Laboratorium Pemodelan Arsitektur dan Perkotaan

DESIGN OF FLOOD RESISTANT HOUSING IN TAMBELAN SAMPIT RIVERFRONT

With the Open Building approach

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DEPARTMENT of ARCHITECTURE

LEGALIZATION PAGE

Final Architectural Design Studio Entitled :

Design of Flood Resistant Housing in Tambelan Sampit Riverfront with the Open Building Approach

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Has been evaluated and agreed on : 15th July 2021

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Final Architectural Design Studio entitled :

Design of Flood Resistant Housing in Tambelan Sampit Riverfront with the Open Building Approach

Quality of Final Architectural Design Studio Book **: *average)*good)*excellent)**

So that.

***recommended) *not recommended)**

To be a reference for Final Architectural Design Studio

Yogyakarta. 15th July 2021
Supervisor.

Ir. Ilya Fadjar Maharika, MA, Ph.D

ORIGINALITY STATEMENT PAGE

I, the undersigned below :

Name	: Muhammad Kemal Adro
Student's Identification Number	: 17512138
Program	: Architecture
Faculty	: Faculty of Civil Engineering and Planning
University	: Islamic University of Indonesia
Tittle	: Design of Flood Resistant Housing in Tambelan Sampit Riverfront with the Open Building Approach

I state that this Final Architectural Design Studio Project that I write and work on is my own work, not the transfer of other people's writings or thoughts that I acknowledge as my own results or thoughts. As for the fFinal Architectural Design Studio work, there are parts of quotes from other people's work that I have written down according to the norms, rules, and ethics in writing

If later it is proven or can be proven that this final architectural design studio is completely plagiarized, I am willing to accept sanctions for such actions.

Yogyakarta. 9th July 2021
The one who made the statement

Muhammad Kemal Adro

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1.0
INTRODUCTION


Selamat Datang
di Tambelan Sampit
KB 4180 NV

1.1 DESIGN PREMISE

TAMBELAN SAMPIT RIVERFRONT REVITALIZATION

Flood Resistant Housing with an interactive design approach

At its early development, Pontianak was a city which lived off of Kapuas River. One area in the city of Pontianak that is located on the banks of Kapuas River is Tambelan Sampit with an area of 0.41 km2 and the population of 10,937 people. This area also has several challenges that must be resolved, namely: Lack of public facilities; High building density, irregularity of position, river behind the housing, unqualified building standards and 60% of housing are on the riverbank

The problems mentioned have occurred due to the rapid urbanization and unplanned housing settlements, which not only houses several households in a compact area where public spaces and amenities are unable to be provided due to tight pathways and roads. Particularly the access from the main road which slowly turns into a wooden platform while water transportation is limited to only a few points in the river banks.

Apart from the access, circulation and placement of the housing units, the houses are in close proximity to each other leaving no area for wind to circulate. While the wind is massively affected from the river. The river itself is an abundant amount of resource but without proper infrastructure the availability of clean water is not available.

Then, in concerns to safety measures against seasonal floods or rising tides, the foundation of the houses are in a critical state due constant erosion which have affected the integrity of the living area on the river banks. This event in the long term can cause a major incident if not handled in a timely manner. Thus, the revitalization of Tambelan Sampit Riverfront Housing is needed to be done using an interactive approach to generate a new public space and joint housing settlements which can prevent floods and provide basic amenities for the surrounding.

Keywords : Tambelan Sampit, access & circulation, safety, housing, open building

1.2 DESIGN BACKGROUND

Figure 1.1 River Bank Houses condition in 2021
Source: Writer, 2021

1.2.1 Tambelan Sampit History and Development

At its early development, Pontianak was and is a city which lived off of Kapuas River. The city, administratively is divided into several administrative areas, one of area in the city of Pontianak that located on the banks of Kapuas River is Tambelan Sampit with an area of 0.41 km2 and a population of 10,937 people (BPS Pontianak, 2019).

In its two and half decade of development and constant growth, Tambelan sampit has developed several living areas and one of the most known ones that are in the riverbank, the area itself was recognized by the city as an area that was in need of financial help.

The housing conditions of the household there are limited due to the population economy which has a majority of labor workers rather than business owners. Thus limiting the quality of living spaces in its surrounding and living quarters, which can be interpreted as an inadequate living situation.

The inadequate living situation is shown by the amount amenities and the physical condition of the houses situated there. The houses there to be exact are not properly maintained to withstand constant floods, while also lacking water facilities such as plumbing. Thus, having to rely on the river while simultaneously in constant danger from it.

If it is unattended further more, there is a probability of it being more dangerous with the rising tide water that comes yearly, while the number of houses that is not equipped properly to withstand it will still be built onward.

Source: (Helyanto), Gusti Zulkifli Mulki**), Marsudi**)., 2020. Kajian Penataan Perumahaan dan Pemukiman di Tepian Sungai Kapuas di Kota Pontianak(Studi Kasus Kelurahan Tambelan Sampit Kota Pontianak)*

Figure 1.2 Flooding in 5th December 2020
Source: Youtube, 2020

1.2.2 Flood Occurrences

In one of the interviews that i have conducted, one respondent name mr.A has said one opinion that was commonly shared among the people living there:

"Biase jak, ikut renang doang selesai"

"Lari ke yang kering, dah aman kan"

"Kapan lagi bise mancing banyak"

These opinions were still being uttered while in October of 2020 there was a flood which reached a height of 1.7 meter that have caused several houses and amenities being partly submerged underwater.

Another shocking thing to be heard is that while the area is in a flood prone area, the citizens there were not particularly bothered and were accustomed to the frequent floods. A report from the city stated that roughly **3 major floods occur yearly**, while minor floods occur around **8 - 12 times** coinciding with heavy rains (BPS Pontianak, 2021)

1.2.3 River Living

While in constant danger of floods, it was still one aspect that is a part of living beside the river, because while it is dangerous, the interactions of people in this area mostly involves the river. The examples of these are, sitting by the river, drinking by the river, eating by the river, and activities such as fishing and swimming.

But in its essence, it is to live off the river. One particular cause is there is no piping, the water for the houses there comes from the river, some use it for cleaning dishes or clothes, occasionally bathing if needed. Thus making it a essential point in the people living there that their kitchens or bathing area is directly in contact with the river water

Source: (Nurhidayati, E. and Fariz, T., 2020. Kebertahanan Pemukiman Rumah Panggung di Tepian Sungai Kapuas Pontianak. Mintakat: Jurnal Arsitektur.)

1.2.4 The Present and Future Impact of the Flood to the Urban Pattern

Figure 1.3 Predicted Water Spread caused by Flooding
Source: Writer, 2021

Figure 1.4 Normal Condition of Tambelan Sampit Riverbank
Source: Google Earth, 2021

An interview with a worker from BMKG Pontianak which was shown in the news, the area exposed to the flooding in years to come is expectant to be rising slowly, which people are then followed by a report of being evicted to relocate from the riverbank and move to a flat provided by the government following a financial fund of 8 million rupiahs. But the problem occurred when people started to lose their jobs and livelihood, caused by the relocation. Citing from an article from *wargajogja.net,* a citizen has reported she had to change jobs due to the relocation and has been struggling to work.

Source:http://wargajogja.net/sosial/proyek-waterfront-city-pontianak-nasib-warga-tak-seindah-bangunannya-yang-megah.html

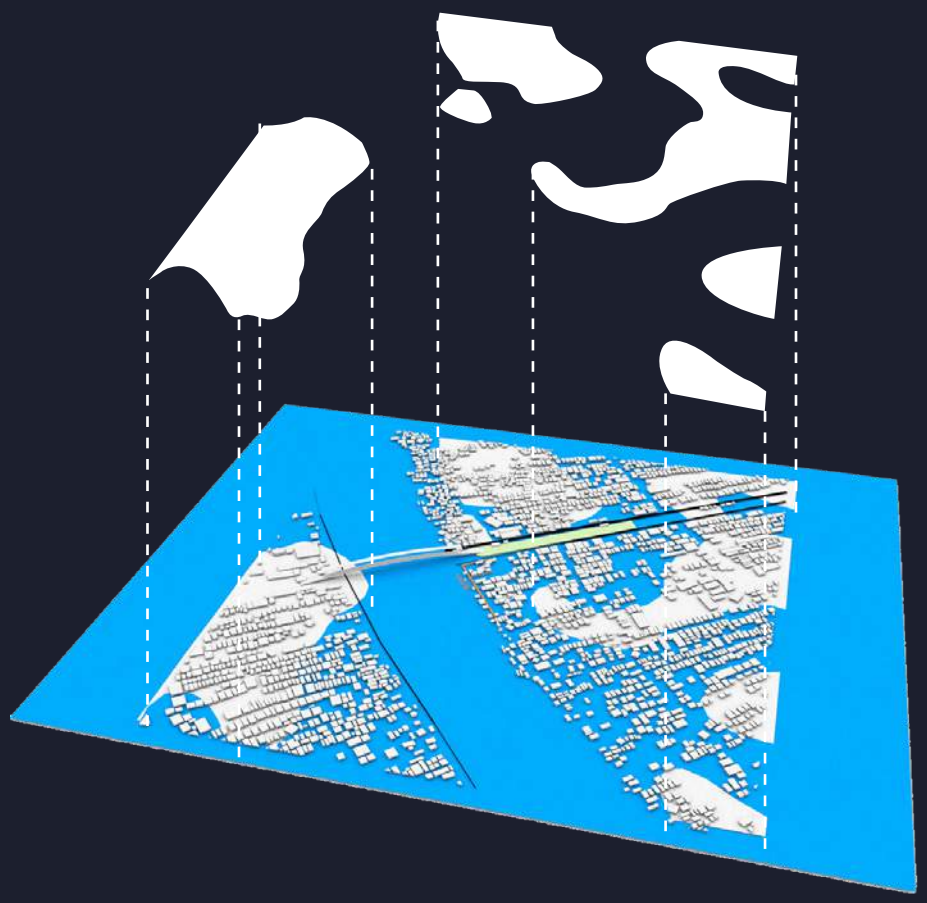


Figure 1.5 3D Simulation of Expected Flood in Years to come (Created in Rhino), Tambelan Sampit Area
Source: Writer, 2021

A simulated flood condition where in 10 years time, where the amount of water will keep increasing if not handled carefully due to rising water level and sinking peat soil if the flooding and heavy rain keeps reoccurring in large quantities.

In 2020, a massive flood which reached a staggering number of 1.7 meters above sea level occurred in the month of December in which the seasonal tides is normally seen (refer to Figure 1.5), but never reaching this height. This occurrence had disturbed and obstructed the citizens widely with roads being covered with water, homes being filled with fish, some snakes. This unprecedented flood height has people concerned over the future possibilities if the flood water level keeps rising and what can be done to respond to it.

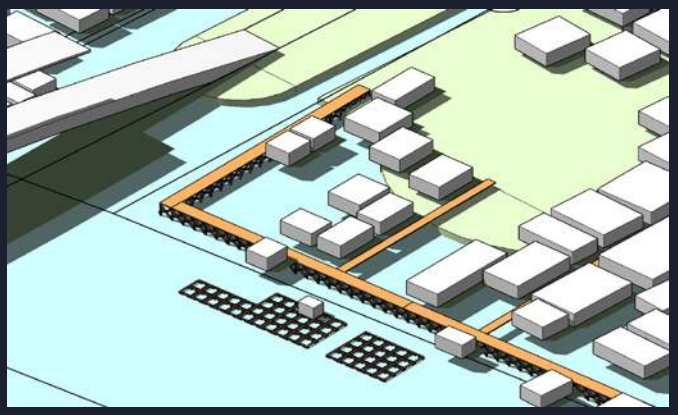


Figure 1.6 3D Existing in a Normal Condition
Source: Writer, 2021

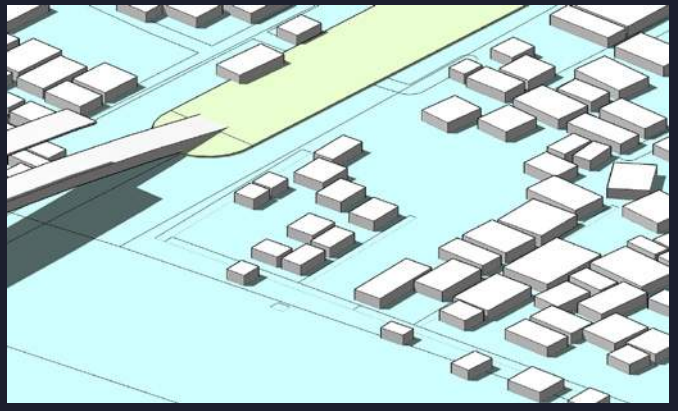


Figure 1.7 3D Existing in a Flooded Condition (1.7m above sea level)
Source: Google, 2021

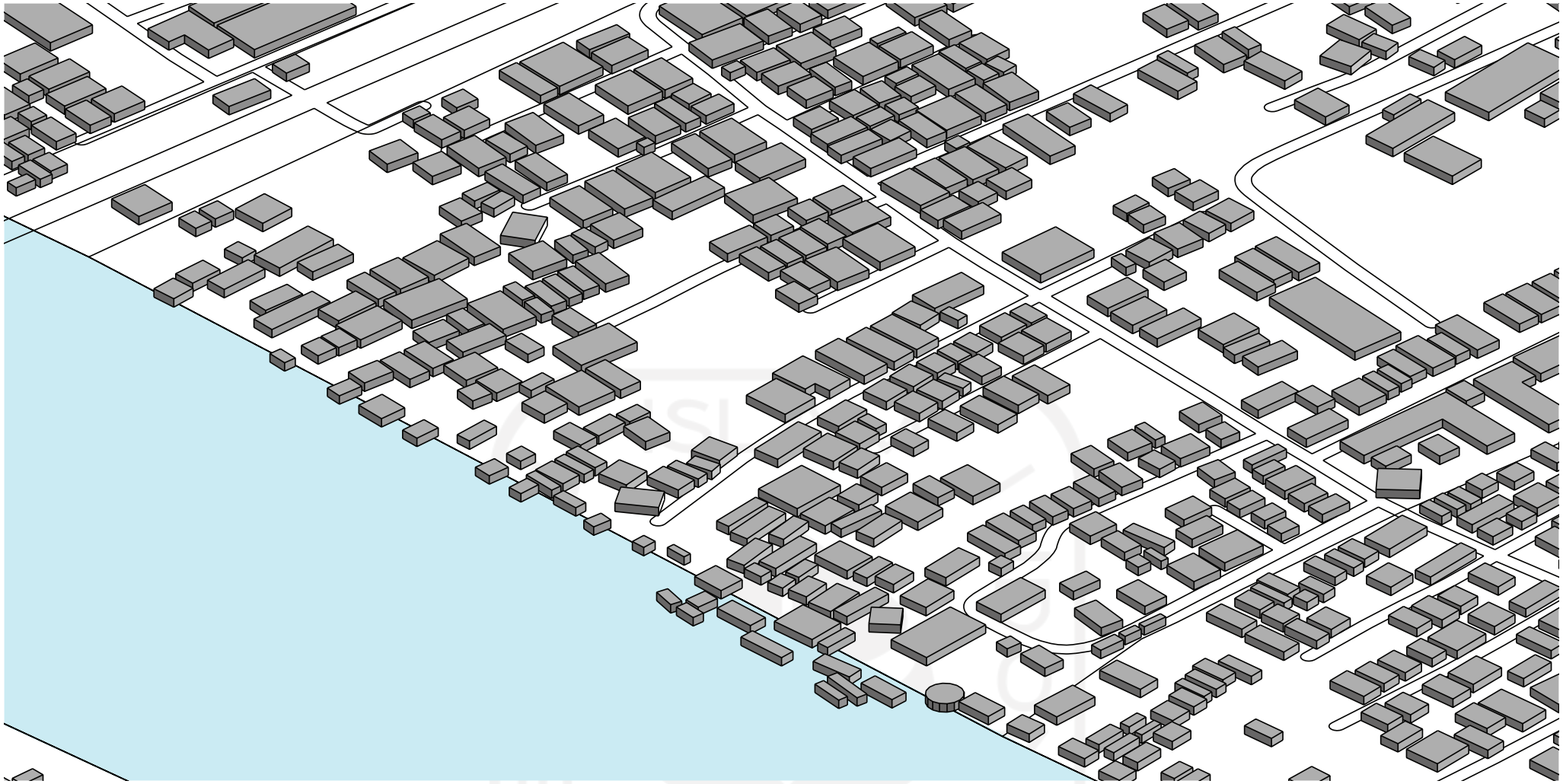


Figure 1.9 Pontianak Municipilaty Administrative Border
Source: Google Earth, 2021

Figure 1.10 Pontianak Top View
Source: Google Maps, 2021

1.2.5 Urban Typology

In Pontianak, the urban pattern presented here is that the city is based on the natural features of the surrounding topography such as the Kapuas river as main central axis and small water ways deriving from the river which creates a network of water ways in the city itself. While the typology of the housing in majority is based of a traditional house which is built on stilts to adapt to the peat soil.

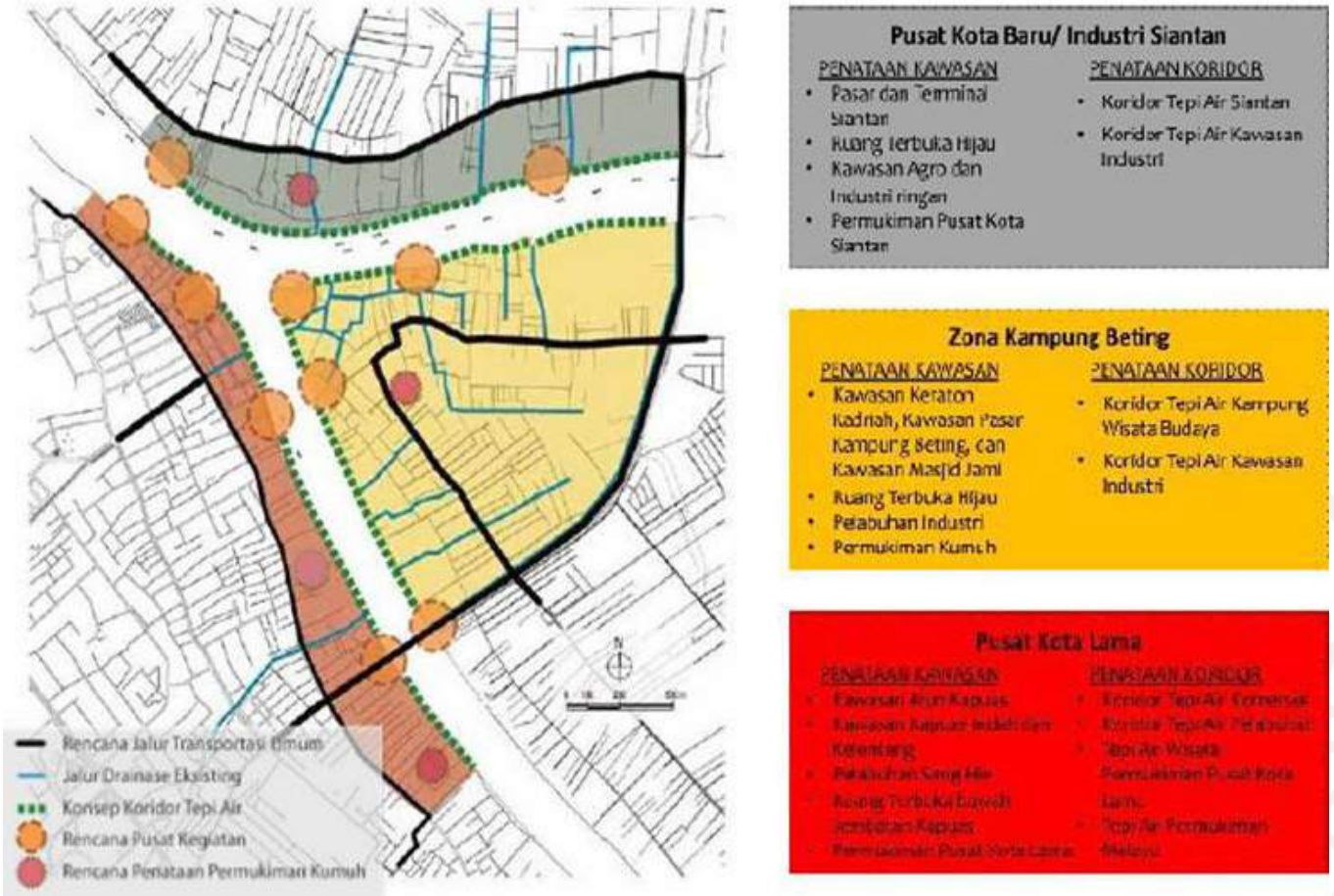


Figure 1.8 Area Mapping
Source: Google, 2021

1.2.6 Potential and Future Planning

Pontianak Municipality Future Plans

In 2015, a large scale planning was conducted to revitalize these highlighted areas by the government to increase the city's river edge areas to intervene at the present an unsanitary area of problems the city was facing, the solution that the city suggested was a massive waterfront which is encompassing the river area near the 3 way intersection of the river as its main area of development

Pengertian dan Karakteristik Permukiman Kumuh
22 Oktober, 2020|Kawasan Kumuh

- Permukiman kumuh adalah permukiman yang tidak layak huni yang ditandai dengan ketidakteraturan bangunan, tingkat kepadatan bangunan yang tinggi, dan kualitas bangunan serta sarana dan prasarana yang tidak memenuhi syarat. (UU No.1 Tahun 2011 tentang PKP).
- Kondisi relasi sosial dan kekerabatan relatif tinggi sebagai perwujudan keberadaan komunitasnya (Rindarjono, 2012).
- Karakteristik permukiman kumuh digambarkan dengan tingkat pendapatan dan tingkat pendidikan masyarakat penghuninya yang rendah (Budiharjo, 2011).
- Permukiman kumuh atau slum merupakan kondisi permukiman dengan kualitas buruk dan tidak sehat, tempat perlindungan bagi kegiatan marjinal serta sumber penyakit epidemik yang akhirnya akan menular ke wilayah perkotaan (UN Habitat, 2010).

Pontianak Municipality Kotaku Plans

- Providing basic infrastructure (roads and safety barriers)
- Refurbishing old houses into rent-able housing
- Providing up to 50% financial aid for mid
- low households that need shelter or living quaters

1.2.7 Background Conclusion

The threat of floods is always constant, but people are not adapting in a safe manner that can withstand it constantly. Making it a priority to create a safe environment that also solves the root problems such as illegal housing, below standard building construction, and etc.

1.3 DESIGN PROBLEM

Based on the background issue that has been mentioned, the problematique is listed as:

General Problem
How to design a housing complex to resist floods with an Open Building approach?

Specific Problem
1. How is the design able to accommodate aspects of everyday river living while also able to resist floods with the approach of Open Building?
2. How can the design form and facade can fulfill the structural, lighting, and passive cooling to create a comfortable and safe living space?

Purpose
1. A design able to accommodate aspects of everyday river living while also able to resist floods with the approach of Open Building
2. A design form and facade which can fulfill the structural, lighting, and passive cooling to create a healthy and safe living space

Aim
1. To create a comfortable and safe housing complex that is innovative which is suited to prevent floods
2. Emphasize the quality of architecture on the flood resistant housing complex
3. Create a strong connection on the housing complex in between the public space and the riverfront

Design Scope
1. In the interior layout, its prioritizing on a design able to accommodate aspects of everyday river living while also able to resist floods with the approach of Open Building
2. On the exterior design, a layout that is able to respond to the surrounding landscape and the public interactions between public spaces and the river as a main focus
3. On the facade, it is derived from the context of the river and existing architecture

Design Framework
Bryan Lawson(2006), design framework function model in a specific context that is translated and mostly have a number of useful characteristics. But in discussing a more a commonly known model there will be four functions such as formal, practical, symbolic, and radical functions.

1.3.1 DESIGN PROBLEM MATRIX

According to Bryan Lawson Method of thinking

	Formal Problem	**Practical** Problem	**Symbolic** Problem	**Radical** Problem
Designer	Fit to the topography and hydrology of the river system	The appropriation of the flood resistant design The use of local materials	**New Idea of Living,** dissemination of the idea to the society in general	Dividing the **support** level into the flood resistant system and main structure, while the housing units walls and interior is dictated by each user activity as an **infill** While the public area is designed to expand to a certain measure
User - Residents of RT01	**The spatial quality** (indoor comfort, visual, and physical aspects)	The applicability of their own materials & preferences	Create an **image of architecture**	Bring back **"river living"** as public space
Client - Residents of RT01 - Local Community - Local Municipality	**Low cost,** "simple form" Symmetrical, perpendicular to the river. one mass	The appropriation of the flood resistant design	Create "river hub" and the site of recreation	**Maintain cultural values** of river living
Regulator - Municipality building codes - Ministry of Public Work and Housing	1. KDB paling tinggi sebesar 80 (delapan puluh) persen; 2. KLB paling tinggi sebesar 3,2 (tiga koma dua); dan 3. KDH paling rendah sebesar 30 (tiga puluh) persen; Besaran minimalnya adalah 7 meter atau menyesuaikan dengan ketahanan struktur tanah, kontur tanah dan beban bangunan teraman	Concrete as a main structure Belian Wood as a main building construction Cerucuk Wood is not allowed in construction	Symbol determined by government ... mengembangkan ruang terbuka dan jalur pejalan kaki dalam mewujudkan konektivitas objek-objek perdagangan, jasa dan rekreasi di pusat kota dan tepian Sungai Kapuas;	Residential Area

1.4 DESIGN PROCESS

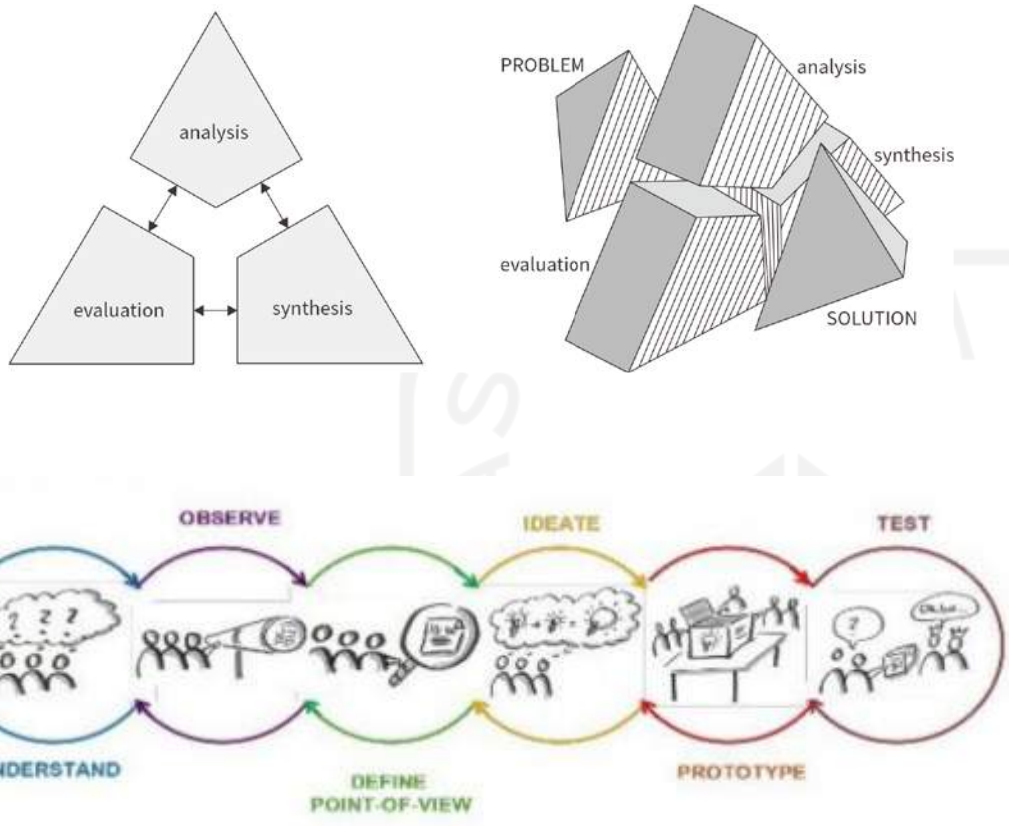


Figure 1.9 Design Method Scheme
Source: Bryan Lawson, 2006

According to Bryan Lawson (2006), it is more possible that a design is a process in which a problem and solution emerge at the same time. Often the problem maybe even is nit fully understood without several solutions can be accepted to form that hypothesis. The design process map shows that negotiation between problem and solution is individually seen as reflection of the scheme. Analysis, Synthesis, and Evaluation is involved in the negotiation but the map does not show a starting point and end point of such or a flow from one activity to another.

Problem Statement
Identifying the problem in macro, micro, and physical building function potential and its landscape, as a consideration toward the development and decision making in the preliminary design theme. Formulating problem or issue that is architectural and non-architectural and provide the purpose as well as the aims of the design

Data Collection
Identifying the intended problem, provided with substantial data (primary and secondary). Primary as in observation that is in the form of the latest physical condition data of the area, evaluation is additionally creating a riverfront as a consequence for the flood resistant system. The available data that can be provided such as: Surrounding site area, changes/difference in spatial design, site boundary, human activities/behavior. Secondary data as in data obtained from literature study to acquire references through articles as well as precedences which will be used as a guide on the provided problem. Secondary data is the consideration toward similar studies that have implemented and integrated flood resistant system into their design and theories on implementing Open Building Approach.

Data Analysis
1. Analysis of Flood Resistant Design
2. Analysis of Open Building approach
3. Analysis of Regulations
4. Analysis of Landscape
5. Analysis of climate conditions
6. Analysis of Literature Study and Typology Study (Precedence)

Program
As a guide on problem mapping, data analysis, problem identifying, as well as considering determining the design concept that is done on the next method phase

Design Concept
Design Concept is the strategy in which the writer bases of it problem solving and consideration toward the recommended design that has been mentioned by the writer in writing, illustrations, or even diagrams that is able to be understood and support the argumentation that have been presented

Design Development
This phase is intended to direct all the problem solving, data, and study into one design. The design also adapts to the design concept as means to create the schematic design

Design Evaluation
The initial design is then evaluated to understand if the quality of the design is good enough and if the specific design problem is solved. Design process evaluation is conducted through several simulations whether it is in 2d, 3d, and BIM.

How is the design able to accommodate aspects of everyday river living while also able to resist floods with the approach of Open Building?

A simulation on the flood resistance is done on a building scale by providing different alternatives on the use of different Flood Resistant (FR) design to determine the open building approach which can evaluate the success of the design.

How can the design form and facade can fulfill the structural, lighting, and passive cooling to create a comfortable and safe living space?

A simulation is conducted to determine the success of the design by determining the amount of sunlight and wind flow is able to enter the housing by the use of BIM software (Vilux and Flowsquare)

Final Design
After conducting the design evaluation, the design is develop further. In this phase, this is the final step of the design, complete with the details and the finalizing whole aspect of the building.

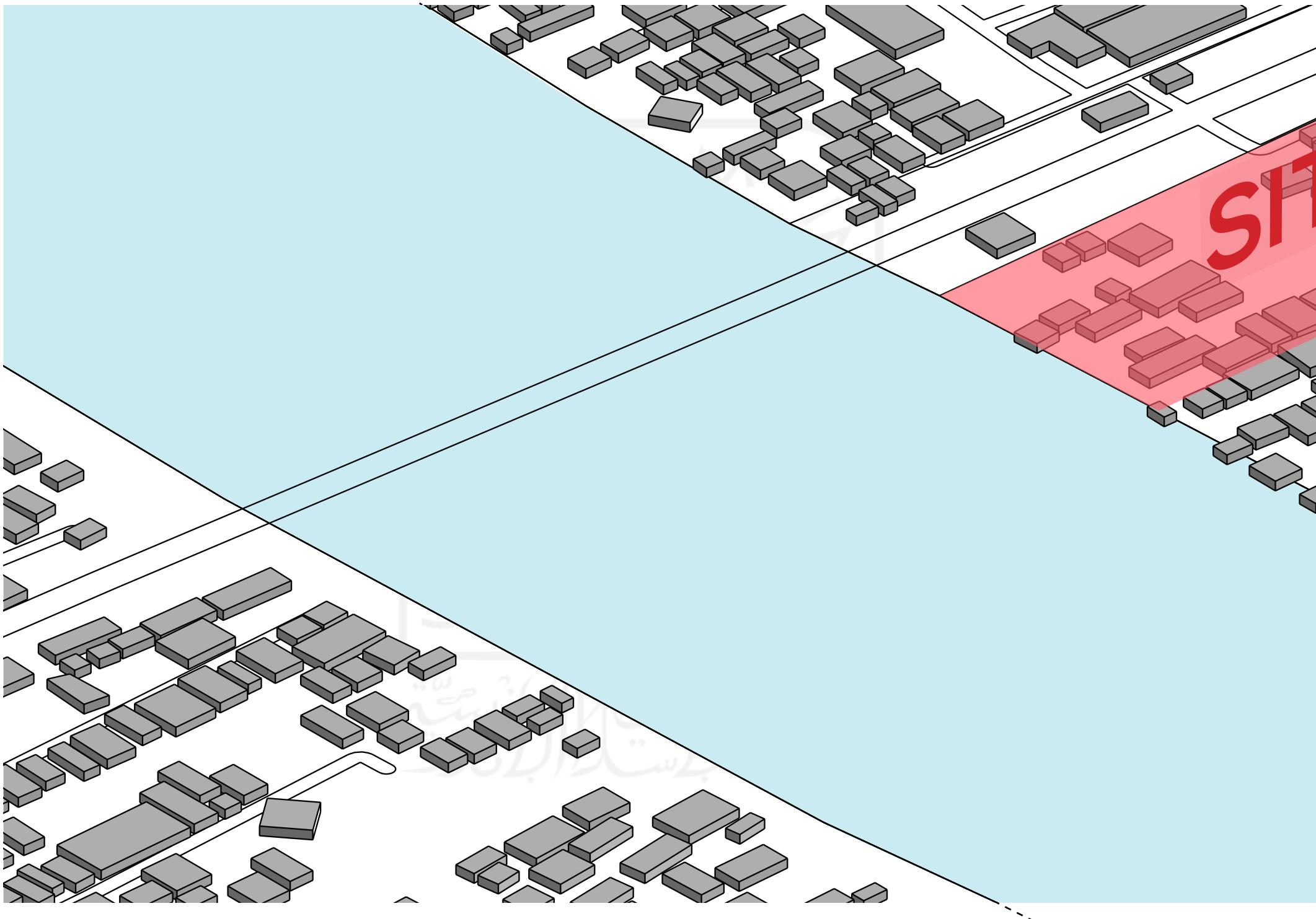
1.5 ORIGINALITY

Other projects with similar approach or function and the difference with this project.

Title : Perancangan Kampung Deret di Semanggi Surakarta dengan Pendekatan Open Building
Authors : Muhammad Hilmi Afifan, 14512085
Location : Semanggi Surakarta
Approach : Open Building
Institution : Islamic University of Indonesia
Problem : Slum Housing in a train station area that will obstruct the railway area
Similarity : Similar approach theory, using infill
Differences : Different implementation on the design aspects focusing on a knock down wall system

Title : HUNIAN VERTIKAL UNTUK RELOKASI WARGA KAMPUNG PENGOK, YOGYAKARTA (Dengan Pendekatan Open Building)
Authors : Aldhi Nugraha Anantama, 14512204
Location : Kampung Pengok, Yogyakarta
Approach : Open Building
Institution : Islamic University of Indonesia
Problem : Slum Housing in a train station area that will obstruct the railway area
Similarity : Similar approach theory, using infill
Differences : Different implementation on the design aspects focusing on a knock down wall system

2.0
DESIGN STUDY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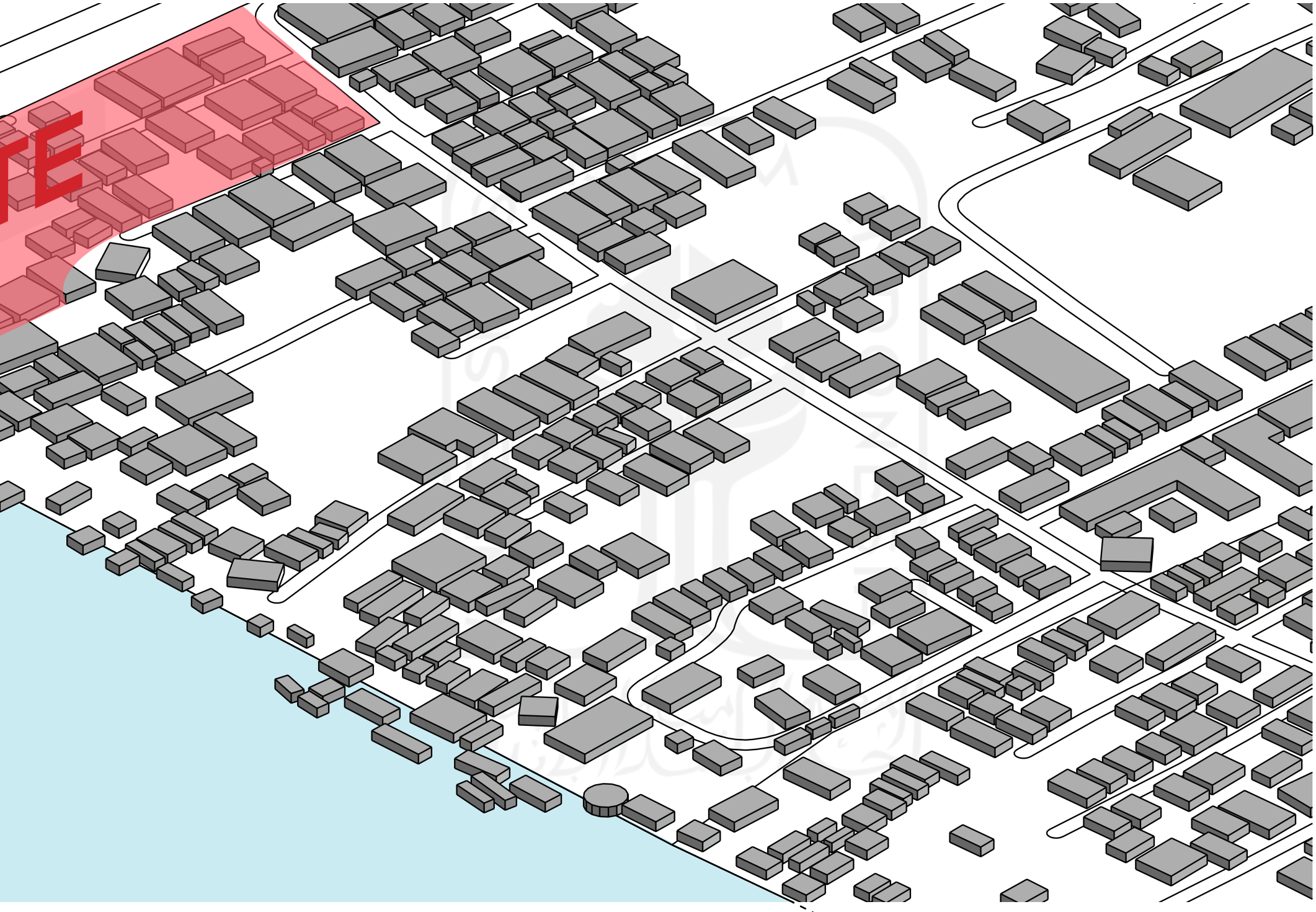


Figure 2.1 Urban Perspective View of the location
Source: Writer, 2021

2.1 LOCATION

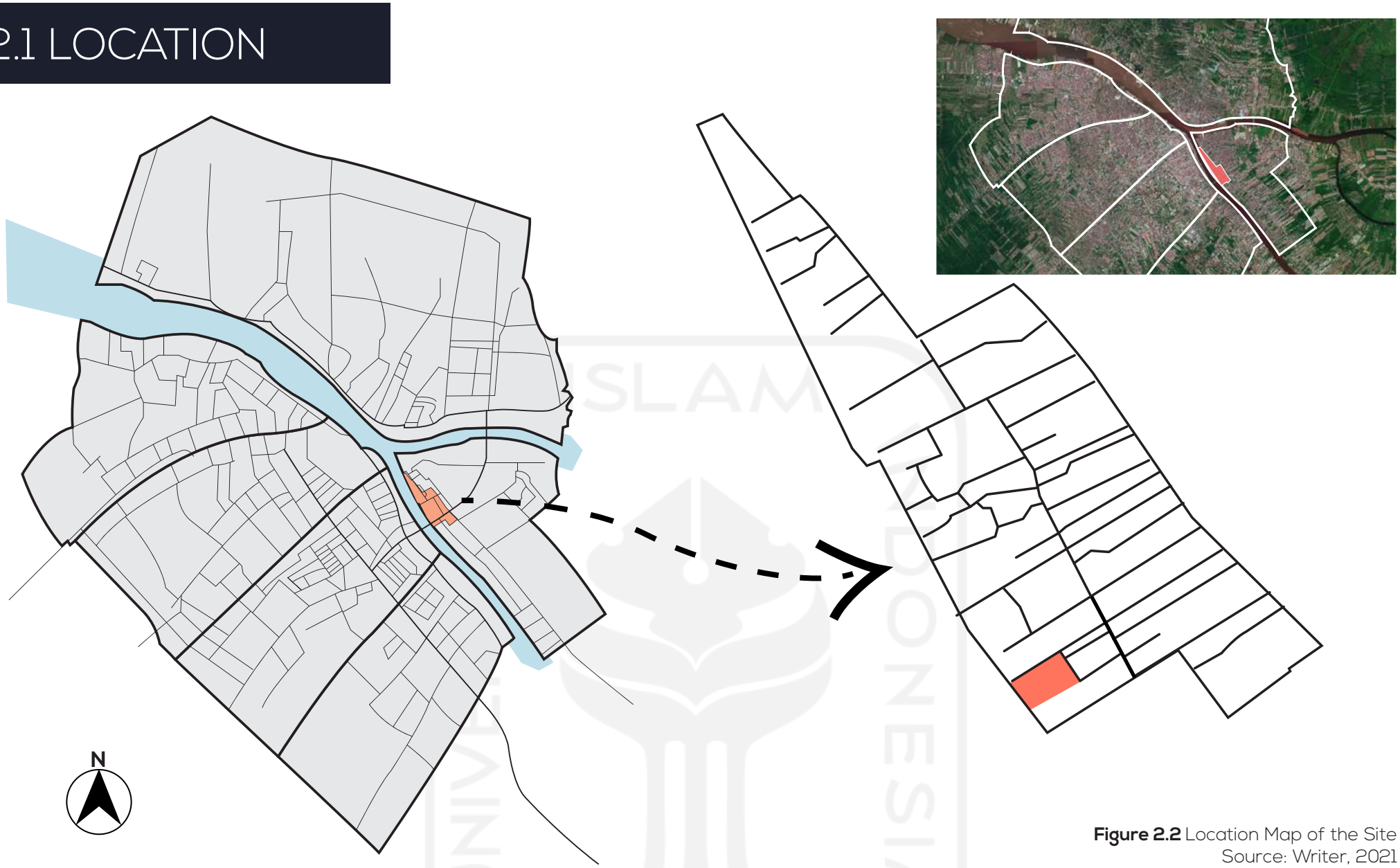


Figure 2.2 Location Map of the Site
Source: Writer, 2021

2.1 LOCATION
Choosing the site,

Swadaya Street, RT01/RW07, Municipality of Tambelan Sampit, East Pontianak, Pontianak, West Borneo 78243

ISSUES
All the surrounding areas near this site is filled with inadequate houses which have small living areas and no social/community spaces. This compacted housing area has limited access due to the street width.

ADVANTAGES
- Near a public water front for tourists and citizens
- Near a Large City Market (Pasar)
- Near a Large Hospital (Yarsi Hospital)
- Near a Historical Site (Kadriyah Palace)

DISADVANTAGES
- Unstable Land - Wet land (Tanah Gambut)
- Scarcity of Clean Water Supply
- Not an entirely clean area due to accumulated Trash from Illegal River Dumping

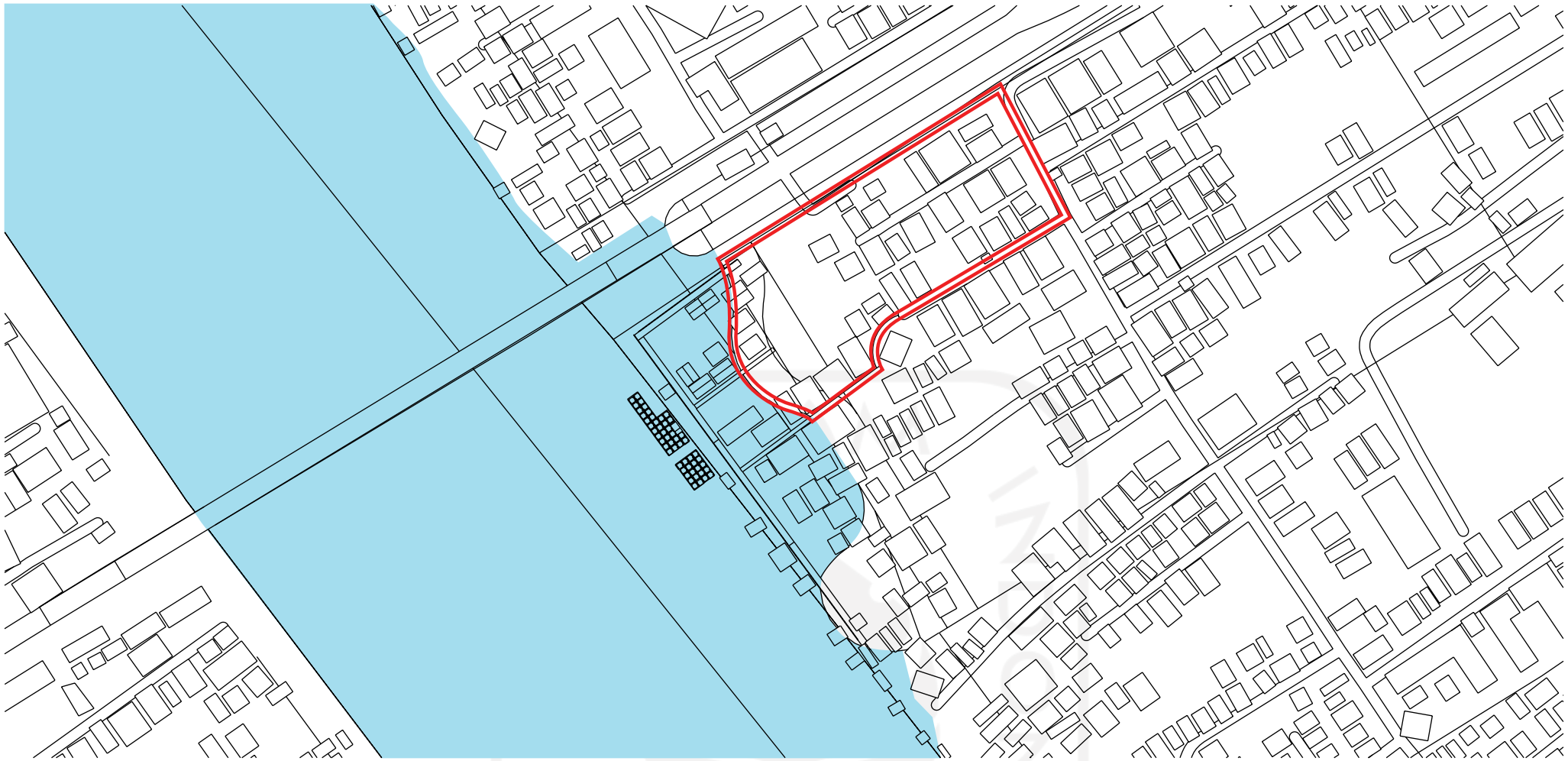


Figure 2.3 Top View of the Site
Source: Writer, 2021

2.1.1 Site

The selected site was inside of Tambelan Sampit that is in contact with the river, that have many houses which shows unsafe structures such as rotting wood or rusted metal as walls and broken foundations. This site is called Swadaya Village in which the area is in the municipality area of RW07/ RT01 which has 98 households which is privately owned and built.

2.1.2 Architecture

The building typology there is mainly for residential purposes, a small amount of commercial houses (warung & fishing home), and for public use (mosque and harbor). In this said site, the buildings there have adopted a traditional architecture of using stage houses there due to living above water and the usage of wood as a main structure for its light weight characteristics

2.1.3 Site Boundaries

The site that became the main area of focus is only on the riverbank of Swadaya Village that is limited by the administrative boundaries of RT and RW as well as the Kapuas River on southwest side.

2.1.4 Site Lot Measurements

The area surrounding the site in the residential area of Swadaya Village is in direct contact with the water which is in the setback for buildings from the river. The BCR, FAR, GCR is as followed below

Site Measurements = 10.750m2
BCR = 80 %
= 8.600m2
FAR = 3 floors = 15 m limit
GCR = 30 %
= 3.225m2

2.1.1 Site Measurements

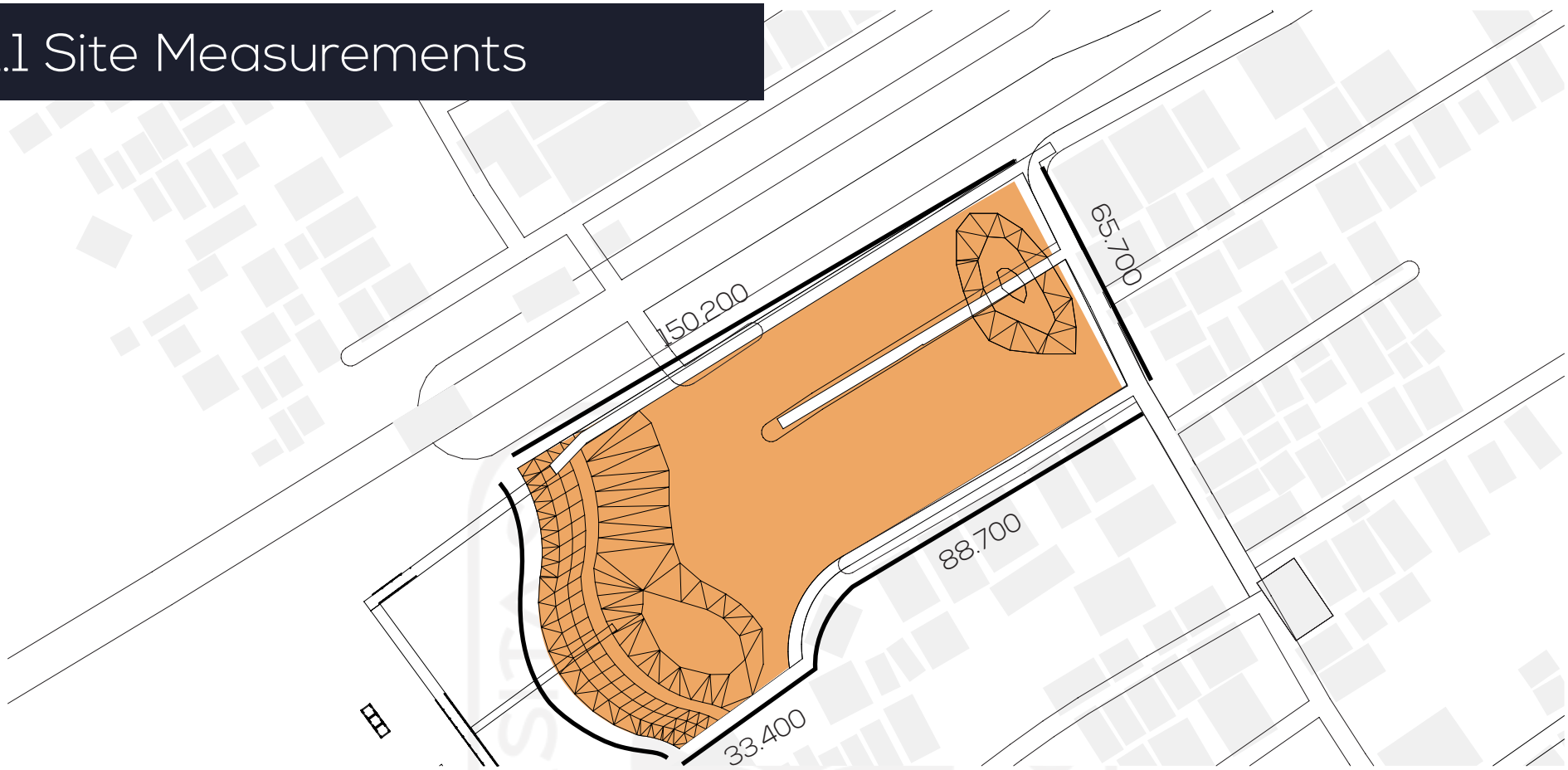


Figure 2.4 Site Boundaries Measurements
Source: Writer, 2021

Figure 2.5 Site BCR Measurements
Source: Writer, 2021

2.2 CLIMATIC CONDITION

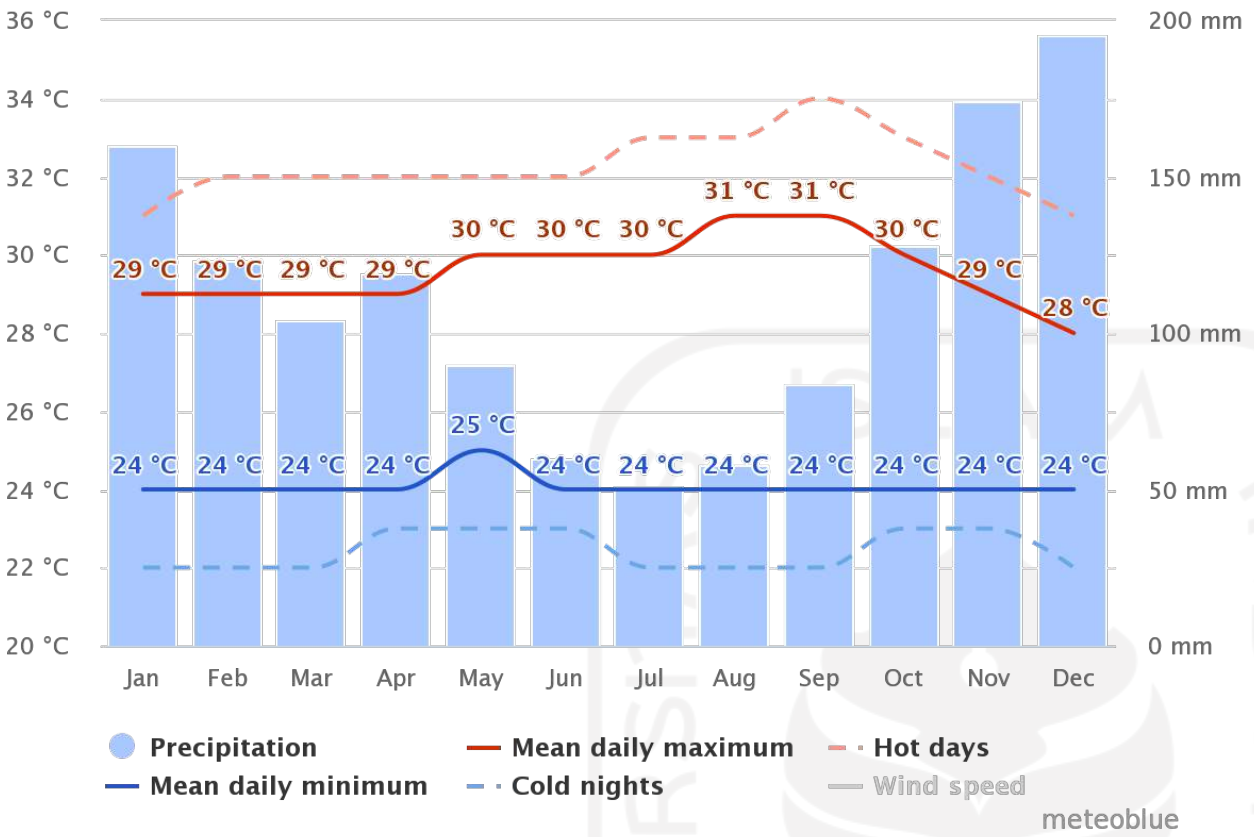


Figure 2.6 Pontianak Yearly Temperature Diagram
Source: meteoblue.com, 2021

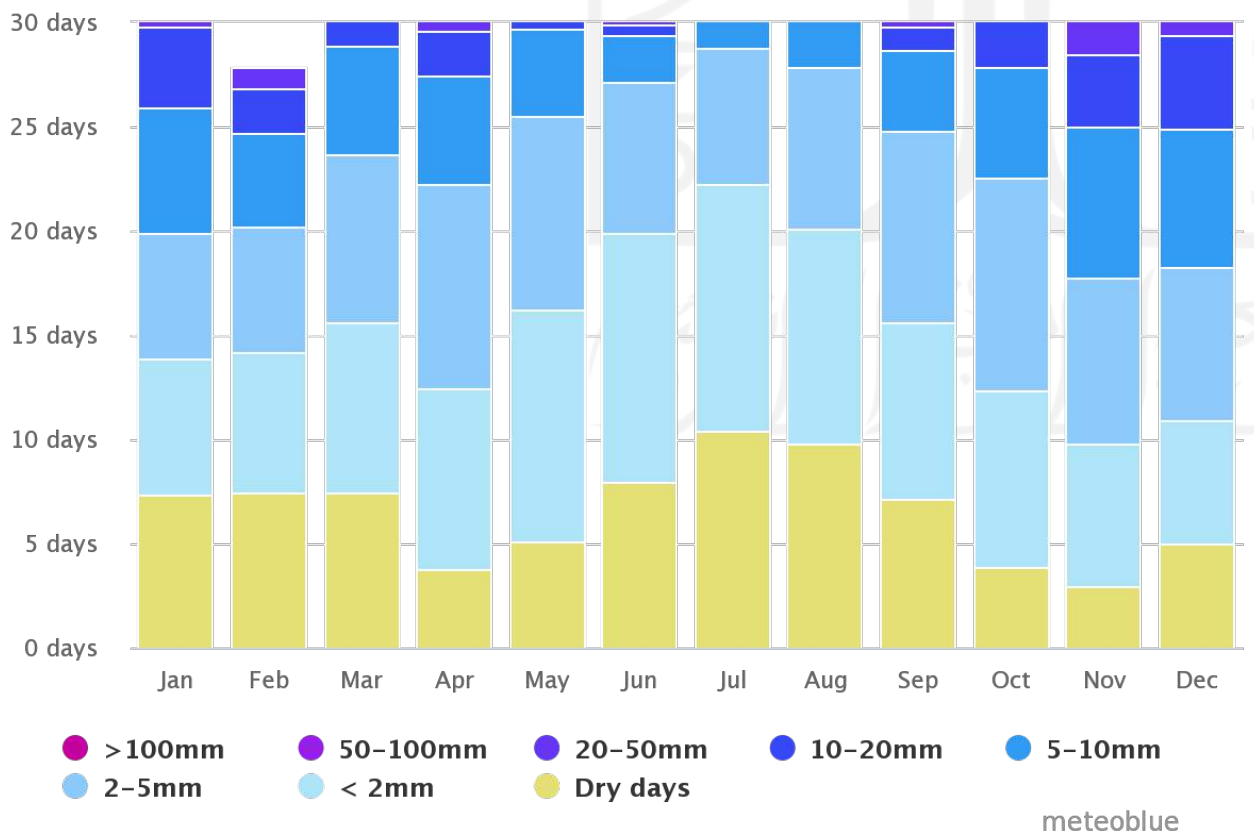


Figure 2.7 Pontianak Yearly Precipitation Diagram Data
Source: meteoblue.com, 2021

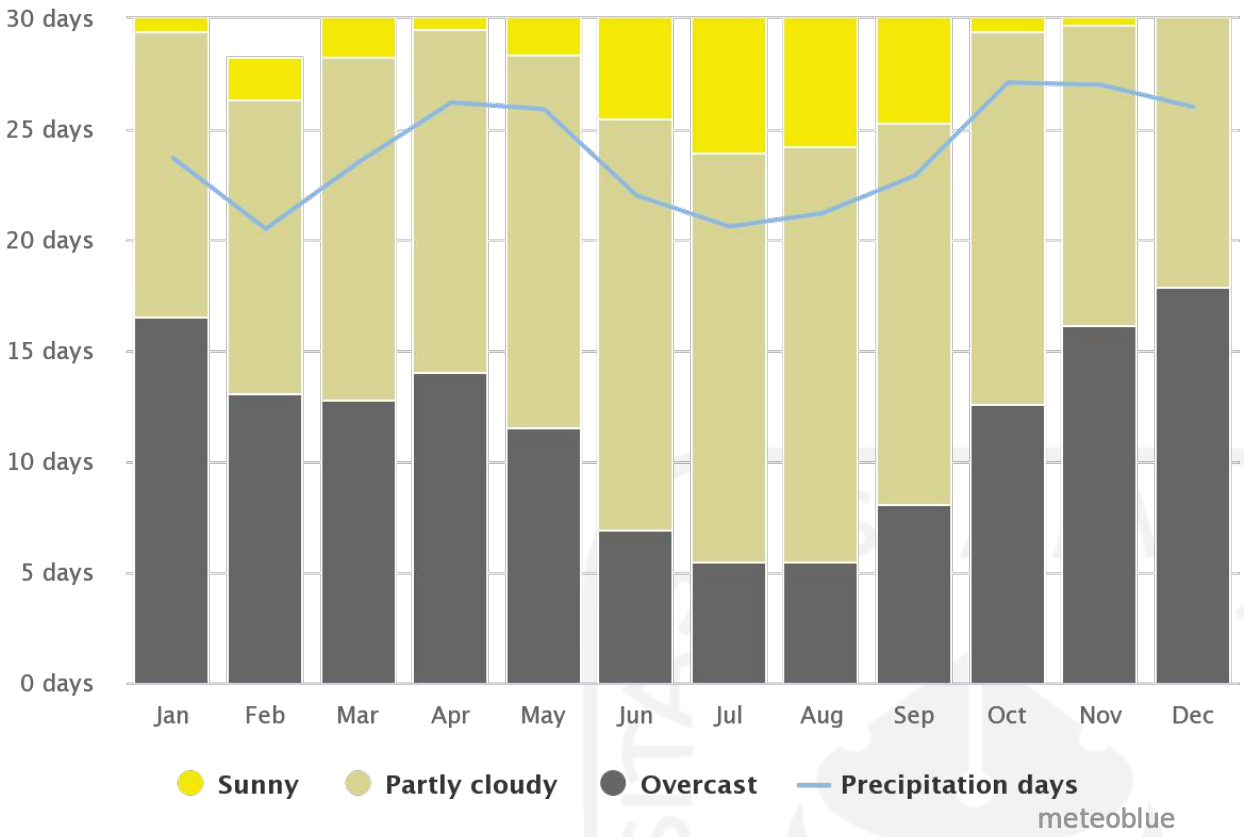
2.2.1 Temperature

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Pontianak. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

In this diagram the maximum amount of temperature can reach up to 31 Degrees in the summer while the lowest can reach in the 24 Degrees. While the average on each month is above the average comfort degree of 26 Degrees conforming that the amount of heat in Pontianak is above average

2.2.2 Precipitation

The precipitation diagram for Pontianak shows on how many days per month, certain precipitation amounts are reached. In tropical and monsoon climates, the amounts may be underestimated. While in Pontianak in particular the amount of precipitation can reach an average of 100mm due to its location in a sub tropical climate, particularly in certain months such as September till April where the rainy season occurs which impacts heavily on the amount of precipitation.



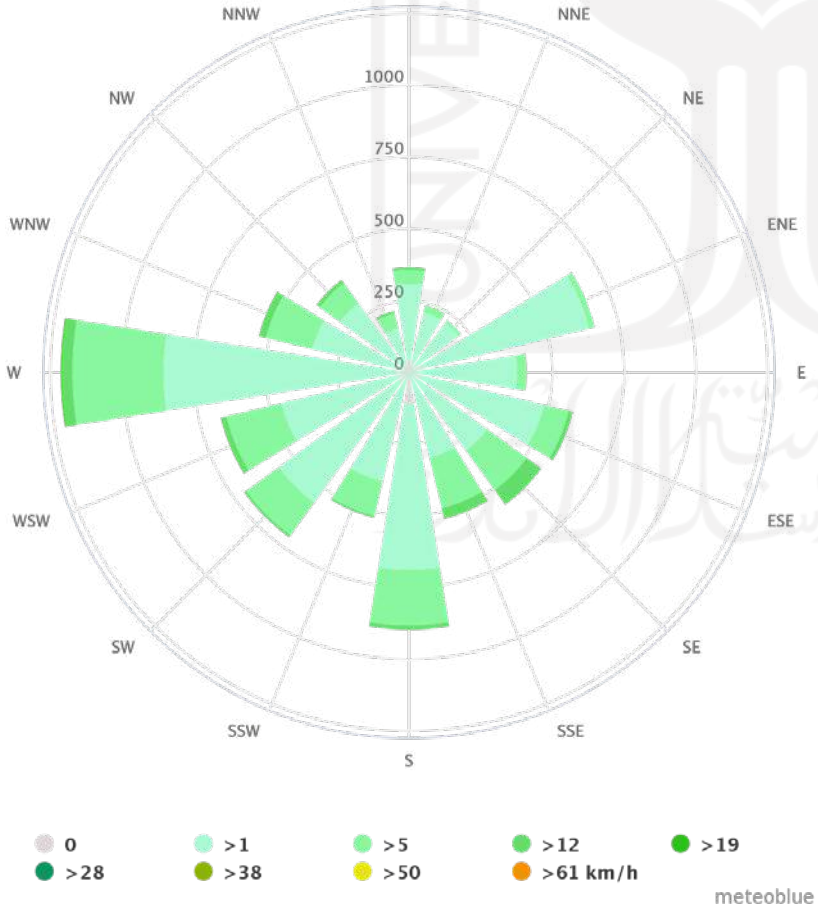


Figure 2.10 Wind Rose of Wind Speeds in Pontianak
Source: meteoblue.com, 2021

2.2.3 Weather

The graph shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

Pontianak has mostly partly cloudy days but has also a substantial number of overcast which causes the humidity to rise while during sunny days while limited in quantity is very hot reaching up to 31 Degrees and can still rain at the same time.

Note: In tropical climates like in Malaysia or Indonesia the number of precipitation days may be overestimated by a factor up to 2.

Figure 2.8 Monthly Data of Sunny and Rainy Days
Source: meteoblue.com, 2021

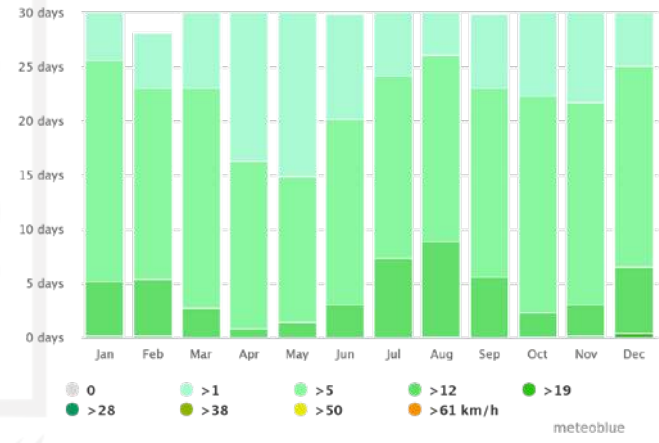


Figure 2.9 Monthly Wind Speeds in Pontianak
Source: meteoblue.com, 2021

2.2.4 Wind

The diagram for Pontianak shows the days per month. From this we can confirm that in August is where the highest constant speed is reached, while from December to January is when a constant above 12km/h that can be dangerous combined with heavy precipitation

The wind rose for Pontianak shows how many hours per year the wind blows from the indicated direction. The highest wind speed comes main from the west, that is assumed to be sea wind coming from the river that is connected to the sea.

2.3 TOPOGRAPHY CONDITION

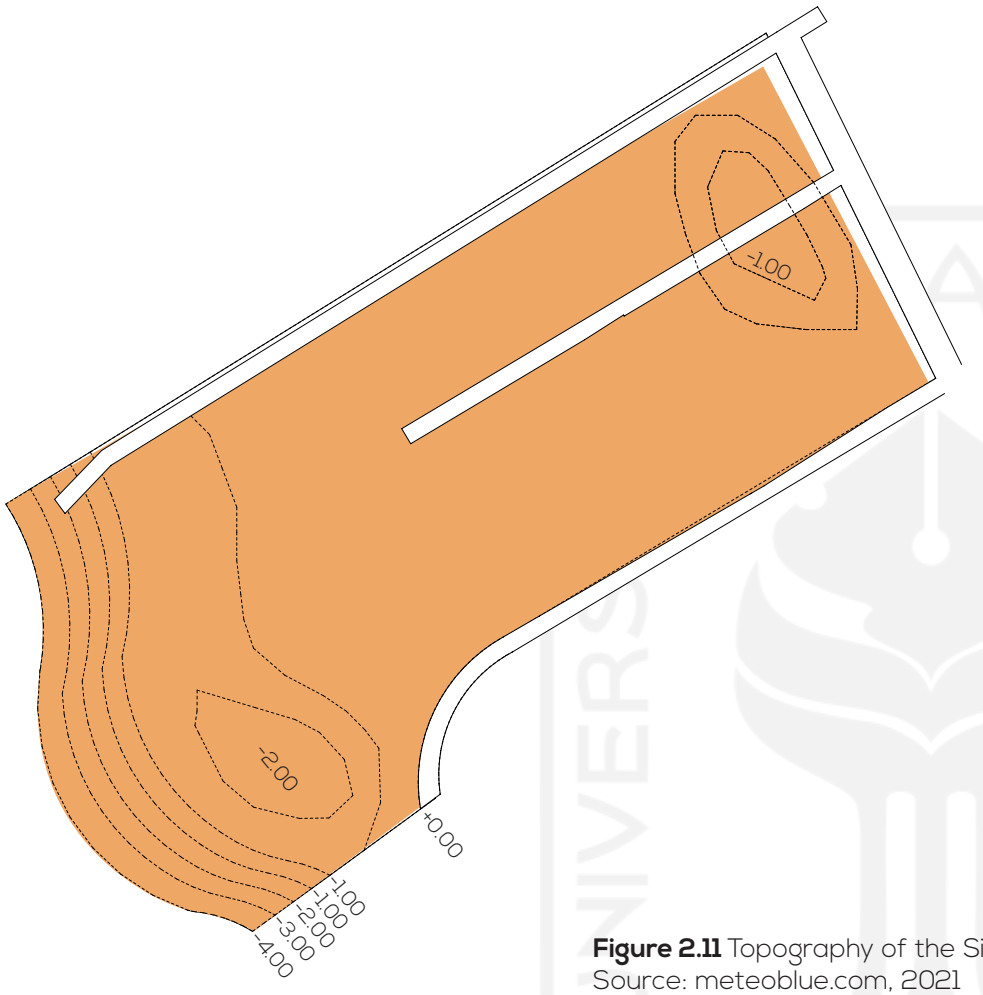


Figure 2.11 Topography of the Site
Source: meteoblue.com, 2021

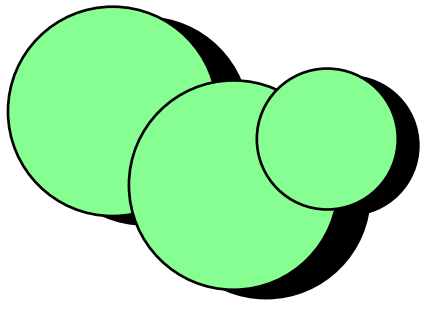
2.3.1 Contour and Soil Conditions

The land in the riverbanks are all peat soil (tanah gambut), in which the ground is not very stable in/ hard which is suitable to live in normal conditions, thus suggesting to build using stilts/ piles. The hard soil in the riverbank is predicted to be 20m below the surface in which it can used on how deep the foundation needs to be. Another point is that while also in peat soil, the amount of water being absorbed here/ the ability to absorb water is very probable due to the nature of peat, which in turns causes water to gather in the soil.

Continuing on to the contour, the slope on the riverbank was fairly steep considering the maximum amount for a built area is 15%.

There are some signs of erosion caused by the frequent flood water which has a ditch/ small embankment where flood water would gather as a result from rain and the river.

2.4 GREEN & BUILT AREA



2.4.1 Vegetation, Softscape, and Hardscape

The trees here are mainly composed of 2 types of trees which is the **Sindur** tree and **Bintangor**, which has a relatively wide coverage area from its leaves. The trees mainly are near to the land rather nearing the river bank, due to land being more unstable/moist nearing the riverbank. While the soil here are all peat soil which can absorb high amounts of water but lacks in hardness and rigidity which is why the hard soil is found 20-30m below ground in this particular city area.

The houses inside the site if needed to be moved, the only element directly interacting with the soil is the stilts and foundation buried in the soil, while the floor or wall are able to be deconstructed fairly easily due to a majority of it made out wood.

While some houses use concrete, the houses that use concrete needed to lift the house around 30 cm using concrete fillers for the water to not enter their houses easily, in contrast the houses that uses wooden floors, let the water flow beneath them and will slowly sip into the house through the wooden plank gaps.

The roads are smooth concrete, nearing the river edge the roads are turned into wooden platforms. Which uses planks and stilts that is more feasible to be used above water and more easily fixed.

Figure 2.12 Hard scape and Soft scape in Site
Source: Writer, 2021

2.5 CIRCULATION & TRAFFIC

Figure 2.13 1KM around the site and traffic division
Source: Writer, 2021

2.5.1 Vehicular Circulation

The red traffic is the bridge and Main highway road connecting 3 regions in Pontianak from the middle of the city to East Pontianak and eventually North Pontianak. This red indicated road is one of the busiest and crowded road to be used for work and going out of town.

While the purple road is a secondary road which is not quite common due to its smaller width compared to the main road, this purple road can only fit 2 car width's which is around 5-6 meter. This road in particular is commonly used for traveling to the residential area near the surrounding

Now coming to the blue road, it is the smallest road compared to the previous ones, this road width is only 2-3m wide which is commonly used for residents of the homeowners there and is used to go to the wooden platforms above the riverbank. Used only to provide a pathway to smaller houses that has no 4 wheel vehicle circulation due to the homeowners there mostly owning only a motorcycle. This road is mostly quiet all day and night with the occasional visitors during the morning for fishing.

2.6 ARCHITECTURE QUALITY

Figure 2.14 Housing Typology in RT01
Source: Writer, 2021

2.6.1 Existing Housing Condition

The main features of architecture is following a traditional stage house commonly found in Pontianak where a raised platform and mainly wood pile foundations to avoid floods and use it to cool the building due to its raised base floods. Additionally the main feature of using pile foundation is widely used in Pontianak due to its soil conditions where it is mostly comprised of peat soil (Tanah Gambut) where using pile foundation is more feasible than using a sloof or foot plate.

The variety and similarities in architecture here at present is staying true to the common principles of a traditional Borneo house while also having varieties to suite each house owner economical condition.

The common principles are:
- Having a raised floor/stage house
- Front terrace/porch
- Using mostly wood

While the varieties can be summarized to 5 types of houses. These houses is the current existing buildings inside the site and its nearby surrounding. But still within RT01/RW07, the house data was obtained through a survey and the cooperation from the community.

2.6.2 Space Analysis - Type 1 House

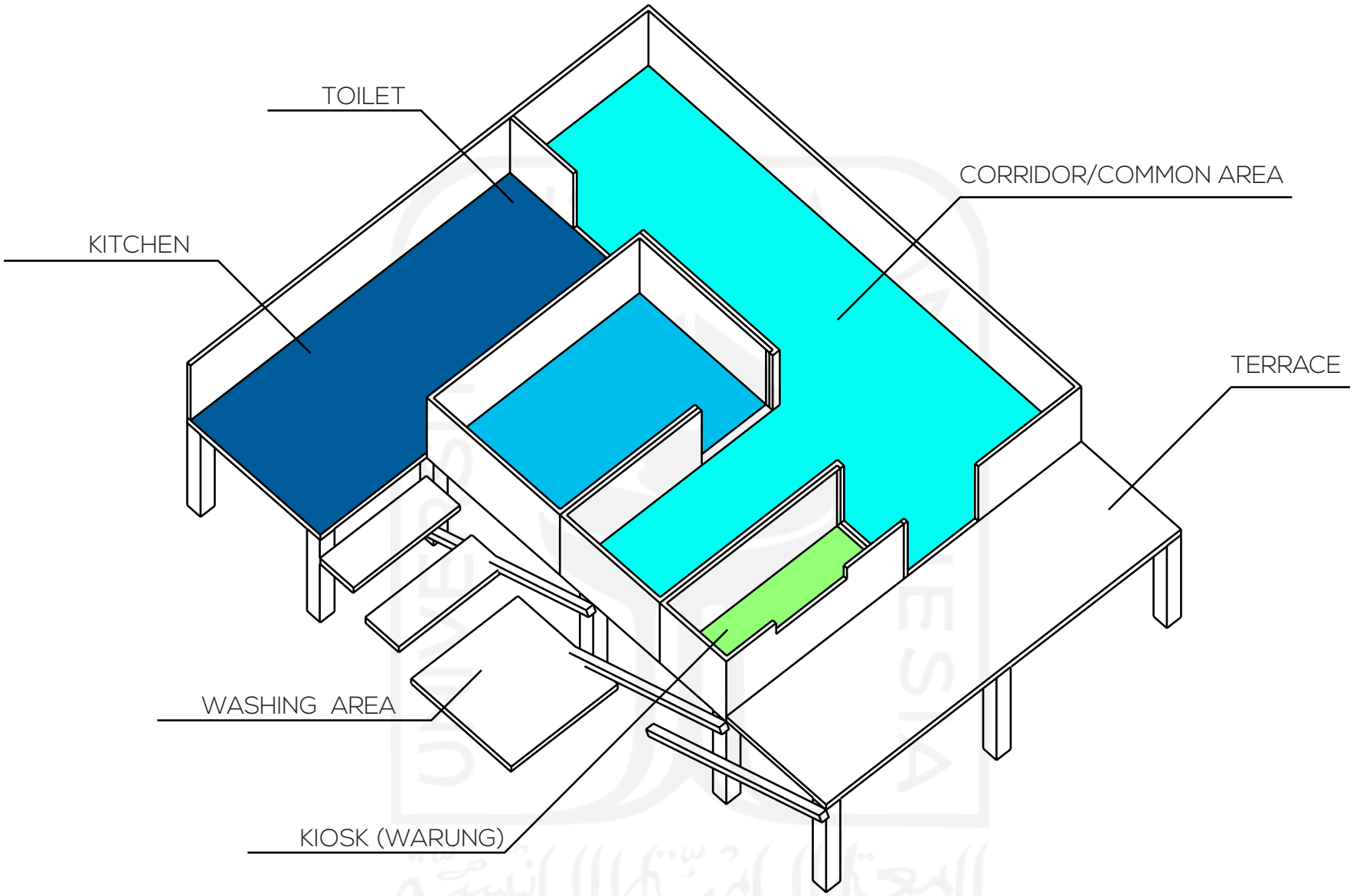


Figure 2.15 Type 1 House in RT01
Source: Writer, 2021

2.6.2.1 Type 1 House - Above Water

This type of house has 4 zones which is public, semi-private, private, and a kiosk(warung) that is connected by one large space/corridor. The kitchen and toilet is situated at the back while also being connected to the outside small dock where they wash their clothes and dishes using river water

The terrace supports as a common area where guests or customers can come in and interact with the homeowners while keeping a boundary between house and service area The Toilet and kitchen is open to the washing area that is convenient for getting water and washing dishes and collecting rain water

2.6.3 Space Analysis - Type 2 House

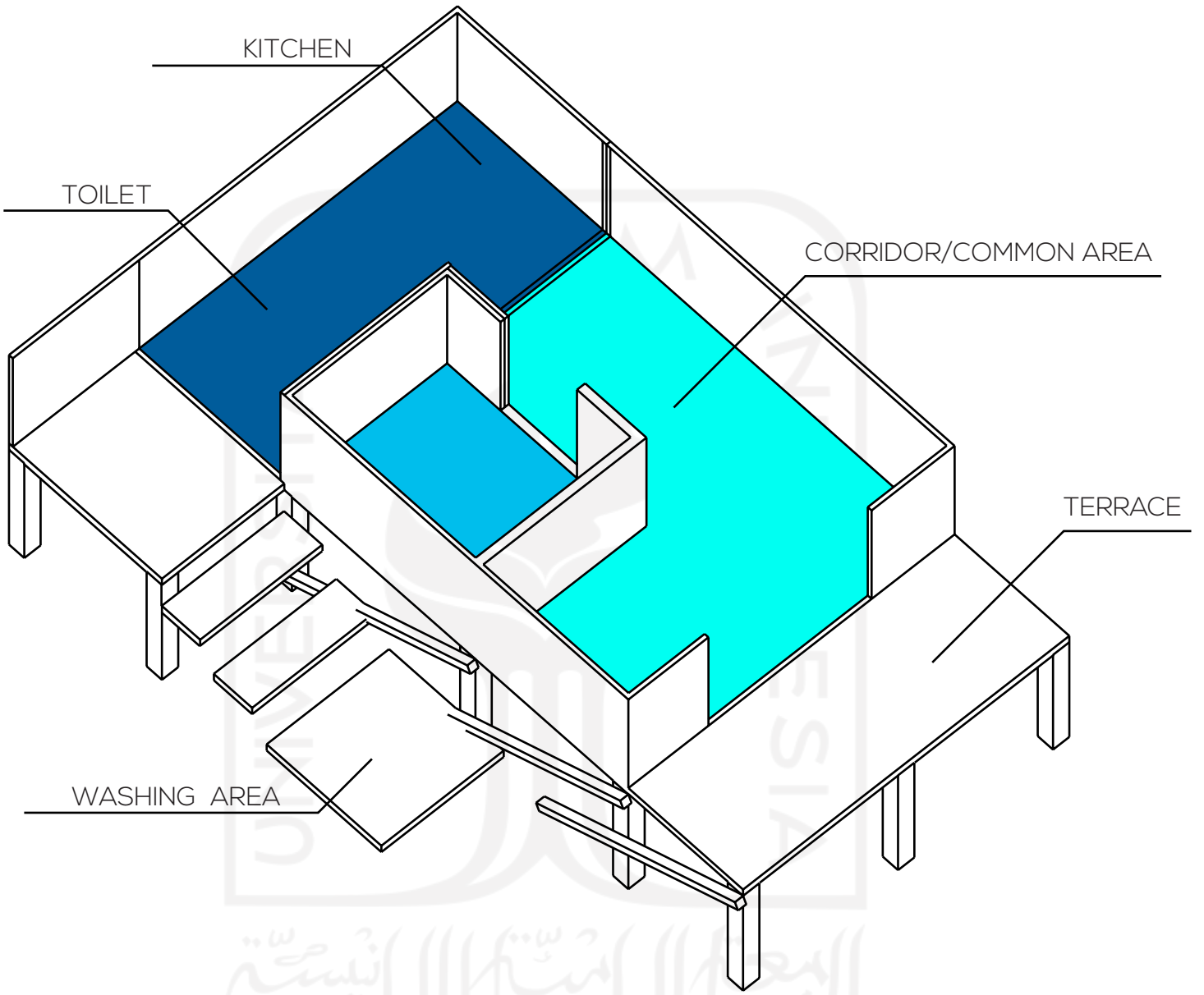


Figure 2.16 Type 2 House in RT01
Source: Writer, 2021

2.6.3.1 Type 2 House - Above Water

This type of house has 3 zones which is public, semi-private, private, that is connected by one large space/corridor. The kitchen and toilet is situated at the back while also being connected to the outside small dock where they wash their clothes and dishes using river water.

While the structure is a 3mx6m space that fits a medium family and has a household dependent on fishing for their livelihood

The terrace supports as a common area where guests or customers can come in and interact with the homeowners while keeping a boundary between house and service area

The toilet is connected to the outdoors while the kitchen is at the secluded space connected to the corridor, and the washing area is near the toilet

2.6.4 Space Analysis - Type 2 House

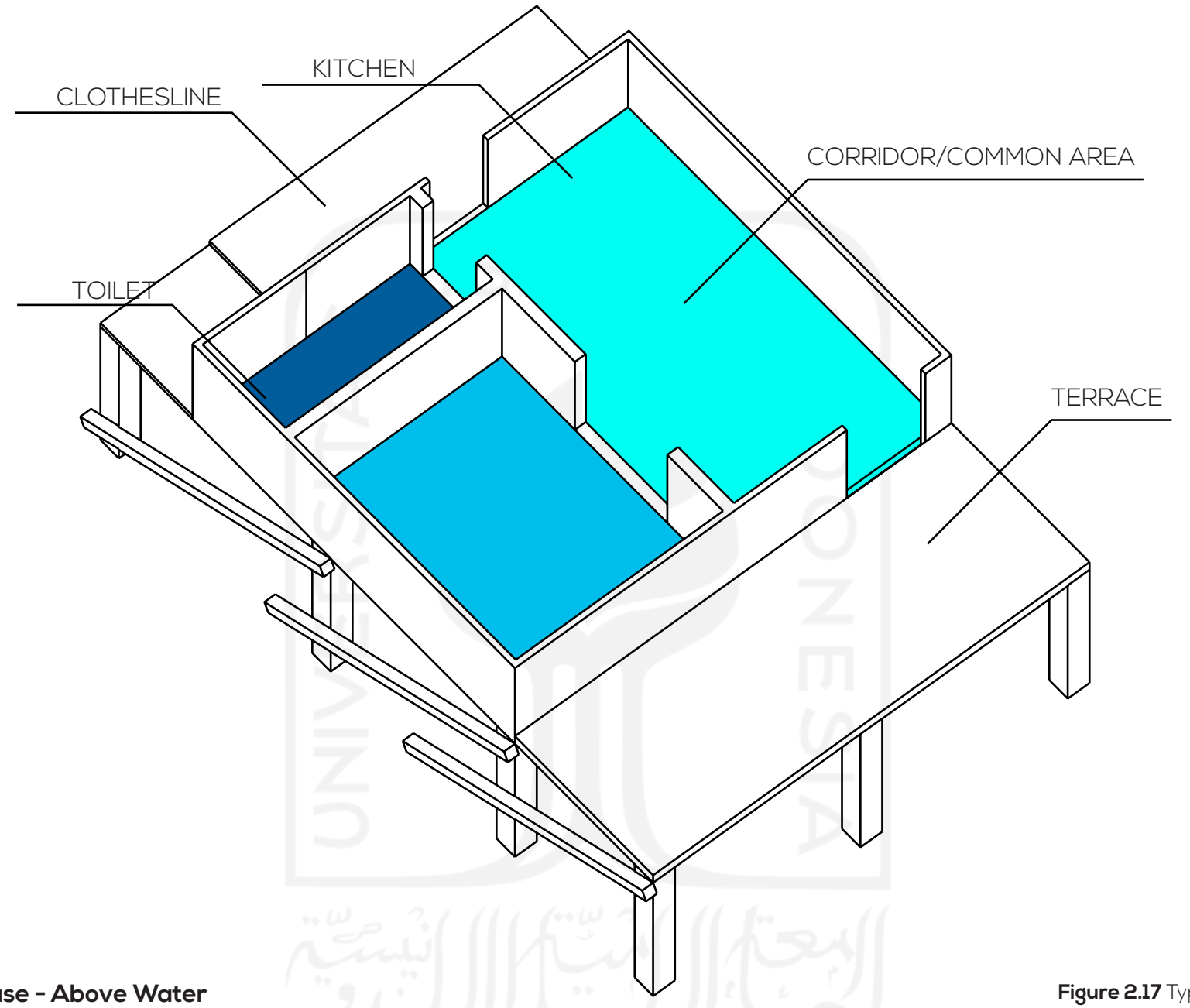


Figure 2.17 Type 3 House in RT01
Source: Writer, 2021

2.6.4.1 Type 3 House - Above Water

This type of house has 3 zones which is public, semi-private, private, that is connected by one large space/corridor. The kitchen and toilet is situated at the back while also being connected to the outside small dock where they wash their clothes and dishes using river water. While the structure is a 4mx4xm space that fits a medium family

The terrace supports as a common area where guests or customers can come in and interact with the homeowners while keeping a boundary between house and service area

This doesn't have a washing dock because in the toilet, clean water is provided. At the back a clothesline to dry clothing is provided for safety measure to avoid public visibility

2.6.5 Space Analysis - Type 4 House

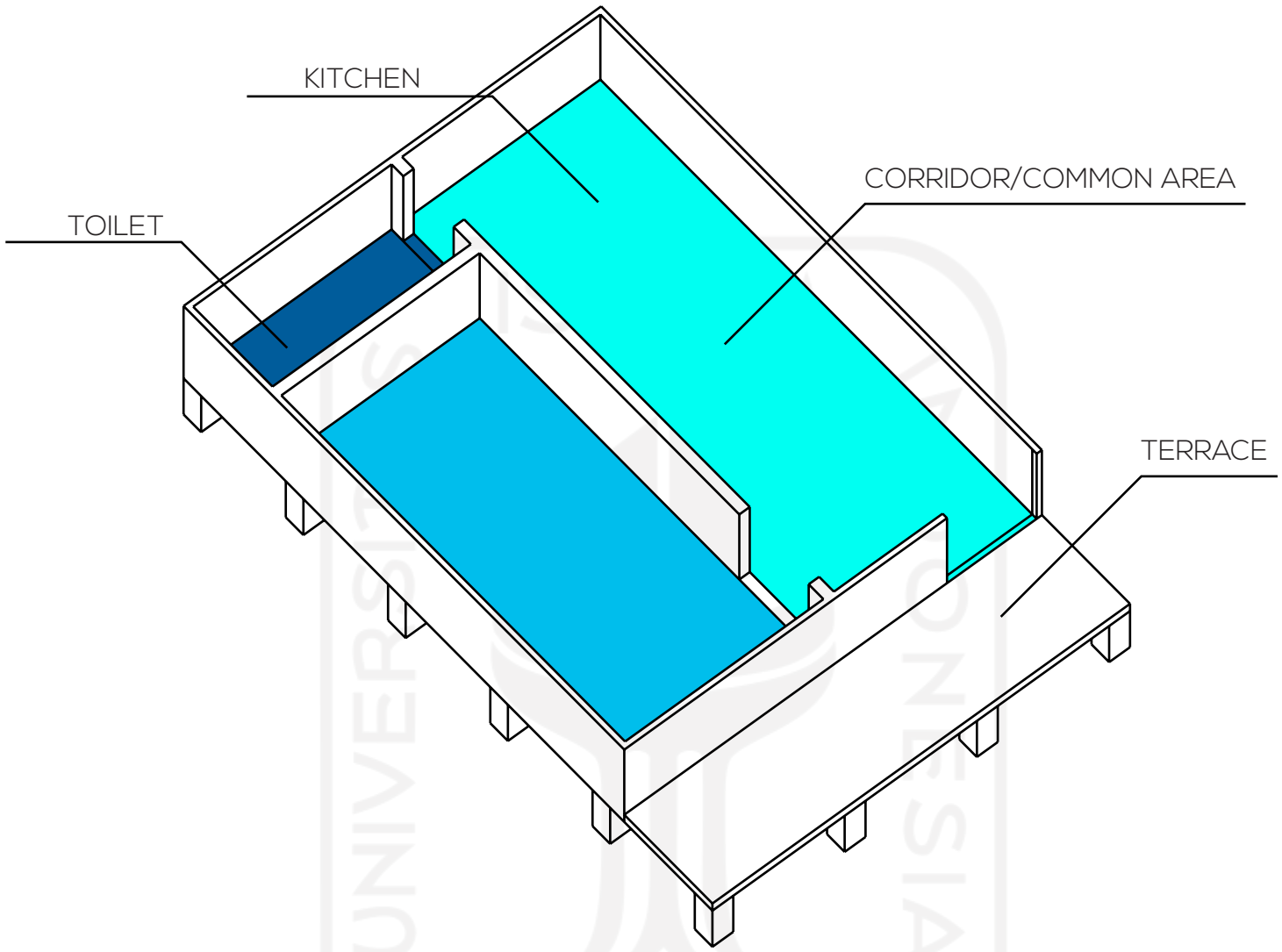


Figure 2.19 Type 4 House in RT01
Source: Writer, 2021

Type 4 House - Above Land
This type of house has 3 zones which is public, semi-private, private, that is connected by one large space/corridor. The kitchen and toilet is situated at the back.

While the structure is a 5mx6m space that fits a medium family that livelihood is a labor worker

The terrace supports as a common area where guests or customers can come in and interact with the homeowners while keeping a boundary between house and service area

Being on the land, the availability in which the terrace can be used for the clothesline while also functioning as a utility area

2.6.6 Space Analysis - Type 5 House

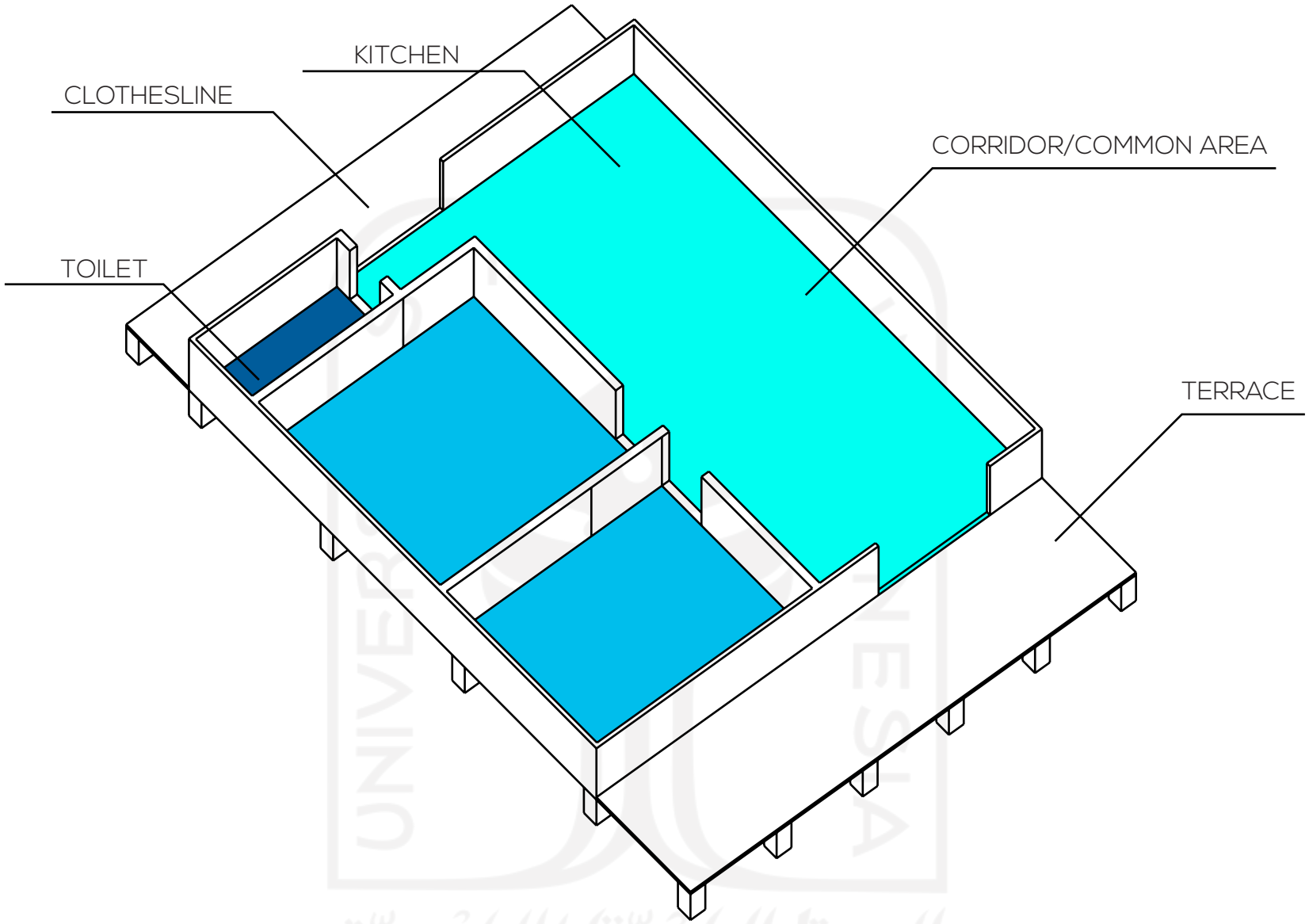


Figure 2.20 Type 5xHouse in RT01
Source: Writer, 2021

Type 5 House - Above Land
This type of house has 3 zones which is public, semi-private, private, that is connected by one large space/corridor. The kitchen and toilet is situated at the back. This house type is best suited for a 5-6 person family.

While the structure is a 5mx6m space that fits a medium family, a house livelihood that is based on entrepreneurship

The terrace supports as a common area where guests or customers can come in and interact with the homeowners while keeping a boundary between house and service area

Being on the land, the availability in which the terrace can be used for the clothesline while also functioning as a utility area

2.6.7 Space Analysis - Conclusion

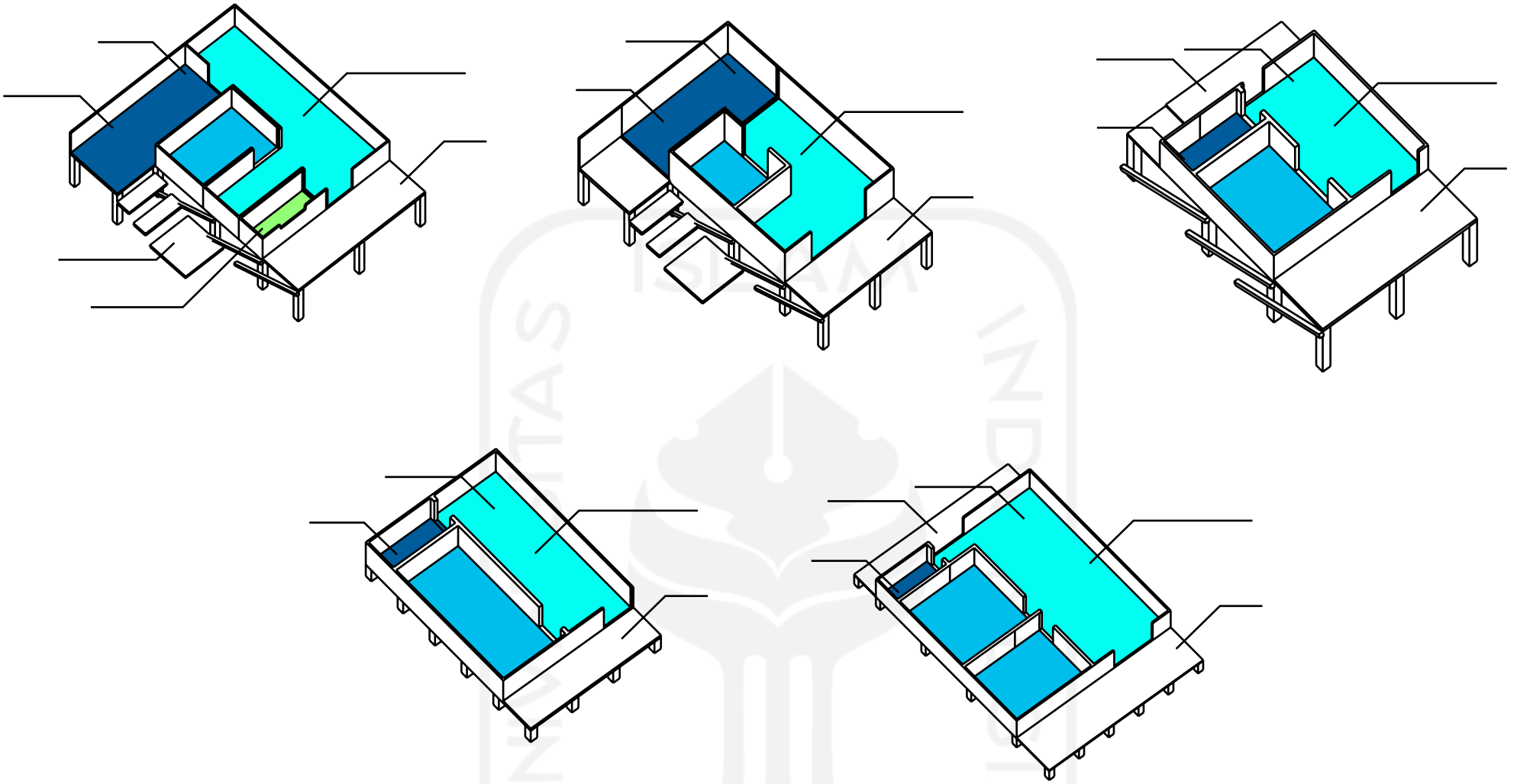


Figure 2.21 House Summary
Source: Writer, 2021

2.6.7.1 CONCLUSION

From these house analysis the similarities from all of these houses is that the area of structure is in repetition of a 4 by 4 grid. While some are smaller, it can fit into the 4x4 grid. While the programming is situated for each family occupation that has a differentiating professions.

Further observational analysis shows that the amount of people dependent on the river for their daily due to a lack of a clean water source for their daily needs, particularly bathing and laundry which affects the quality of life there. Because the river water is not recommended for bathing due to a danger of harmful substances that may affect their health in the long term.

2.6.8 Material Analysis - Similarities

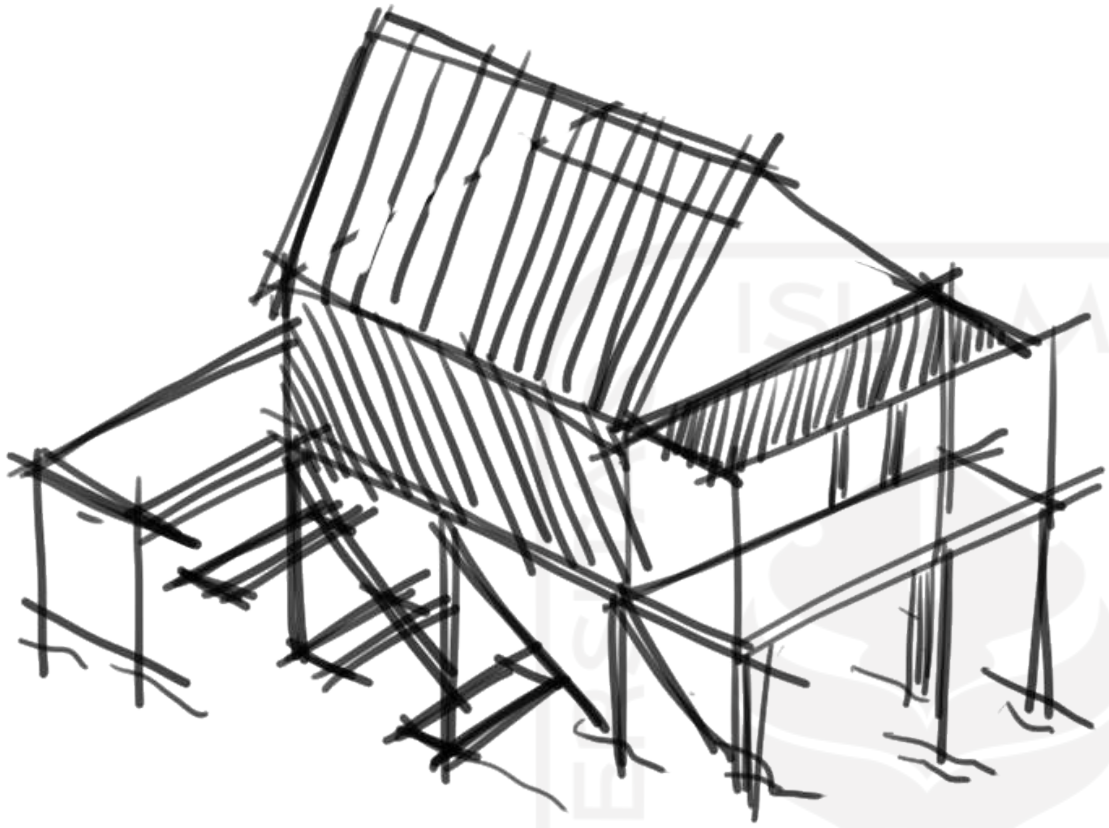


Figure 2.22 House Material
Source: Writer, 2021

2.6.8.1 Material Analysis

The existing material comprised of mainly of wood, usually Belian wood, Meranti wood, and occasionally Ulin wood, as the main structure comprising the columns, beams, and foundations. Another mainly used material is zinc metal sheetings for the roof and wall finishings for the exterior.

These materials are obtain fairly easily in Pontianak due to its abundant amount of these particular wood types. Now the condition of the wood itself is not that great due to constant weathering and water erosion, some are rotted and unable to used again if needed.

2.7 DESIGN THEME STUDY

Figure 2.23 River Bank Houses
Source: Google Maps, 2019

2.7.1 Open Building

Open Building creates a space that orients itself toward its user. The intent is to ascertain the design decision that has been made can impact it in the long term in a good way in which it can suite to future changes and stability. Open Building considers the changes in the requirement of its tenants in the future. Besides that, other changes that has to be planned in the open building design are environmental factors such as thermal, acoustics, lighting, and building performance (Harbaken, 1960).

Habraken in planning and designing an open building, should identify the different levels in the building planning process, **support and infill**, referring to the available urban fabric (local material), and said fit-out building. In implementing open building into the building it is a possibility that a change in the floor elements and exterior walls of building can occur in the coming future. Because of that, open building also take notice in the changes of the building facade in the future, layout in the multi-unit building.

Kendall also divided Open Building into 2 Levels, that is Base Building and Fit Out. Base Building - the part that is more permanent compared to the entire building, is related to the political, environmental and climatology (structure, skin, public circulation, and main MEP system). Fit-Out - the part that is more interchangeable compared to the whole building, decided on each tenant space, with the system, partition, tools, and entirety of the MEP system itself. (Kendall, 2003).

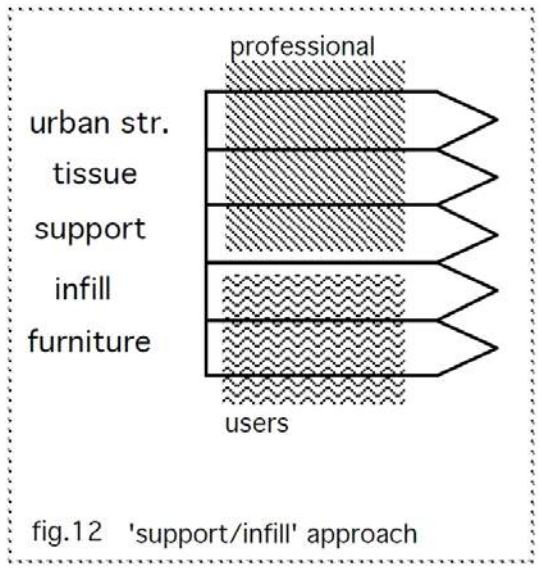


Figure 2.24 Habraken's Open Building Approach
Source:http://open-building.org/ob/concepts.html, 2021

Source: (by Prof. Dr. Stephen Kendall, http://www.open-building.org/ob/concepts.html)

2.7.1.2 IMPLEMENTATION IN TAMBELAN SAMPIT CASE

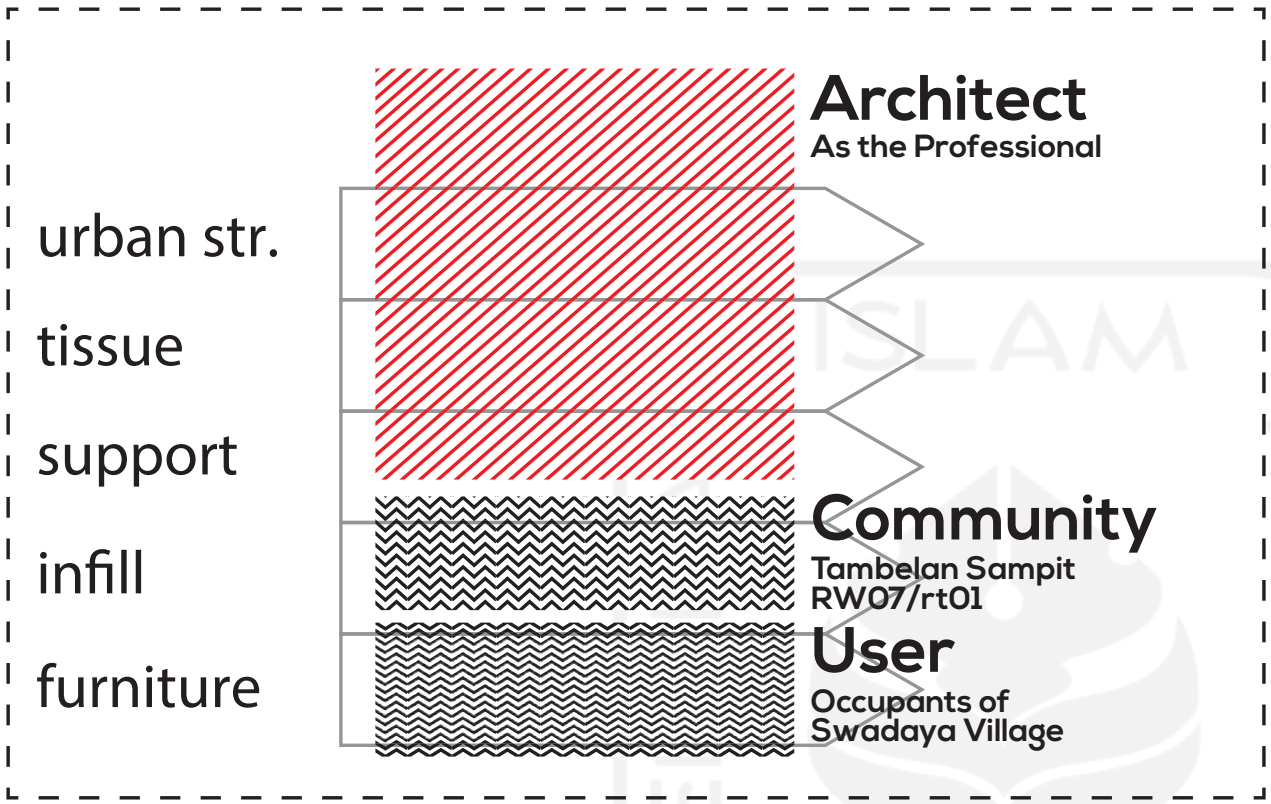


Figure 2.25 Interpretation of the approach
Source: Writer, 2021

The diagram above is intended to show the division of authority in the open building design.

The concept is that the citizen of the village/ RT01 has the authority in deciding in an infill level, in which their immediate living space concerning the interior walls and materials used in the floor, walls, and ceiling.

While the professional describe here is the architect where he has the authority and responsibility to provide up to the support level in which the main structures and supporting amnesties are design and created by said architect

The other implementation of open building here is the flexibility that it can provide to the residents following its construction and in the coming years. The main structure is detached entirely/ is separated from each 4 units structure to enforce the idea of interchangeable walls that can be replaced by the residents if needed, or by creating an additional wall to create another room.

While another form presented here is the availability in differing sizes of the units to accommodate future needs such as :

- 4x4 - 4x6 - 4x8 built area unit
- 8x8 - 8x12 built area unit

2.7.2 Flood Resistance

Flood Resistant is a saying in which an object or subject is able to withstand a certain amount of incoming water which on certain events will raise the water level affecting said object. This event usually happens in **Floodplain areas** that can be subjected to hydrostatic (standing water) and hydrodynamic (flowing water) pressures during floods. These pressures can result in displaced foundation walls, collapsed structures, floating fuel tanks, scouring, and other damage.

Flood resistance is thus required as to have structural and nonstructural components be durable, resistant to flood forces (including buoyancy), and resistant to deterioration caused by inundation with floodwater. Options that require emergency operation (such as shutting off electricity or removing vulnerable components) should be avoided if possible, particularly in areas subject to flash flooding.

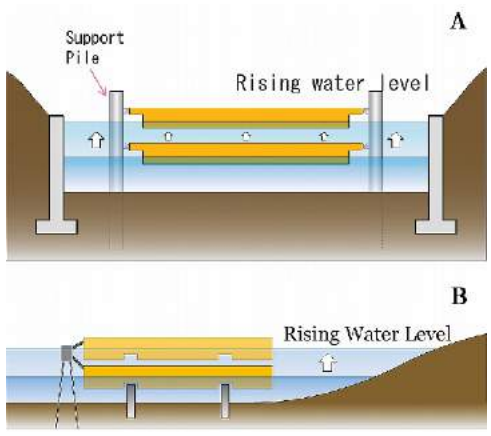


Figure 2.26 nterpretation of the approach
Source: Writer, 2021

Common methods of Flood resistance design are :
- Strengthening certain aspects to withstand the flood
- Avoiding the flood by moving the object
- Redirecting the flooding water into other areas

Other ways in they have to respond to the flood are by using 2 viable methods :

- Floating Architecture

Floating Architecture here means a designing method which centers itself around the use of Floating techniques using technology from several design methods

- Pile Foundation (Tiang Tongkat / Tiang Pancang Kayu)

Pile Foundations are commonly used for marsh or soft soils, or in this case to avoid the flood using pile foundations to lift the ground level of the houses above the water line and while being structurally safe and feasible to be built.

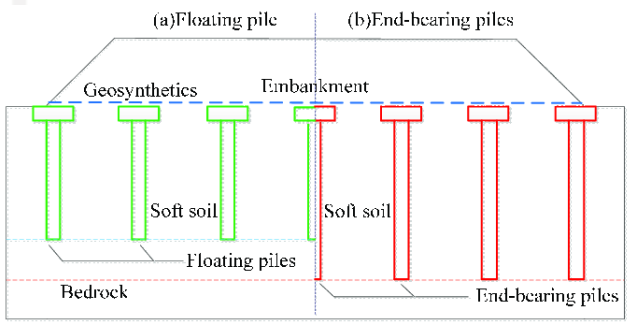


Figure 2.27 nterpretation of the approach
Source: Writer, 2021

Source: https://www.calcasieuparish.gov/home/showdocument?id=3021

2.8 DESIGN PRECEDENT STUDY

Framework

- WHY - WHICH - HOW -

In this study, the study is conducted by gathering and studying several study cases in which that has a relevant relation to the theme in there are 3,

- Flood Resistance -

- Open Building -

- Residential Housing -

In each theme there will be provided 2 case studies to be chosen, and at the end. A cumulative study on which elements that can be used/integrated into the preliminary design

2.8.1 Flood Resistance - Flood House

Figure 2.28 nterpretation of the approach
Source: Writer, 2021

Flood House / F9 Productions

After living a part of their lives in the flood prone region of Fargo, Lance Cayko & Alex Gore from F9 Productions started thinking of the catastrophe that could strike if the flood dikes gave way and for that reason they designed a flood resistant house that takes on the challenge of how to survive in the worst conditions.

Figure 2.29 nterpretation of the approach
Source: Writer, 2021

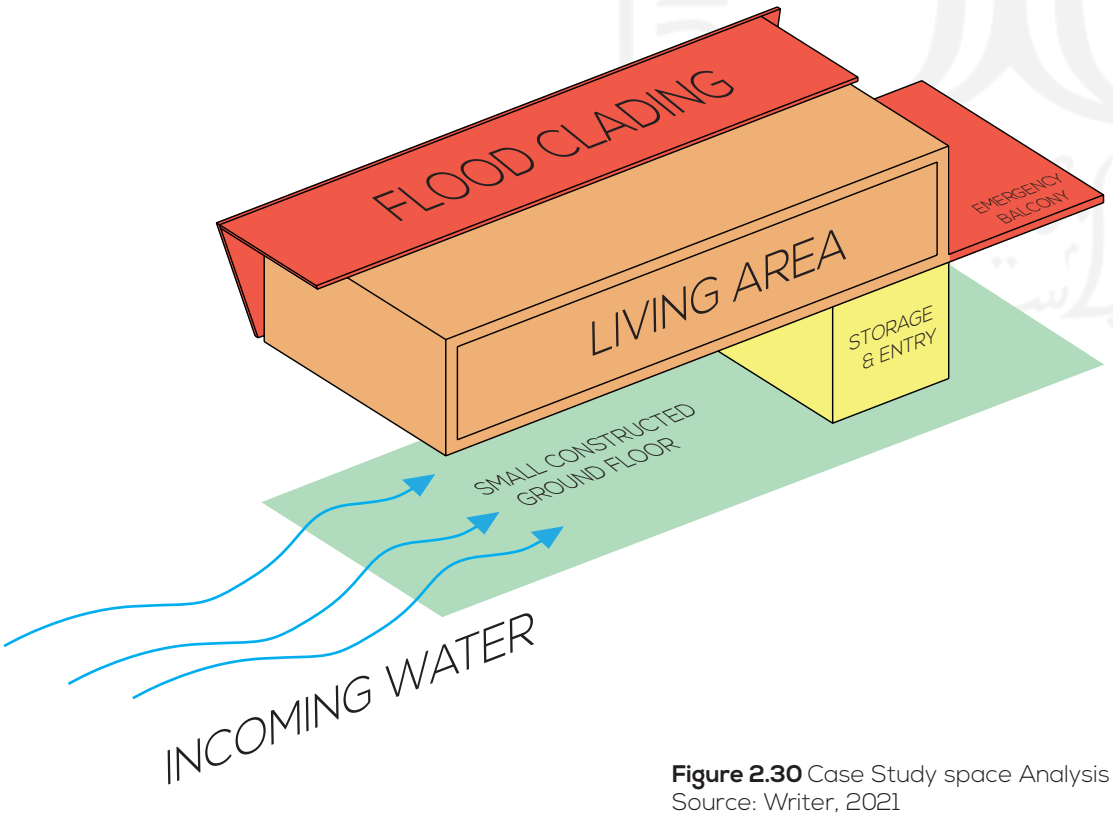


Figure 2.30 Case Study space Analysis
Source: Writer, 2021

Design guidelines for Flood design

- A raised home design elevates treasured items away from rising waters. The house is built upon elevated ground that is high to protect the main level from any flooding.
- Small ground floor constructed area
- The ground floor is only used as an entry way as well as tool storage
- The above deck provides a means of escape in the event of an emergency
- Exterior Protection is maintained by steel siding guards the house from falling debris, and also acts as a shield against large floating objects.
- Barriers such as Sand bagging efforts are reduced dramatically by the small footprint

2.8.2 Open Building - MaMa One

MaMa One/ Marc Koehler Architects

MaMa One & Open Cities • MaMa One connects to the cool, raw and bold atmosphere of its surrounding neighborhood Buiksloterham. Living and working are not separated but integrated in a healthy, active and worthwhile life.

Buiksloterham, the former industrial area of Amsterdam Noord is rapidly changing into an exciting, living and working environment. The new city district is ambitious in the field of circularity and sustainability, and in creating a resilient and healthy city that can adapt to future needs and changes.

Figure 2.31 Case Study space Analysis
Source: Writer, 2021

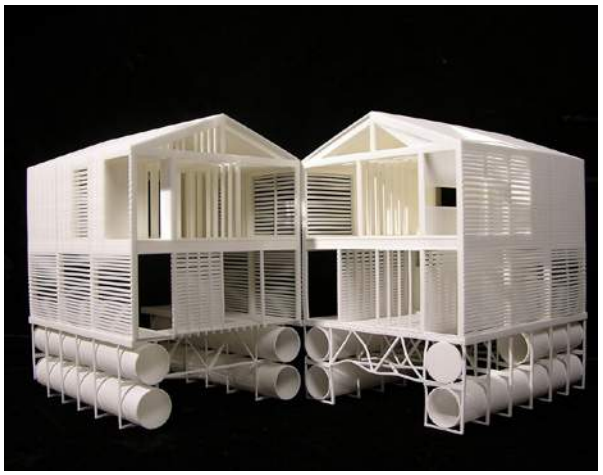
Design Guidelines for Open Building Approach

- It is built for adaptation and reassembly with Open Systems that can easily be adapted overtime. Cross laminated timber modules can be connected both vertically and horizontally. This offers more flexibility to create a **differentiated mix of housing types** and a diverse community, both during the development of the project and in the future.
- Marc Koehler Architects recognizes **three different levels of adaptability**. The first level is the flexible layout of the home itself. There are several ways to layout each home: a living room at the front and a bedroom at the back, or a reversed layout with an added kitchen at the front. The second level makes it possible to add a wall and create an extra room, or in reverse, disassemble walls and create more open space. On the third level, it should possible to divide two 60 m^2 houses into three 40 m^2 houses.

Floating House / MOS Architects

This project intersects a vernacular house typology with the site-specific conditions of this unique place: an island on Lake Huron. The location on the Great Lakes imposed complexities to the house's fabrication and construction, as well as its relationship to site. Annual cyclical change related to the change of seasons, compounded with escalating global environmental trends, cause Lake Huron's water levels to vary drastically from month-to-month, year-to-year. To adapt to this constant, dynamic change, the house floats atop a structure of steel pontoons, allowing it to fluctuate along with the lake.

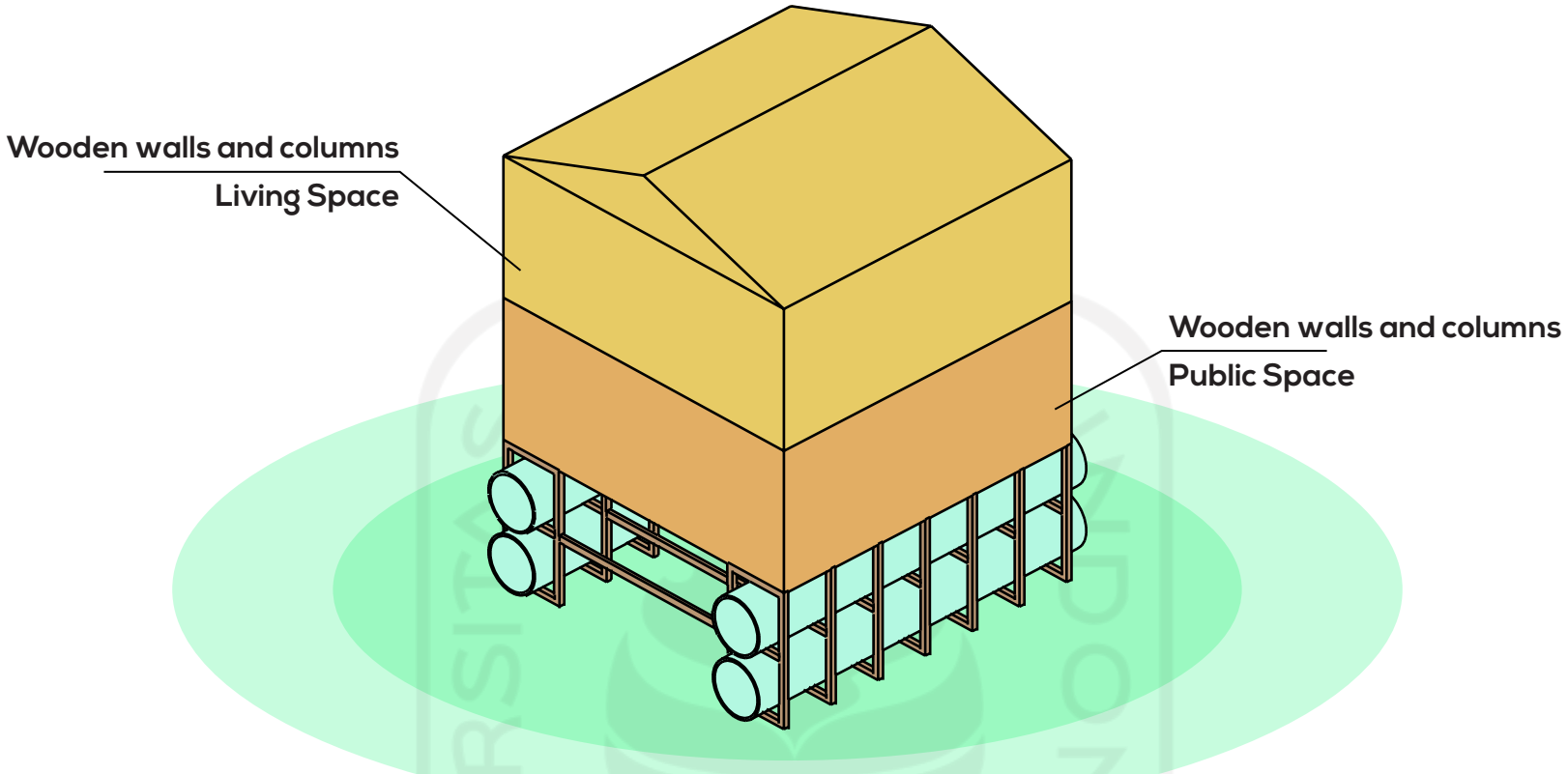
Figure 2.32 Case Study space Analysis
Source: Writer, 2021



Key features for flood resistant design

- A floating structure detached from the land or soil to fluctuate with the water
- Small compact structures is used for light movement of the building

Figure 2.33 Case Study space Analysis
Source: Writer, 2021



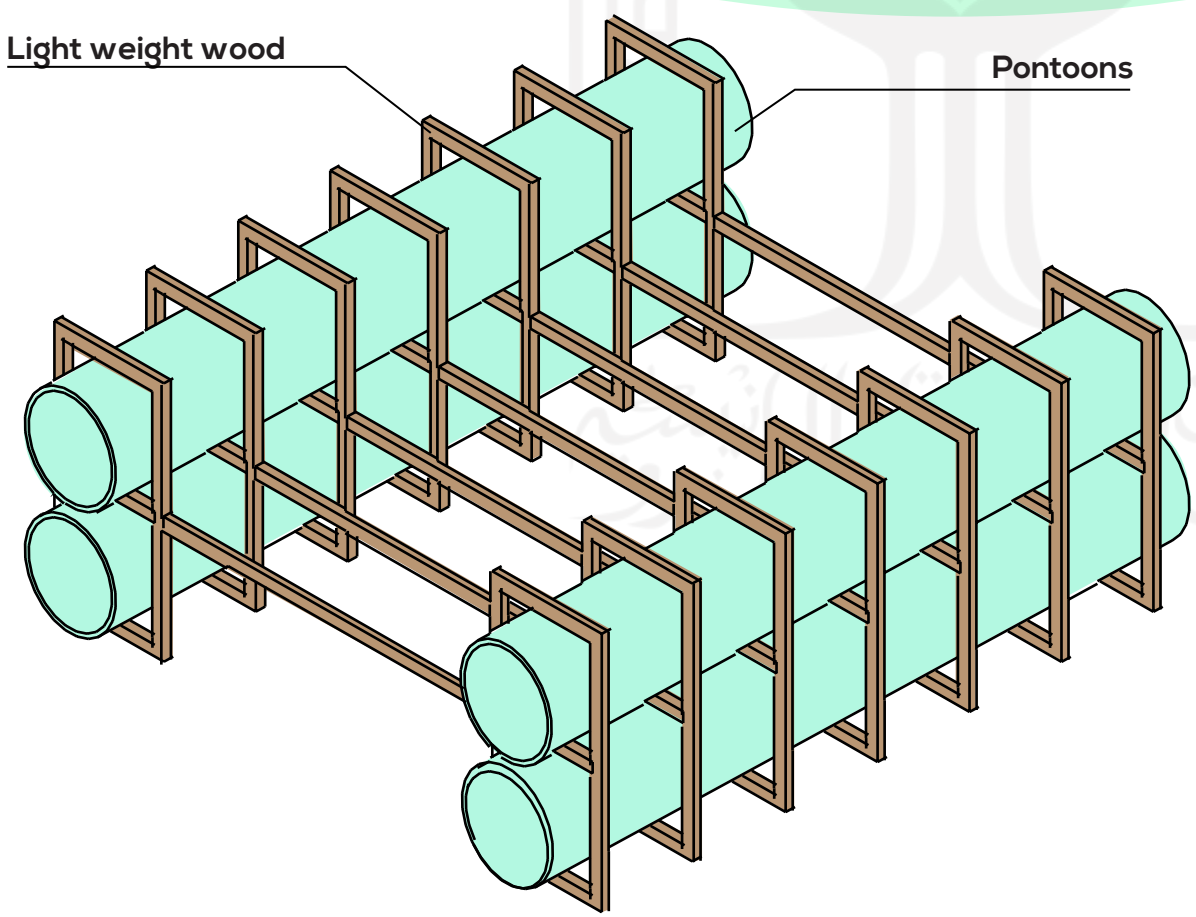


Figure 2.34 Case Study structure Analysis
Source: Writer, 2021

Design Guidelines for flood resistant design

- A floating structure detached from the land or soil to fluctuate with the water using pontoons and a wooden structure
- Small compact structures is used for light movement of the building
- Wooden material to lessen the amount of rigidity and maximize the amount of flexible material upon the force of the water

Figure 2.35 Case Study Floating System Analysis
Source: Writer, 2021

Silodam / MVRDV

In the western part of the Amsterdam harbor an extensive urban operation has been undertaken in order to densify the city and to meet the demands of the market, even on one of the more vulnerable areas. A former dam with a silo building on top has been transformed into a new neighborhood that consists of a series of relatively costly components: a dam with a sunken parking lot, renovation of the old silo buildings, the required mix of less expensive social housing, the underwater protection barrier against oil tankers, the required deep piling foundation and the expensive temporary dry-docks constructions.

To help pay for parts of this operation, a new housing block at the end of the dam was proposed. Timing helped. The Dutch real estate boom in the nineties allowed for higher profits.

Figure 2.36 Case Study Floatig System Analysis
Source: Writer, 2021

Lesson learnt for Open Building Approach

- . A mixed program of 157 houses (for rent or for sale), offices, work spaces, commercial spaces and public spaces had to be arranged in a 20 meter deep and ten-story-high urban envelope.

- The apartments differ in size, cost and organization. In order to accommodate this process in time, a series of neighborhoods of 8 to 12 apartments were created. Blocks of apartments which surround a corridor, a garden, a gallery and a hall.

- an unexpected sequence of semi-public routes appeared: from galleries on one side one can walk via slits and corridors to galleries on the other side and higher up. Connecting all the houses with the hall, the public balcony, the harbor the barbecue area and garden, the library, fitness area and toy exchange, a three-dimensional neighborhood materializes.

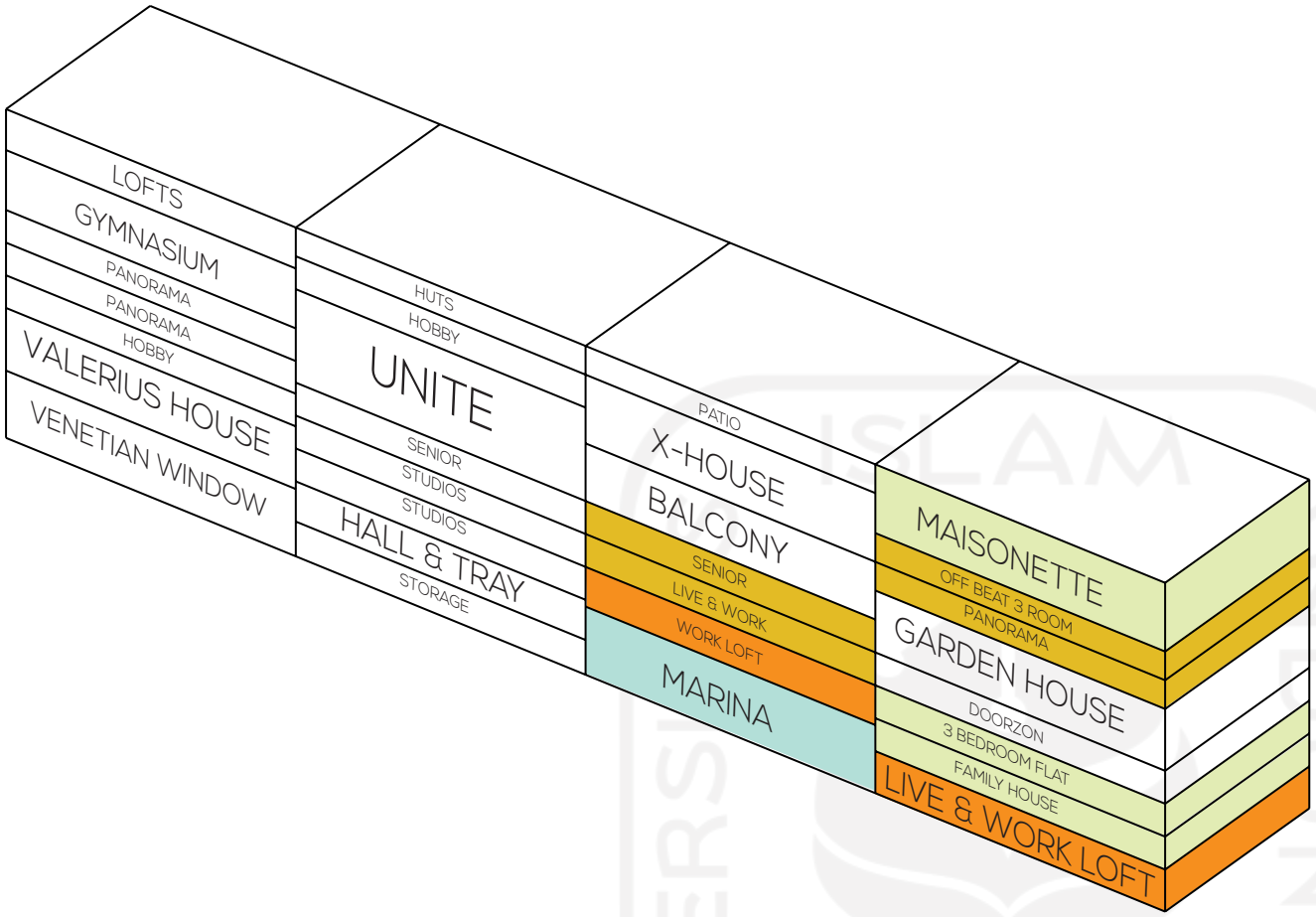


Figure 2.37 Case Study Space Programming Analysis
Source: Writer, 2021

SPACE PROGRAMMING

- . A mixed program of 157 houses (for rent or for sale), offices, work spaces, commercial spaces and public spaces had to be arranged in a 20 meter deep and ten-story-high urban envelope.

This programming is divided into 4 divisions to create an alternating arrangement, thus each division is not identical to one another, while the similarity is in its sizes. Thus enabling, while in a confined box form, enabling a certain identity to each activity which is the embodiment of open building, that can be adopted as a design guideline

Design Guidelines:

- Providing all of the required activity while not limiting on the space, but also considering the restrictions on the division sizes

- Different type houses are accommodated through different uses of the material provided by each occupant while also provided by the designer to a certain extent

Figure 2.38 Case Study Space Programming Analysis
Source: Writer, 2021

Mad Arkitekter to Design Germany's Tallest Wooden Tower

Centered on climate and social sustainability, the Woho project is a high-rise building with a diverse program and a distinct social profile. Designed as a small district in itself, the building is located in Kreuzberg, a central, diverse, and unconventional district in the German capital. Reflecting these spatial qualities, Mad Arkitekter designed a proposal that re-interprets the typical Kreuzberg quarter, in a vertical configuration. Selected out of 14 offices, Mad Arkitekter impressed the jury with its design that fits into the urban context and at the same time solves the requirements of the special WoHo program.

Precendent Study Summary

Design Guidelines for flood resistant design

- making the interior wet proof/recoverable
- adding a storey and reconfiguring the ground floor
- raising floor levels
- jacking-up the structure or floating the whole house
- Available emergency plan

Design Guidelines for open building approach

- Modular structure able to accommodate rooms of different sizes
- Able to redesign the room area if needed thus no structural bearing walls in the units
- The functions of the living area is dictated by the users
- Semi public areas that can define the community as a whole thus using it as a buffer area

Suggestions in the building format

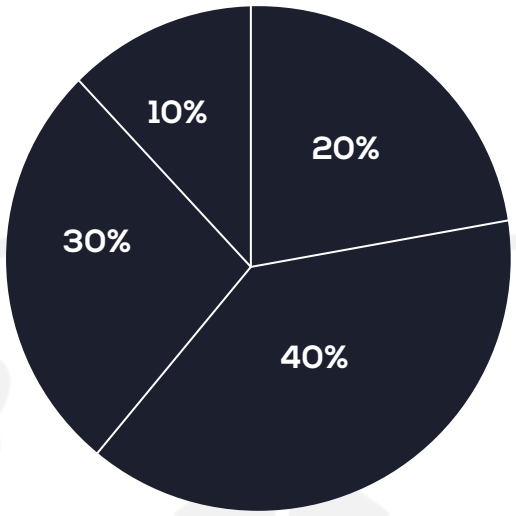
Dividing the **support** level into the flood resistant system and main structure, while the housing units walls and interior is dictated by each user activity as an **infill**

- Cross laminated timber as a main structure to construct the frame of the houses
- Units are modular as in able to have diverse alternative
- Floating and permanent foundations to differentiate the building response to the flood
- Open ground floor plan, with public areas that are strengthen in the case of a flood
- Several activities are enhanced such as swimming, fishing, boat areas, and daily needs

2.9 SPACE ARRANGEMENT

Client and User Data

Client in the making of this housing is the the citizens of Swadaya Village itself which is in danger of the rising floods affecting their houses. The land of the site is owned by the municipality of Pontianak, ans is planned according to the regulations that is invoked surrounding the site. Use in this case, is the citizen of RW07/RT01 Swadaya Village, Tambelan Sampit. Where the citizens there have lived on the site for over 15 years. There is also a recorded data of the citizens there shown the figure below



RT01

58 HOUSEHOLDS

149 LIVES

10%
CONSISTING OF
THE ELDERLY (>60 YEARS OLD)

30%
CONSISTING OF
CHILDREN (<18 YEARS OLD)

20%
CONSISTING OF
TEENAGERS (>18 YEARS OLD)

40%
CONSISTING OF
ADULTS (>30 YEARS OLD)

RIVER

HOMEOWNERS JOBS RELIANT ON THE RIVER (FISHERMAN, FISH SELLERS)	**HOUSEHOLDS** CONSISTING OF MULTIPLE CHILDREN (4-5)	**HOMEOWNERS JOBS** NOT RELIANT ON THE RIVER (CONSTRUCTION WORKERS, LABOR WORKERS)
HOMEOWNERS JOBS RELIANT ON THE RIVER (FISHERMAN, FISH SELLERS)	**HOMEOWNERS JOBS** NOT HEAVILY RELIANT ON THE RIVER (WARUNG, BUSINESS OWNERS)	**HOMEOWNERS JOBS** NOT RELIANT ON THE RIVER (CONSTRUCTION WORKERS, LABOR WORKERS)
WATERFRONT PARK	**KIOSKS** FROM BUSINESS OWNERS	**MOTORCYCLE PARKING AREA**

LAND

TIME ANALYSIS OF THE EXISTING CITIZENS

	FATHER	MOTHER	TEENAGER	CHILDREN	ELDERLY	SPACE REQUIREMENT
05.00 - 06.00	- Wake Up - Get Ready for work	- Wake Up - Cook Breakfast	- Wake Up - Get Ready for School	- Wake Up - Get Ready for School	- Wake Up	- Bedroom - Kitchen
06.00 - 07.00	- Breakfast - Watch TV - Bathe - Chat with Neighbors	- Breakfast - Watch TV - Bathe - Get Ready for work	- Breakfast - Watch TV - Bathe - Go to School	- Breakfast - Watch TV - Bathe - Go to School	- Breakfast - Bathe - Watch TV	- Family room - Common room - Toilet
07.00 - 09.00	- Go to Work - Work	- Clean the House - Work - Gather with others - Do Laundry	- School - Work	- School	- Clean the House - Sleep - Gather with others	- Room to gather - Area for Laundry
09.00 - 10.00	- Work	- Cook - Work - Gather with others	- School	- School	-Cook	- Kitchen - Rooom to gather
10.00 - 12.00	- Work - Eat Lunch - Watch TV	- Work - Eat lunch - Watch TV - Gather with others	- School	- Eat Lunch - Watch TV - Play	- Eat lunch - Watch TV - Gather with others	- Room to gather - Family room - Porch
13.00 - 17.00	- Work	- Work - Dry Clothes	- Play - Study - Watch TV - Gather with others	- Play - Study - Watch TV - Gather with others	- Watch TV - Gather with others	- Room to gather - Family room - Room for guests - Clotheline space
17.00 - 18.00	- Watch TV - Go Home - Bathe	- Watch TV - Go Home - Bathe	- Watch TV - Study - Gather with others - Go Home - Bathe	- Play - Study - Gather with others - Go Home - Bathe	- Watch TV - Bathe	- Room to gather - Kitchen - Family Room - Toilet
18.00 - 22.00	- Work - Watch TV - Eat Dinner	- Work - Watch TV - Eat Dinner	- Study - Watch TV - Eat Dinner	- Study - Watch TV - Eat Dinner	- Watch TV	- Family Room - Bedroom
22.00 - 05.00	- Work - Gather with others - Rest	- Work - Gather with others - Rest	- Study - Watch TV - Rest	- Study - Watch TV - Rest	- Watch TV - Rest	- Family Room - Bedroom

2.10 Building Regulations

Municipality Policy

Kebijakan Kota Baru Pontianak - RP2KPKP Kota Pontianak
Based on this Policy it was intended for the riverbank areas that contained slum areas which is in dire need of clean water while also living with inadequate houses

Living Space

A healthy house is a house built using simple building material and constructions but still fulfilling the basic need for health, safety, and comfort. Such principles are:

1. An average 9 m2 area/person, and a minimal ceiling height og 2.8m

2. A requirement for health and comfort in a room is affected by these 3 aspects :

- **LIGHTING**
- **AIR CIRCULATION**
- **TEMPERATURE AND HUMIDITY**

3. A minimal requirement for safety and security are:

1. **A bedroom covered with walls and a roof, as well as sufficient lighting, and protected from the weather.**
2. **A common room where interaction is encouraged between family members**
3. **A toilet that can be used as a service room for bathing and washing.**

A house's adequacy is determined by if the space for each person is 20% from the 9 m2 or a minimal of 7.15 m2 (*KepMen Nomor: 403/KPTS/M/2002*).

Building/Structure

PERATURAN WALIKOTA PONTIANAK NOMOR 52 TAHUN 2015 Pasal 21
Form and position of building mass that considers flood danger. Because of that, the mass building planning is:

- Simple, incline to be symmetrical, uniform and form as one unit/entity
- Perpendicular to the river axis
- For other areas beside the surrounding area road inspection mass building form is oriented to form a perimeter block

According **Ditjen Cipta Karya tahun 2000 tentang Petunjuk Teknis Penataan Bangunan dan Lingkungan di kawasan tepi air**, several things that need to considered are :

ACCESS

1. Akses berupa jalur kendaraan berada di antara batas terluar dari sempadan tepi air dengan areal terbangun.

2. Distance between access toward the public space/ riverbank form the secondary road is a minimum of 300m

3. Road network free from 4 wheeled vehicles

4. A minimum widt of a for pedestrians at the riverbank is 3 m.

PERUNTUKAN

1. Peruntukan bangunan diprioritaskan atas jenjang pertimbangan: penggunaan lahan yang bergantung dengan air (water dependent uses), penggunaan lahan yang bergantung dengan adanya air (water related uses), penggunaan lahan yang sama sekali tak berhubungan dengan air (independent and unrelated to water uses)

2. Kemiringan lahan yang dianjurkan untuk pengembangan area publik yaitu antara 0 - 15%.

Sedangkan untuk kemiringan lahan lebih dari 15% perlu penanganan khusus.

3. Jarak antara satu areal terbangun yang dominan diperuntukkanpengembangan bagi fasilitas umum dengan fasilitas umum lainnya maksimum 2 km.

BANGUNAN

1. Kepadatan bangunan di kawasan tepi air maksimum 25%.

2. Tinggi bangunan ditetapkan maksimum 15 m dihitung dari permukaan tanah rata-rata pada areal terbangun

3. Orientasi bangunan harus menghadap tepi air dengan mempertimbangkan posisi bangunan terhadap matahari dan arah tiupan angin

4. Bentuk dan desain bangunan disesuaikan dengan kondisi dan bentuk tepi air serta variabel lainnya yang menentukan penerapannya.

5. Warna bangunan dibatasi pada warna-warna alami.

6. Bangun-bangunan yang dapat dikembangkan pada areal sempadan tepi air berupa taman atau ruang rekreasi adalah fasilitas areal bermain, tempat duduk dan atau sarana olahraga.

7. Bangunan di areal sempadan tepi air hanya berupa tempat ibadah, bangunan penjaga pantai, bangunan fasilitas umum (MCK), bangunan tanpa dinding dengan luas maksimum 50 m2/unit

8. Tidak dilakukan pemagaran pada areal terbangun, kecuali pemagaran dengan tinggi maksimum 1 m dan menggunakan pagar transparan atau dengan tanaman hidup.

03

DESIGN CONCEPT

3.3 ARCHITECTURAL CONCEPT

3.3.1 User Programming

Creating Diversity through Modularity

While being a similar or modular form the idea is to create different divisions into which each divisions has different goals on its living situations. Specifically the living arrangements and its connection intensity to the river. From being dependent, to a minimum requirement, the division can be categorized into these need to be close to the river and create differentiating living functions which has different intentions.

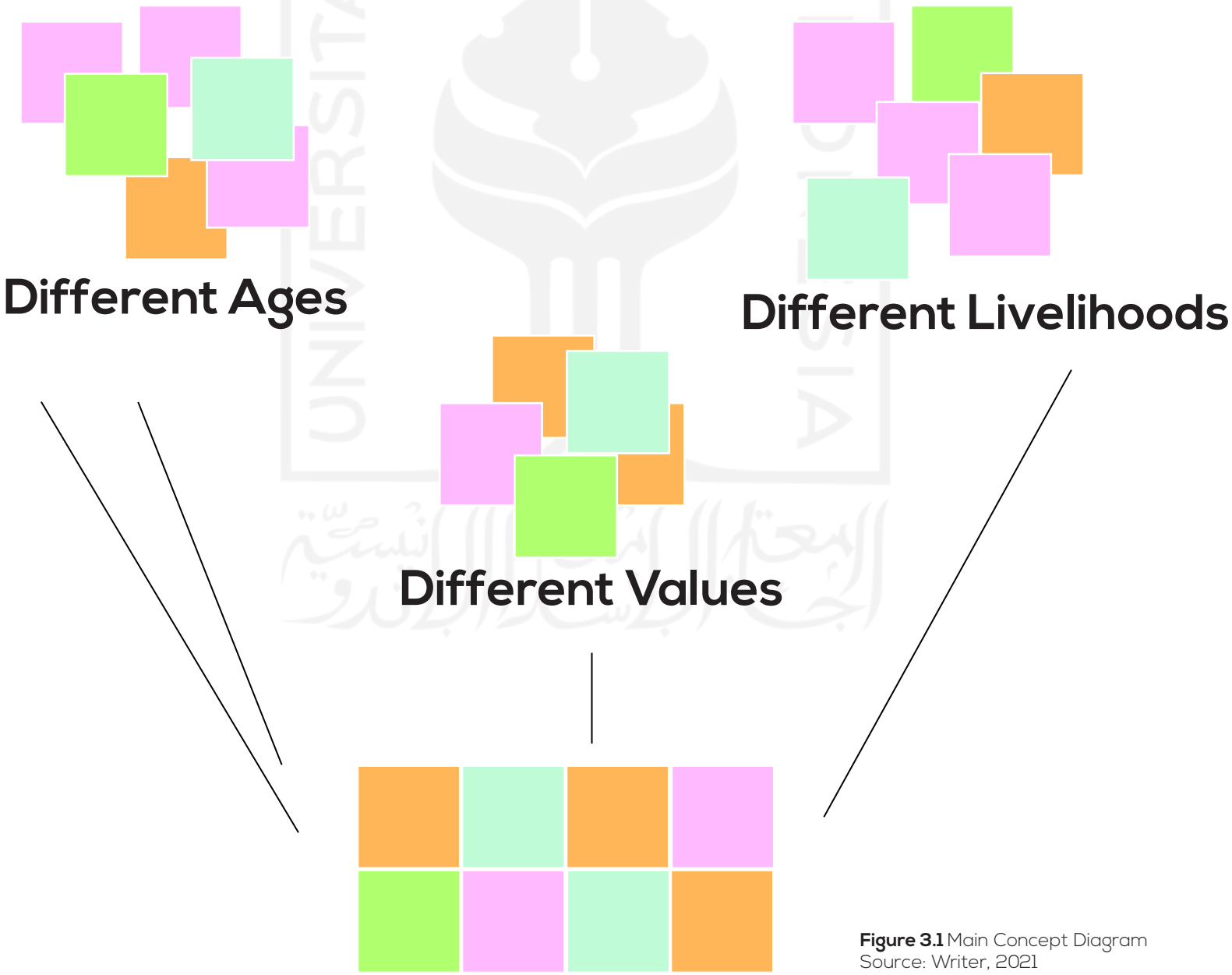


Figure 3.1 Main Concept Diagram
Source: Writer, 2021

3.3.2 Theme Implementation

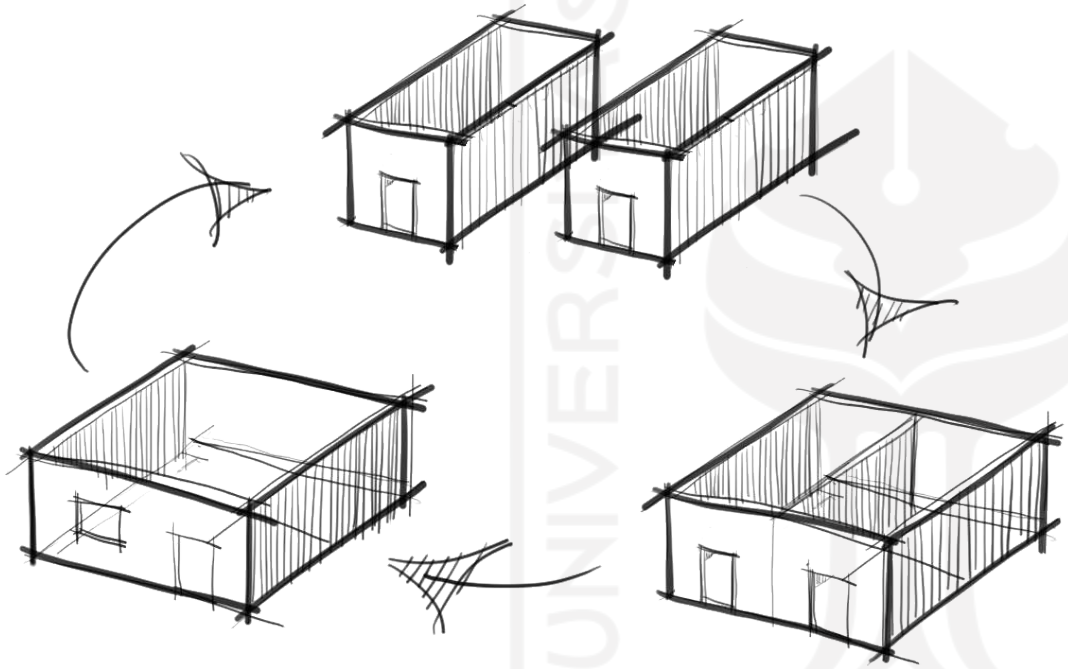


Figure 3.2 Flexible Modular Unit Sketch
Source: Writer, 2021

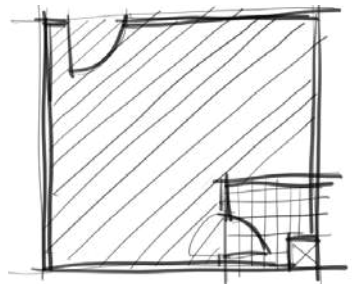
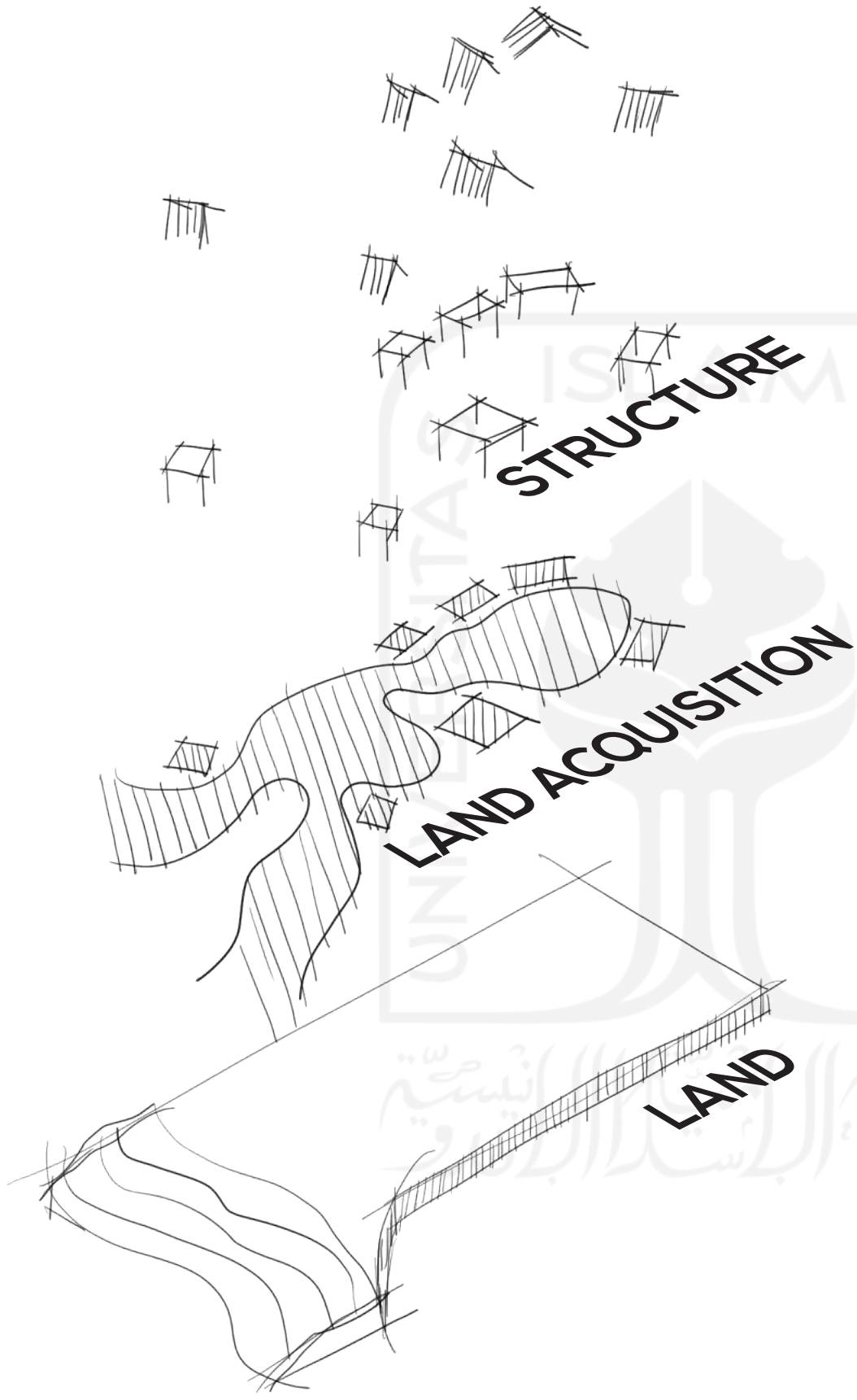


Figure 3.3 Flexible Modular Plan Sketch
Source: Writer, 2021

The Open Building concept is implemented through a modular plan using a 8x8 as base plan where it can be divided into 2 other configurations of 2 modular 4x8, or even a single 4x8. This is then enforced with the open plan where no set of interior walls is set in the unit, rather than restricting the floor plan created by the architect, we intend to give freedom of different configurations of their living space which can accommodate different activities while already providing a basic necessity of a toilet which has clean water access and safe from the flood.



The Municipality contributes to development of the physical landscape in the design by providing the funds and plans with the suggestion of the architect. Supported by the Kotaku Program where the city is providing 50% financial support for the infrastructure such as pathways and plumbing. The municipality controls the hardscape, and building structure.

But the community or RT01/RW07 provides contribution through reusing suitable material from their previous houses. Such as the partition and infill level. While also contributing to the softscape by cooperating on existing vegetation.

Thus making the municipality handles 70% of the site construction.

Each plot of land is owned by the municipality on loan to the residents giving them the chance to use an interest pay system where each year will have to payback to the municipality

Figure 3.4 Structure Study Sketch
Source: Writer, 2021

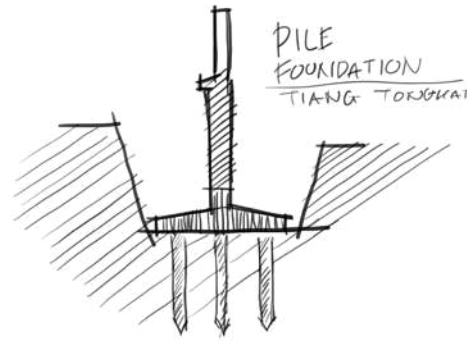


Figure 3.5 Pile Foundation Sketch
Source: Writer, 2021

Using Columns acting as anchors, the columns serves as a tether to lock the building into place in the case of a flood, while the floor functions as a floating deck that is able to move freely upward and downward. While in a dry setting (non flooded situation) the columns acts as supporting structure to sustain the load from the platform and the floor above it

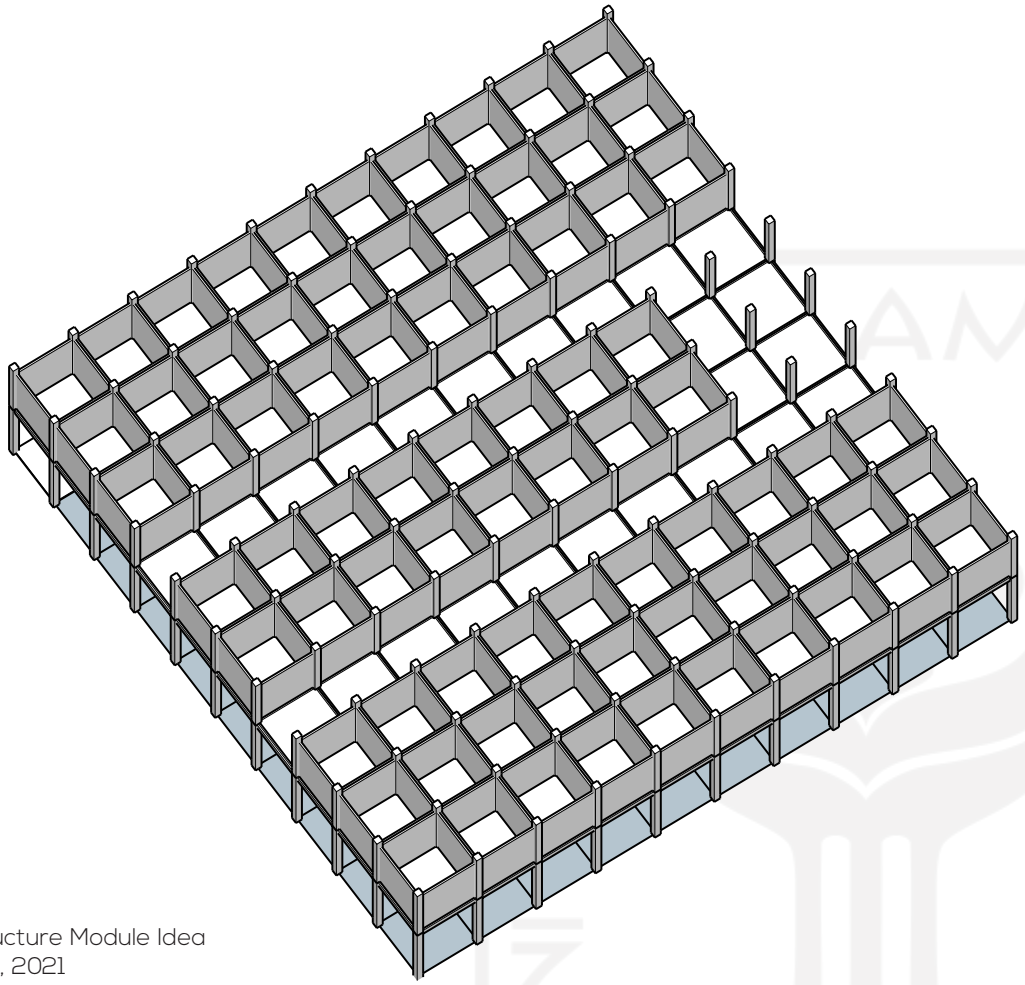


Figure 3.5 Structure Module Idea
Source: Writer, 2021

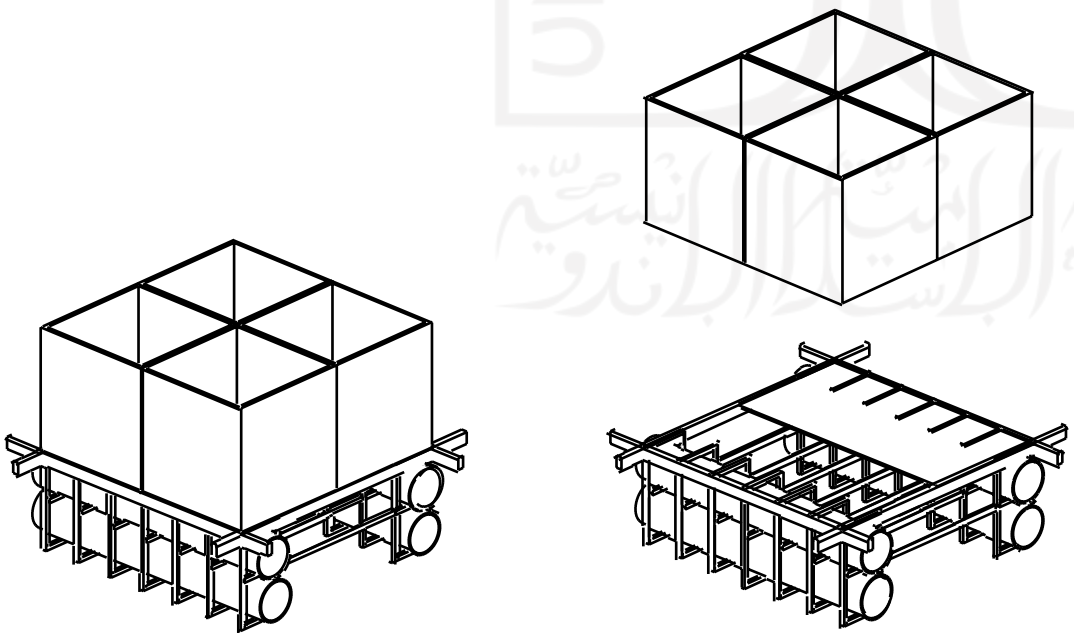


Figure 3.6 Floating Structure Details
Source: Writer, 2021

Structural System and Implementation

The first point in which the exploration is related to the building structure which can define the building form and integrity. Thus the building structure to accommodate the flood design was explored by using a combination of floating architecture and detachable architecture.

Floating architecture means to use the available resources to make a mass float with a unique configuration

While Detachable Architecture is to be able to be disconnect components with independent elements.

With this idea, the intended design is to be able to detach from the main structure while also being to stay afloat above the water level

The usage of the modularity in the structure is based off of the space analysis of the existing homes which have a similar configuration of 4x4 grid house

With this, the choice to use 4x4 as a main structural grid is favorable that can ease the users spatial perception of their homes being similar in size.

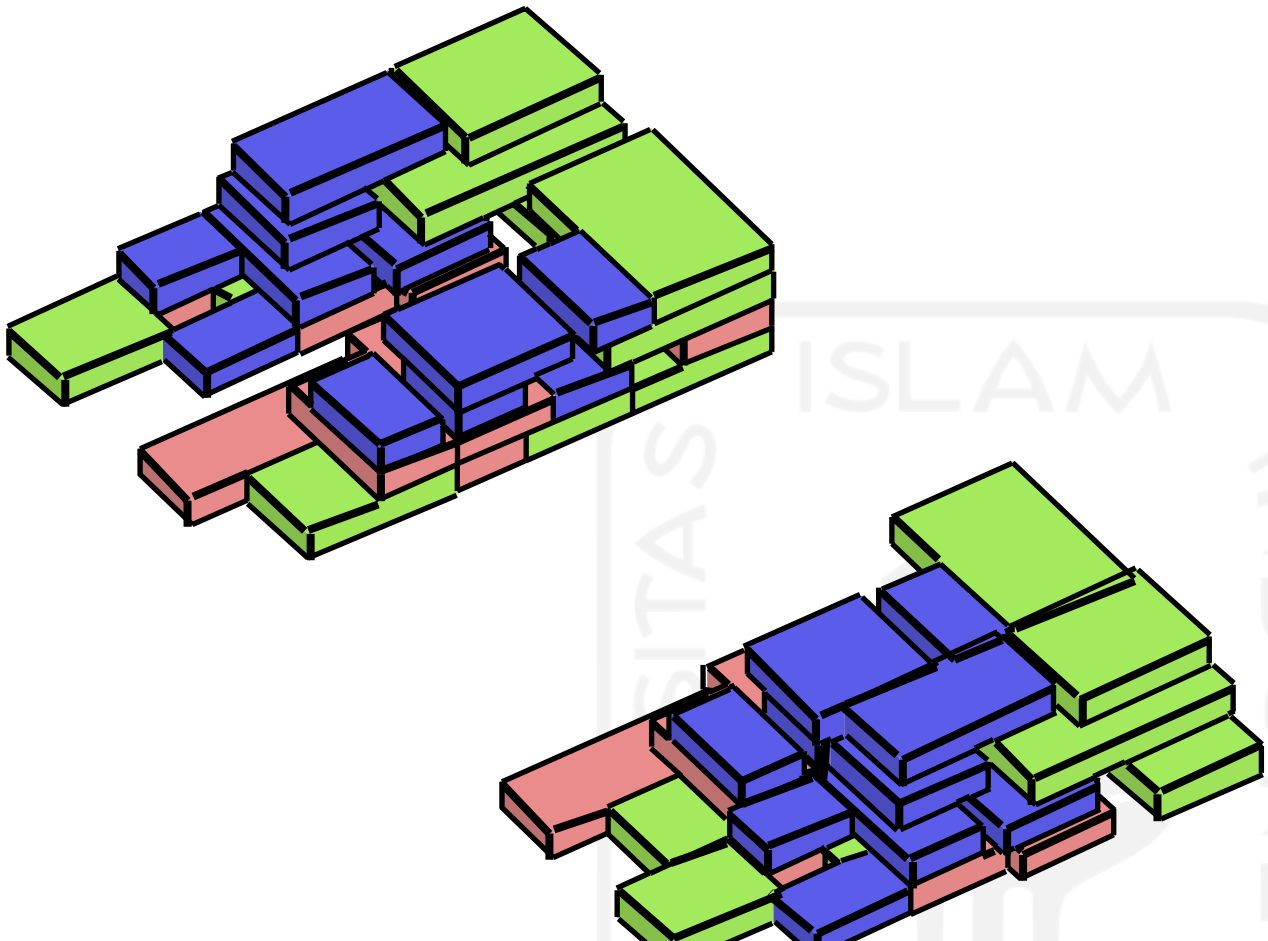


Figure 3.7 Mass Arrangement Idea
Source: Writer, 2021

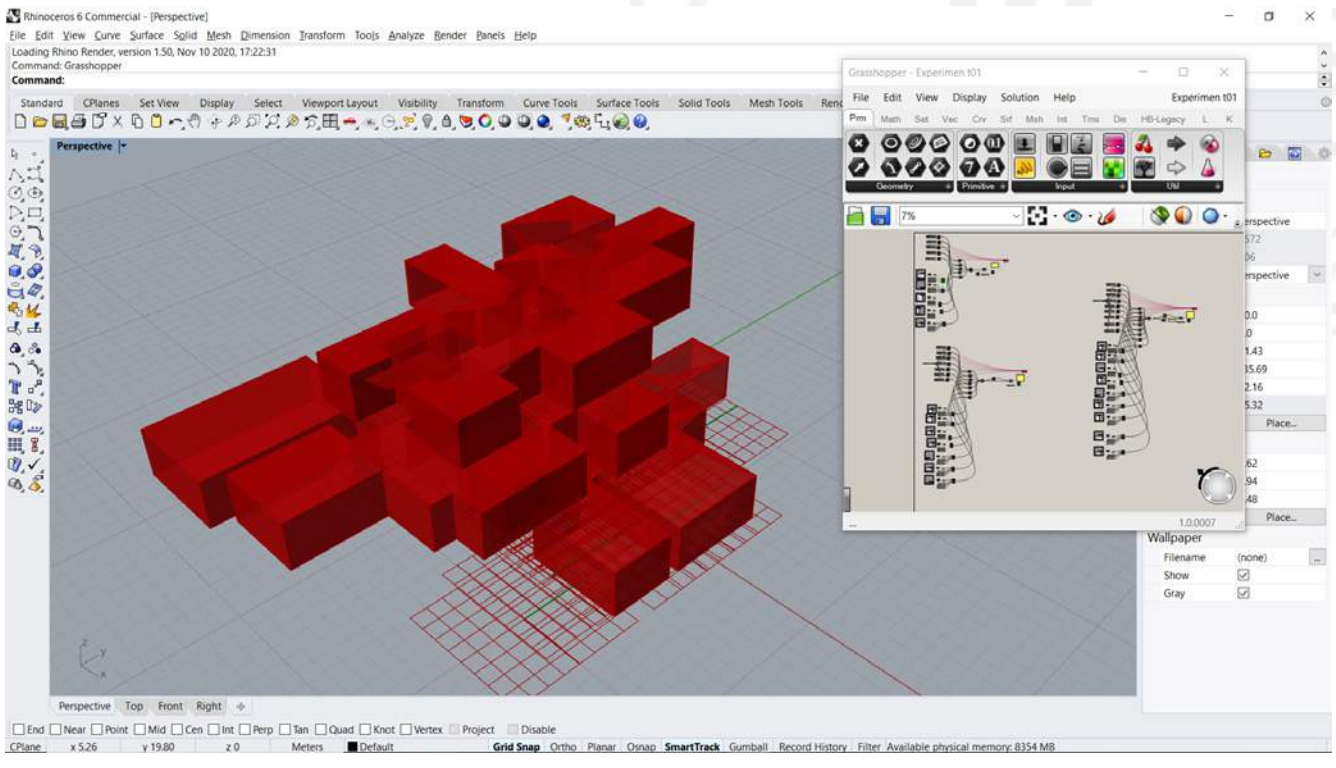


Figure 3.8 Rhinoceros Galapagos Test
Source: Writer, 2021

Alternative Form Based off of Open Building

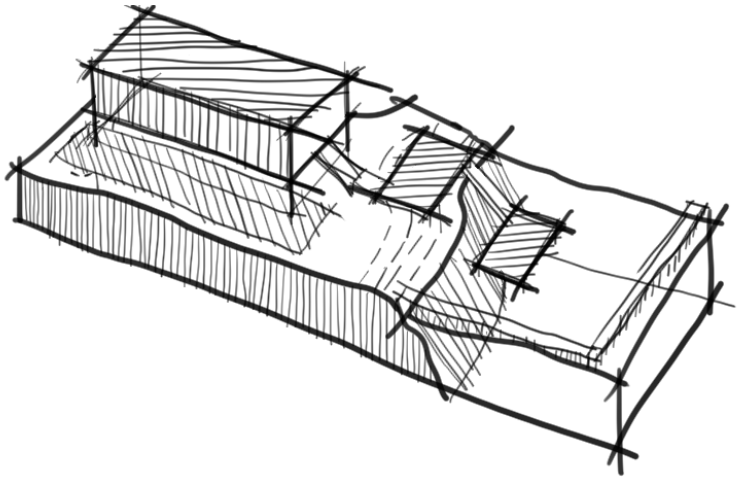
The initiative is to reuse the existing spaces (in this case the citizen's homes of swadaya village of RT01/RW07) is to collect the spatial data of the houses in swadaya village

A simulation was conducted using Rhino and grasshopper with the plug in Galapagos to maximize the amount of volume while keeping the amount of area at a minimum to conjoined the multiple homes available.

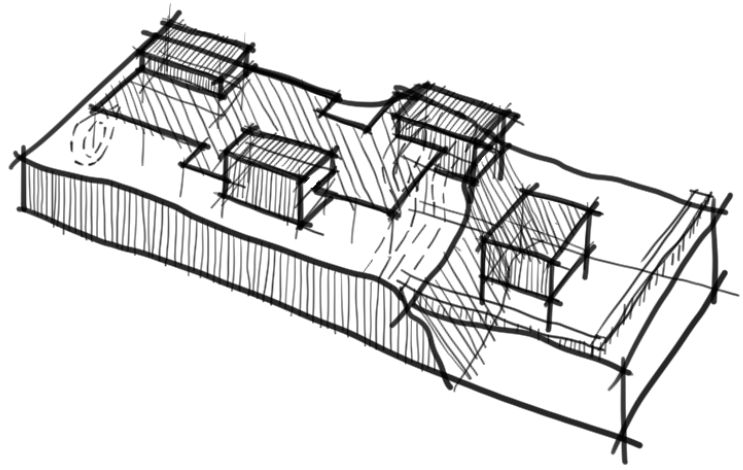
A total of 3 simulations was conducted using 58 Houses as the subject with the limit on each space to 3 meters in height to differentiate between floors while the length and width is according to each homes measurements available in Swadaya Village RT01/RW07.

The results were 3 differentiating mass programming where there is a mix of different spaces that is conjoined into a single mass

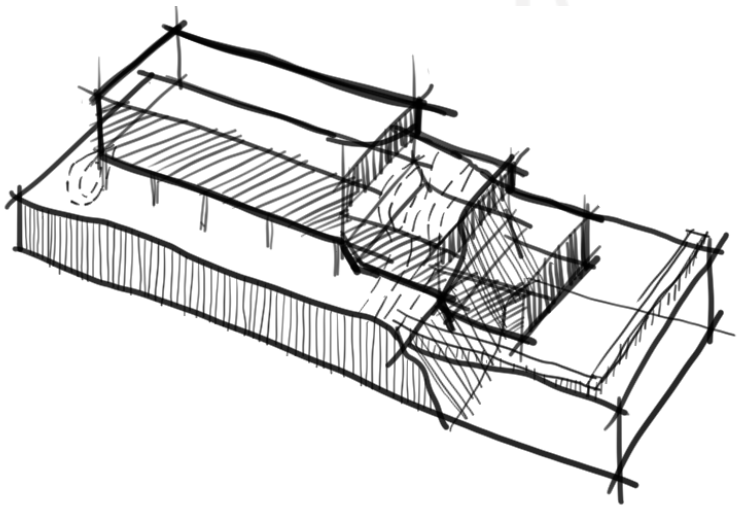
3.4 DESIGN EXPLORATION



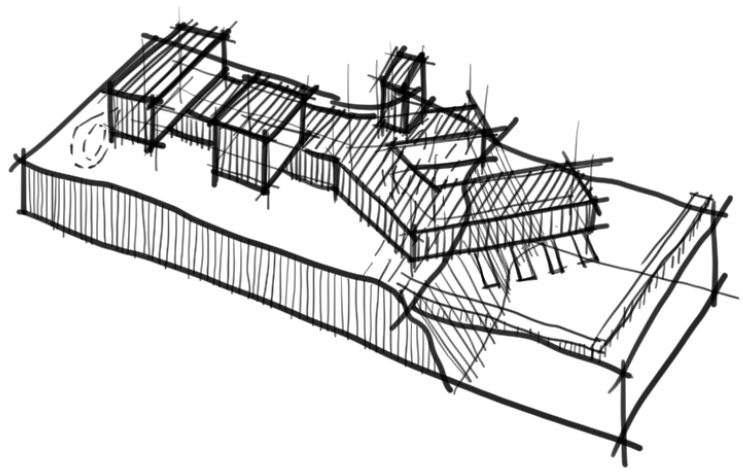
An implementation of the living situation by using tiang tongkat and a small connected floating platform above water and is perpendicular to the river axis



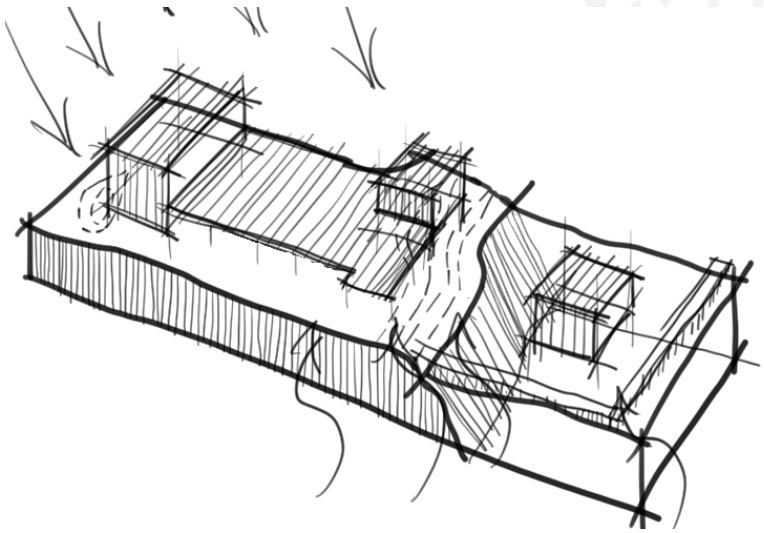
Using several mass to be used as living blocks and residential areas while heavily focusing on a lifted open area as main living area, but this reduces area on living quarters



Arranging a staggering configuration but still as a one mass firstly to follow the contour and let in sun and wind from different angles



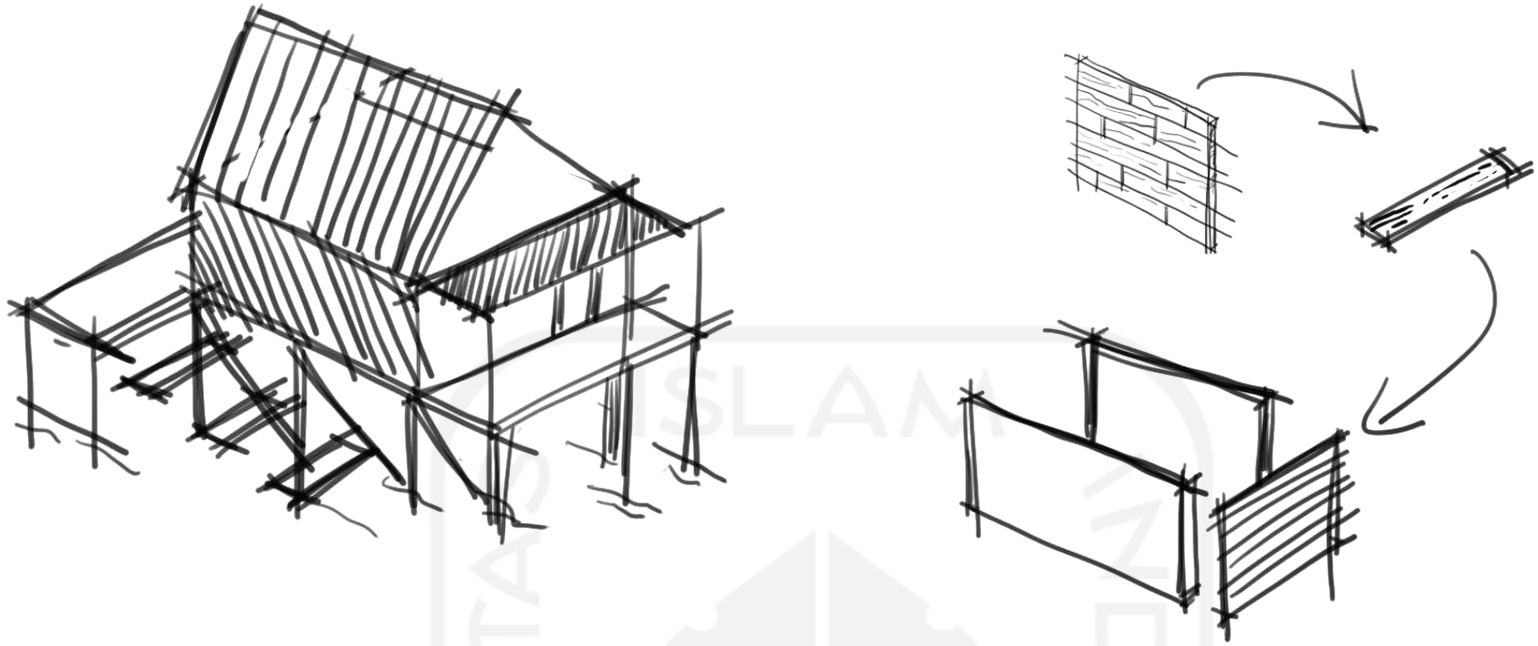
Different masses encompassing the site while a single circulating mass connecting the different masses to connect to the river and to the docks.



CONCLUSION

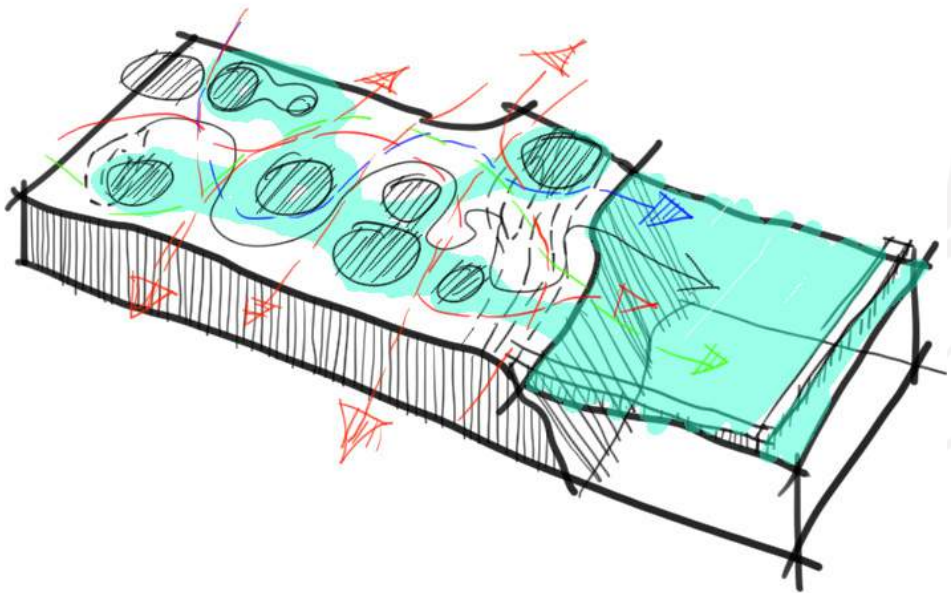
But all of these exploration is not in line with the river line as in a natural flow of movement similar to a flowing river. Thus a need for further research of a movement or path that can give a natural impression where the river itself is a part of the design.

BUILDING MATERIAL CONCEPT



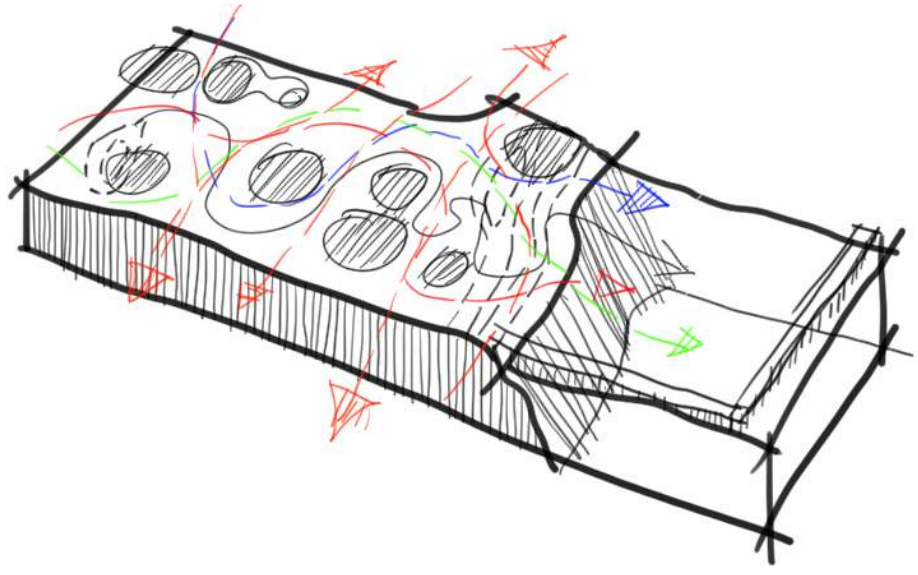
The idea is to use the existing materials as a means to lower costs and to maintain the existing culture of using wood as a means to live near the water and a familiar atmosphere for the users. The largely used material here is meranti plank woods and other types of wooden planks while the

LANDSCAPING CONCEPT



Here is am overlay on the areas of the water that enter the site which can be used as guide to pinpoint focal points in which areas that can potentially be flooded and where it can be focused on

CIRCULATION CONCEPT



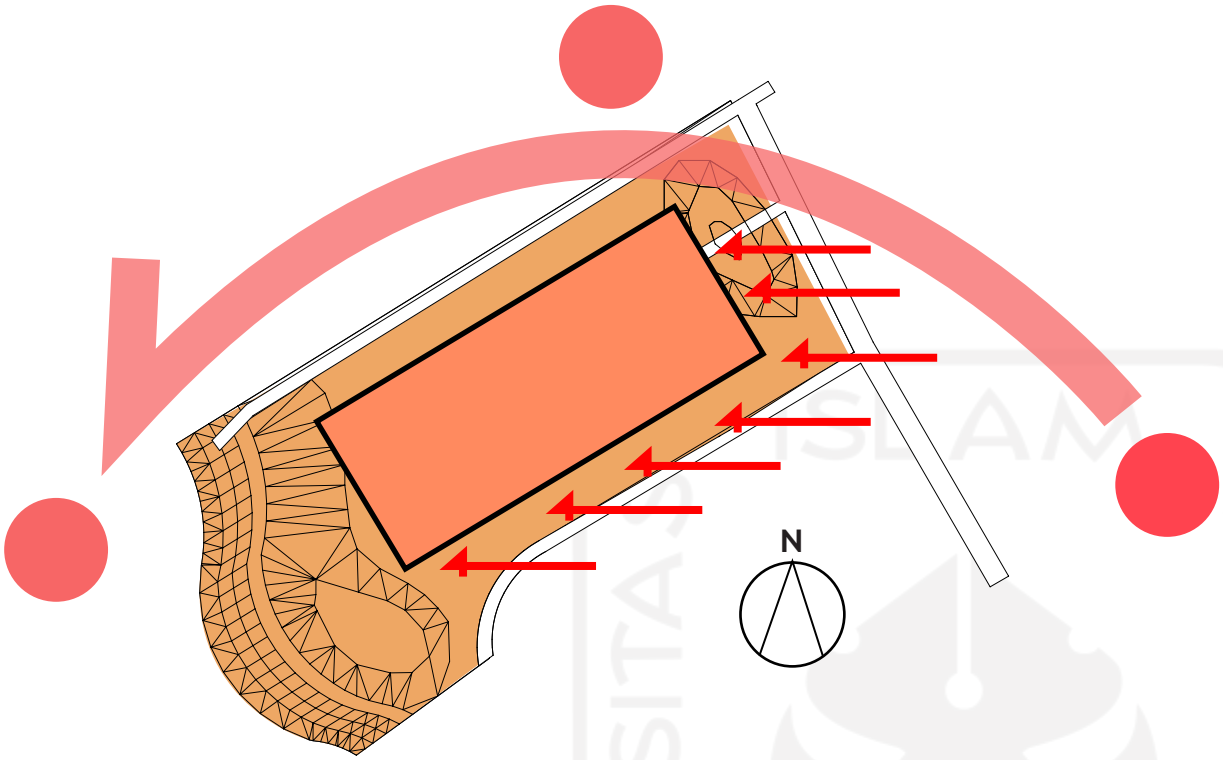
Thus creating focal points that can interpreted as central axis that guide the circulation path and heading. Providing several pathways which is imitating organic movement by following the water line created by the flooding

3.5 SITE DEVELOPEMENT

The setback from the river only applies to the residential area while the public facilities are available to be above water.

A shocking statement is that the amount of area that is able to be used above water for recreational and work based activities are many, thus here it is proposing a residential above water that specifically need to be in contact with the water

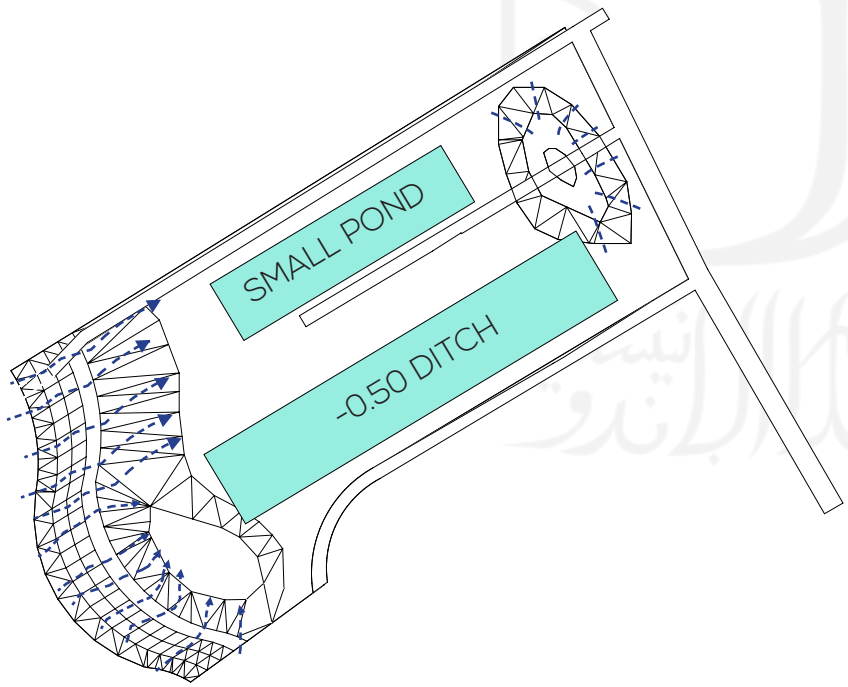
3.5.1 Solar Response



The average amount of sunlight is sequential to its position on the earth and in Pontianak this is an especially important aspect due to it being on the equator line. The equator line is present between the middle area between the south and north pole.

The average sunlight that impacts the site in particular is heavily coming from the east to the west. Which in the morning harmful infrared which is usually before 9 AM. To deflect/ refract that particular sunlight the building's, the orientation of the building is angling so that no one surface area is directly facing east or west. Thus reducing the amount of surface area the solar radiation touches.

3.5.2 Rain & Flood Run Off



The setback from the river only applies to the residential area while the public facilities are available to be above water.

A shocking statement is that the amount of area that is able to be used above water for recreational and work based activities are many, thus here it is proposing a residential above water that specifically need to be in contact with the water

To respond to a small flood is that, by creating ditches and dry ponds, in the event of a small flood the water is to be directed into those ditches to maintain a dry and wet area which can allow people to pass through the building to a higher ground in time

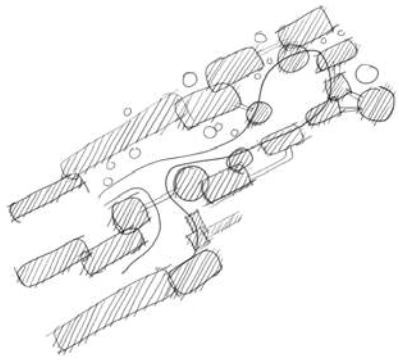
3.6 MASS PROGRAMMING

Moving away from a singular structure or mass, which is more massive and obstructing the overall atmosphere of a village which is comprised of singular one story buildings. To do that, we split up the previous singular mass into several masses but is still keeping the required amount of space for the village residents.

Now moving on to the 3 created layouts which in this turn emphasizes on circulation and landscaping which is seemingly adapting to the river waves and calmness.

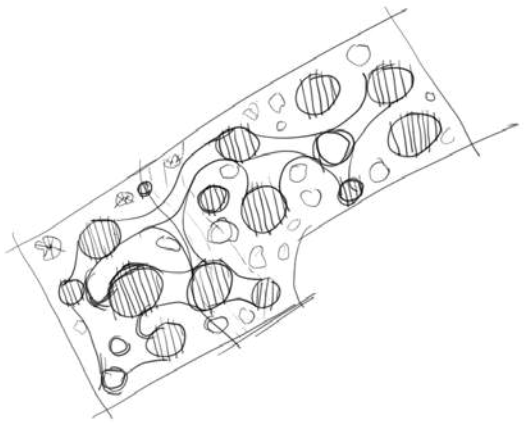
1st Alternative

Curved buildings and intersecting with each other while small circle is created as small focal points which can create meeting points/ interacting points between visiting individuals. While the landscaping here plays a big part by creating a big canal to invite water into the site creating a strong physical connection which the residents can directly interact with. The buildings itself is a combination of curved rectangles all perpendicular towards the river.



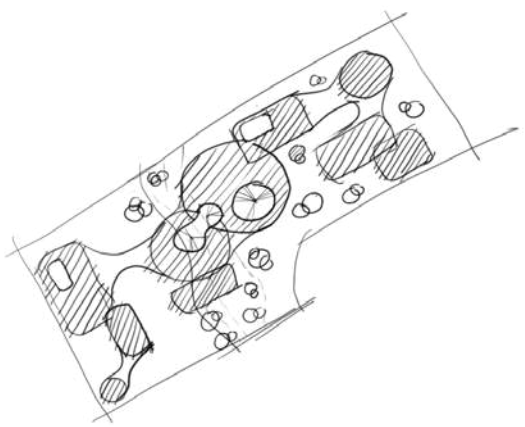
2nd Alternative

Focusing on circular hard scape which acts as focal points, the circles are mapped by the flood water which is an overlay where the site is flooded. To take advantage of these points rather than flattening out all of the contour the points where the flood cover the site is focused on to be a center points for the site which defines the circulation building arrangements and landscape. Thus creating a layout which mimics the flood path and very liquid form.

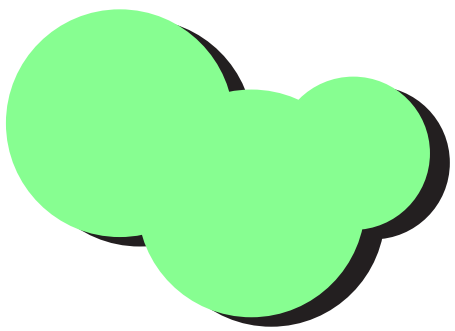


3rd Alternative

Where a combination from the 1st and 2nd alternative where buildings and circular hardscapes are distributed throughout the site while maintaining the canal as a physical trait of the river connection. This meant that the combination where the canal functions as the flood resister/control canal that can hold a certain amount of water and that the buildings in the site itself is not attached to the soil but lifted off the ground.



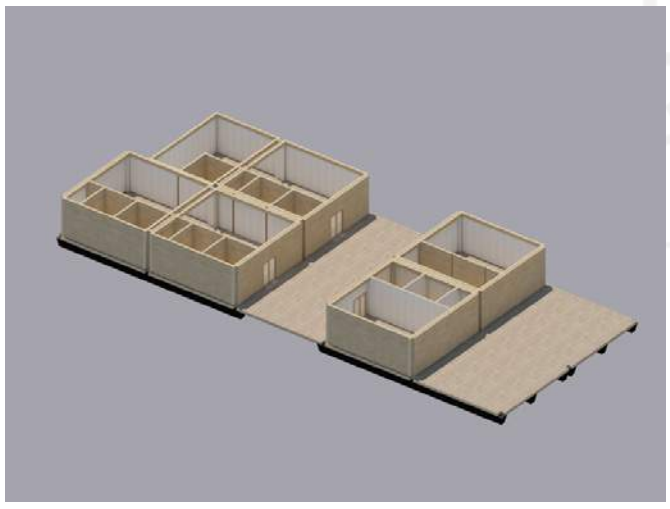
3.7 VEGETATION PLAN



Existing Trees - Rearranging
The Sindur and Bitangur trees are the existing trees which currently resides inside the site, there are around 34 big or old tree, while there are around 10 small trees of the same kind. Rather than removing the trees, we relocate the trees into other areas in which it can be created as focal points for meeting points, converging points, and gathering points.

The trees themselves are able to grow on marsh or wet lands due to its close proximity toward the river, thus enabling being a supporting feature that can withstand the flood.

While potted plants here are recommended here rather than planting into the landscape due to the frequency of the flood that can damage the plant.



1st Alternative

This design was created as a first alternative to all the possibilities, which in turn is to rigid, while also featuring a simple and modular composite for ease of use and build.

This design is in coherent with the regulation of making into a singular mass, perpendicular to the river which can withstand the horizontal movement of the waves more consistently.

2nd Alternative
This design has a focus on the circulation and connection between the river and the riverfront. The main aim is to have a 2 way accessibility from 2 types of transportation while also not limiting the movement from each home owner to the river.

The Landscaping here plays a major role in the connection where the design focuses on the interaction of the river towards the houses themselves. In consideration to the amount of safety elements, the amount of interaction is amplified through the use of a

4.0

FINAL DESIGN

4.1 TAMBELAN VILLAGE

A renovated village which focuses on the idea of flood resistance towards frequent floods and housing issues concerning lacking infrastructure. The idea of the village is to once renew the connection of the river to the river edge, adding different vistas, each resident is able to be given a chance to interact with the river whether in physical touch or visual comfort. The village is meant to be a safe area of convergence once the flood comes. While also providing several methods of evacuation paths

The major concept is to be able to provide different settings of accommodation but in a simple manner through an analysis of the residents by providing a modular space that can be changed according to the user needs and wants in the long term. While also being able to re connect to the river without the constant fear of a massive after effect from the flood.

The cylindrical paving in scattered throughout the site is to provide meeting areas throughtout the site to allow different points of interest in the site on the ground level, while below the residential area housing is for service and facilities which are made for the public and building

The landscaping is only change to level out some of the contour while providing a descending small pond to help contain water if the water level rises slightly

The structural grid for the ground floor is a 8 x 8m grid that spans accros the ground floor for small ground coverage area. The design is that the ground floor and upper floors have different structural grids but is still in the multiplication of 4

This multiplication of 4 is obtained through a space analysis on the exisiting houses in Swadaya Village. Which mostly has a structural grid in the multiplication of 2. With this the usage of smaller grids on upper floors is used as the dividing line and a modular configuration on the setting of sizes available once the building is configured

The main acces path from the biggest road is 335m, with this the amount of entry ways is not complicated to disturb the residents in finding their way to the site

The acces is divided into 2 which is for private vehicles and pedestrians. The meaning private vehicles here is for the residents to have their own vehicle area, while the pedestrians here are emphasized to have free reign in accesibility and circulation which in turn the previous site is limited to only public roads

0. Siteplan 1:400

The normal river level is at -40.00 based on the contour of the site, which can drastically change in the case of a rainy season where it is can rise to -10.00 where if a flood occur or a slow rising tide can happpen, may reach +0.00 where the ground level is situated. While in the existing this may obstruct the residents their by flooding their houses, to further reduce the chances, is that all residential areas are put on the upper floors which is + 35.00 and by limiting the amount of built ground coverage for water to be absorbed by the ground.

The existing platform is not demolished to be used as a river boundary and pedestrian path for visitors to come, the initial idea is that to maintain the least possible usage of new materials for the building if it is not directly needed for structural reasoning

While also functioning as a fish barrier, fishing area and recreational area can then be developed here for future instances if the residents intend to build a business here

And further providing a safe swimming area (contained area) which can limit user movement if the river is not suitable for swimming

4.2 Connecting to the river

The idea here is that the river is invited into the site as a piece of physical connection which has several perks of being able to physically interact with it, keeping the values of which living beside the water and river living which can be one with the environment.

While certain aspects of connecting is to be able to travel upon the water, by letting water inside the site, the amount water vehicle owned by the residents can be used for daily travel and in case of emergencies but only for small boats

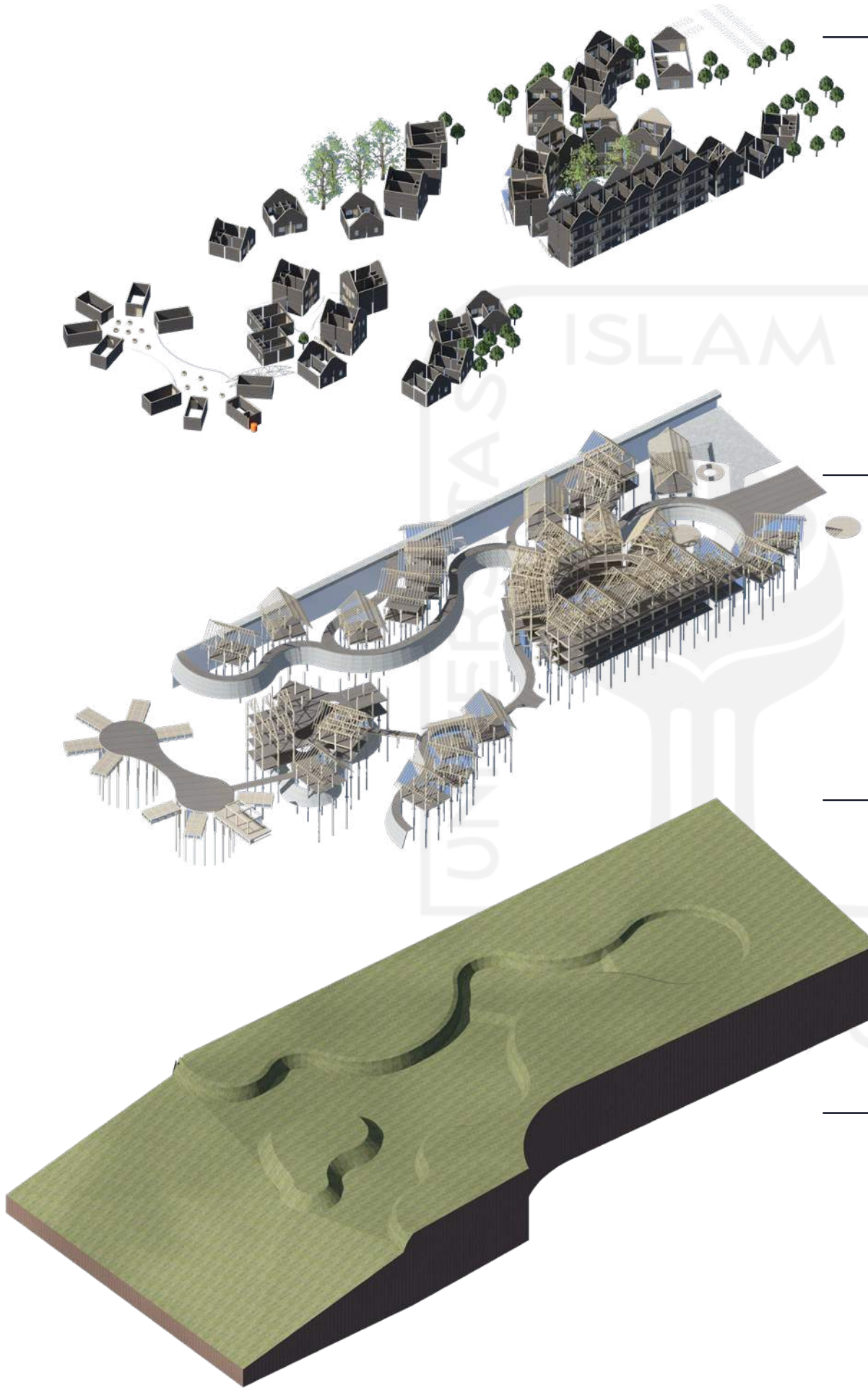
The other connection is by living above water with the pontoon, the amount of people living relying on the river is no small amount but have no living and working place, now by providing these certain floating platforms, the people are provided with options with living closer to the river while being protected by using the flotation system

4.3 Open Building Implementation

The Open Building concept is implemented through a modular plan using a 8x8 as base plan where it can be divided into 2 other configurations of 2 modular 4x8, or even a single 4x8. This is then enforced with the open plan where no set of interior walls is set in the unit, rather than restricting the floor plan created by the architect, we intend to give freedom of different configurations of their living space which can accommodate different activities while already providing a basic necessity of a toilet which has clean water access and safe from the flood.

The walls are made out of wooden sheets and columns for ease of use for interchangeability, while the bathroom is has a fixed core that cannot be changed for a main feature of a fixed infrastructure

4.3.1 Open Building Level



Community

The partition and softscape including existing vegetation here is provided by the residents which controls on the way the partition is made which can change the facade, while also still in a modular structure that can fit the community into this new setting.

Kotaku Program

The infrastructure, structure and hardscape here is provided by the program which handles 50% of the financial and ownership of the houses. Providing retaining walls that withstands floods, structural bearing elements that supports the building.

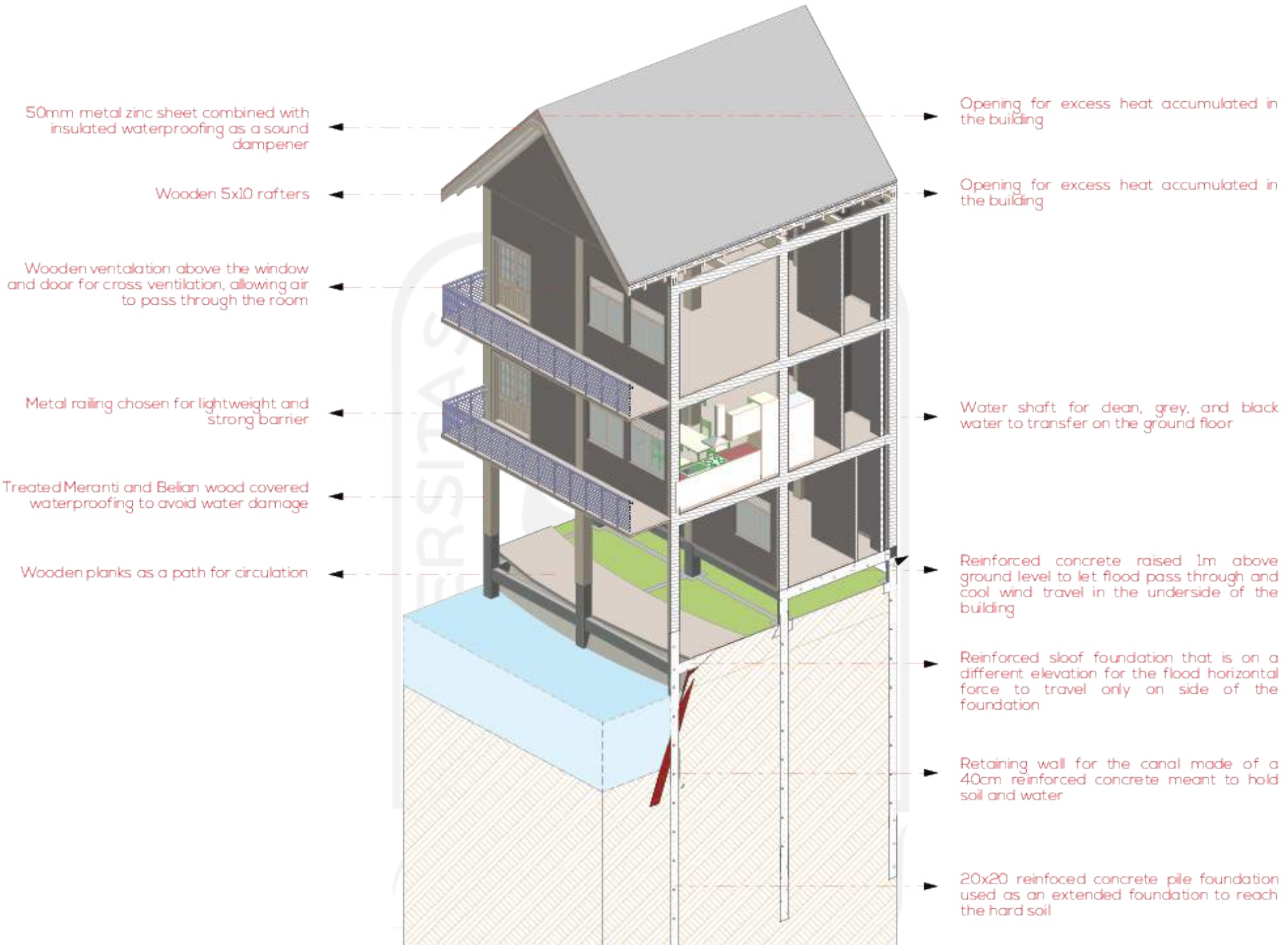
Kotaku Program

The program here is conducted through the municipality for the restructuring of an area to be develop into a suitable living situation. The land acquisition is done through the program to endorse illegal housing to be moved into new lands provided by the local government/municipality.

Municipality

The Municipality owns the site, which in turns owns the land that the site is sitting in. Making the Municipality the legislator and Client of the Project.

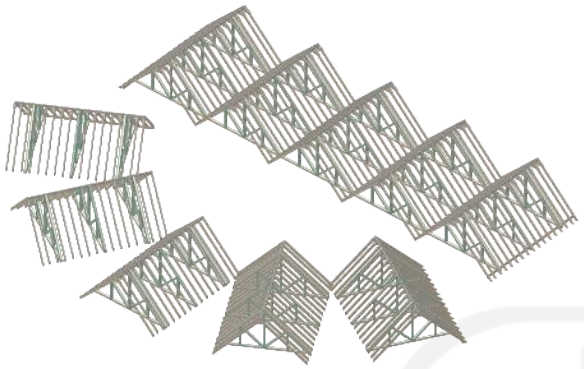
4.3.1.1 Community Contribution



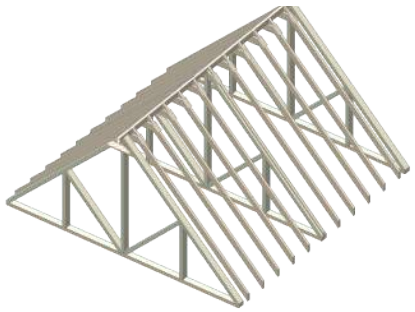
The community here have the authority to change the partition to suit their own living space within the provided space of 8x8m/4x8m units that is available, Providing a choice in living situation of changing the layout, and softscape which includes the trees and surrounding greenery that has previously existed in their surroundings.

The partition is made by reusing the existing building material which has different dimensions and types that can each suit each resident rather than making it a uniform material.

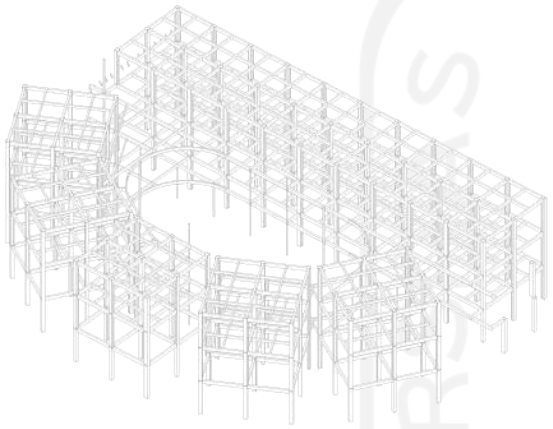
4.3.1.2 Kotaku Program Contribution



The Rafters dimension is 15x8cm that is functioning to hold the roof finishings

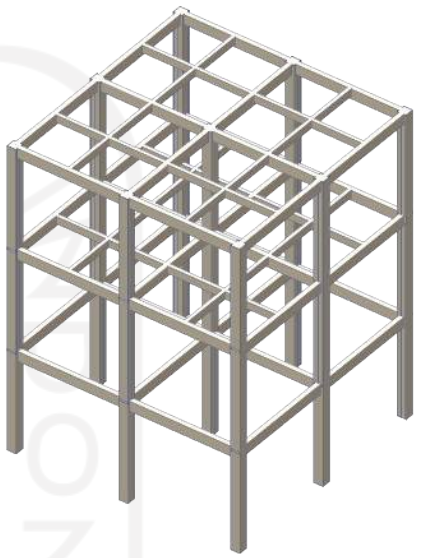


The Rafters and Trusses also using treated wood as a base material that can hold up the roof, the finishing on the roof is using zinc metal sheetings for its availibility in the area



Using the same principle of using treated wood and a simple platform structure, the base flooring is lifted 1M above the ground elevation. This functions when and if a Major Flood occurs the water level will not reach the base flooring on any of the houses

The wooden column is 30x30cm Belian wood
The Beams dimension is 35 x 17,5 cm

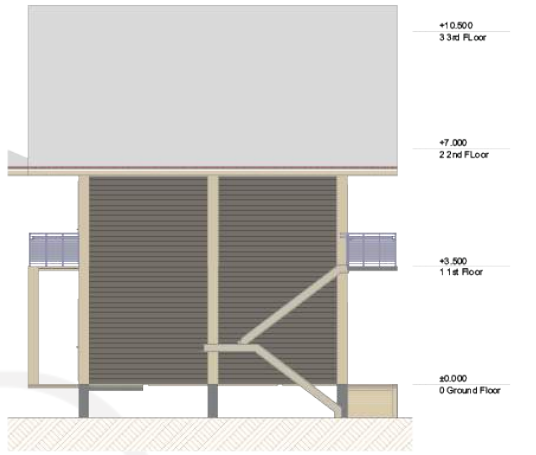


Using Wooden Columns and Beams that is treated wood, that is Belian wood that has been waterproofed sealed to withstand the elements functions as the main structure of the building while also being relatively affordable due to its abundance in Pontianak

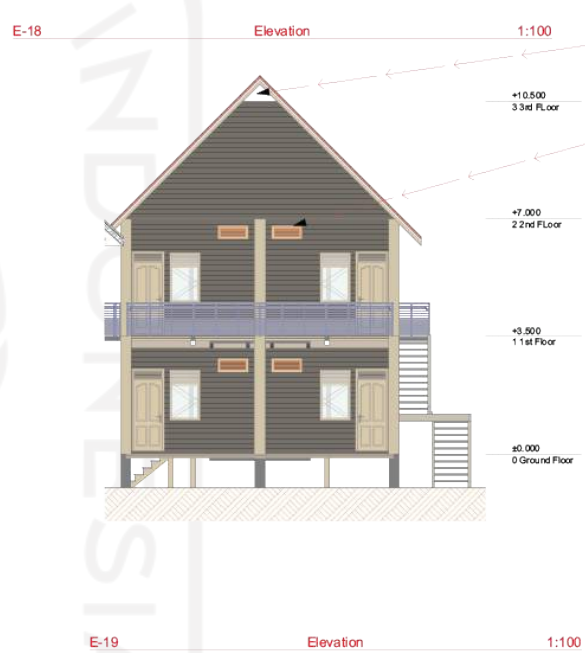
The Foundation is using a pile foundation made of reinforced concrete that is then used to anchor the building in to the soft soil (Peat Soil). The reason being that the long foundation is that due to its close proximity to the river, the land is more softer than normal.

While in the Kotaku program, the above seen structure is meant to be built by the Kotaku program worker but in collaboration with the architect as basis on the modular structure.

E-17 Elevation 1:50



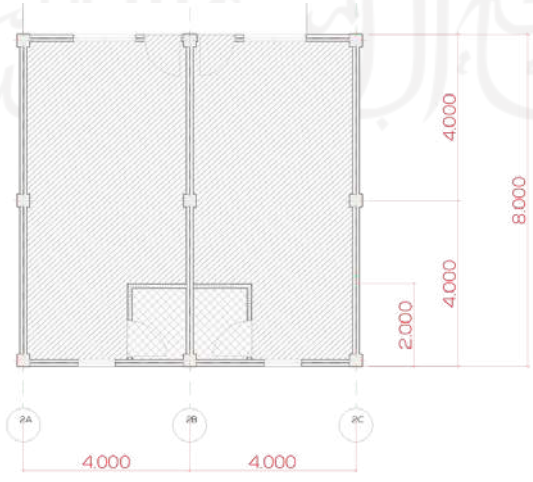
E-18 Elevation 1:100

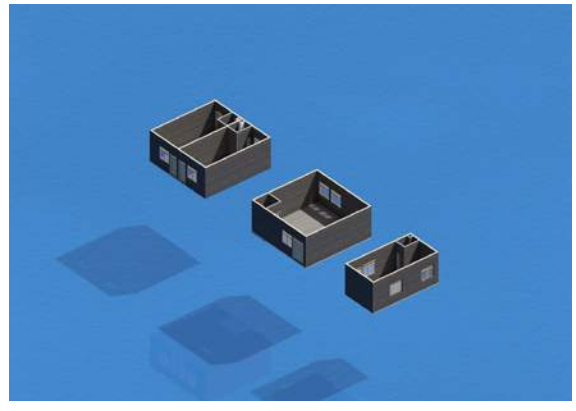


E-19 Elevation 1:100

4.4 Modular Housing

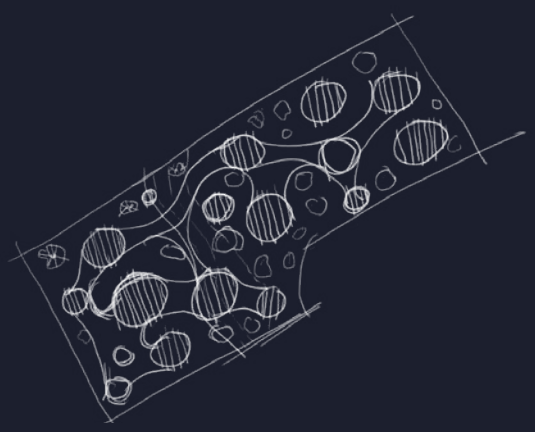
The unit itself is not determining the type of module which it is made into, so the it can change if the homeowners are able to afford it themselves by enlarging or minimizing theirs spaces into several areas, and even converting it into open areas, While there are some houses which only provide single story units for the large families, they are given the right to change the size of the plan itself.





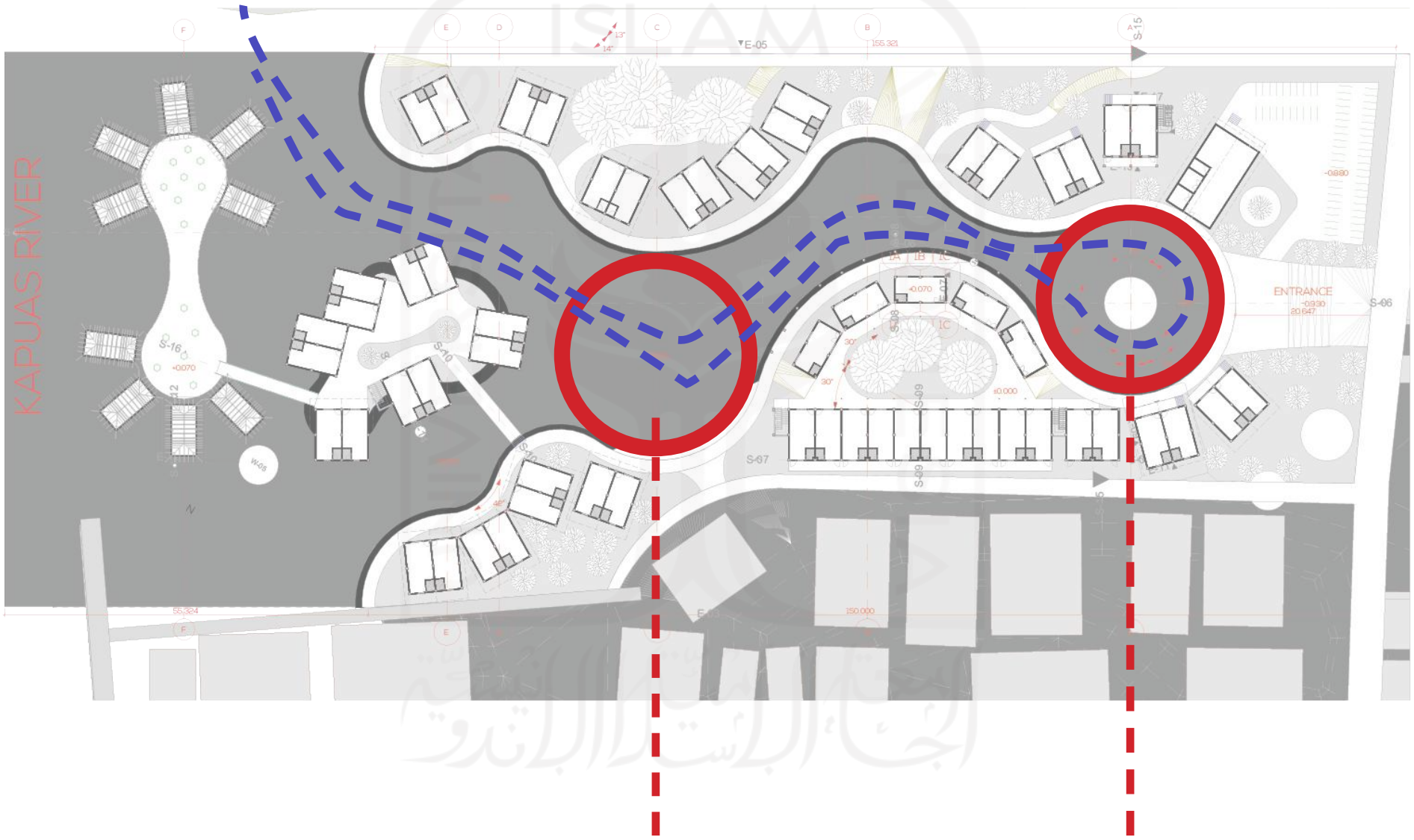
4.5 FLOOD RESISTANCE

In the up seasons/dry seasons the water doesnt reach the farthest canal because the farthest canal is on a higher elevation compared to the others, while the closest one will always be filled



In the rainy season or a major flood occurs the canal is filled and the surrounding urban areas are flooded, the site itself is not flooded due to the run off area inside the site which is the canal while if a major flood occurs the houses are lifted 1M above the ground level

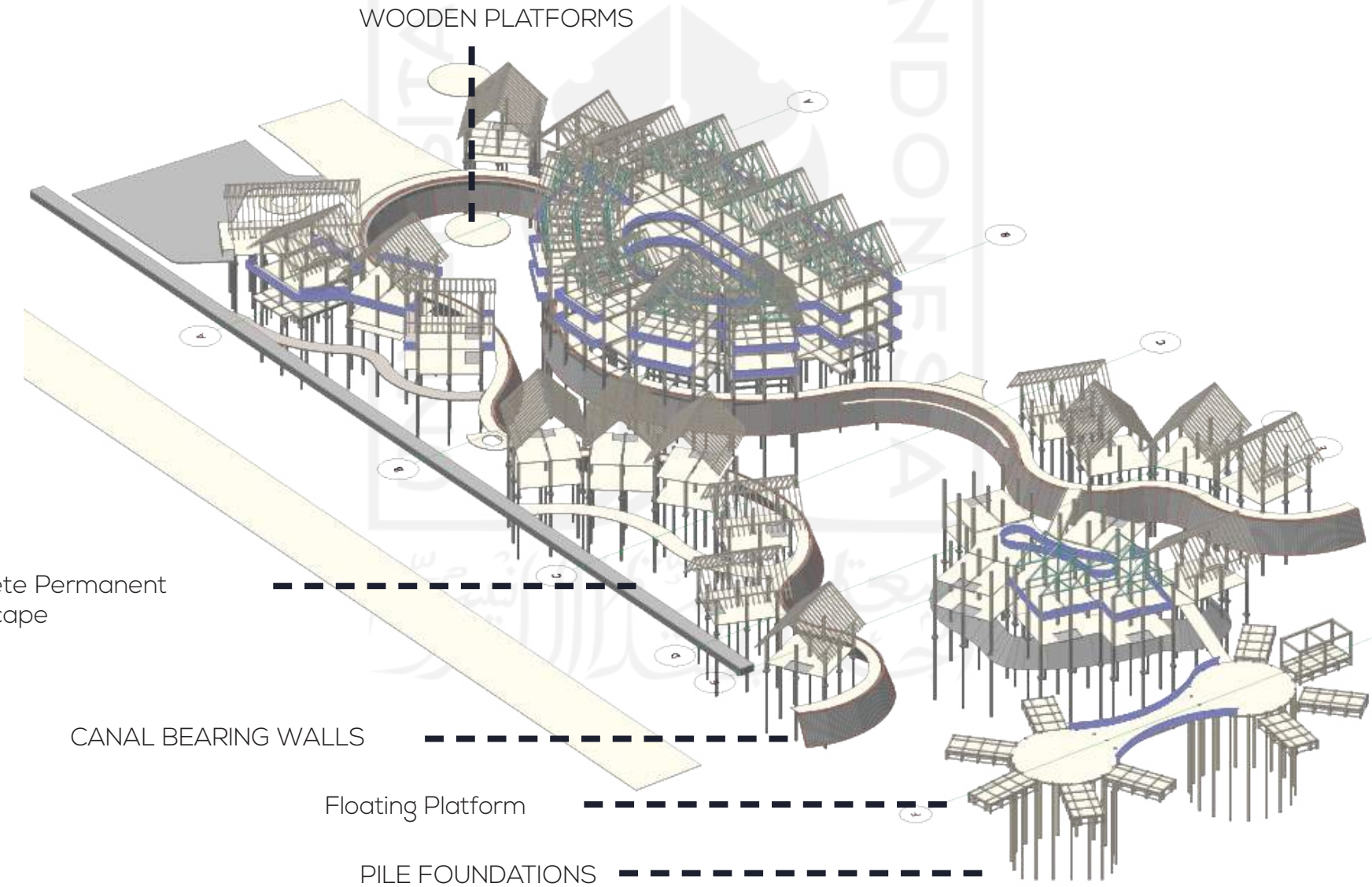
Boat circulation/ evacuation route in the advent of a flood. Thus making it possible for water based vehicles to enter the site for evacuation purposes



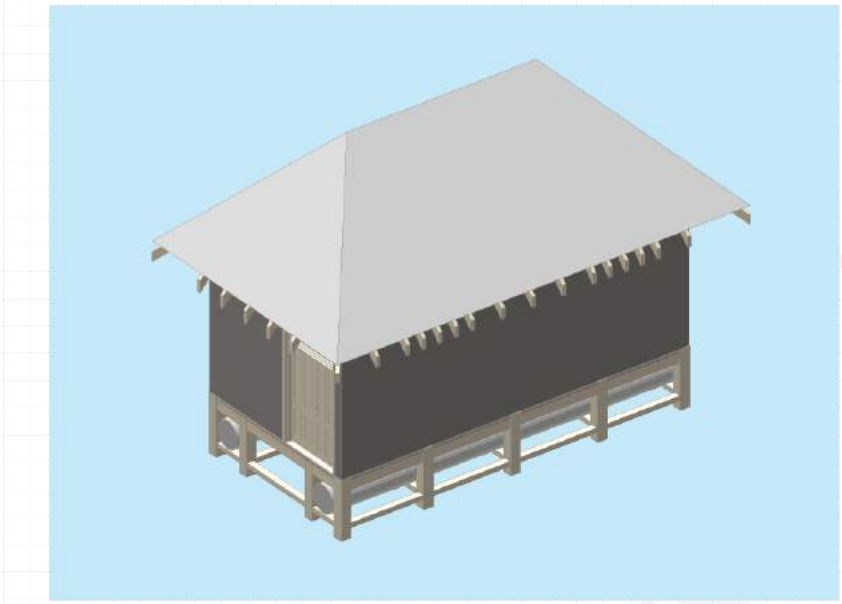
The circular canal was designed to fit in the turning radius of a 4x2 boat to enter the site comfortably without hitting any other structures

4.6 HARDSCAPE & STRUCTURE

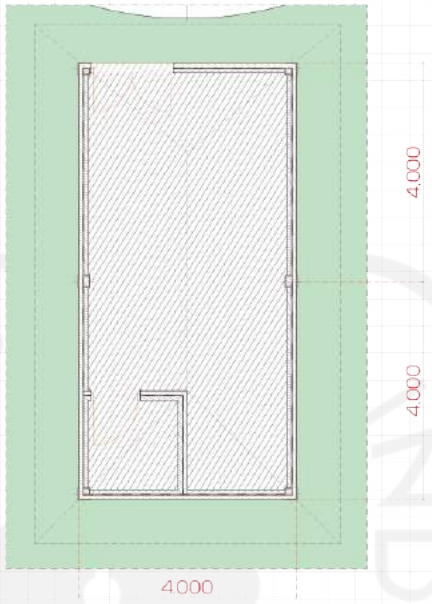
The unit itself is not determining the type of module which it is made into, so the it can change if the homeowners are able to afford it themselves by enlarging or minimizing theirs spaces into several areas, and even converting it into open areas, While there are some houses which only provide single story units for the large families, they are given the right to change the size of the plan itself.



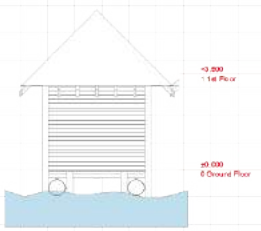
4.7 Floating House



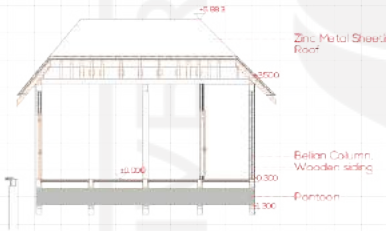
3D-05 Type 4 House (1) 1:50



W-05 FloorPlan 1:50



E-12 Back Elevation 1:100



S-12 Section 1:100

The floating house here represents the floating architecture and the people who chose to stay near the river, the idea is it si always constantly floating anchored to the platform but can change elevation depending on the flood level

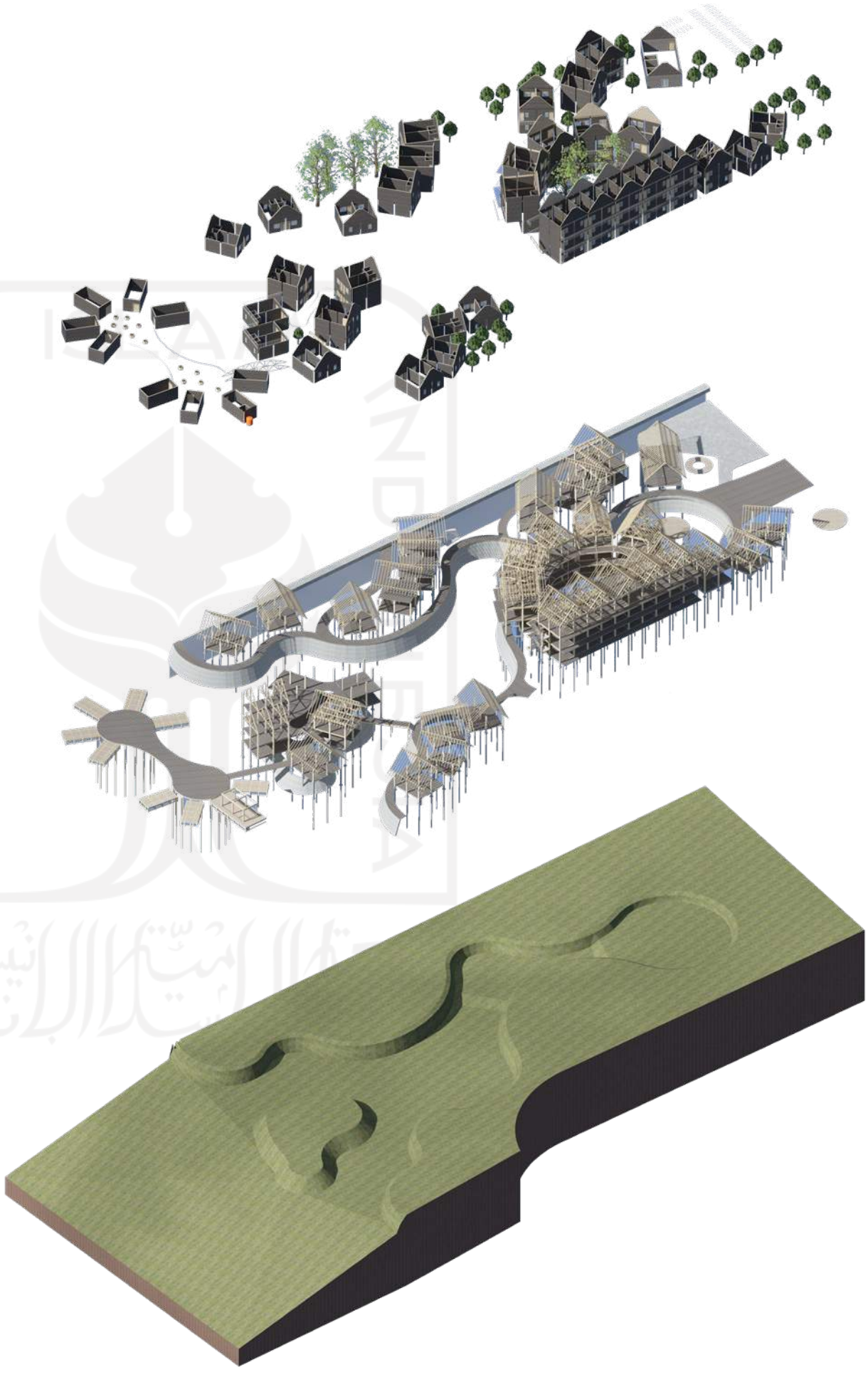
5.0

REFLECTION

5.1 Open Building Level

The clarity on the open building approach is not consistent and is not clear enough on the actor of each level that should be defined further into several brackets of authority.

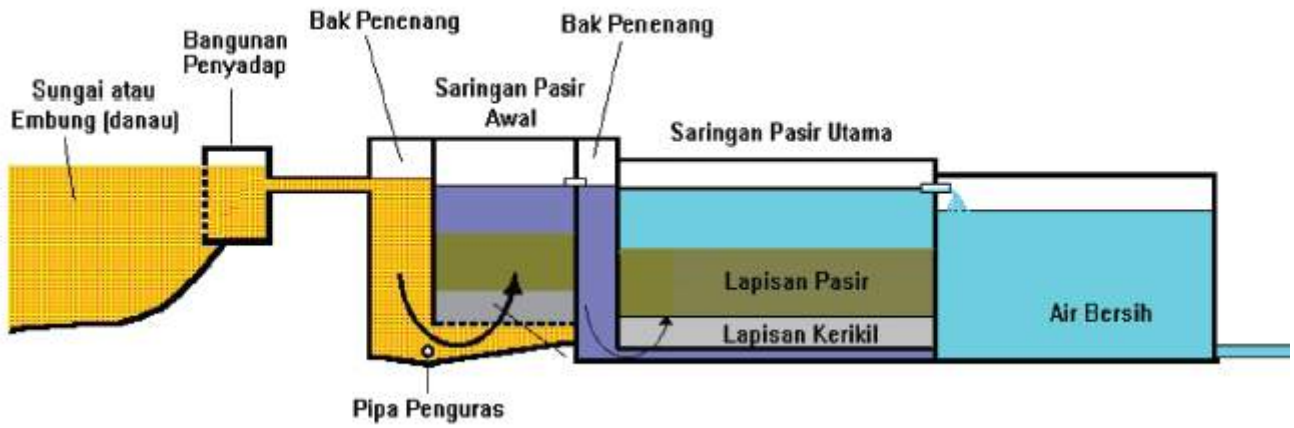
A diagram was needed to give a clearer division of the authorities present inside the site while also identifying the main actors of each authority



5.2 Flood Resistance

The connection from everyday living near the river, needing it to be specifying on what aspects that are connected to the river.

One is on the filtration process of the river water being used in the site as a main source of clean water, by using filtered river water, the site/building there does not heavily depend on water from the Water Recycling Plant but has another method to ensure clean water in the case of a flood



The meaning of resistance was not clearly defined in the book thus needing a clear definition of the following words.

The meaning of **Flood : an overflowing of a large amount of water beyond its normal confines, especially over what is normally dry land.**

Resistance : the ability not to be affected by something, especially adversely.

Thus it means to not be affected largely by the overflowing amount of water that is beyond normal boundaries.

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Attachment 1

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Bismillaahirrahmaanirrahiim

Assalamualaikum Wr. Wb.

Dengan ini, menerangkan Bahwa:

Nama	: Muhammad Kemal Adro
Nomor Mahasiswa	: 17512138
Pembimbing	: Ir. Ilya Fadjar Maharika, MA, Ph.D
Fakultas / Prodi	: Teknik Sipil Dan Perencanaan/ Arsitektur
Judul Karya Ilmiah	: DESIGN OF FLOOD RESISTANT HOUSING IN TAMBELAN SAMPIT RIVERFRONT With the Open Building approach

Karya ilmiah yang bersangkutan di atas telah melalui proses cek plagiasi menggunakan **Turnitin** dengan hasil kemiripan (*similarity*) sebesar **10 (Sepuluh) %.**

Demikian Surat Keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

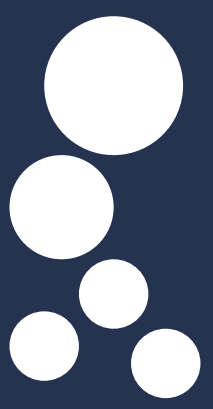
Wassalamualaikum Wr. Wb.

Yogyakarta, 29 Juni 2021
Direktur

UNIVERSITAS ISLAM INDONESIA
DIREKTORAT PERPUSTAKAAN
YOGYAKARTA

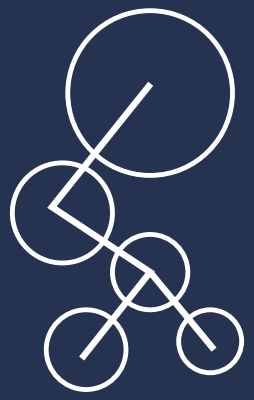
Joko S. Prianto, SIP., M.Hum

Attachment 2

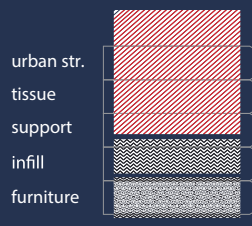


OPEN BUILDING

TAMBELAN VILLAGE



FLOOD RESISTANCE



Open Building creates a space that orients itself toward its user. The intent is to ascertain the design decision that has been made can impact it in the long term in a good way in which it can suite to future changes and stability. Open Building considers the changes in the requirement of its tenants in the future. Besides that, other changes that has to be planned in the open building design are environmental factors such as thermal, acoustics, lighting, and building performance (Harbaken, 1960). Habraken in planning and designing an open building, should identify the different levels in the building planning process, **support and infill**, referring to the available urban fabric (local material), and said fit-out building. In implementing open building into the building it is a possibility that a change in the floor elements and exterior walls of building can occur in the coming future. Because of that, open building also take notice in the changes of the building facade in the future, layout in the multi-unit building.

At its early development, Pontianak was and is a city which lived off of Kapuas River. The city, administratively is divided into several administrative areas, one of area in the city of Pontianak that located on the banks of Kapuas River is Tambelan Sampit with an area of 0.41 km2 and a population of 10,937 people (BPS Pontianak, 2019).

In its two and half decade of development and constant growth, Tambelan sampit has developed several living areas and one of the most known ones that are in the riverbank, the area itself was recognized by the city as an area that was in need of financial help.

The housing conditions of the household there are limited due to the population economy which has a majority of labor workers rather than business owners. Thus limiting the quality of living spaces in its surrounding and living quarters, which can be interpreted as an inadequate living situation.

The inadequate living situation is shown by the amount amenities and the physical condition of the houses situated there. The houses there to be exact are not properly maintained to withstand constant floods, while also lacking water facilities such as plumbing. Thus, having to rely on the river while simultaneously in constant danger from it.

If it is unattended further more, there is a probability of it being more dangerous with the rising tide water that comes yearly, while the number of houses that is not equipped properly to withstand it will still be built onward.

Flood Resistant is a saying in which an object or subject is able to withstand a certain amount of incoming water which on certain events will raise the water level affecting said object. This event usually happens in **Floodplain areas** that can be subjected to hydrostatic (standing water) and hydrodynamic (flowing water) pressures during floods. These pressures can result in displaced foundation walls, collapsed structures, floating fuel tanks, scouring, and other damage.

Flood resistance is thus required as to have structural and nonstructural components be durable, resistant to flood forces (including buoyancy), and resistant to deterioration caused by inundation with floodwater. Options that require emergency operation (such as shutting off electricity or removing vulnerable components) should be avoided if possible, particularly in areas subject to flash flooding.

Common methods of Flood resistance design are :
- Strengthening certain aspects to withstand the flood
- Avoiding the flood by moving the object
- Redirecting the flooding water into other areas

Other ways in they have to respond to the flood are by using 2 viable methods :

- Floating Architecture
Floating Architecture here means a designing method which centers itself around the use of Floating techniques using technology from several design methods

- Pile Foundation (Tiang Tongkat / Tiang Pancang Kayu)
Pile Foundations are commonly used for marsh or soft soils, or in this case to avoid the flood using pile foundations to lift the ground level of the houses above the water line and while being structurally safe and feasible to be built.

DEPARTMENT of ARCHITECTURE

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Supervised by:
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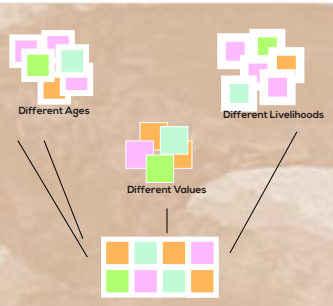
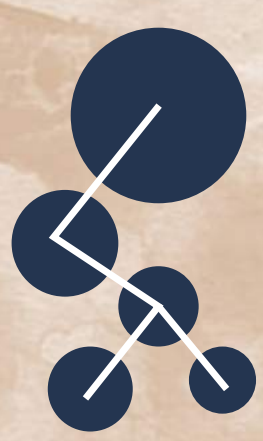
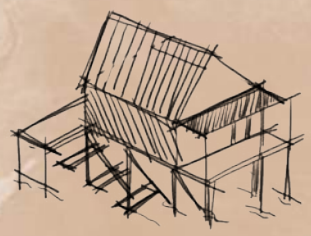


CREATING DIVERSITY THROUGH MODULARITY

While being a similar or modular form the idea is to create different divisions into which each divisions has different goals on its living situations. Specifically the living arrangements and its connection intensity to the river. From being dependent, to a minimum requirement, the division can be categorized into these need to be close to the river and create differentiating living functions which has different intentions.

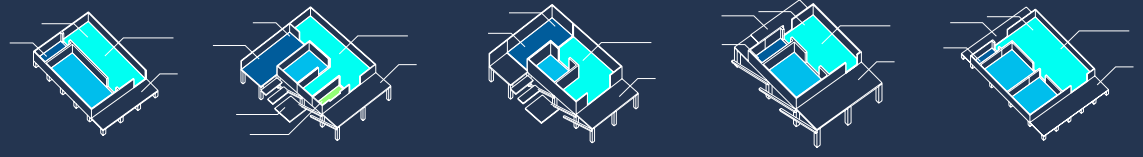




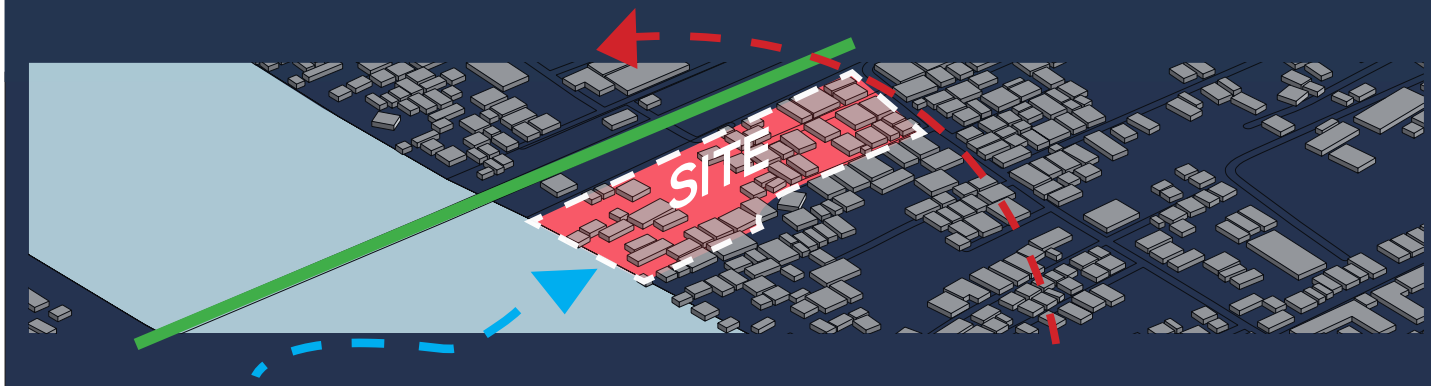
LIVING WITH THE FLOOD

Rather than try to constantly prevent the flood from happening which the rising sea water comes up to 38cm per year, we should slowly connect ourselves with the flood such as interacting, using the flood, and finding ways that benefit living in a flood prone area.
Using Columns acting as anchors, the columns serves as a tether to lock the building into place in the case of a flood, while the floor functions as a floating deck that is able to move freely upward and downward. While in a dry setting (non flooded situation) the columns acts as supporting structure to sustain the load from the platform and the floor above it

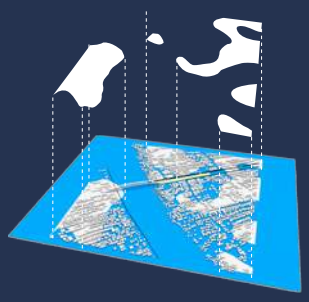
Space Analysis



The variety and similarities in architecture here at present is staying true to the common principles of a traditional Borneo house while also having varieties to suite each house owner economical condition.
The common principles are: - Having a raised floor/stage house - Front terrace/porch - Using mostly wood
While the varieties can be summarized to 5 types of houses. These houses is the current existing buildings inside the site and its nearby surrounding. But still within RT01/RW07, the house data was obtained through a survey and the cooperation from the community.

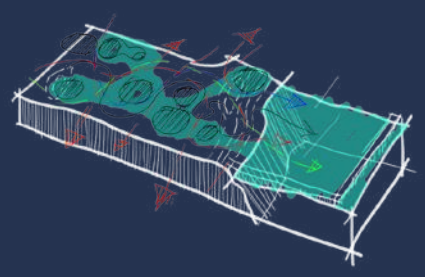


FLOOD SIMULATION



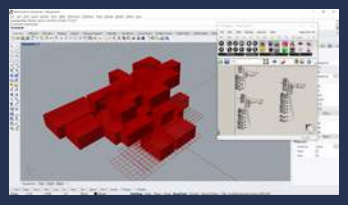
A simulated flood condition where in 10 years time, where the amount of water will keep increasing if not handled carefully due to rising water level and sinking peat soil if the flooding and heavy rain keeps reoccurring in large quantities.

LANDSCAPE OVERLAY



Here is am overlay on the areas of the water that enter the site which can be used as guide to pinpoint focal points in which areas that can potentially be flooded and where it can be focused on

COMPUTATIONAL FORM FINDING



A simulation was conducted using Rhino and grasshopper with the plug in Galapagos to maximize the amount of volume while keeping the amount of area at a minimum to conjoined the multiple homes available. A total of 3 simulations was conducted using 58 Houses as the subject with the limit on each space to 3 meters in height to differentiate between floors while the length and width is according to each homes measurements available in Swadaya Village RT01/RW07. The results were 3 differentiating mass programming where there is a mix of different spaces that is conjoined into a single mass

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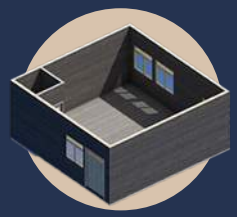
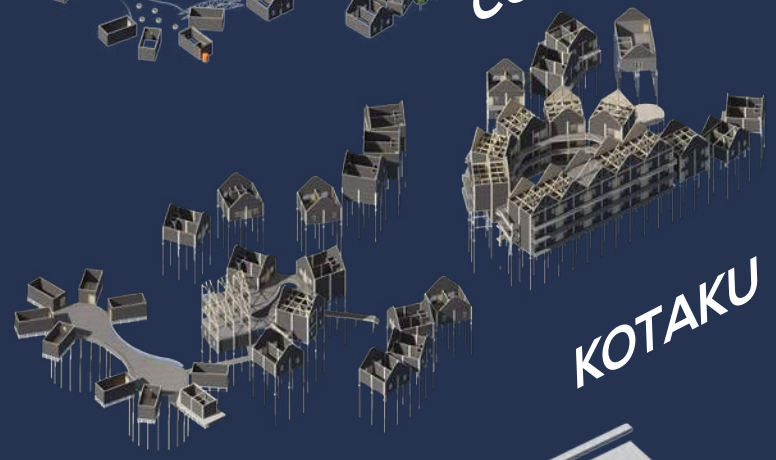


The basis of the minimal space that was analyzed, that is modular in several existing houses before which has a grid of 8x8

COMMUNITY

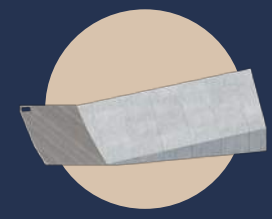
Vertical circulation, using stairs made of steel I beams for additional strength in the case of a flood rather than using wood as a basis, the tallest floor is the 3rd floor which can be easily reached for a short travel time



KOTAKU

Ramps for barrier design on being able for the first floor to be accesed by difabled individuals for a smooth transition onto a higher elevation. the ramps are presented throughout the site to provide easy access for any point on the site except the floating house area.

KOTAKU

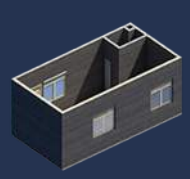


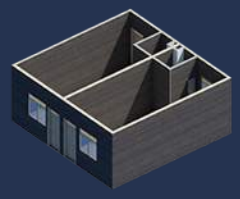
Ramps for barrier design on being able for the first floor to be accessed by di-fabled individuals for a smooth transition onto a higher elevation. the ramps are presented throughout the site to provide easy access for any point on the site except the floating house area.

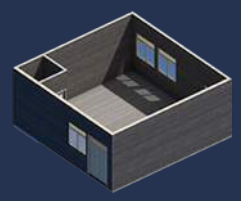
In the case of emergency or a flood boat access is prioritized here for people unable to reach higher lands, this comes forth in the canal design by measuring the turning radius of boat to form the diameter of the canals and docks

MUNICIPALITY

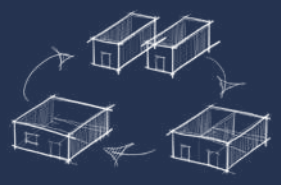
OPEN BUILDING IMPLEMENTATION



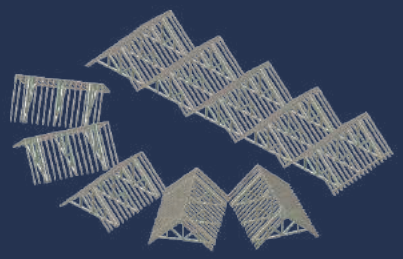




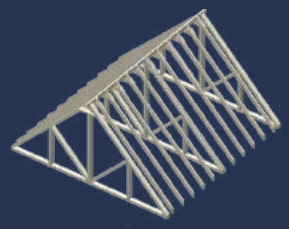
The Open Building concept is implemented through a modular plan using a 8x8 as base plan where it can be divided into 2 other configurations of 2 modular 4x8, or even a single 4x8. This is then enforced with the open plan where no set of interior walls is set in the unit, rather than restricting the floor plan created by the architect, we intend to give freedom of different configurations of their living space which can accommodate different activities while already providing a basic necessity of a toilet which has clean water access and safe from the flood.



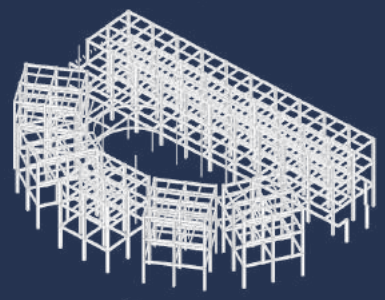
FLOOD RESISTANCE IMPLEMENTATION



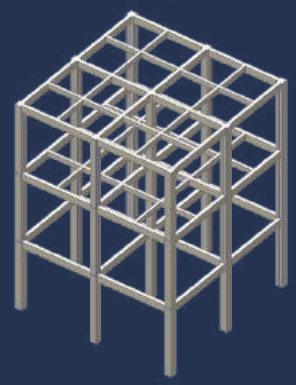
The rafters dimension is 15x8cm that is functioning as a heat dampener with the tall roof and is small enough to hold the metal sheeting



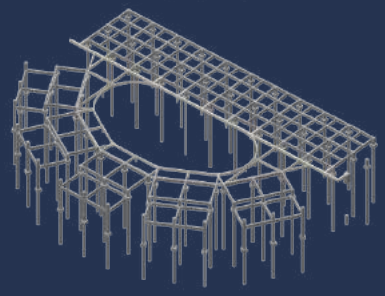
The rafters and Trusses also using treated wood as a bade material that can withstand a high amount of weathering. The finishing on the roof is using zonc metal sheets for its availibility and common usage in the area

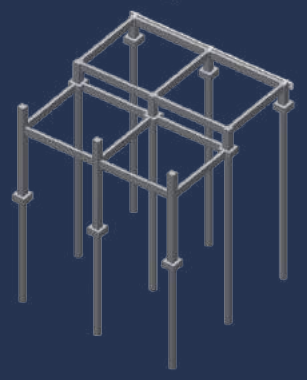


Using the principles of the existing architecture of using a stage house construction method, this also brings several benefits of letting cool air travel under the building while also cooling the building, has a higher tolerance towards the water level due to its elevation while also being able to provide light weight structure that is easily replaceable and low maintenance



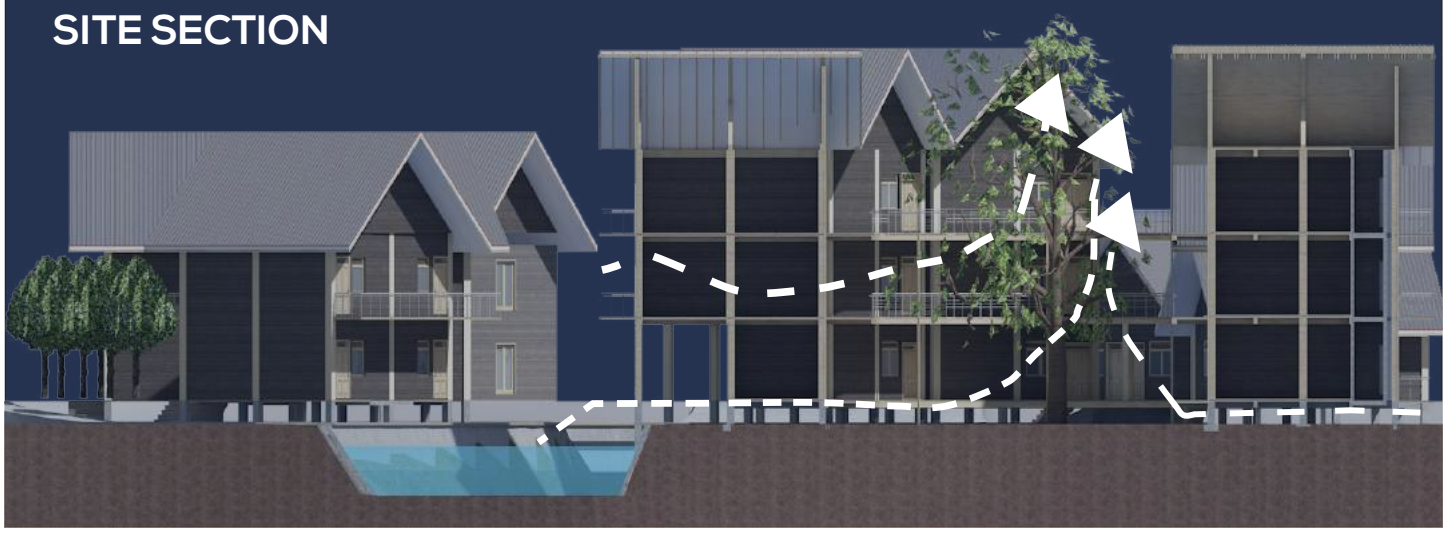
Using belian and meranti treated wood for the members the amount of each element can carry is lessened due to its modular traits of using small bearing spans between the columns





The Foundation is using piple foundations to ease the construction due to its close proximity of the river the hard soil is not easily found and it is also used because the surrounding area is filled with peat soil

SITE SECTION



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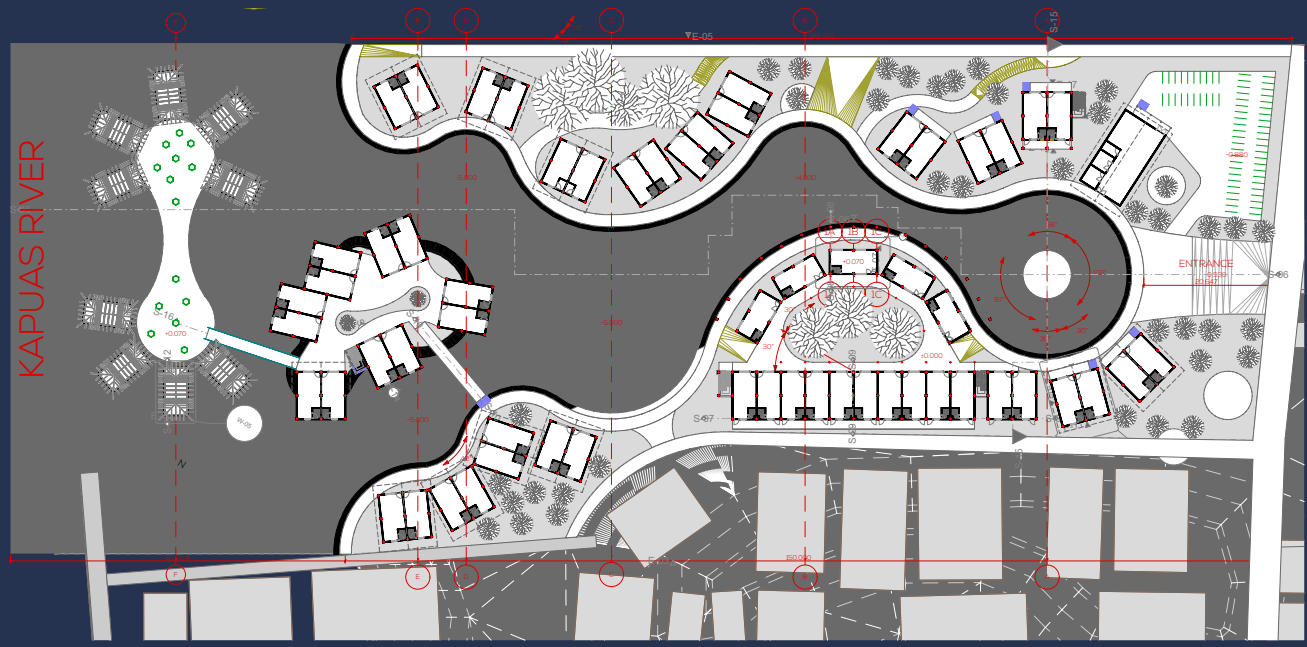

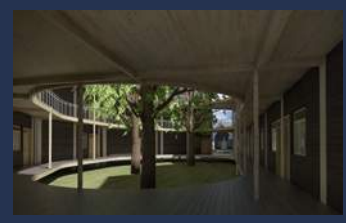

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5


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