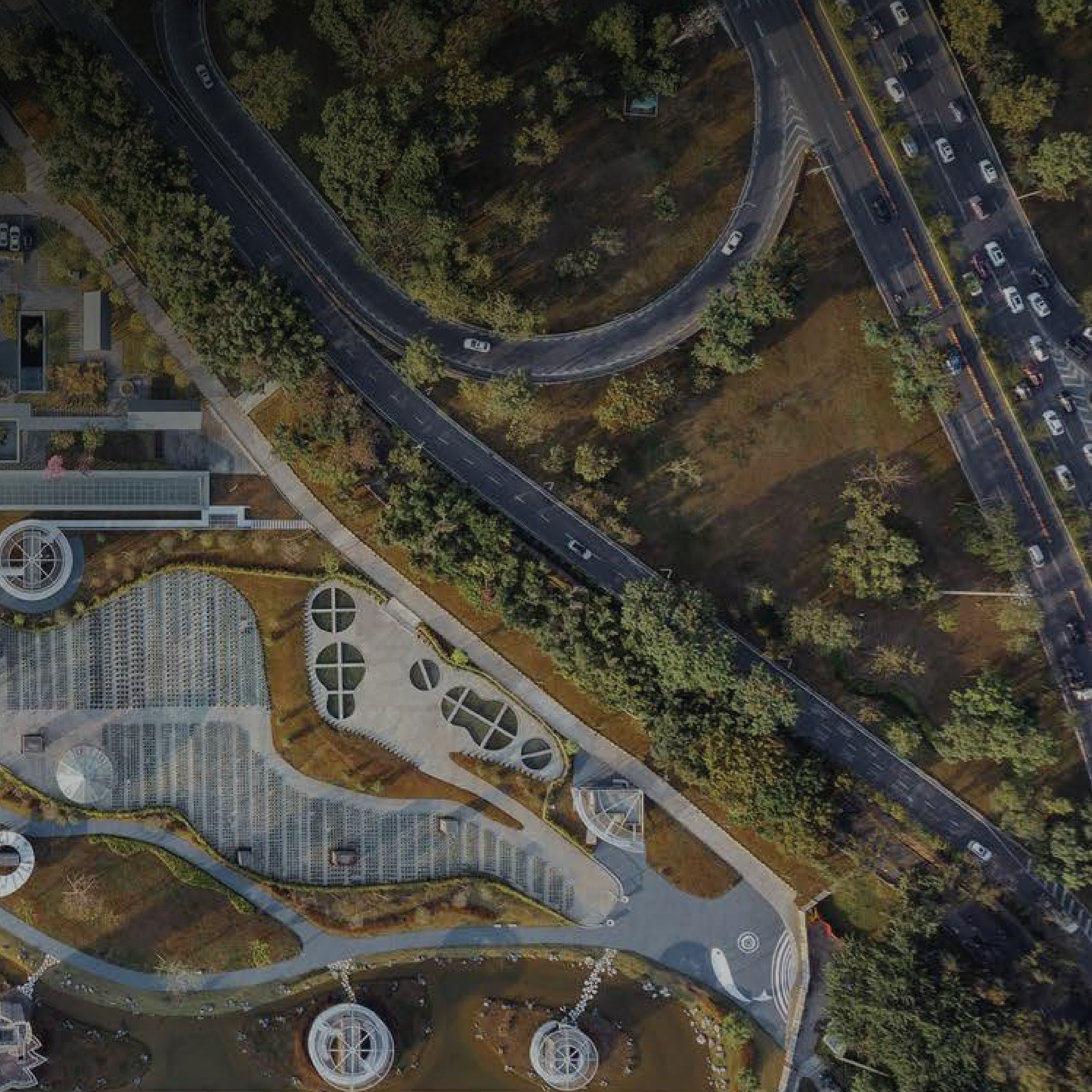
PRECEDENT - CASE STUDY

Shenzhen Lotus Water Culture Base

Shenzhen Lotus Water Culture Base and Ground Level of Honghu Park Water Purification Plant

Figure 2.46 Aerial view of Shenzhen Lotus (Shuangyu, 2022).







Sponge Area

Improvement on green area
to work as a absorption
space

Shelter Point

Shelter point with water filtering
on it. Helping to watering the
urban farming

Water from the river

Figure 1.2 Jakarta Masterplan 1965-1985 (Manan, 2016)

Figure 1.3 Decrease in green area planning in the Jakarta Masterplan from period to period (Manan, 2016)

Figure 1.4 (Right) Decrease in green area planning in the Jakarta Masterplan from period to period (Manan, 2016)



Figure 2.47 Diagram Analysis of Shenzen Lotus
(Author, 2022). Base image (Shuangyu, 2022)



Shelter flood margin

Flood Possibility

Shelter that can adapt with the flood disaster. without using floating structures

New ideas to implement:

With similar system, but using a floating structures for the building. So when heavy flood happens in Kemang, the building can deal with it

Air tank that help building float when flood comes

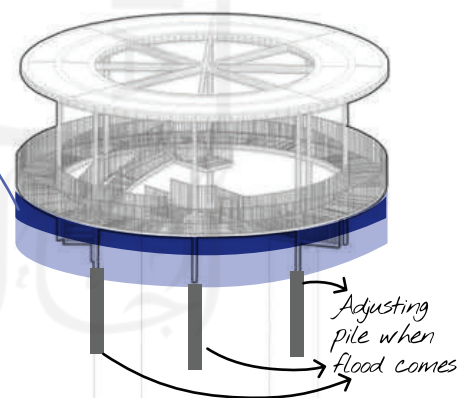
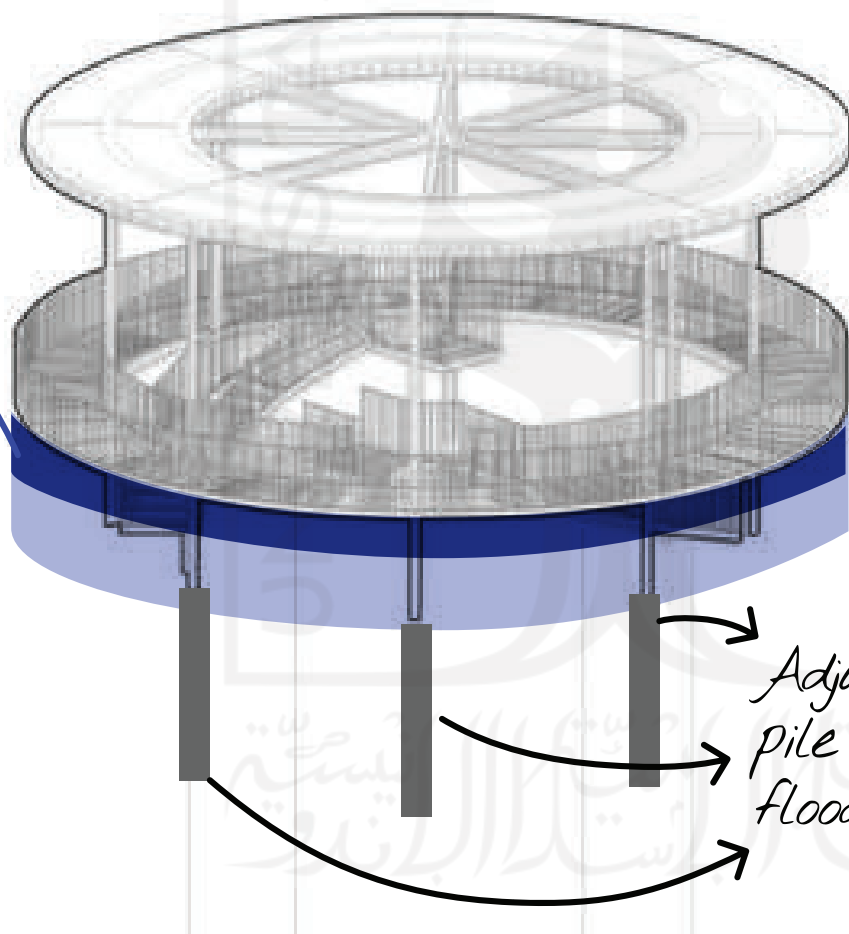


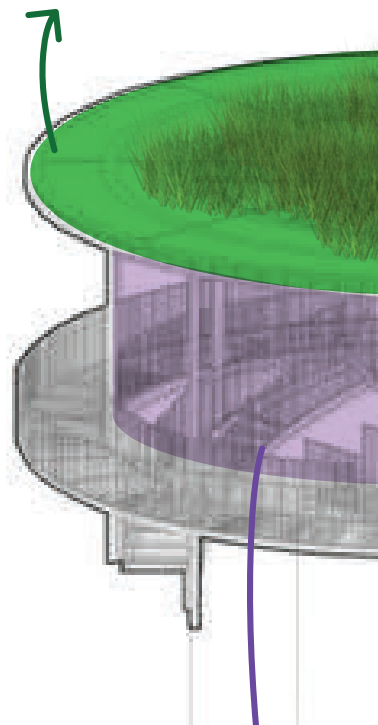
Figure 2.48 Diagram Analysis of Shenzhen Lotus Building's (Author, 2022). Base image (Shuangyu, 2022)

*Air tank that
help building float
when flood comes*



*Adjusting
pile when
flood comes*

*The shelter r
an urban fo
place it sepa
ground*



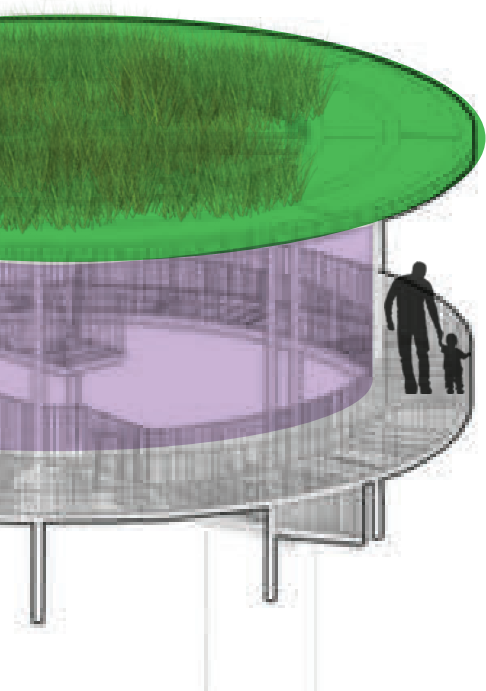
*The center
used as a t
when the fl*

Figure 2.49 Ideas implementation from Shenzen Lotus (Author, 2022). Base image (Shuangyu, 2022)

Figure 2.50 Ideas implementation from Shenzen Lotus (Author, 2022). Base image (Shuangyu, 2022)

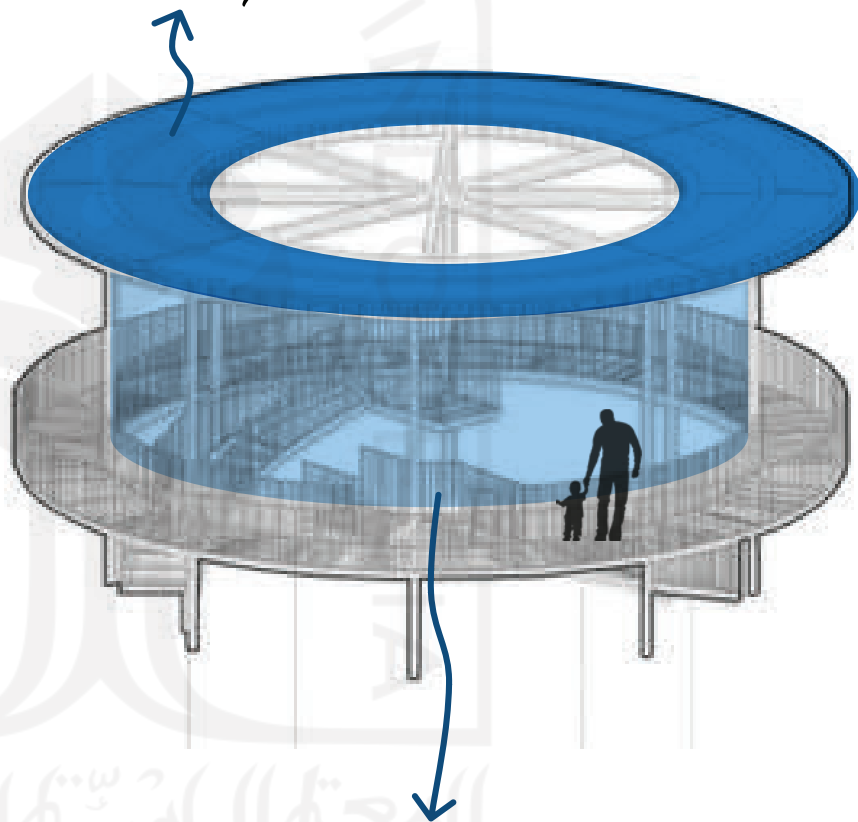
Figure 2.51 Ideas implementation from Shenzen Lotus (Author, 2022). Base image (Shuangyu, 2022)

roof can be used as
arming. Instead of
erately on the



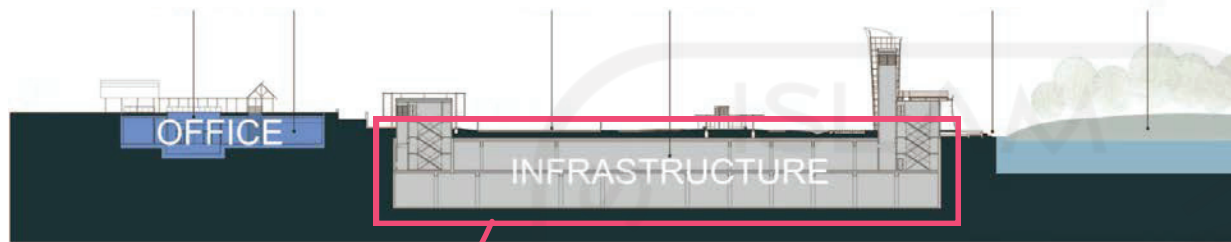
of the shelter can be
temporary settlement
ood comes

Photovoltaic as an outer of the
roof to use as an alternative
energy when the flood comes and
electricity went off.



Photovoltaic also can be implemented in
settlement walls. Work as an opening
but at the same time it collect the
energy from the sun

The river water flowed into the absorption area. Then the water will be collected on the filtering system on the main shelter



Water filtering system on the main building

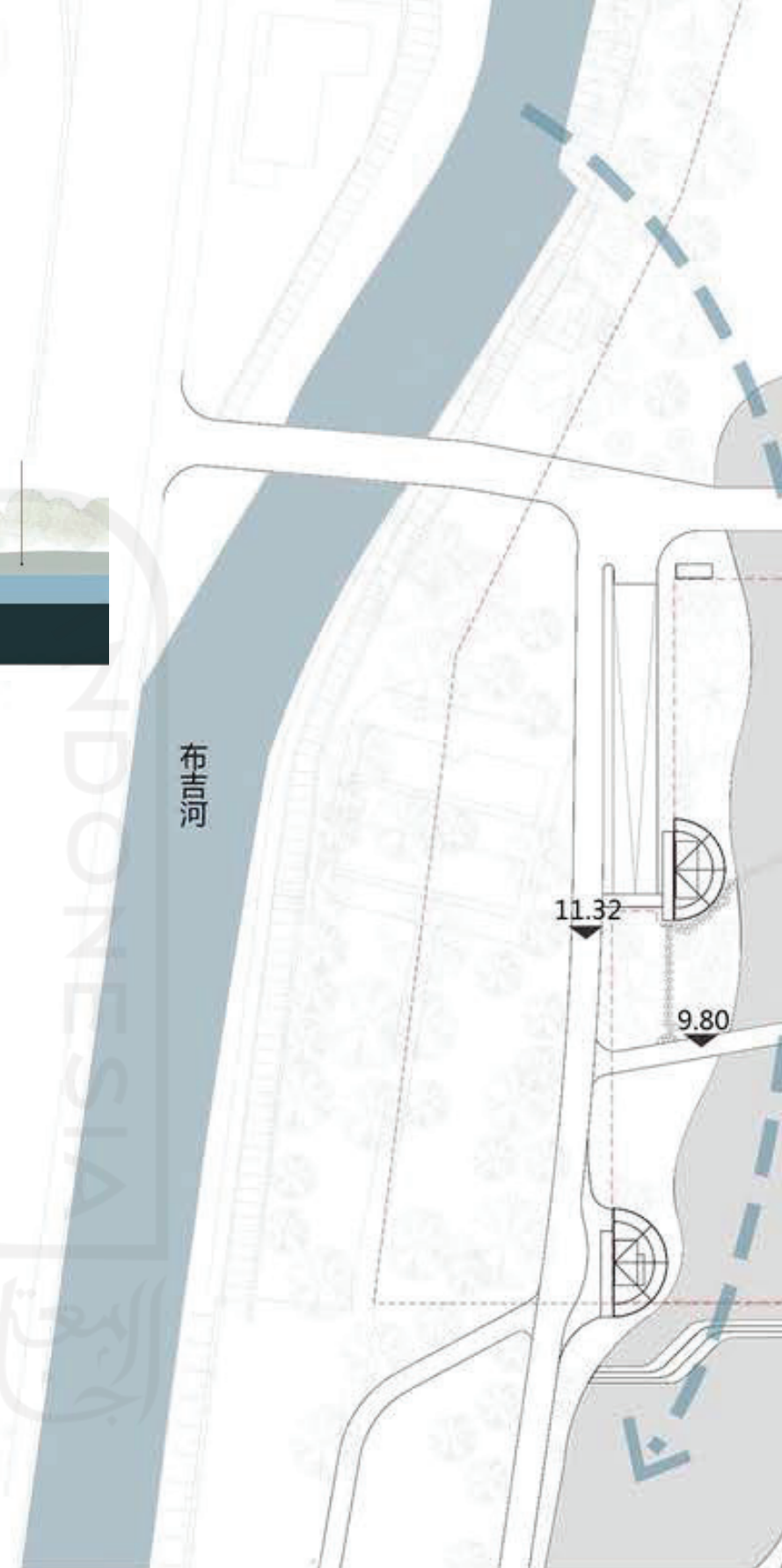
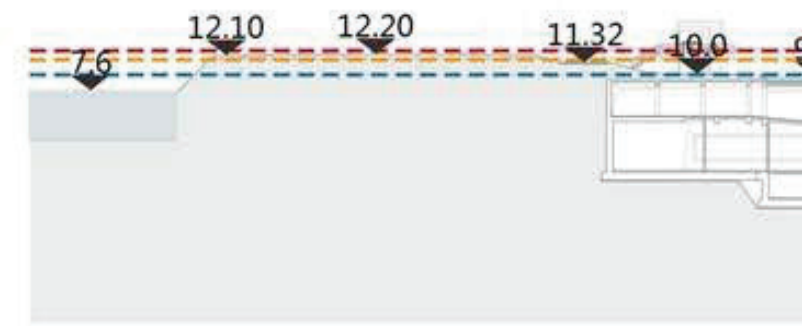
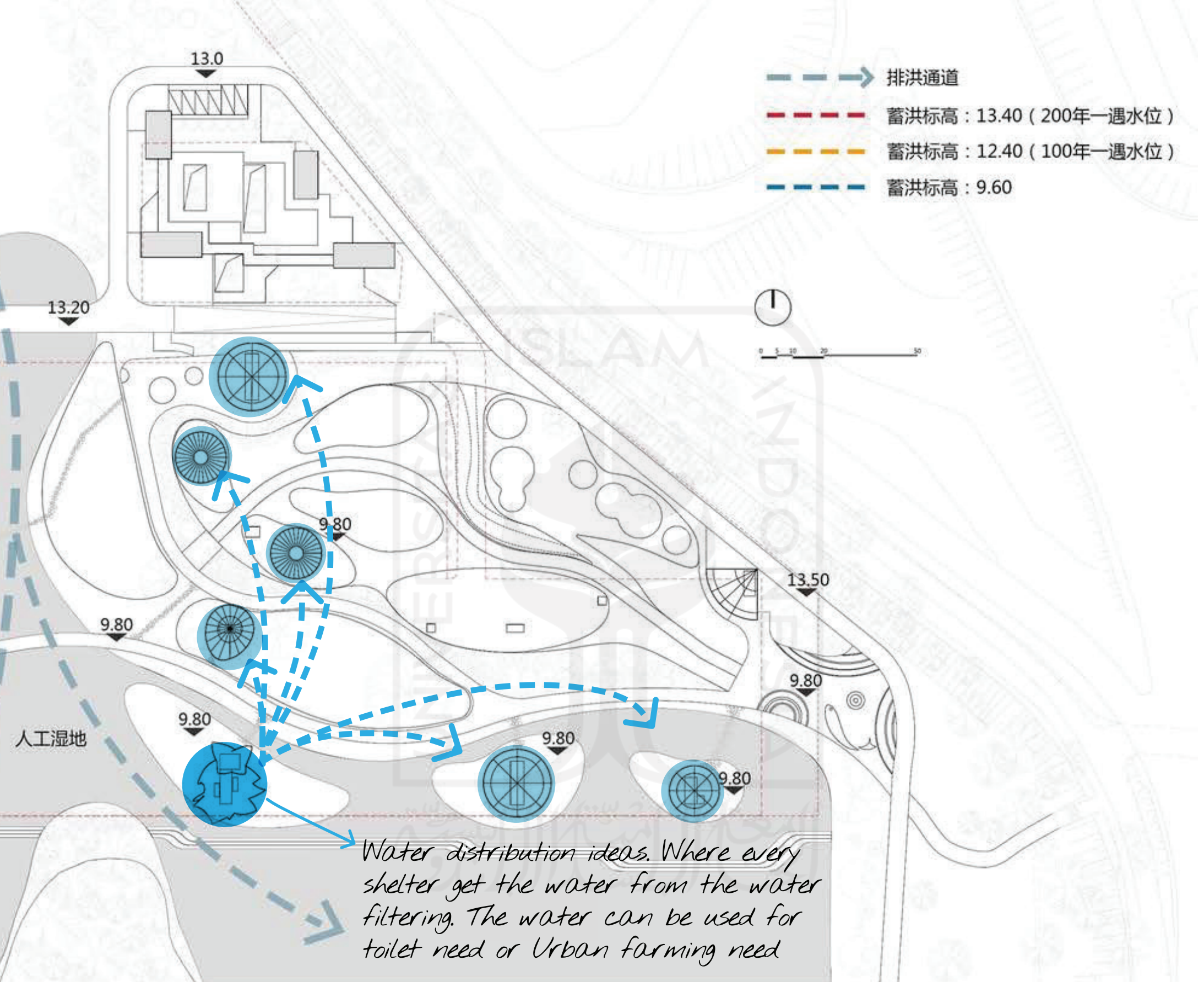
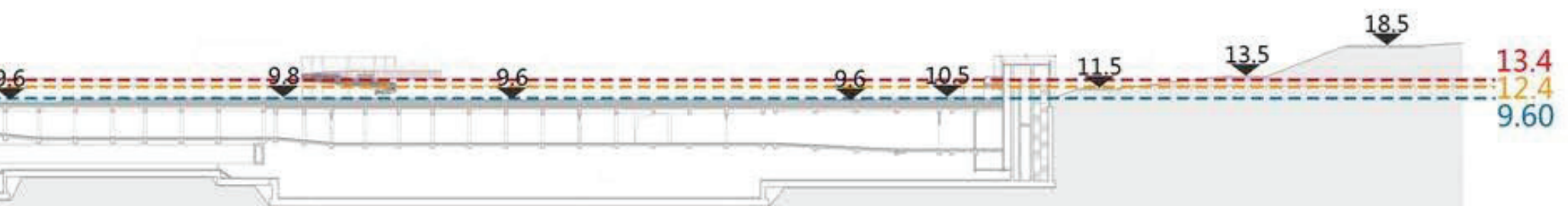


Figure 2.52 Ideas implementation from Shenzhen Lotus (Author, 2022). Base image (Shuangyu, 2022)

Figure 2.53 Ideas implementation from Shenzhen Lotus (Author, 2022). Base image (Shuangyu, 2022)

Figure 2.54 (Right) Ideas implementation from Shenzhen Lotus (Author, 2022). Base image (Shuangyu, 2022)



PRECEDENT - CASE STUDY

Formosa, The Amphibious House



Figure 2.55 The Amphibios House (Baca Architect, 2014).

Formosa, its an amphibious house. The building was placed on the ground but whenever flood comes. The building will rised up in its place. Floated by the water, but the building still stick with the foundation structure.

Designed by Baca Architects - specialists in waterfront architecture and floodresilient developments – the unique house is located on an island in the picturesque stretch of the River Thames that passes through Marlow, in Buckinghamshire, a site designated as Flood Zone 3b and a Conservation Area.

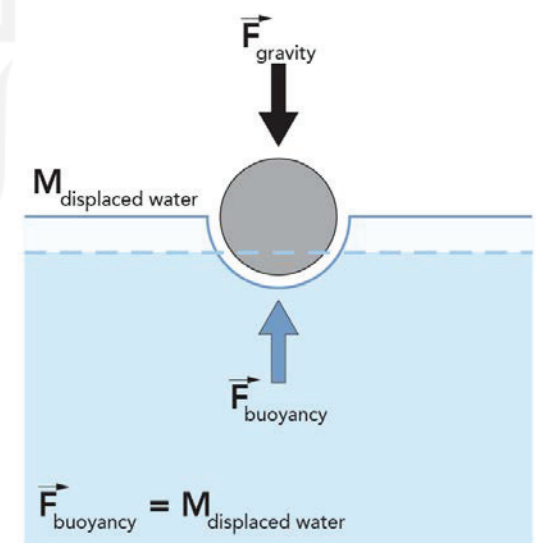


Figure 2.56 Archimedes Principle in Amphibious House (Baca Architect, 2014).

Amphibious construction brings together standard components from the construction and marine industries to create smart flood solutions.

The house itself is on the ground and the floating base is barely visible from the outside. Amphibious designs may vary according to location and owner preferences.

The amphibious design allows the floor level to be set less than 1m above ground level instead of 2m, as the house is static. This allows the 225 sqm 3-bedroom dwelling to be built on the existing three-story 90sqm house without significantly increasing the height, and therefore reaching full.

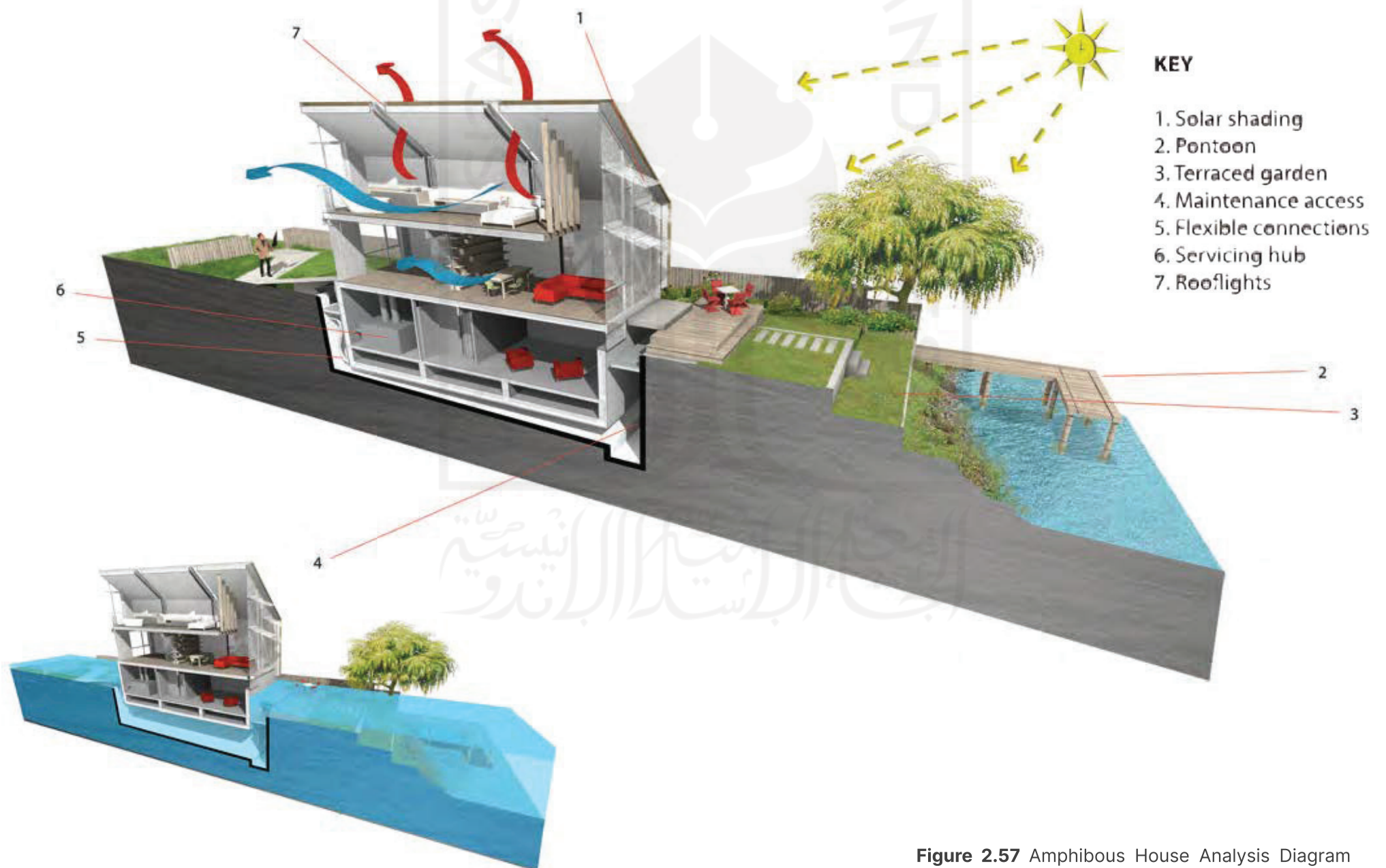


Figure 2.57 Amphibious House Analysis Diagram (Baca Architect, 2014).

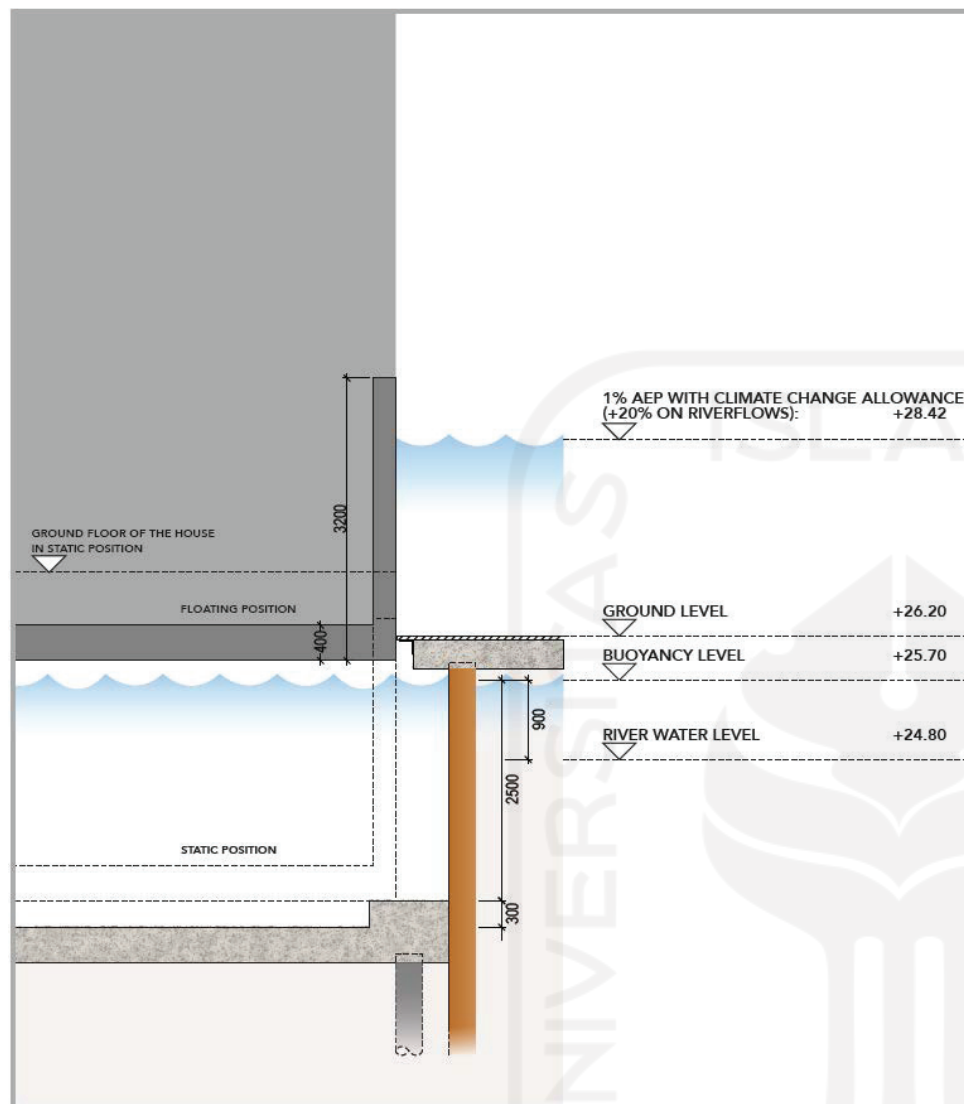


Figure 2.58 Amphibious House Detail Section (Baca Architect, 2014).

Rivers and groundwater are connected hydrologically, so during flooding here as the Thames rises, groundwater below the surface will also rise. The pier gradually rises from the ground, by lifting the building, as the river level rises. When the water is just below ground level, the house floats. The house can rise up to 2.7 m to cope with a 1 in 100 flood event. The Mast Guides extend almost 4 m above ground level so that if the flood is greater the house will be maintained between the poles.

The flexible pipe is designed to extend up to 3m which allows all services to stay clean and operational during a flood event and most importantly allow to return to the property immediately after a flood, maximizing their daily life.

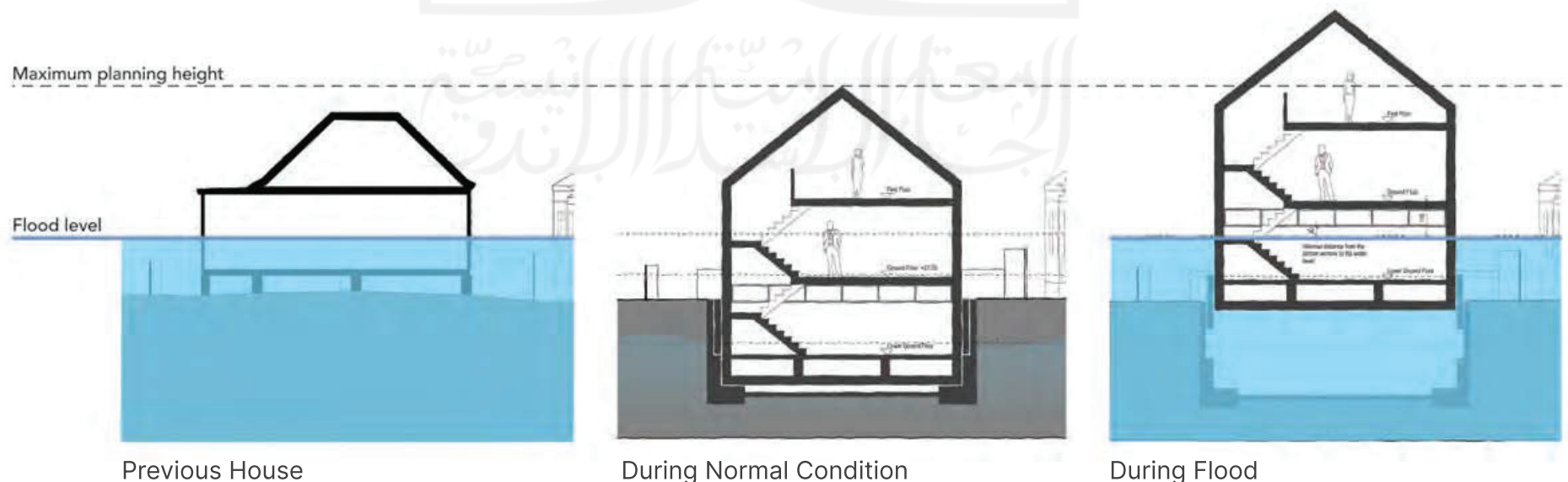
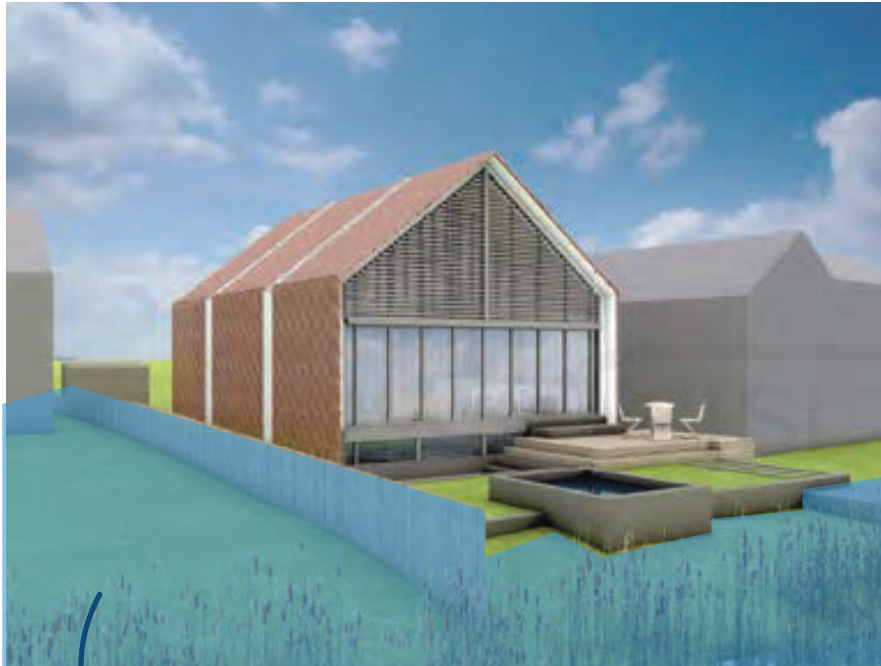


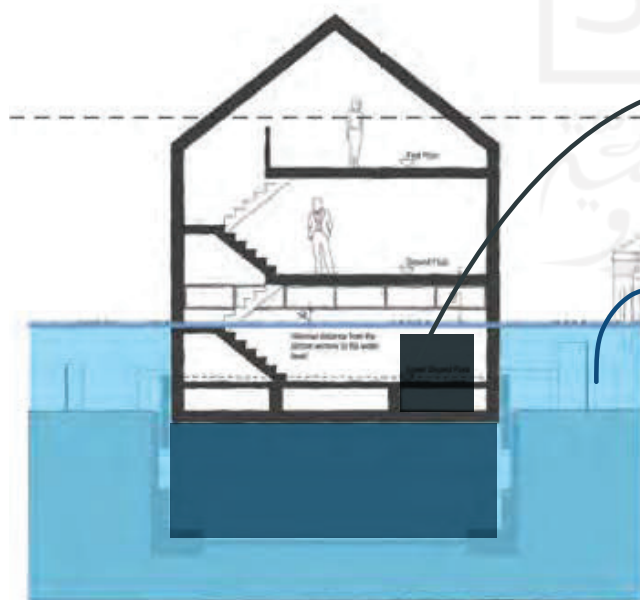
Figure 2.59 Stage of Amphibious House when flood comes (Baca Architect, 2014).



The ideas is to implement the abosrption system into the house and the neighbour (street, garden, etc)



So the flood water not only passing through the area. But the water was absorbed to the ground, which later on can be used for community needs



Each house have a small filter system that can hold up for housing need

The flood water below the house can be filtered so that it can be used later on for the bathroom need

Figure 2.60 Amphibios House Analysis (Author, 2022). Base image (Baca Architect, 2014).

Figure 2.61 Amphibios House Analysis (Author, 2022). Base image (Baca Architect, 2014).

Figure 2.62 Amphibios House Analysis (Author, 2022). Base image (Baca Architect, 2014).

PRECEDENT - CASE STUDY

Oceanix City by Bjarke Ingels Group

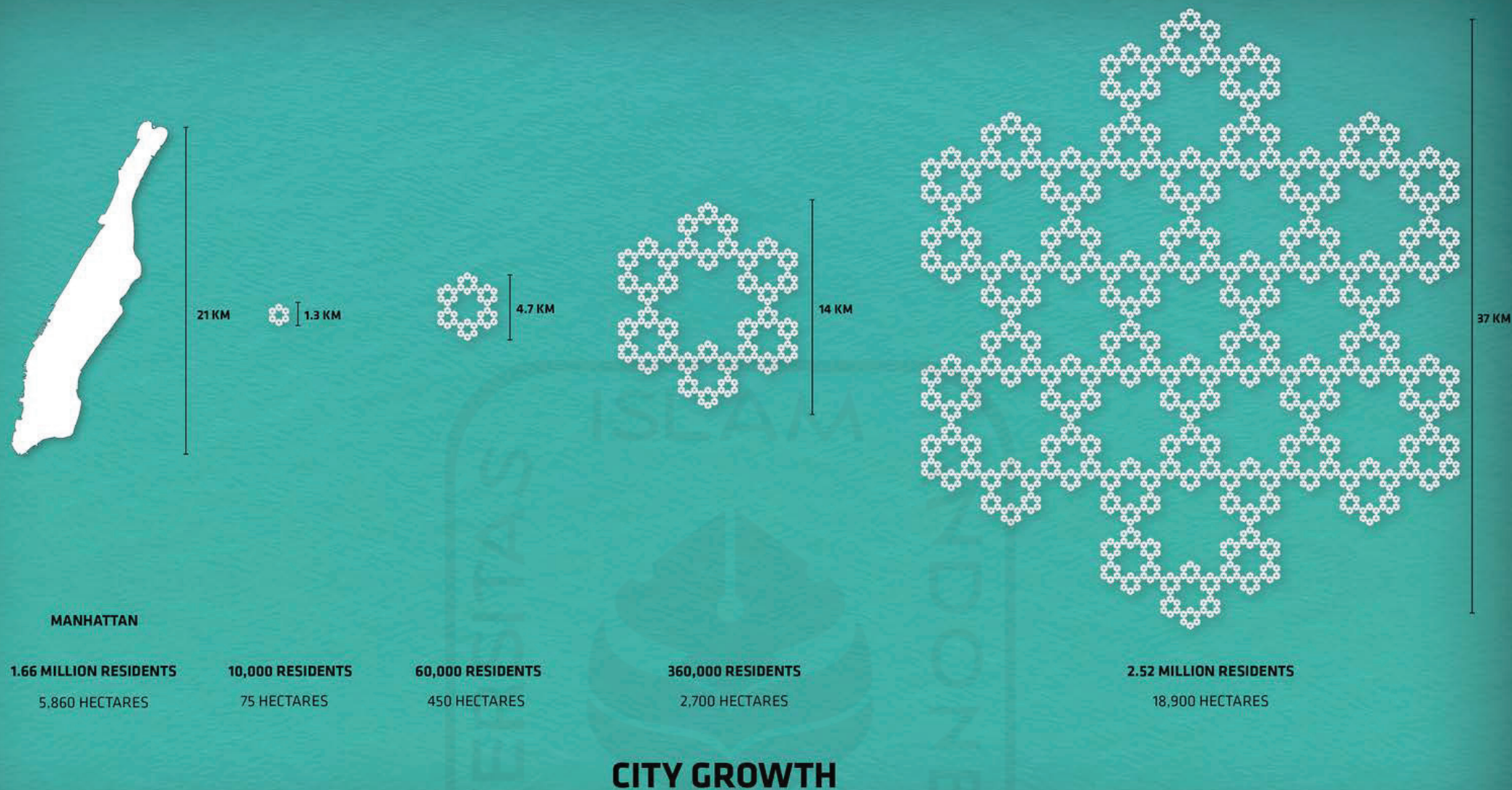
BIG and UN Collaborate on Floating, Modular Eco-City

Oceanix City by Bjarke Ingels Group is proposed resilient and sustainable floating community design as part of UN-Habitat's New Urban Agenda. It was proposed in a response to a prediction that in 2050, the world's largest city will be sink due to rising sea levels.

Figure 2.63 Oceanix City Concept (Walsh, 2019).

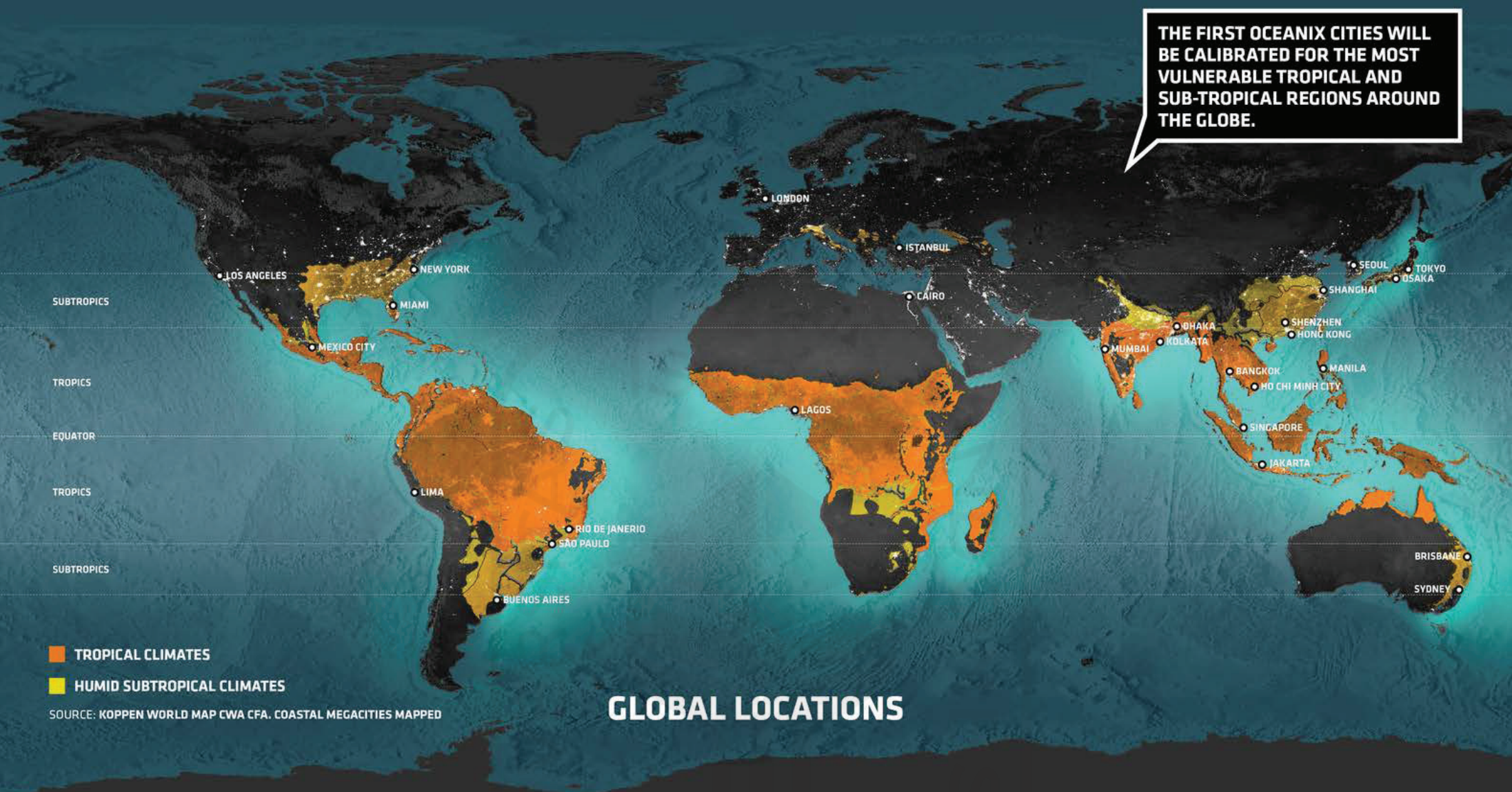






The modular system is the key of this project. The building can grow based on community needs and conditions. The system was scalable from small neighbourhood into become one big city. The function of each module also **scalable based on community needs**. For instance, one module can be fully function as a market, meanwhile another module full functioned as a settlement. In the same time, there can be one module that contain market activity and settlements at the same time. **The scalability of this project should become the point that will be implemented on next design.**

Figure 2.64 Oceanix City Concept (Walsh, 2019).



The scalable system is not only applied in one certain area. **The project can be implemented anywhere in the world with the different system based on each location.** The tropical system will be different with the subtropical system. Likewise with other parts of the earth

Figure 2.65 Oceanix City Concept (Walsh, 2019).

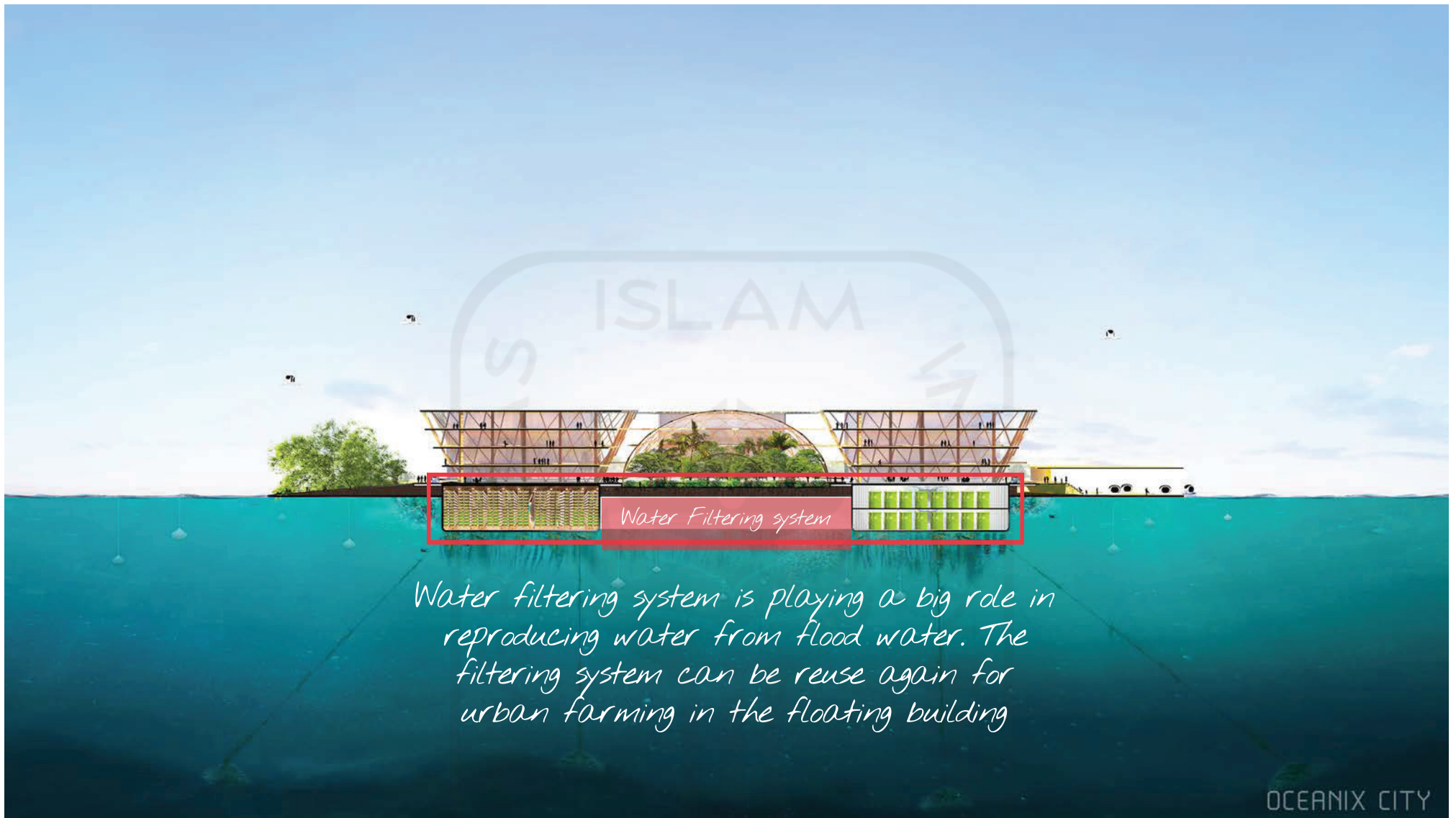
Low-rise buildings, made using sustainably sourced wood and local materials such as bamboo will be built on floating platforms. Solar panels, wind turbines and water filtration systems, as well as farmland, will also be combined to create a self-sustaining and environmentally friendly floating community.



The life ecosystem below the building might not be suitable for flood water. Flood water was limited for life because almost all of them was dirty.

How about water flood in Kemang?

If Kemang was sink totally. It might be suitable. Since it will sink by sea water.



Water flood is a problematic water, it was contaminated by a lot of things. It can be contaminated by oil, soil, sand, grey water or even black water. In order to reuse the water flood, it need a special treatment where the water need to be filtered in adequate and complicated ways. However, the flood water should be reuse due to its potential if treated well.

Figure 2.66 (Left) Oceanix City Concept (Walsh, 2019).

Figure 2.67 Oceanix City Concept (Walsh, 2019).

PRECEDENT - CASE STUDY

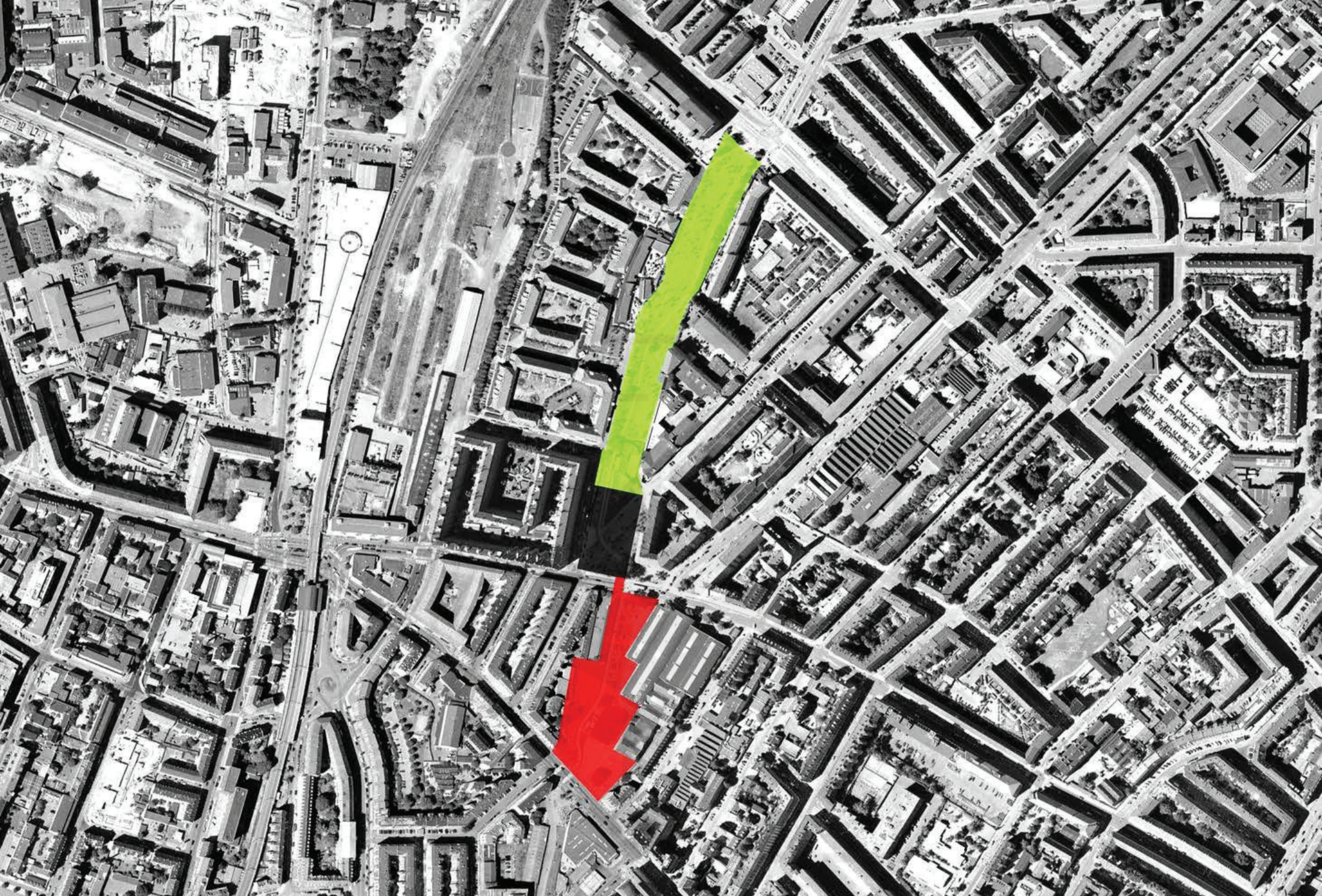
Superkilen / Topotek 1 + BIG Architects + Superflex

Superkilen is creative collaboration project between BIG, Topotek1 and SUPERFLEX, which constitutes a rare fusion of architecture, landscape architecture and art - from early concept to construction stage.

Figure 2.68 Superkilen Aerial View (Sanchez, 2012).







Superkilen is an example of how diversity can unite into harmony. Everyone can fully participate in the development of the city. **This project illustrate what if everyone is entitled to equal and appropriate rights.** There are no limitations in term of “minority” or “poor”. Everyone gets their rights according to their respective portions.

Figure 2.69 Superkilen Diversity Diagram (Sanchez, 2012).

Market/culture/sport – the red square

Red Square was conceived as an urban extension of the internal life of the hall. A variety of recreational offerings and a large central square allow locals to meet each other through physical activity and games. The colored surfaces are integrated in both color and material terms with Nørrebrohall and its new main entrance, where the surfaces blend inside and out in the new foyer.



Urban living room – the black square

Mimers Plads is the heart of the Superkilen Masterplan. This is where locals meet around a Moroccan fountain, a Turkish bench, under a Japanese cherry tree as an extension of the area's terrace. On weekdays, permanent tables, benches and grill facilities serve as urban living spaces for backgammon, chess players, etc.



Sport/play – the green park

Activities Green Park with its hills and soft surface appeals to children, youth and families. Green landscapes and playgrounds where families with children can meet for picnics, sunbathing and grass rest, but also hockey tournaments, badminton games and sports among the hills.



Figure 2.70 The Red Square, Superkilen (Sanchez, 2012).

Figure 2.71 The Black Square, Superkilen (Sanchez, 2012).

Figure 2.72 The Green Park, Superkilen (Sanchez, 2012).

PROBLEM MAPPING

Matrix

	Formal Problem	Practical Problem	Symbolic Problem	Radical Problem
Physical Condition, Regulation <ul style="list-style-type: none"> - Laws Of The Republic Indonesia Number 24 Year 2007 - Government Regulation Of The Republic Of Indonesia Number 34 Year 2009 - Special Regional Provincial Regulations The Capital Of Jakarta Number 1 Year 2012 - Regional Spatial Plan 2030 - United Nations Department of Economic and Social Affairs Sustainable Development Goals 2030 	Reducing Flood Risk LAWS OF THE REPUBLIC INDONESIA NUMBER 24 YEAR 2007 LAW ON DISASTER MANAGEMENT <i>Chapter 4</i> <i>Disaster management aims to:</i> <ol style="list-style-type: none"> provide protection to the public from the threat of disaster; aligning existing laws and regulations. there is; ensure the implementation of disaster management in a planned, integrated, coordinated, and comprehensive manner; respect local culture; build public and private participation and partnerships; encourage the spirit of gotong royong, solidarity, and generosity; and create peace in social life, nation, and state. 	GOVERNMENT REGULATION OF THE REPUBLIC OF INDONESIA NUMBER 34 YEAR 2009 ABOUT GUIDELINES FOR MANAGEMENT OF URBAN AREAS <i>Chapter 23</i> <i>(1) Rural areas can be planned to become new Urban Areas.</i> <i>(2) New Urban Area Planning is prioritized for:</i> <ol style="list-style-type: none"> provide residential space; provide new space for the needs of industry, trade, and services; provide space for government services; and/or provide space for the development of National, provincial, and district strategic activity centers. 	SPECIAL REGIONAL PROVINCIAL REGULATIONS THE CAPITAL OF JAKARTA NUMBER 1 YEAR 2012 REGIONAL SPATIAL PLAN 2030 REGIONAL SPACE PATTERN <i>Chapter 154</i> <i>2. The tourism area development plan as referred to in Article 148 paragraph (2) letter K, is implemented based on the following directions:</i> <ol style="list-style-type: none"> development and improvement of green functioning urban tourism areas located in Pondok Indah, Fatmawati, Blok M, and Kemang; 	Inclusivity & Equality UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS <i>Sustainable Development Goals 2030</i> <i>9. Industry, Innovation, and Infrastructure</i> <i>10. Reduced Inequality</i>
Users <ul style="list-style-type: none"> - Kemang People - Jakarta citizens 	Safety Providing a safe place from predicted or unpredicted disasters.	Support Place Support area to increase city social quality	Absorption Area Give a chance for the area to grow as a city absorption.	Inclusivity Build a better and friendly city for all citizens and break the exclusivity inside the city.

	<i>Formal Problem</i>	<i>Practical Problem</i>	<i>Symbolic Problem</i>	<i>Radical Problem</i>
Clients Lippo Group Governor of DKI Jakarta <ul style="list-style-type: none"> - Department of Public Housing and Settlement Areas - Department of Human Settlements, Spatial Planning and Land - City Parks and Forest Service 	Provide a safe place for citizens from any disasters, especially the flood risk and drowning risk.	Rearrange the spatial arrangement of the city to break the exclusivity among the citizens.	Build a greenery system to avoid any current or future disaster.	Break the exclusivity in city social life by giving a better chance for lower people to grow.
Designer	Adaptive Safety Architecture Create a new typology of architecture that can adapt with flood disaster	Rearrangement of City Spatial Rearrange the city spatial to help the social quality increase	Rebuilding an Architecture System Rebuilding an architecture problem solving to work as a design system that can be applied into the whole city	Increase the Social Life Quality Increase the city life quality by creating a spatial arrangement that help reduce exclusivity

PROBLEM STATEMENT

General Problem

How to design an inclusive housing that respond to flood disaster in Kemang, South Jakarta along with reforestation and break exclusivity at the same time?

Specific Problems

1. How to design an inclusive housing that respond to flood disaster in Kemang, South Jakarta?
2. How to make the inclusive housing are affordable for the local people that affected by the reforestation in order to respond the flood?
3. How to break the exclusivity between poor and rich in Kemang?

GOALS AND OBJECTIVES

Goals

The design was aiming to increase the social and environmental value along Krukut river in Kemang. The Krukut riverside was developed with reforestation along with the development of public spaces where the rich and the poor can interact together, so that the barrier between the rich and the poor can be dissolved. Residents' housing is also reorganized to respond to flood disasters. Using Modular Housing method with Open Building approach to increase the inclusive value among the community.

Objective

1. Design an inclusive modular housing responding to the flood disasters.
2. Advance customization modular housing using infill method with Open Building approach
3. Design a Third place as a connection between poor and rich people





03

Design Formulation

Site Exploration

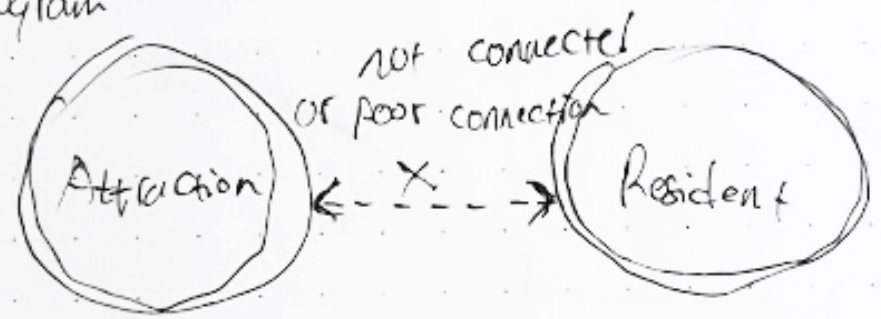
Building Exploration

Modular Concept





Existing program



Stage

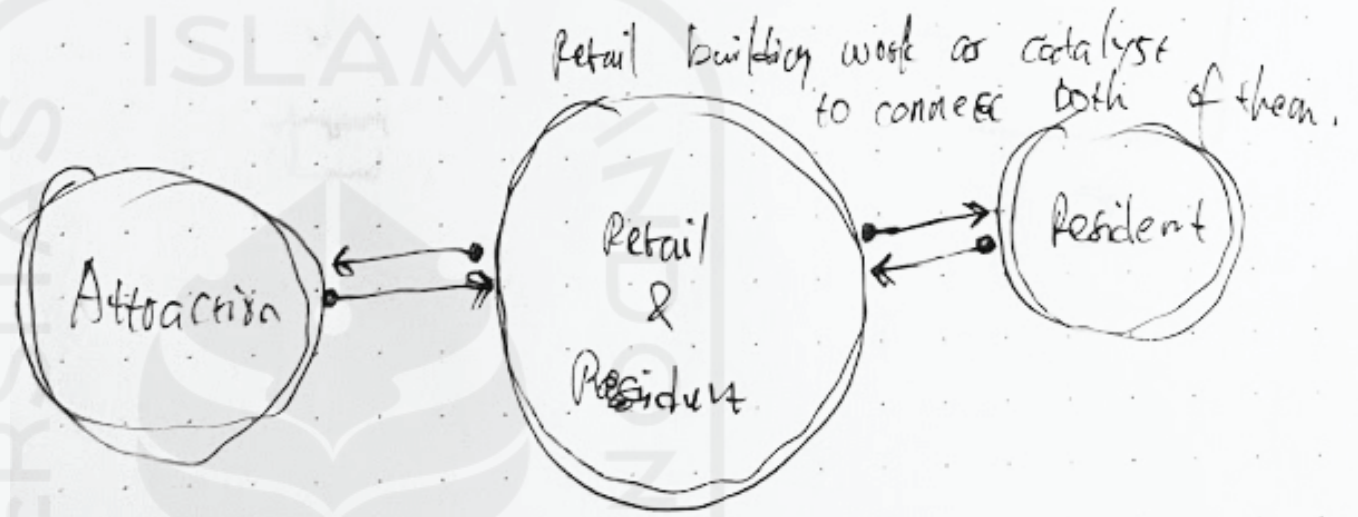


Buffer Zone

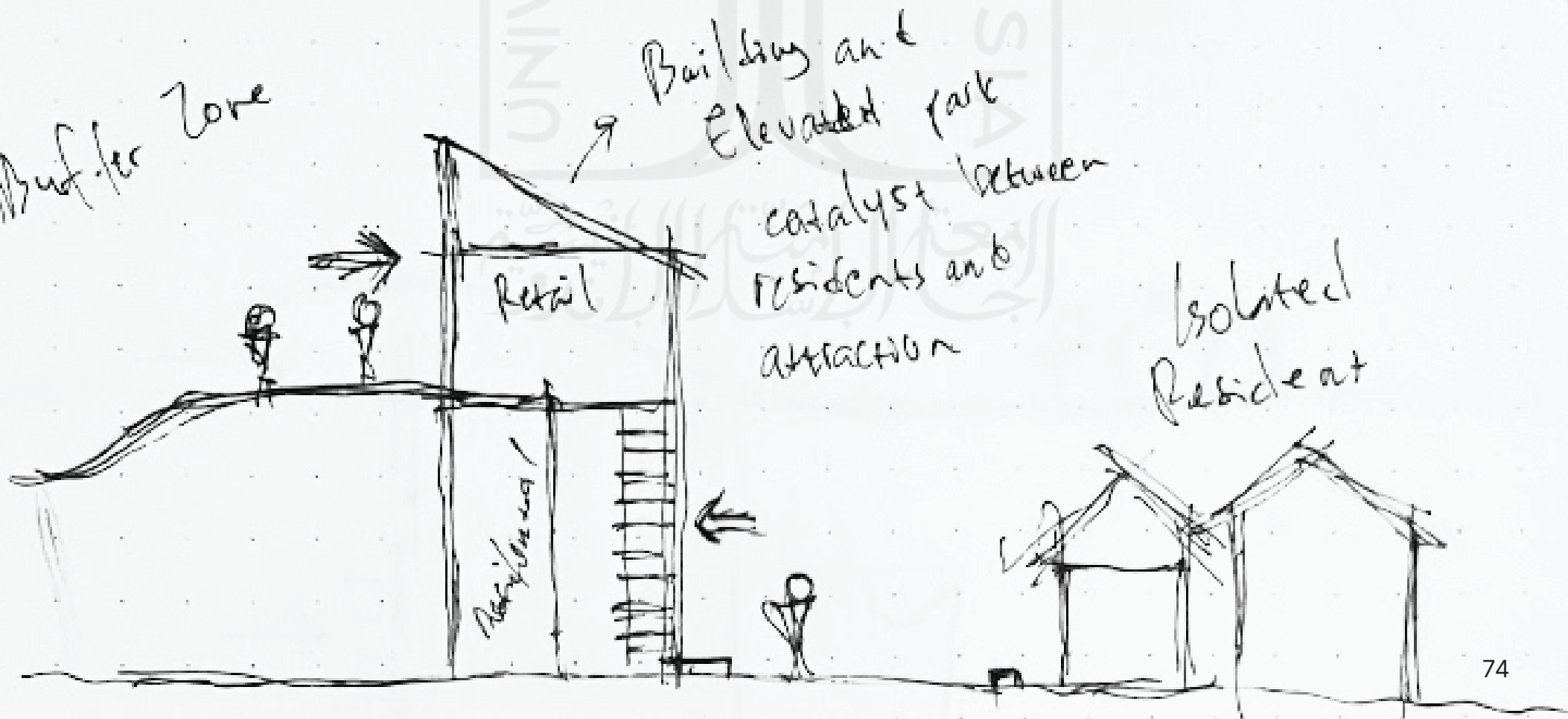


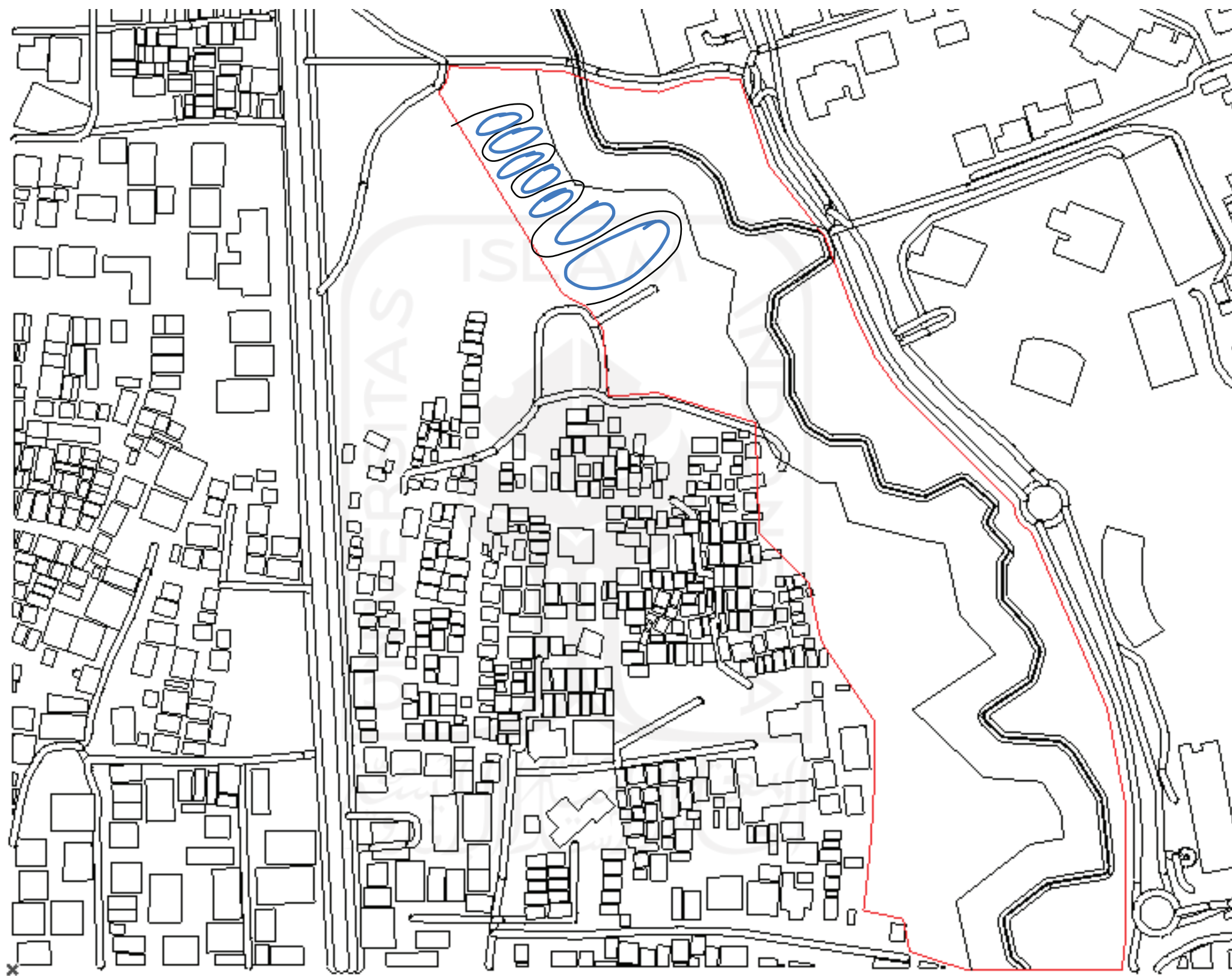
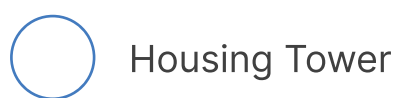
Residential

with elevated park and building



Buffer Zone

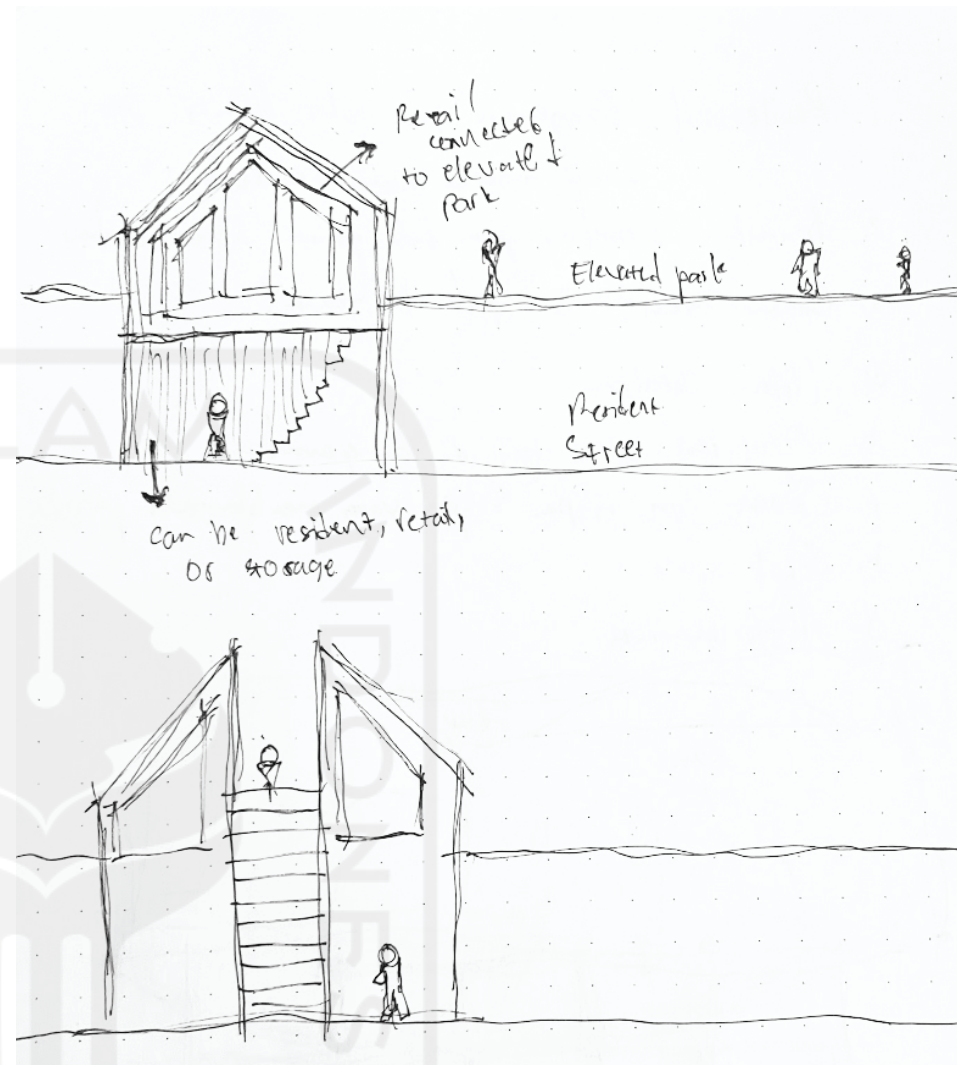




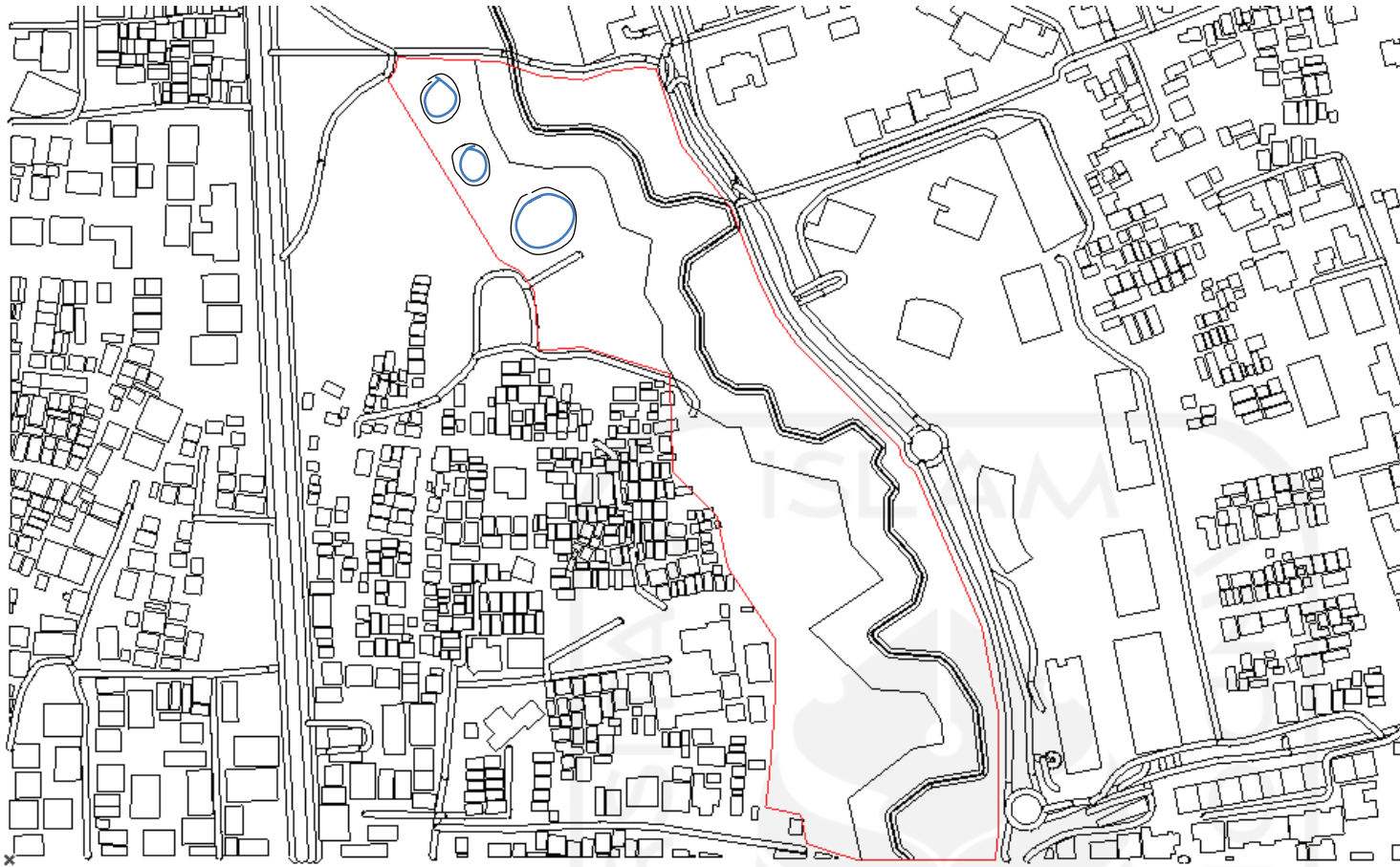
Housing was designed in radial order.

The circulation was filling the gap for each building

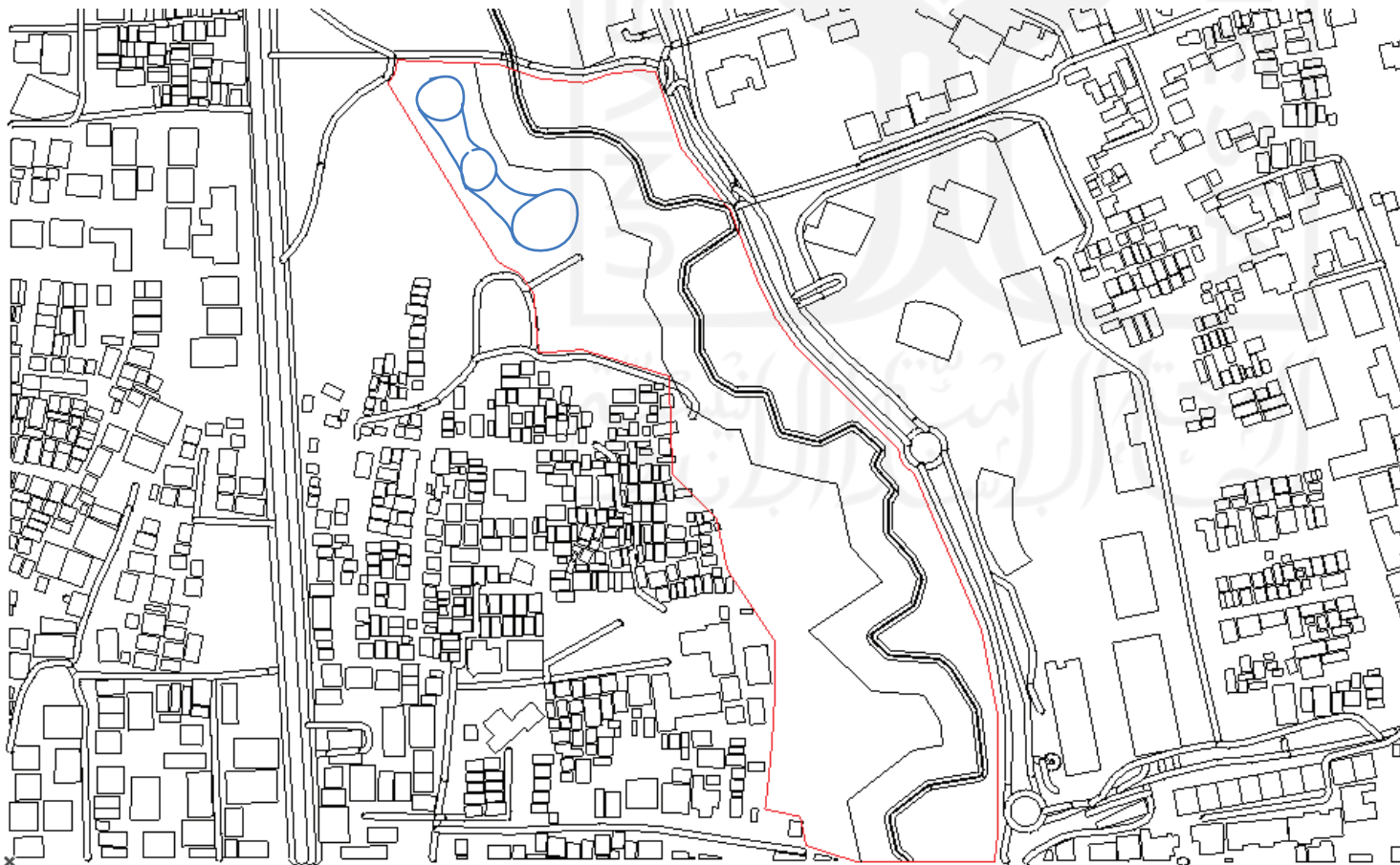
Each radial module can contain up to 8 houses with the different height between the side of facing the river and the main street. The side that facing the river has lower land rather than opposite side



Each house has 2 function: Retail and Living.
Ground floor can be use for retail meanwhile living was placed on the floor above.



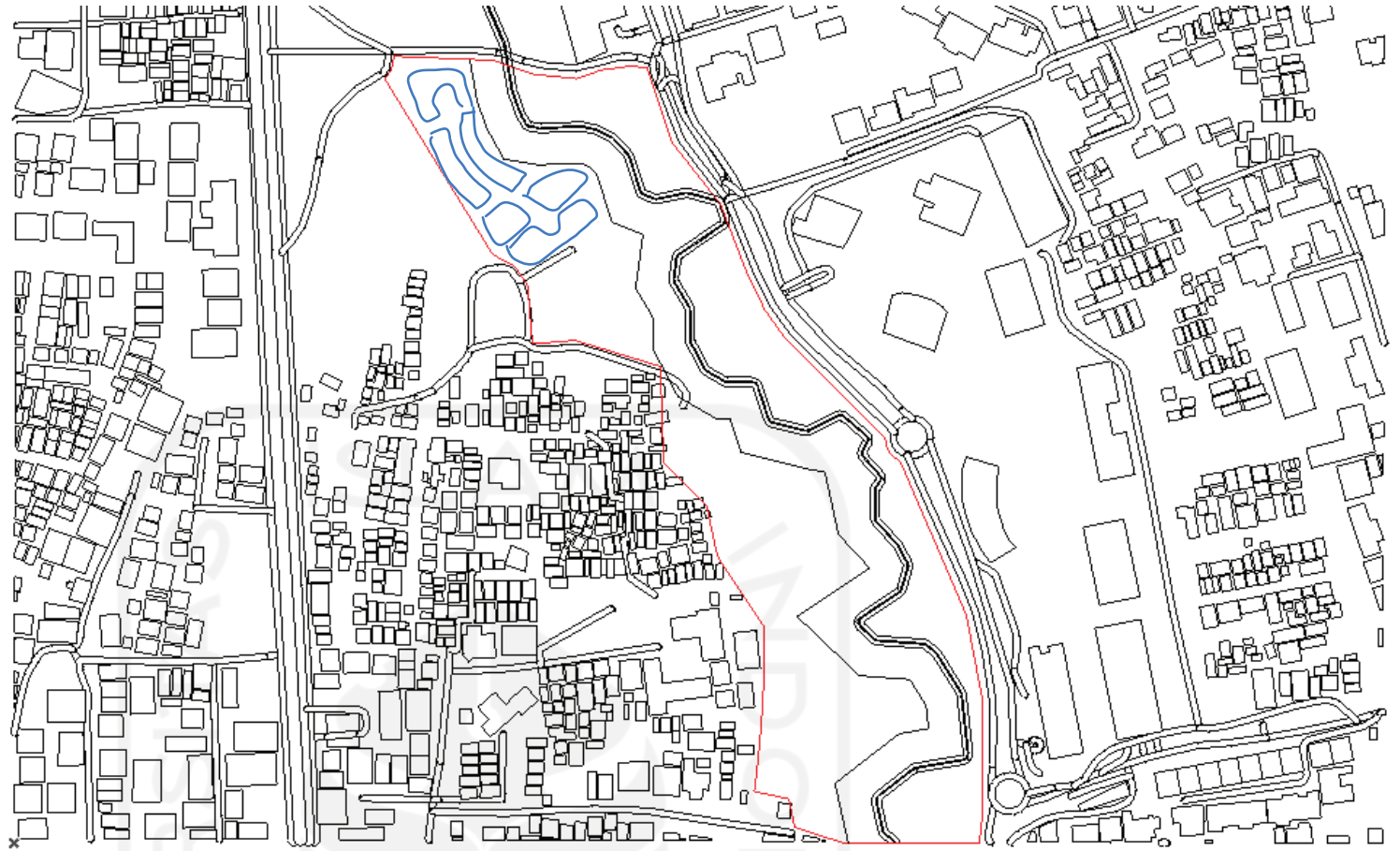
Same concept with the first ideas. Housing was designed in radial order.



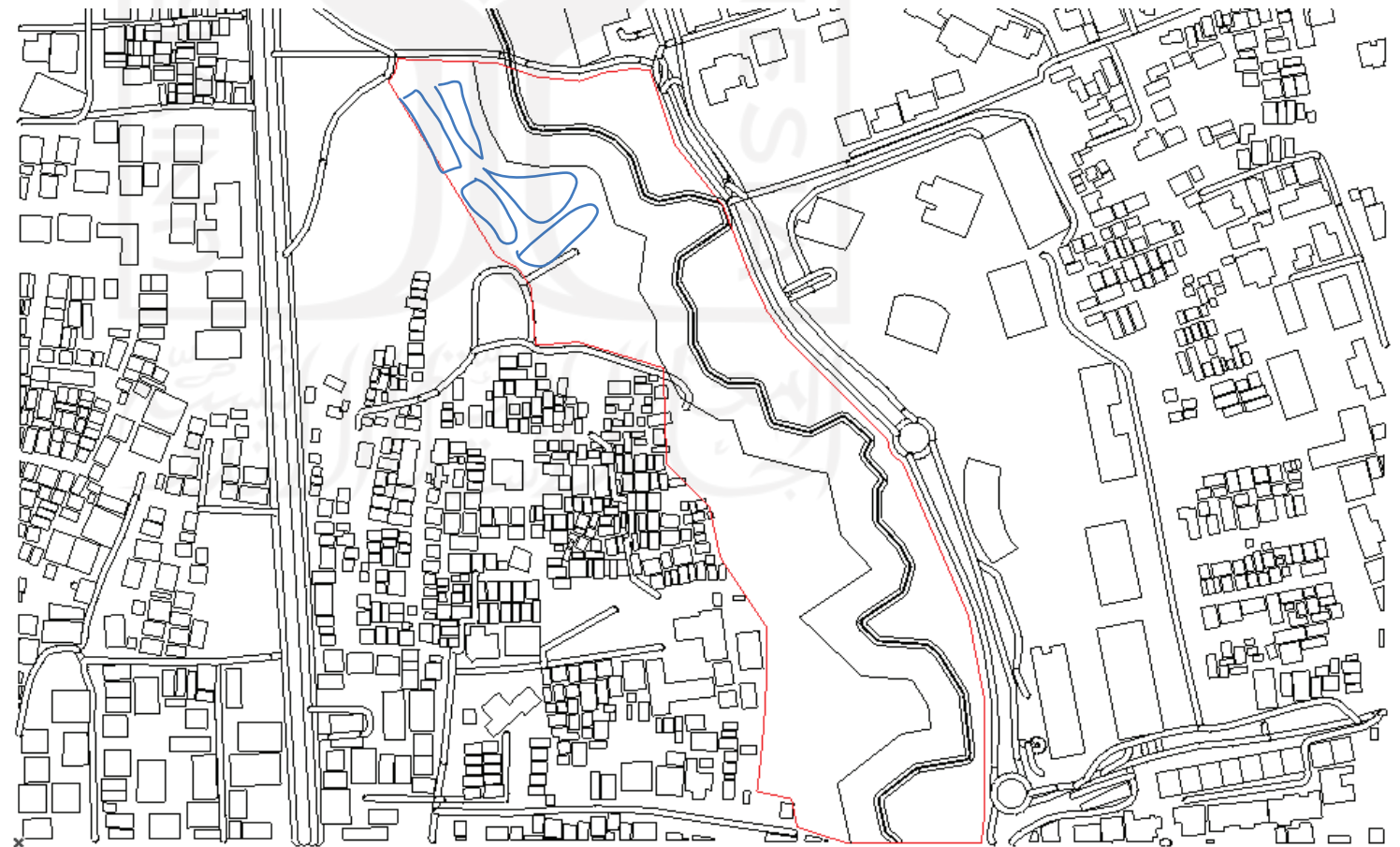
Housing was designed in radial order. And the area between radial become private area for the housing owner

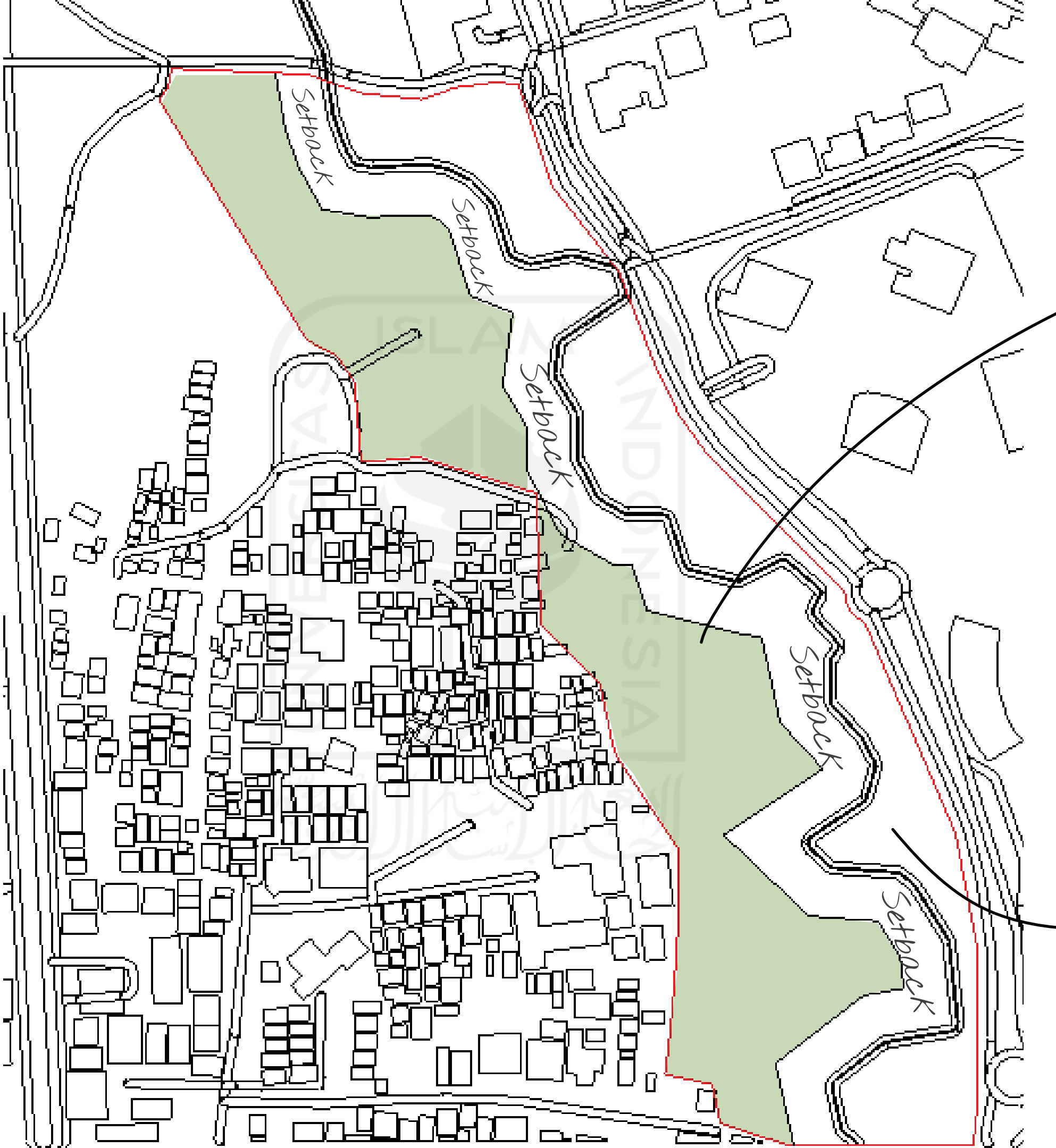
 Housing Tower

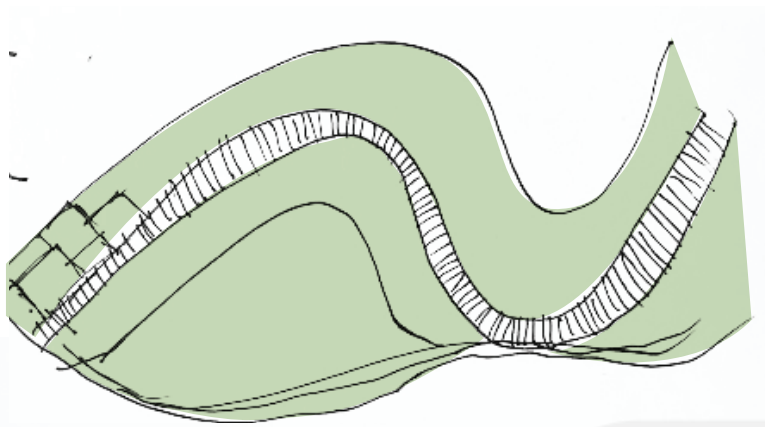
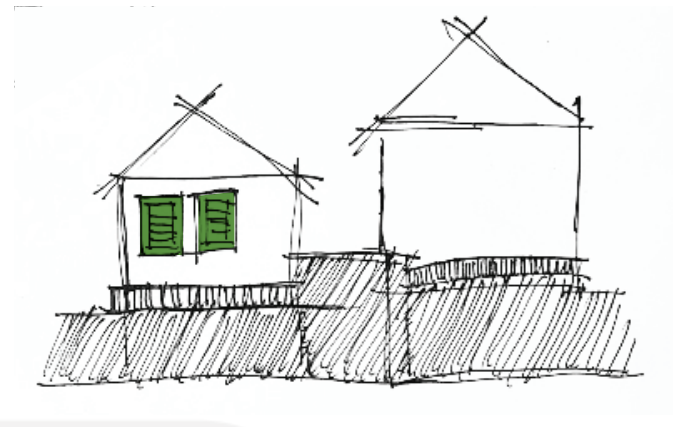
Some houses create cluster that become one module. Pedestrian was filled the gap between each module



Some houses create cluster that become one module. Pedestrian was filled the gap between each module



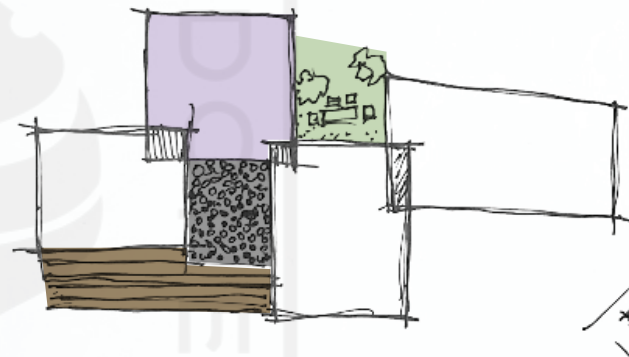




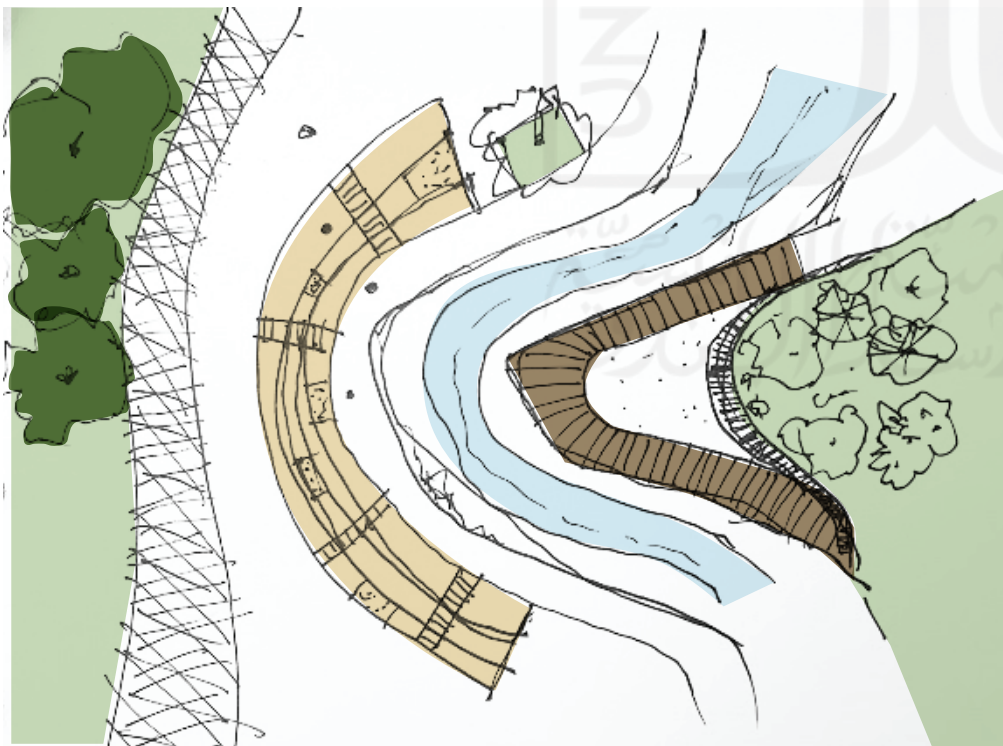
Retaining wall below the house can be used for the structure and protect the area from getting flood further



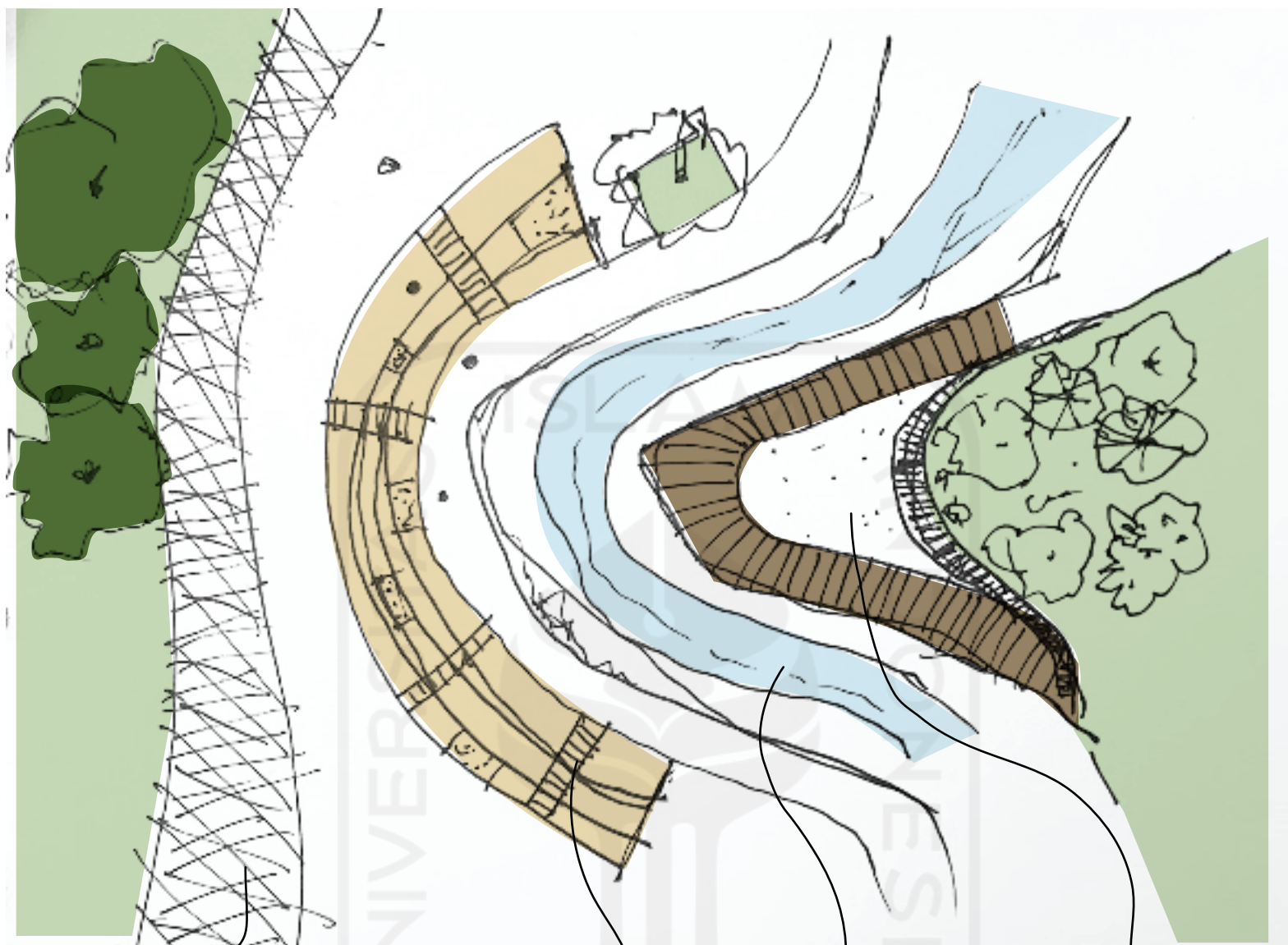
Modular house was arranged linear along with the site line and along with the new contour



If the module was integrated one each other. It create an open space that can be used by the occupant. Especially if they using it as a retail area



River cape shape gives a benefits to be used as a show stage. The audience was sitting in amphitheater crossing the river meanwhile the performer perform on river cape



Pedestrian

Amphiteater

River

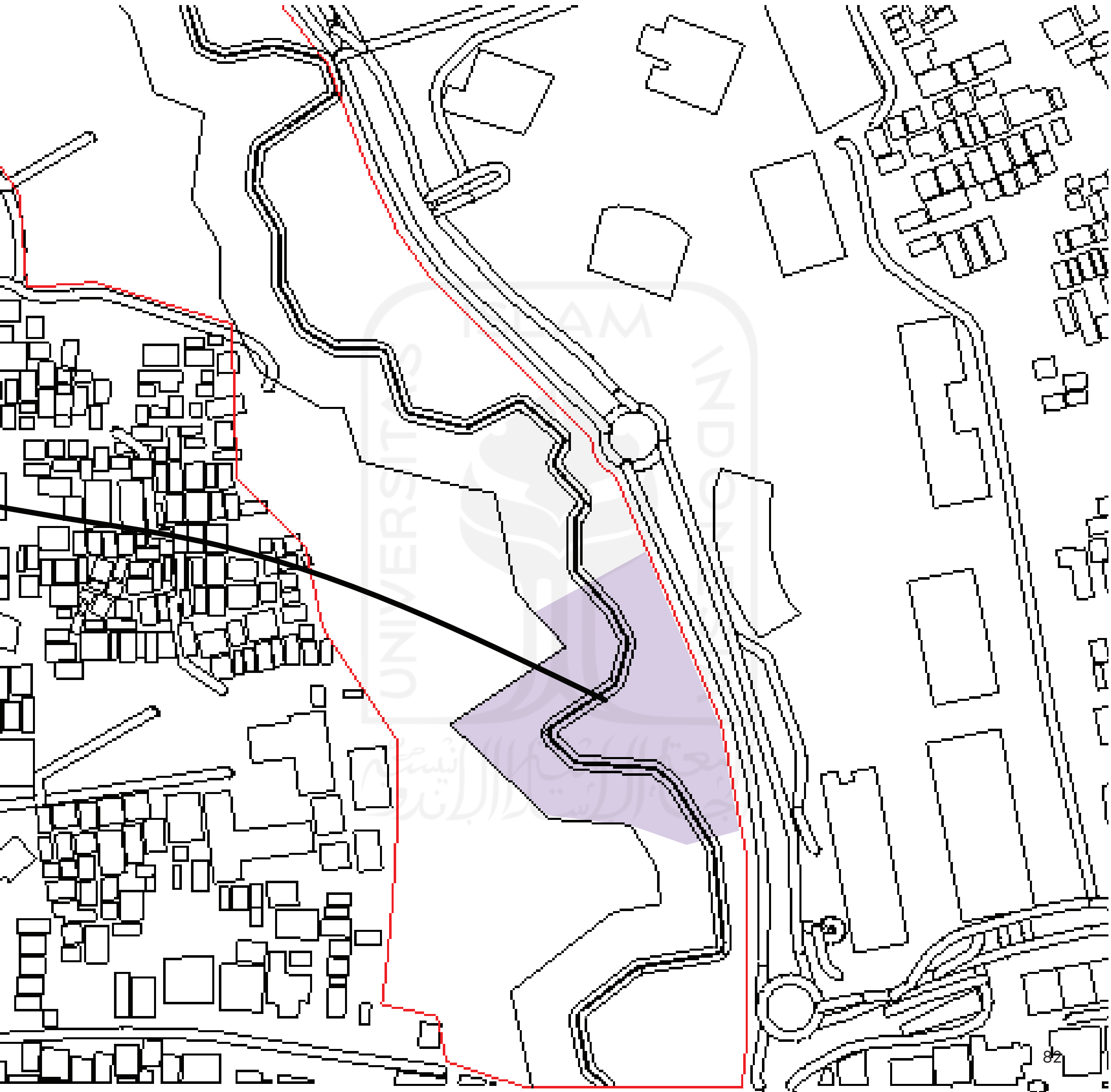
Stage



Audience watching
the show from
crossriver



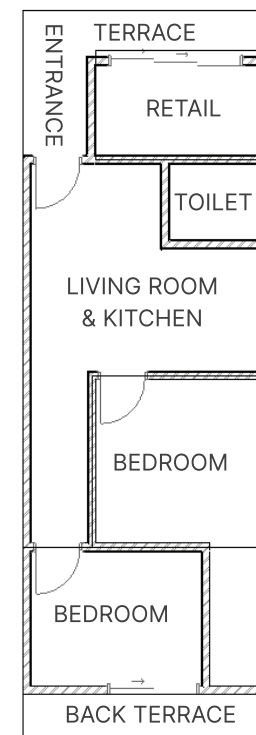
The existing high wall was
integrated with new greeneries
as a show background





The house design was emphasize integration between house and retail. The exploration trying to keep as minimum 2 Bedroom, 1 Toilet, 1 Living room & Kitchen, and 1 Retail

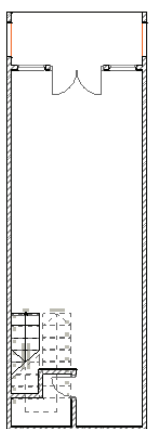
1 Floor House



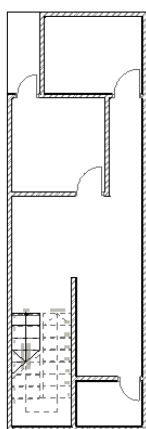
2 Floor house

Alternative 1

Ground Floor



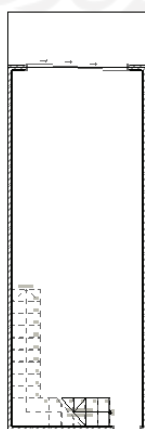
1st Floor



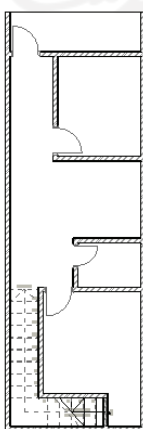
2 Floor house

Alternative 2

Ground Floor

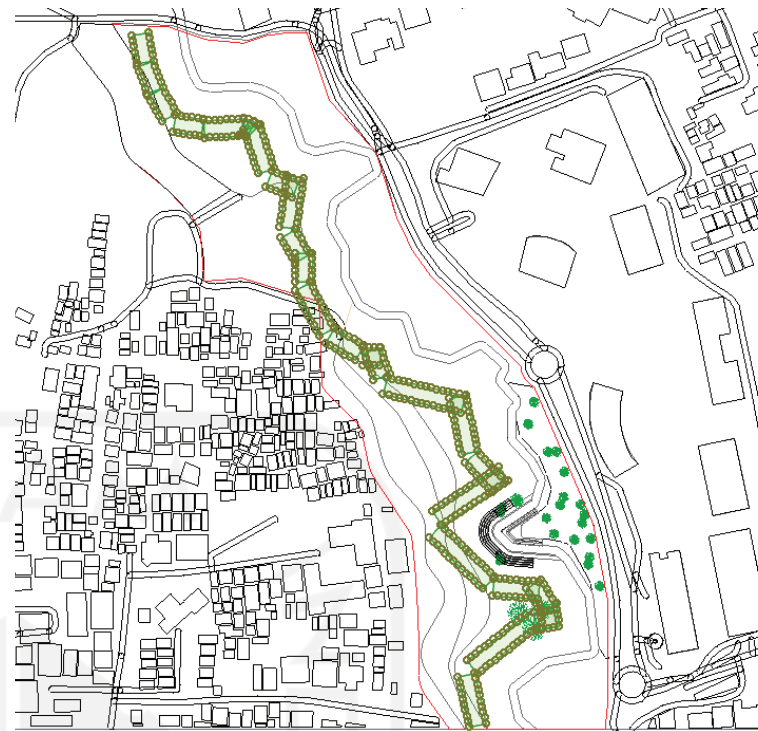


1st Floor

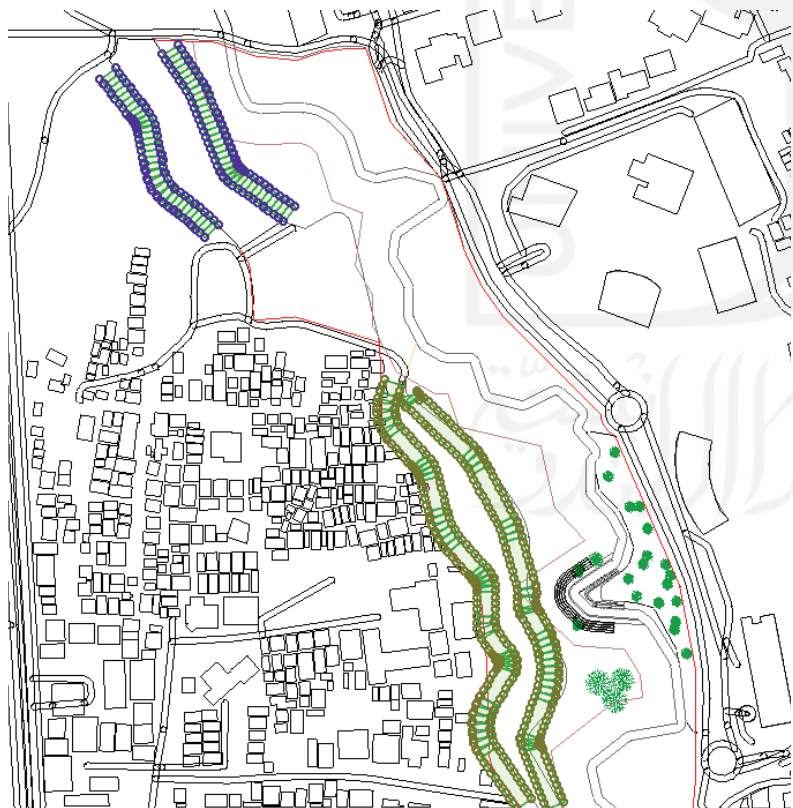




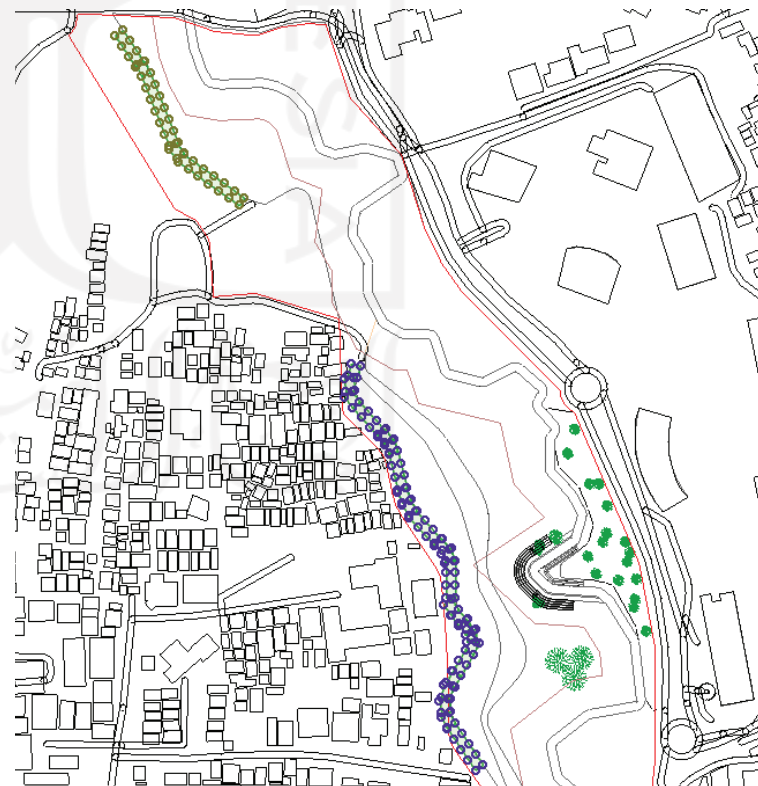
Exploring the house module 4×12 to be designed in the site following contour line



Exploring the house module 4×12 to be designed in the site along the setback



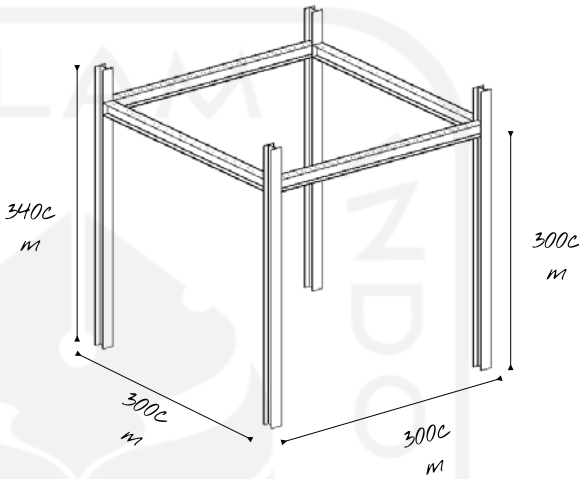
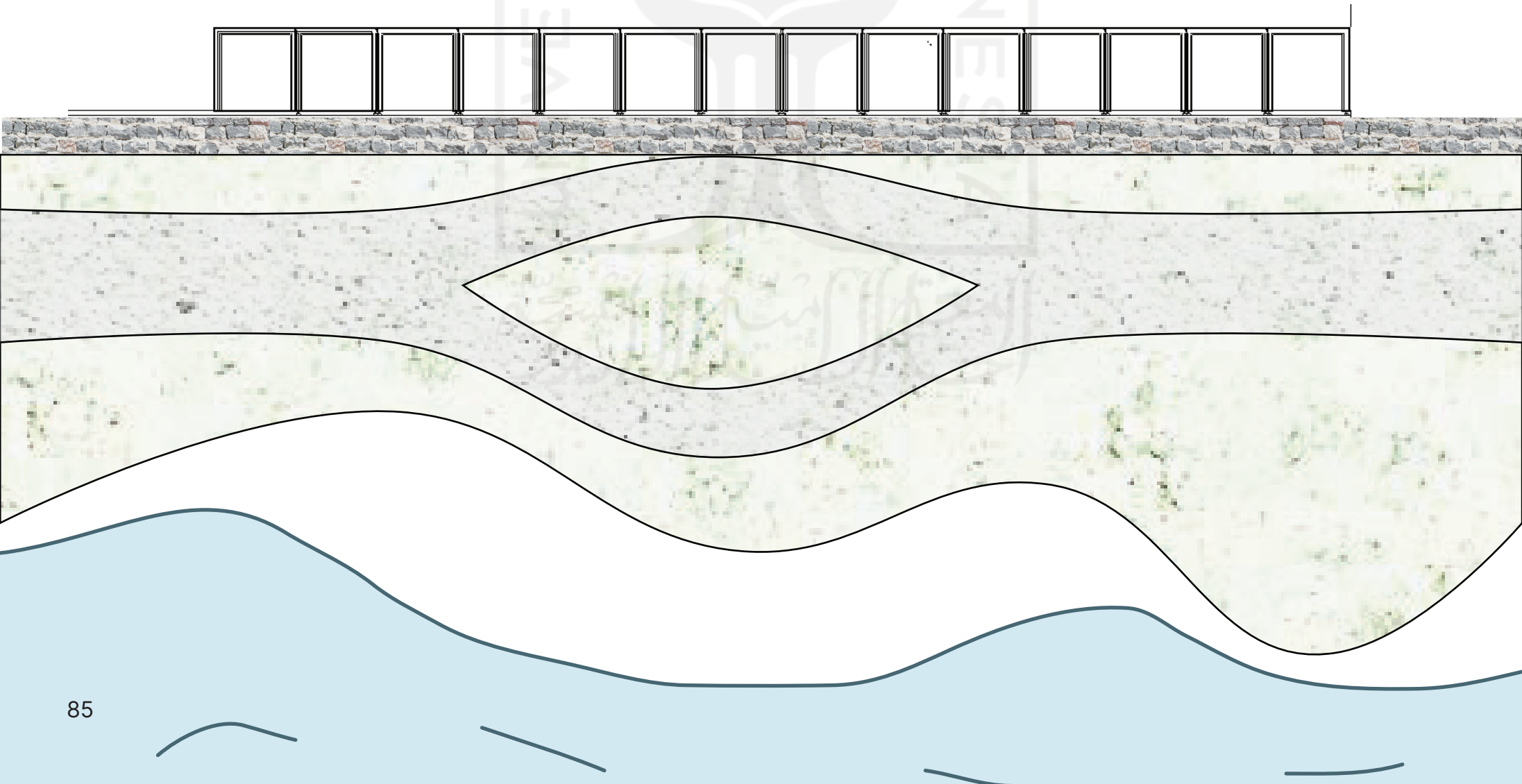
Exploring the house module 5×9 to be designed in the site following contour line



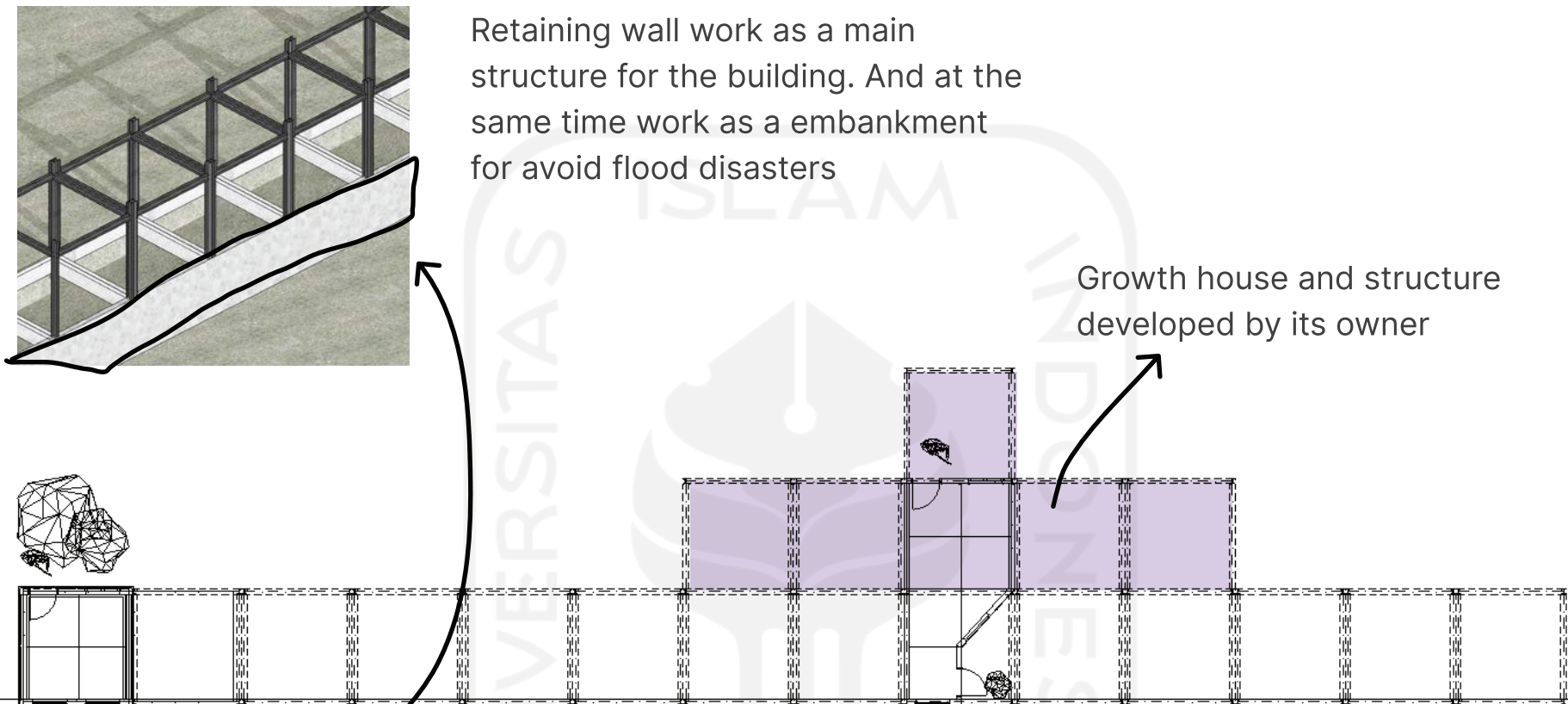
Exploring house module in site perimeter

STRUCTURE PROVIDED BY THE GOVERNMENT

First line of module structure are provided by the government as part of responsibility to control the flood. It includes 4 clomn and beam and foundation for flooring and sloof



GROWTH STRUCTURE AND HOUSE WAS BUILD BY THE OWNER



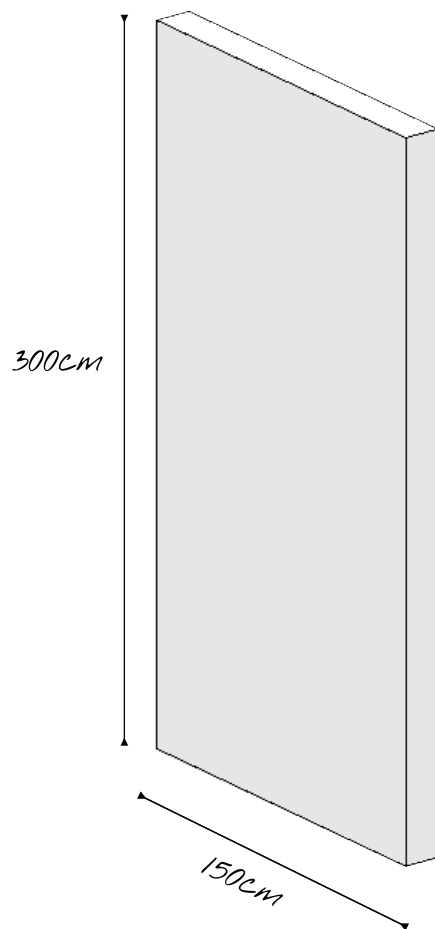
Retaining wall work as a main structure for the building. And at the same time work as a embankment for avoid flood disasters

Growth house and structure developed by its owner

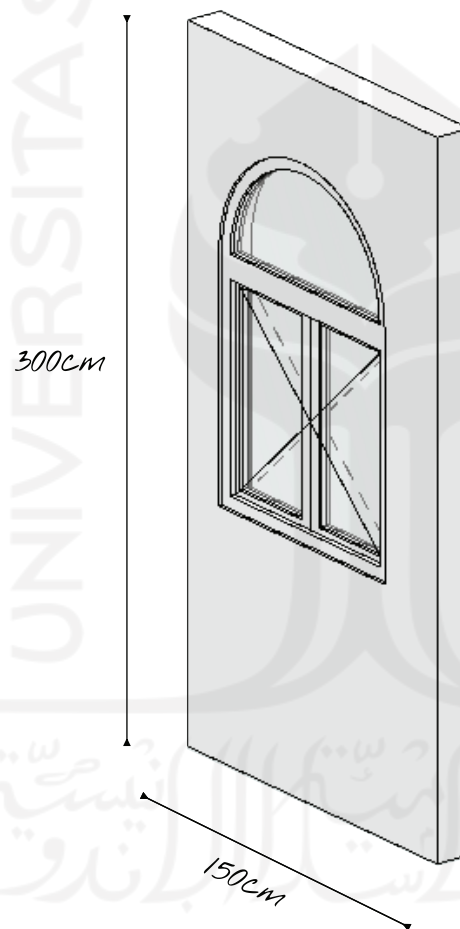
DESIGN EXPLORATION

Modular

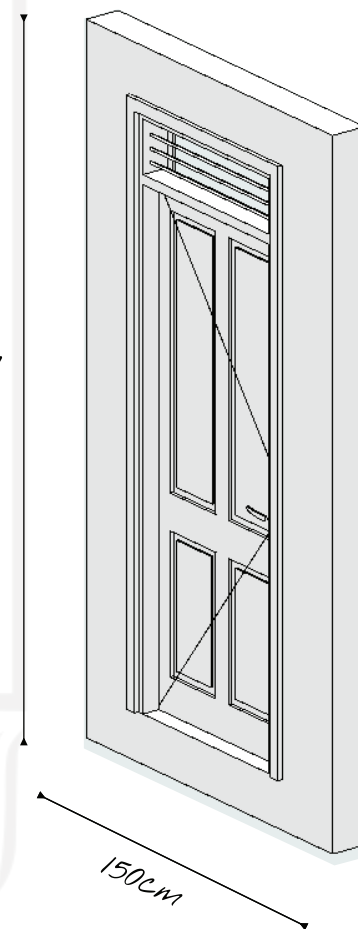
*Prefabricated
Concrete Wall*

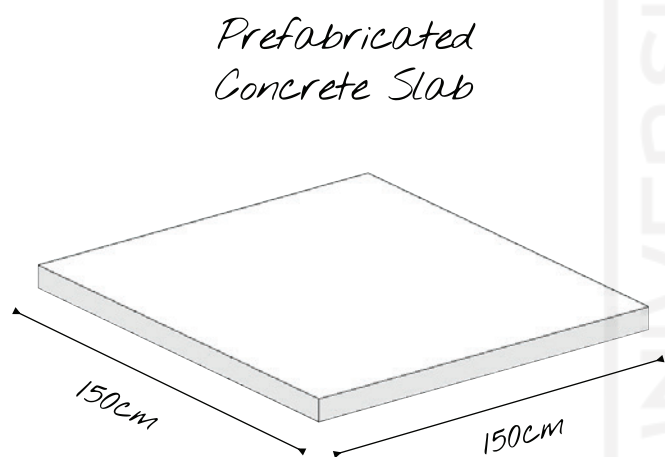
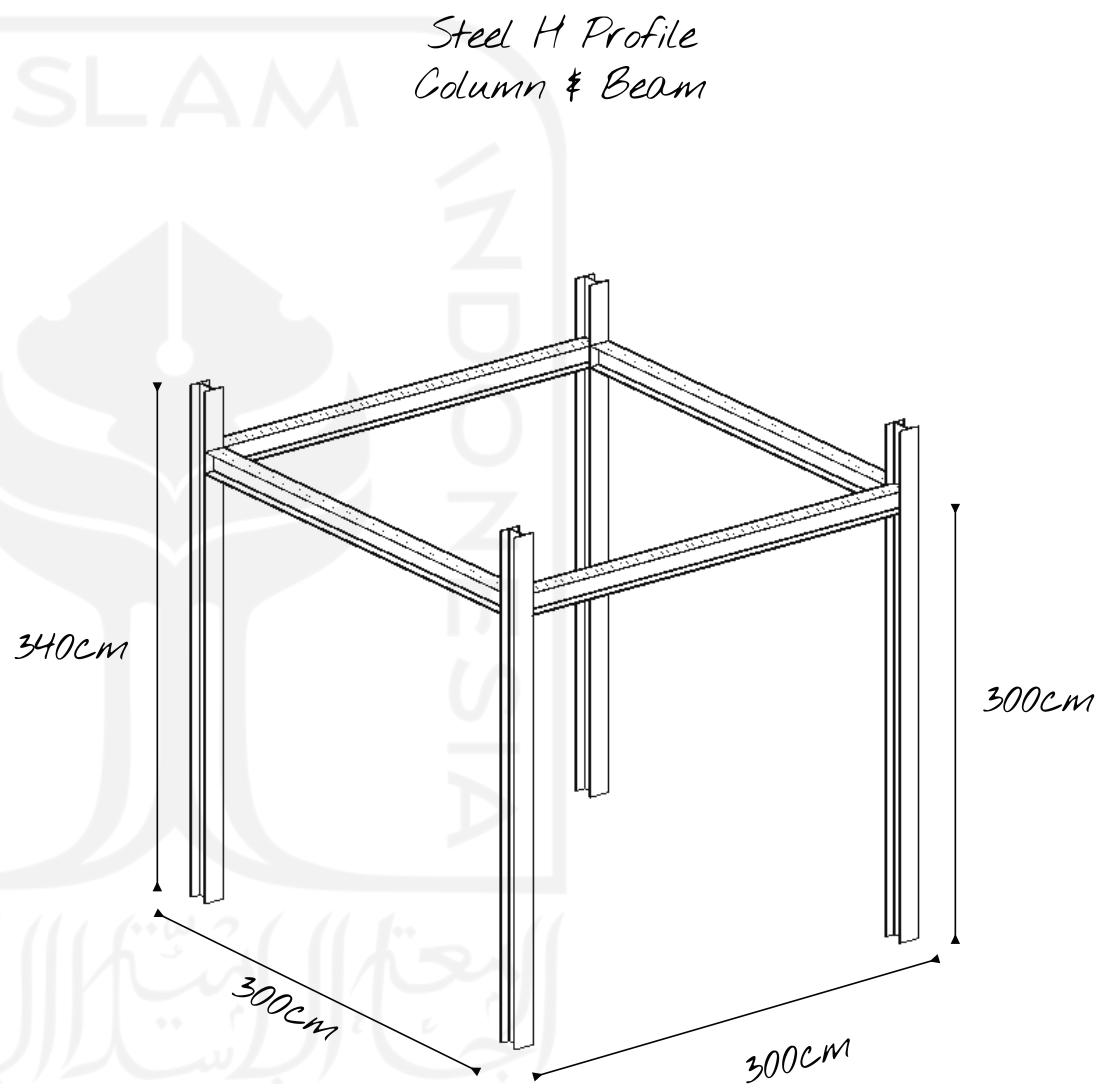


*Prefabricated Concrete
Wall with window*



*Prefabricated Concrete
Wall with door*





DESIGN SCHEMATIC

Site Section

Reforestation - Erosion Control

In order to minimize erosion risk.
Reforestation are needed to increase
the stiffness of the soil



Embankment

Using an embankment as a wall to
protect the settlements from the flood

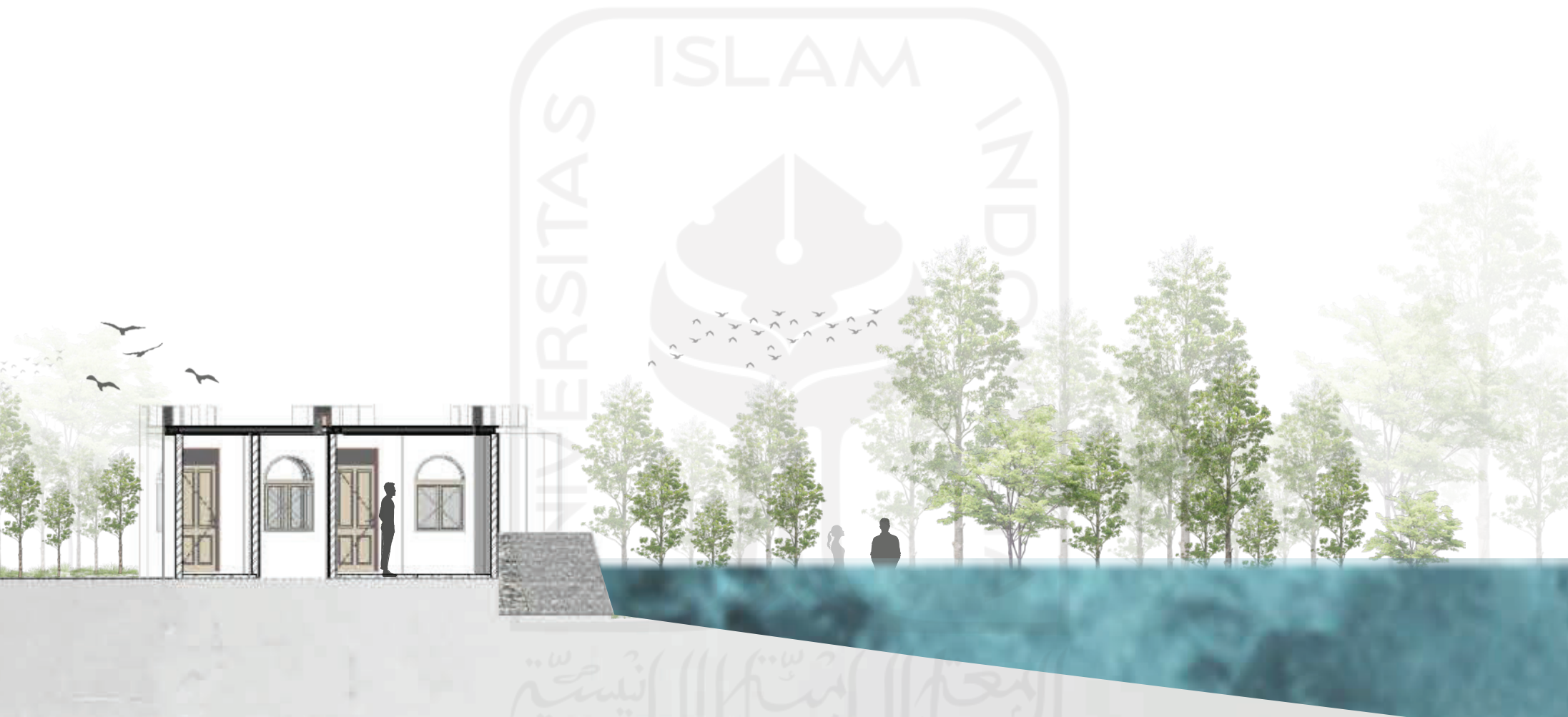
Hardscape - Erosion Control

Amphithater with partially hardscape reducing the risk of soil erosion. The hardscape can slowdown the erosion



DESIGN SCHEMATIC

Site Section on Flood Condition

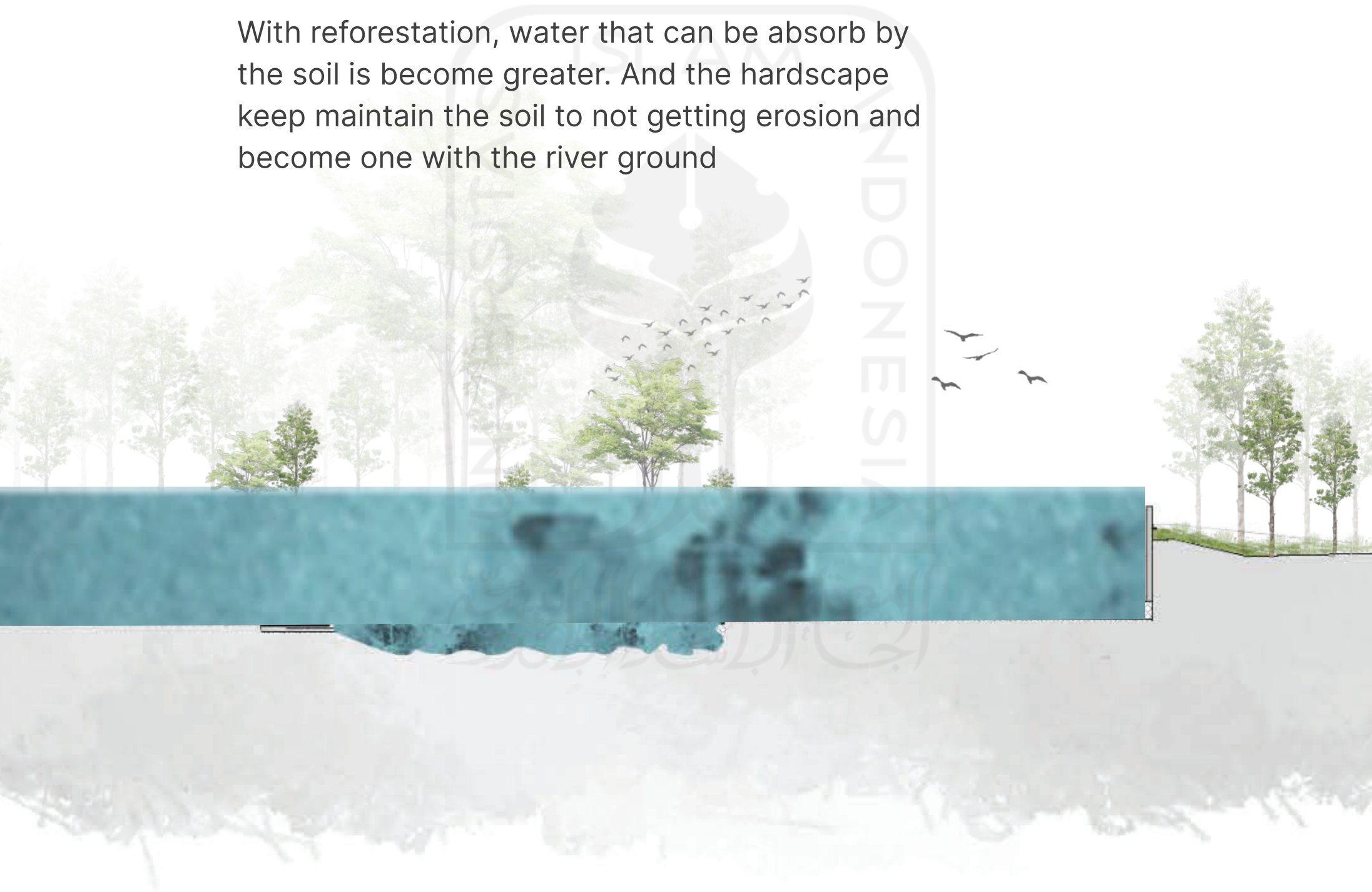


Embankment on Heavy Flood

When heavy flood comes, the embankment play a role as a fortress or a wall to protect the settlements from flood

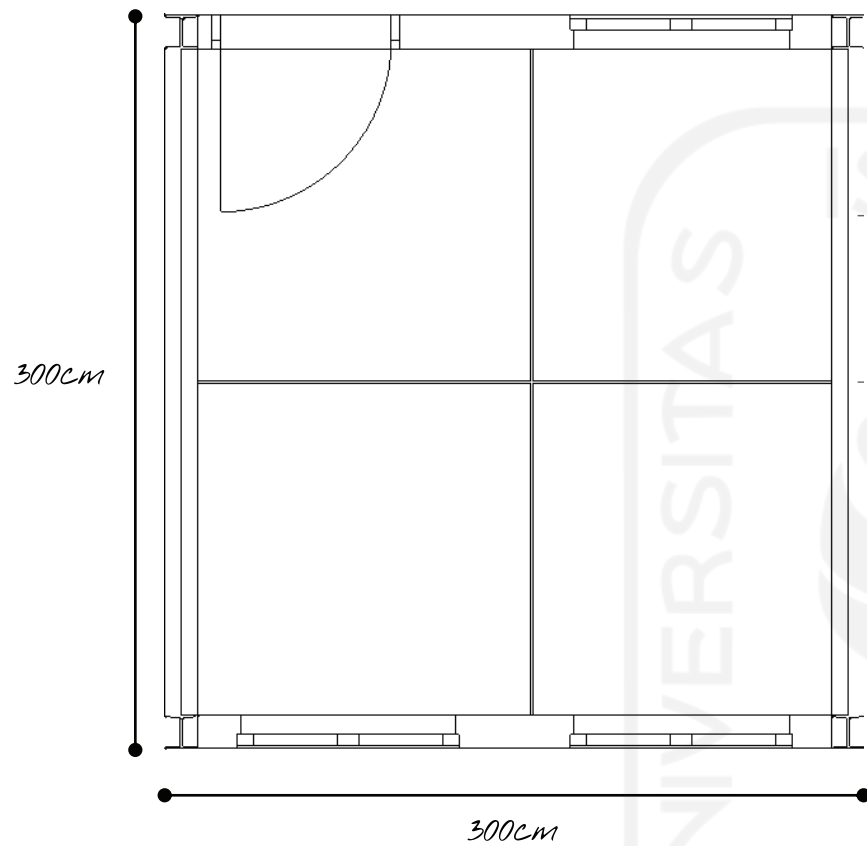
Reforestation and Hardscape

With reforestation, water that can be absorb by the soil is become greater. And the hardscape keep maintain the soil to not getting erosion and become one with the river ground

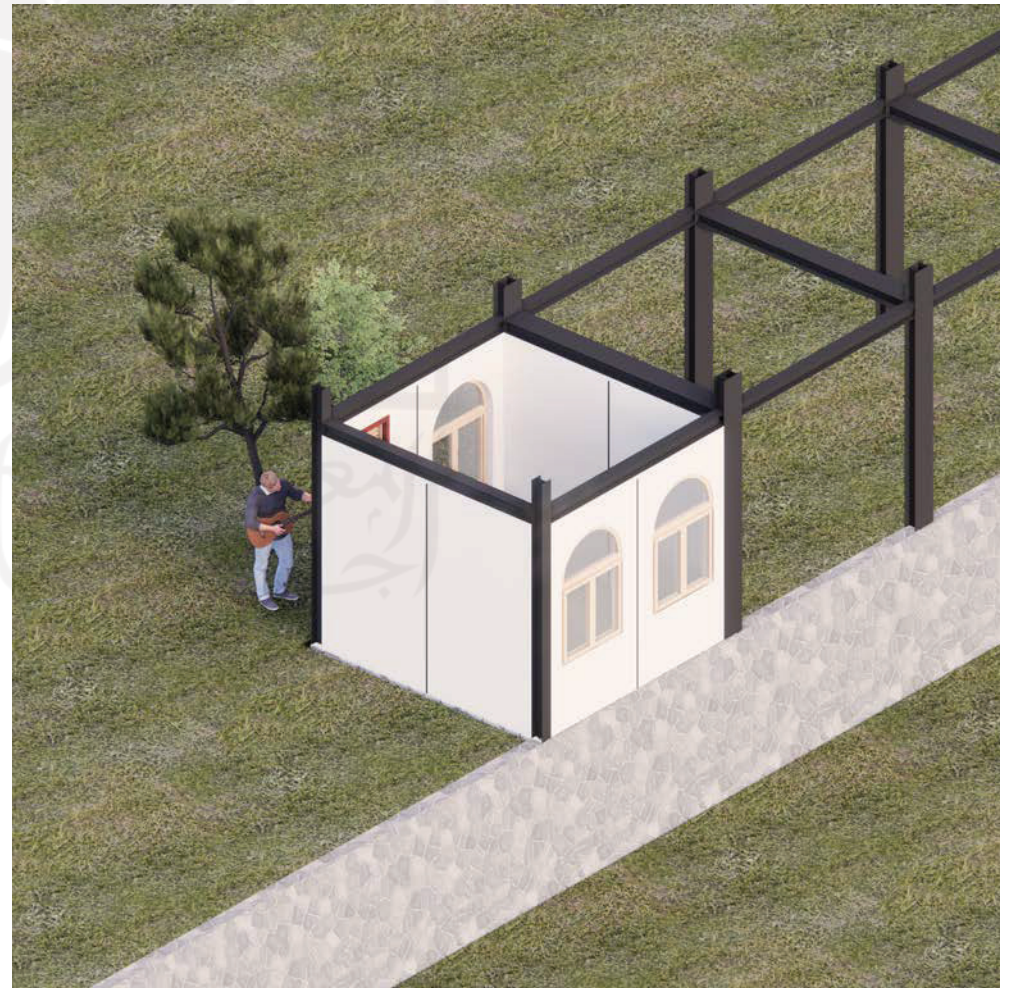


DESIGN EXPLORATION

1 Unit Simple

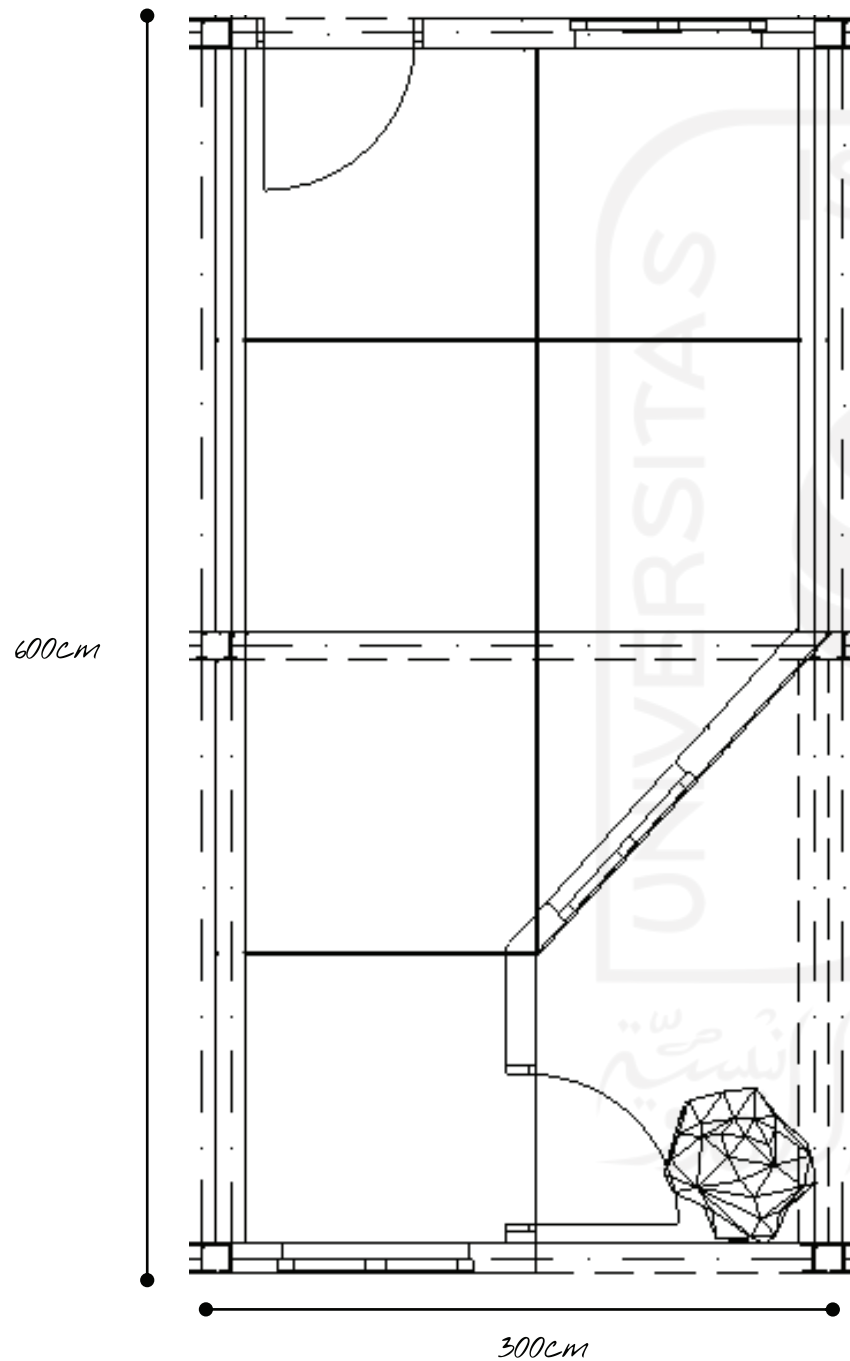


1 unit with 1 module only has 9m² area. It was enough for 1 people to sleep, working, etc.

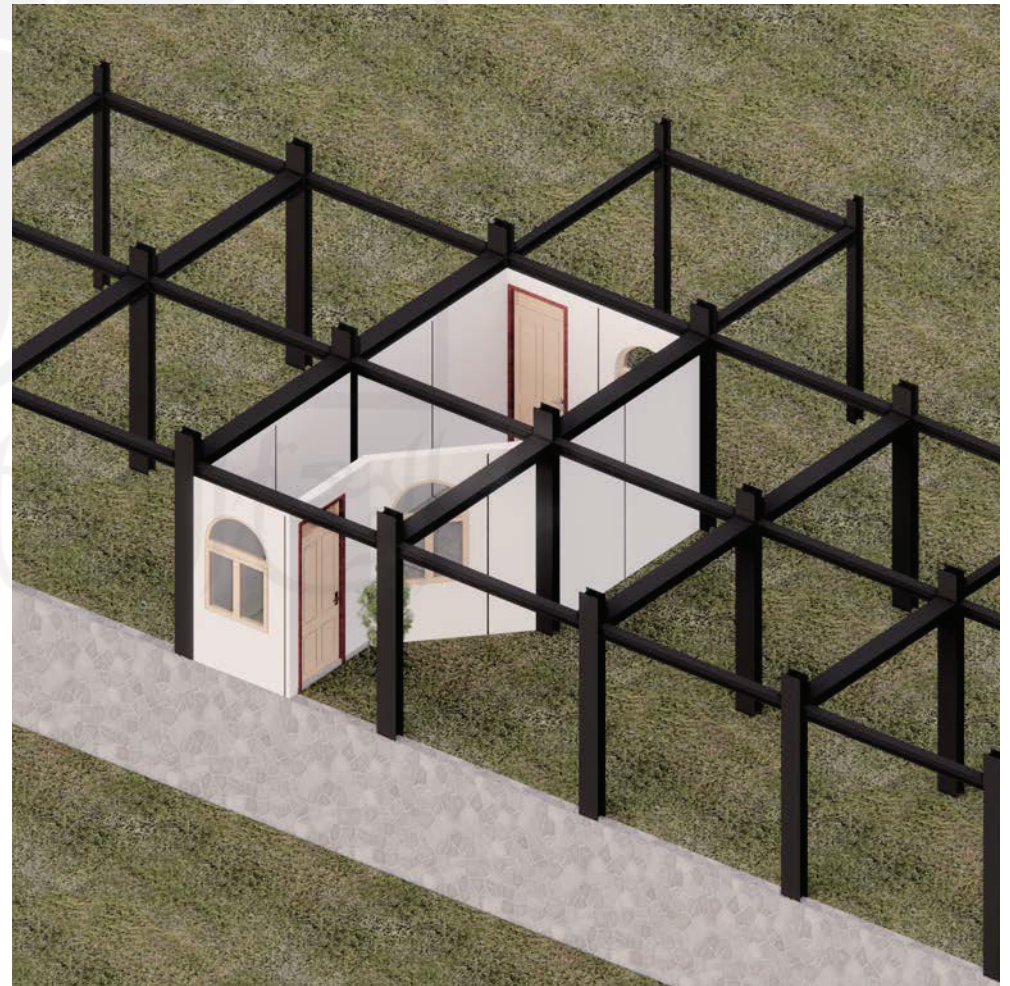


DESIGN EXPLORATION

1 Unit Advance

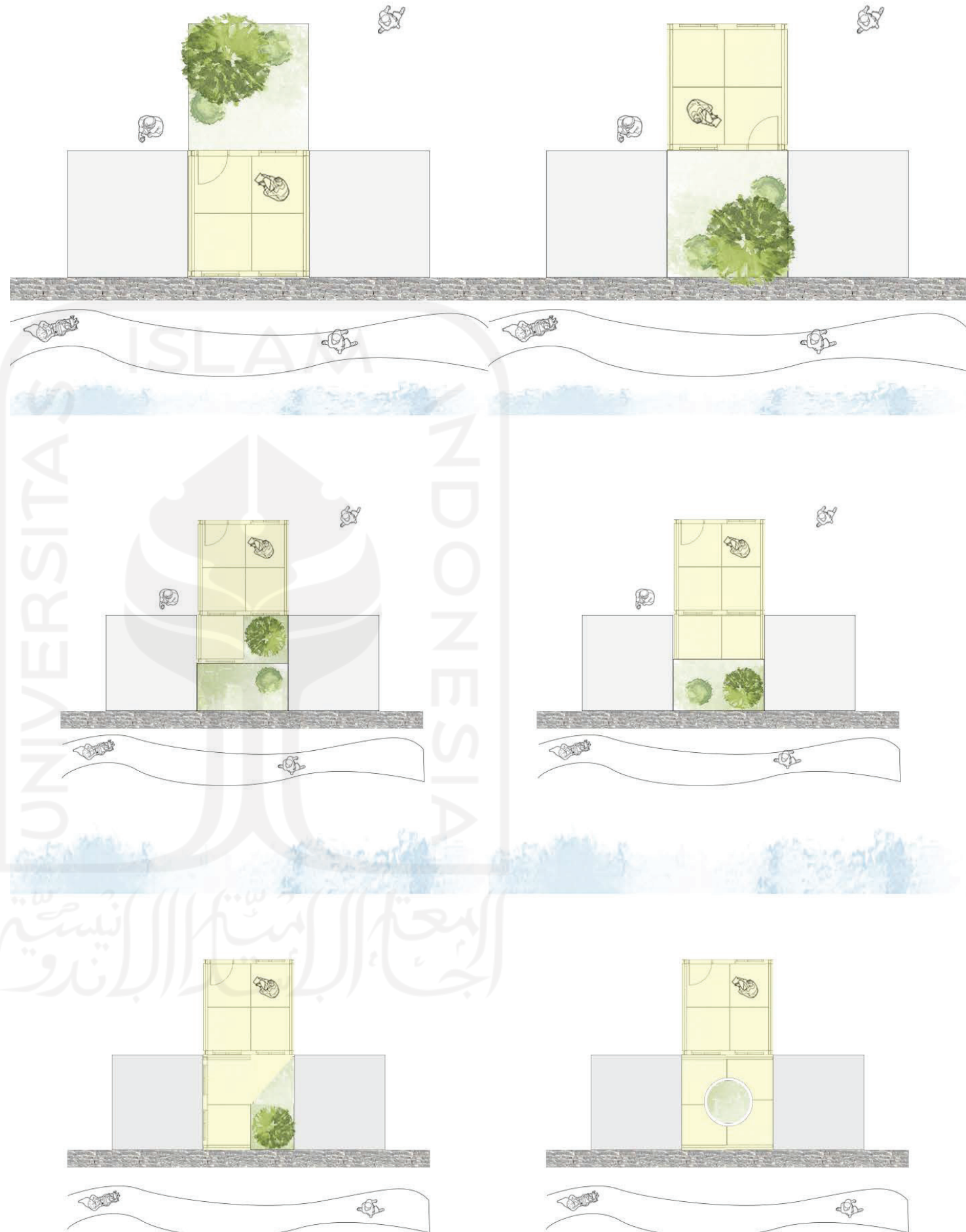


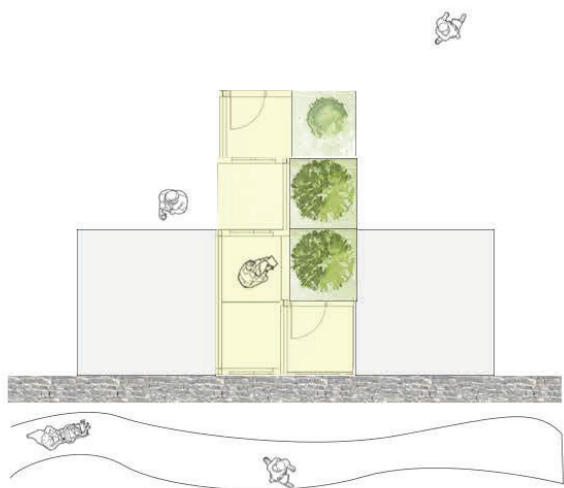
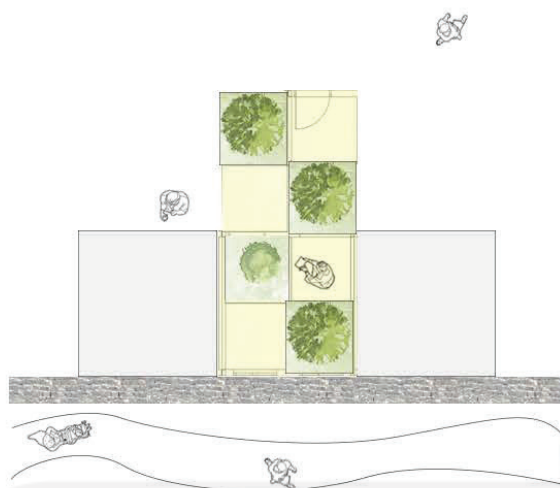
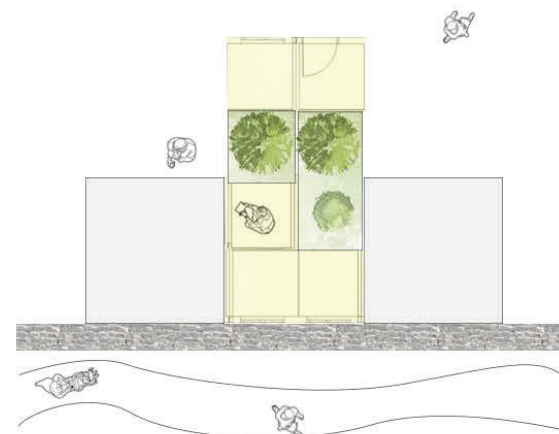
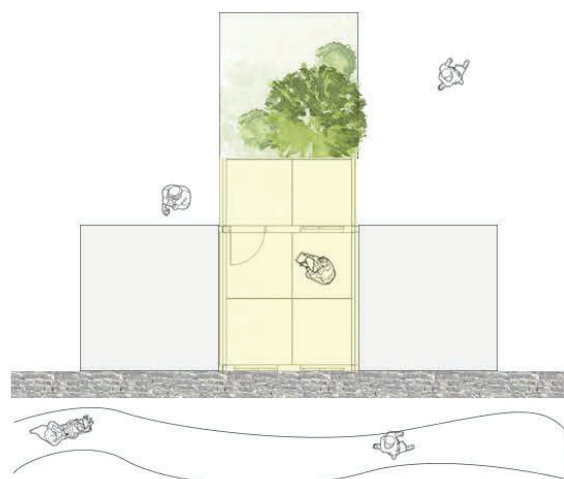
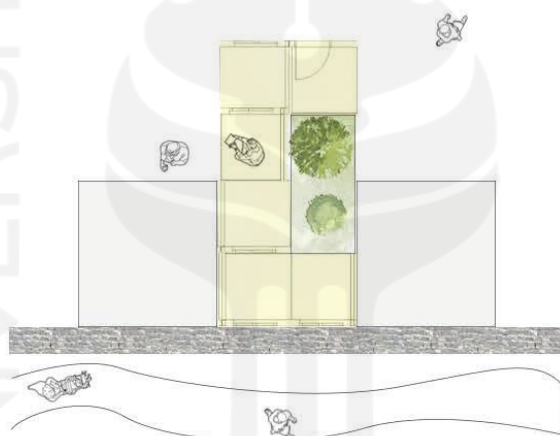
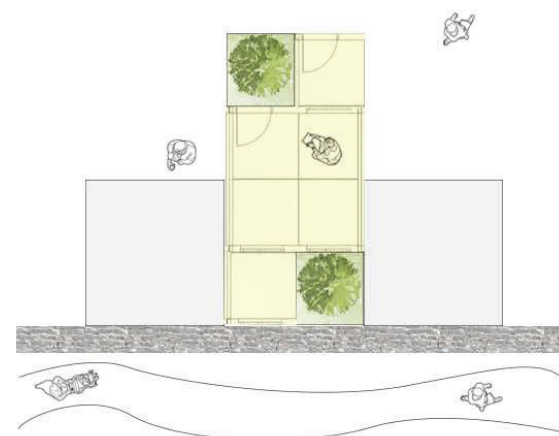
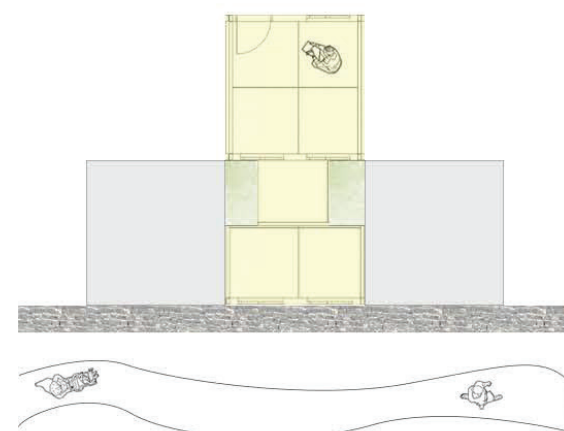
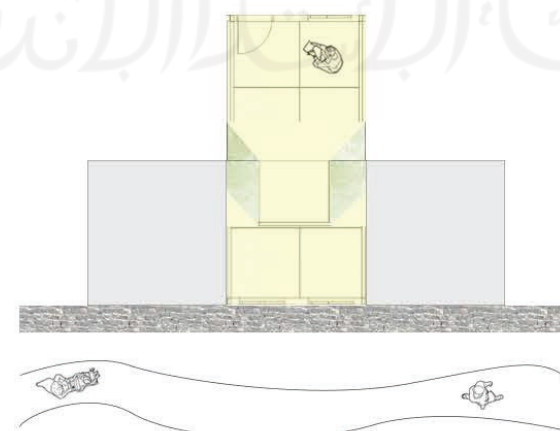
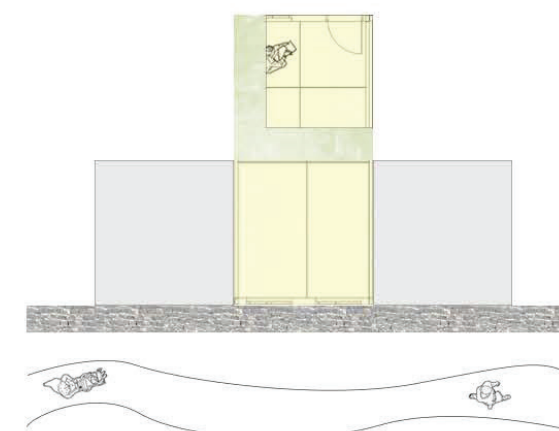
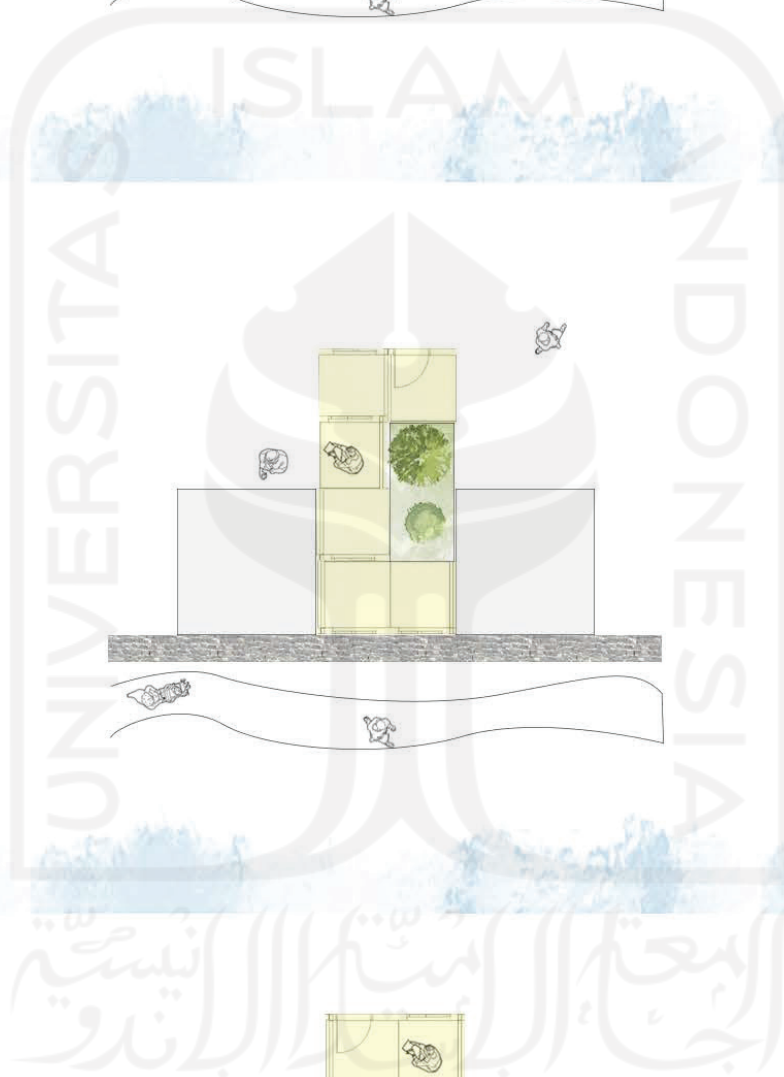
With advance customization, 2 module in 1 unit can make a big difference in term of room quality. It can fit up to 3 person with a lot of opportunity to maximize all the side of the building



EXPLORATION

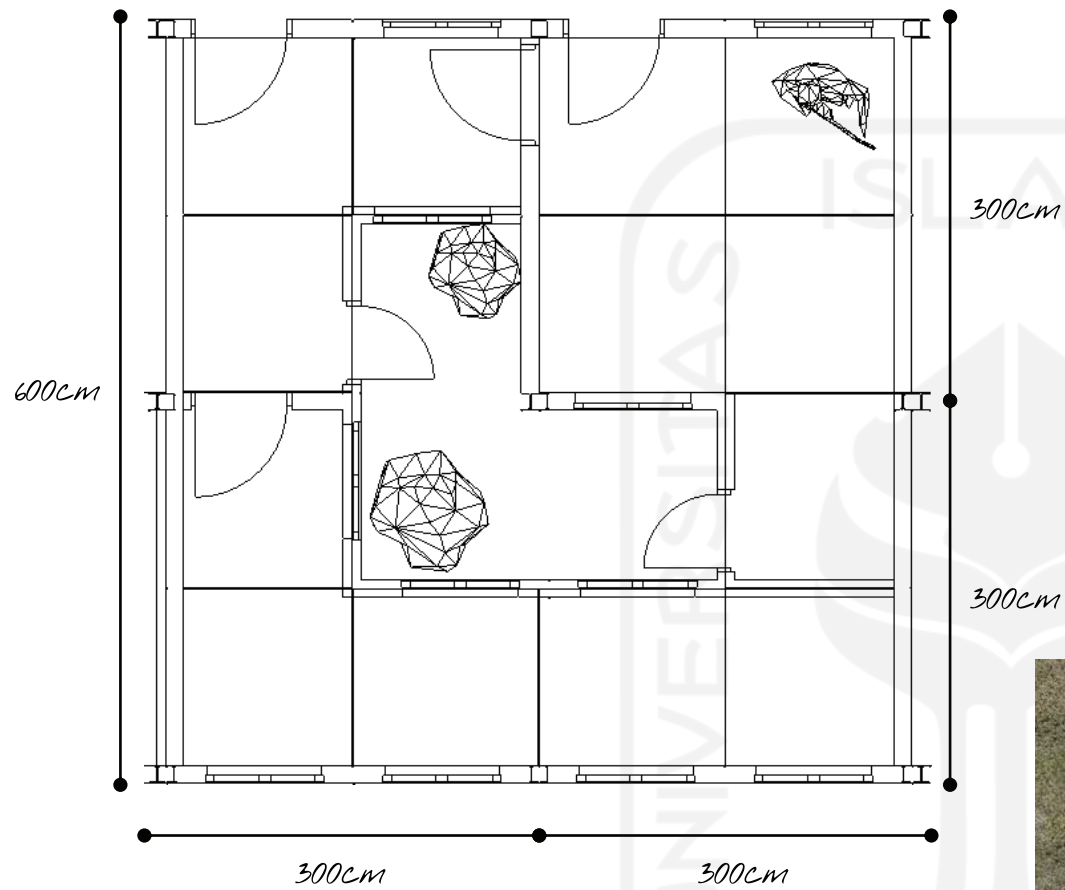
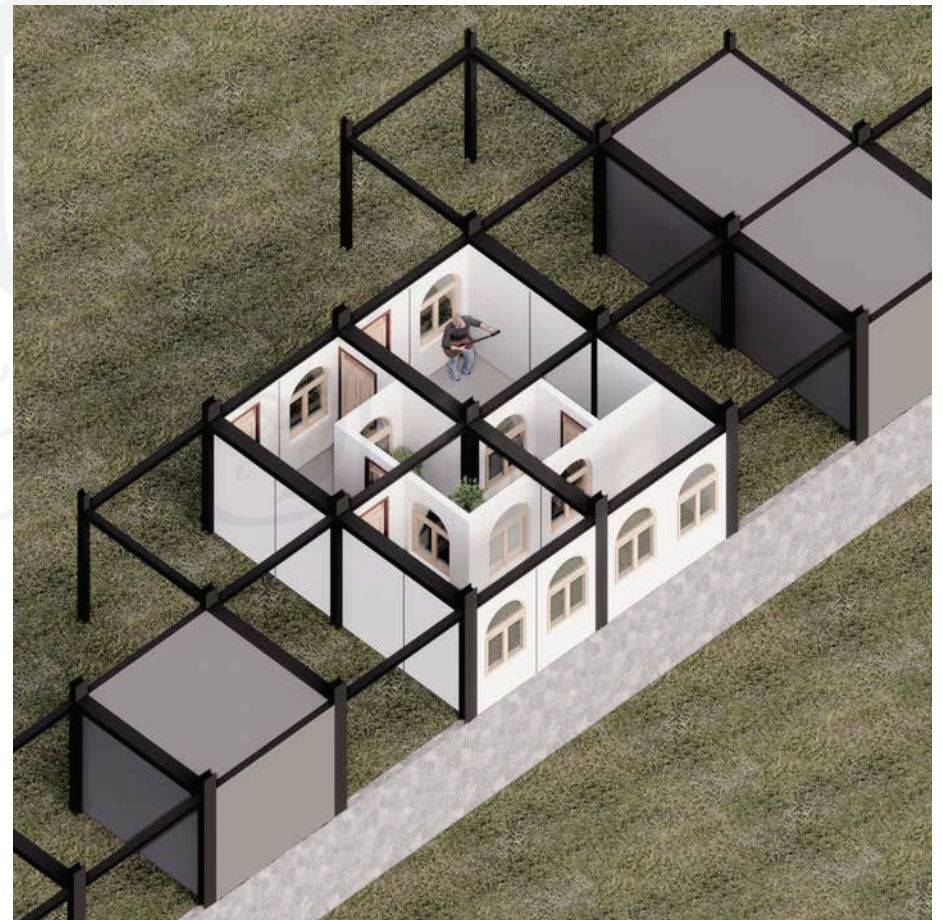
1 Unit Design Variety





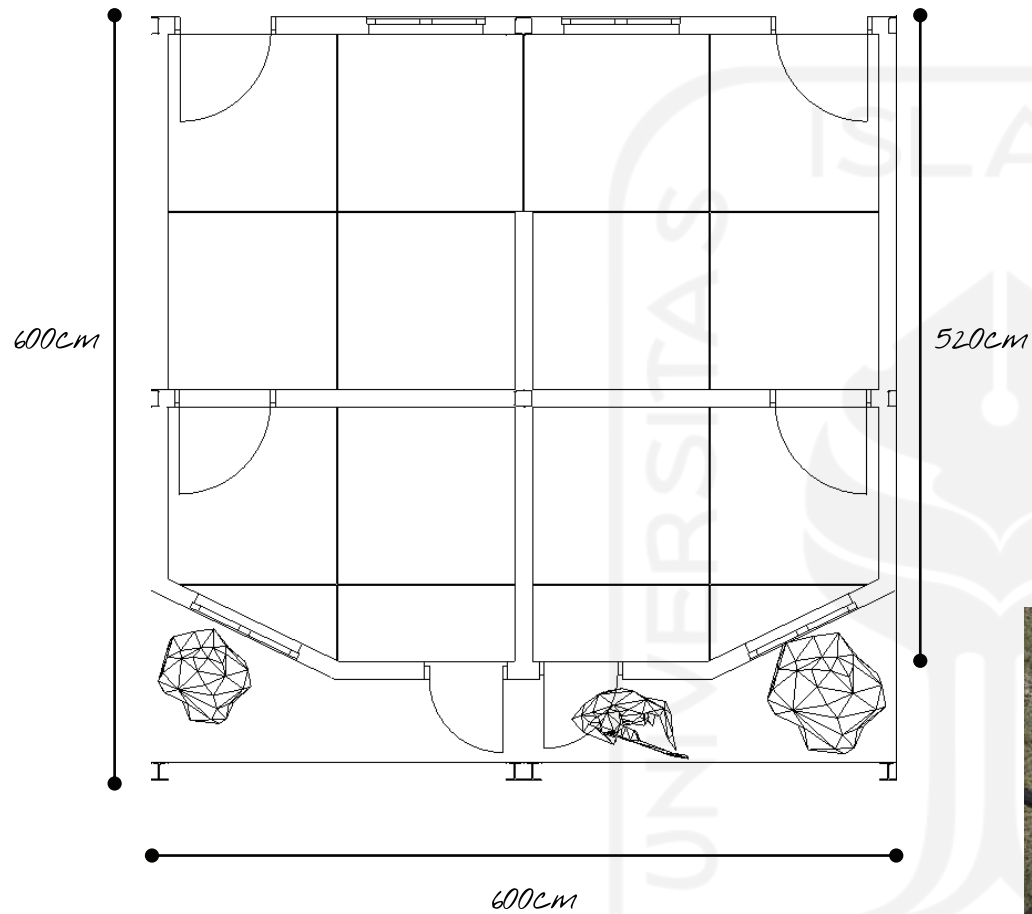
DESIGN EXPLORATION

2 Unit Simple: 2 Family



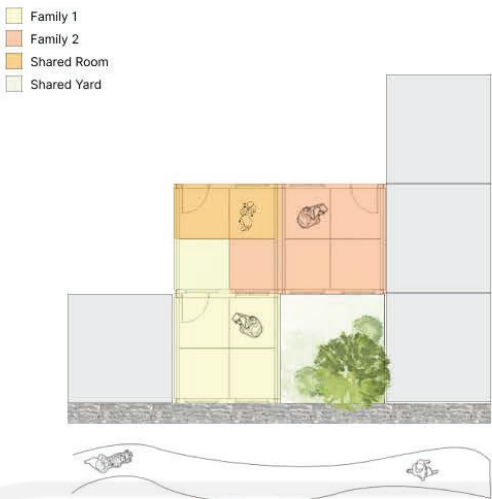
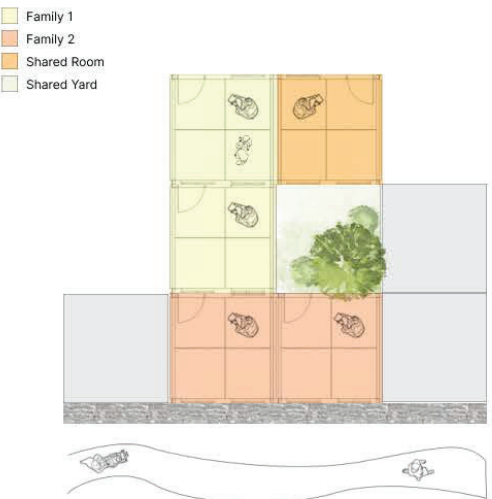
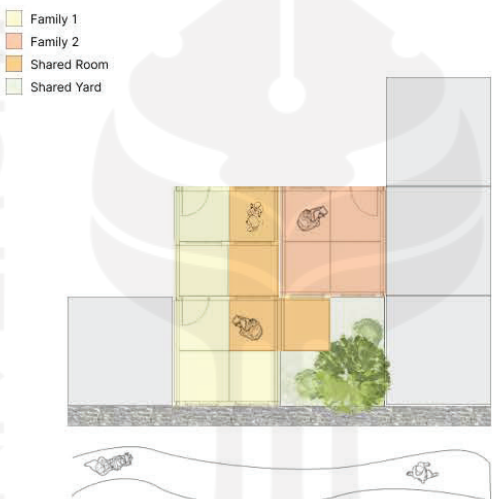
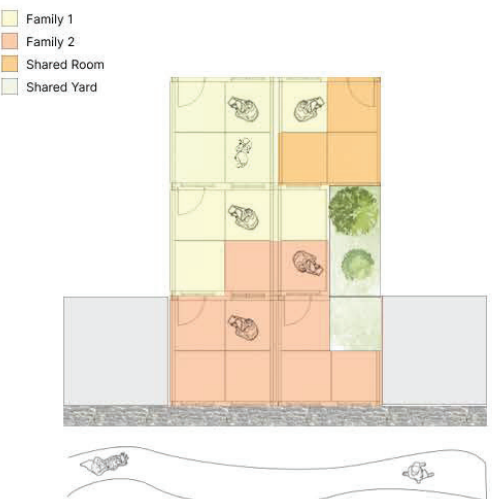
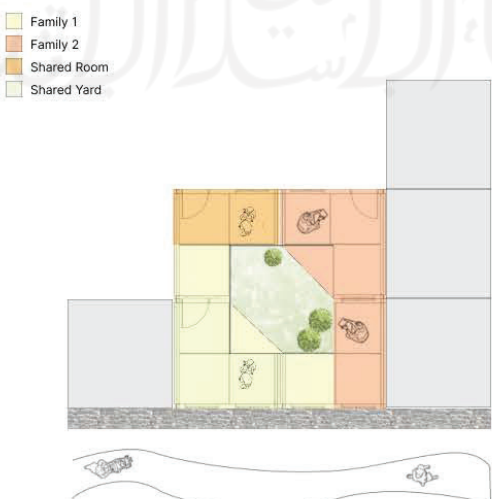
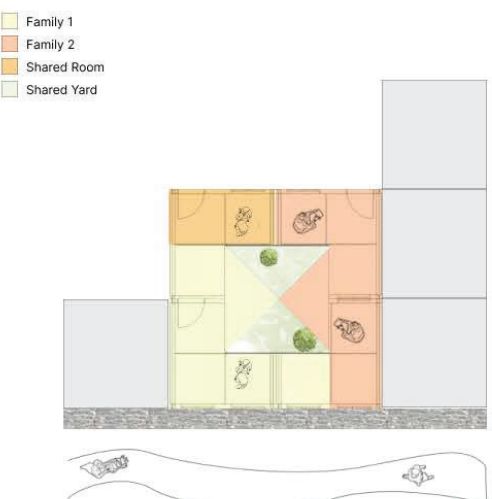
DESIGN EXPLORATION

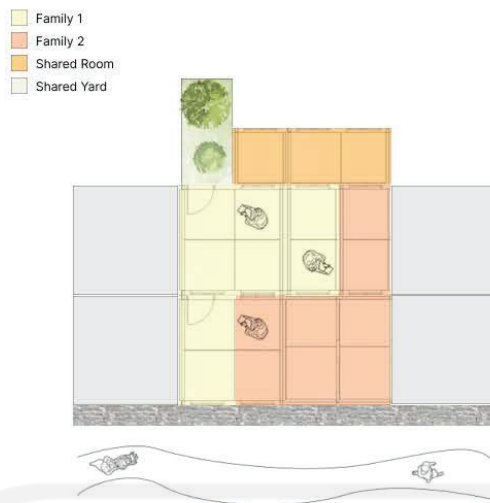
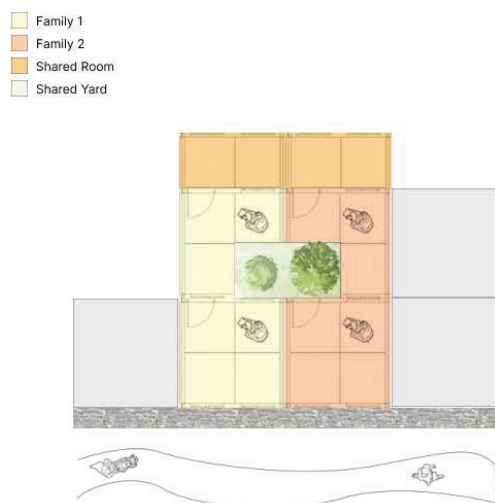
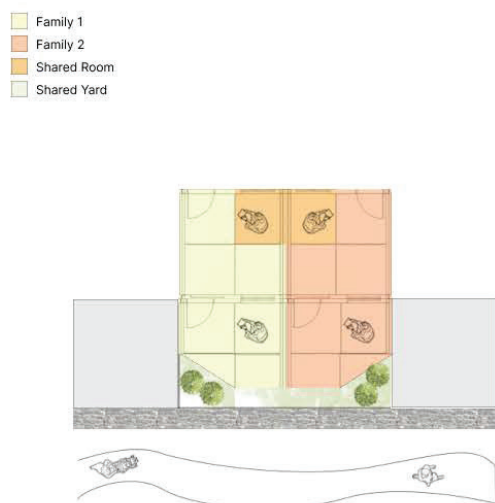
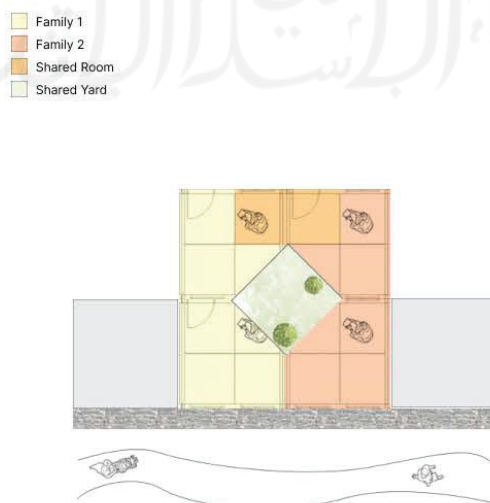
2 Unit Advanced: 2 Family



EXPLORATION

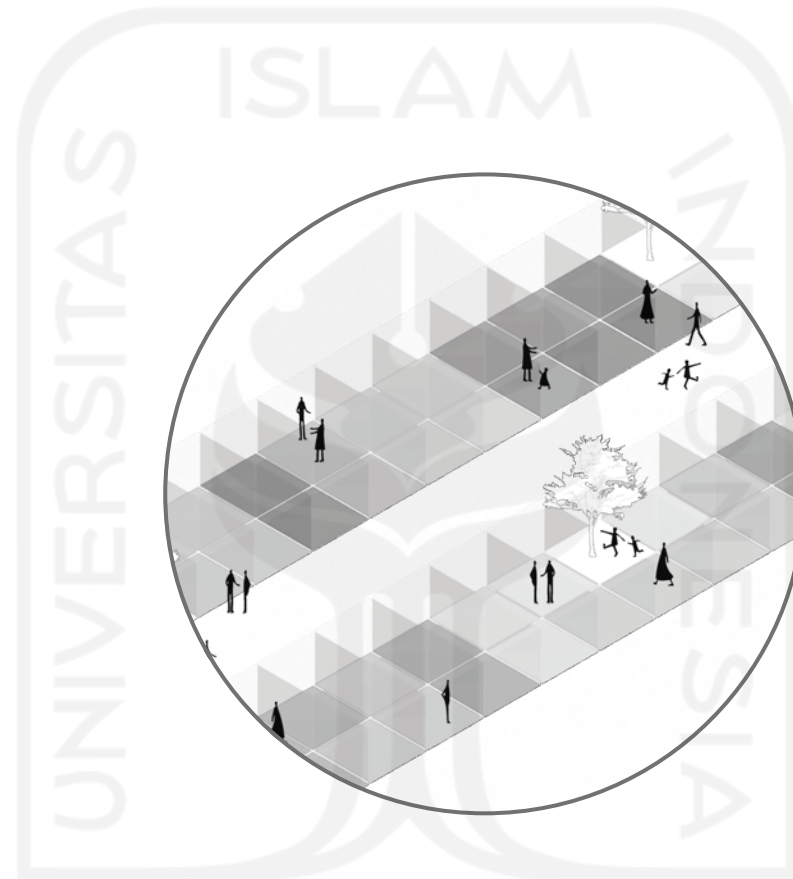
2 Unit Design Variety





IDEAS

Residential Open Building



Support Level

The Support in Open Building is a permanent element that serves as a sharing element to create space for living

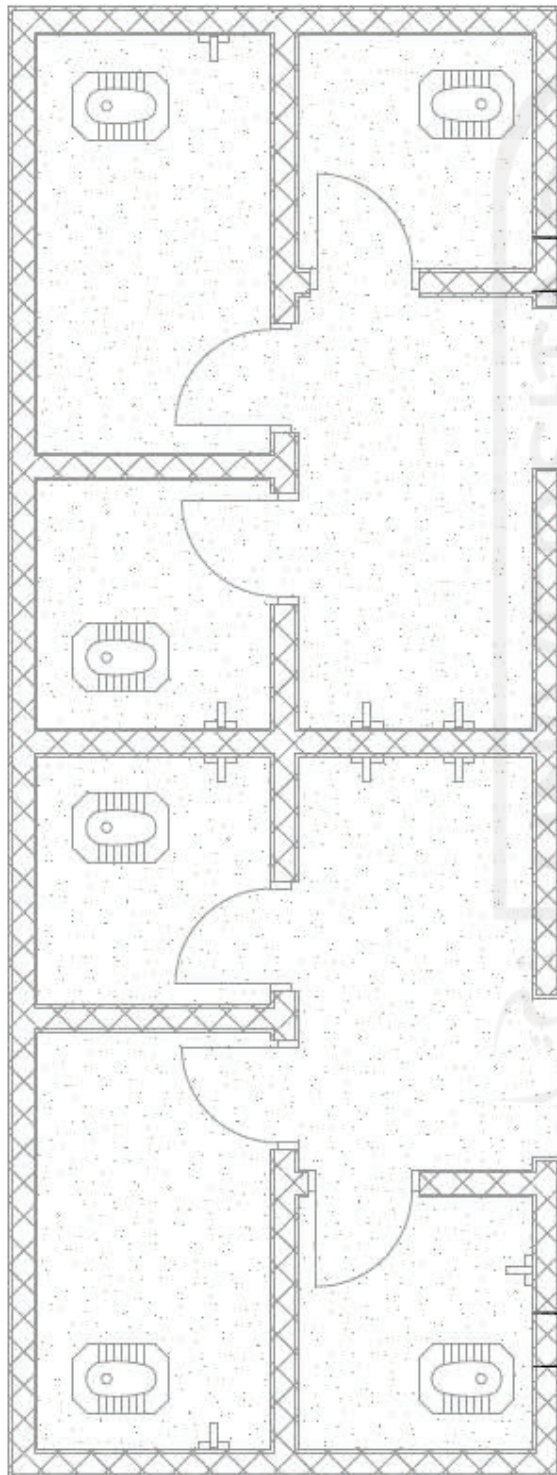
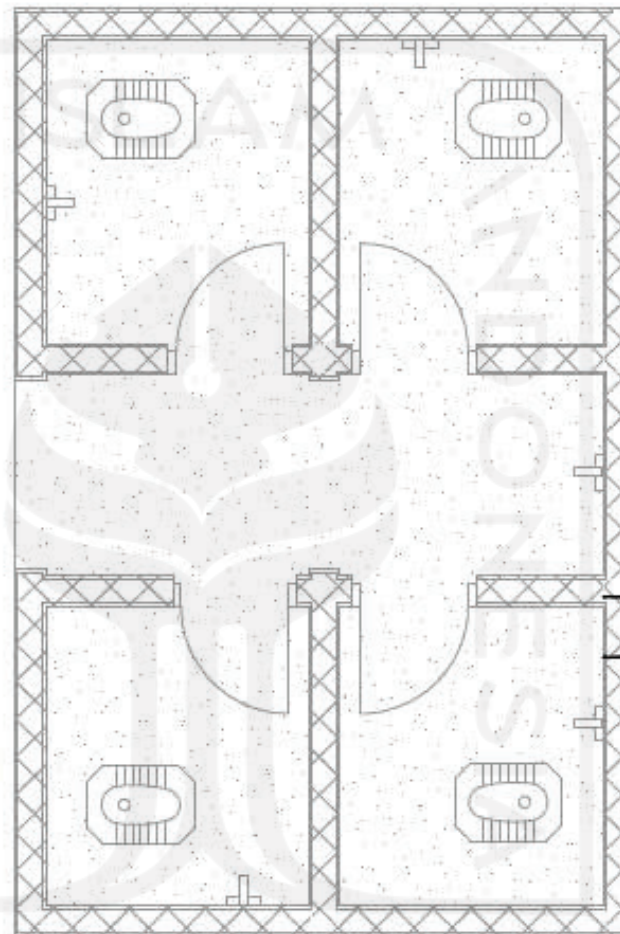


Infill Level

Infill level was designed under authority of the user. User has their own authority to design their place based on their preferences

EXPLORATION

Support: Public Toilet



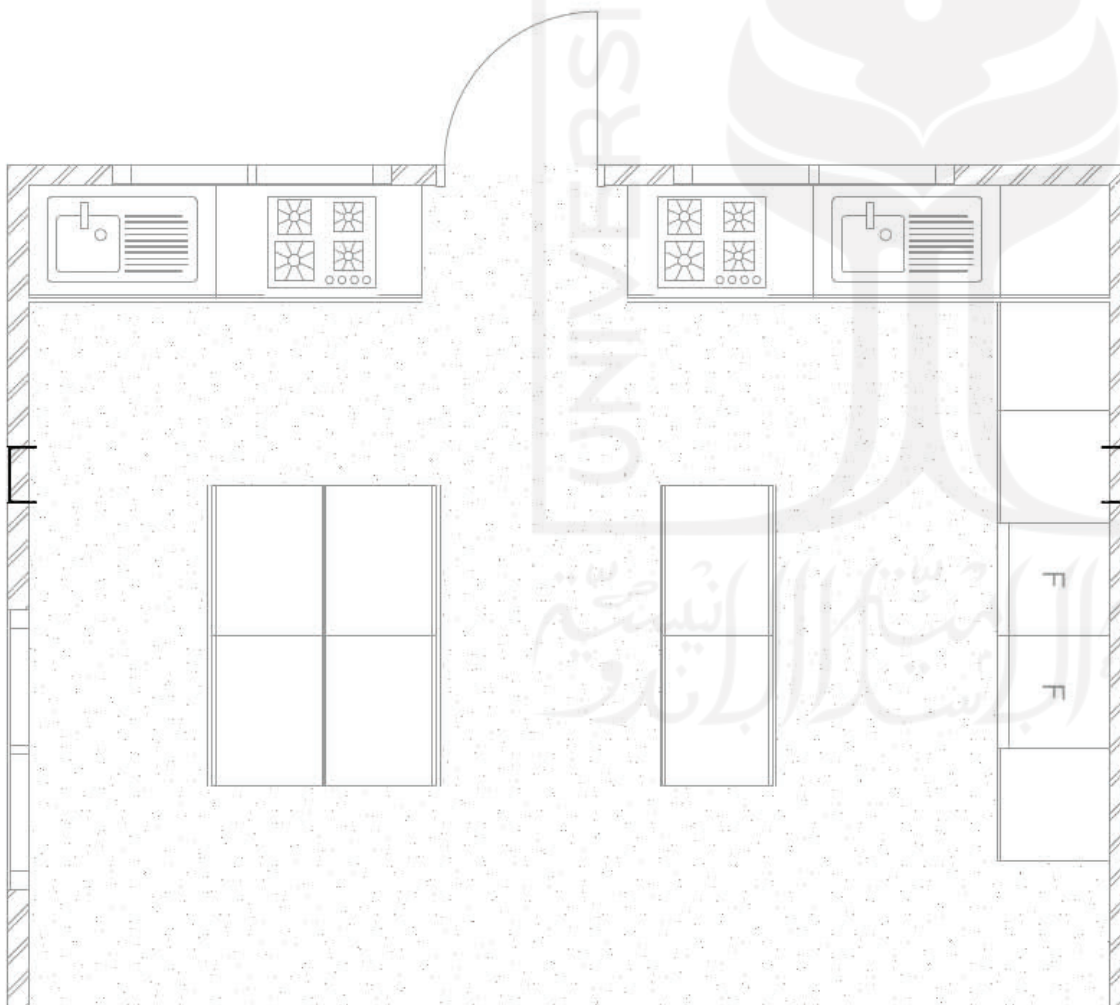
Public Toilet is part of the Support because it will use by multiple user by different family. Public Toilet also provided in Support level to help people with resource limitation to get proper bathroom

EXPLORATION

Support: Public Kitchen

Public Kitchen was provided in Support Level to help the community to make more interaction between one another. Public Kitchen will be beneficial in event such as wedding, maulidan, etc

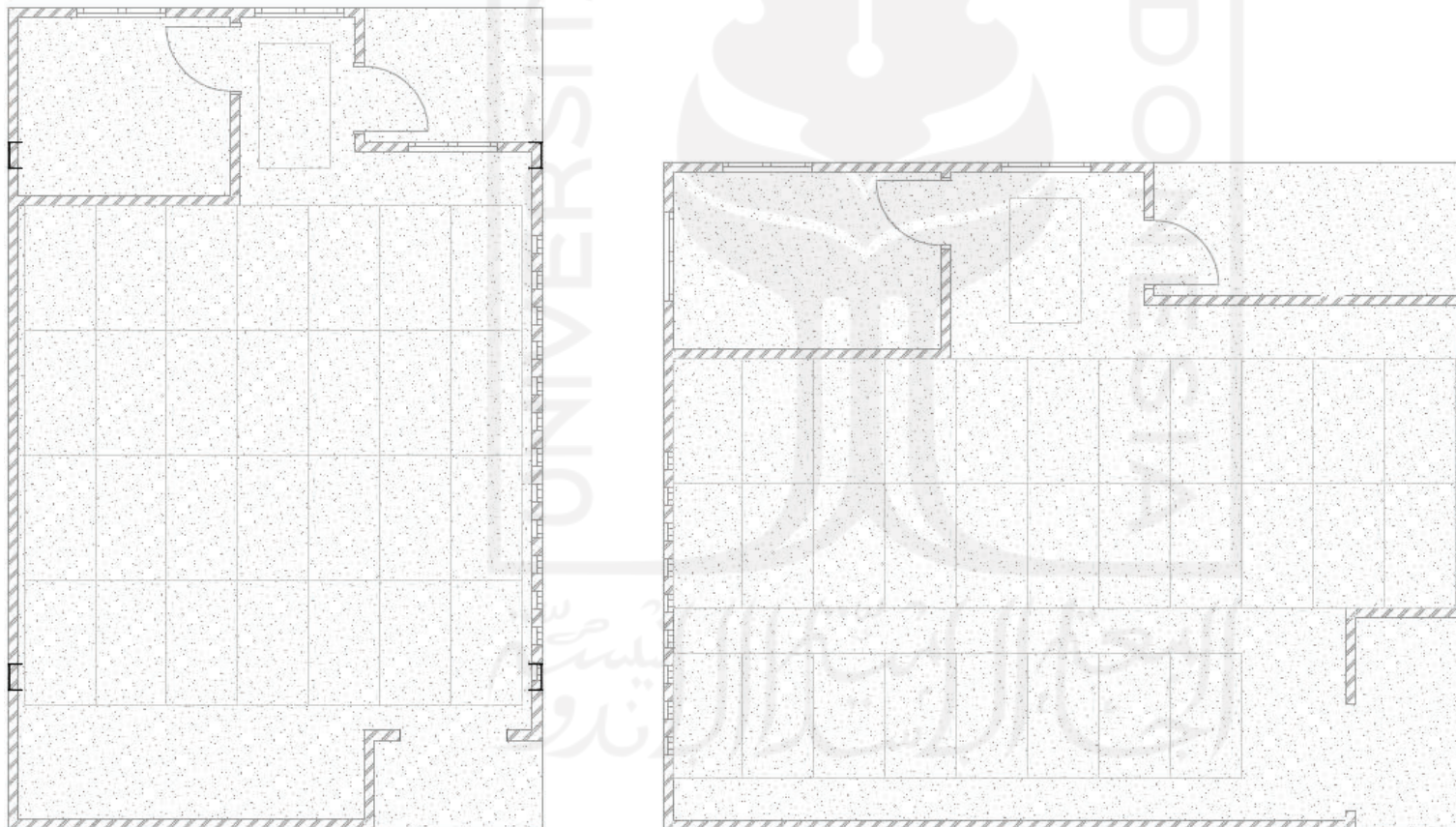
Public kitchen will be provided in every floor and each building. This can assist people to tighten their budgets



EXPLORATION

Support: Musholla

Musholla are beneficial among the community. There's a lot of things that community can do with musholla. It can use for any event, or can be use only for meeting, etc



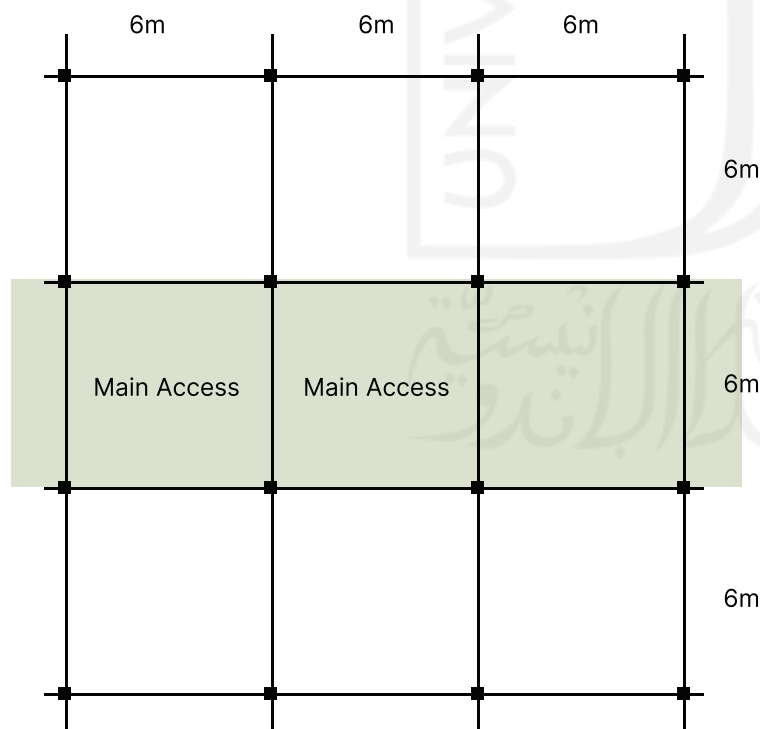
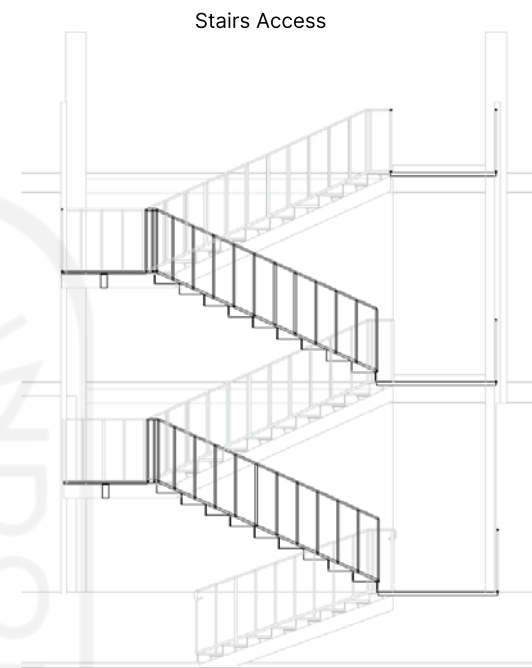
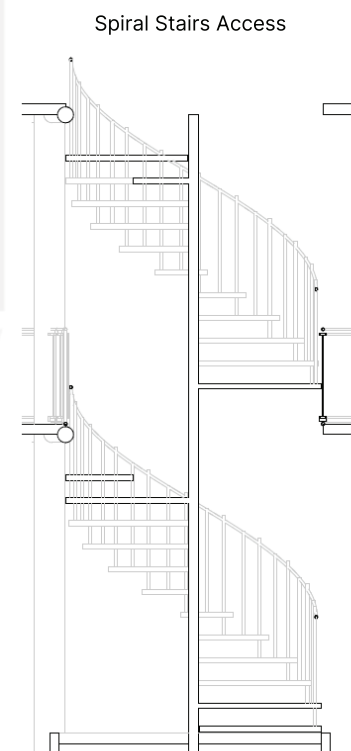
EXPLORATION

Support: Main Structure & Access

The column and beam are the main element of Support Level. The Column size is 300×300mm made by Steel H Profile. Columns can be half-used between users, one user using 150×150mm and the other use the same amount. This principal works with Beam as well.

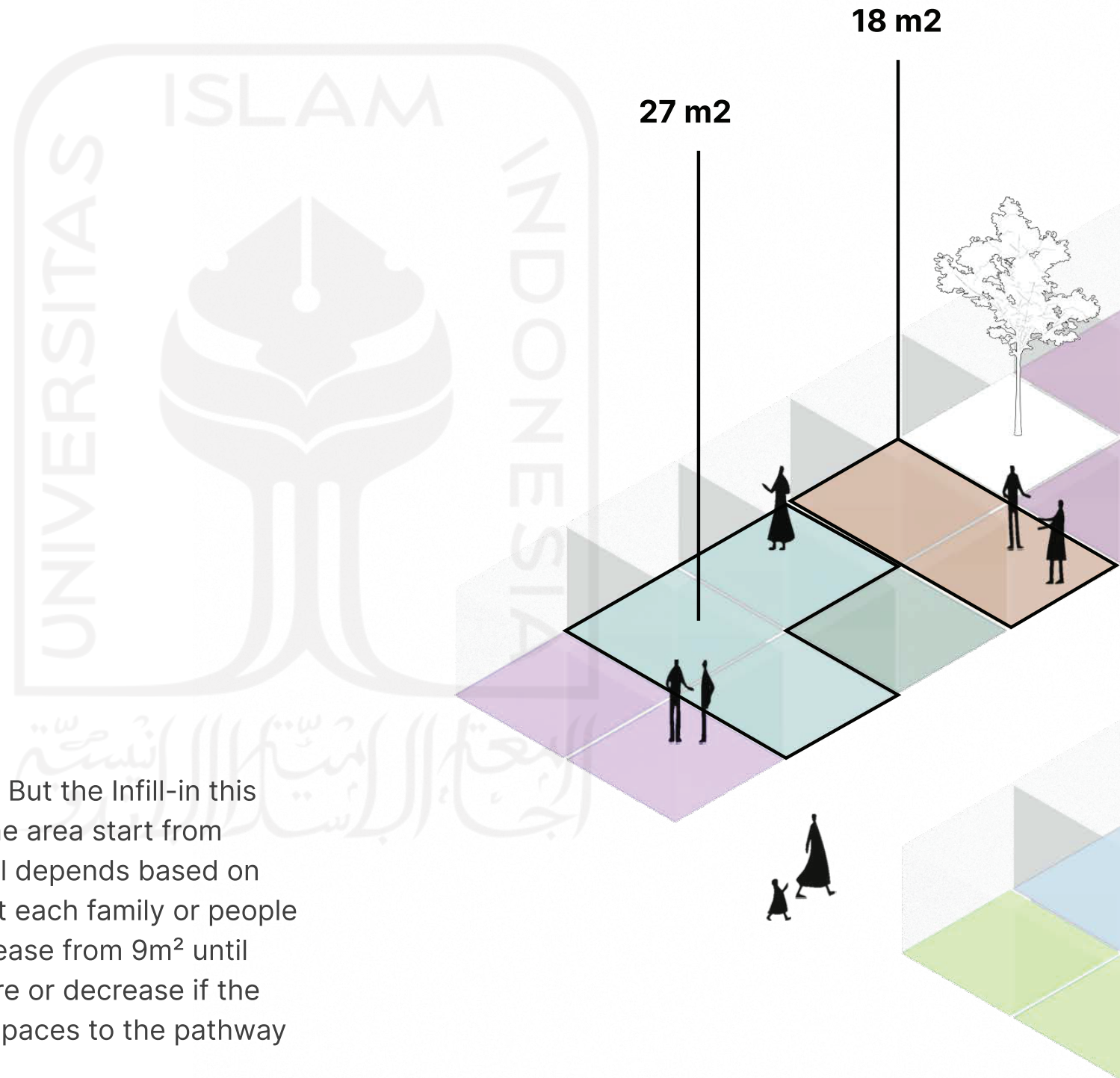
The main pathway are provided in the center of the building with 6m width. Although it can decrease until 3m due to user adjustment with their infill houses.

The stairs also part of the support. It will provided in each building and on the perimeter of the building

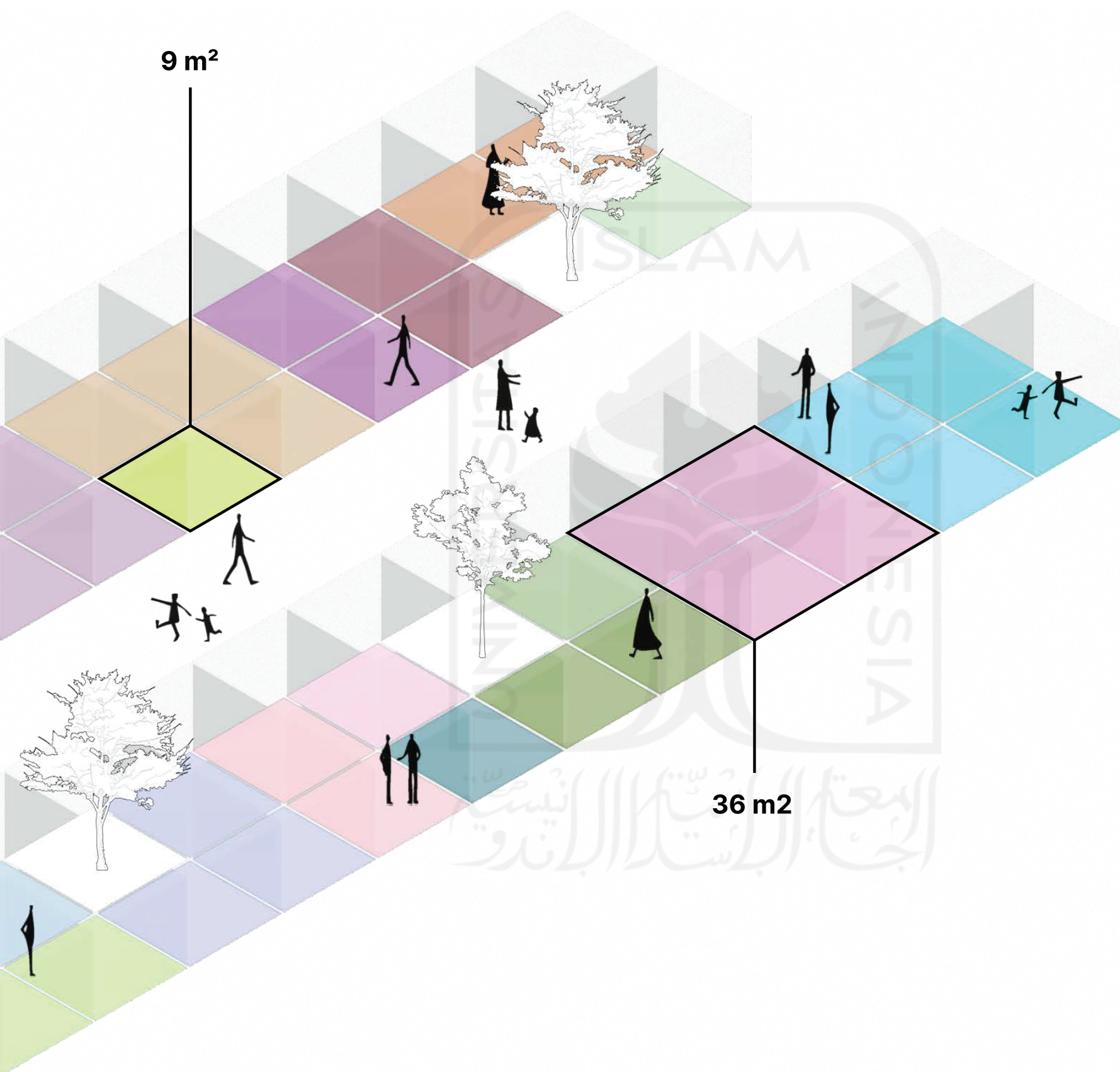


IDEAS

Infill: Owner Scenario

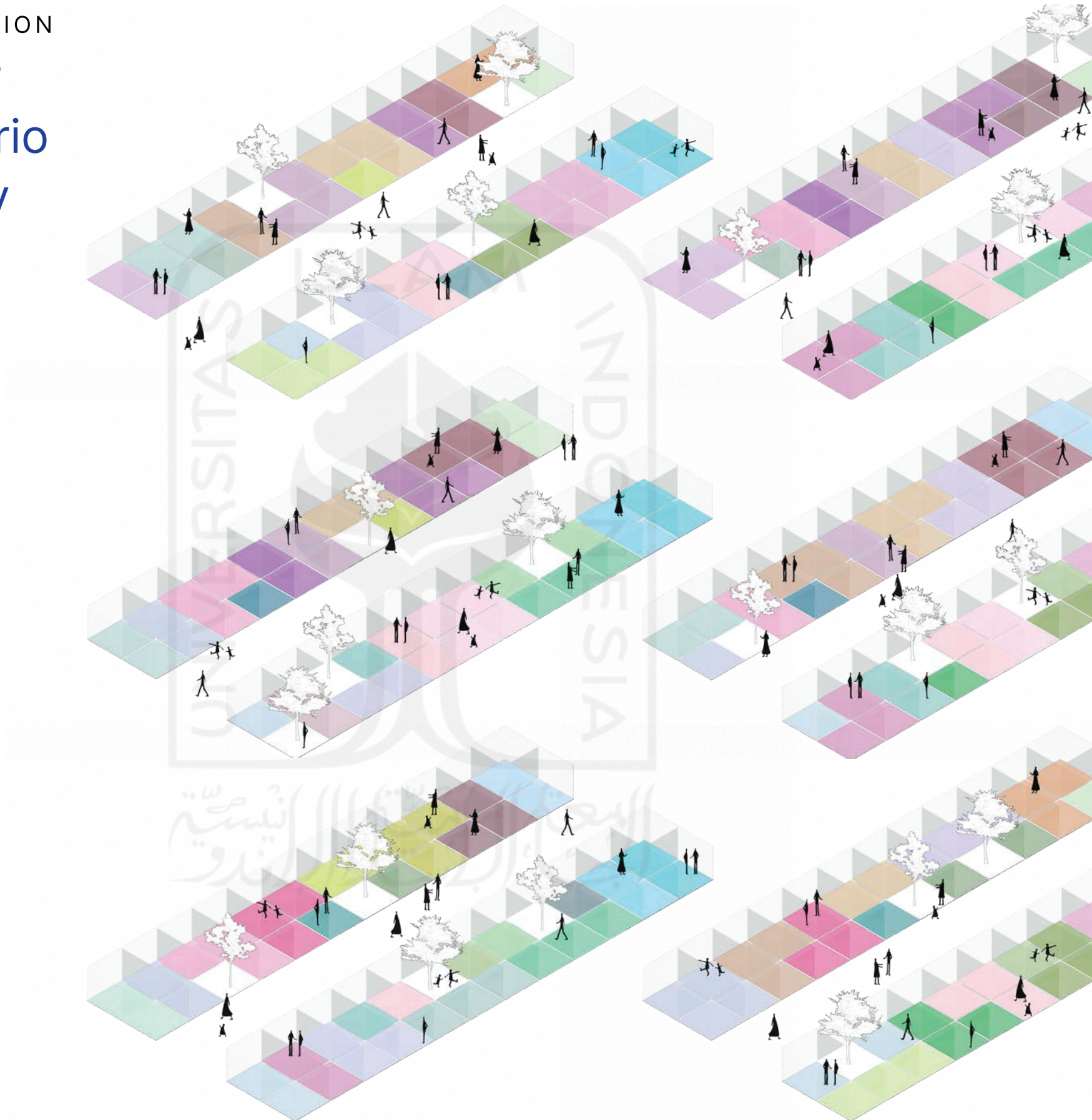


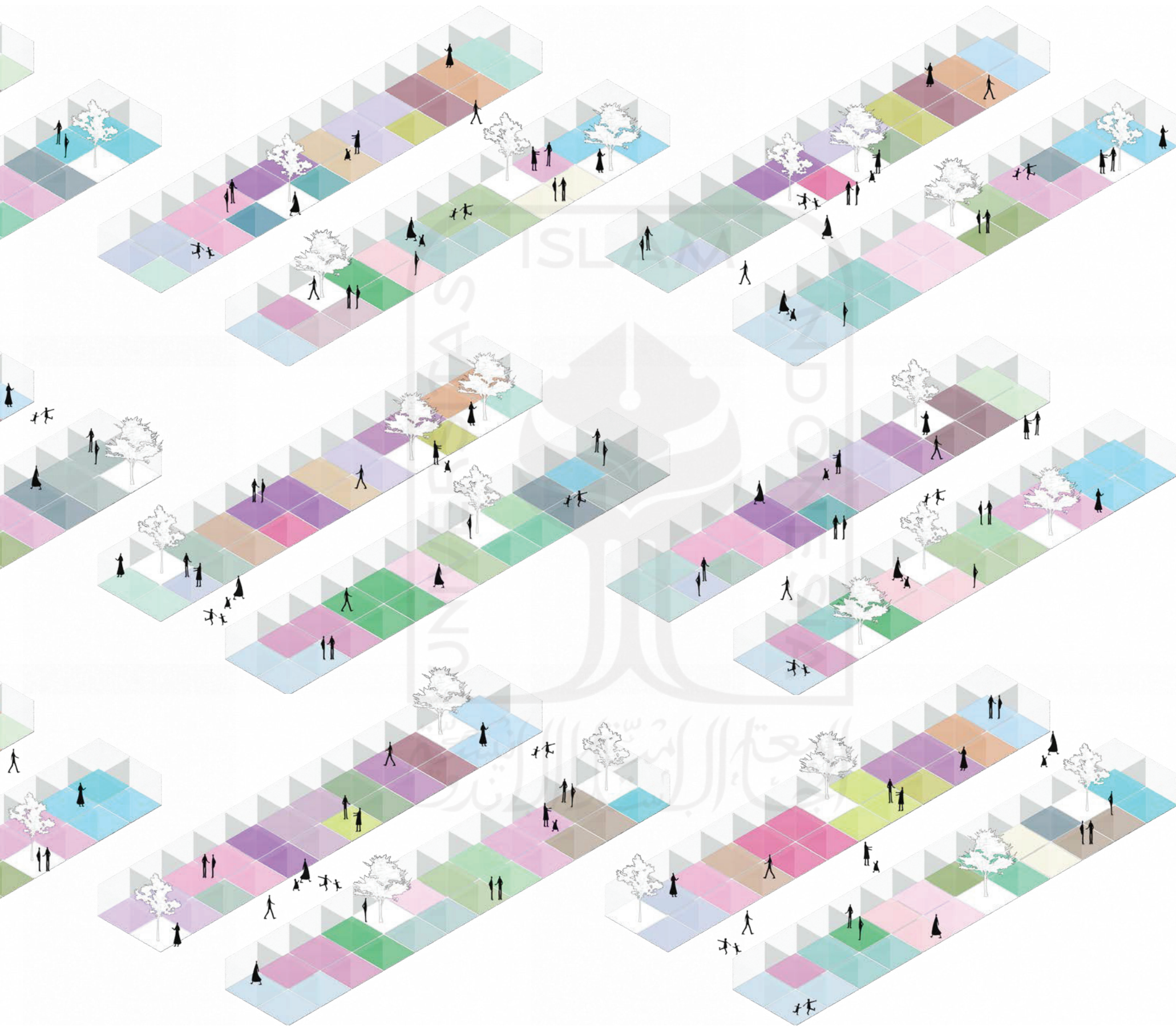
The structure grid is 6×6m. But the Infill-in this case is a house, can rent the area start from 3×3m and up to 6×6m. It all depends based on the user and the needs that each family or people has. The rent area can increase from 9m² until 36m², or even increase more or decrease if the user want to expand their spaces to the pathway



EXPLORATION

Owner Scenario Variety





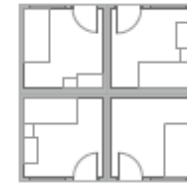
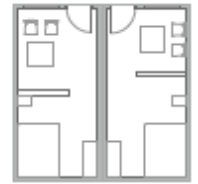
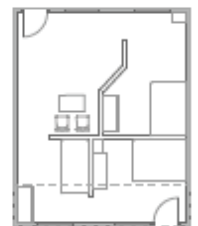
EXPLORATION

Layout Variety

Eventhough the user can rent from basic 3×3m, or 3×6m, or 6×6m. The user are allowed to expand their houses horizontally towards the pathway (both inside and outside) with 1.5 maximum.

It will make a lot of variety with the housing layout they will have. Someone houses may has 10.4m², meanwhile another one might have 22.5m². All of the layout variety was depend on the user need and user preferences.

The image on the right side only shows a possibility on what the layout they might have. It also can work as a guidance or recommendation for them to build their houses

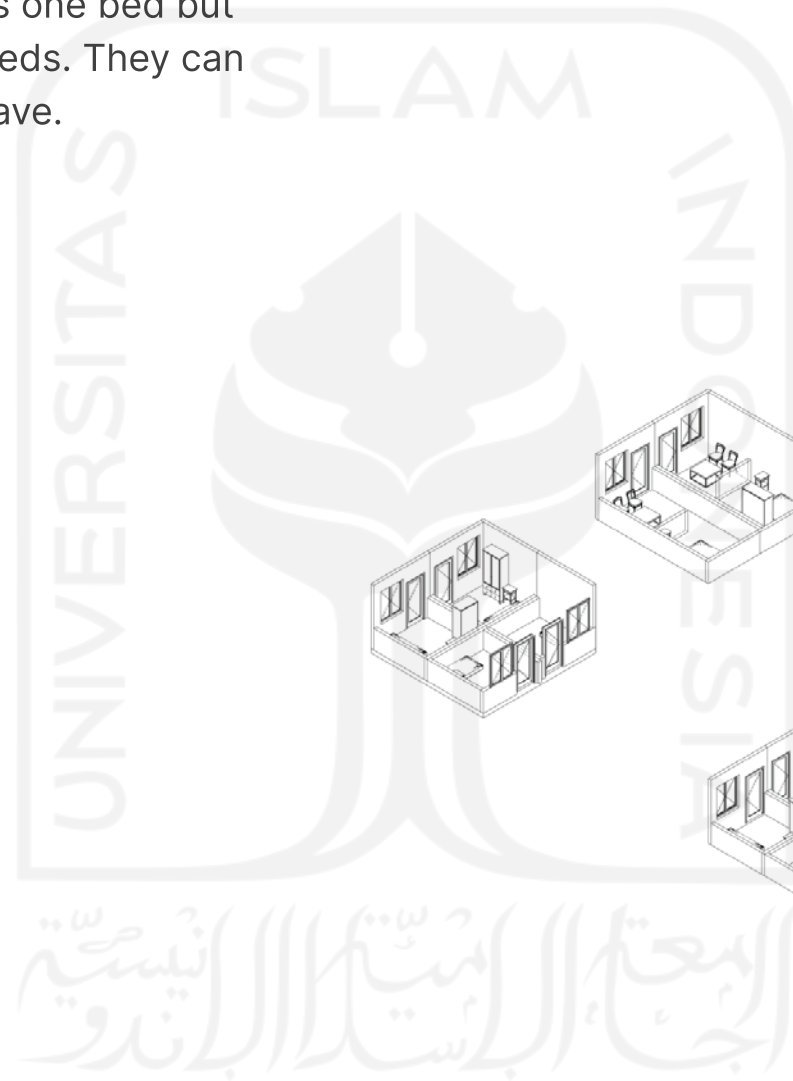
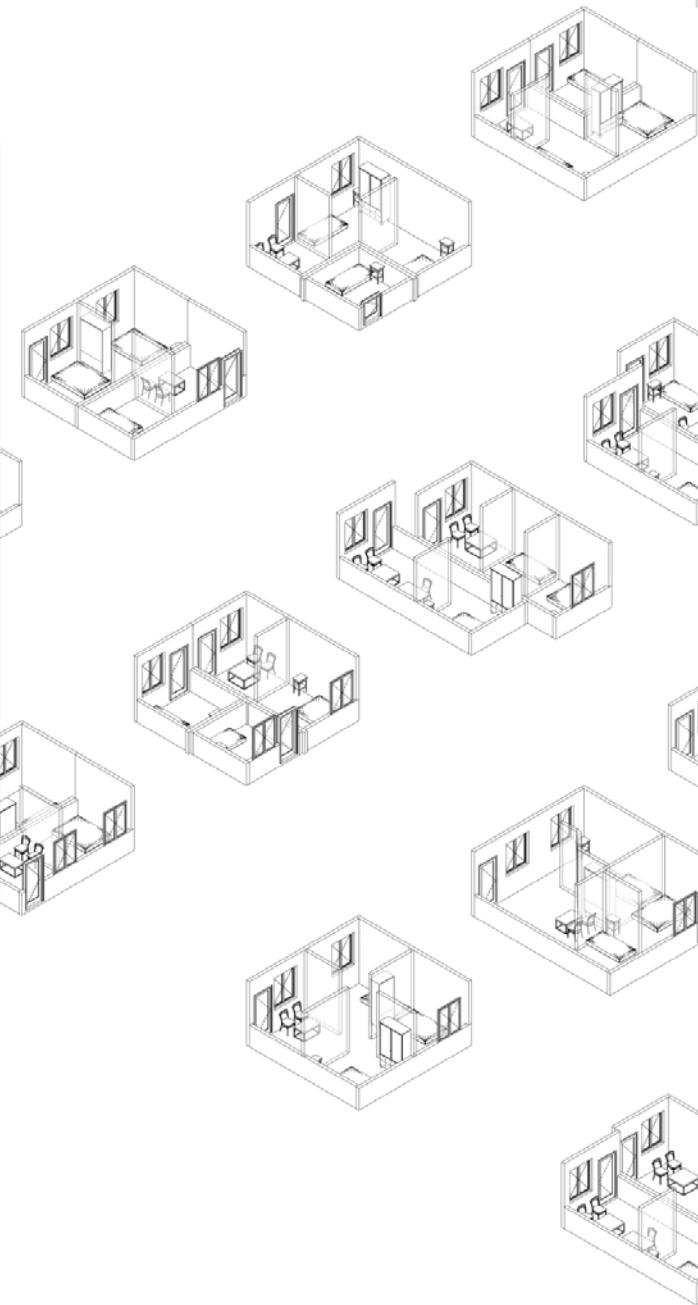


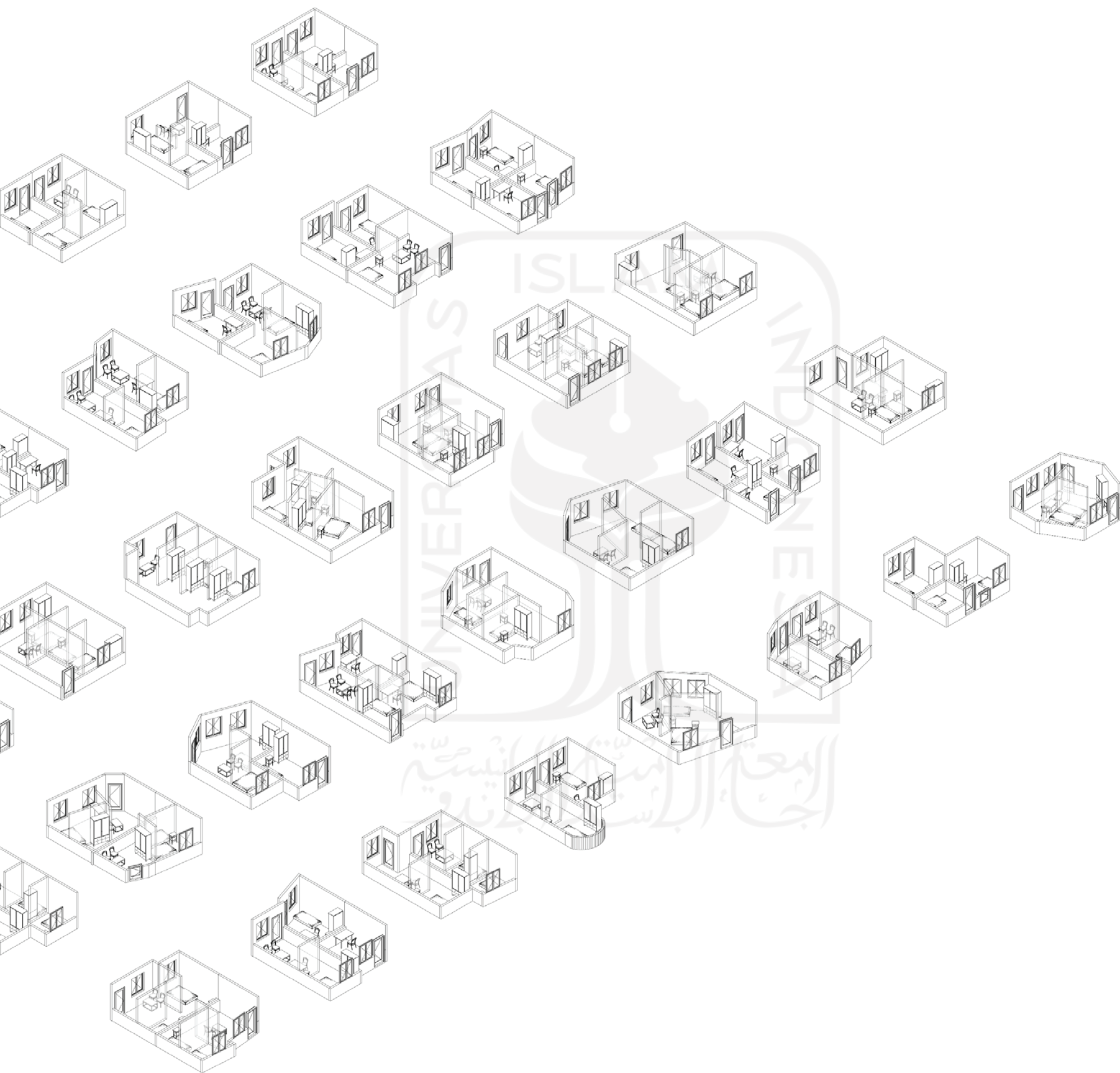


EXPLORATION

Furniture Variety

Resulting from layout variety, furniture variety also adjust based on the layout on what users have. One person might has one bed but another person has three beds. They can arrange it as free as they have.





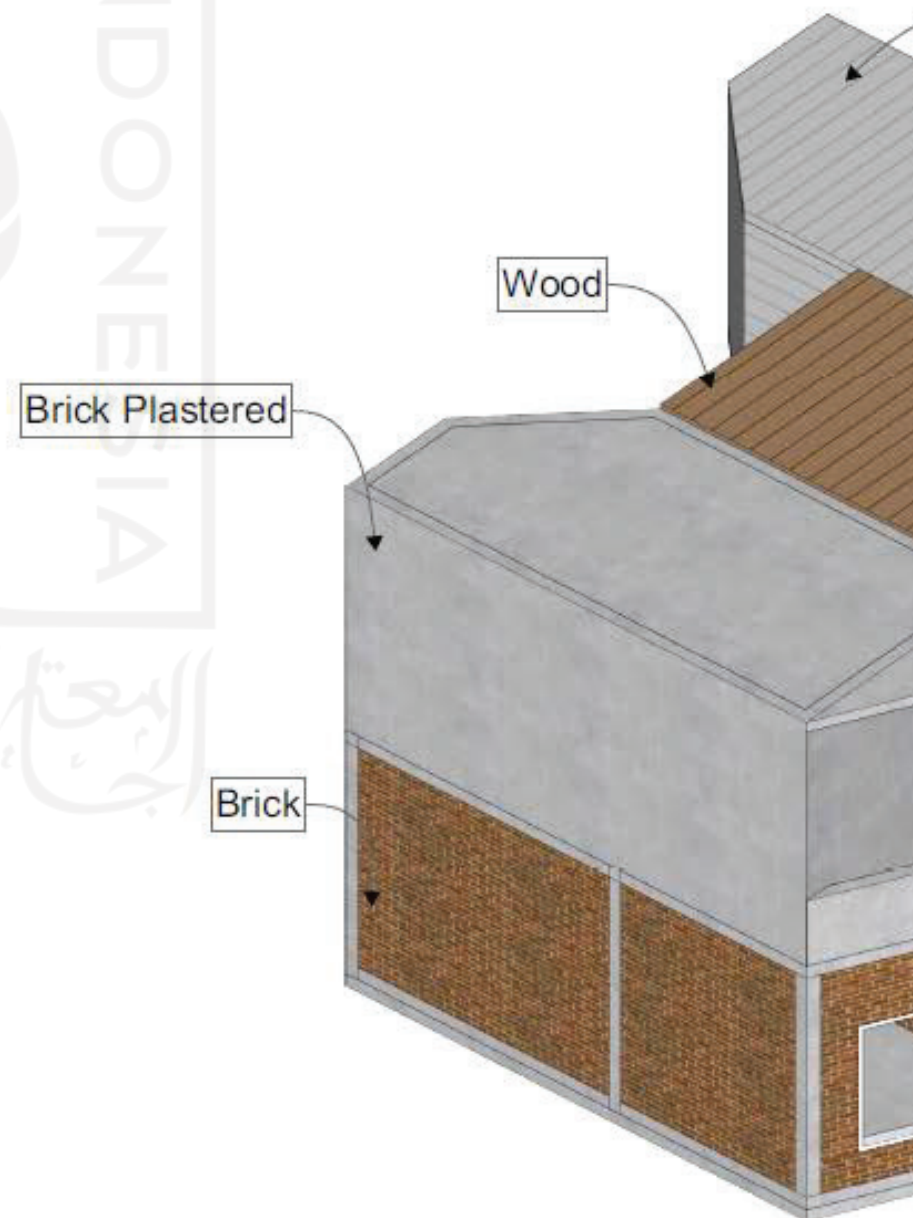
EXPLORATION

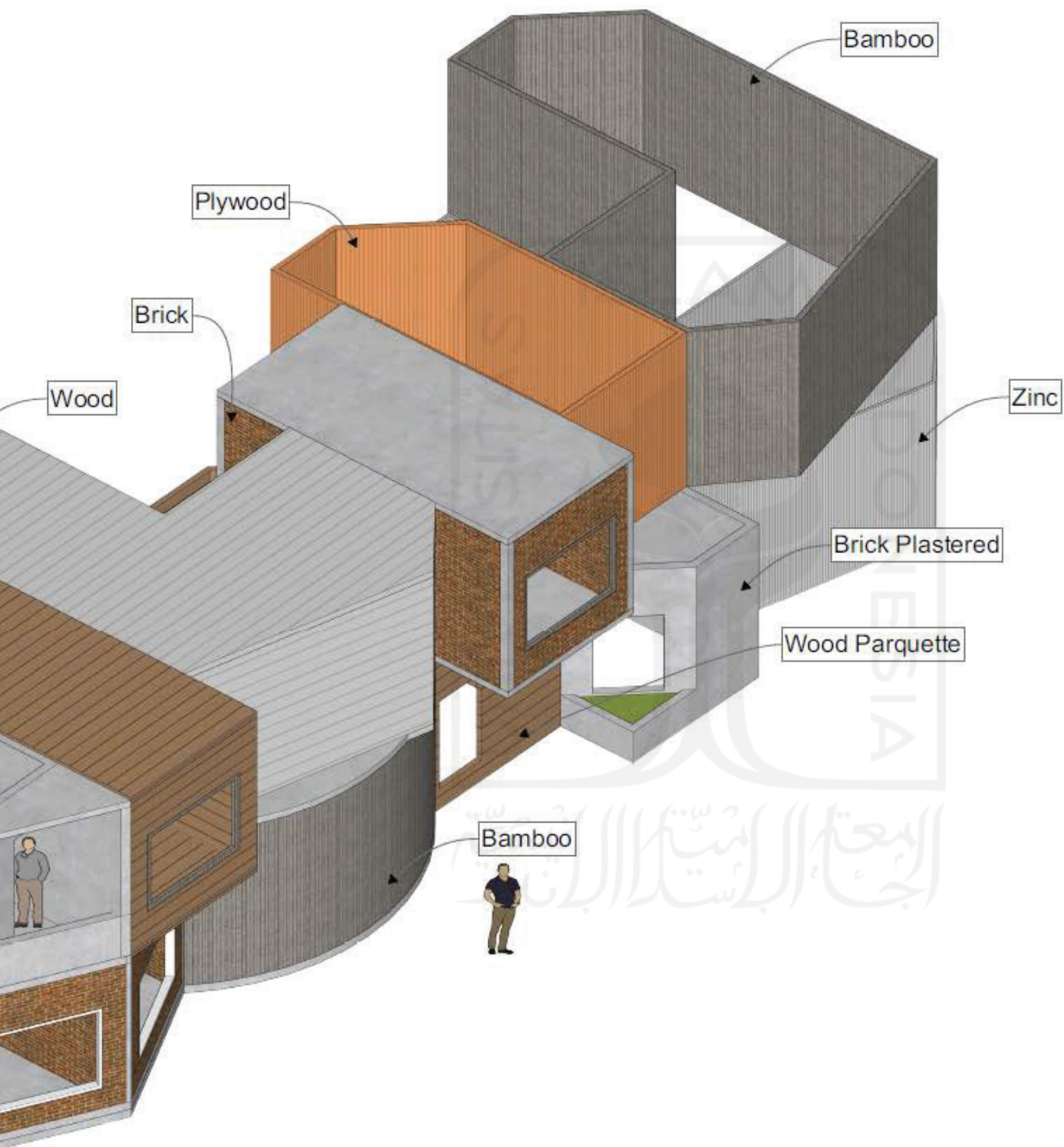
Material Variety

The Infill variety also work on the material of the houses. Each user has the choice to use any material they have, there's no limitation on exploring any material they want to have to be use as a part of their houses.

Even the users can use their used material, or even combined it with the new one. Brick combine with wood, wood combine with used bamboo, etc.

With all those chance, users can have the houses based on what they need, or they preferences, or even they tastes.







04

Final Design

Master Plan

Site Plan

Ground Floor Plan

1st Floor Plan

Barrier Free Plan

Evacuation Route GF Plan

Evacuation Route 1st Floor Plan

Plumbing Ground Floor Plan

Plumbing 1st Floor Plan

Site Section

Section Mushola - Toilet

Section Open Space

Section Kitchen - Modul

Section Modul - Modul

Section Modul - Void

MEP Details

Infill Structure Details

Site Axonometric

Site Axonometric

Site Aerial View

Site Aerial View

Exterior Perspective

Interior Perspective

Support

Public Toilet

Public Kitchen

Musholla

Infill

Layout Variety

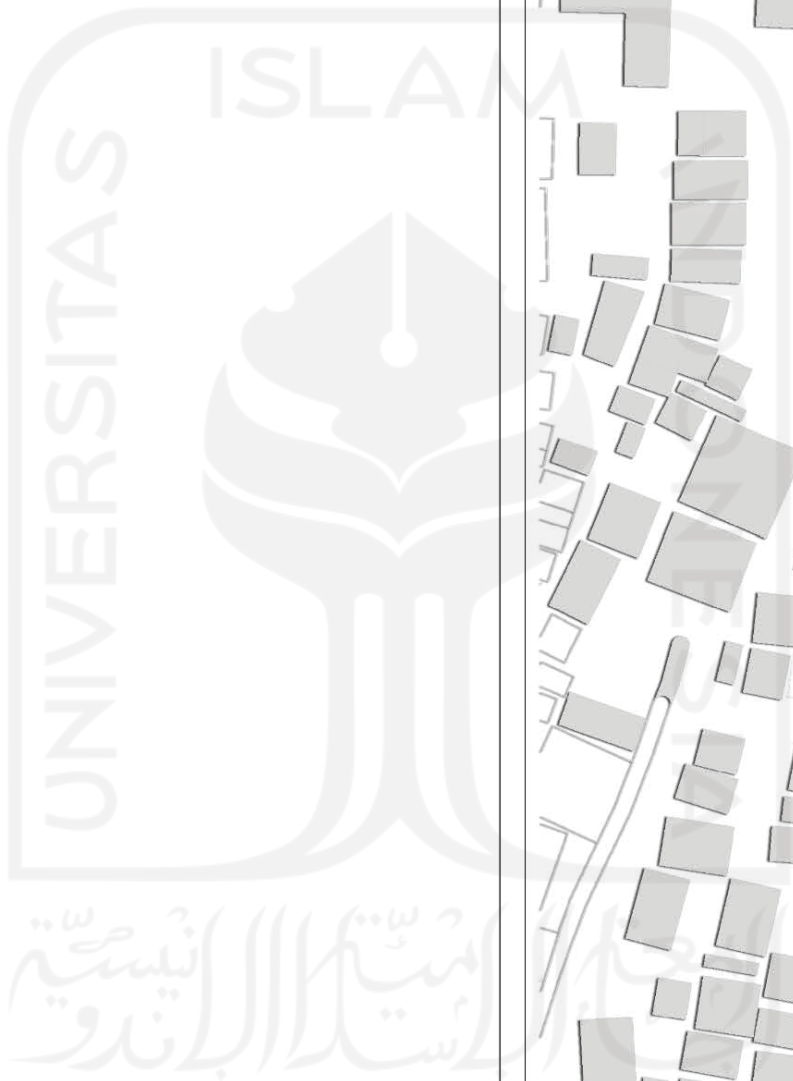
Furniture Variety

Material Variety

Owner Scenario

FINAL DESIGN

Masterplan



LEGENDS

- 1. Site
- 2. Krukut River
- 3. Main Building
- 4. Amphitheater
- 5. High Rise Building
- 6. Dense Residential
- 7. Existing Field



FINAL DESIGN

Site Plan



LEGENDS

- 1. Public Garden
- 2. Main Building

FINAL DESIGN

Ground Floor Plan

LEGENDS

1. Entrance
2. Open Space
3. Musholla
4. Toilet
5. Public Kitchen
6. Building Corridor
7. Infill House
8. Void Space



FINAL DESIGN

1st Floor Plan

LEGENDS

1. Stairs
2. Open Space
3. Musholla
4. Toilet
5. Public Kitchen
6. Building Corridor
7. Infill House
8. Void Space

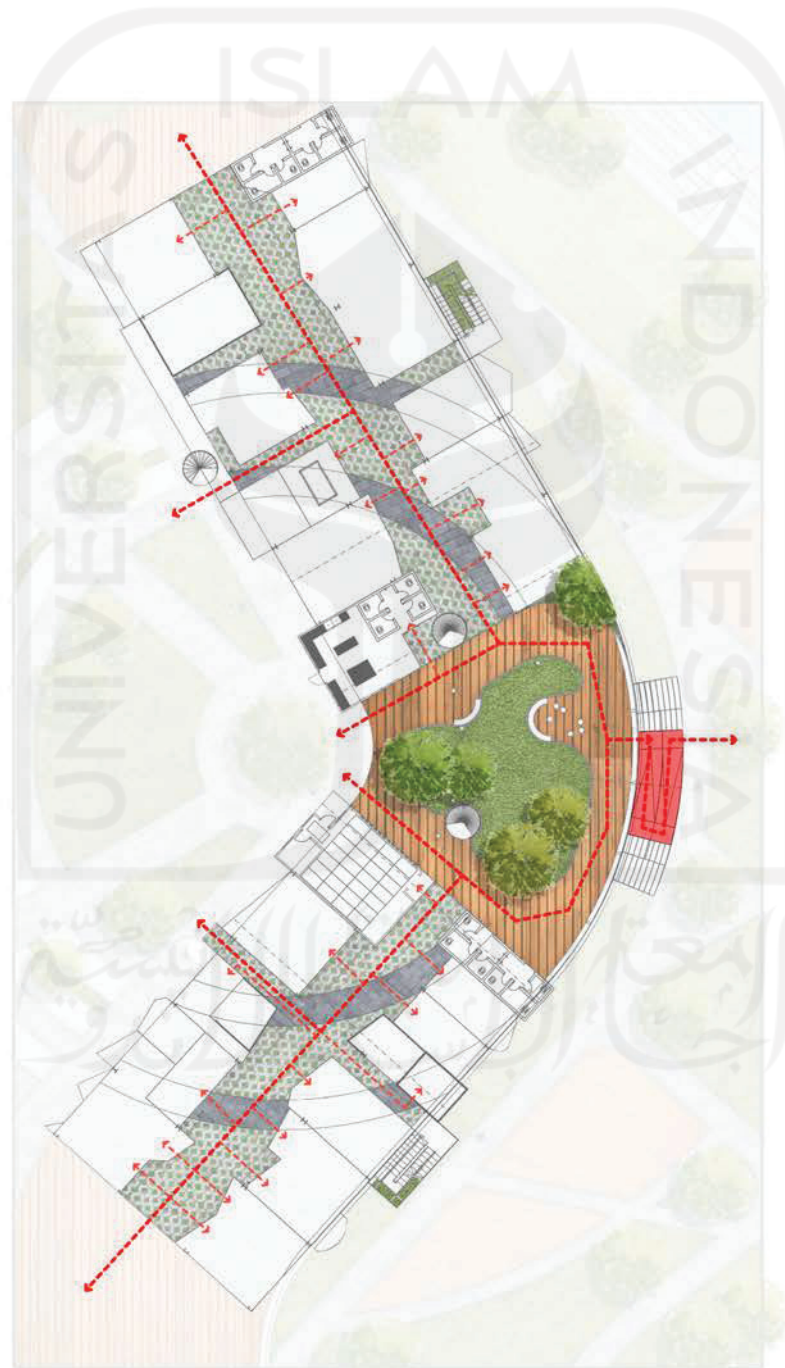


FINAL DESIGN

Barrier Free Plan

LEGENDS

- > Main Diffable Access
- > Housing Diffable Access
- Ramp



FINAL DESIGN

Evacuation Route Ground Floor

LEGENDS

- Evacuation Route
- Fire Extinguisher
- Stairs and Ramp

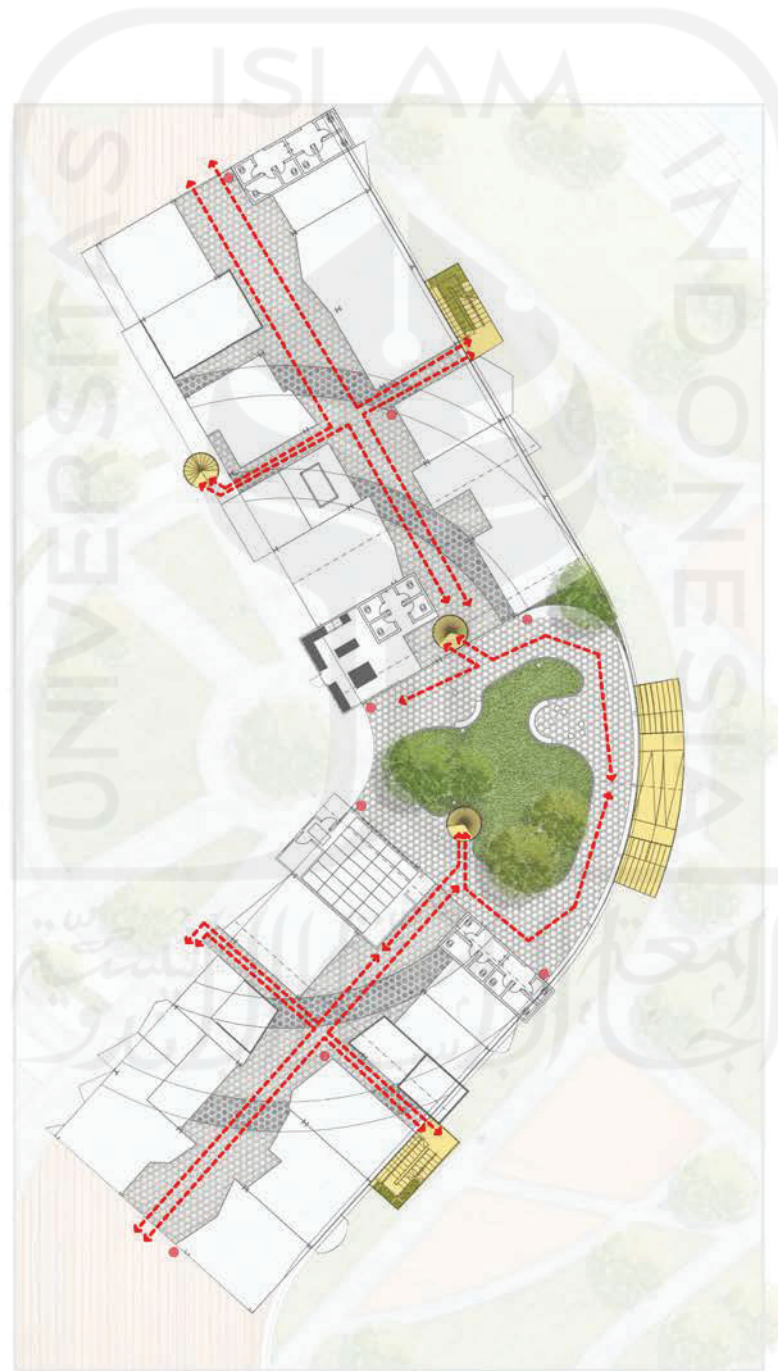


FINAL DESIGN

Evacuation Route 1st Floor Plan

LEGENDS

- > Evacuation Route
- Fire Extinguisher
- Stairs and Ramp



FINAL DESIGN

Plumbing Ground Floor Plan

LEGENDS

- Clean Water
- Black Water
- Grey (oily) Water
- Ground Water Tank
- Septictank
- Kitchen Gutter



FINAL DESIGN

Plumbing 1st Floor Plan

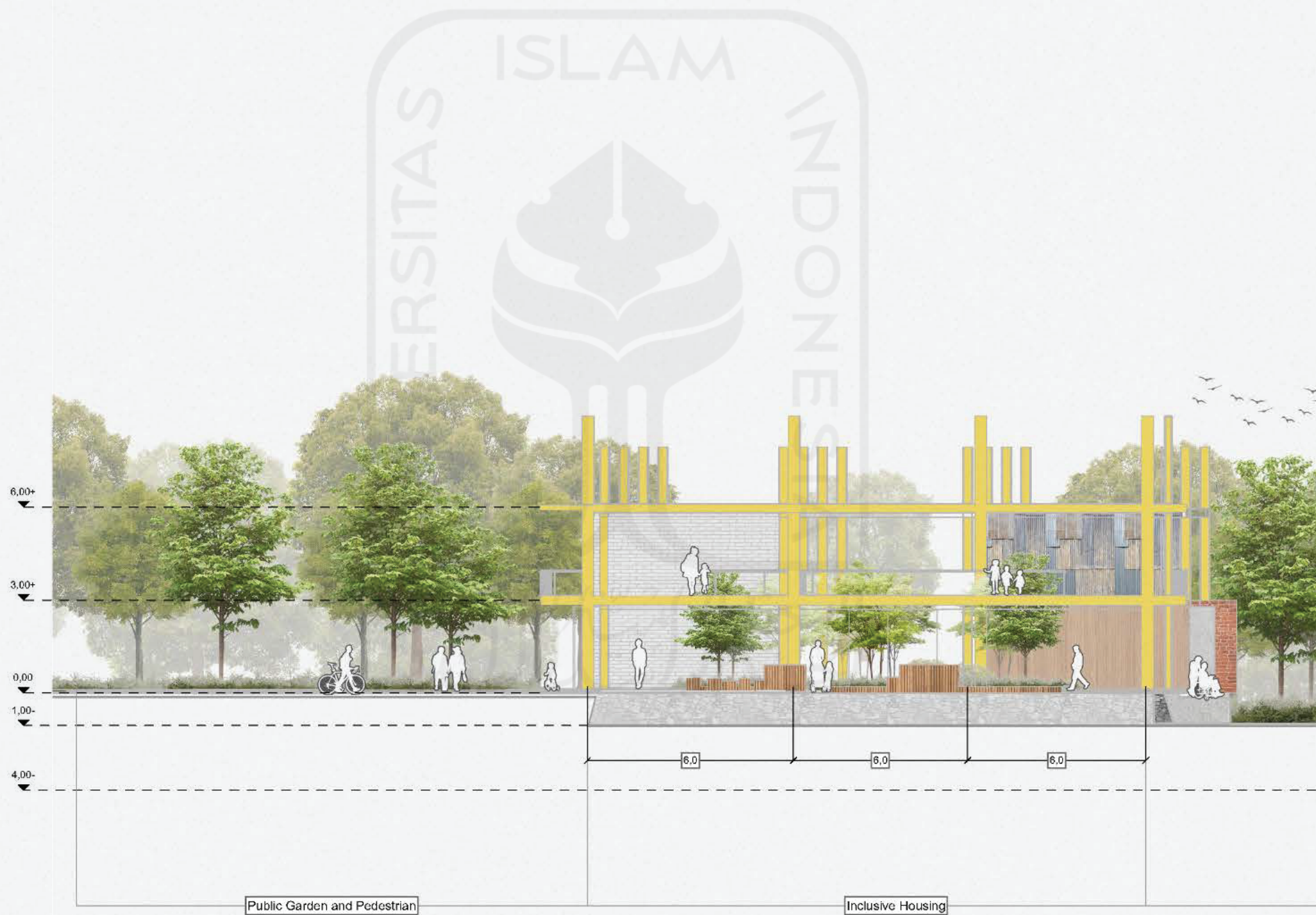
LEGENDS

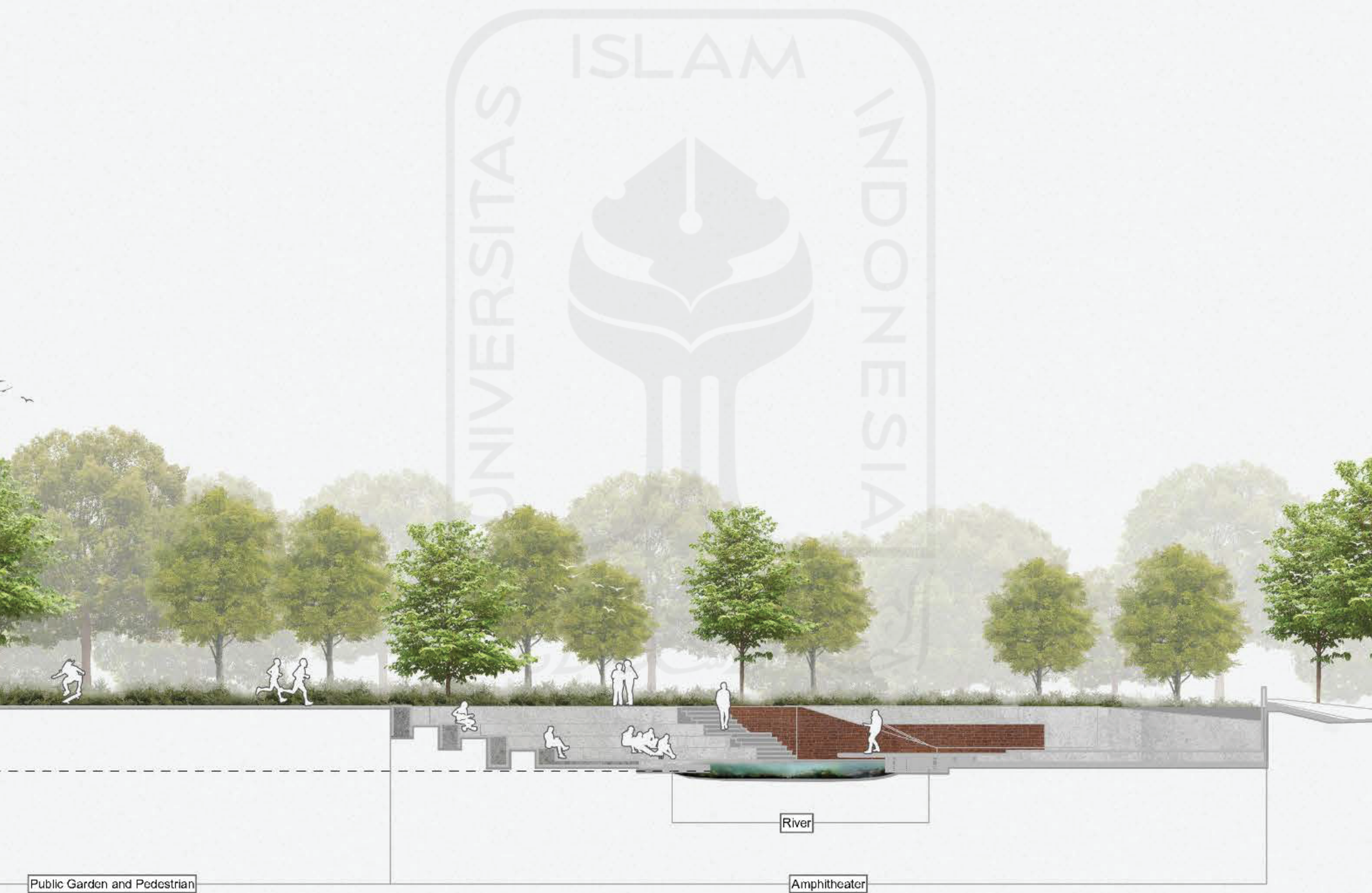
- Clean Water
- Black Water
- Grey (oil) Water
- Ground Water Tank
- Septictank
- Kitchen Gutter



FINAL DESIGN

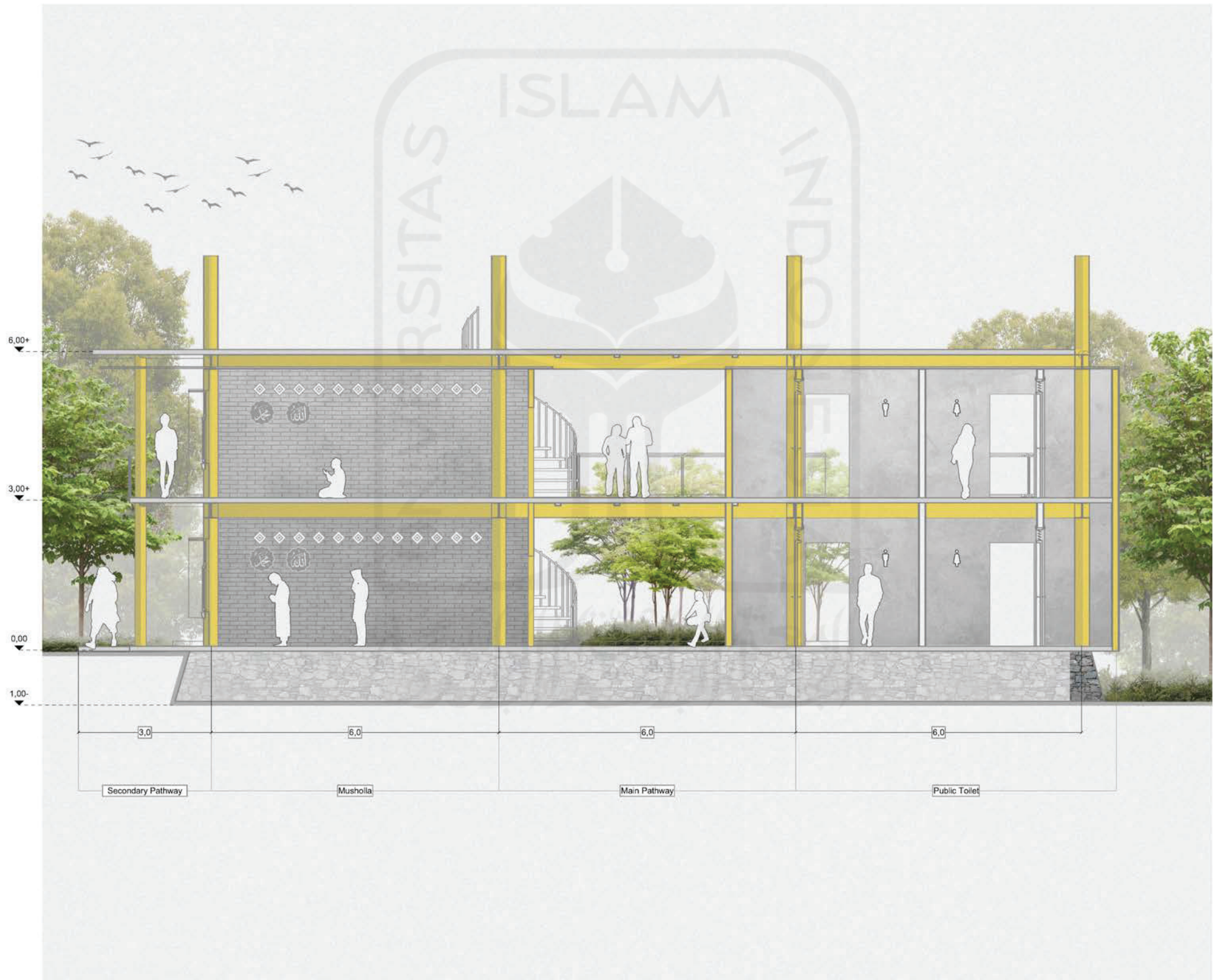
Site Section





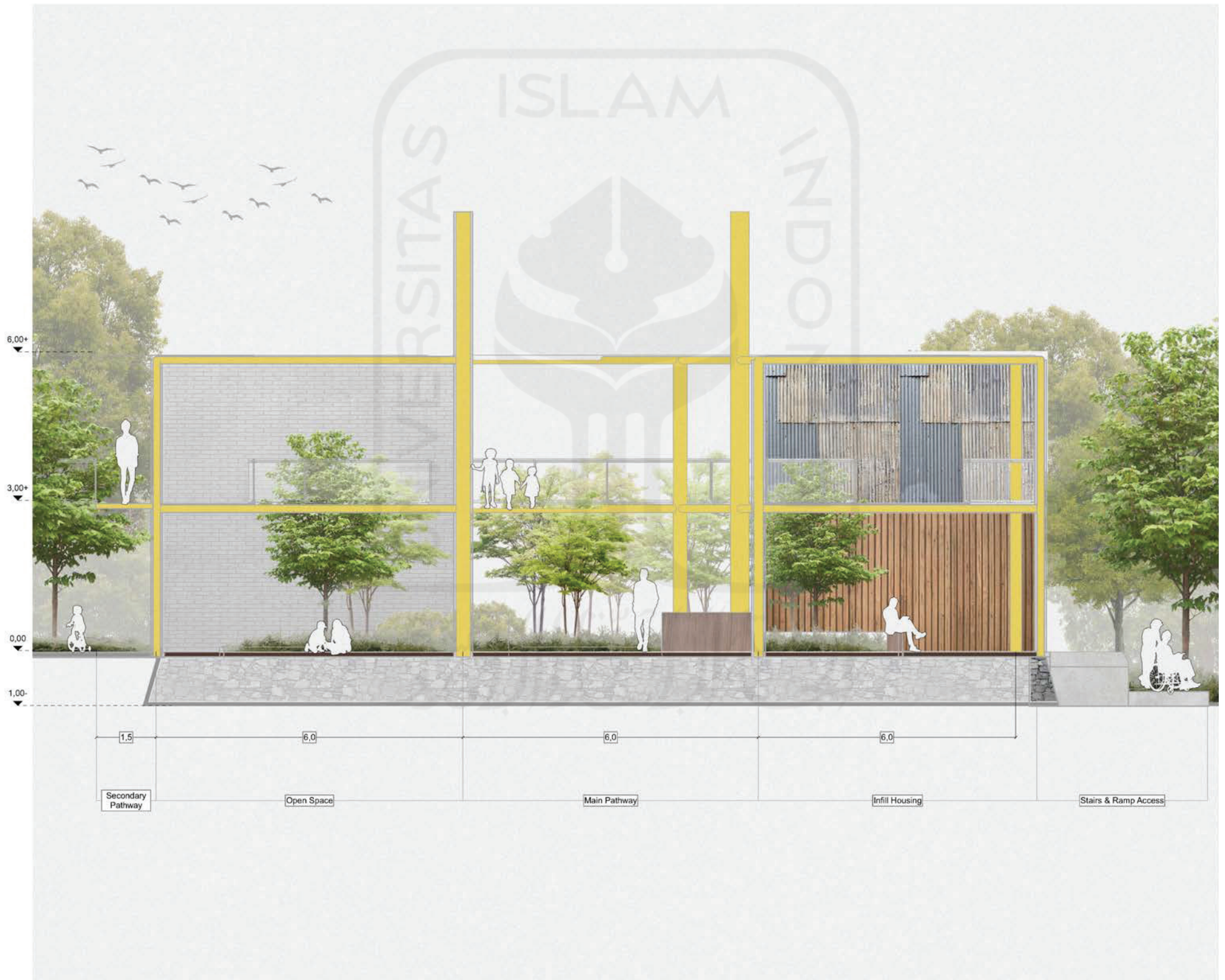
FINAL DESIGN

Site Mushola - Toilet



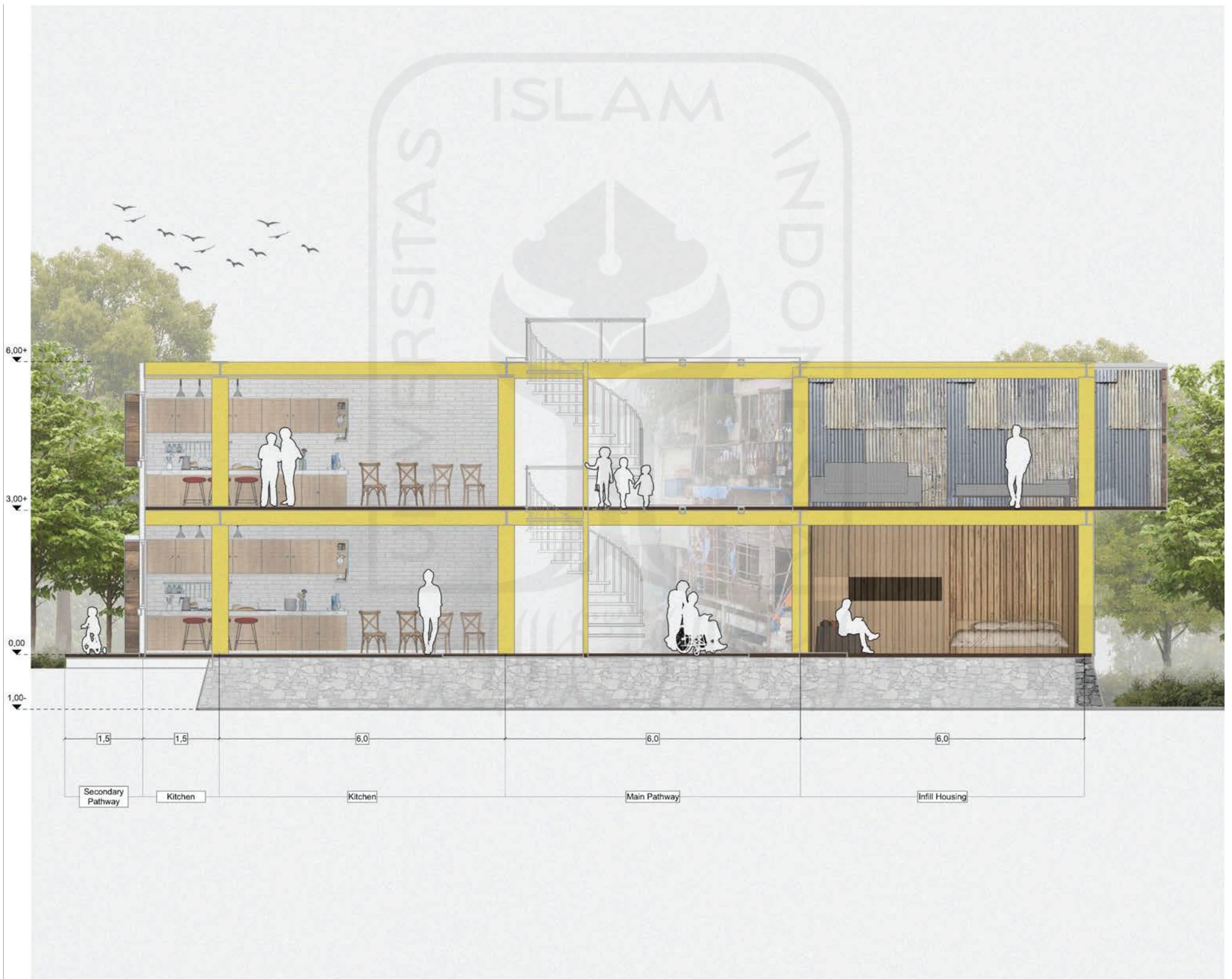
FINAL DESIGN

Site Open Space



FINAL DESIGN

Site Kitchen - Modul



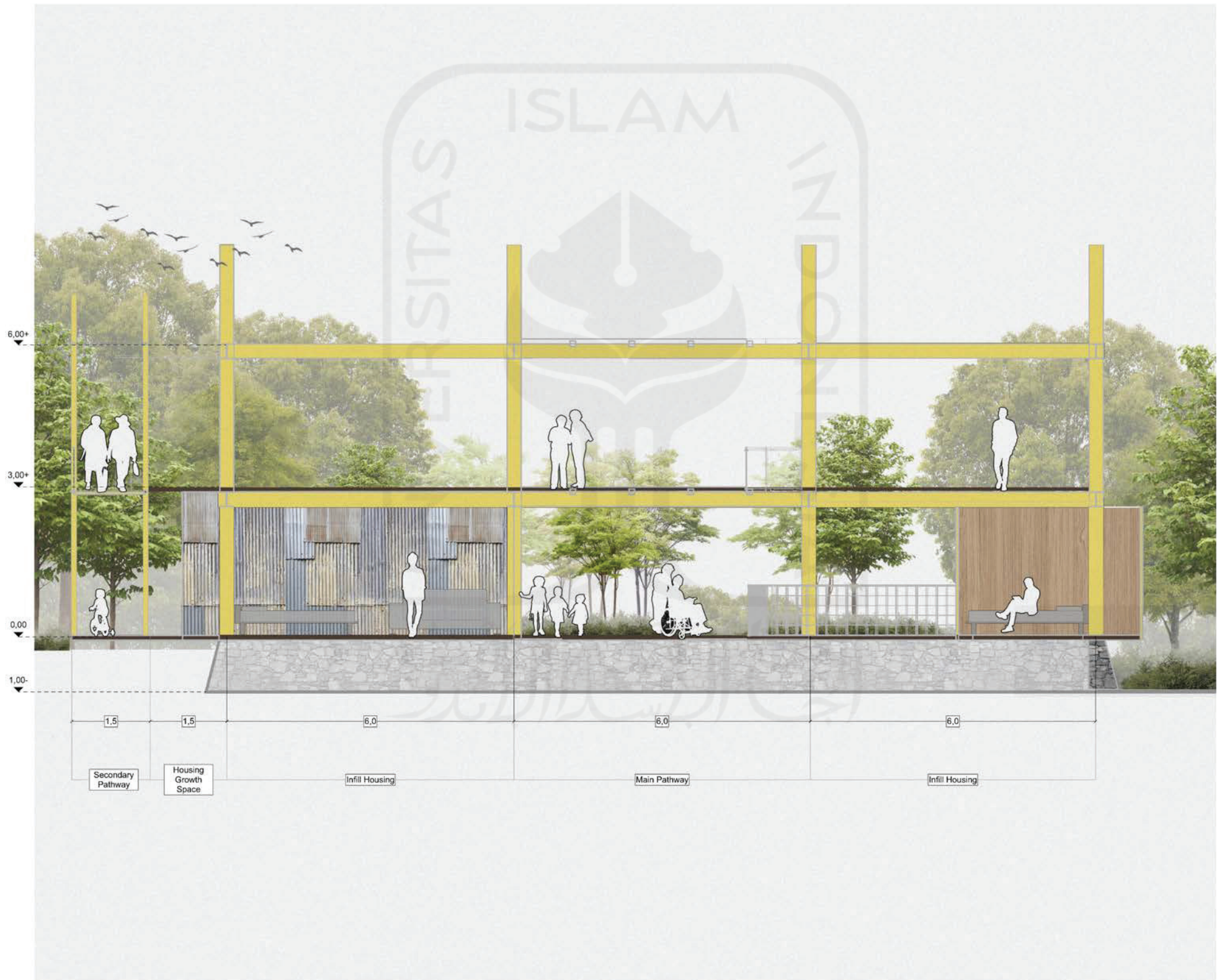
FINAL DESIGN

Site Modul - Modul



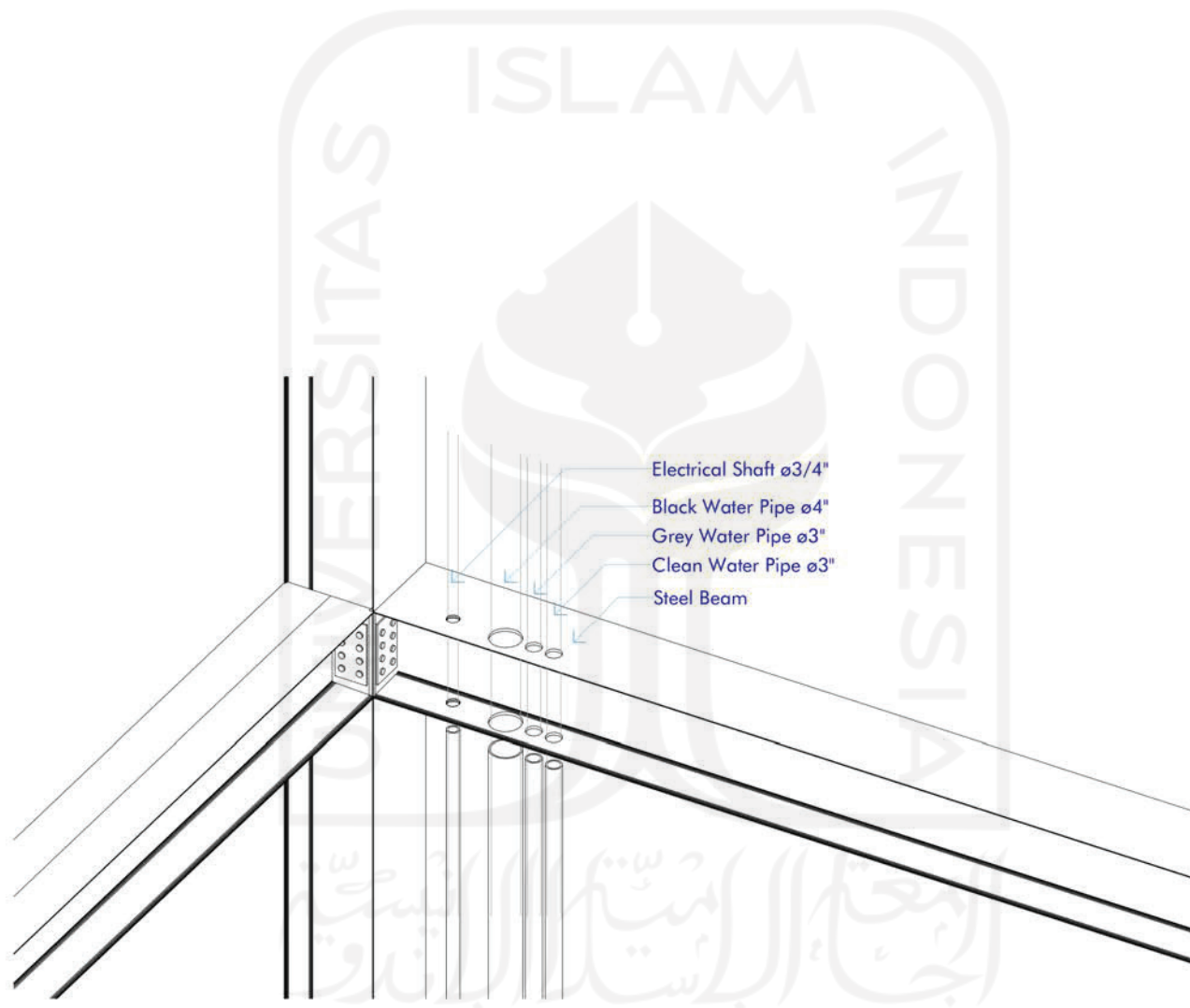
FINAL DESIGN

Site Modul - Void



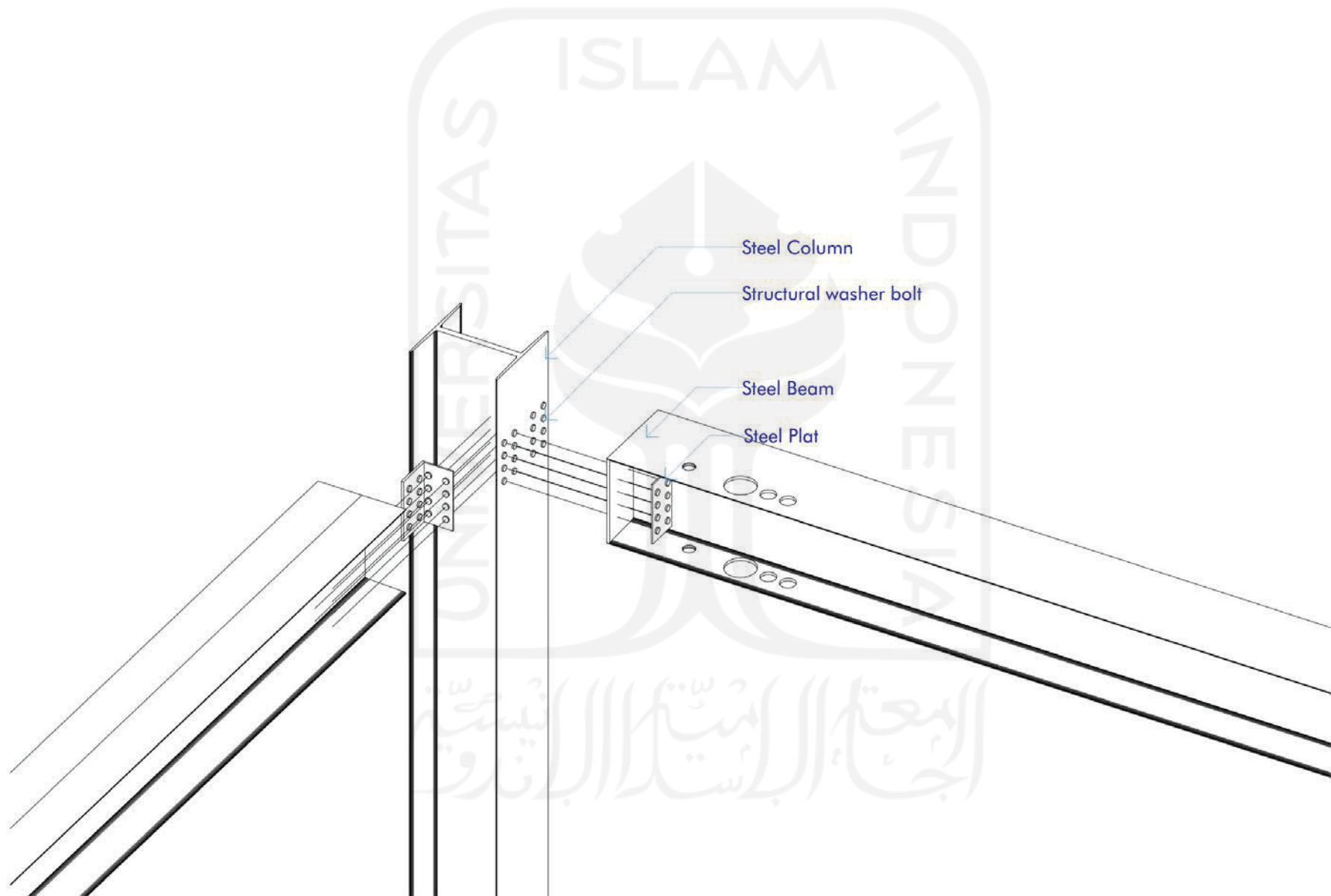
FINAL DESIGN

Detail MEP



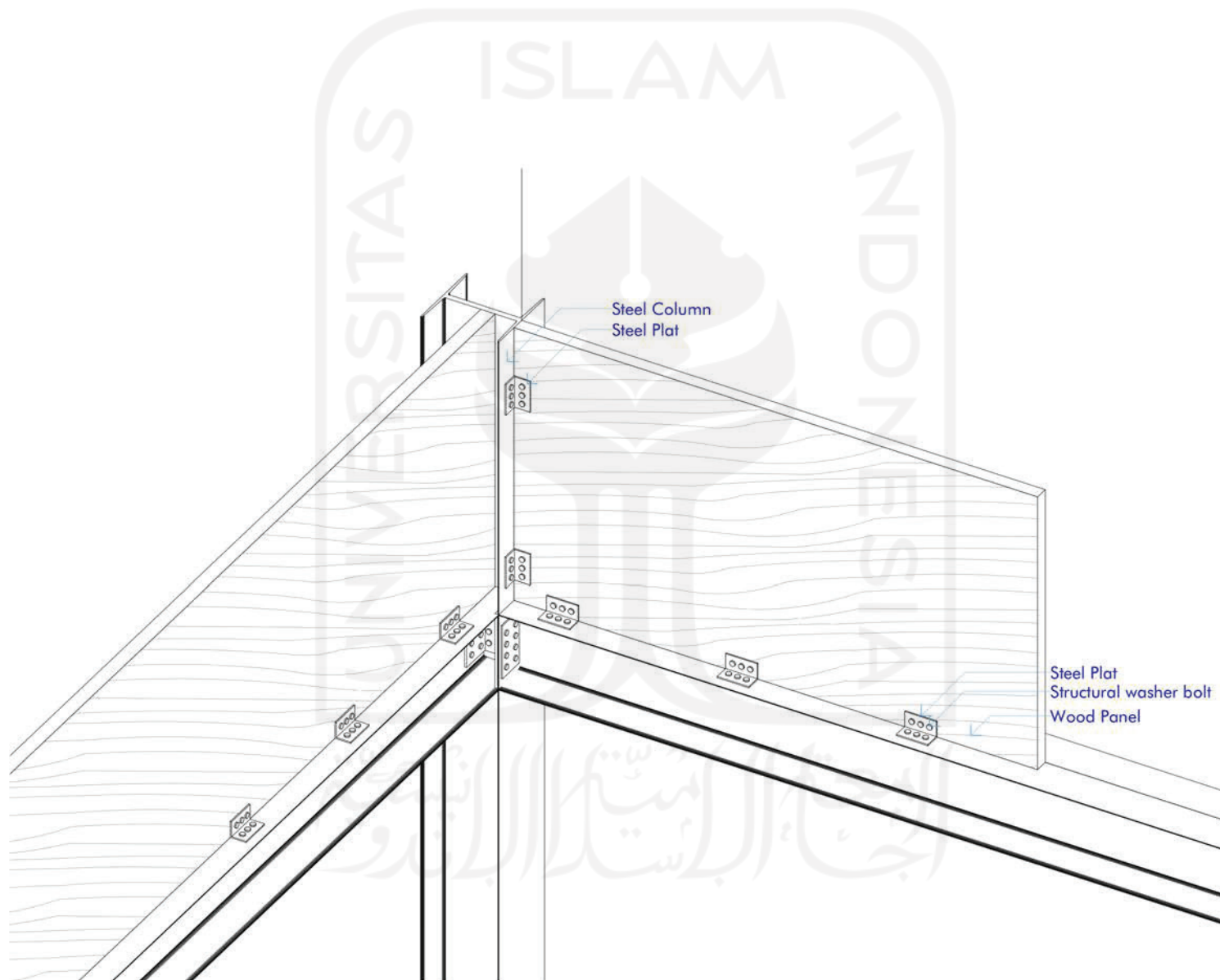
FINAL DESIGN

Detail Infill Structure: Steel - Steel



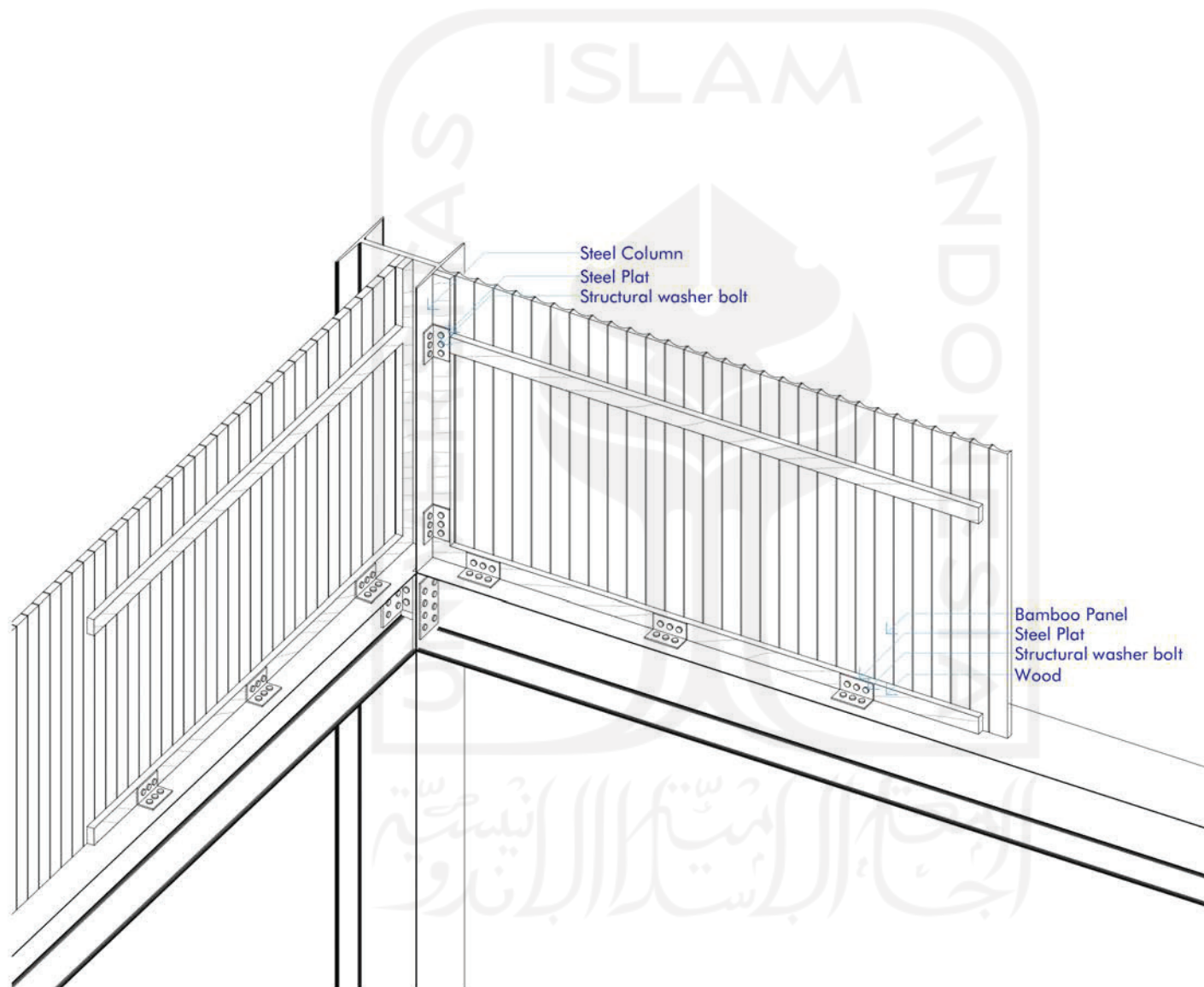
FINAL DESIGN

Detail Infill Structure: Steel - Wood



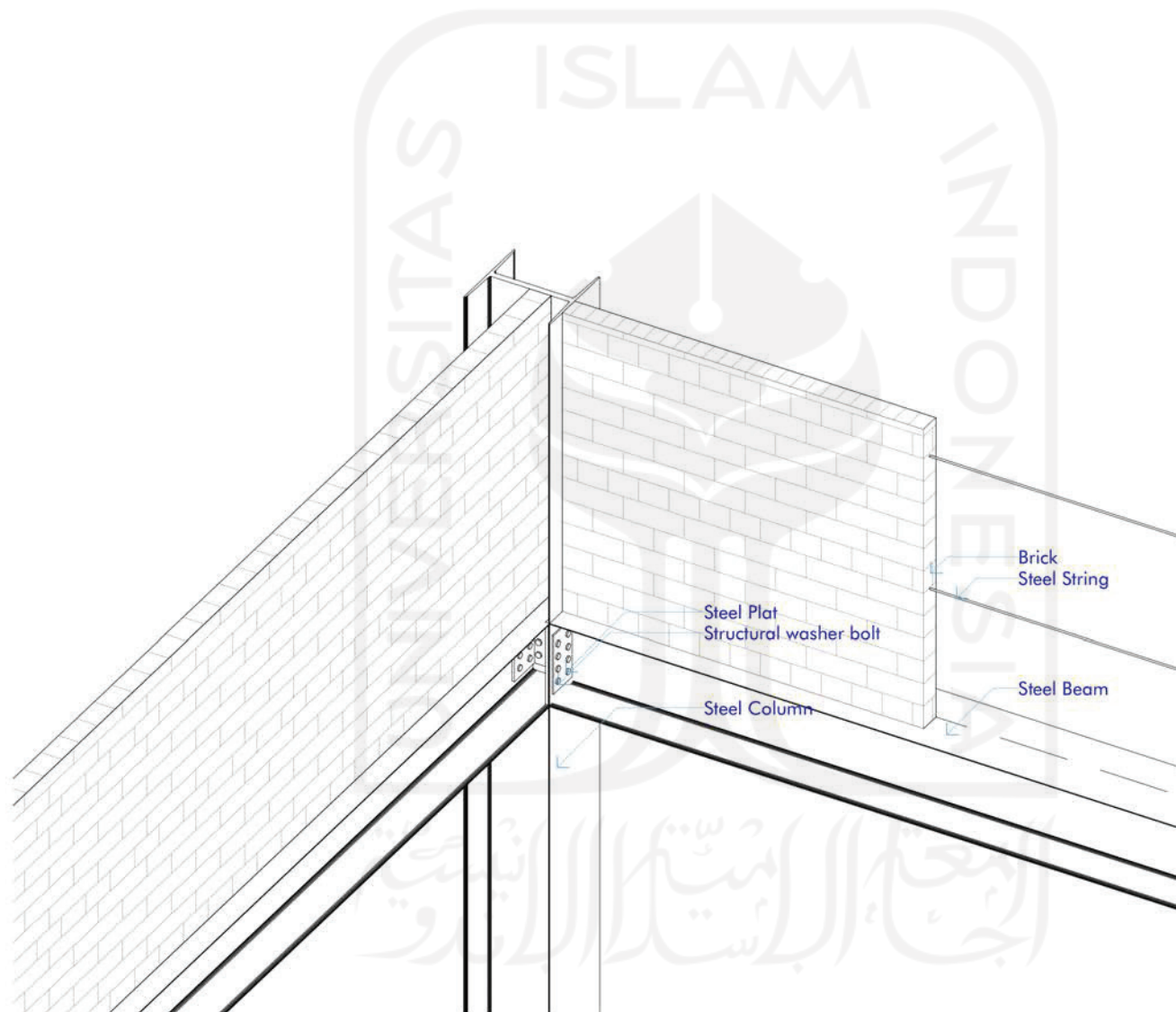
FINAL DESIGN

Detail Infill Structure: Steel - Bamboo



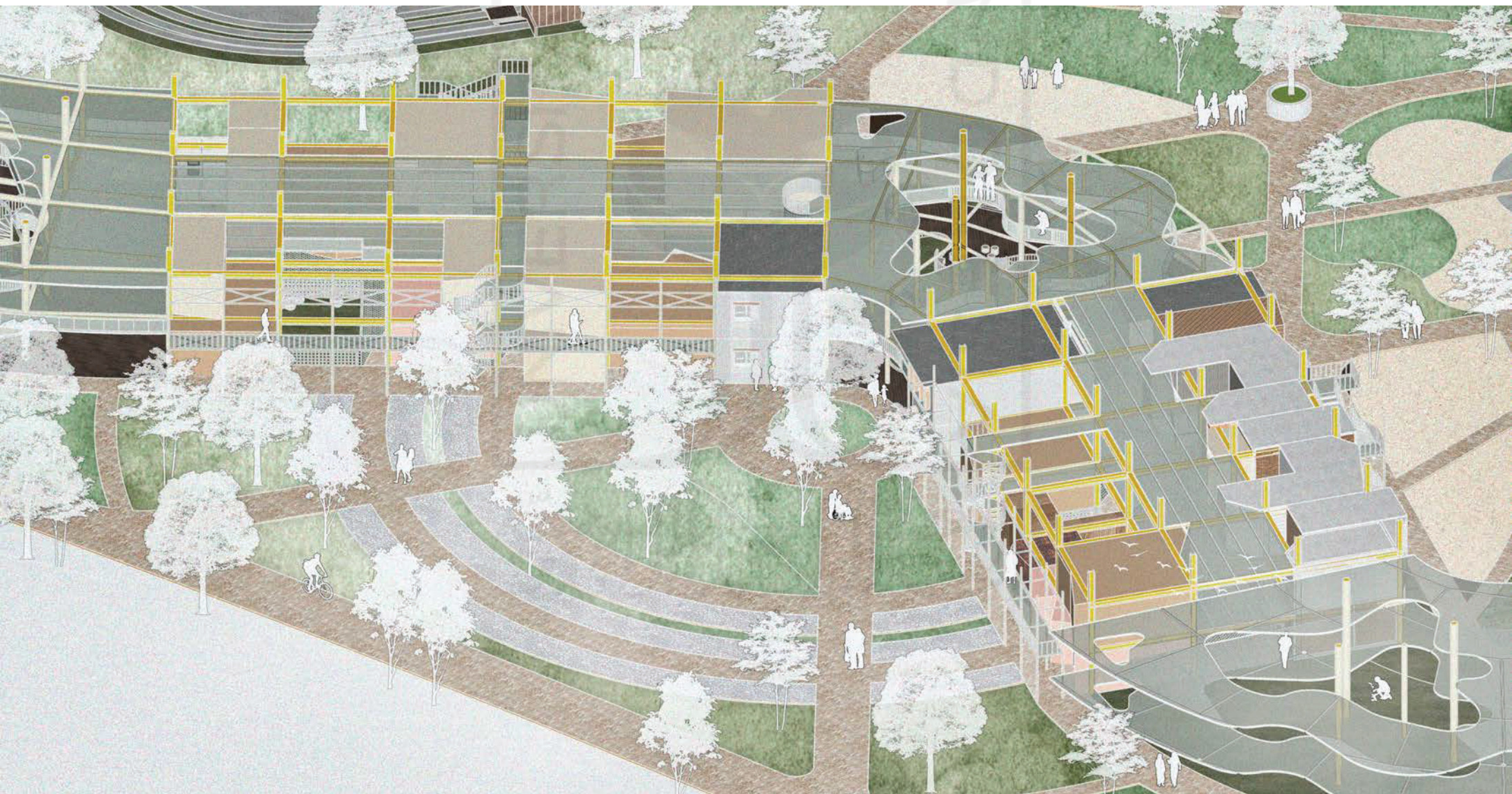
FINAL DESIGN

Detail Infill Structure: Steel - Brick



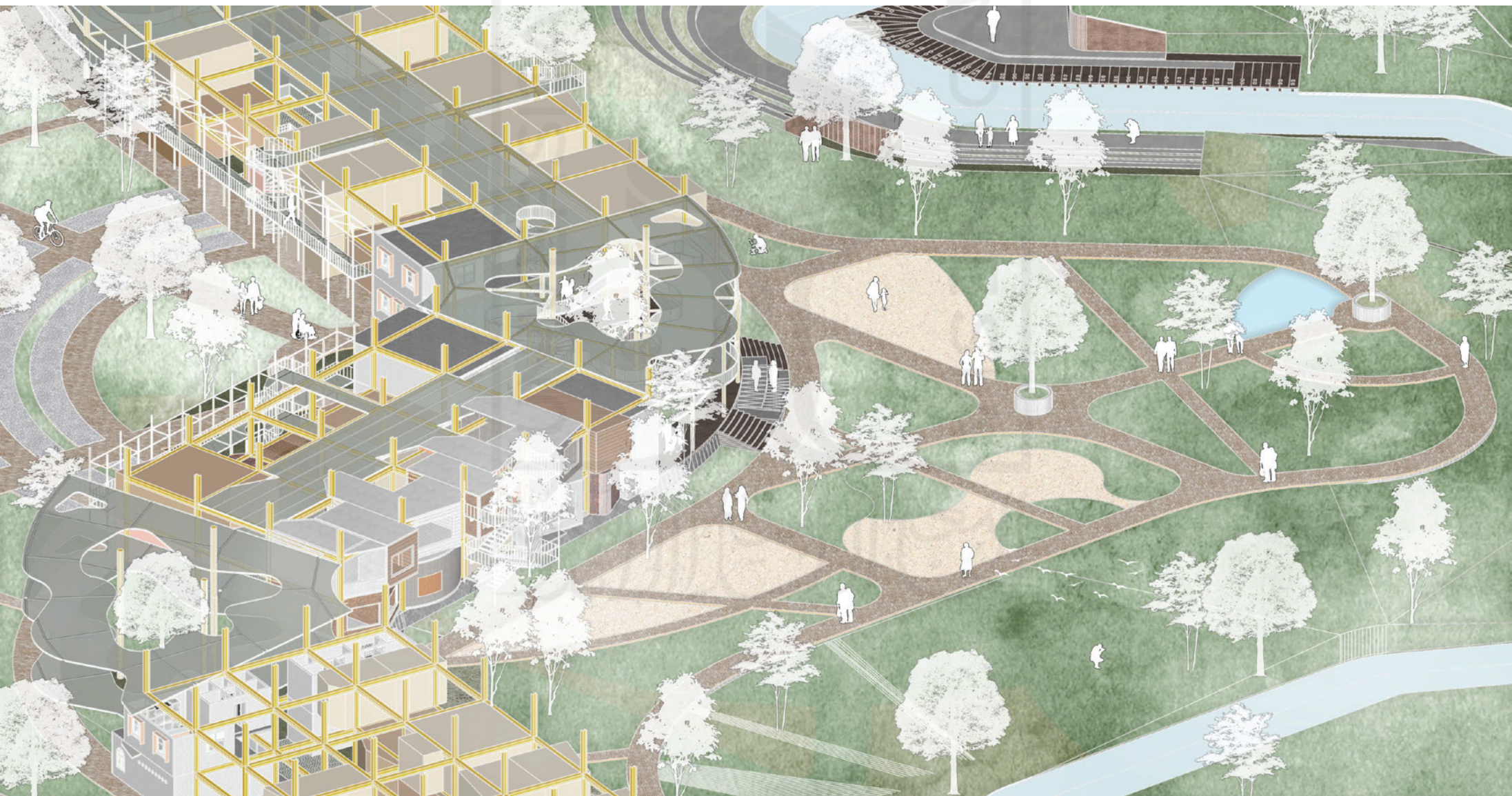
FINAL DESIGN

Site Axonometric



FINAL DESIGN

Site Axonometric



FINAL DESIGN

Site Aerial View



FINAL DESIGN

Site Aerial View



FINAL DESIGN

Exterior Perspective



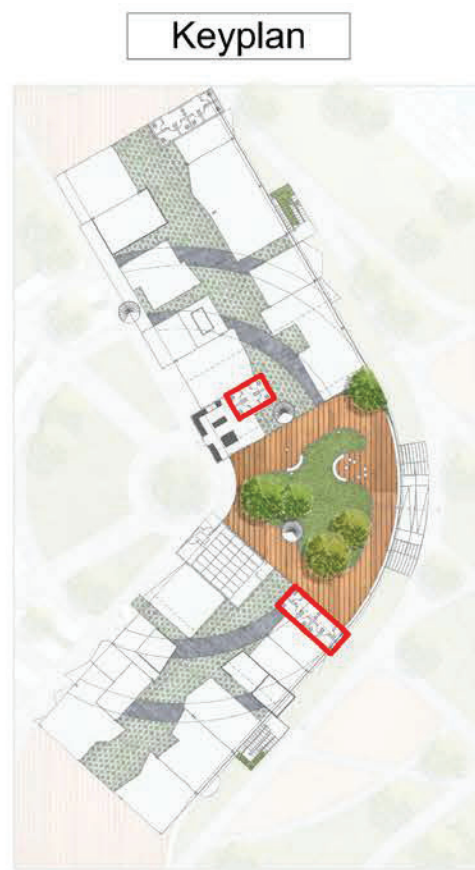
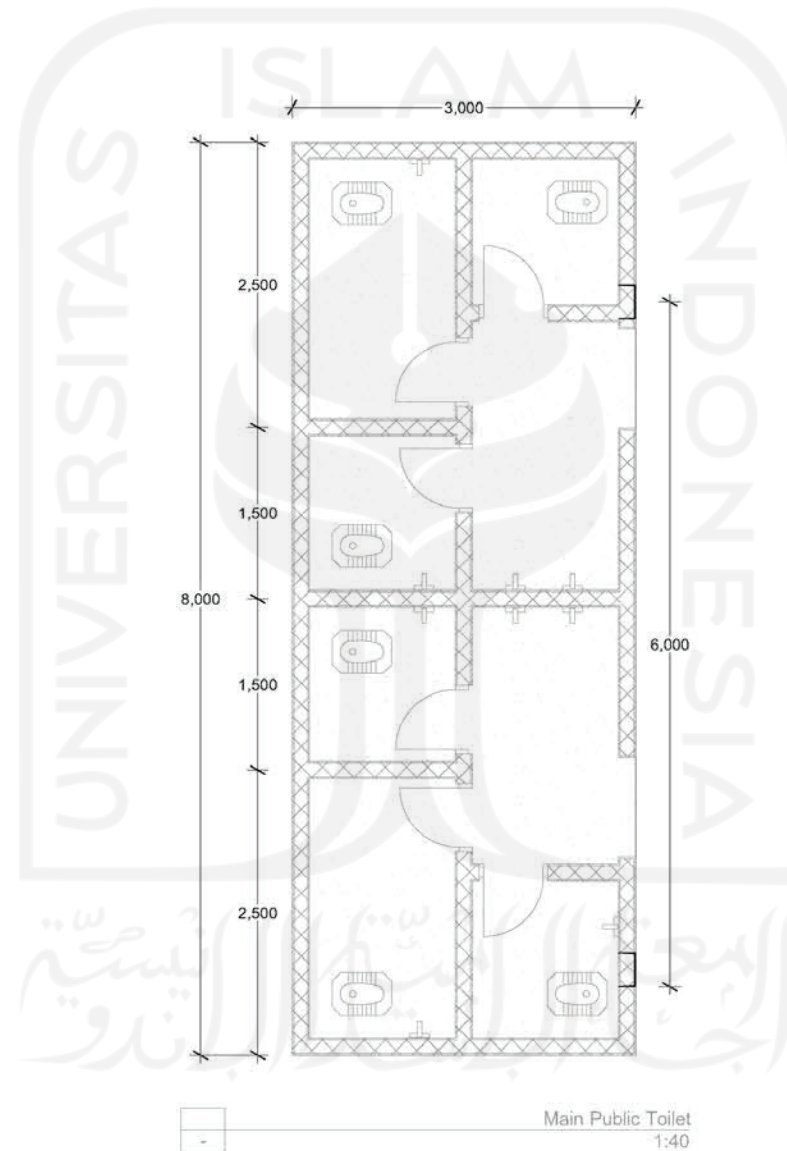
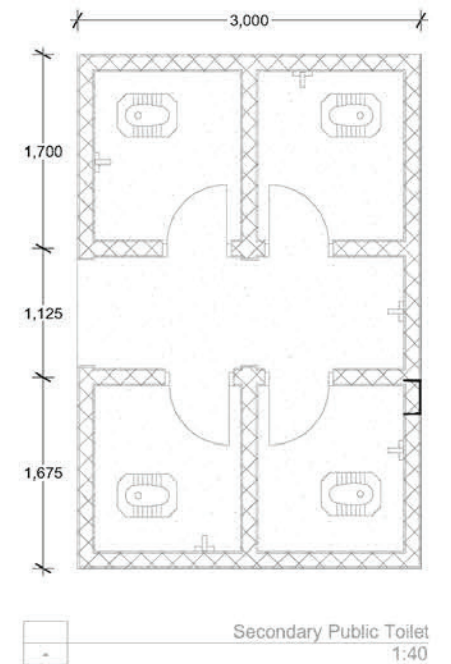
FINAL DESIGN

Interior Perspective



FINAL DESIGN

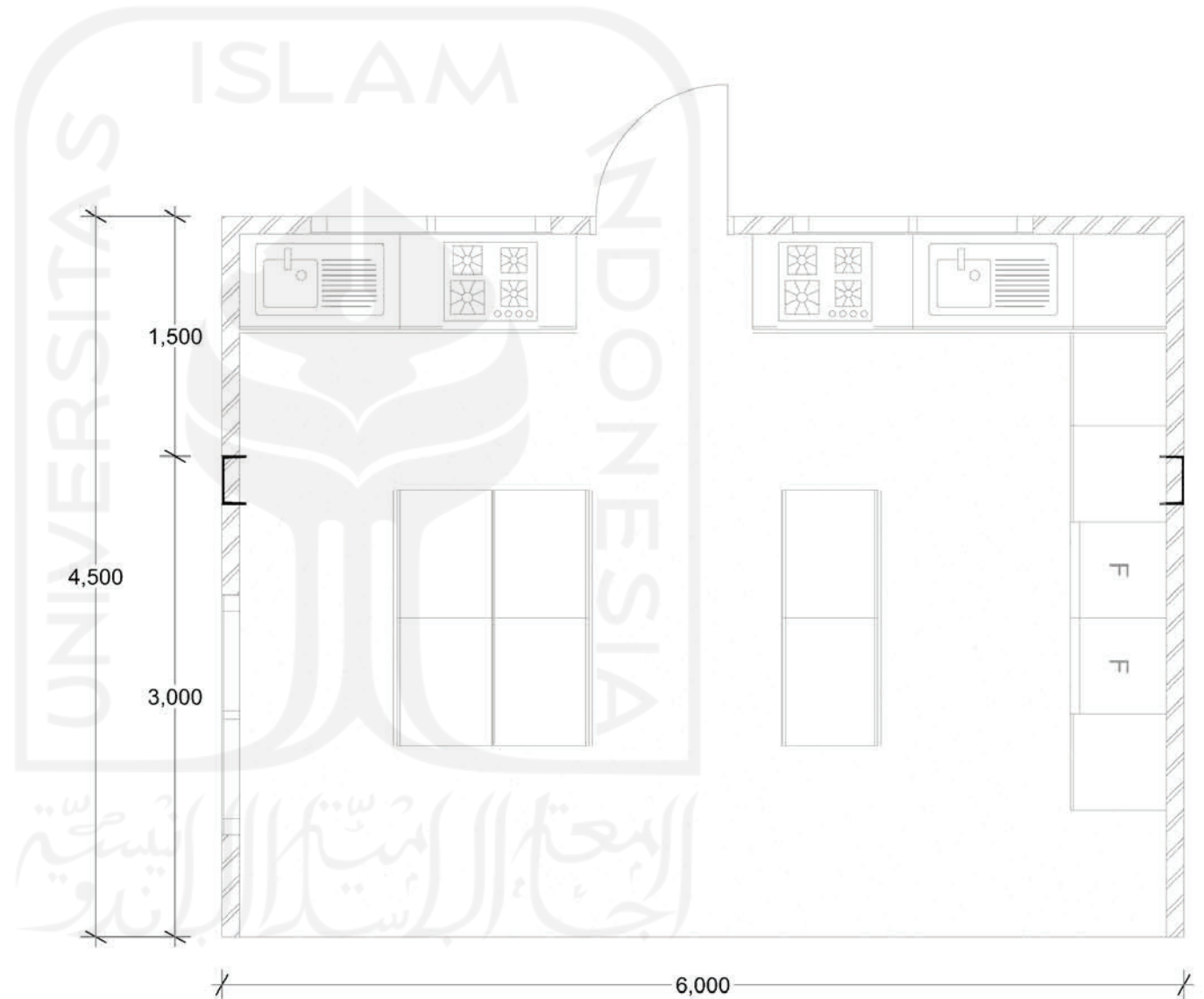
Support: Public Toilet



FINAL DESIGN

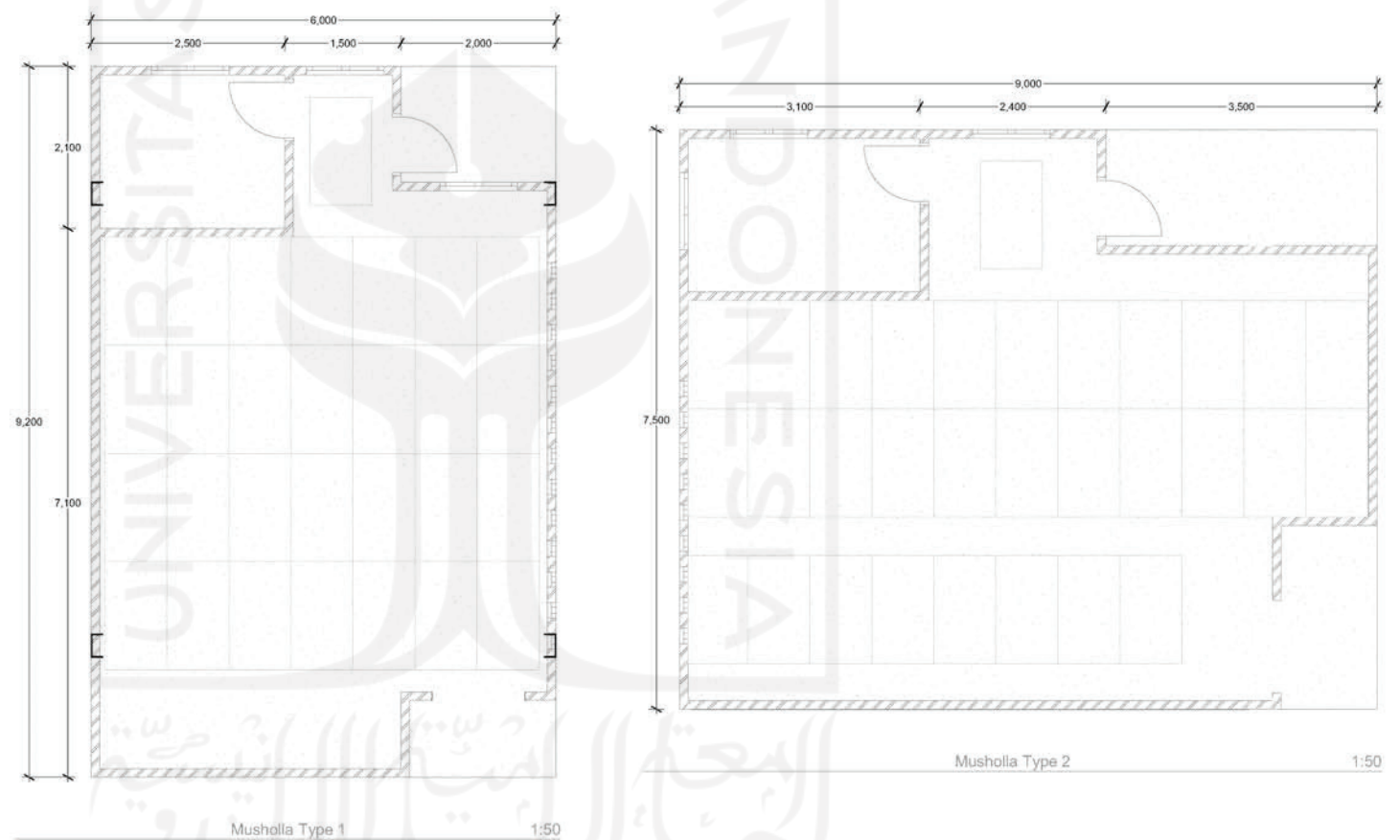
Support: Public Kitchen

Keyplan



FINAL DESIGN

Support: Musholla



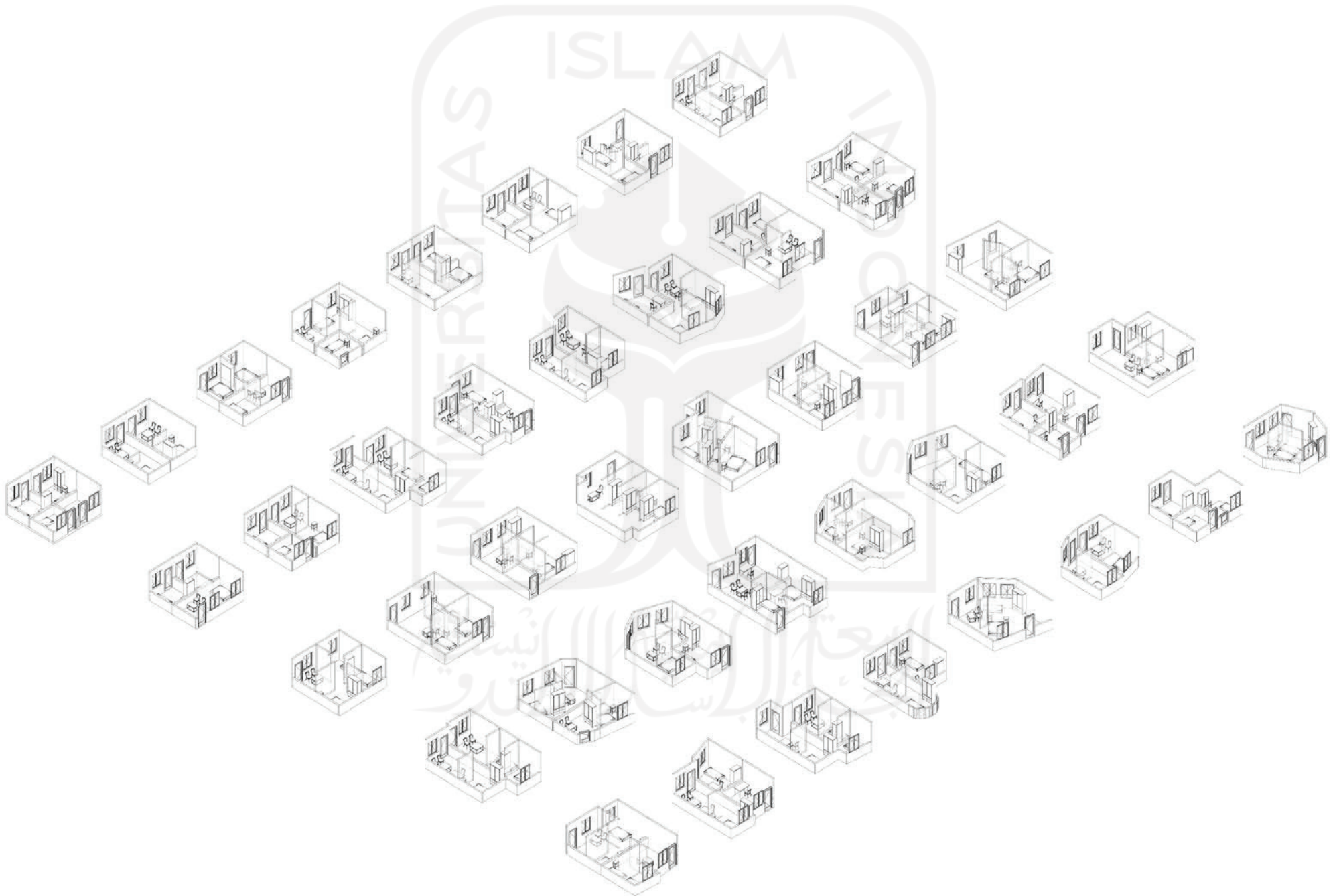
FINAL DESIGN

Infill: Layout Variety



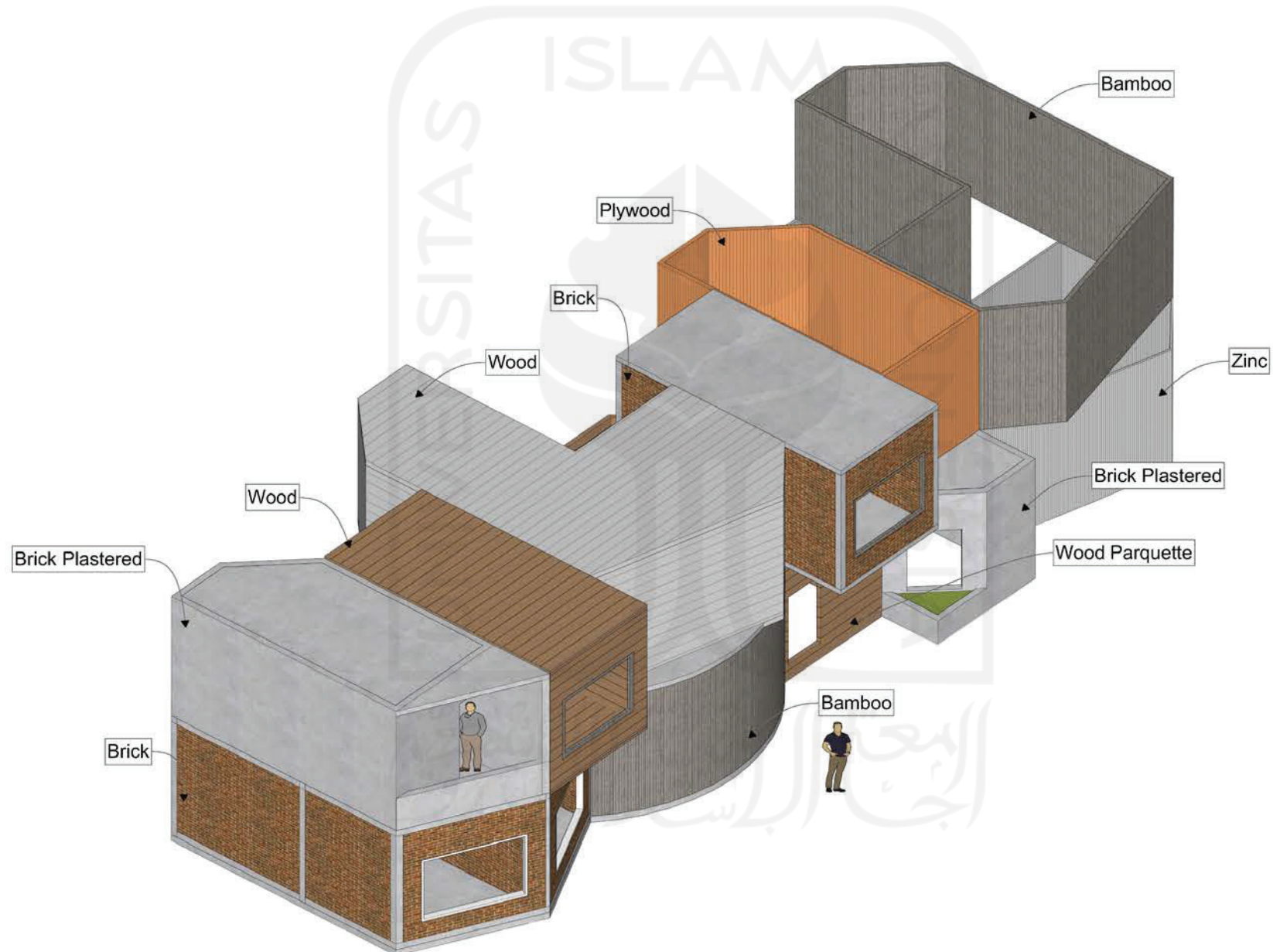
FINAL DESIGN

Infill: Furniture Variety

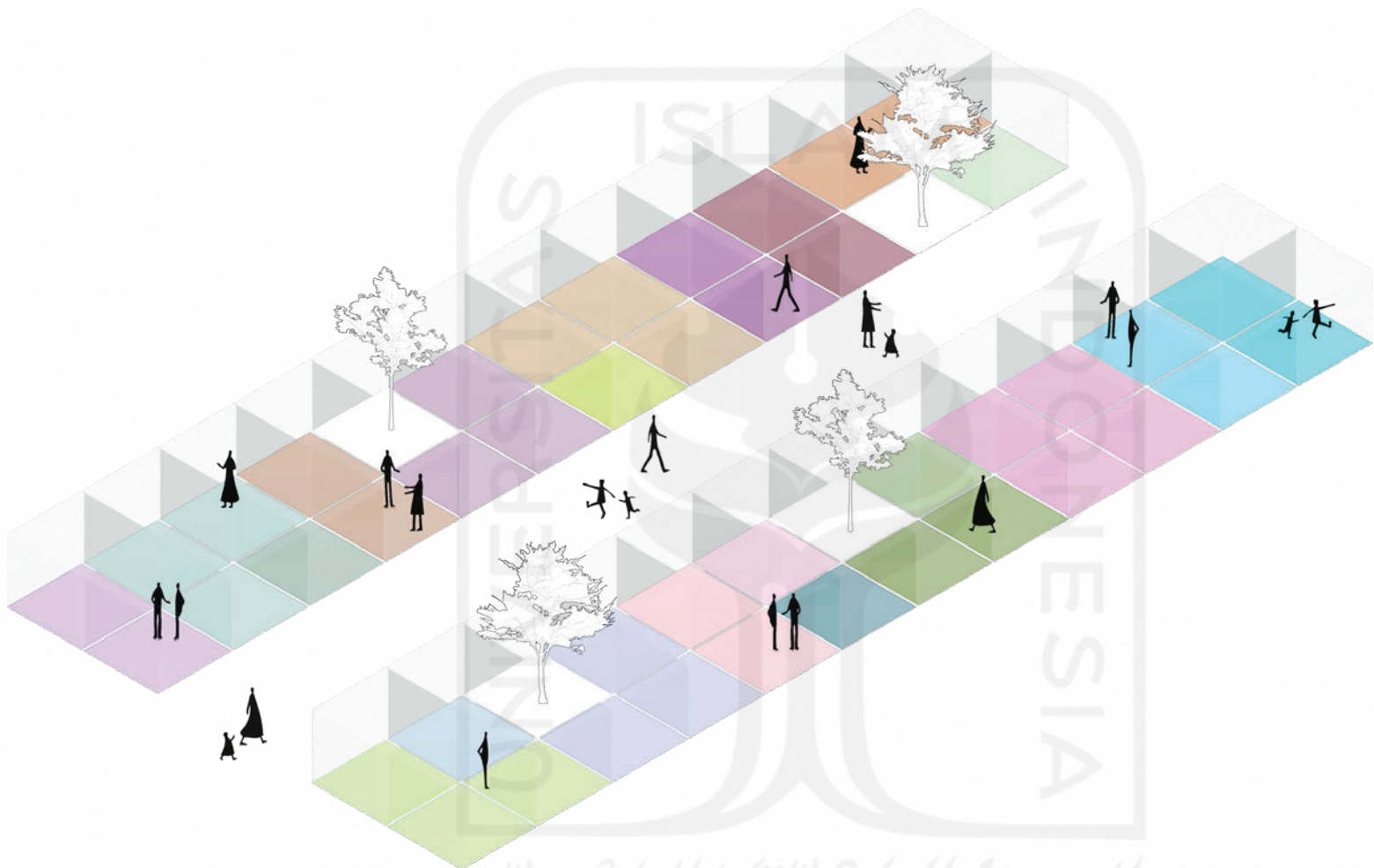


FINAL DESIGN

Infill: Material Variety



Infill: Owner Scenario 1

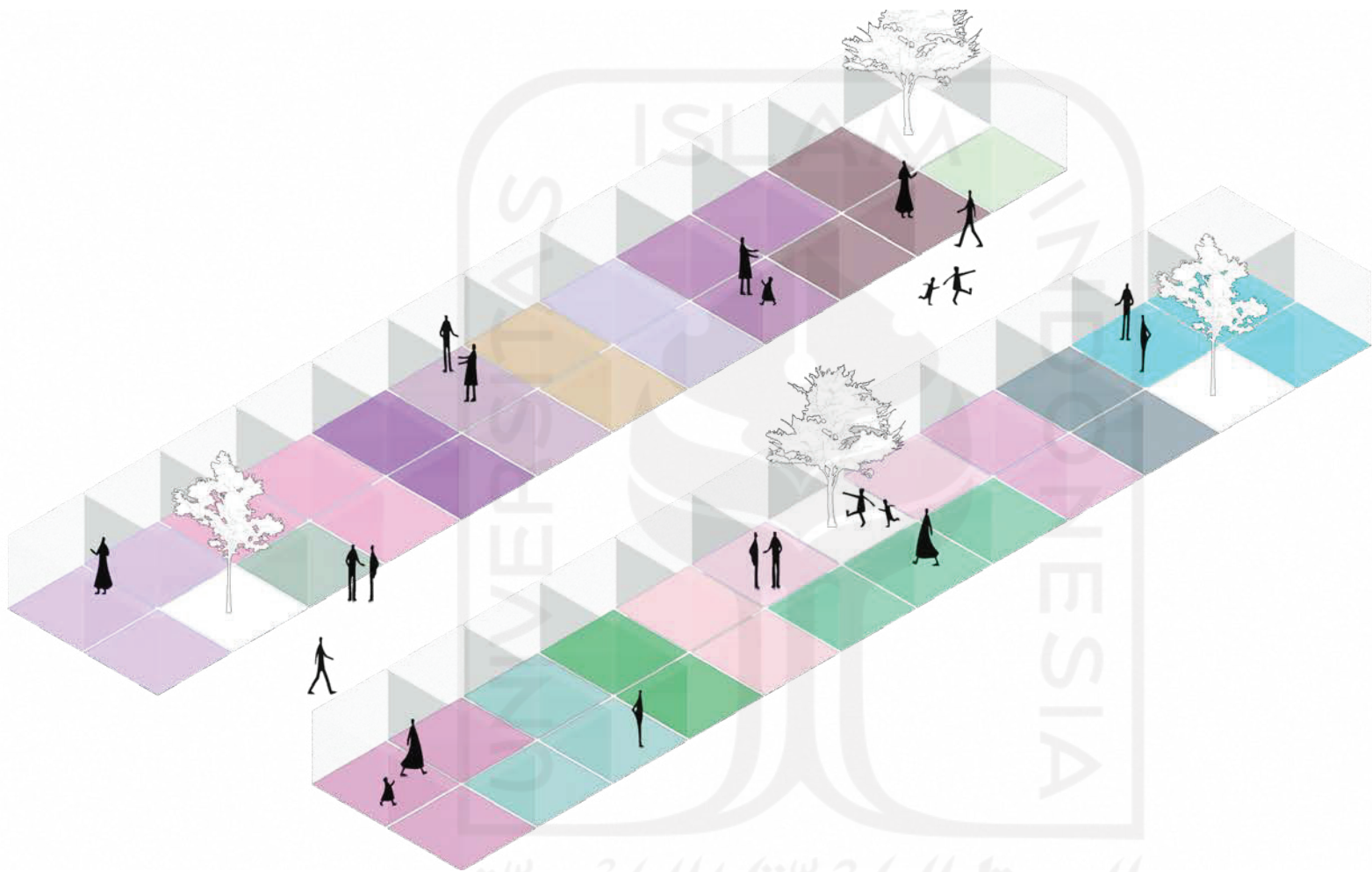


LEGENDS

Owner 1: 18 m²	Owner 7: 27 m²	Owner 13: 18 m²	Owner 19: 18 m²
Owner 2: 27 m²	Owner 8: 18 m²	Owner 14: 36 m²	Owner 20: 27 m²
Owner 3: 9 m²	Owner 9: 18 m²	Owner 15: 9 m²	Owner 21: 9 m²
Owner 4: 18 m²	Owner 10: 18 m²	Owner 16: 18 m²	Owner 22: 27 m²
Owner 5: 27 m²	Owner 11: 9 m²	Owner 17: 9 m²	Open Space
Owner 6: 9 m²	Owner 12: 18 m²	Owner 18: 9 m²	

FINAL DESIGN

Infill: Owner Scenario 2

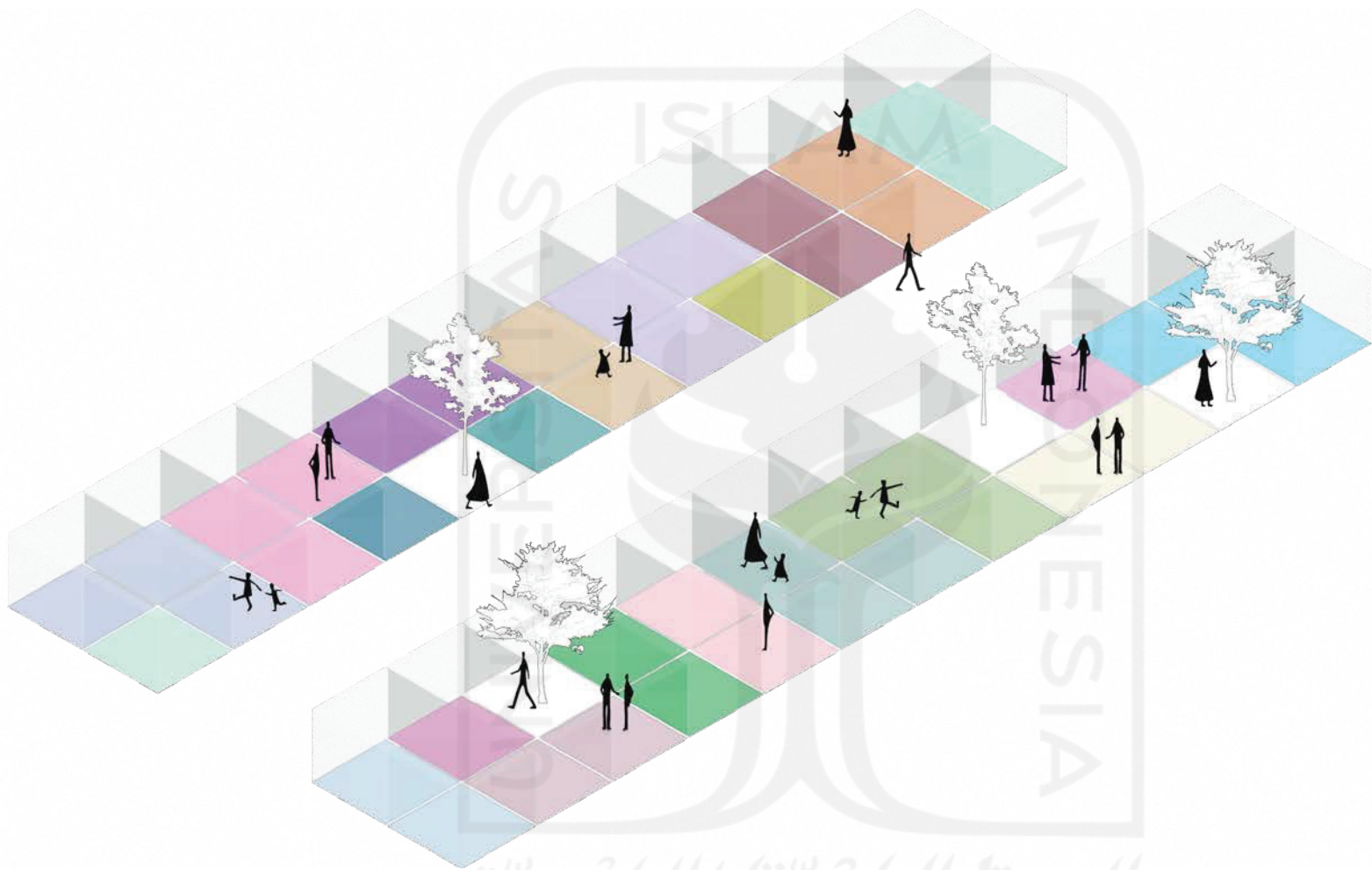


LEGENDS

Owner 1: 27 m²	Owner 7: 27 m²	Owner 13: 9 m²	Owner 19: 27 m²
Owner 2: 27 m²	Owner 8: 27 m²	Owner 14: 27 m²	Open Space
Owner 3: 9 m²	Owner 9: 9 m²	Owner 15: 9 m²	
Owner 4: 18 m²	Owner 10: 27 m²	Owner 16: 18 m²	
Owner 5: 18 m²	Owner 11: 18 m²	Owner 17: 18 m²	
Owner 6: 18 m²	Owner 12: 18 m²	Owner 18: 27 m²	

FINAL DESIGN

Infill: Owner Scenario 3

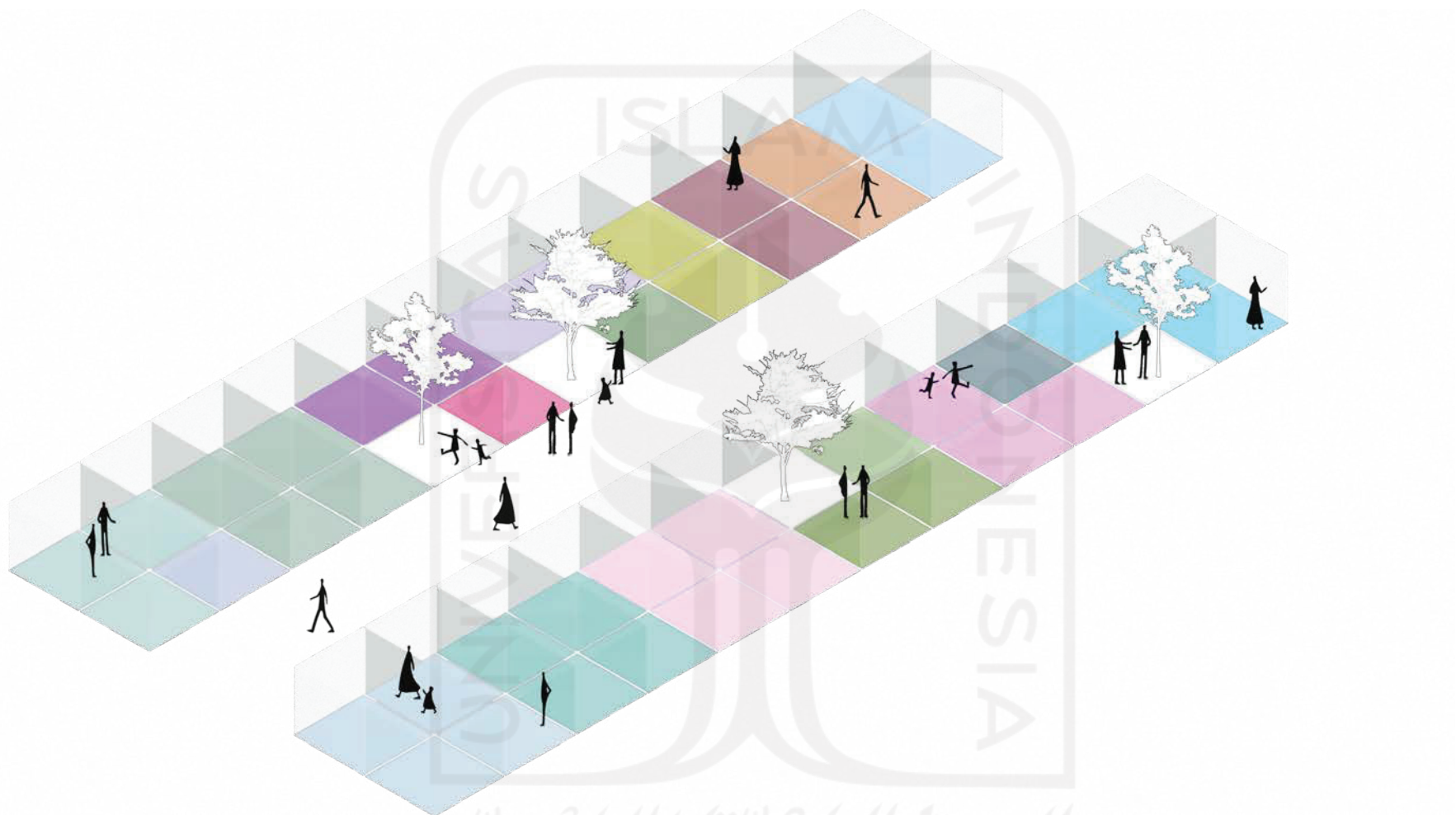


LEGENDS

 Owner 1: 9 m²	 Owner 7: 18 m²	 Owner 13: 27 m²	 Owner 19: 18 m²
 Owner 2: 27 m²	 Owner 8: 27 m²	 Owner 14: 9 m²	 Owner 19: 18 m²
 Owner 3: 27 m²	 Owner 9: 9 m²	 Owner 15: 18 m²	 Owner 19: 9 m²
 Owner 4: 9 m²	 Owner 10: 18 m²	 Owner 16: 27 m²	 Owner 19: 18 m²
 Owner 5: 18 m²	 Owner 11: 18 m²	 Owner 17: 27 m²	 Open Space
 Owner 6: 9 m²	 Owner 12: 18 m²	 Owner 18: 18 m²	

FINAL DESIGN

Infill: Owner Scenario 4



LEGENDS

 Owner 1: 27 m²	 Owner 7: 9 m²	 Owner 13: 9 m²	 Owner 19: 36 m²
 Owner 2: 9 m²	 Owner 8: 18 m²	 Owner 14: 27 m²	 Open Space
 Owner 3: 36 m²	 Owner 9: 18 m²	 Owner 15: 18 m²	
 Owner 4: 18 m²	 Owner 10: 18 m²	 Owner 16: 9 m²	
 Owner 5: 9 m²	 Owner 11: 18 m²	 Owner 17: 36 m²	
 Owner 6: 18 m²	 Owner 12: 27 m²	 Owner 18: 36 m²	



05

Evaluation

“There should be a Third place that connects the rich and the poor. Since the boundaries that separate the rich and the poor still exist, it means that the exclusivity between the poor and the rich has not been solved”

Revianto Budi Santosa, Dr., Ir., M.Arch. IAI

Third places and direct access

In the master plan, there is already an amphitheater that functions as a Third place to connect between poor and rich. Unfortunately, boundaries still exist and access from the rich does not exist.

With the addition of a public garden on the north side, and added access to the amphitheater, it is hoped that it can become a connection between the rich and poor.

Masterplan before evaluation

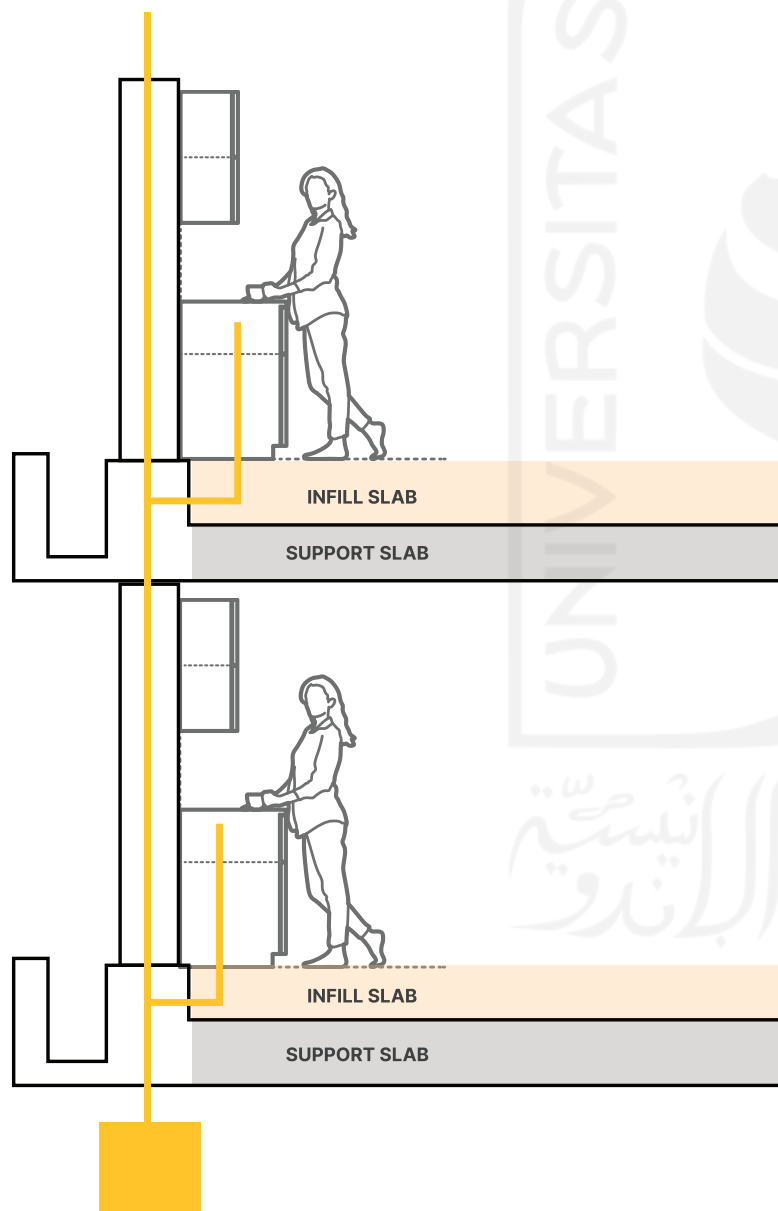


Masterplan after evaluation



“Public kitchen is not considerable for public housing. Because everyone wants to have their own kitchen; at the same time, it is possible for people to open food stalls in their homes.”

Revianto Budi Santosa, Dr., Ir., M.Arch. IAI



Using inverted beam design

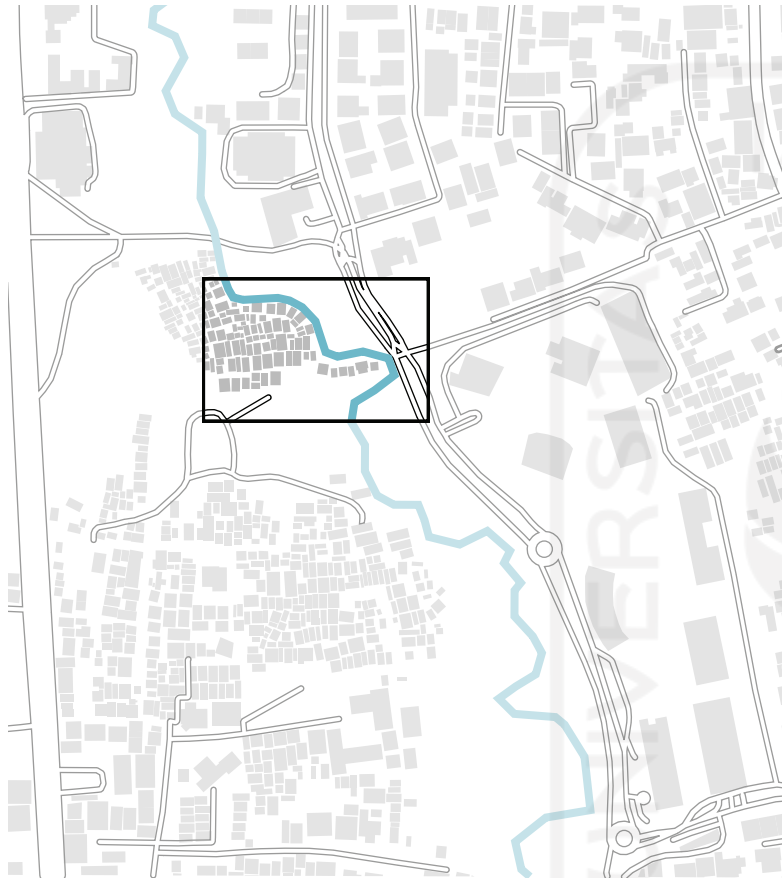
By using inverted beams in the building structure, it can provide space to place building MEP in each existing house block.

The building MEP is located on top of the slab (support) which will later be covered using the slab (infill) of each occupant.

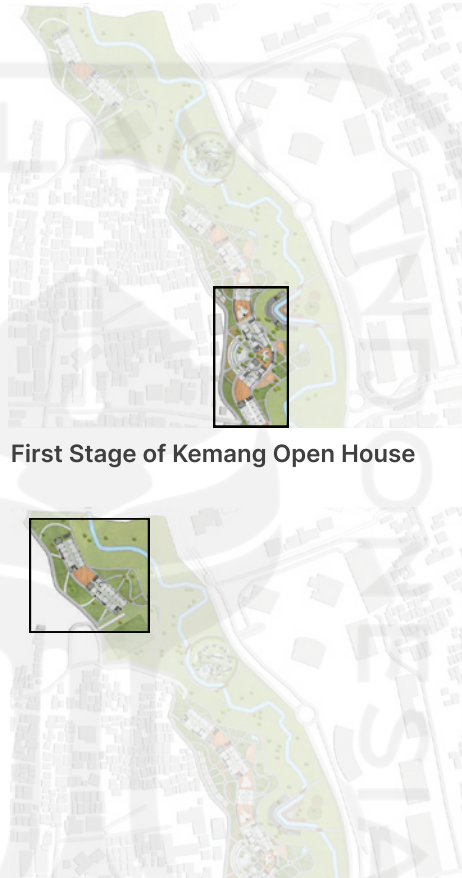
With this inverted beam, each home can have the opportunity to create its own kitchen. However, users must also pay attention to the available space

“Explain development stage of the design!”

Wiryono Raharjo, Ir.,M.Arch., Ph.D.



Housing area that relocated on first stage development



First Stage of Kemang Open House



Third Stage of Kemang Open House



Second Stage of Kemang Open House



Last Stage of Kemang Open House

Using inverted beam design

Housing that is directly affected by flooding is prioritized in the development stage.

In the first stage of development, Kemang Open Housing is built on vacant land that is relatively safe from flooding. Once built, residents directly affected by flooding will be relocated to buildings that have been completed in the first stage.

Relocation and development then follows the pattern established in the first development and continues until the completion of development for Housing and Reforestation.

“How many families can be accommodated. and, how do you limit the growth of houses?”

Wiryono Raharjo, Ir.,M.Arch., Ph.D.

Families can be accommodated

Around 200 houses (counted using Google Earth) will be affected by the development of this area. However, the affected families cannot be calculated due to limitations on time and distance.

The houses that can be built in Kemang Open Housing are around 300-400 houses, depending on how users use the building blocks. This number can grow to around 600 houses if all 3 floors of the building are used and develop along the growth of users

Growth Limit

Kemang Open Housing is built to grow as users increase. However, the support provided and built by the government is only available up to 3 floors, both support in the form of building structures and other support elements (stairs, public toilets, etc.).

Building more than 3 floors is discouraged for safety reasons, and also because support is not available. Even if the user still wants to add floors to the building, it will cost a lot to get the appropriate safety and circulation.



06

Attachments

Plagiarism Check



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SURAT KETERANGAN HASIL CEK PLAGIASI

Nomor: 1867092547/Perpus./10/Dir.Perpus/IV/2022

Bismillaahirrahmaanirrahiim

Assalamualaikum Wr. Wb.

Dengan ini, menerangkan Bahwa:

Nama : ABDUR RAHMAN
Nomor Mahasiswa : 18512078
Pembimbing : DR.-ING. ILYA FADJAR MAHARIKA.
Fakultas / Prodi : Teknik Sipil dan Perencanaan/ Arsitektur
Judul Karya Ilmiah : INCLUSIVE MODULAR HOUSING DEVELOPMENT IN KEMANG
AREA WITH OPEN BUILDING APPROACH TO DEAL WITH
FLOOD DISASTER

Karya ilmiah yang bersangkutan di atas telah melalui proses cek plagiasi menggunakan **Turnitin** dengan hasil kemiripan (*similarity*) sebesar **8 (Delapan) %**.

Demikian Surat Keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

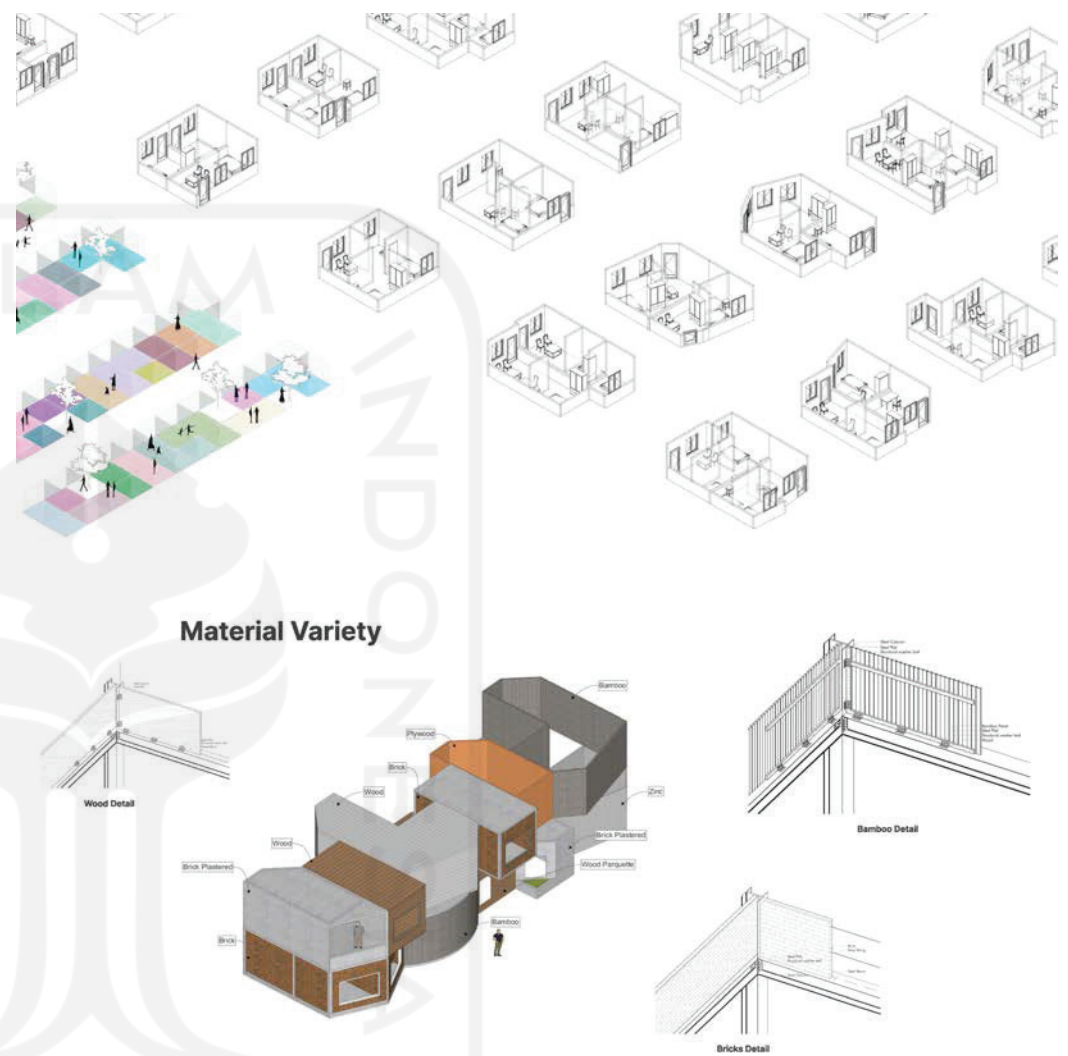
Wassalamualaikum Wr. Wb.

Yogyakarta, 7/6/2022

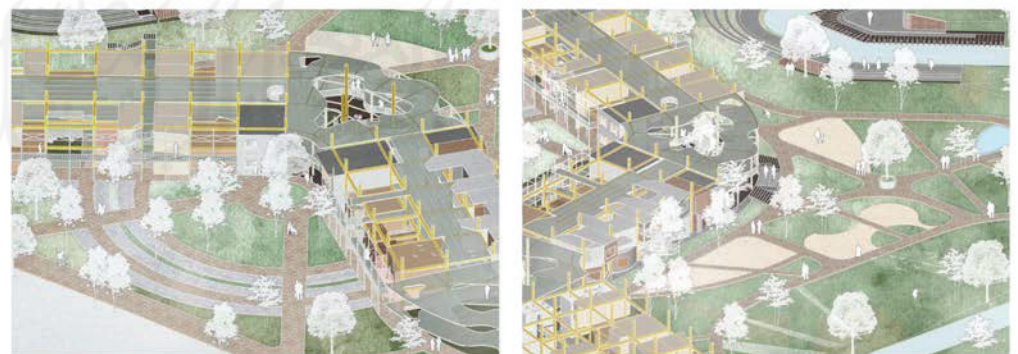
Direktur



Joko S. Prianto, SIP., M.Hum



Infill Plan Variety



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