BUILDING PERFORMANCE & TECHNOLOGY LABORATORY

REDESIGN OF PENGGUNG BUS TERMINAL AS

REST AREA +

IN KLATEN, CENTRAL JAVA

WITH ADAPTIVE REUSE CONCEPT

Supervisor :
Dr. Yulianto P. Prihatmaji, S.T,, M.T., IPM, IAI

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

So that,

***recommended) *not recommended)**

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Who makes the statement,

Galih Indraswari Nugroho

FOREWORD

Praise to Allah SWT this bachelor thesis finally has been finished, entitled: **"Redesign of Penggung Bus Terminal as Rest Area in Klaten Central Java with Adaptive Reuse Concept".** Also shalawat and greetings to our beloved Prophet Muhammad SAW.

I would like to express my gratitude for those involved during my bachelor thesis period. Names listed below are few among many others but not limited to:

1. Allah SWT, for the life He gave, people I met, the strength I got during difficult times, and all blessing I have. I couldn't be more grateful.
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LIST OF CONTENT

LIST OF FIGURE

LIST OF TABLE

ABSTRACT

The Penggung bus terminal, which is located on Jl Klaten - Solo, Klepu, Ceper District, Klaten Regency, Central Java, is a type C passenger terminal. Buses that stop at this terminal are rural transportation from Panggung to Semin, Gunung Kidul. Meanwhile, the Jogja-Solo intercity buses stop only to drop off and pick up passengers. The remaining rural fleet is only 2 making this terminal empty of visitors. The increase in the number of private vehicles as well as technological advances are also factors in the quiet terminal. The terminal, which was supposed to be a convenient transit point, is starting to become a dead place.

The government is aware of the issues that exist in most bus terminals at this time and has discussed changing the concept of bus terminals by adding more facilities. This is expected to attract the attention of visitors. Adaptive reuse of terminal buildings and kiosks that still have a strong structure was chosen as a method to solve the problem of dead space.

The result of the redesign of the Penggung bus terminal is the addition of a function as a rest area with the concept of a road service station. The kiosk building structure was maintained while the facade and roof shape were changed to give this building a new impression and hoped to attract the visitors to come.

Keywords: *Penggung bus terminals, Dead space, Rest area with roadside service station, Adaptive reuse.*

CHAPTER

01

INTRODUCTION

I.1 BACKGROUND

Penggung Terminal which is located on Jl. Klaten - Solo, Klepu, Ceper, Kec. Karanganom, Klaten Regency, Central Java is a type C passenger terminal. Buses that stop at this terminal are buses heading for Jogja-Solo and Semin-Penggung. Other rural bus fleets are no longer available.

The decrease in the number of bus passengers between Yogyakarta-Solo and Gunungkidul-Klaten has made the Penggung terminal empty of visitors. According to Syahputra 2020, people prefer to use trains to travel from Yogyakarta to Solo, or vice versa. Public interest in using public transportation has also decreased and they prefer to use private vehicles.

The Ministry of Transportation (Kemenhub) admits that currently there is a need for improvements to the existing bus terminals in Indonesia .Director of Land Transportation Infrastructure Risal Wasal said that many terminals are in bad condition (08/11/19). "In the future, we will change the concept of all terminals. The concept is that there are other supporting facilities from the terminal, ”said Risal.

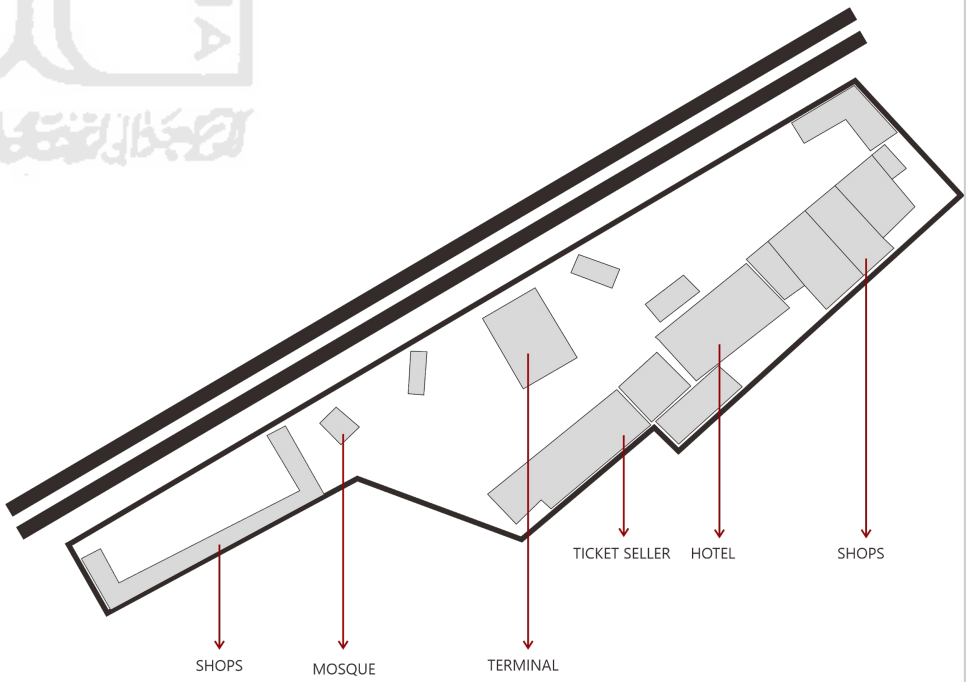


Figure 1.1 Schematic map of Penggung terminal
Source: Writer

Penggung bus terminal that lack of visitors

How to re-active bus terminal?

Big potential of Penggung bus terminal location

Supporting facilities of Penggung bus terminal

I.1.1 Lack of visitors in Penggung bus terminal

The Penggung terminal is now empty of visitors. This is due to a decrease in the number of bus passengers who have begun to switch to other modes of transportation, such as commuter lines and private vehicles. According to Syahputra 2020, 88 out of 170 people (54.71%) chose to use the train to travel from Yogyakarta to Solo. Meanwhile 46 of them chose to use the bus. Wijayanto 2017, explained that the Yogyakarta route bus has a load factor of 42.57%, this is still far below the standard that should be above 70%.

I.1.2 Towards the dead place

Land use on the Penggung bus terminal is not optimal. The terminal is equipped with several facilities such as a merchant kiosk, toilets, and a prayer room. However, the arrangement of these facilities was ineffective. This is evidenced by the market land which is used as a parking lot for night buses at night. Land that should be used for various activities is not being utilized properly.

The Klaten Transportation Agency (Dishub) in 2012 plans to restart the Penggung terminal. However, this has not been realized until now. It is evident that the efforts made by the government have not yet been able to solve the existing problems. Penggung Terminal is actually getting less and less visitors and is almost a dead building. The kiosk at the terminal has also been closed.

Figure 1.2 Conditions of Penggung bus terminal
Source : Google earth

Figure 1.3 Street vendors in the terminal
Source : Writer

I.1.3 Strategic place with untapped potential

Penggung terminal and market is located on the edge of the Solo-Yogyakarta highway. This location is very strategic and has enormous potential. Yogyakarta and Solo are tourist cities that are full of visitors. Especially since the opening of the Trans Java toll road that stretches from Merak Banten port, to Ketapang port, Banyuwangi. One of the Trans Java toll exits is in solo, so that tourist visits to Yogyakarta increase via the solo - Yogyakarta road. As stated by the tourism office of the Special Region of Yogyakarta, the increase in the number of tourists during the Eid holidays in 2019 increased by 15-20% from the previous year. These tourists pass the Penggung terminal which is located on the side of the road.

The number of exits or exits for the Solo-Jogja toll road in the Klaten area has increased from two locations to three locations. The three locations are in Kuncen Village, Ceper District, Ngawen Village / District, and Borangan Village, Manisrenggo District. This was revealed by the Head of Spatial Planning for the Klaten Public Works and Spatial Planning (PUPR) Office, Joko Suprapto, when accompanying Klaten Regent Sri Mulyani to visit the affected locations of the Solo-Jogja toll road, Tuesday (9/7/2019).

Figure 1.4 Car that park on the bus lane
Source : Writer

Figure 1.5. Conditions of retail kiosk
Source : Google earth

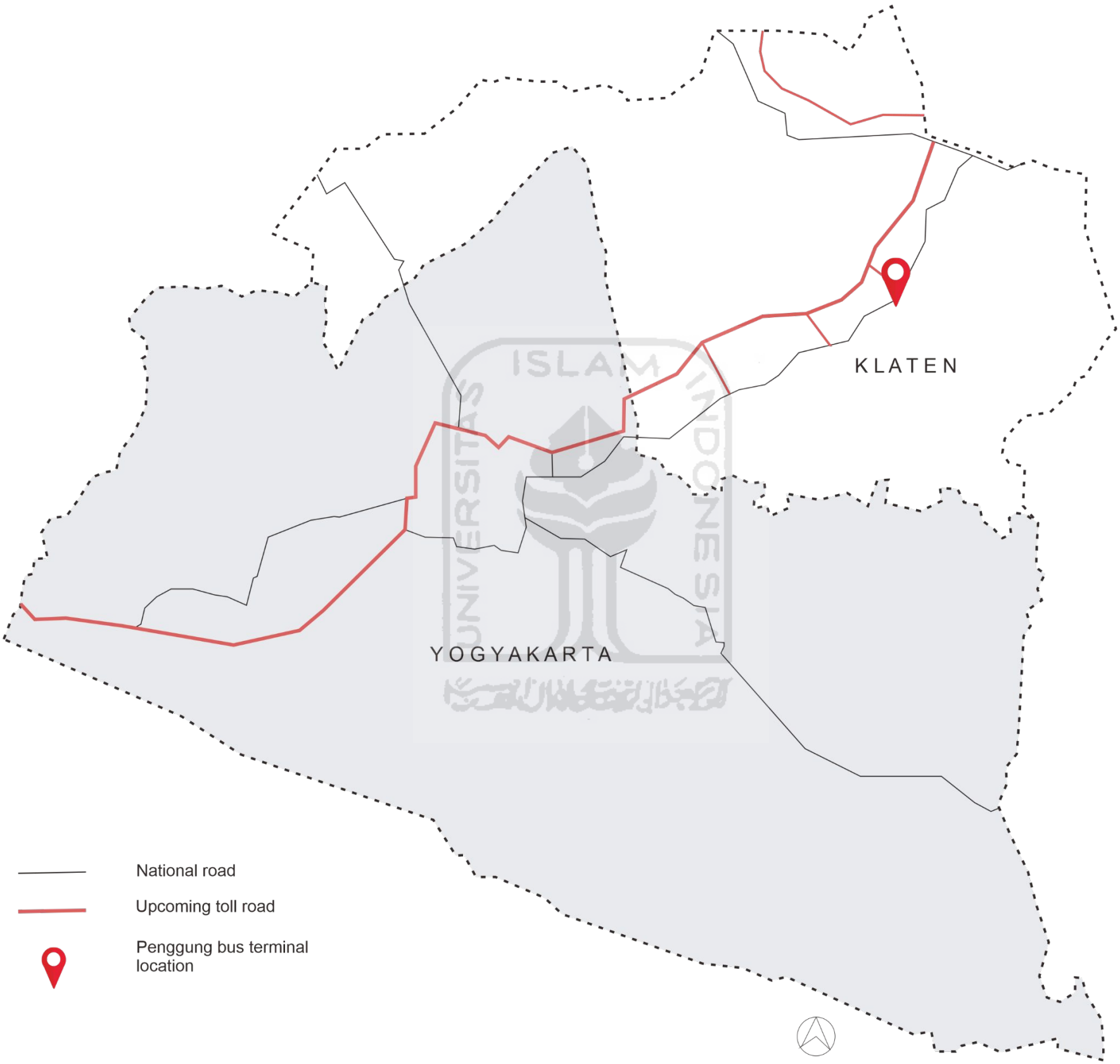


Figure 1.6. Upcoming Jogja-Solo toll road
Source : Writer

Figure 1.7 Penggung bus terminal to Kuncen exit
Source : Writer

I.1.4 How to re-active bus terminal?

The Ministry of Transportation (Kemenhub) admits that currently there is a need for improvements to the existing bus terminals in Indonesia. Director of Land Transportation Infrastructure Risal Wasal said that many terminals are in bad condition.

Risal said that various steps have been prepared in an effort to revive bus terminals in Indonesia.

"In the future, we will change the concept of all terminals. The concept is that there are other supporting facilities from the terminal, ”said Risal.

Risal hopes that the concept created can make people come to the terminal not only because they want to travel. However, said Risal, there are other destinations such as tourism that are not far from the terminal.

"We build it with the agreement of the local government. So the consultant or third party building it must coordinate with the local government. What is needed so as to create new growth in the area. As the hope of the regions, a new economic center that is really needed by the regions, "explained Risal.

Figure 1.8. Director of Land Transportation Infrastructure of the Ministry of Transportation, Mohamad Risal Wasal
Source : Kumparan.com/ Moh. Fajri

I.1.5. Rest area facilities to re-active Penggung bus terminal

The rest area on non-toll roads (public roads) is a place that is intended for public road users to have a rest. A rest area is a place and facilities provided for road users so that both the driver, passenger and vehicle can rest for a while for reasons of being tired.

In Indonesia, rest areas on public roads can be found almost along road corridors in both the primary and secondary network systems. These resting places can be in the form of restaurants, inns, public fuel filling stations (SPBU), prayer rooms, and road shoulders. In general, these resting places do not meet the technical requirements and requirements, especially those related to direct access to the building on the main roads. Low discipline and control of space related to providing a place to rest can lead to increased disorder, congestion, accidents, and other problems. (Herlambang, 2017)

I.1.6 Potential to support sub-urban growth

The conditions of the Klepu village community are quite diverse, with the largest population among other villages in the Ceper sub-district, namely 6216 people (BPS Klaten, 2020). The livelihoods of the Klepu villagers vary, from agriculture, mining, industry, construction, trade, and others. Among these sectors, industry and trade are the main sectors of livelihood with the number 363 and 362 from 1627.

Figure 1.9. Conditions of Penggung bus terminal
Source : writer

I.2 PROBLEMS STATEMENT

General Problem Formulation
How to revitalize the Penggung terminal to be rest area so that it can revive its existence ?

Specific Problem Formulation
How to use a building that has become a dead space so that it can revive its existence, without removing the value of the place?

How to design buildings that have different functions, namely the function of terminals, rest areas, and road service station?

How to give spatial comfort in the rest area building function?

How to give visual comfort in the rest area building function?

How to give good indoor air quality in the rest area building function?

Figure 1.10. Kiosk for ticket in the Penggung bus terminal
Source : Writer

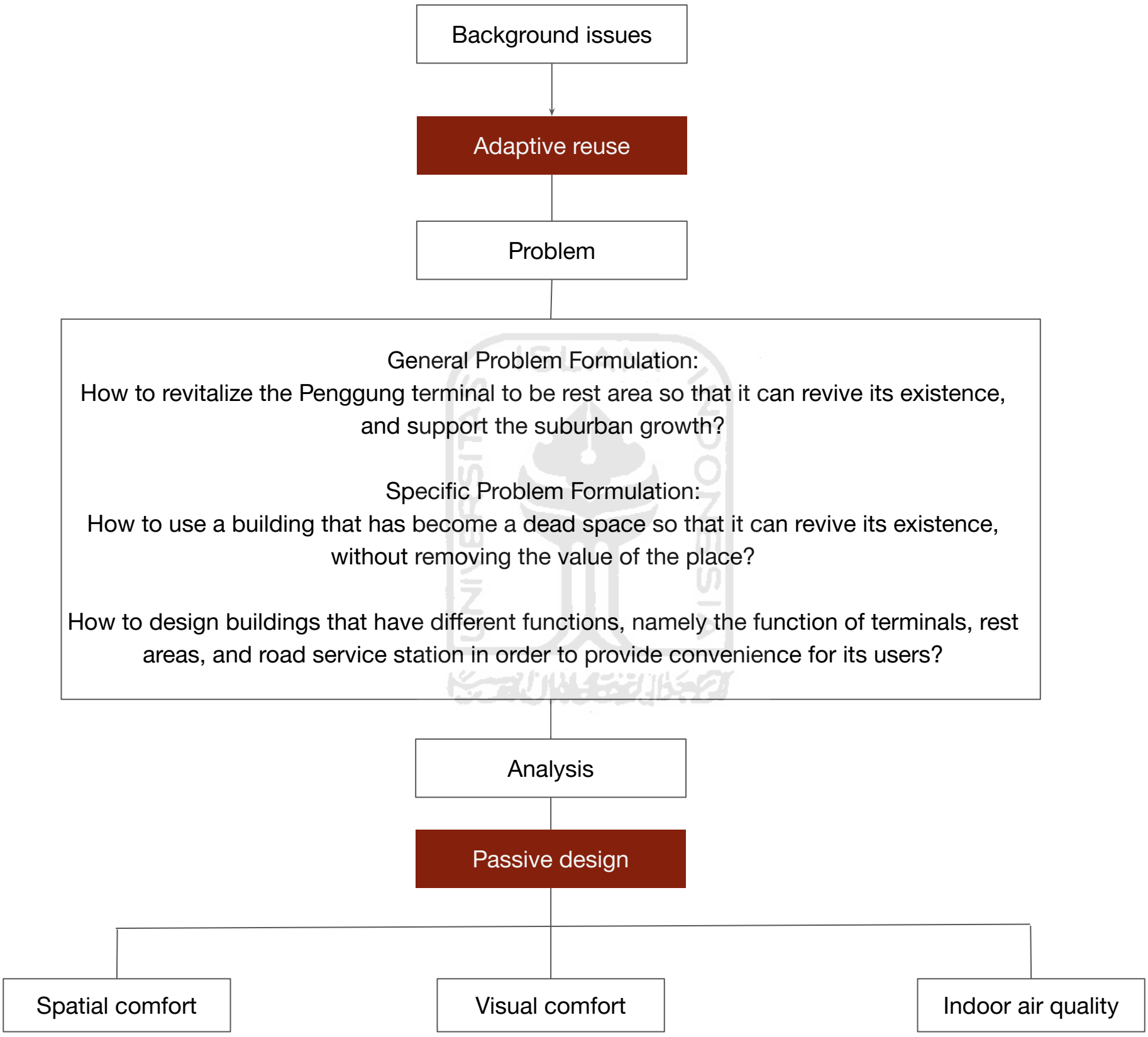


Figure 1.11 problem mapping
Source : Writer

I.3 OBJECTIVES

Design Aims
Can redesign the rest area and bus terminal at the Penggung terminal that is able to apply the adaptive reuse principle

Design Objectives
The target users in this rest area design are the Jogja-Solo national road drivers, bus passengers, and also the local community.

Designing a rest area in the Penggung sub-terminal area with the adaptive reuse principle so that the land does not become a dead space but still maintains the history of the site.

Designing safe circulation for terminal users and rest areas.

Able to make land efficient.

Design Limitation
Architect:

- Preserved the former building that has important value.
- Additional building mass created with performanced based design to be able to give comfort for those who rest.

Client:
Client of this project is the Klaten City Transportation department.

User:
The user of Penggung rest area is those who pass the Solo-Jogja national road and local people of Klepu village and Ceper district.

I.4 DESIGN METHOD

Adaptive reuse + Passive design

1. Background issues
   Background issues are obtained by looking for a problem that occurs in an area, then deepening it by using data that can support the problem so that the cause can be found. These data can later be used to reduce the problem concentration limit so that a location that is suitable for the problem can be chosen. In the case of this design, the problem raised is that the bus terminal is almost a dead space, so that additional functions are needed to avoid dead space.

2. Analysis
   At the analysis stage, we will find out which problem-solving methods are most relevant in an effort to solve the problems that are trying to be raised previous. The problem solving method is analyzed according to the context behind the problems that occur, so that it will be studied first to obtain an approach to the design so that the design can function as a problem solver that occurs in the building. In this design process, as an effort to solve the problem in the form of dead space at the Penggung bus terminal, the rest area function was added to the site while maintaining the historical value of the previous building, as well as passive design for the new building in order to achieve thermal comfort.

1. Design Problem
   At this stage, the previously tried approach will be derived into variables and parameters that detail the problem-solving actions of each approach. This action is then matched to relevant design elements, such as building mass arrangement, building facades, landscape, and spatial layout.

2. Design concept
   At this stage, it will describe the application of the approach to the design made, based on actions in the problem process design.

3. Design testing
   At the design test stage, the first is to measure the value of the integration of the functions and character of the building using a comfort indicator in the form of passive cooling to find out how much the building's ability level provides comfort to users while resting.

I.5 FRAMEWORK OF THINKING

object	**Penggung Rest Area +** With roadside service station concept			
Issues	Public Transportation	Penggung bus terminal	Rest area potential	Jogja-Solo Toll road
Specific formulation	How to design rest area and bus terminal With roadside service station concept ?			
General formulation	How to design a bus terminal that start to be left out and prevent a dead space?		How to design a mass form that can maintain the historical value of the former building but also give new fresh look for the new function?	
Study	**Roadside service station**	**Adaptive reuse**	**Passive design**	

Synthesis

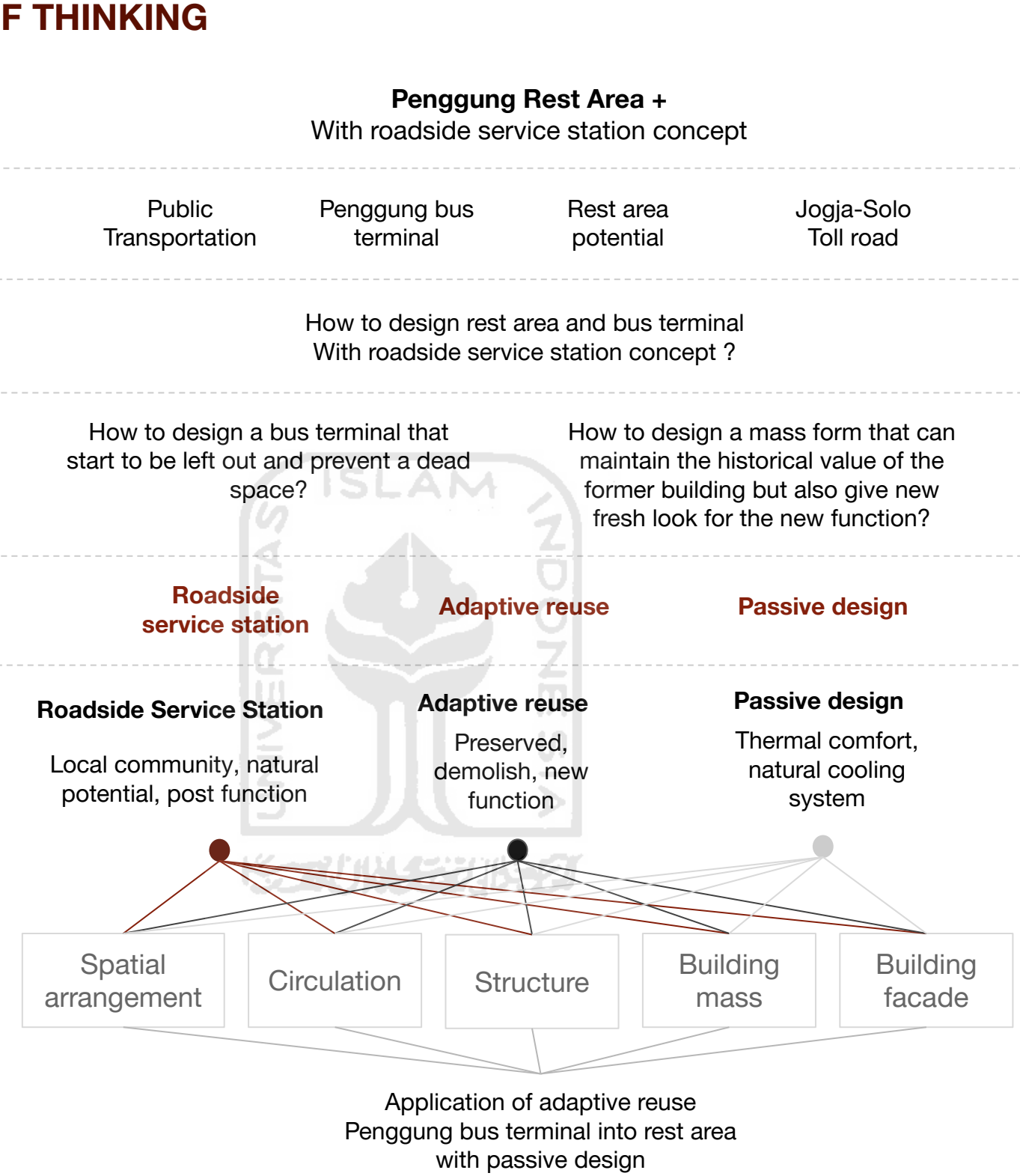


Figure 1.12 framework of thinking
Source : Writer

I.6 ORIGINALITY AND NOVELTY

A. Designing a Rest Area in Temon, Kulon Progo with a Biophilic Design Approach

In the final project that is done by iswara, choose the issues of the new airport in Kulon Progo that will need a new highways connected to the city center. This is one of the potential to create rest area since the distance between the new airport and the city center is quite far. The similarities between Iswara and the writer are the building function and typology. While the difference between them are the approach that is used and the location context. Iswara used biophilic as the design approach while the writer use roadside service station concept. The context of the site also different because they have different site area.

B. Planning and Designing the Suramadu Area Rest Area in Bangkalan Madura Regency

The issues that is chosen by Agustinah is that the Suramadu bridge is the only one connector between the Madura island with Surabaya city. The number of the vehicle that pass this bridge increase every years. The study was to design rest area as the facilities and also welcoming people that enter the Madura island. The similarity between Agustinas' paper and this paper is both of the paper designing the rest area as the public facilities. Therefore, there are several things that is different with both of them. The location, problem, and the approach that is used in the design method are not the same.

Table 1.1 Originality table 1

No	Name and Year	Title	Location
A.	Faishal Dhiyas Iswara, 2018	Designing a Rest Area in Temon, Kulon Progo with a Biophilic Design Approach	Temon, Kulon Progo, Special Region of Yogyakarta

Table 1.2 Originality table 2

No	Name and Year	Title	Location
B.	Ulaikah Agustinah, 2015	Planning and Designing the Suramadu Area Rest Area in Bangkalan Madura Regency	Bangkalan, Madura, East Java

Source : Writer

C. Rest Area with Energy Efficiency Building Approach in Gamping District Yogyakarta

Gamping that became the west entrance gate to the city of Yogyakarta has a big potential of the tourist to came. The new international airport that was built in the Kulon Progo district. Ramadhani sees this one of the potential aspect to build rest area in the Gamping, since the road towards the new airport is pretty far from the city. The similarities between Ramadhani's paper and this paper is the building typology. While the differences are the location and the approach that is used in the design method. Ramadhani focused on the energy efficiency of the building while the writer try to applied roadside service station concept in her design.

Table 1.3 Originality table 3

No	Name and Year	Title	Location
C.	Annisa Ramadhani P, 2019	Rest area with energy efficient building approach in gamping district yogyakarta	Gamping, Sleman, Special region of Yogyakarta

Source : Writer

CHAPTER

02

DESIGN PROBLEM STUDY

II.1 BUILDING TYPOLOGIES

II.1.1 Rest Area

The rest area on non-toll roads (public roads) is a place that is intended for public road users to have a rest. Purpose of provision a place of rest as stated in Government Regulation (PP) No. 34 years 2006 (Indonesia 2006), namely for improve road user safety or reduce the number of accidents that are caused by fatigue.

A rest area is a place and facilities provided for road users so that both the driver, passenger and vehicle can rest for a while for reasons of being tired. (Department of work General Directorate General of Highways, 2009)

“There are rest areas that are in road traffic and transportation provisions which state that every time you drive a vehicle for 4 hours should take a rest for at least half an hour, to let go fatigue, take a short nap or drink coffee, eat or go to the restroom / toilet. The maximum working time for drivers of public motor vehicles is 8 hours a day, so that the rest area is also used as a changing place the driver (Brilliawan, 2016)

II.1.2 Michi No Eki

Michi-no-Eki means “Roadside Station” in Japanese. This system has created 20 years ago to promote the speciality of a region through safe and comfortable traffic environment.

Each Michi-no-Eki has three distinct features:
“Refresh” – Rest facilities that include free 24-hour parking and restrooms.
“Community” – Regional cooperation where cultural centers, tourist attractions, recreation and other local development facilities promote interaction with the region.
“Information” – Where road, tourist and emergency care information is readily available.

The development of the times and technology makes motorcycle and car riders increase rapidly in Japan. These riders are improving rapidly, even on long-distance driving. This makes the government to create a comfortable resting place for motorists with more facilities and involving the local community, Michi no Eki.

Cooperation between governments, companies, and also local residents where local communities can manage their businesses independently. Michi no Eki also emphasized that the local community really has a place for them to sell their products, such as stands, restaurants, traditional food, handicraft, agricultural products for travelers.

Michi no Eki tries to provide a unique experience for motorists who stop because it offers local wisdom that is different in each region. While on the other hand, Michi no eki can also improve the local economy by selling their industrial and agricultural products.so it is hoped that the goal of empowering local communities and creating new jobs can be realized.

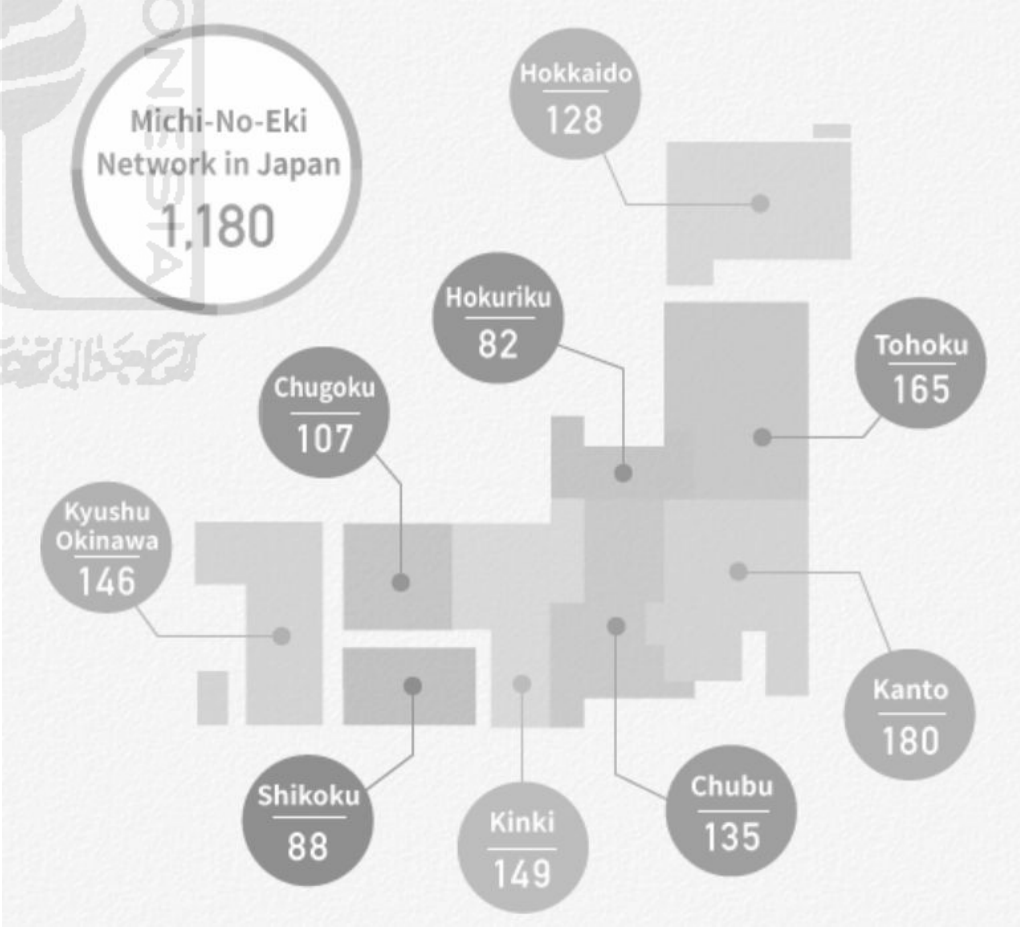


Figure 2.1 Number of Michi no Eki in Japan
Source : https://www.michi-no-eki.jp/

II.1.3 Roadside service station (Anjungan Pelayanan Jalan)

The Roadside Service Station is a concept of a resting place that functions not only as a resting place but also functions as a resting place at the same time.

There is a knot of interaction between local residents and road users. This interaction activity is aimed at encouraging increased local economic development through the introduction and marketing of natural potentials and products of local communities in the local area. The development of the rest area provision function is to attract the interest of stakeholders to maintain and maintain the sustainability of the provision of rest areas. The rest area with the APJ concept seeks to optimize the existing facilities and potential around the bridge to support the additional functions developed. Facilities and potential resources are identified comprehensively (social, economic, and environmental) based on a needs analysis by taking into account the sectoral master development plan of the local area. Through the needs analysis, additional functions, which include local business incubators, public facilities, road management posts, and emergency response posts, are expected to run optimally.

The APJ concept in Indonesia is basically developed from the Michinoeki concept in Japan which is adapted to the conditions, characteristics, and provisions governing its implementation in Indonesia. Michinoeki is a rest area designed by the Japanese government to promote local tourism and trade. The impacts that have been felt from Michinoeki's development are local economic development, job creation, provision of public services for local communities, and the integration of development areas.

The difference between Michinoeki and rest areas in general is that Michinoeki is designed to involve community participation, serve the community through public services, and encourage interaction between road users and the surrounding community to get to know and develop existing potentials through collaboration. These interaction opportunities are obtained by opening business opportunities for local residents. to market local products, and provide public services such as health care rooms, educational activities and training, local cultural activities, and restaurants and commercial services.

Learning from the success of organizing rest areas with the Japanese Michinoekidi concept, in the direction of their development, resting places in Indonesia are trying to apply the APJ concept which is slightly different from the Michinoeki concept. The fundamental thing that distinguishes between the Michoneki concept in Japan and the APJ concept in Indonesia is the availability of the functions of a road management post and an emergency response pos

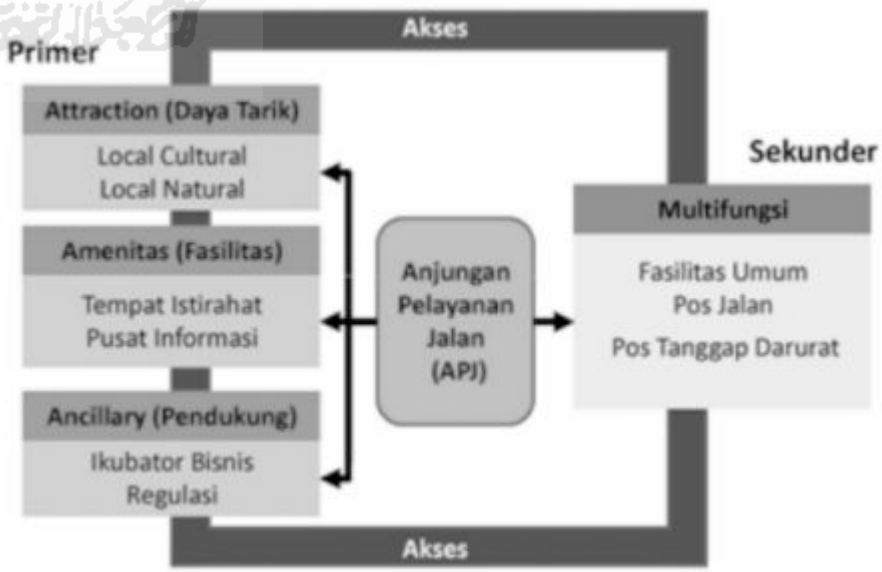


Figure 2.2 Facilities in Roadside service station
Source : Hendra Hendrawan, 2017

II.1.4 Planning a rest area with the concept of APJ

Planning is a very important activity in determining the success of optimal, efficient and effective infrastructure provision. Planning a rest area with the concept of APJ, needs to be analyzed comprehensively. both social, economic, environmental and technical aspects. five principles that must be considered in each stage in planning a rest area with the concept of APJ, namely:

1. Planning should show the compatibility of the rest area development objectives with the sectoral and regional master development plans.
2. planning must refer to a needs analysis, like the needs of road users, road operators, and local communities
3. planning must comply with the aspects of security, safety and convenience for road users and users of rest areas
4. planning must follow statutory regulations and technical requirements related to road infrastructure and buildings.
5. Planning must involve all stakeholders, both government, private and local communities so that the rest area can be sustainable, including institutional support and financing.

II.2 REGULATIONS

II.2.1 Rest Area Regulations

Regulations regarding the construction of rest areas on toll roads and national roads has been included in the regulations, including:

1. Republic of Indonesia Presidential Regulation number 67 of 2005 chapter II, article 2 reads minister / head of institution / head of region / can cooperate with infrastructure provision business entities.
2. Regulation of the minister of finance number 38 / PMK.01 / 2006 Article II reads minister / head of institution supervises the implementation of the agreement cooperation through applicable laws and regulations, and submit progress reports on projects that have received support government minister of finance / executing the risk management unit functions periodically.
3. Republic of Indonesia presidential regulation number 67 of 2005 chapter II, article 4 reads the types of infrastructure that can be cooperated with business entities includes transportation infrastructure.

The provisions for service facilities on the freeway are already in specify in Construction and Building Standards No.007 / BM / 2009 Geometry Freeway for toll roads, as follows:

a. General requirements
   - Rest areas and services are only for road users barrier-free for toll roads and prohibited from being connected to access anything from outside.
   - Rest areas and services are service facilities for users freeway for toll roads and not a facility to be destination.
   - Places of rest and services must be able to serve all types freeway user vehicles for toll roads.

b. Service facility requirements
   - The area of rest areas and services as well as service facilities must be calculated to be able to accommodate up to service needs ten years from operation to the capacity of the facility services can be built in stages.
   - At rest areas, a minimum of 30 parking spaces must be provided class I vehicles (passenger cars and small / single wheel trucks) and 10 class II vehicles (big trucks and big buses)
   - At a minimum rest area and services, a parking space must be provided for 80 class I and 20 class II vehicles.

II.2.2 Rest Area Location Regulations

Based on the Planning Guideline of Rest Areas on Public Roads by ministry of PUPR in the year of 2017:

The criteria that must be met are related to the safety and convenience of road users and users
rest areas include:

1. provision of rest areas is planned at locations that can reduce accidents due to fatigue;
2. The rest area is outside the Street Owned Room (Rumija) and has access to the Room Road Supervision (Ruwasja);
3. the rest area is not in a disaster-prone location;
4. meets the geometric requirements of the road, including safe visibility, has signs for access in and out of rest areas, clear signs and markers and adequate, and control of traffic in and out of the rest area.

Planning a rest area must pay attention to regulations related to spatial planning environmental licensing. The provisions that must be considered in determining the location are as follows:

1. site selection based on the sectoral master development plan and the detailed local spatial plan;
2. is on land controlled by the government or through the process of land acquisition with a Clear and Clean status; 3 of 22
1. go through the pre-study and / or feasibility study stage to identify the need for a rest area. Provisions through the pre-feasibility study or feasibility study stage refer to Government Regulation Number 29 of 2000 and its amendments to the Implementation of Construction Services;
2. obtaining an environmental permit. Types of environmental documents refer to Government Regulation Number 27 of 2012 concerning Environmental Permits and technical provisions issued by Regulation of the Minister of Environment regarding environmental permits;
3. has conducted a traffic impact analysis. Environmental impact analysis provisions refer to Government Regulation Number 32 Year 2011 concerning Management and Engineering, Impact Analysis, and Traffic Demand Management.

II.2.3 Building Regulation

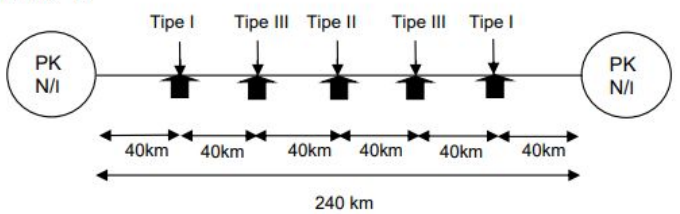
Government regulations related to locations in the Ceper District area of Klaten Regency include:

1. Basic Building Coefficient (KDB) 40-60%
2. Building Floor Coefficient (KLB) 1,2 - 2.0 and Green Open Space (RTH) 30%
3. Maximum building height is 36 m
4. Rooi building, the building demarcation line is 10 -14m
5. River rooi = 0.5 of the width of the river body measured from the river's edge

Tabel 3 - Jarak minimal antar tempat istirahat berdasarkan tipe tempat istirahat

Tipe	I	II	III
I	160 km		
II	80 km	80 km	
III	40 km	40 km	40 km

Contoh penentuan lokasi tipe tempat istirahat dan jarak minimal antara tempat istirahat dapat dilihat pada Gambar 1.



Gambar 1 - Contoh penentuan lokasi tempat istirahat berdasarkan tipe tempat istirahat

Figure 2.3. The distance between rest area
Source : Pedoman tempat istirahat pada jalan umum

II.3 FEASIBILITY STUDY

Interview report

Date : April, 15th 2021
Time : 07.00 am
Place : Penggung bus terminal
Interviewees : Yusuf Salam
Interviewer : Galih I. Nugroho

Yusuf, a janitor who was appointed head of the Penggung bus terminal in 2012, stated that the future of Penggung bus terminal was bleak. This is due to several things such as advancing technology and also the ease of owning a private vehicle. The number of rural bus fleets that stop at this terminal is only 1 or 2 buses, with the Penggung - Cawas - Semin line. Meanwhile, inter-city buses between provinces, such as Jogja - Solo, only stop for a moment to pick up and drop off passengers.

Yusuf explained that the government has not made a special effort in this matter. The last discourse that is rumored to be carried out is curbing street vendors that are starting to become permanent in the terminal area. This is still a discourse today. Meanwhile, the last building renovation was carried out in 2019 on finishing the terminal roof and fence paint, Yusuf explained.

According to Yusuf, reactive Penggung bus terminal by adding rest area facilities can be one of the solutions for Penggung bus terminals so as not to die. It would be better if this rest area becomes a tourist destination for travelers and also the people of Klaten city. Thus, not only travelers can access this rest area, making it even more crowded with visitors.

Figure 2.4 writer with the head of Penggung bus terminal
Source : write, .2021

Interview report

Date : April, 28th 2021
Time : 07.00 am
Place : Penggung bus terminal
Interviewees : Endang
Interviewer : Galih I. Nugroho

Endang that works at the transportation department of the engineering sector of facilities and infrastructure, confirmed that the condition of the Penggung bus terminal is now empty of visitors. This is due to advanced technology such as cellphones so it is very easy to ask for pick-up. In addition, it is also easy for people to own private vehicles to make public transportation such as buses become obsolete. Rural transportation is decreasing day by day.

Endang explained that for a long time the government had a plan to revive these terminals that were almost dead, by reviving dead village transportation routes. However, this has not been implemented because it is realized that the main problem with this terminal is that the number of enthusiasts has decreased over time as a result of technological advances, not due to unavailability of routes. This government discourse has a high risk of failure, so it has not yet been implemented. Up until now, the government hasn't has future plan for the Penggung bus terminal.

After the writer presented his idea to provide additional facilities in the form of a rest area with the concept of a road service pavilion, Endang's response agreed. According to her, it was a good idea. With the enormous potential of the Penggung bus terminal location, it is a pity if it is left to become a dead place. she also stated that now, kiosk at the terminal is rented by individuals and if there is no serious government effort, then there is the possibility of becoming property rights for that individual.

The merger of the functions of the terminal and rest area is also important because inter-city buses between the Yogyakarta-Solo provinces are still in great demand by the public.

Figure 2.5 writer with the transportation department staff
Source : Writer, 2021

Interview report

Date : June, 10th 2021
Time : 08.30 am
Place : telephone interview
Interviewees : Supriyono, S.Sos
Interviewer : Galih I. Nugroho

Supriyono, who has served as the head of the Klaten Regency transportation office since May 2021, previously served as the sub-district head of Ceper District. Of course, you already know the Penggung bus terminal because of its location in Ceper District. Supriyono explained that the current condition of the terminal is much different from 10 years ago. Currently there are almost no visitors. For the time being, there are no plans to renovate the terminal building itself.

After receiving an explanation from the author regarding the revitalization of the terminal into a rest area building with the concept of a road service platform, Supriyono agreed and considered that this could be a solution for the terminal building which was empty of visitors. With this rest area, it is hoped that it will attract the attention of local tourists who pass through the Solo-Yogyakarta national road.

The location of the Penggung terminal, which is also strategic, which is approximately 2 kilometers from the upcoming exit toll road, is becoming increasingly strategic. The Kuncen toll gate is the closest toll gate for the leading tourist attractions in Klaten Regency, such as Umbul Ponggok, Umbul Sigedang, Umbul Manten, and various other water attractions. According to him, this rest area can be a short stop for tourists before visiting tourist attractions.

This idea may be submitted to the central government, because at this time, the Klaten Transportation Agency still does not have the authority to change the function of the terminal.

II.4 PRECEDENT

II.4.1 Michi-no-Eki Hota Shogakko

The elementary school building, which was established 126 years ago, received a proposal for a new function. This building is no longer used as an elementary school, but several new functions were proposed by local residents in order to become a public facility that also attracts the attention of tourists. 126 years is not a short time, therefore the historical history of this building is still perpetuated, only its function has been changed.

The proposed function, among others, is as Michi no Eki, because many local residents work as farmers. Michi no Eki allows the farmers to sell their product to the tourist. The gymnasium building, which is located in the center of the site, was converted into an emergency post, due to its strategic location and the whole city does not yet have this facility. The second floor of the school building is used as a resting place as well as a temporary lodging place that is crowded on weekends. The farmers sell their product in the first floor of the building. This place became the main trade of the whole area.

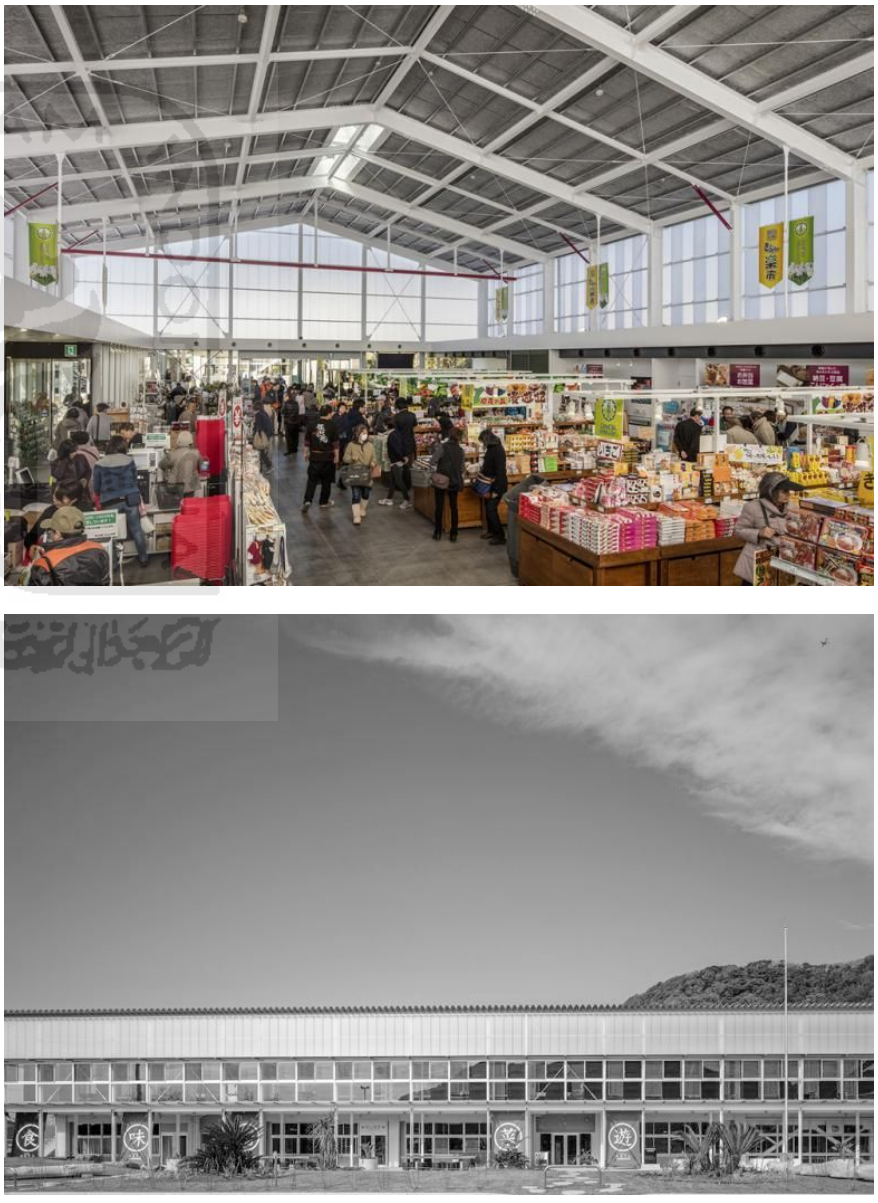


Figure 2.6 Michi no Eki Hota Shogakko
Source : studio-nasca.com

The existing classroom changed the function into the drinking and eating spaces. Finally the local community was happy about this changes, there are ceremony and it gathers all the generation from the children up until the elderly. Beside that, it also successed to increave their economic.

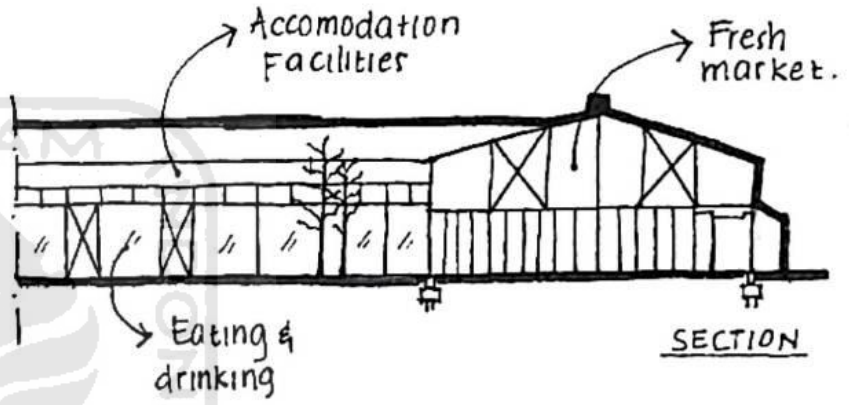


Figure 2.7 section of michi no eki hota shogakko
Source : writer

Figure 2.8 Classroom reuse as eating space
Source : studio-nasca.com

II.4.2 L’Industreet Campus / Atelier WOA

WOA (Wood Oriented Architecture) sees great potential in the city of Stains, near Paris. Famous for its hangars and warehouses, WOA is trying to create a dynamic living space because of the many dead spaces in this area.

To give an urban element to its design, WOA designed a plaza in the middle of the building that blends with the park and public space. In addition, the design continuity to the nearest station.

Basically this building was made to provide public facilities for local residents. Parking, restaurant, campus that all accessible for locals. The main building used to accommodate the unemployed to get workshops to become skilled in special skills. The main building is divided into two and is connected by a plaza and open space so that this project is connected to the neighborhood.

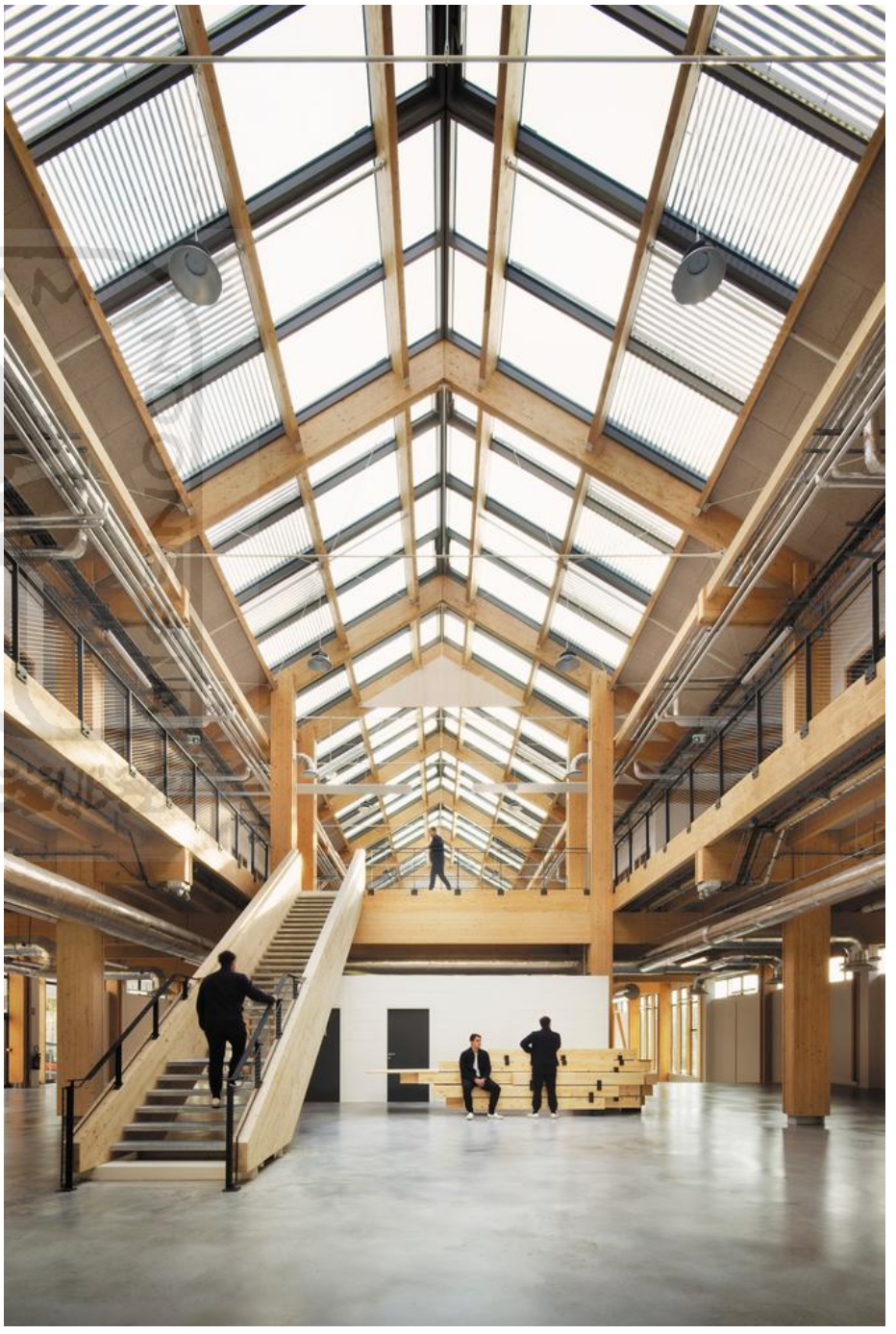


Figure 2.9 interior of L’Industreet Campus
Source : Archdaily

Application in the design:
The building was built on the dead space, and merge some of the different function in one complex. The function was based on the needs of the surrounding neighbourhood.

PROBLEM:

Dead Space

NEEDS:

New Function Room programming

Dynamic living space

STRATEGY:

Densification of function

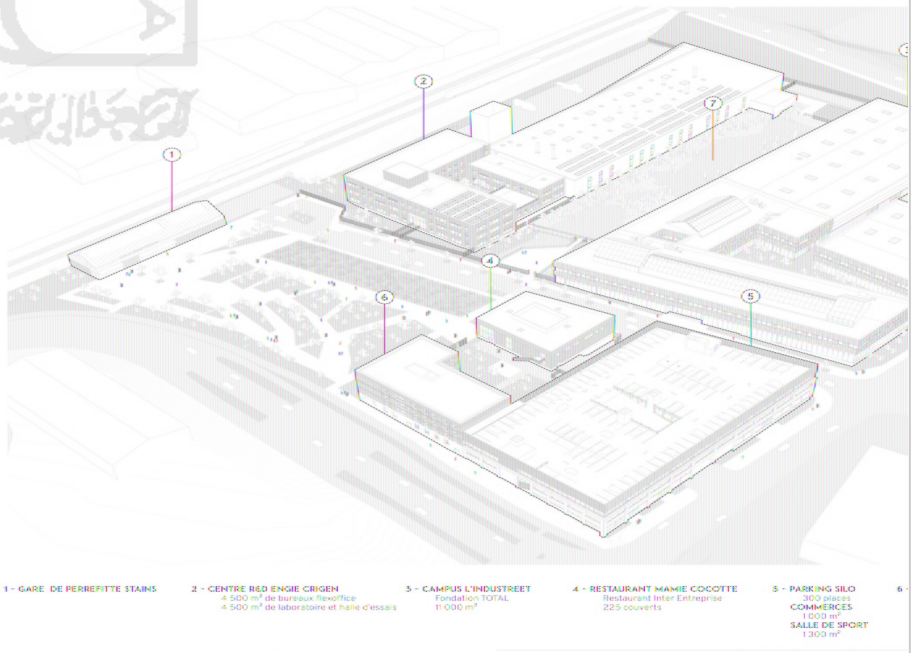


Figure 2.10 L'Industreet Campus
Source : Archdaily

II.4.3 Rest Area KM 260B

Like most in Indonesia, the Banjaratma Sugar Factory is a legacy of the Dutch government when colonizing Bumi Nusantara. The Banjaratma Sugar Factory itself was founded by a plantation company based in Amsterdam, the Netherlands, NV Cultuurmaatschappij in 1908. The factory, which is located in Banjaratma Village, or about 5 kilometers west of the city of Brebes, started operating in 1913. Its existence used to be a job field for some villagers.

The renovation process of the former Banjaratma Sugar Factory building is not easy. Because they must obey historical values, one of which is not to change the artistic value and the initial essence of this cultural heritage building. Especially during its time, PG Banjaratma was also a place for research. Although the restoration process has not been fully completed, the KM 260 B rest area on the Pejagan-Pemalang toll road is indeed different. Visitors will feel like tracing the journey of making sugar in the past. In this place there are traces of space and equipment, from stoves, flywheel engines and alleys of former steam generator, considering that this sugar factory used to use steam technology instead of wood or coal.

Figure 2.11 Rest area KM 260B, Brebes
Source : Matalensa.com

Application in the design:
Preserved the historical value of the former building and create new function that re active the building. There are also new building that added to give more facilities to the whole site area.

PROBLEM:

Dead Space

NEEDS:

New Function Room programming
Preserved the heritage

STRATEGY:

Adaptive re-used

Figure 2.12 Rest area KM 260B mushola and interior
Source : Matalensa.com

II.4.4 Anjungan cerdas rambut siwi

Anjungan cerdas rambut siwi has many functions, namely as a place of rest to improve the safety of national road users and is expected to reduce traffic accidents which reach 30,000 casualties per year. Anjungan Cerdas equipped with various facilities, parking, toilets, restaurants, places of worship, and a garden. In addition, it is also expected to become a viewing post on various PUPR infrastructures with high aesthetics and the beauty of the surrounding physical environment which is expected to be able to become a new tourism spot.

Figure 2.13 Anjungan cerdas rambut siwi
Source : Jawapos.com Donald Daud/Humas Pemkab Jembrana

This multifunctional rest area is also expected to be the location for the introduction and marketing of various local production and culture to national road users. On the other hand, it is also a center for information on various products and the potential of the area around the location.

The fact that this anjungan cerdas located in the middle of the rice field and near the rambut siwi beach, make it strategic place to take a rest. Connecting Denpasar to Gilimanuk, This national road is traversed by many vehicles every day. There are amphitheaters for the locals to perform their culture and attract tourist to come. This anjungan cerdas really take concern of the local communities.

Figure 2.13 Anjungan cerdas rambut siwi
Source : http://bappeda.jembranakab.go.id

Application in design:
The wide opening in the second floor, let the natural lighting pass through the building. Not only that but it also let the visitors enjoy the view, since the site located in the natural place. The first floor was opened, it has function to let the wind pass and cool down the building.

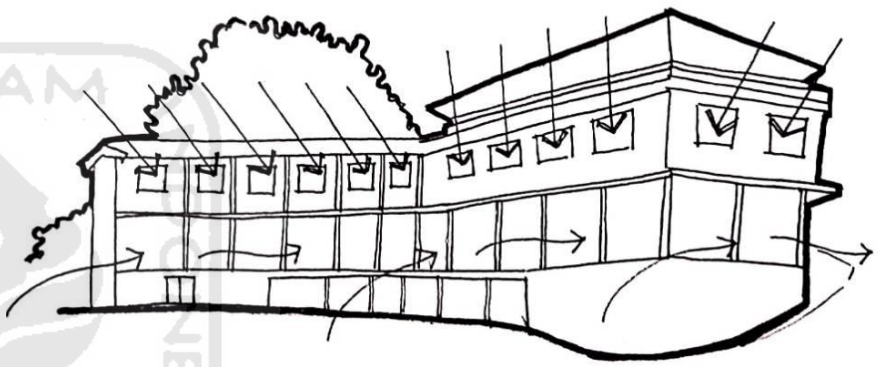


Figure 2.14 Air circulation in Anjungan cerdas rambut siwi
Source : writer

Figure 2.15 Site plan of Anjungan Cerdas Rambut siwi
Source : detiknews.com

II.4.5 Rest Area Teras Melati 695 Mojokerto

The presence of the Trans Java Toll Road, which connects from West Java to the end of East Java, has also made the Rest Area business along this toll road flourish. This service and rest area is of type B, with the concept of combining natural beauty and modern buildings. The building made has green open space, so that lighting and air conditioning can take advantage of nature.

The Teras Melati rest area is expected to improve the economy of the people of Mojokerto, with the involvement of the local community to sell their industrial products in this rest area. The Teras Melati 695 rest area have been equipped with children's play facilities, massage therapy, supermarkets and Jombang East Java specialties. Including souvenirs for Jombang-Mojokerto toll road users. In addition, the facilities and infrastructure for places of worship, toilets and showers as well as workshops are also provided.

Figure 2.16 Rest Area Teras Melati
Source : jeferiasthama.com

Application in design:
The building use natural lighting and also has single bang so that the wind can pass through the building. Sunlight can pass through the building but the sun radiation was blocked by the secondary skin.

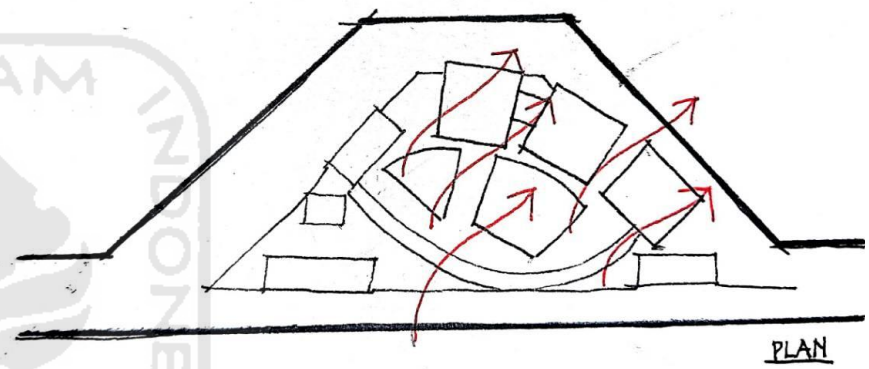


Figure 2.17 air circulation in Teras Melati
Source : writer

PROBLEM:

Thermal comfort

NEEDS:

Green area
Natural lighting
Natural cooling system

STRATEGY:

Passive design

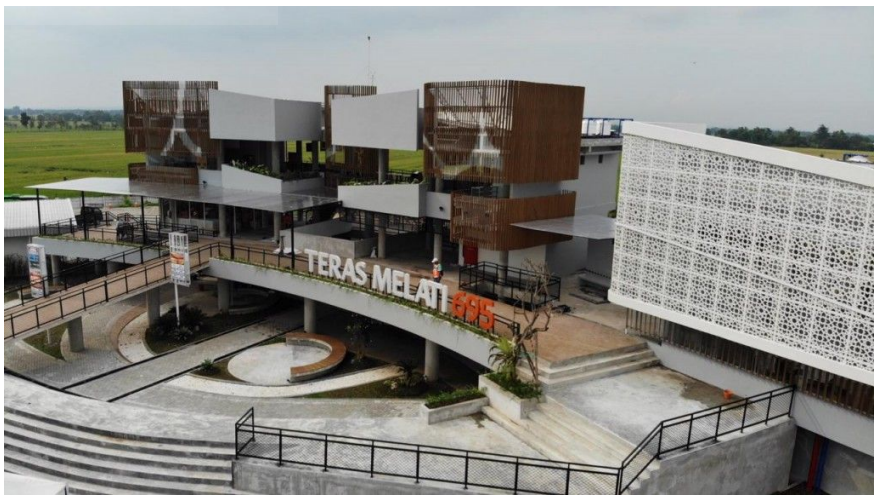


Figure 2.18 top view of Teras Melati
Source : pamitra.co.id

II.5 PRELIMINARY STUDY OF DESIGN THEME

II.5.1 Adaptive Reuse

Adaptive reuse refers to used the repurposing the former building structure into new function. Adaptive reuse architecture breathes new life into historic structures by converting them into something useful for the surrounding.

Adaptive reuse often used to preserved the history. Not necessarily the heritage building that has to be preserved, but those who start to be left out and have sentimental value to the surrounding. Adaptive reuse architecture is functional and often incredibly beautiful.

Creative adaptive reuse projects are an incredibly popular option within communities because people enjoy the historical preservation of significant buildings in their neighborhood and new unique landmarks.

Adapting buildings is an important component of any sustainability strategy. Along with adequate maintenance it is essential for ensuring the long-term prosperity of our built assets. Moreover, adaptation entails less energy and waste than new build, and can offer social benefits by retaining familiar landmarks and giving them a new lease of life.

Based on the James Doughlas, The fundamental requirements in adapting building is:

1. New or modified function of the building must be clear and the building itself must be capable to accommodating an improved or new use.
2. Site must be available for the changes
3. The land must be big enough to carry out alteration or extension.

Adaptive reuse of a building concern the most about sustainable construction. It can be said that adaptive reuse is one of the key to it. Adaptive reuse gives additional value and benefits to the local community or environment.

II.5.2 Step of Adaptive Reuse

1. Asses the building with feasibility
   - Prioritize element of the design or part of the building,
   - Highlight Vulnerable of those prioritized parts of the building,
   - Identify risks about the detail selected,
   - Assess the risk
   - Control the risk, minimize the risk of building failure.

2. Survey the neighborhood.
   It is important to conduct survey to the neighborhood to be able to design the new function of the potential site.

3. Study of the existing structure
   It is important to study the existing structure to be able to know the strength, durability, and safety. Prevent damaging the existing structure.

4. Designing the extension
   An extension here means any addition that is physically as well as functionally linked to an existing building.
   - The new attached building is usually not smaller than the original
   - There is some degree of physical attachment of the extension to the main building.

II.5.3 Insertion

The design of a new building that is in the same complex as the existing building must pay attention to the condition of the existing building both in terms of formation and facade appearance. (Ardiani, 2009). Insertion is an attempt to insert a new building into one complex/area with existing building

COMPATIBLE LARAS design criteria:

1. Facade Elements
   - Similar faade elements and relationships, for example repeating the rhythm of window and door heights
   - Using building materials and facade motifs is the same as minimizing them
   - Matching colors

2. Building Mass
   - Adjusts to the average height.
   - Building degradation is the same as the surrounding existing buildings
   - The ground figure formation is the same as the surrounding buildings

II.5.4 Passive Design

Passive design is a design strategy to achieve building comfort. In Republic of Indonesia Law No. 28 of 2002, it has been stipulated that the requirements for comfort are one of the technical requirements in assessing the feasibility of building functions. In more detail in Article 26, it is stated that the requirements for the comfort of a building must include the comfort of space to move and the relationship between spaces, conditions in space, views, as well as thermal comfort.

In the rest area, building comfort become the main problem. People will be able to have a proper rest if the building is comfortable. Because rest in this rest area is refers to recharge the energy and decrease or even to get rid of their fatigue after a long driving.

The level of comfort is also inseparable from the surrounding conditions called the environment, both physical and non-physical (human traits).

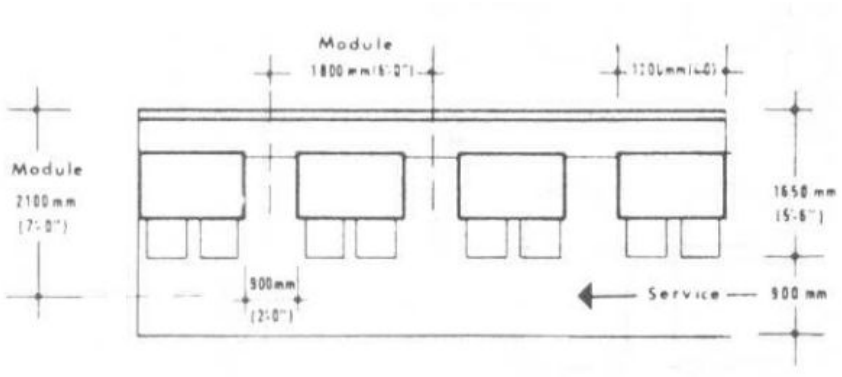
II.5.5 Space comfort

A building is ideally designed to accommodate all human activities that inhabit it. In addition, the building must be supported by a comfortable and healthy environment for its users to function optimally.

The comfort aspect of space is generally influenced by the comfort of space to move and the comfort of the relationship between spaces. The comfort of the space to move can be obtained from the dimensions of the room and the layout of the room that provides the comfort of moving while in the room. Meanwhile, the comfort of the relationship between rooms is the level of comfort obtained from the layout of the space and circulation between spaces in the building for the implementation of building functions.

The space comfort needs to meet with the requirement or the standard so that people will be able to move freely. There are some of the standard for rooms.

Picture 2.19 Restaurant seating place standard:



Source: Time saver Standard for building

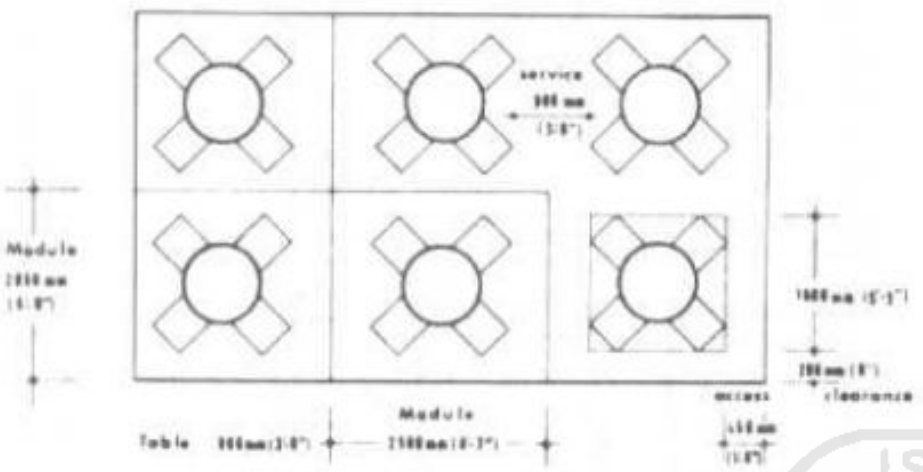
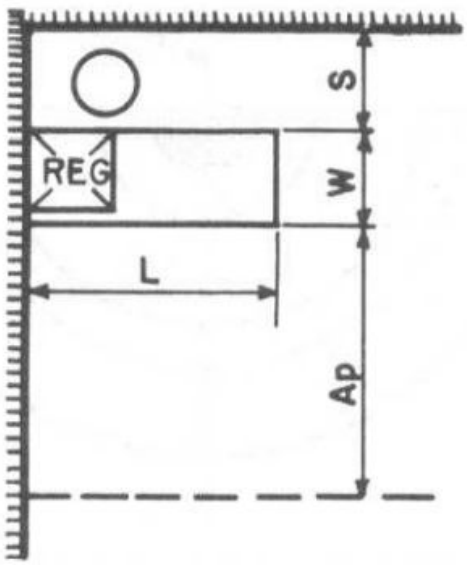


Figure 2.20 Standard for seating area



CASHIER'S DESK and COUNTER

		Usual Minimum
S	Cashier's Aisle	2–0 to 2–6
Ap	Public Aisle	3–6 to 5–0
Length		4–0 to 8–0
Width		2–0 to 2–4

Fig. 9 Nondining spaces.

Figure 2.21 Standard cashier and counter:
Source: Time saver Standard for building

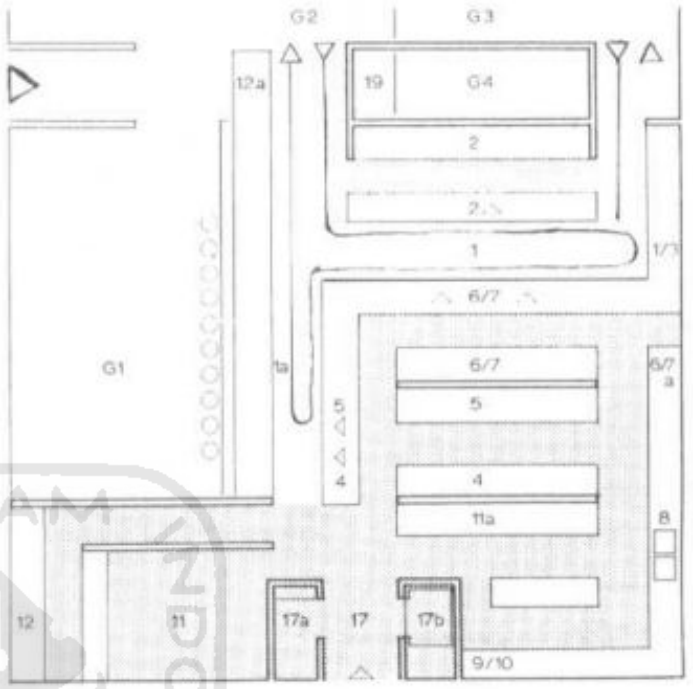


Fig. 10 Restaurant for travelers (Highway restaurant, or café-restaurant at a busy intersection in the city). Capacity:
- Snack—45–50 seats (200 persons every hour)
- Restaurant—80 seats—(two- or threefold reoccupancy during meals; at other times, coffee, ice cream, pastry, and sandwich service)
- Grill—40 seats (one- or twofold reoccupancy, high standard service) Kitchen: Linear-wall arrangement, approximately equal balance between freshly prepared meals and ready-to-serve meals. Storage, empty goods, and personnel cloakrooms in the cellar.

Legend:
1. Waiters' passageway
1a. Service corridor for snacks, and cold meal and pastry-serving counter for restaurant
1/3. Waiters—Beverage self-service
2. Dishwasher
4. Pastry
5. Cold kitchen
6/7. Warm kitchen (roast, grill, fry), bain-marie in the serving counter
6/7a. Cooking and frying apparatus (2 vats, 1 pan)
8. Pot and pan washing
9/10. Meat and vegetable preparation
11. Storage for the day
11a. Cupboard group, cooled and not cooled
12. Kiosk facing the street
12a. Cigarette machine
17. Goods delivery
17a. Office
17b. Elevator to cellar
19. Employee toilets
G1. Snack area with about 40 seats and seats at the bar
G2. Restaurant
G3. Grill restaurant, possibly with small bar for espresso coffee, aperitifs, whisky, and other spirits
G4. Guests' toilets

Figure 2.22 Standard for kitchen:

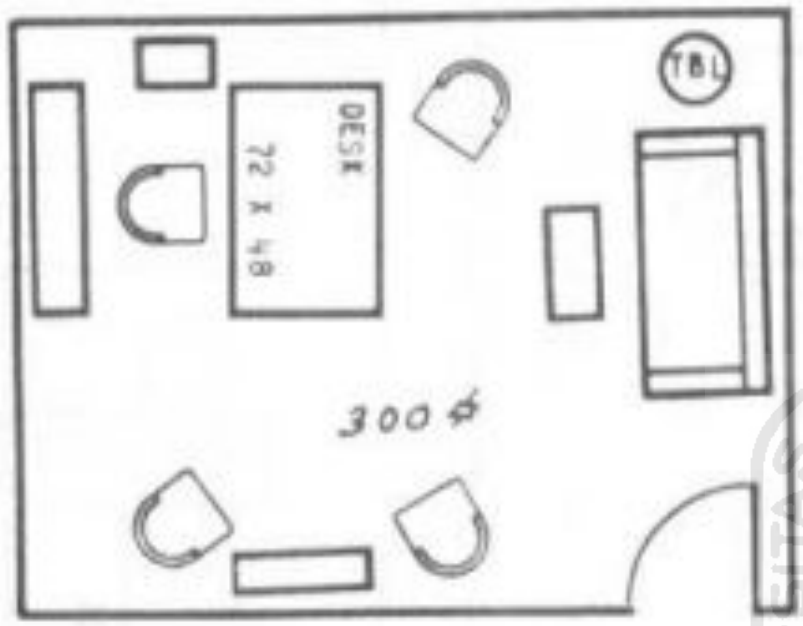


Figure 2.23 Standard for offices:

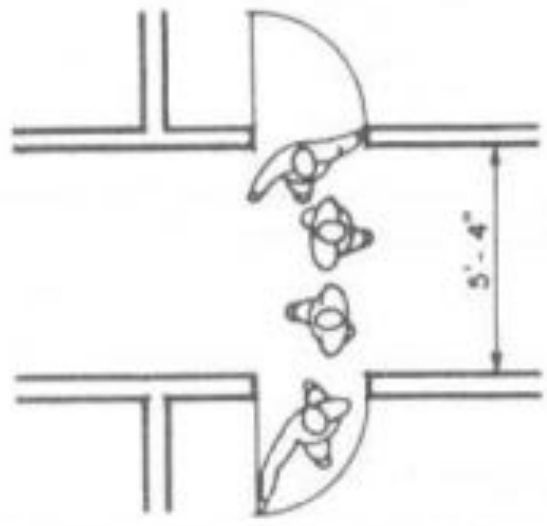


Fig. 13 Corridor width based on requirements of human figures.

Figure 2.24 Standard for corridor in offices:

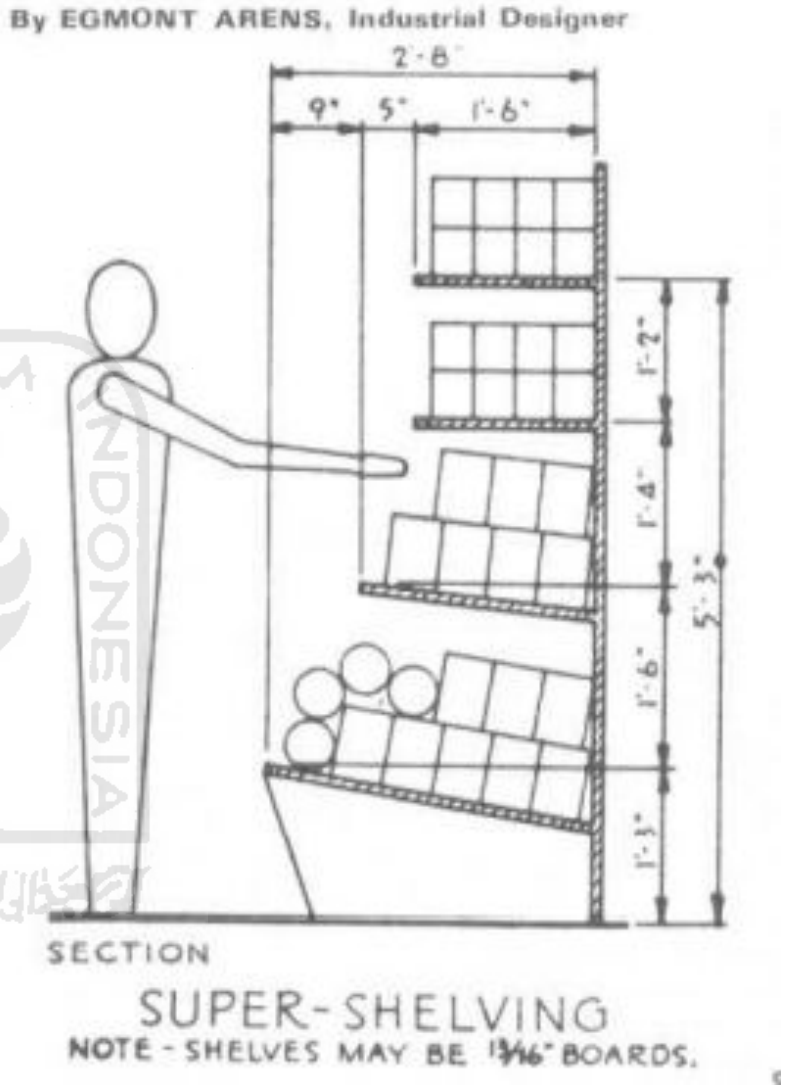


Figure 2.25 Standard for retail shelf:

Source: Time saver Standard for building

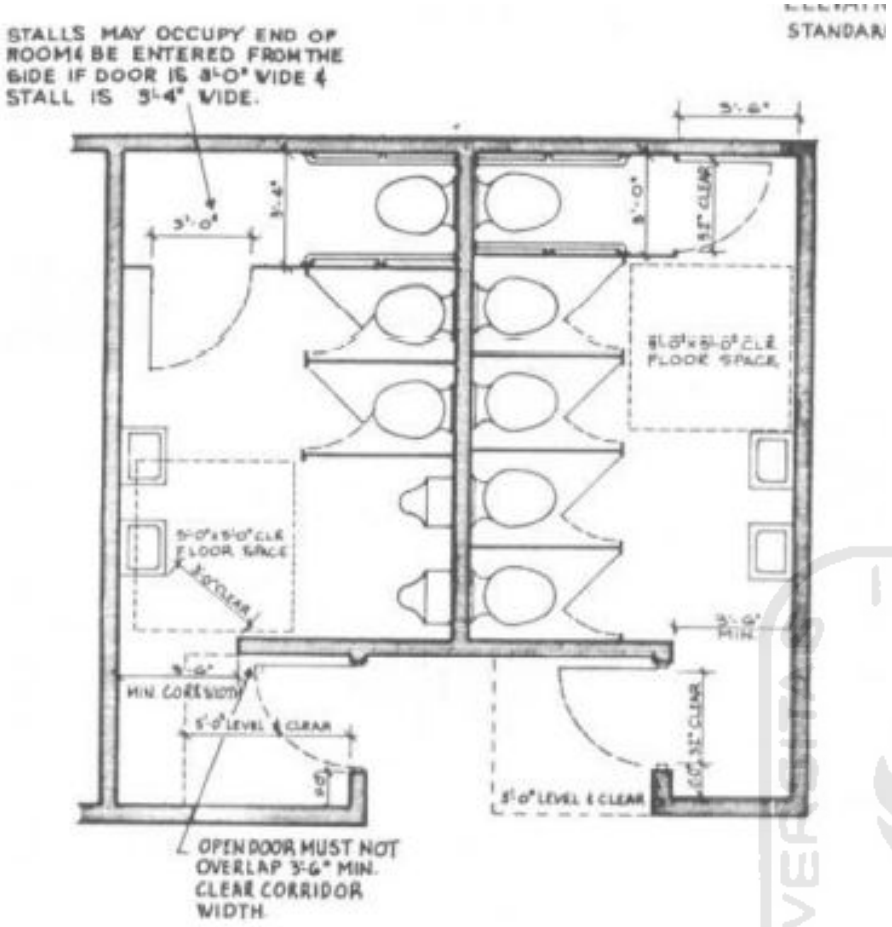


Fig. 2 Suggested entry and privacy screen arrangement to prevent door swinging out into the corridor. Doors may swing in or out.

Figure 2.26 Standard for public toilet

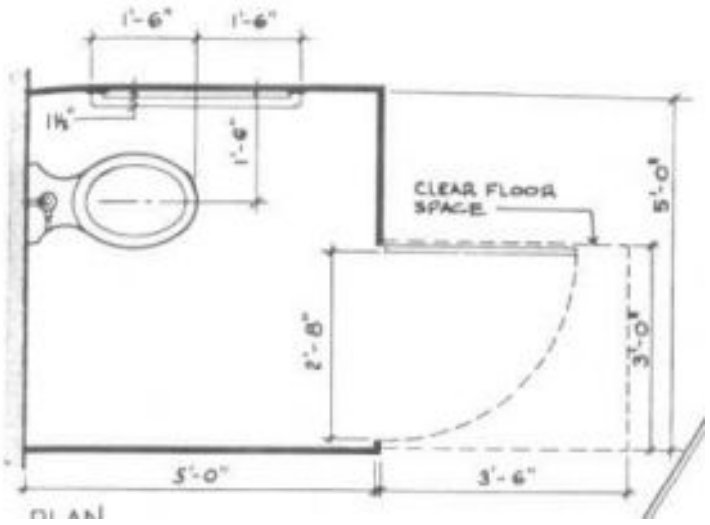


Figure 2.27 Standard for disable toilet

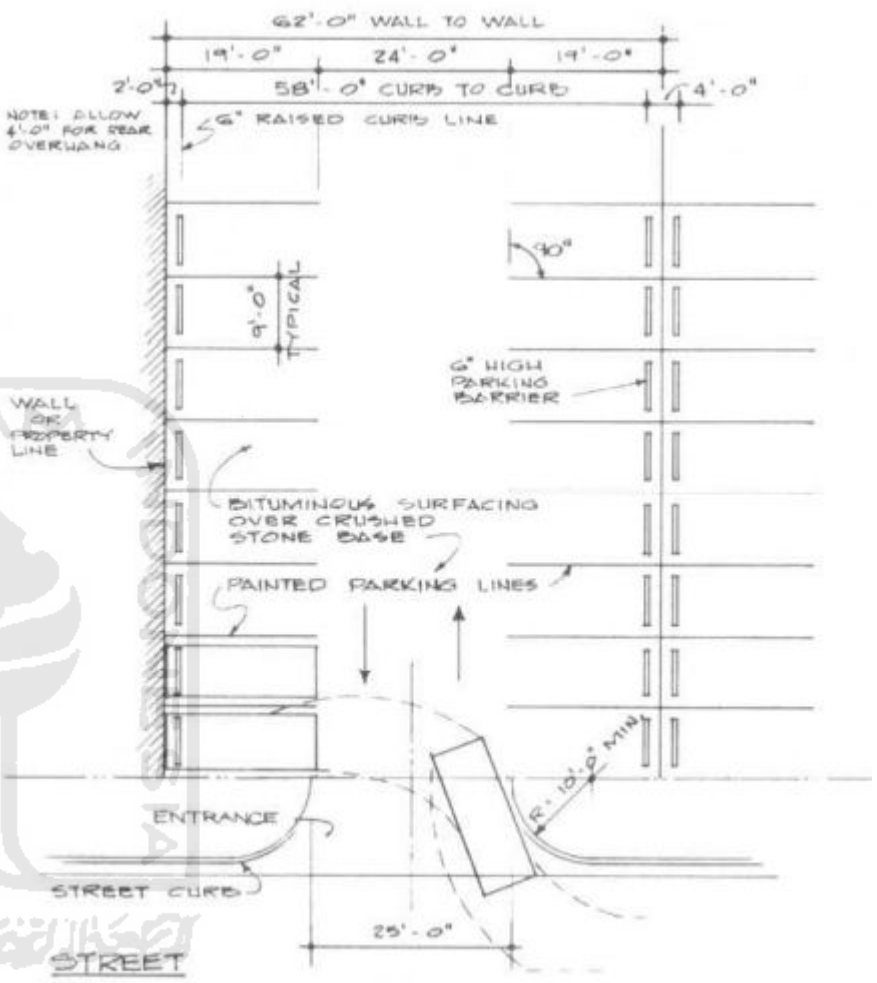


Fig. 3 Parking plan—90° parking.

Figure 2.28 Standard for parking

Source: Time saver Standard for building

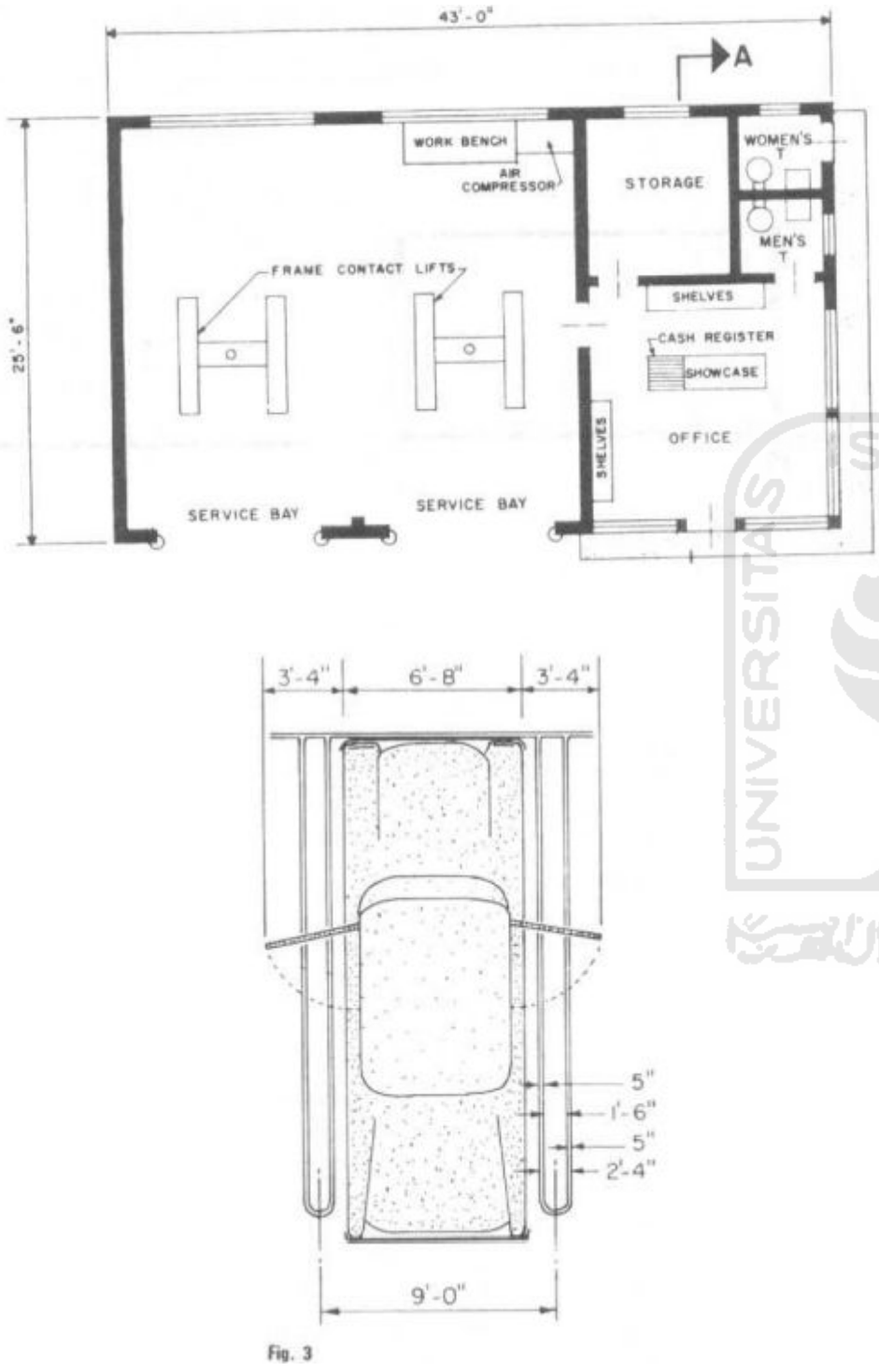


Figure 2.29 Standard for car repair shop

Source: Time saver Standard for building

II.5.6 Visual comfort

Comfort of view is a condition in which people's personal rights in carrying out all their activities / activities in the building are not disturbed by other buildings around them.

It is also undeniable that the ability in designing the interior space of a building cannot be separated from the aspect of human psychology, considering that humans are the users of the building design. For this reason, involve a team of experts and professionals in the design work of the interior / building interior to provide a sense of comfort when functioning.

Visual comfort is a subjective reaction to the quantity and quality of light within any given space at a given time. The concept of visual comfort depends on our ability to control the light levels around us. Both too little and too much light can cause visual discomfort. Just as importantly, changes in light levels or sharp contrast can cause stress and fatigue, as the human eye is permanently adapting to light levels. It can vary depending on the following factors: time of exposition, type of light, the color of the eye (light-colored eyes tend to be more sensitive) as well as the age of the person.

Visual comfort encompasses a variety of aspects, such as aesthetic quality, lighting ambiance and view:

- Views of outside space and connected to nature
- Light quality
- Luminosity
- Absence of glare

The standard of luminance in every building is different based on the function. But the standard for the rest area room is 200-300 based on the SNI. more than 500 is considered as glare.

II.5.7 Indoor air condition

The comfort of the air condition in the room is the level of comfort obtained from the temperature and humidity in the room for the implementation of building functions. Poor air quality in the building space can cause health problems, so it is necessary to take appropriate and sustainable measures.

The impact of air pollution in the building space can occur either directly or indirectly. Immediate health problems may occur after exposure. For example, eye irritation, nose and throat irritation, headaches, nausea, muscle aches, including asthma, flu, and other viral diseases. Meanwhile, health problems can have an indirect impact several years later after exposure. For example, lung disease, heart disease and cancer.

Air quality parameters in buildings can be seen and measured through temperature, odor, humidity, air flow velocity, ventilation quality, lighting, dust levels, and particulates (very small or fine particles). Meanwhile, the impact of humidity that is too high can cause the growth of fungi / microorganisms so that the quality of building construction will be reduced.

Ventilation is necessary in buildings to remove 'stale' air and replace it with 'fresh' air:

- Helping to moderate internal temperatures.
- Reducing the accumulation of moisture, odours and other gases that can build up during occupied periods.
- Creating air movement which improves the comfort of occupants.

II.6 SITE CONTEXT STUDY

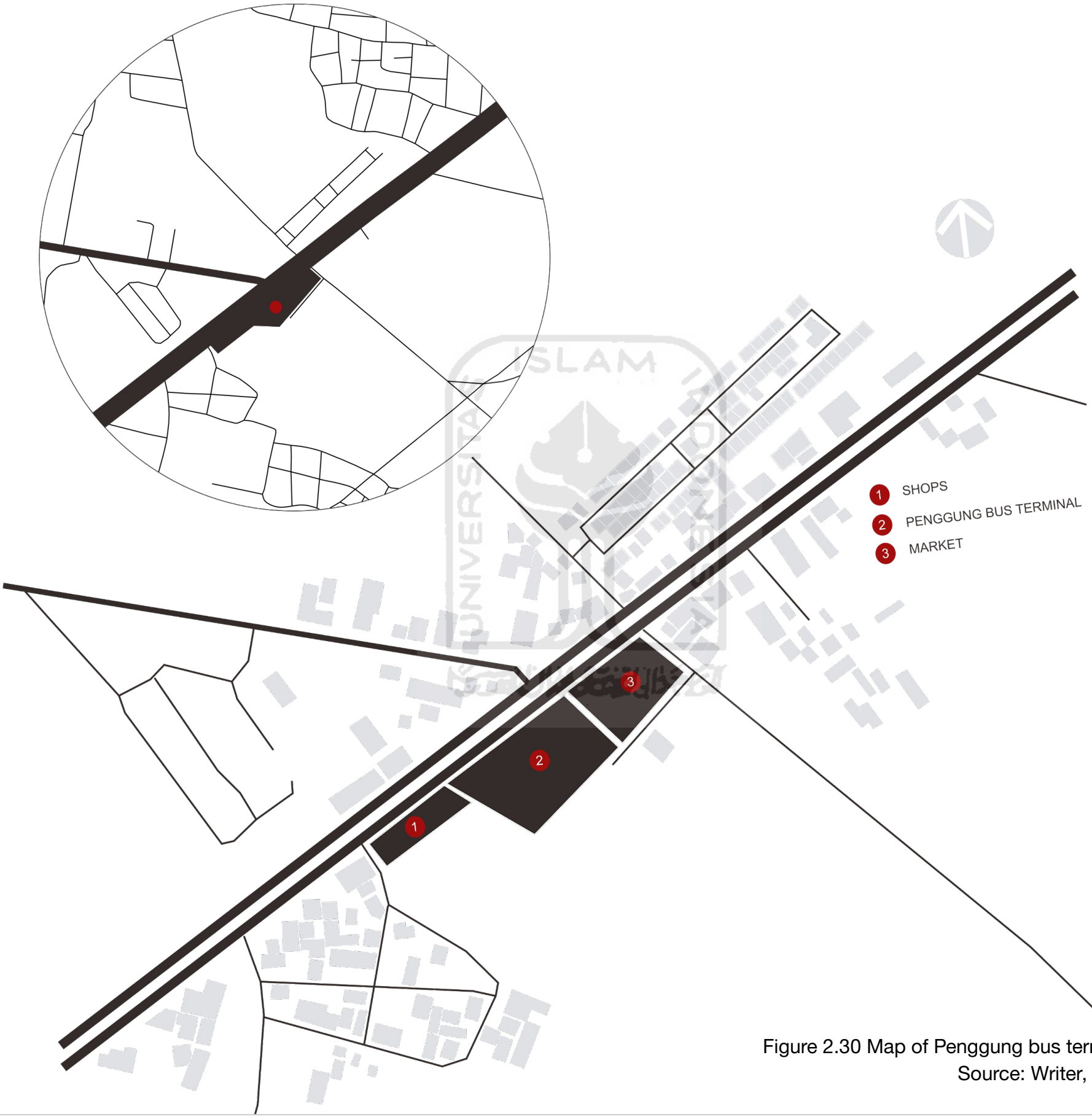


Figure 2.30 Map of Penggung bus terminal
Source: Writer, 2021

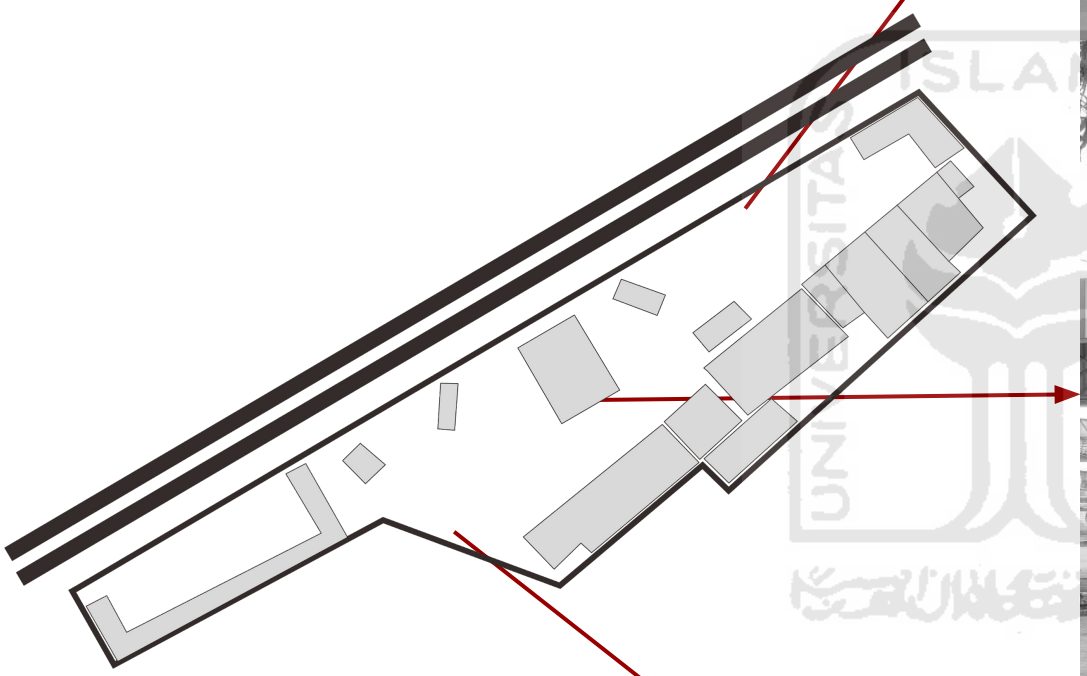
II.6.1 Location

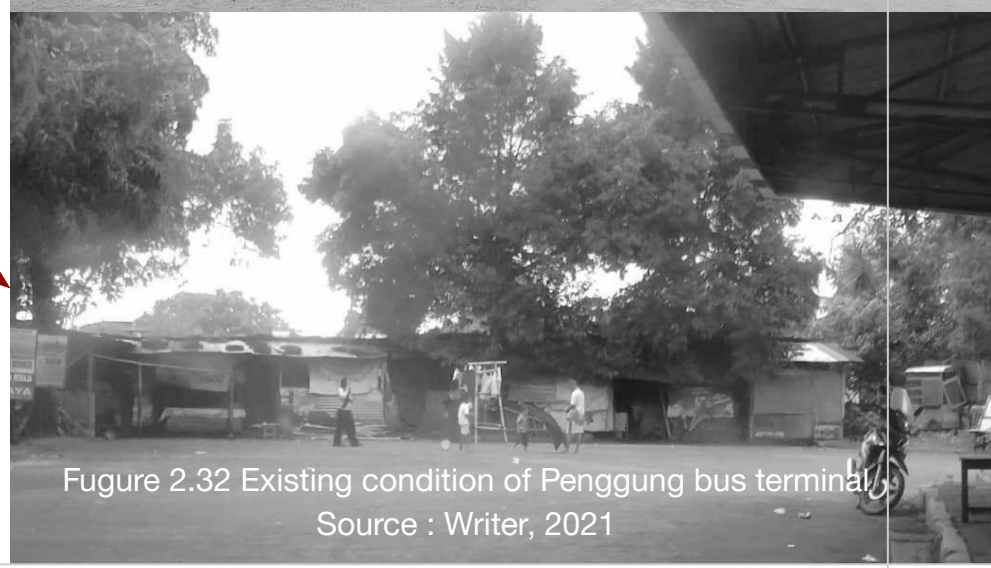
Central Java Province, Indonesia. Klaten Regency consists of 26 sub-districts, 10 sub-districts and 391 villages. In 2017, the total population reached 1,304,519 people with an area of 658.22 km² and a population distribution of 1,982 people / km². Klaten district has the following boundaries:

a. North: Boyolali district
b. East: Sukoharjo district
c. South: Gunungkidul (Special Region of Yogyakarta)
d. West: Sleman (special regency of Yogyakarta)

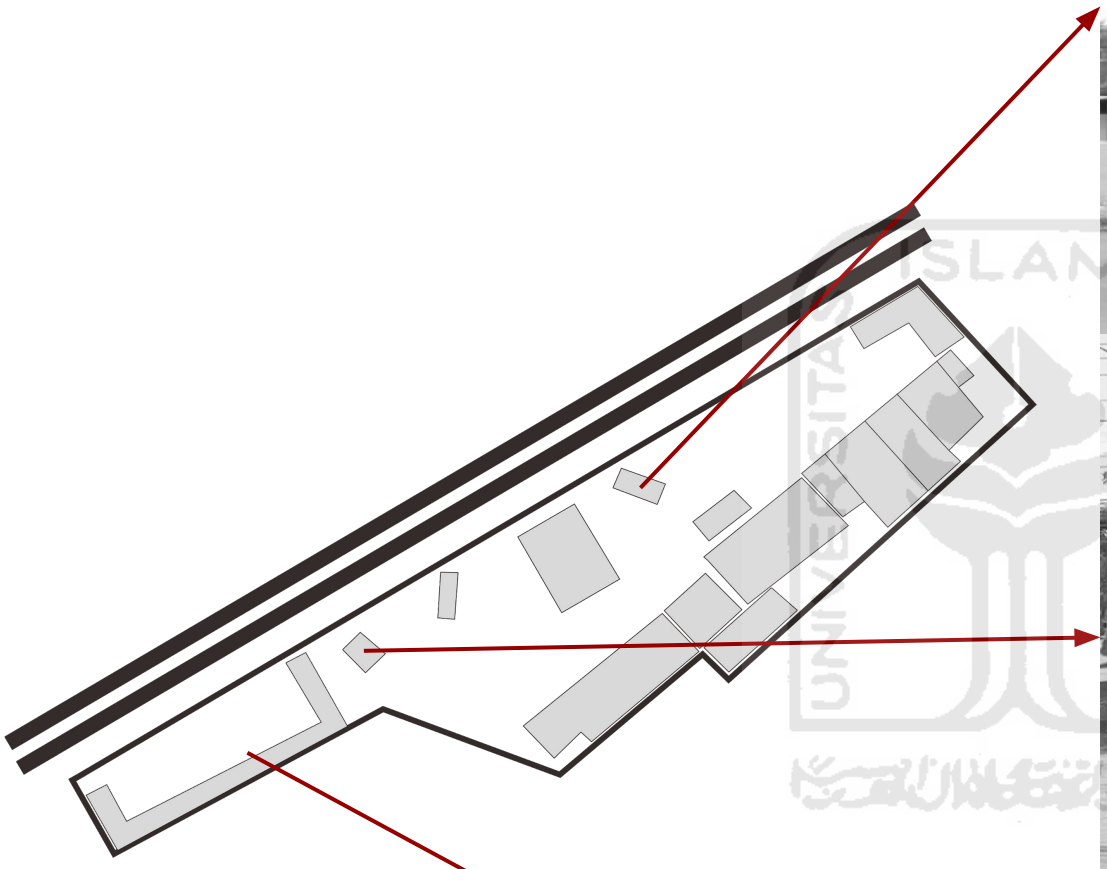
Penggung bus terminal is located on Jalan Solo-Jogja Klepu, Ceper, Klaten Regency, Central Java. The current location conditions are in the form of a terminal building and several kiosks with a land area of 12.328 m2. The location is next to Jalan-Solo Jogja so that in circulation and accessibility it is very easy to reach. Located next to a national road that connects 2 tourist cities, makes Pengging bus terminal mostly traversed by private and public vehicle drivers. The heavy traffic on Jalan Solo-Jogja and the activities around the Penggung bus terminal have made this terminal known to many people, especially tourists who want to go to Yogyakarta via the trans Java toll.

Figure 2.31 Map of Klaten
Source : Google earth





Fugure 2.32 Existing condition of Penggung bus terminal
Source : Writer, 2021



Source : Writer

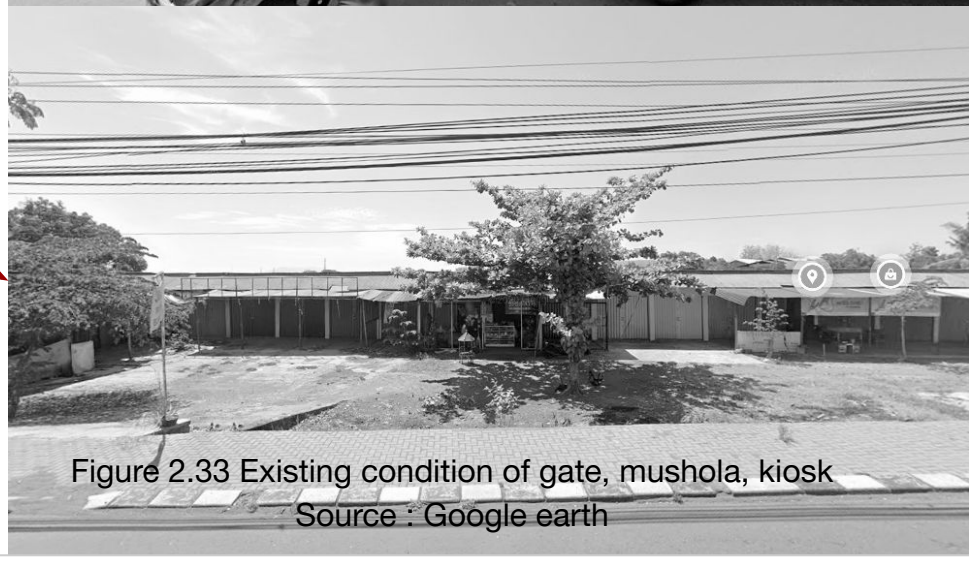


Figure 2.33 Existing condition of gate, mushola, kiosk
Source : Google earth

REST AREA WITH ADAPTIVE REUSE AND PASSIVE DESIGN ANALYSIS

Analysis of rest area and bus terminal functions with adaptive reuse

The existing Penggung bus terminal is started to be left out and towards the dead place

Reactive the Penggung bus terminal with adaptive reuse method and added the function as the rest area

Do lateral extension in the Adaptive reuse to accommodate the new function as the rest area

Do the Passive design strategy in the lateral extension to achieve the building comfort in the rest area

II.6.2 Feasibility analysis for Adaptive reuse

- Prioritize element of the design or part of the building,
- Highlight Vulnerable of those prioritized parts of the building,
- Identify risks about the detail selected,
- Assess the risk
- Control the risk, minimize the risk of building failure.

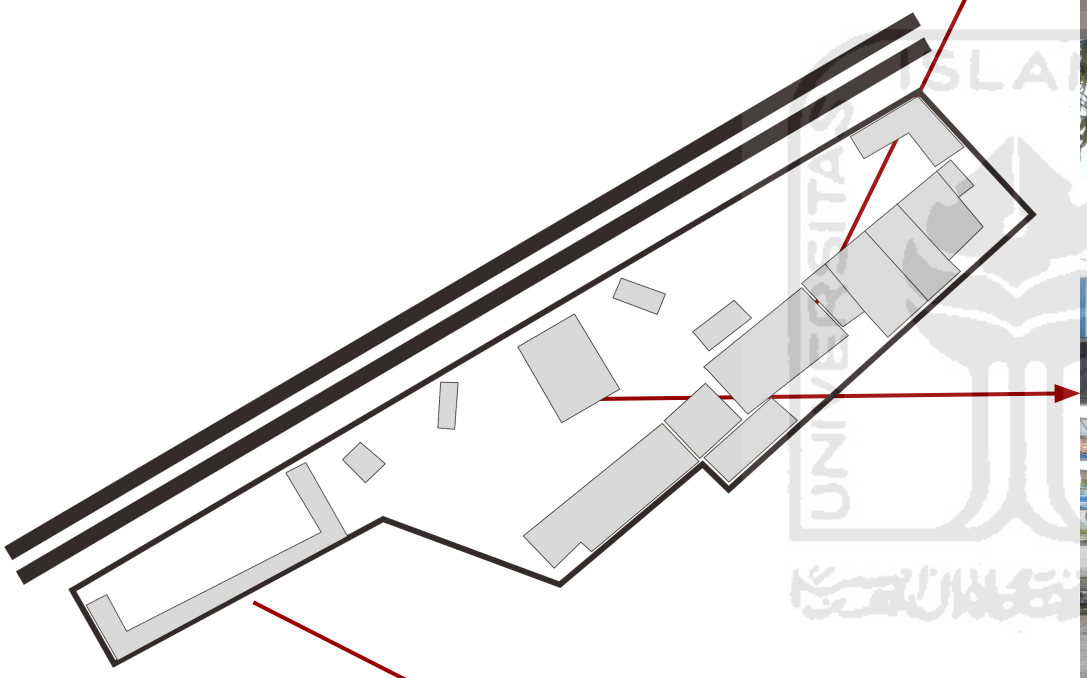


Figure 2.34 Existing condition of Penggung bus terminal
Source : Google earth

1. **Kiosk from in the northern part**
   The building mainly made of brick wall. Each of the kiosk has different style of building. There are some of the building that has 2 floor, but mostly just one floor. The building in the kiosk will be preserved since it has strong structure and low risk of damage in the future. Adaptive reuse will be performed mainly in this part of the building.

2. **Bus terminal building**
   The building of the Penggung bus terminal is the main building in this whole site. The structure was made from steel and it is wide span structure. The truss was exposed from below, but covered with zink on top and surround. This building will be preserved since it has historical value to the neighborhood. The steel structure is well maintained and can be reused. It has low potential of damage risk in the future.

3. **South west Kiosk**
   The buildings are one story building that made from concrete block wall. There are no uniqueness nor historical value of this building. This kiosk give bad impression to the whole site because it tend to look like a slum. This building will not be preserved.

II.6.3 Site view analysis

Penggung bus terminal located besides the Solo-Yogyakarta national road. The view to the north will be the national road. This view might be potential for those who stop to take a rest.

While the view to the west are the street and housing. The village that located near the road mostly used as the warehouse, but the rest are used as the housing.

The view to the east was the street that connect the village to the national road.besides that, there are some shops and housings.

The view to the south is the rice fields. This became the big potential of the site. The view of the rice field can be the natural view to the person that visits the Penggung rest area.

Figure 2.35 view from the site area
Source : Google earth

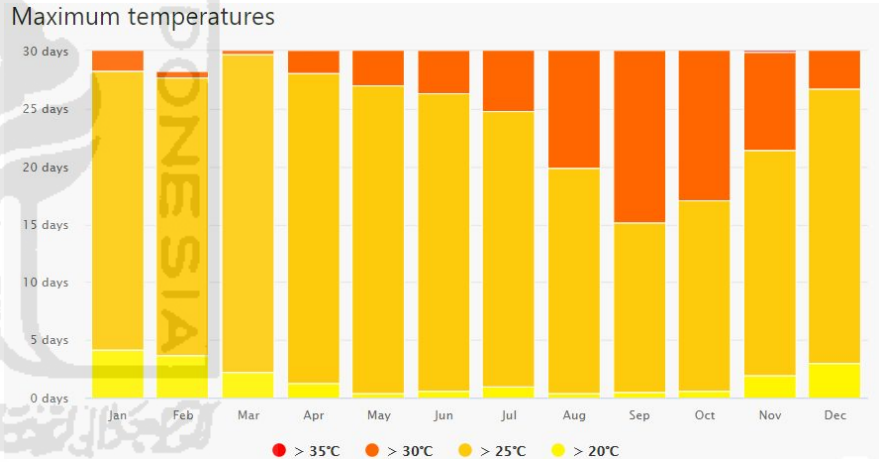
II.6.4 Temperature and maximum temperature analysis

“Maximum daily average” (solid red line) indicates the maximum average temperature of the day for each month for Klaten Regency. Likewise, "means daily minimum" (line solid blue) indicates the average minimum temperature. Hot days and cold nights (dashed red and blue lines) indicates on average the warmest days and the coolest nights every month for the last 30 years.

Consideration of design is necessary adjusted for existing data results. In Standard (SNI) temperature set at temperature of human (personnel) comfort set in the threshold temperature of 31 level.

Temperature and maximum temperature response

Create building with passive cooling to achieve thermal comfort based on the SNI. make sure that the temperature inside the building not more than 31 degree celsius. Use attic room to trap the heat from the sun to enter the building, or use the high ceiling to let the wind cool down the building.



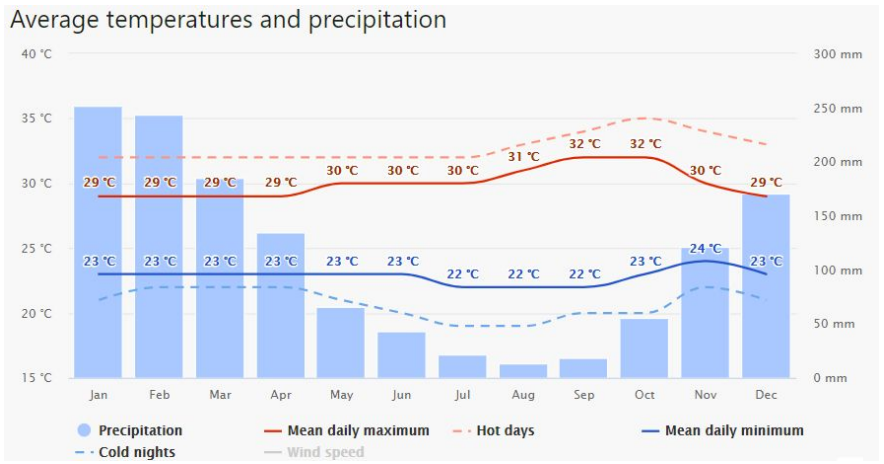


Figure 2.36 site temperature data
Source : meteoblue.com, 2021

II.6.5 Weather, sun clouds and rainfall analysis

The graph shows the monthly number of days that are sunny, partly cloudy, cloudy and bulk rain. Days with less than 20% cloud cover considered sunny, with 20-80% cloud cover partly cloudy and more than 80% cloudy. Rainfall charts are useful for planning seasonal effects. Monthly deposits above 150 mm mostly wet, partially below 30 mm big dry.

Weather, sun clouds and rainfall response

With high rainfall in certain months needs to be anticipate. Especially where the rain water will flow from the building to the landscape. Rainfall also has big influence with the shape of roof and the openings. Making sure that the rain water will not enter the building and make the floor slippery.

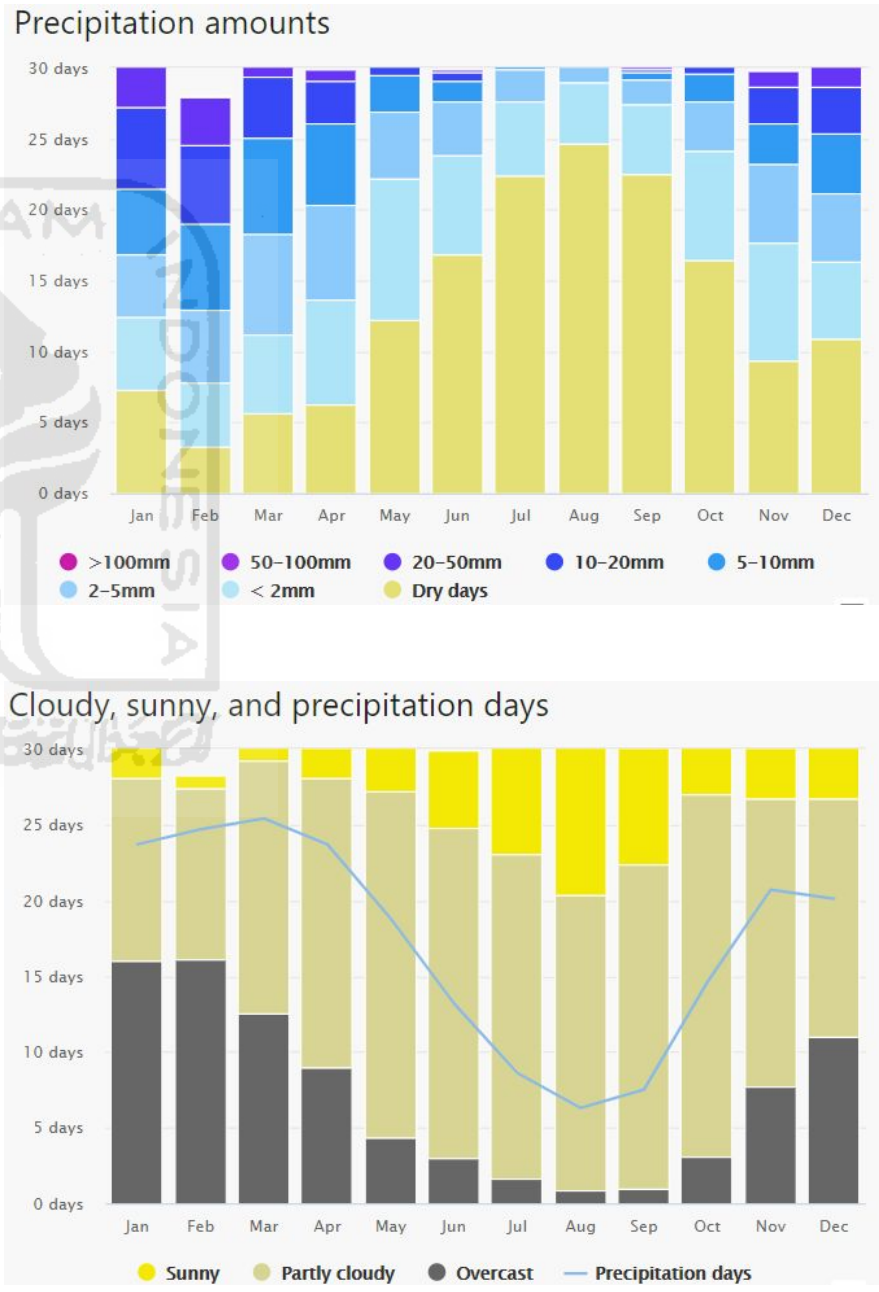


Figure 2.37 site precipitation data
Source : meteoblue.com, 2021

II.6.6 Wind analysis

The diagram for Klaten shows days per month, where the wind reaches certain speed. Most of the wind came from the south and the south west. This wind data will be used as the consideration of the openings and the building facade to achieve the comfort of the building user. Although most of the wind came from the south, but the wind that came from the southeast stronger than the one that came from the south, we can see it from the ind rose.

Wind response

Wind became one of the most important aspect to create passive cooling to the building. The wind can give thermal comfort to the person that stop and take a rest from their trip. Cross ventilation created to achieve the temperature standard based on the SNI.

Openings and the mass arrangement in the southern part became crucial since most of the wind came from the south and the south east.

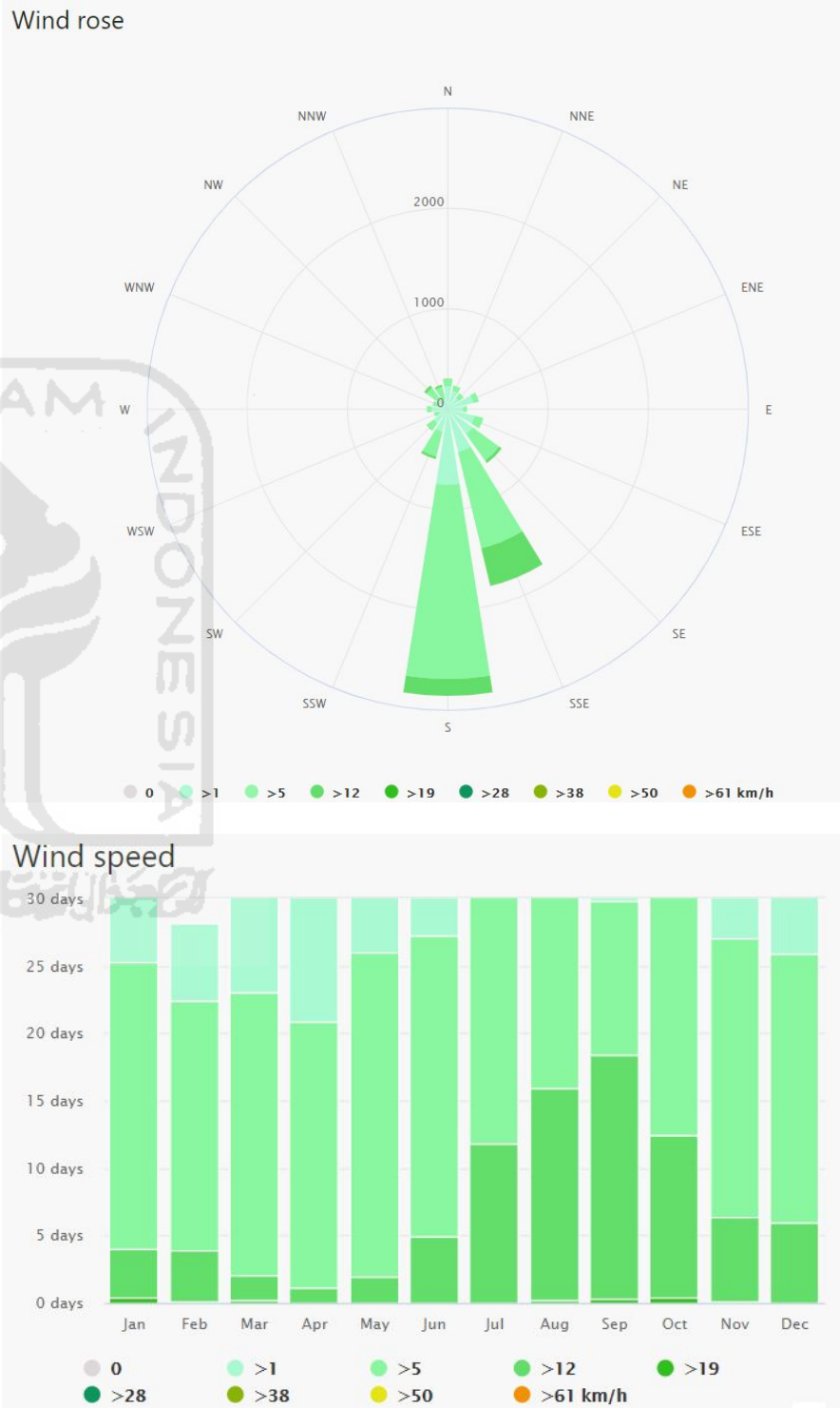


Figure 2.38 wind data
Source : meteoblue.com, 2021

II.6.7 Sun analysis

Consideration of design is necessary adjusted for existing data results. In Standard (SNI) temperature set at temperature of human (personnel) comfort set in the threshold temperature of 31 level.

The orientation of the sun is taken into consideration important in determining the shape of the mass, Place the facade openings and handles on building envelope. Orientation considerations the sun is related to the amount of light exposure direct sun hitting the veil building.

Sunlight response

The shape of the site location extends facing east west makes it challenge to the building mass. The sunlight is needed for the natural lighting in the daytime, but the sun radiation should be avoid. The response of the sunlight will be add secondary skin in the east and west part that exposed by the sun.

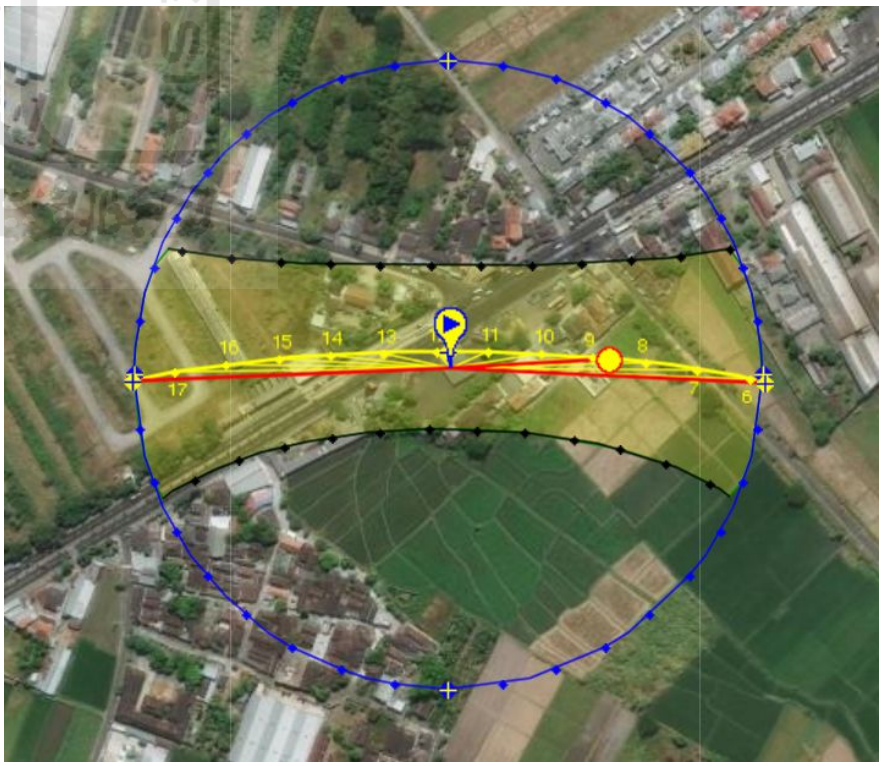


Figure 2.39 site sun path
Source : sunearthtools.com, 2021

II.6.8 User Analysis

The user in the rest area was those who passed the Jogja-Solo national road, and also for the upcoming Jogja-Solo toll road with the Kuncen, Ceper exit. The visitor to the rest area can be predict by the calculation.

Kh = V x Ph x P

Note :
Kh is the type of vehicle that stop (vehicle/hour)
V is the volume of vehicle that pass the street
Ph is the percentage of vehicle that stop
P is the percentage of vehicle that stop in the peak hour, it can be 10% or the number that is determined.

The number of Ph is 3 scenario, Pessimist, moderate, optimists.

Scenario	the estimated vehicles stopped
Pessimist: The number is based on the estimation	0 - 5 %
Moderate: The number is more than the estimation	5 - 10 %
Optimist: The number is more than the estimation and has plan to develop	10 - 20 %

Table 2.1 Percentage of estimated number of stopped vehicles based on scenario
Source : Pedoman perencanaan tempat istirahat

The approximate number of vehicle that stop in Penggung rest area:

projection results with a growth rate of 5% and a plan age of 10 years by means of exponential is obtained:

- Motorcycle : 2047 /hour (dishub,19)
- Car : 1304 /hour (dishub,19)
- Bus and truck : 715 / hour (dishub,19)

Kh = V x Ph x P
Kh = 2047 x 10% x 10%
Kh = 20 motorcycle / hour
= 360 motorcycle / day

Kh = V x Ph x P
Kh = 1304 x 10% x 10%
Kh = 13 car / hour
= 246 car / day

Kh = V x Ph x P
Kh = 715 x 10% x 10%
Kh = 7 bus / hour
= 126 bus and truck / day

Determination of the number of rest area users is done using the equation

$Pg = \sum Kh \times Ep$

Note :
Pg is a number of person that rest in a day
Kh is a number of vehicle that stop
Ep is the average of estimate number of passenger in vehicle

The number of Ep is based on the observation or it can be used this following table

Kind of vehicle	The average number of passenger
Passenger car	4
Moderate Bus	25
Big bus	42
Truck	2
Motorcycle	2

Table 2.2 Estimated average number of passengers by vehicle type
Source : Pedoman perencanaan tempat istirahat

While there are 3 type of rest area, I, II, and III. The type are based on the area of the place.

Table 2.3 Area of rest area based on type of rest area
Source : Pedoman perencanaan tempat istirahat

Type	Area of the site
I	> 4 ha
II	2 ha - < 4 ha
III	1 ha - < 2 ha

The approximate of rest area user with the equation got the number

$Pg1 = \sum Kh \times Ep$
$Pg1 = 360 \times 2$
$Pg1 = 720$ person / day

$Pg2 = \sum Kh \times Ep$
$Pg2 = 246 \times 4$
$Pg2 = 984$ person / day

$Pg3 = \sum Kh \times Ep$
$Pg3 = 126 \times 25$
$Pg3 = 3150$ person / day

Total estimation of visitor in Penggung bus terminal per day is 4854 person.

User Analysis

Buses that are still actively transiting the Penggung bus terminal are rural buses on the Penggung-Semin route and also the Solo-Semin route. Meanwhile, the bus that stops to pick up and drop off passengers is the Solo-Yogyakarta bus. Inter-city buses between provinces that can drop passengers are Surabaya buses, but are prohibited from picking up passengers.

Rural transportation schedule

No	Name of the bus	Time
1.	Putra Jaya Utama	04.00 - 05.00
2.	Rista Jati	06.00 - 07.00
3.	Putra Jaya Utama	08.00 - 08.30

Table 2.4 Rural bus schedule in Penggung bus terminal
Source : head of Penggung bus terminal

Meanwhile the Solo-Yogyakarta that stop and pick up passenger is once every 30 minutes from 8 am until 5 pm. The busses are Suharno, Langsung Jaya, Pratama, Jaya Putra, DAMRI, Sedya Utama, and Sri Mulyo.

Figure 2.40 Pratama Bus stop at the terminal
Source : writer, 2021

II.6.9 Space requirement Analysis

The activities that occur in the rest area use are much different from the previous function, namely the bus terminal user. Although the function as a bus terminal is still being maintained, the main function of the building has been changed to a resting place. Resting places with the concept of road service platforms include economic development activities for the surrounding community, as well as management and emergency response posts.

Table 2.5 Space requirement analysis
Source : writer, 2021

No	User	Activity	Space requirement	Rooms
1.	Visitor	Arrive		
		Entering the site area	Accessible circulation for vehicle and pedestrian	Gate to the site
		Parking	Enough for various kind of vehicle, good circulation	Parking lot
		Siting, take a rest	Comfortable, quiet	Lounge
		Chatting	comfortable , quiet	Lounge
		Eating and drinking	Comfortable, far from the vehicle	Restaurant
		Play	Safe, far from the vehicle	Playground

		Shopping	in accordance with motion standards. The visibility is good to see between the traders' booths. Enough lighting to interact	Retail kiosk
		Defecating and urinating	Easy to find, do not give odor pollution to other rooms, have privacy	toilet
		Sholat	Close to the toilet and ablution, quiet	Mushola
		Return		
		Toward the parking	Good circulation	Circulation
		Get back to vehicle	Meet the standard, good circulation	Parking
		Exit the site	Accessible circulation for vehicle and pedestrian	Gate to exit the site
2.	Passenger	Arrive		
		Drop off	Safe from the bus, close to the bus stop	Drop off area
		Waiting the bus	Easy to find, safe	Waiting room
		Depart	safe, accessible	Bus stop
		Arrive from the bus	Safe, accessible	Bus stop
		Return		
		Pick up	Safe from the bus, close to the bus stop	Pick up zone

		Arrive		
		Entering the site area	Accessible circulation for vehicle and pedestrian	Gate to the site
		Parking	Enough for various kind of vehicle, good circulation	Parking lot
		Load their goods	Good circulation, close to their kiosk and storage	Loading area
		Sell their product	The distance between traders is not too close. Enough storage place	Retail kiosk
		Defecating and urinating	Easy to find, do not give odor pollution to other rooms, have privacy	toilet
3.	Seller	Sholat	Close to the toilet and ablution, quiet	Mushola
		Cooking, washing dishes	Meet the standard, far from the vehicle, do not give odor pollution	Kitchen
		Return		
		Pack their goods	The distance between traders is not too close. Enough storage place	Retail kiosk
		Toward the parking	Good circulation	Circulation
		Get back to vehicle	Meet the standard, good circulation	Parking
		Exit the site	Accessible circulation for vehicle and pedestrian	Gate to exit the site

		Arrive		
		Entering the site area	Accessible circulation for vehicle and pedestrian	Gate to the site
		Parking	Enough for various kind of vehicle, good circulation	Parking lot
		Manage the traffic	Safe, accessible	Traffic management post
		Manage the aid	Easy to find, accessible	Emergency response post
		Defecating and urinating	Easy to find, do not give odor pollution to other rooms, have privacy	toilet
		Sholat	Close to the toilet and ablution, quiet	Mushola
		Return		
		Toward the parking	Good circulation	Circulation
		Get back to vehicle	Meet the standard, good circulation	Parking

II.6.10 Room programming analysis

Table 2.5 room programming analysis
Source : writer, 2021

No	Rooms name	Nature of space	Capacity	Area (m2)	Number of rooms	Total (m2)
Entrance Lobby						
1.	Ramp	Public	1 person	6	1	6
2.	Stairs	Public	4 person / width		3	
Commercial area						
3.	Food kiosk	Public	1 seller / kiosk	4	6	24
4.	Merchandise kiosk	Public	1 seller / kiosk	4	6	24
5.	Restaurant	Public	60 person	120	1	120
Rest area						
6.	Lobby	Public	60 person	60	1	60
7.	Toilet	Public	1 person	2	40	80
8.	Mushola	Public	30 person	90	1	90
9.	Sitting area	Public	40 person	100	1	100
10.	Ablution	Public	1 person	2	4	8
Roadside Service station						
11.	Information center	Public	5 person	60	1	60
12.	Traffic post	Private	person	250	1	250
13.	Emergency post	Private	person	250	1	250

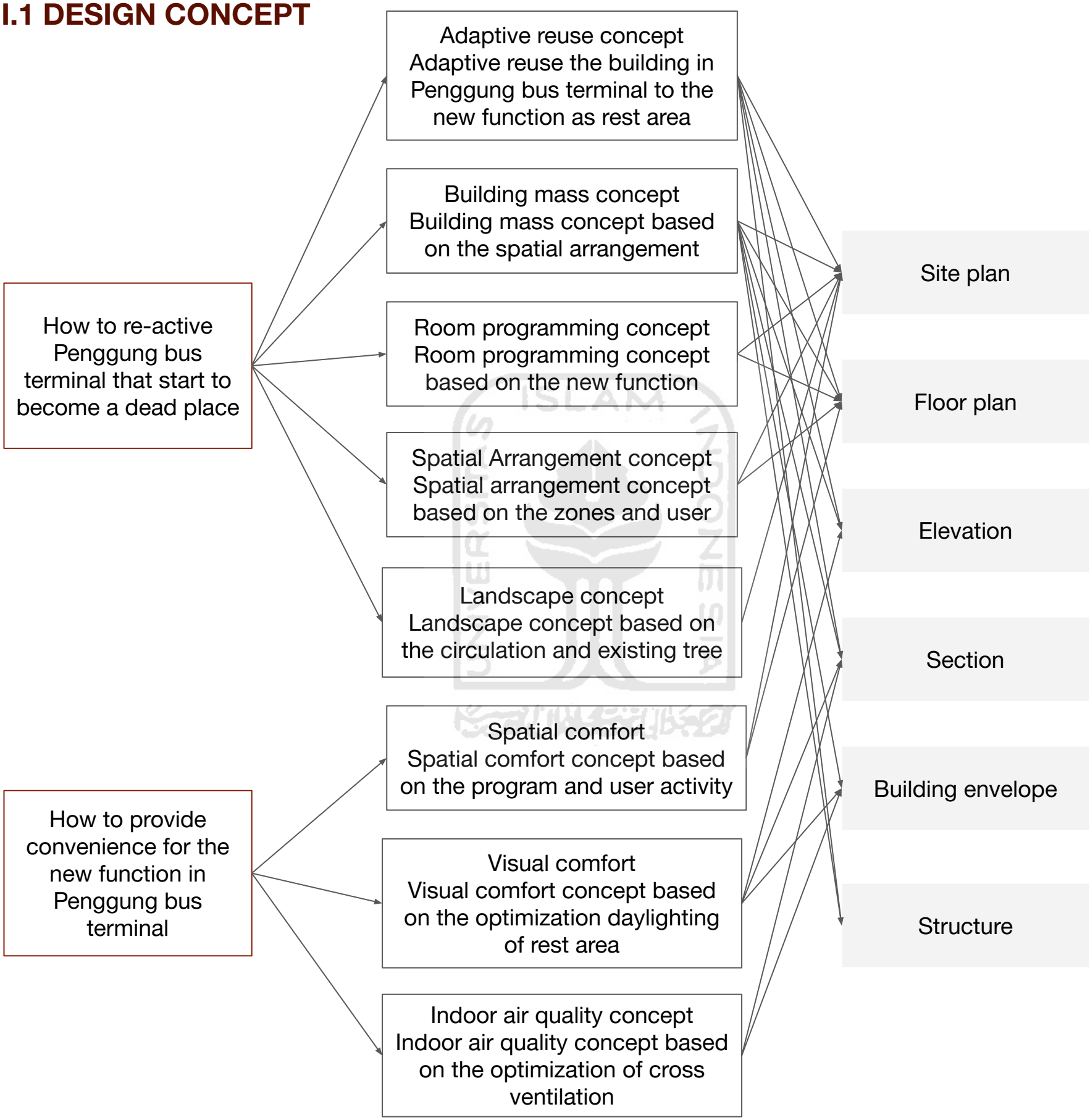
Bus terminal area						
	Drop off area	Public	2 cars	30	1	30
	Waiting area	Public	15 persons	15	1	15
	Taxi area	Public	4 motorcycle	9	1	9
	Depart area	Public	1 bus	48	1	48
	Arrive area	Public	1 bus	48	1	48
Service area						
	Janitor	Private	1 person	4	1	4
Parking area						
	Car repair shop	Public	3 person	100	1	100
	Bus parking	Public	1 bus	48	10	480
	Car parking	Public	1 car	15	54	810
	Motorcycle parking	Public	1 motorcycle	1.5	120	180
Landscape						
	Green area	Public	30% of the site	390	1	390
	Waste management	Private	1 tank	3	1	3

CHAPTER

03

DESIGN RESULT AND PROOF

III.1 DESIGN CONCEPT



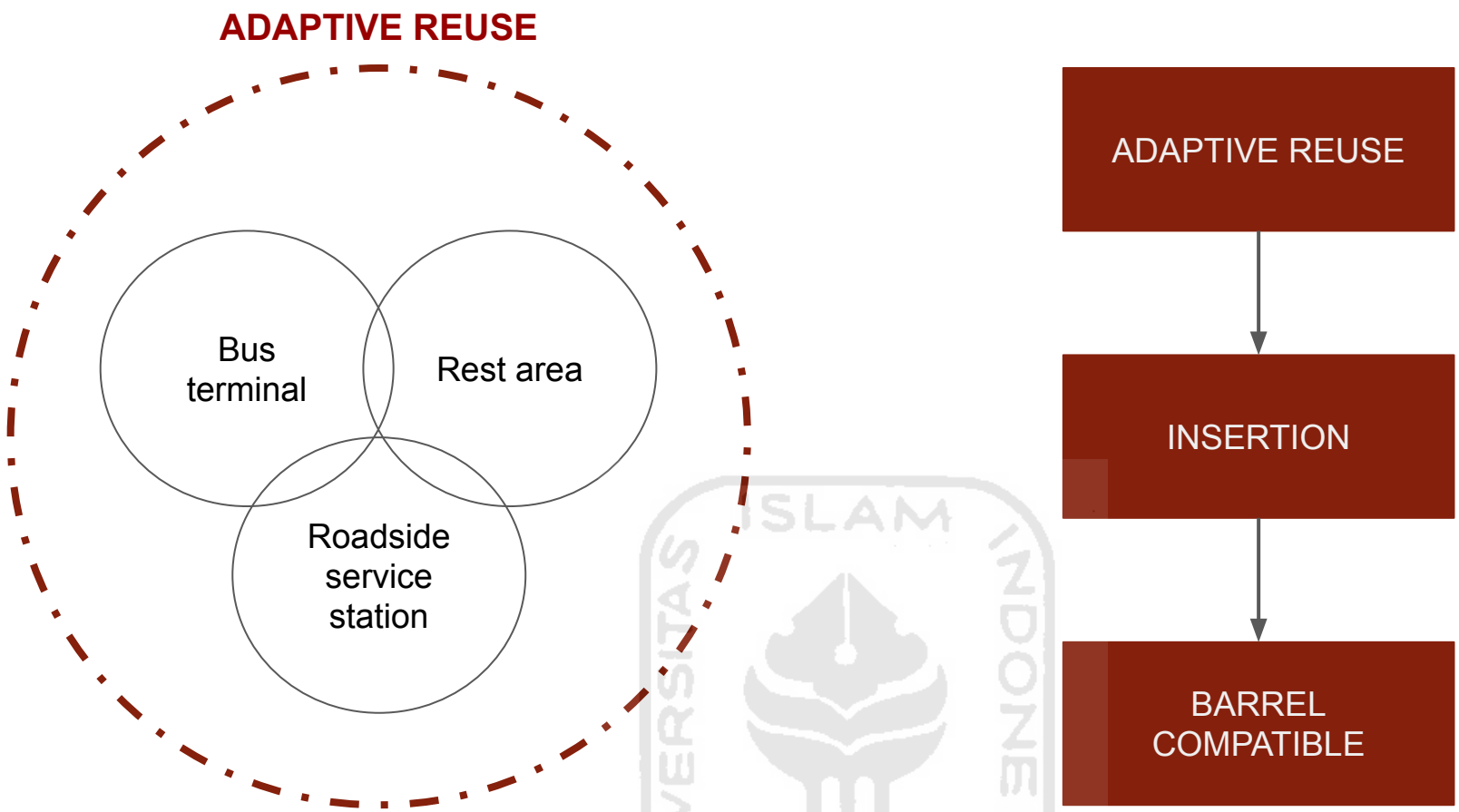


Figure 3.1 Adaptive reuse diagram
Source : writer, 2021

III.1.1 Adaptive reuse concept

Adaptive reuse in the Penggung bus terminal is used to solve the dead place problem. Insertion used as the method in the adaptive reuse concept. The existing building was preserved and add with the vertical extension to response the new function. Because of the existing building is not a heritage building nor a landmark, so that the insertion that used was the barrel compatible

In barrel compatible design the visual elements of the new building are made similar, but the details are simpler than the original building (Ardiani, 2009) Because in Penggung bus terminal the building is not a heritage building, then the similarities took from the local building.

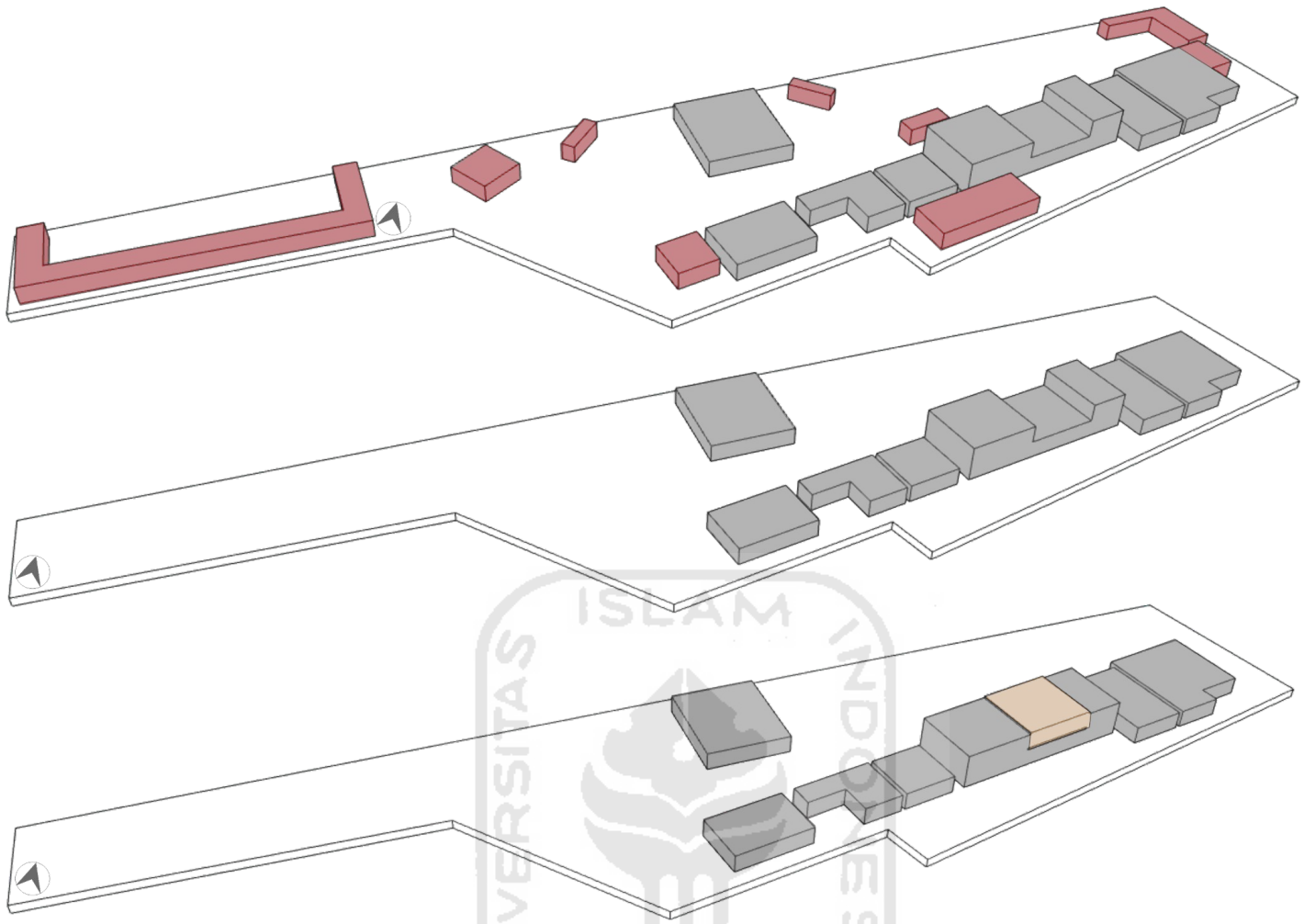


Figure 3.2 Adaptive reuse scheme
Source : writer, 2021

III.1..2 Building mass concept

The building mass was kept from the existing. Some of the building is demolished because the structure is not so strong and have high risk for the future. There are also street vendors that tried to build a semi permanent building and it will not be preserved. The main structure of the terminal is kept and also the kiosk. The building that is demolished (red color) and the one that kept (grey color).

The building that is preserved, then got the lateral extension (cream color). It has function as the mushola. Some building also removed to provide more space for parking and circulation.

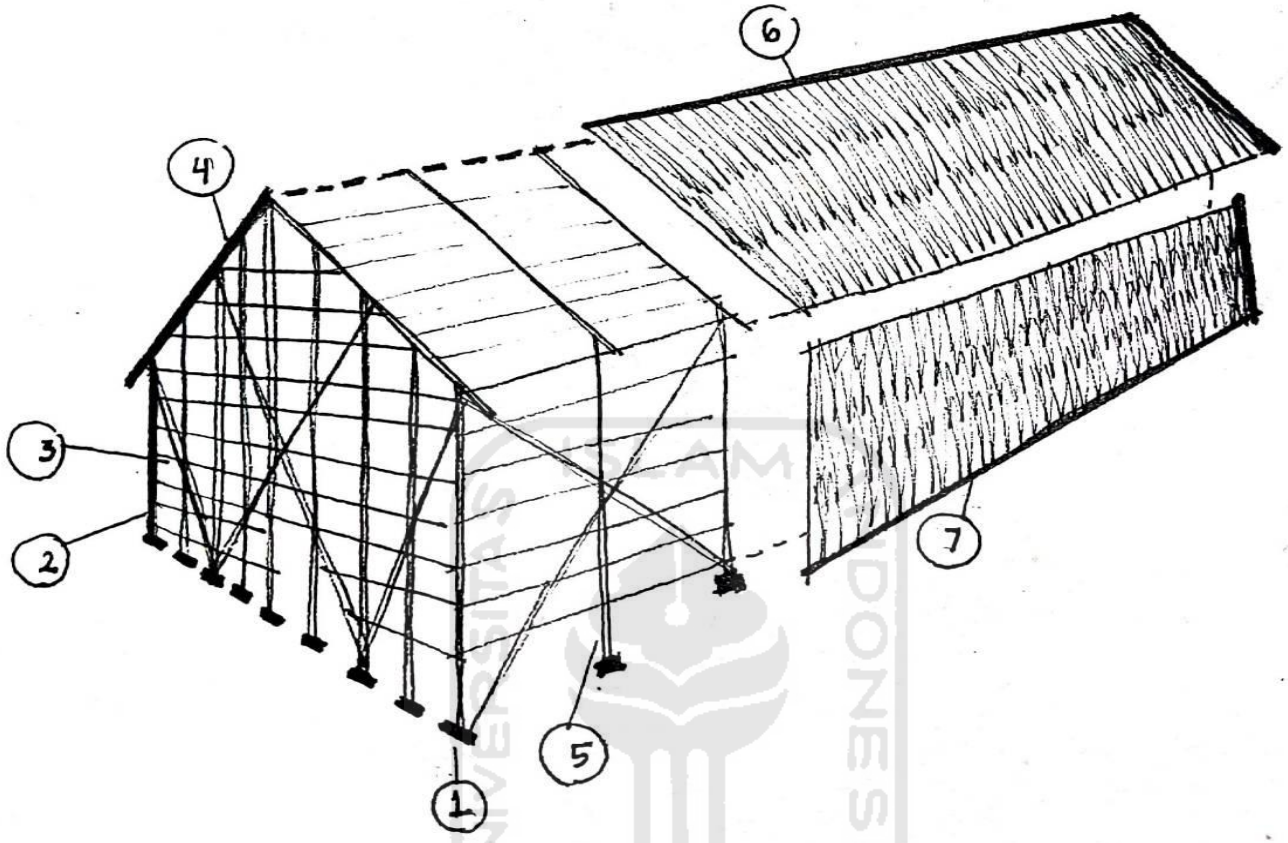


Figure 3.3 Los mbako structure building
Source : writer, 2021

III.1.3 Insertion - Barrel compatible

The existing building that is preserved is the structure of the platform and vertical structural component such as the column and beam. While the roof was change to give a fresh new look. The local building that is chosen to be the reference in this insertion is tobacco warehouse or *los mbako*. It is a building that used to dried the tobacco leaves without the sun. the tobacco was smoked inside the building so that it produce high quality of tobacco. Los mbako building itself made from bamboo and categorized as vernacular building according to (Titiens, 2008). The repetition of bamboo was intentionally made to hang the tobacco leaves. The step to build los mbako is the foundation, and the vertical bamboo. Then the tilted and the horizontal. Repeat and connect, and cover with cane leave.

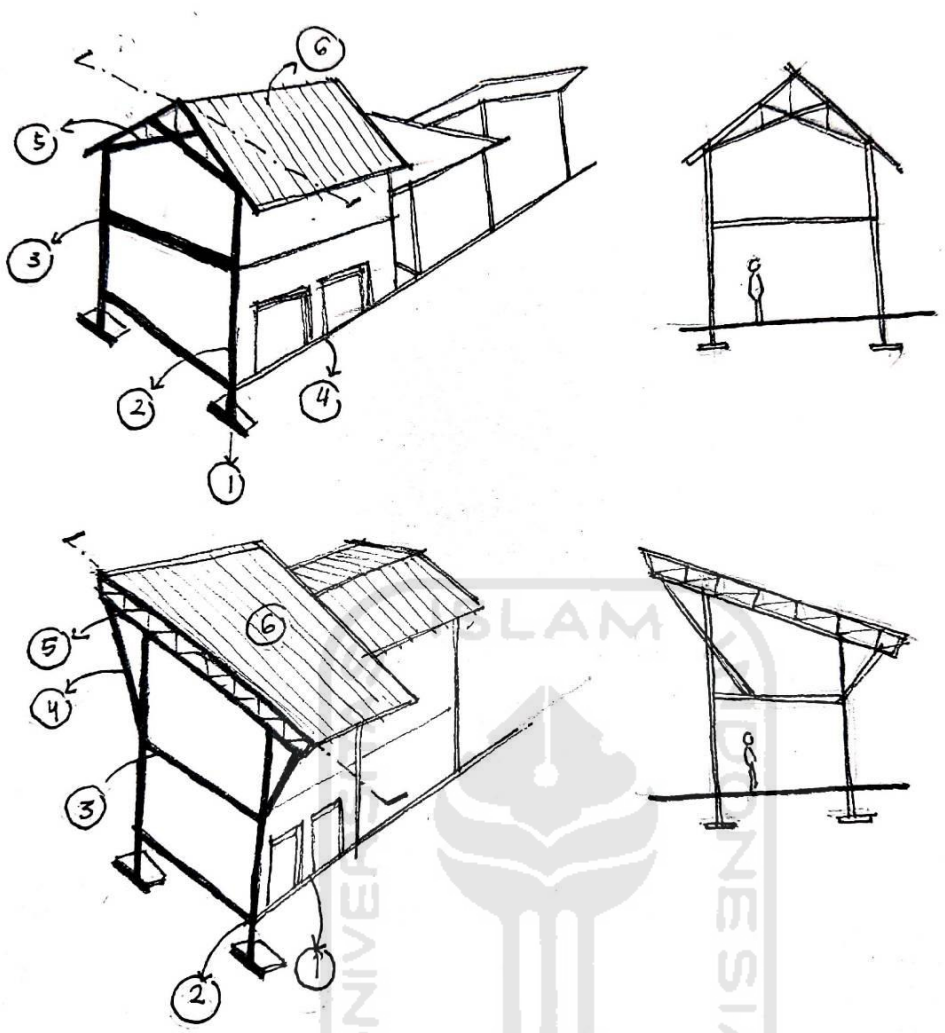


Figure 3.4 Reverse engineering in Penggung rest area
Source : writer, 2021

III.1.3 Insertion - Barrel compatible

The step by step construction was switch. In the los mbako building, the architectural wall was installed the last one but in penggung bus terminal, the wall was already existed so that it was installed first. Then the truss located just in the roof part meanwhile the los mbako building placed the truss at the whole building.

The material also changed. In the los mbako building the main structure was made from bamboo so that it makes the farmer easier to hang the tobacco leaves, meanwhile in the Penggung rest area, the material used as the structure is reinforced concrete and the extension was steel.

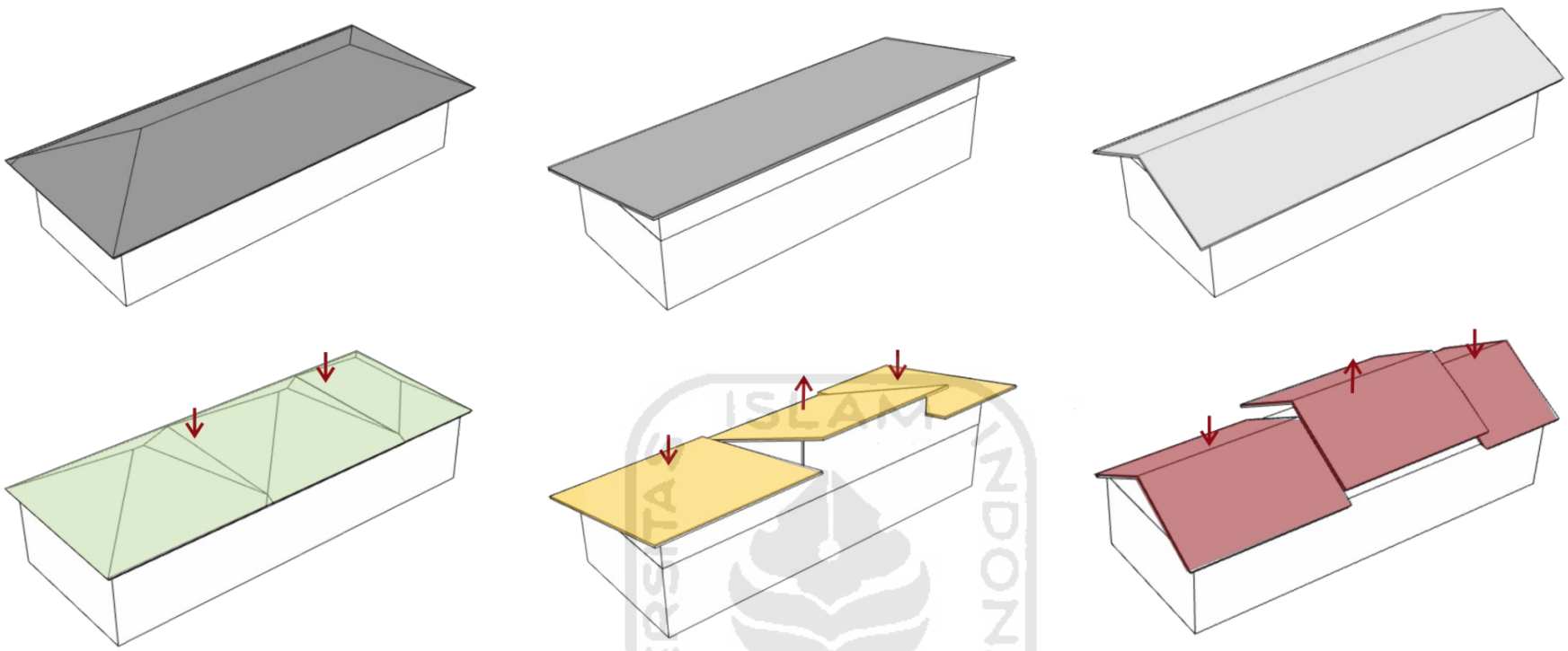


Figure 3.5 roof exploration
Source : writer, 2021

III.1.4 Roof shape concept

The roof was change into the new one to give a fresh look for the building and also make the whole building into one. There are some option of the roof's shape. The first one is the conventional limasan roof. The second one is the tilted roof, the third one is pelana roof, the fourth one is limasan roof but modified, the fifth is the modified tilted roof, and the last one is modified pelana roof.

The roof's shape that is chosen is the modified tilted roof and also the modified pelana roof. Both of them has a good ability to let the hot air below flow.

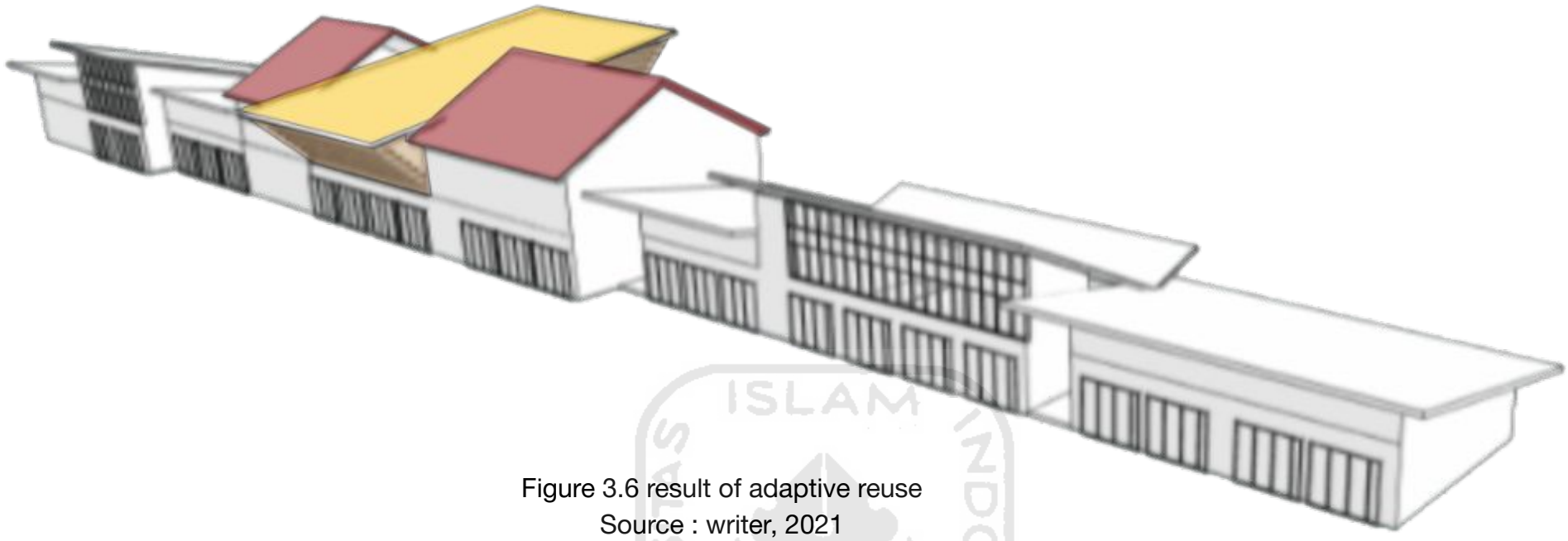


Figure 3.6 result of adaptive reuse
Source : writer, 2021

III.1.5 Facade Concept

The modified tilted roof (yellow color) was applied on the roadside service station post and the bus ticket agent. The modified plane roof applied in the moshola building. The building facade is maintained, just change the material and adjust some so that it gives new look to the building.

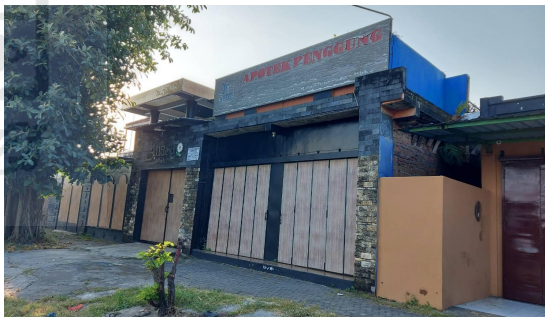


Figure 3.7 renovation on kiosk facade
Source : writer, 2021

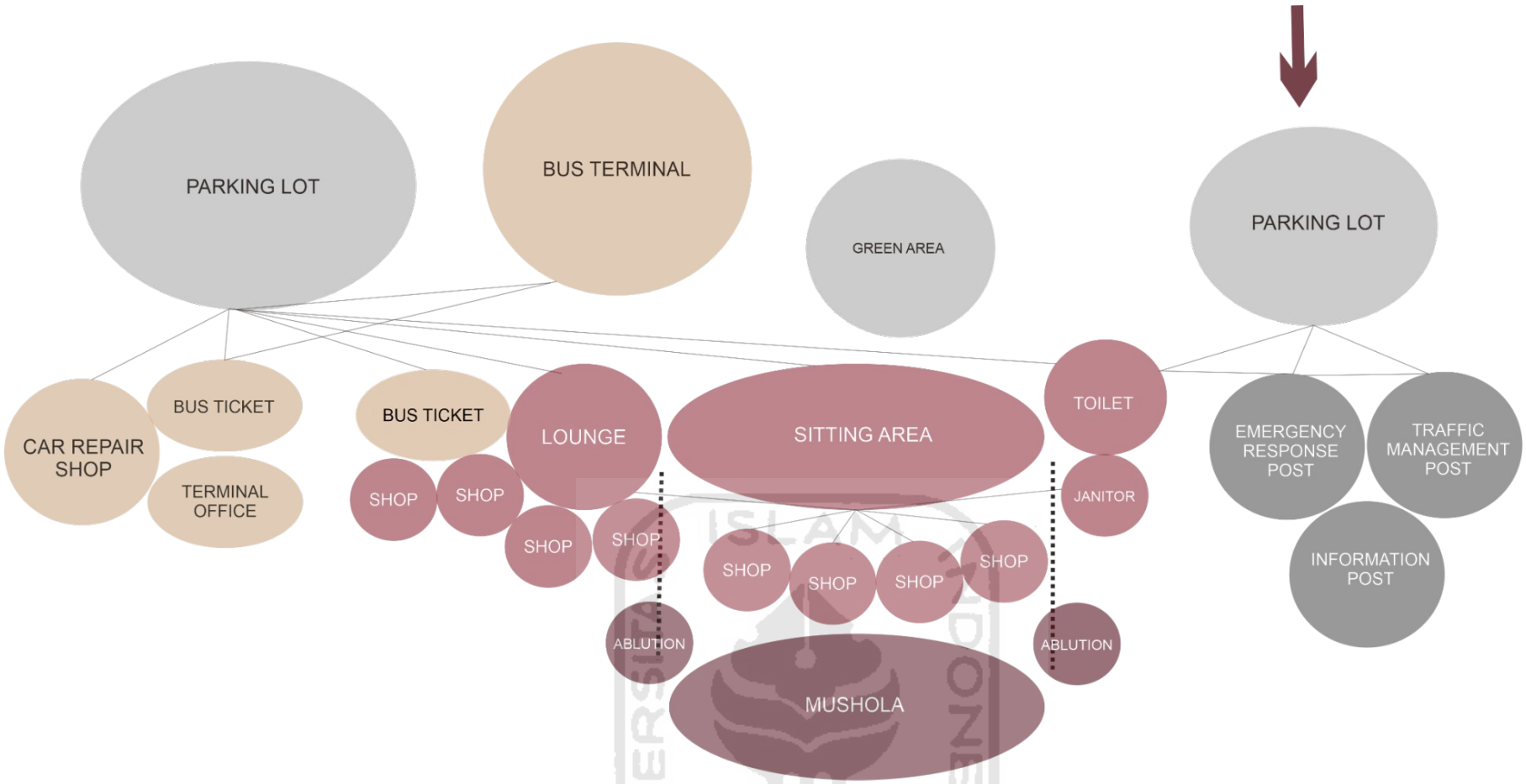


Figure 3.8 bubble diagram of user activity and rooms need
Source : writer, 2021

III.1 6 Room programming concept

Based on the ectivies, user, space programming, and also the building aim that provide spatial comfort, it can be conclude that the program was categorized into 3 main categories. The first category is bus terminal, the second is rest area, and the last is the roadside service station post which consist of traffic management post and emergency response post.

Bus terminal zones include the existing bus terminal, bus ticket agent, and car repair shop. The existing of bus terminal was kept both of the structure and the function. The rest area is a type III, while the bus terminal is type C or sub-terminal, because the total area is between 1-2 hectare. And it already fulfilled the facilities of type III rest area with roadside service station.

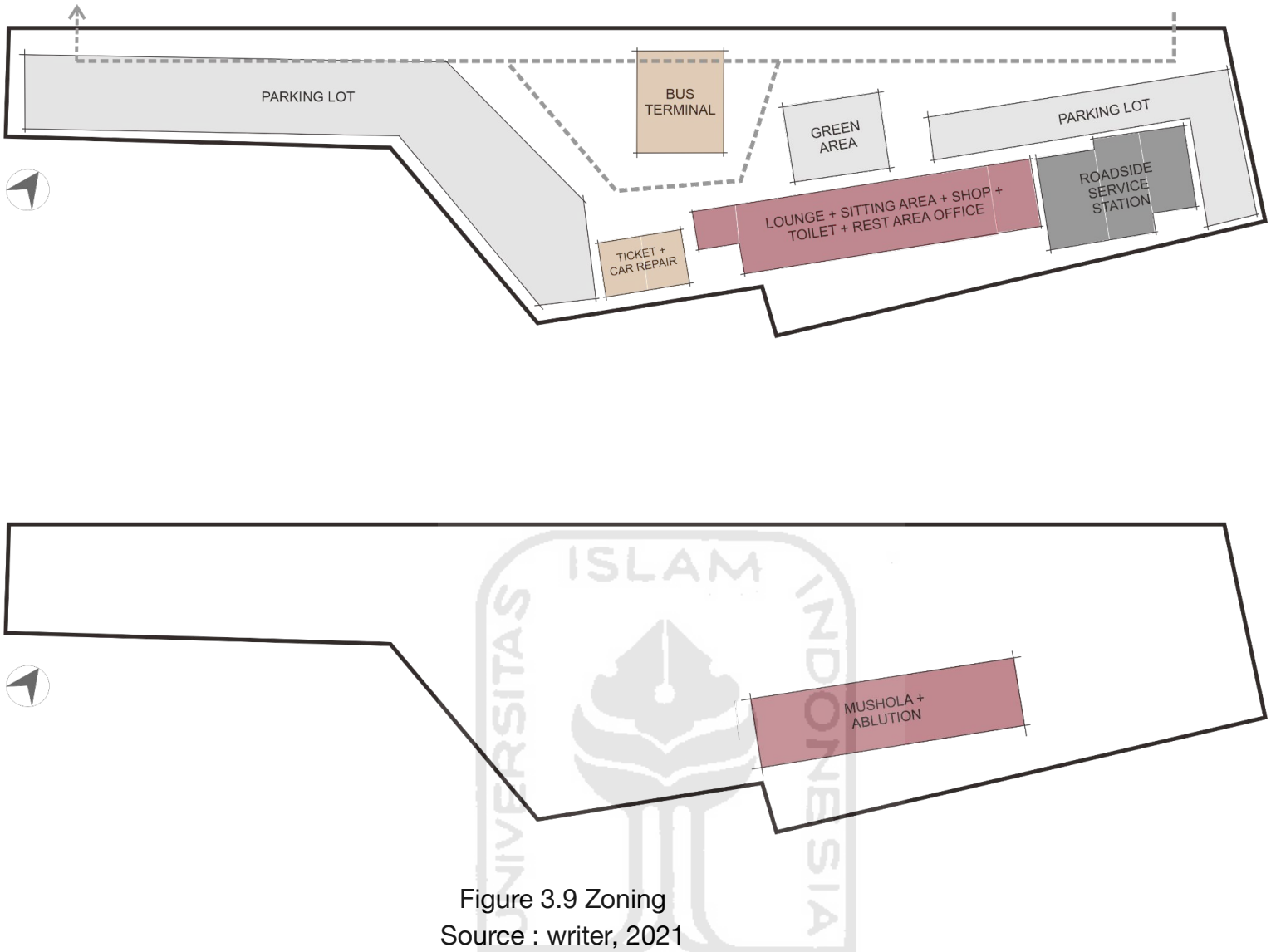


Figure 3.9 Zoning
Source : writer, 2021

III.1.7 Spatial arrangement concept

The strategy to solve the dead space is to adaptive reuse the existing building. This pictures shows the zoning program in the site. The building mainly is a single floor building, and the one that has 2 floor used as the mushola in the second floor. This configuration consider to achieve the spatial comfort. The car parking shop located next to parking lot so that it makes them easier to repair their car.

While the roadside service station function was located in the east of the site so that it can be reached easily by the officer. The bus terminal building was kept and the function also still in the same place, and the rest area function located in the center.

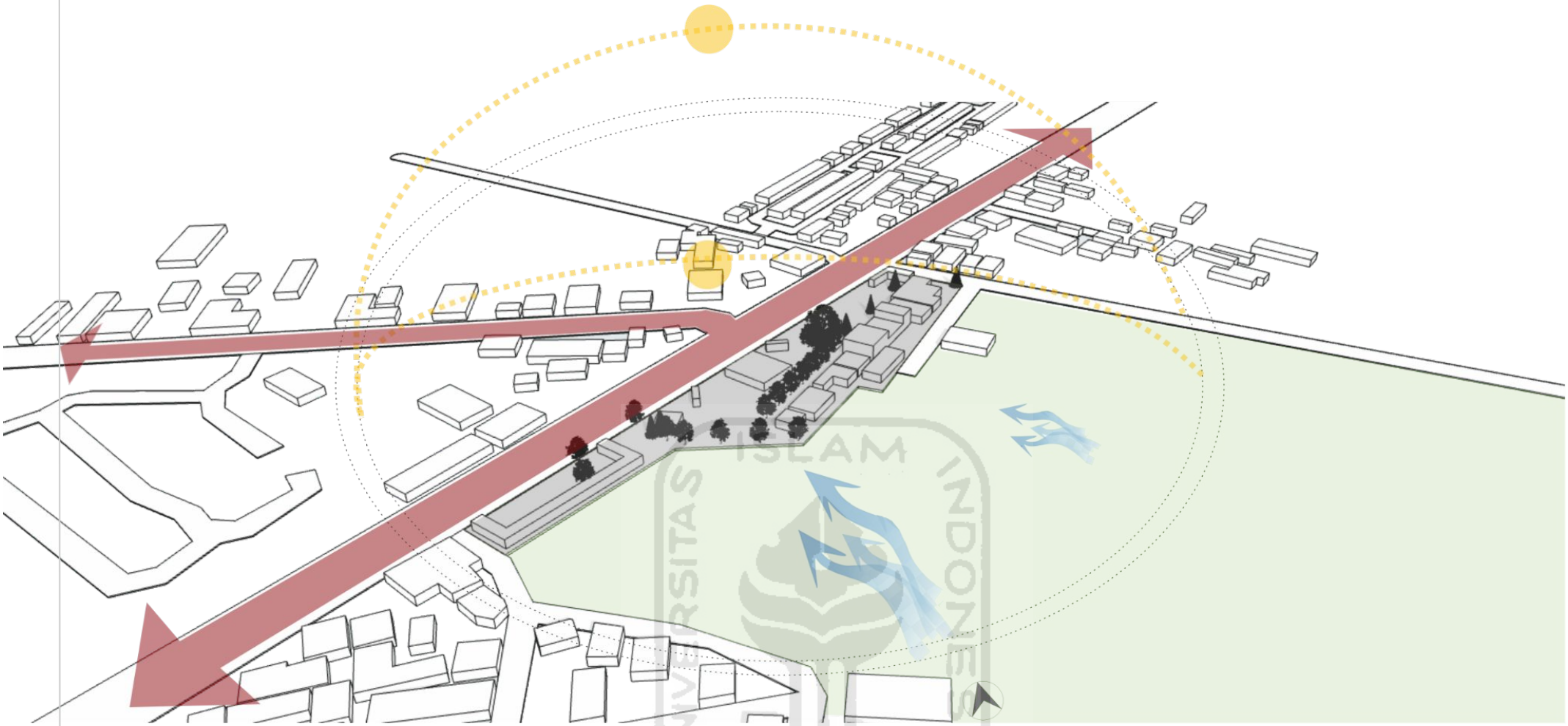


Figure 3.10 climate and access site analysis
Source : writer, 2021

III.1.8 Passive design concept

The building has strategy to achieve the building comfort by passive design, there are spatial comfort, visual comfort and also indoor air quality. 2 out of those 3 used the site potential such as the wind and the sun from the nature. The existing building has the long mass that facing the east and the west, it gives advantage and disadvantage for the building.

The sun is needed to give daylight to the building and by this configuration, the sun give maximum daylight to the building, but it will make the temperature inside the building increase. As the sun radiation that expose to the building is also maximum. This problem will be solved by the cross ventilation.

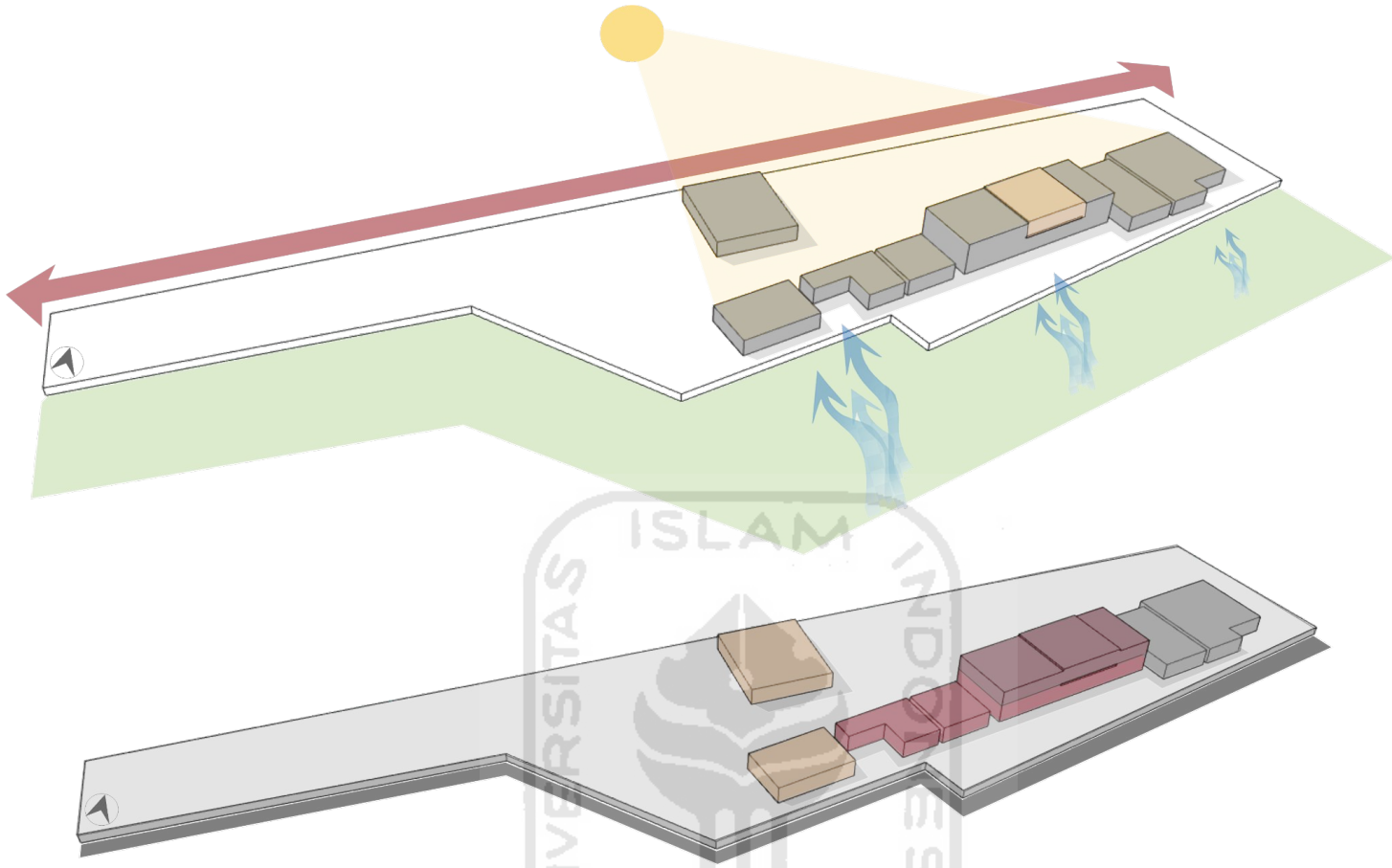


Figure 3.11 sun and wind on the building
Source : writer, 2021

Passive design concept

The building tried to provide convenience to the user by using passive design. The natural daylight was used to give visual comfort and maximize the potential view of the site. The building that exposed by the sun longer facade so that it put with a lot of opening to let the daylight comes through the building.

The southern part of the building also created opening to let the wind that mostly came from the south and south east.

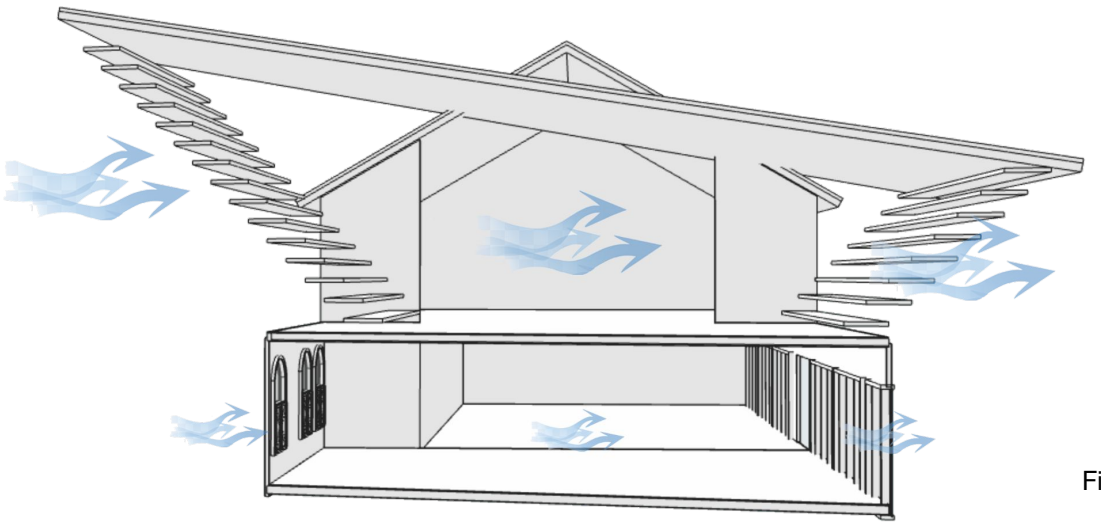


Figure 3.12 Schematic of the wind through the building

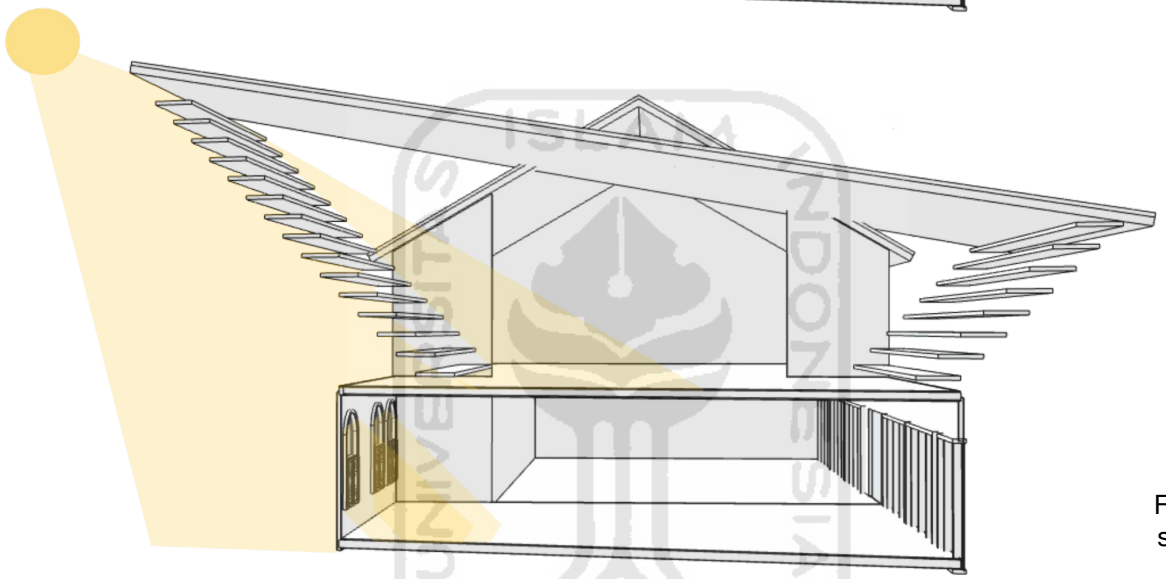


Figure 3.13 Schematic of the sunlight through the building

Source : writer, 2021

Passive design concept

The building tried to provide convenience to the user by using passive design. The natural daylight was used to give visual comfort and maximize the potential view of the site. The building that exposed by the sun longer facade so that it put with a lot of opening to let the daylight comes through the building.

The southern part of the building also created opening to let the wind that mostly came from the south

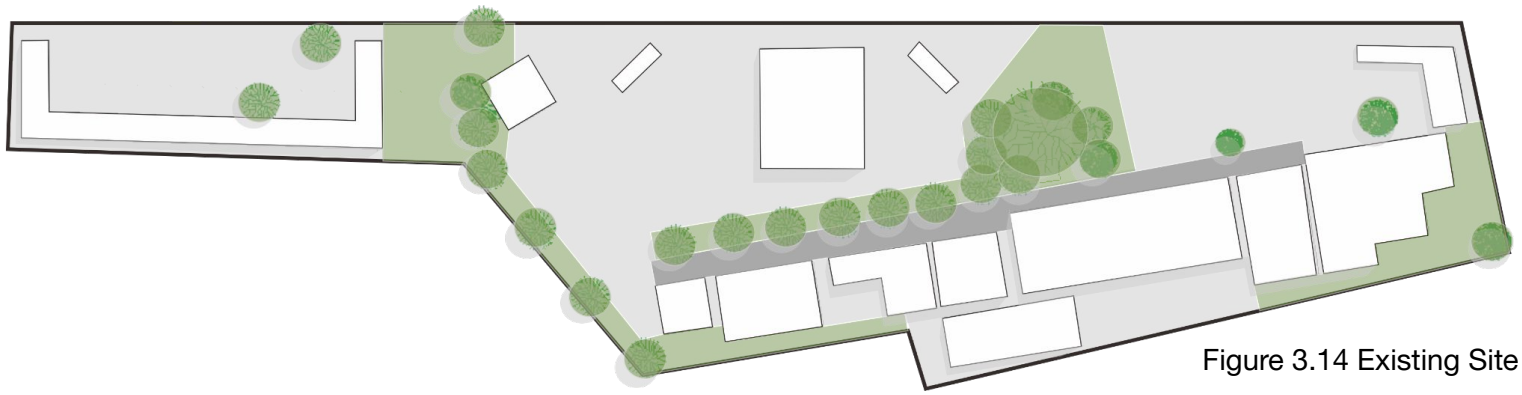


Figure 3.14 Existing Site plan

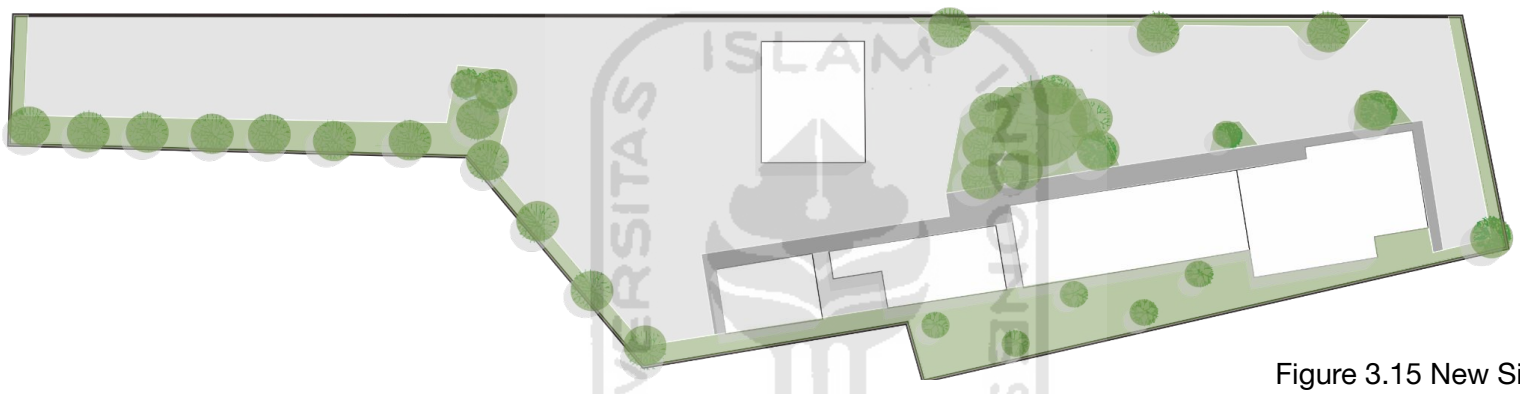


Figure 3.15 New Site plan

Source : writer, 2021

III.1.9 Landscape concept

The concept of the landscape is to preserved as much as existing tree as possible. There are 5 type of tree in the site area. Banyan tree, glodokan tiang tree, mango tree, ketapang tree, and also bintaro tree. All of the trees has a good ability to absorb the air pollution that caused by the vehicle. Especially the Glodokan tiang tree can resist the vibration that made by the vehicle that pass by.

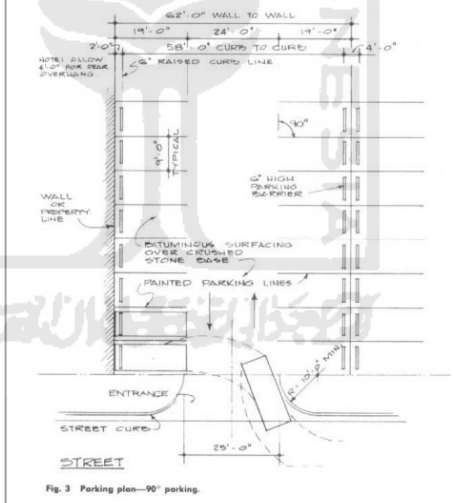
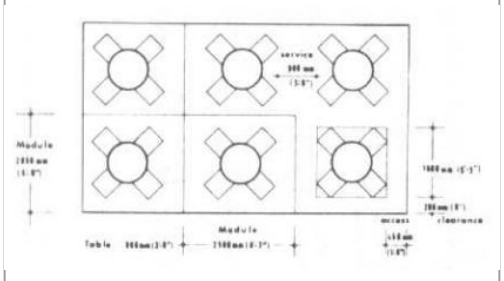
Most of the trees are kept and added with new trees in the southern part of the site with ketapang kencana tree. Ketapang kencana tree has small and thin canopy so that it doesn't block the wind. The fence was replaced with tree and grass to give clearer vision about the rest area building.

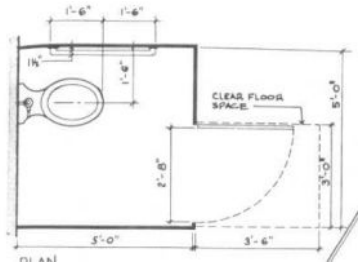
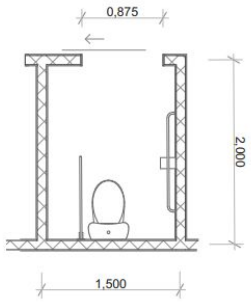
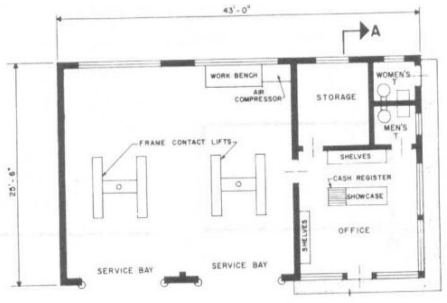
III.2 DESIGN TESTING

II.2.1 Spatial comfort testing

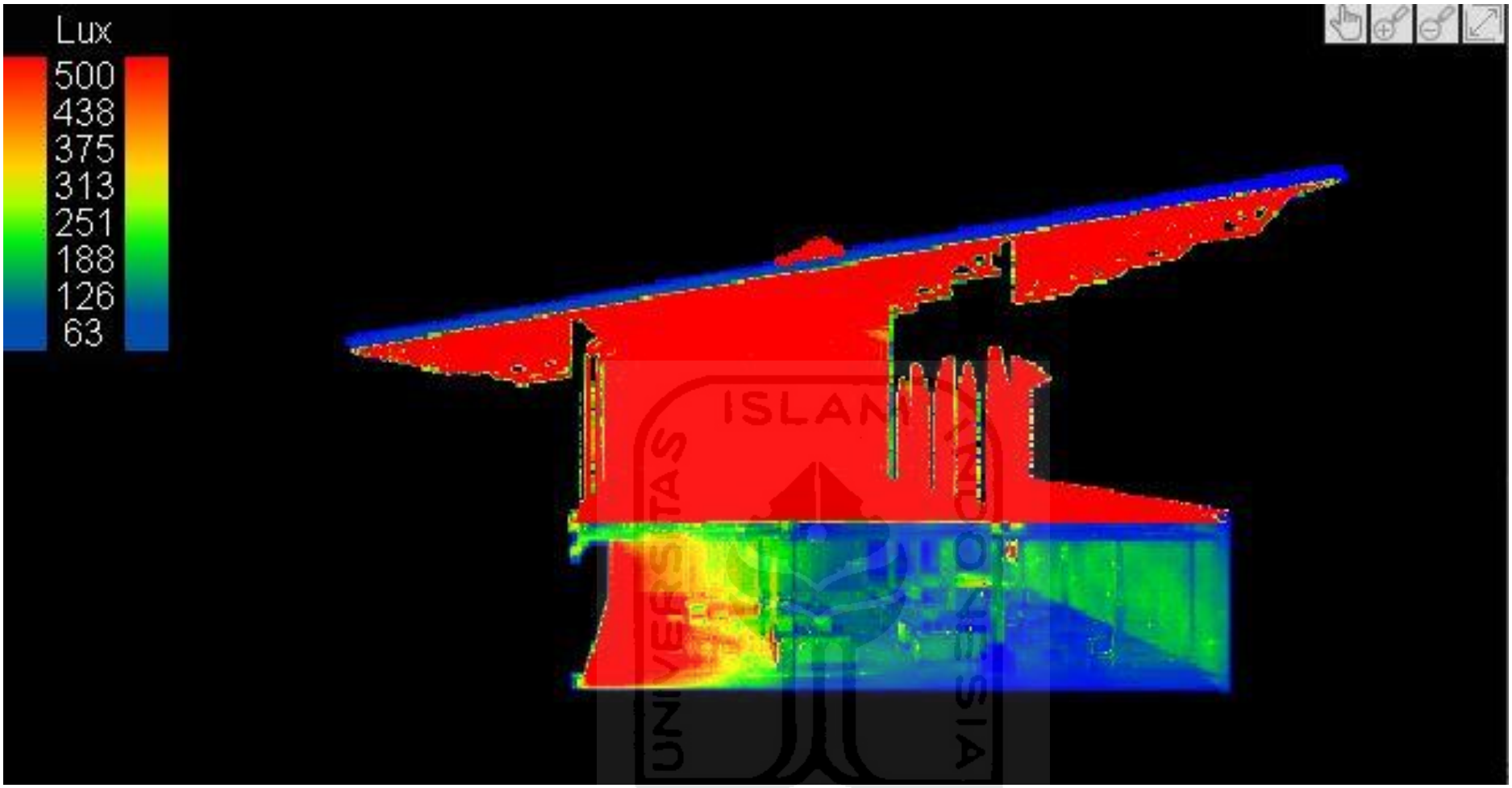
The spatial comfort test is carried out with a checklist of space requirements and also the standard size in the guidelines for the extension of non-toll resort areas. In this case, the Penggung rest area is included in the 3rd type.

Table 3.1 spatial comfort testing
Source : writer, 2021

No	Facilities	Requirement	Standard	Application in design
1.	Parking lot	Minimum 1.200 sqm	 Fig. 3 Parking plan—90° parking.	- 12 bus parking - 36 car parking - 66 motorcycle parking - 3 disable parking The amount of parking is already fulfill the potential user.
2.	Sitting area	120 sqm for 60 people		The sitting area is fit for 72 person

No	Facilities	Requirement	Standard	Application in design
3.	Toilet	Minimum 80 sqm (7 urinoir, 3 wc for men, and 5 wc for women)		- 7 women toilet (include 1 disable toilet) - 3 urinoir + 4 toilet (include 1 disable toilet) 
4.	Praying area / mushola	Minimum 90 sqm		550 sqm mushola because previously there is a mushola building that used by the neighborhood, so it also accommodate the locals.
5.	Restaurant	120 sqm for 60 people		36 sqm for the kitchen and 300 sqm for the sitting area
6.	Car repair shop	No standard mention		105 sqm

7.	Emergency post	APJ function min 250 sqm		240 sqm
8.	Information room	APJ function min 250 sqm		220 sqm
9.	Security post	APJ function min 250 sqm		180 sqm



III.2.2 Visual comfort testing

The building tried to used natural lighting in the day time by adding the opening in the first floor and also the shading in the second floor. The first building mass still has a glare in the second floor although the roof is already expand to the side. Meanwhile the first floor is too dark.

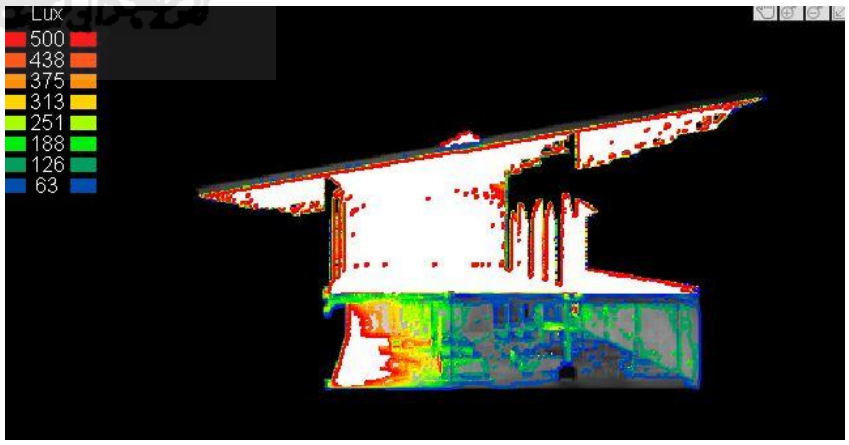
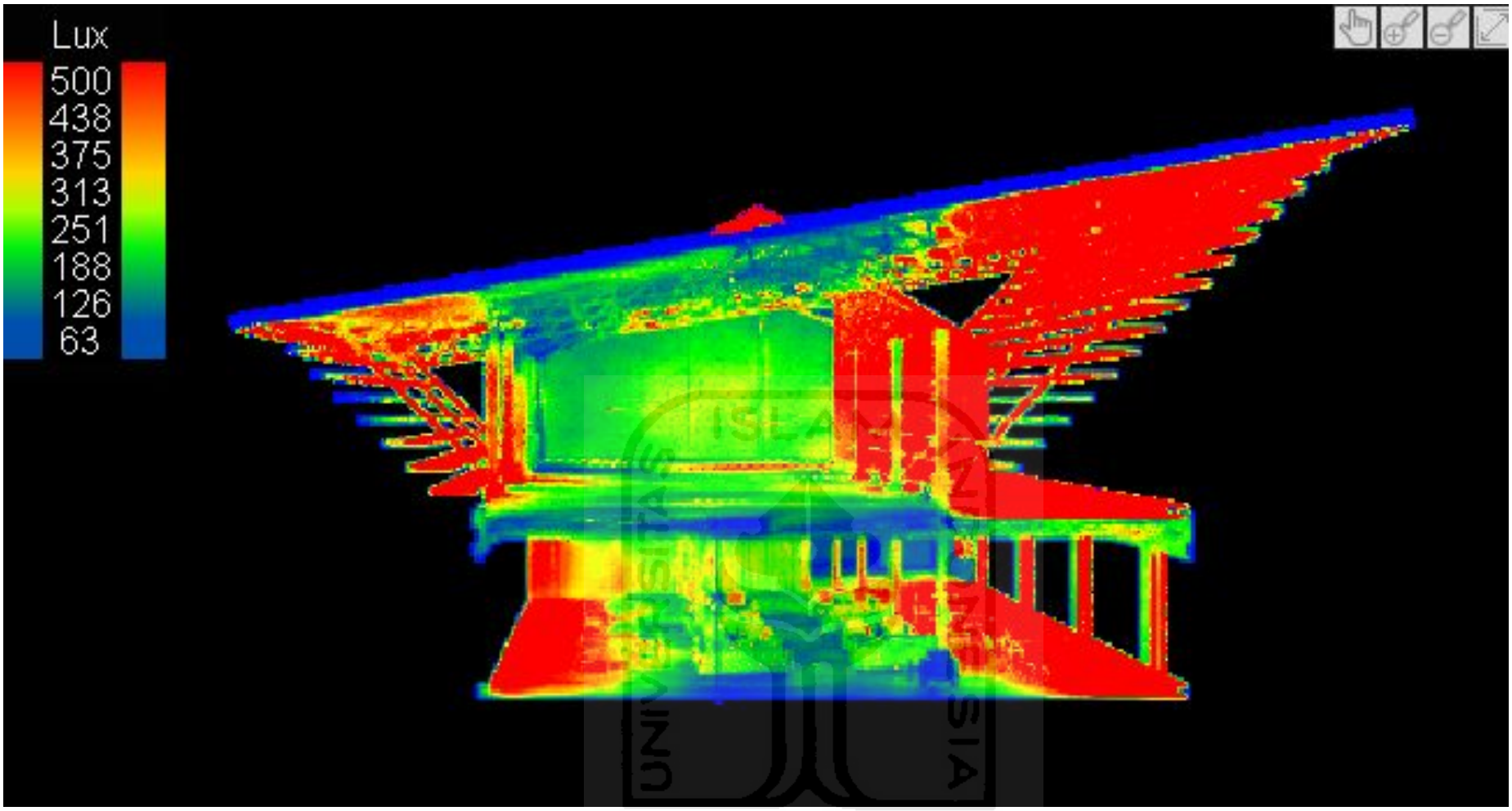


Figure 3.16 model 1 velux test
Source : VELUX daylight visualizer 3



Visual comfort concept

The building tried to used natural lighting in the day time by adding the opening in the first floor and also the shading in the second floor. As we can see that the natural lighting can enter the building and meet the standard of 300 lux for resting place.

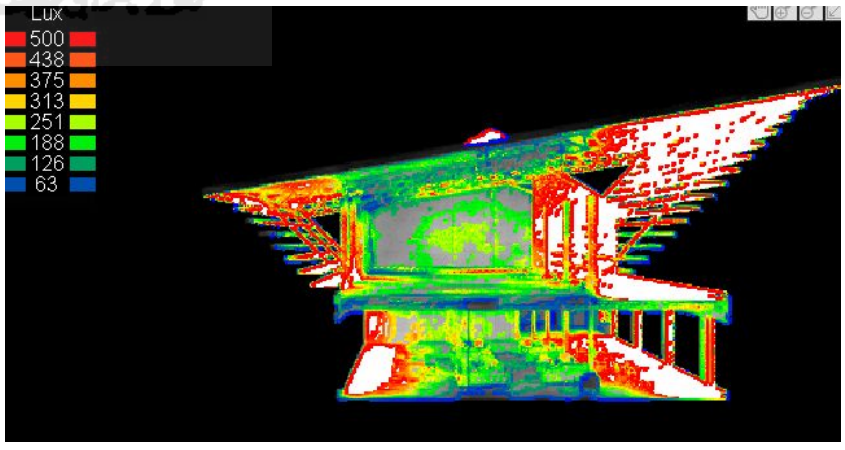


Figure 3.17 model 2 velux test
Source : VELUX daylight visualizer 3

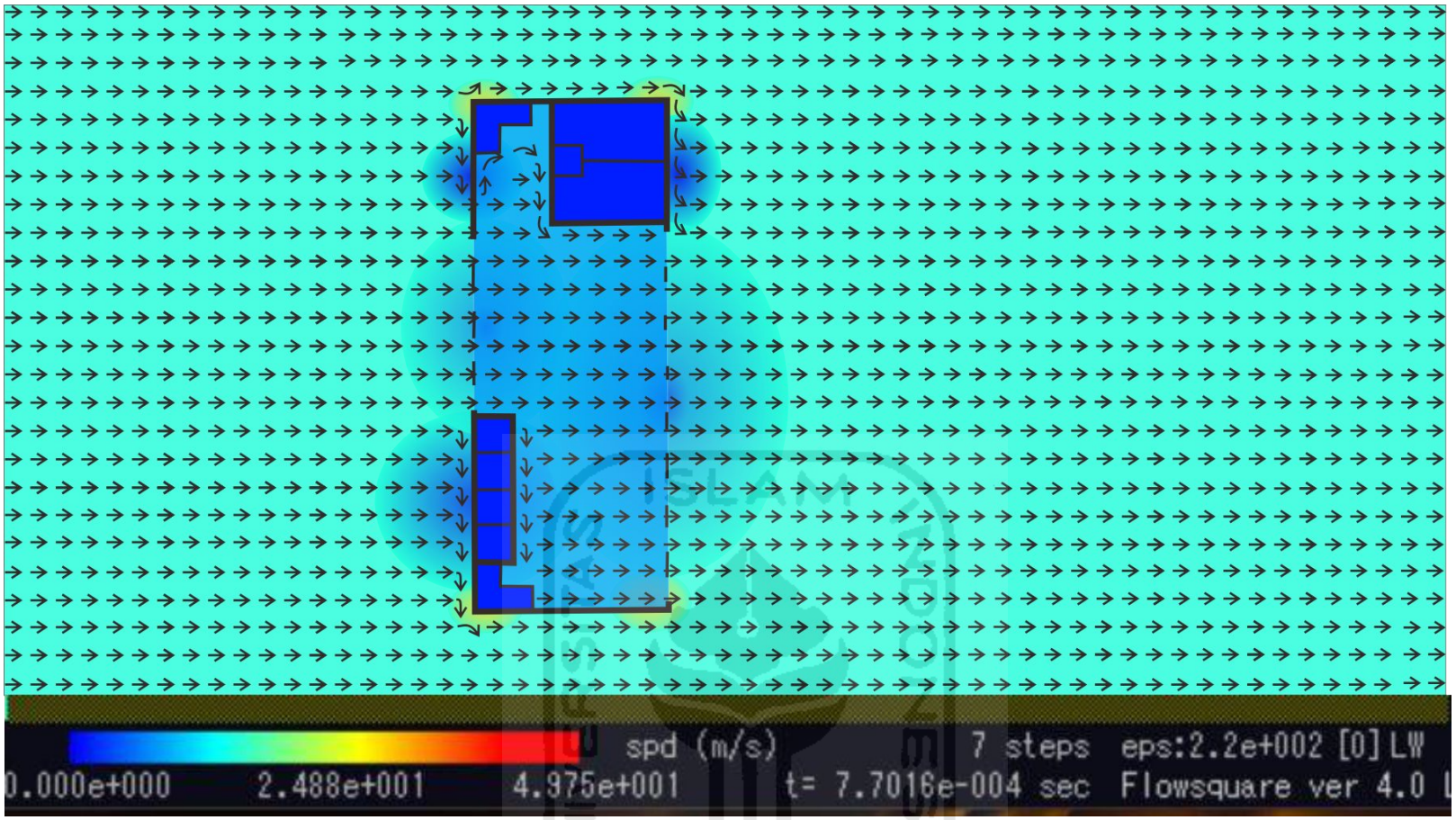


Figure 3.18 Sitting area flowsquare test
Source :Flowsquare V 4.0

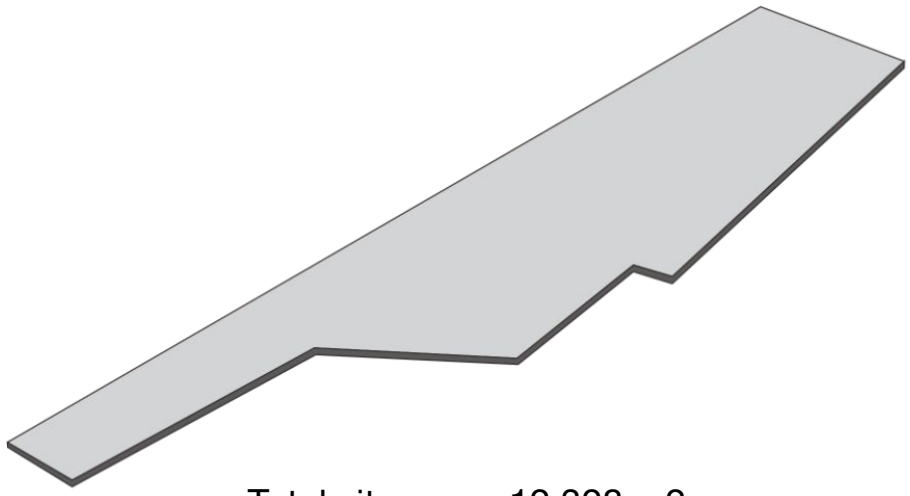
III.2.3 Indoor air quality testing

The result of the test shows that the cross ventilation works on this building configuration. Although the speed was decreased when the wind enter the building but still there are air movement inside the building.

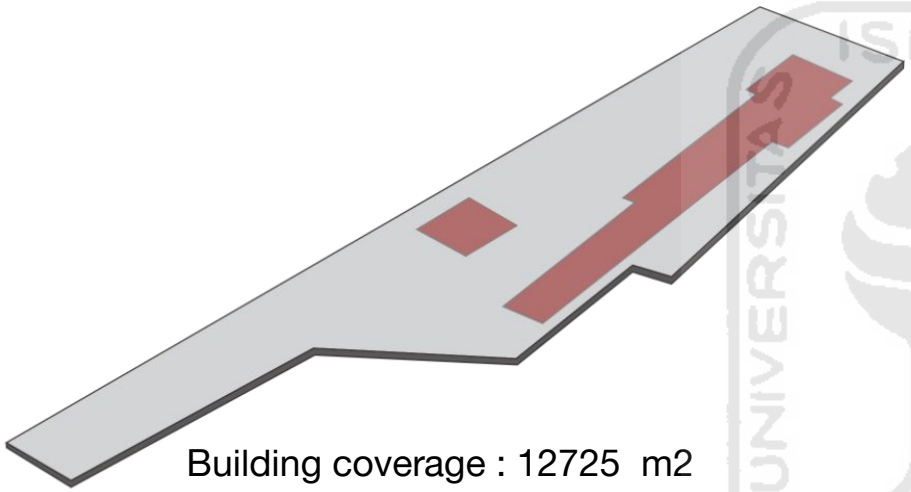
CHAPTER

04

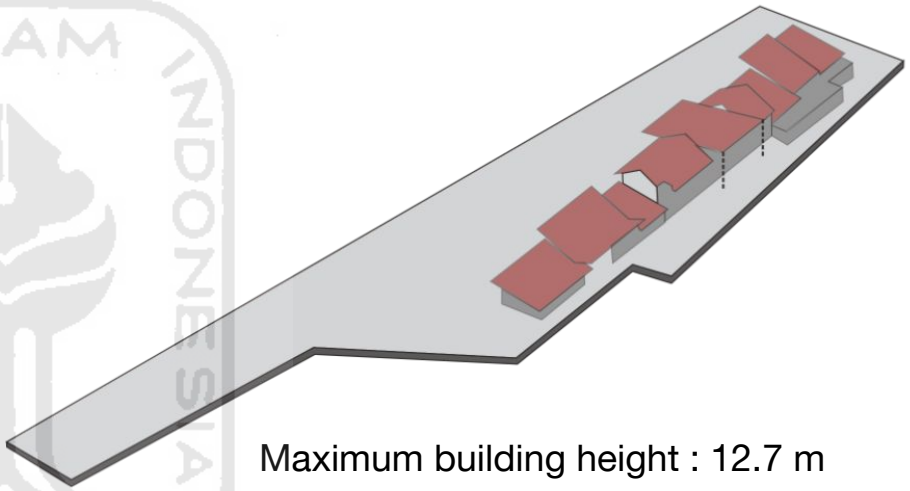
DESIGN RESULT DESCRIPTION



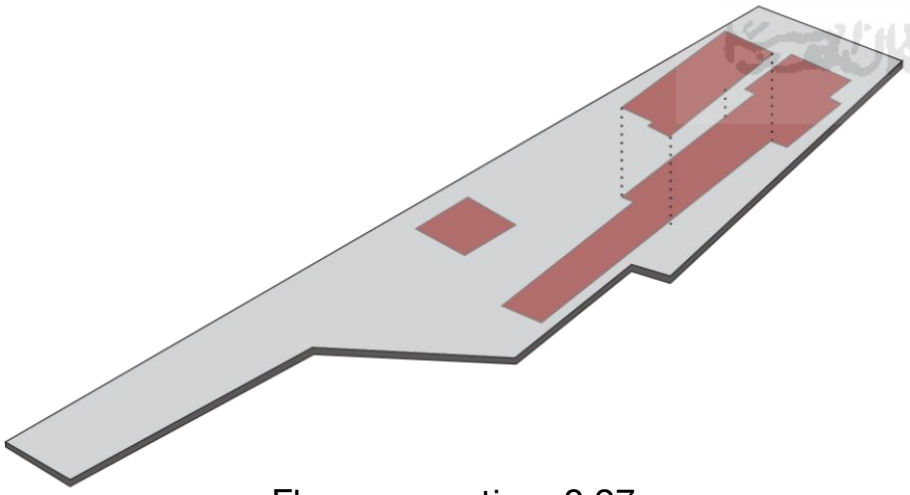
Total site area : 12.328 m2



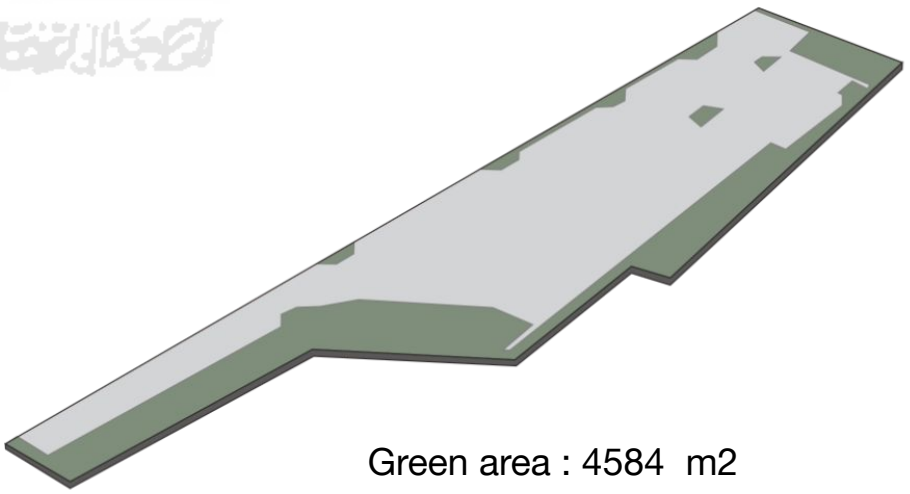
Building coverage : 12725 m2



Maximum building height : 12.7 m



Floor area ratio : 0,27



Green area : 4584 m2

Figure 4.1 Building codes result
Source : Writer, 2021

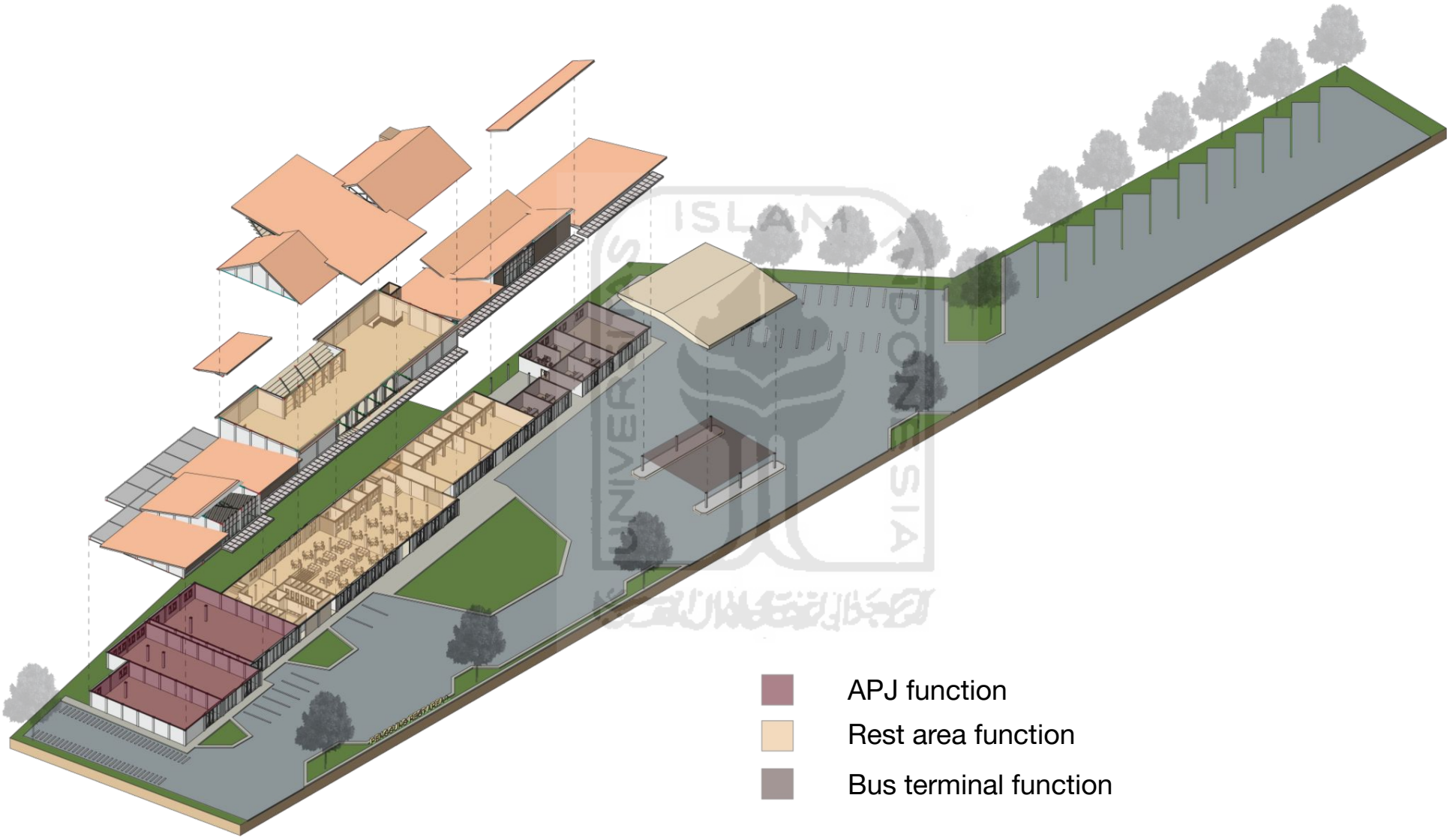


Figure 4.2 exploded axonometric
Source : Writer, 2021

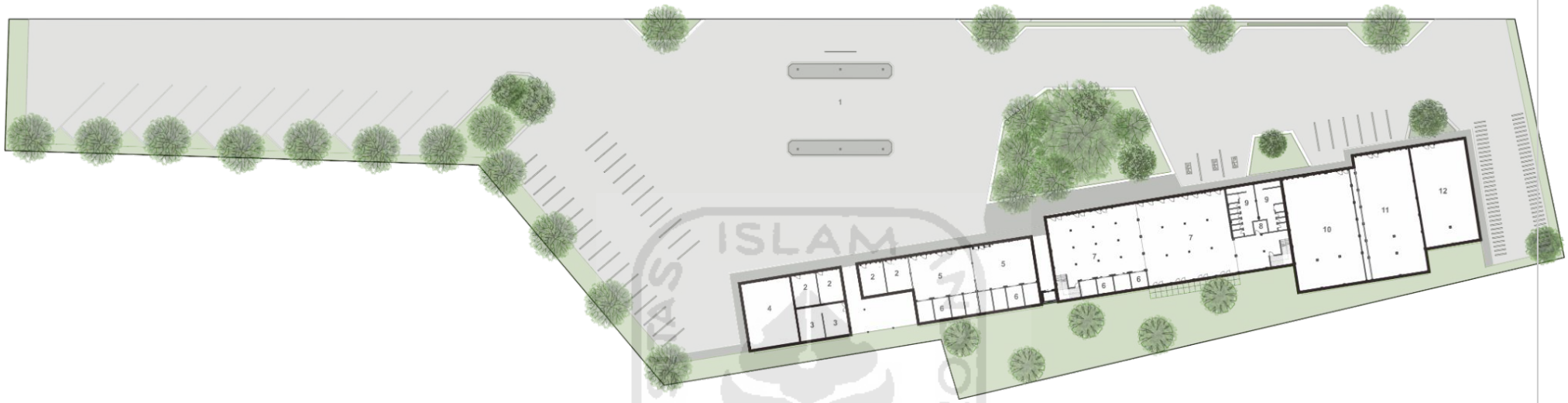


Figure 4.3 Site plan
Source : Writer, 2021

Site plan

The site plan result is to maintain the existing bus terminal building and the kiosk building. The circulation for the inter city bus that stop also maintained. The difference is that it provide more parking lot for the vehicle and also clearer path between the bus and also the car. Most of the vegetation also kept from the existing and added in the southern part and at the front part to become the fance.

Figure 4.4 First Floor plan
Source : Writer, 2021

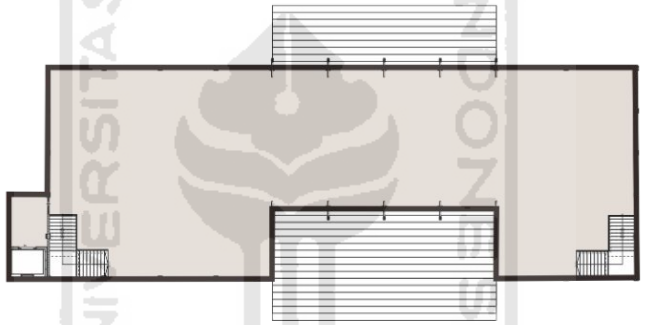


Figure 4.5 Second Floor plan
Source : Writer, 2021

Floor Plan

The plan is to put all of the new function and maximize the space that is provide by the existing. The car repair shop located in the edge of the building so that it close to the parking lot. While the center used as the main rest area function which is the sitting area and shops. The roadside service station function located in the other edge so that it has divert access and separate from other function.

Figure 4.5 Existing Floor plan

Source : Writer, 2021

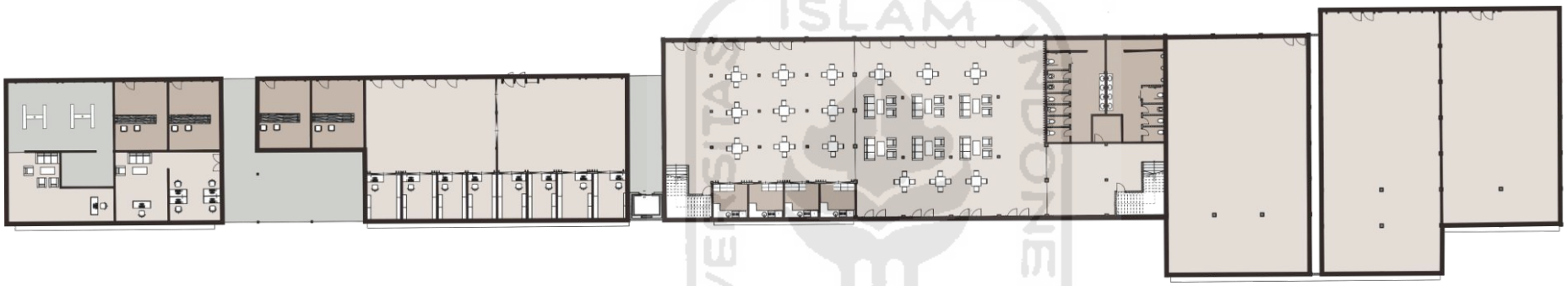


Figure 4.6 New Floor plan

Source : Writer, 2021

Result of redesigning

The problem from the existing plan is that it has a lot of building that is empty. Some also turn into housing for the whole family when it should be used as the retail building.

In the new plan, there are not much area that is change, the border wall and the structure of platform and vertical structure are still used, but the partition wall are removed so that it can accommodate the new function.

Figure 4.8 North elevation
Source : Writer, 2021

Figure 4.9 South elevation
Source : Writer, 2021

Elevation

The elevation is the different height of the roof. Each of the mass has different roof height. This remove the monotonous but still create united between each of the mass. The different height of the roof also let the wind pass through the building more and create cross ventilation.

Figure 4.10 West elevation
Source : Writer, 2021

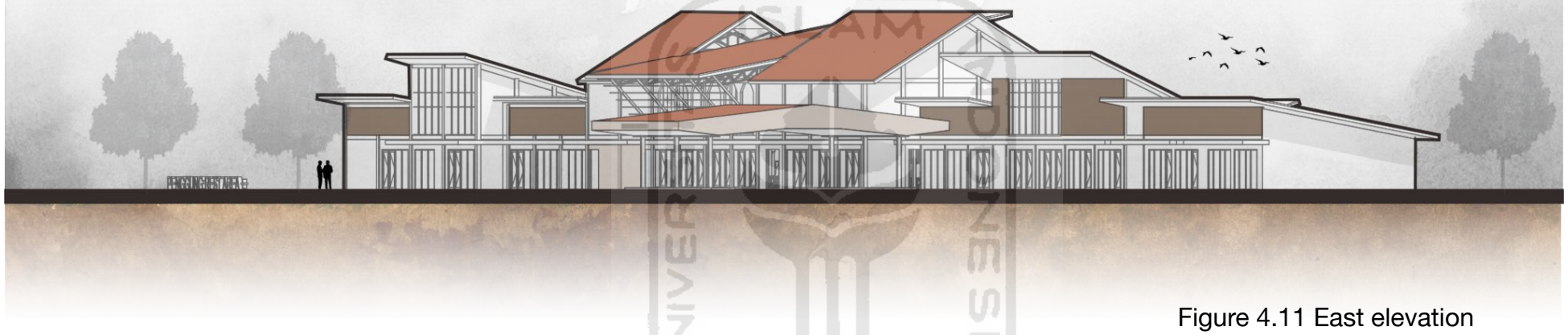
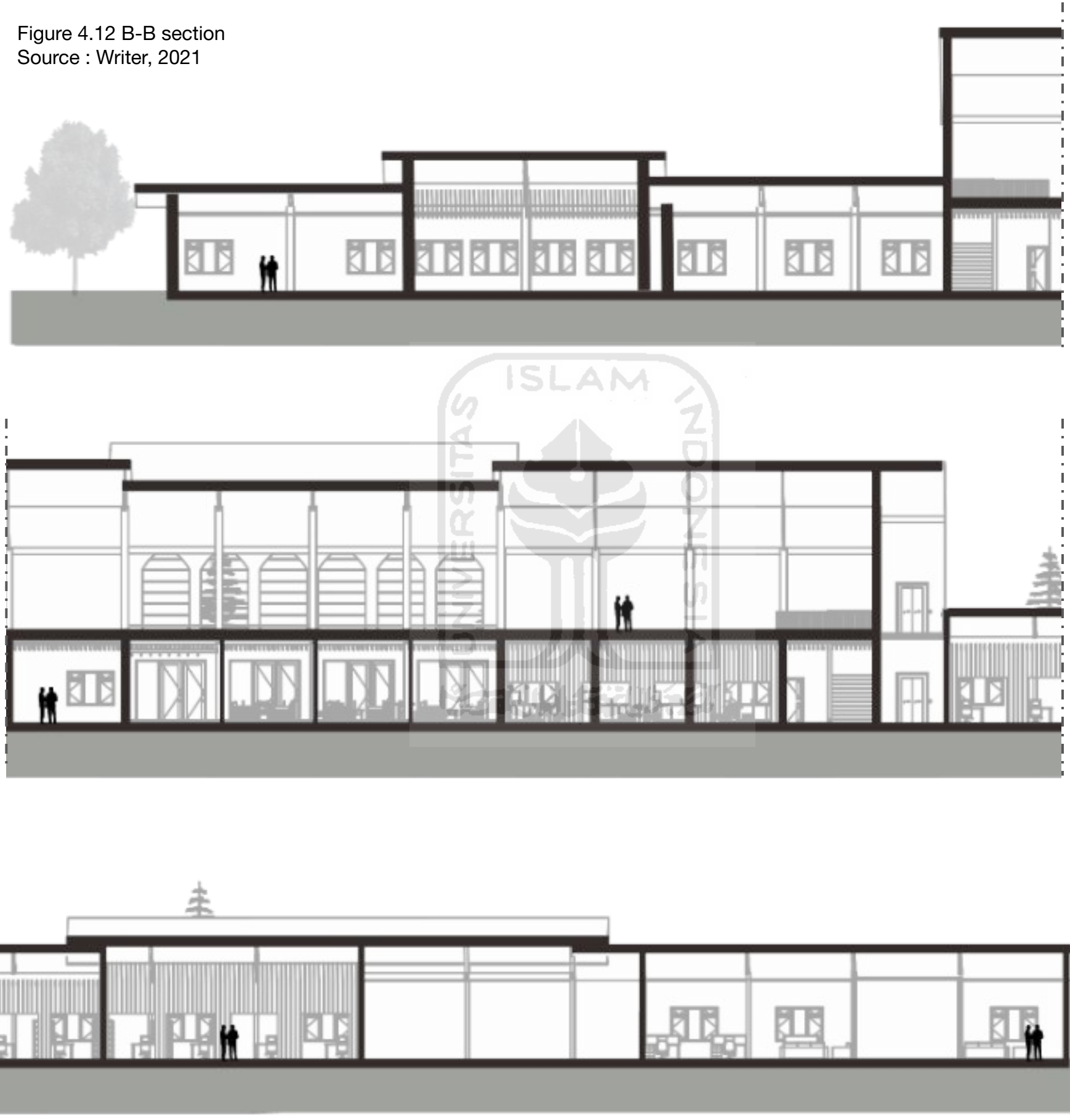


Figure 4.11 East elevation
Source : Writer, 2021

Figure 4.12 B-B section
Source : Writer, 2021



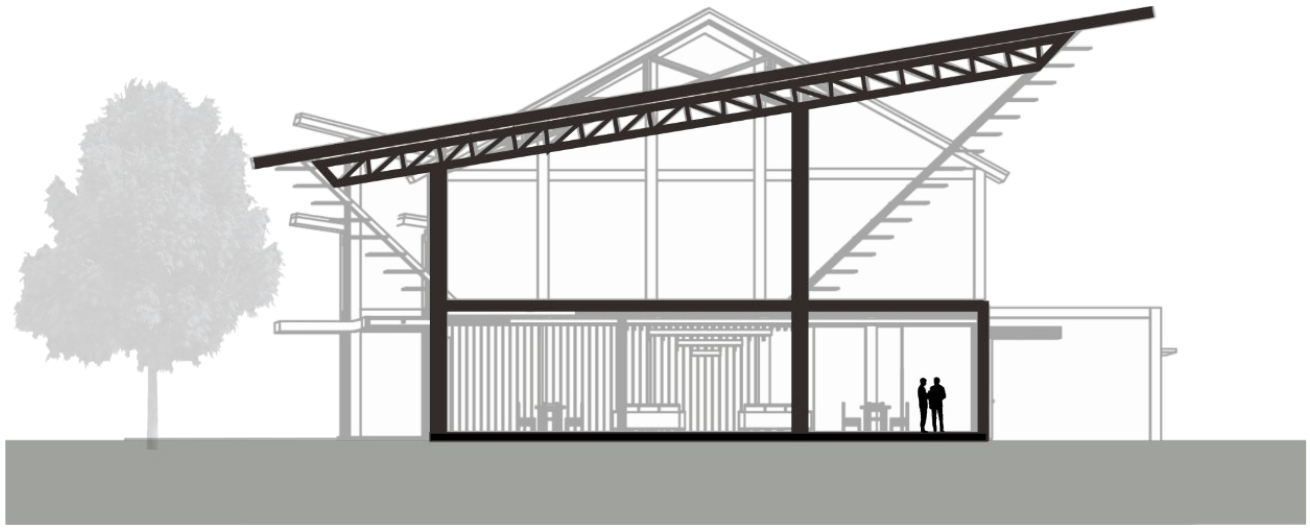


Figure 4.13 A-A' section
Source : Writer, 2021

Figure 4.14 C-C' section
Source : Writer, 2021

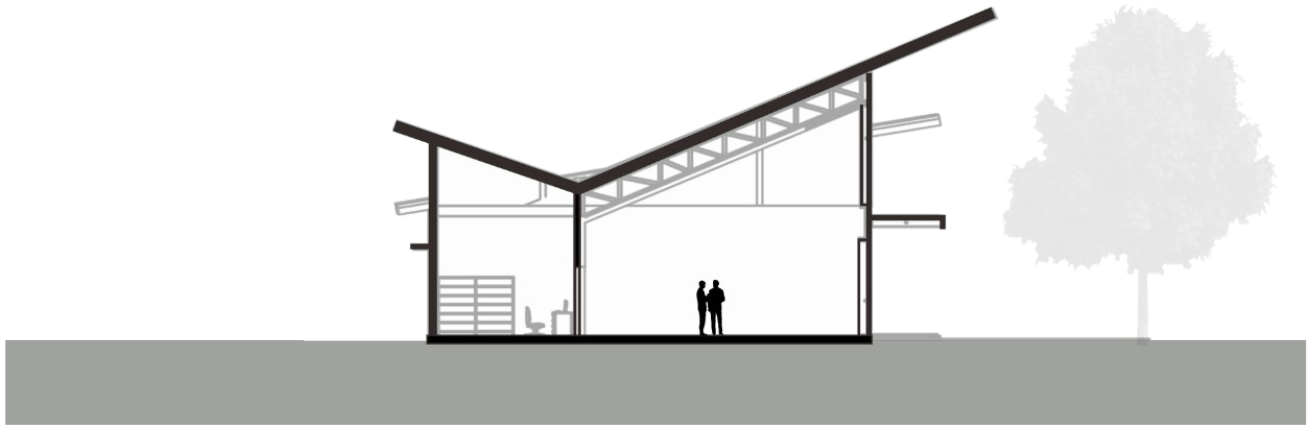


Figure 4.15 D-D' section
Source : Writer, 2021

Figure 4.16 Section A-A’ color
Source : Writer, 2021

Section

The section shows the additional building that became the most important part of the whole site. The adaptive reuse transformation took from the local architecture and the principle of passive design is tried to be aplicate in this part.

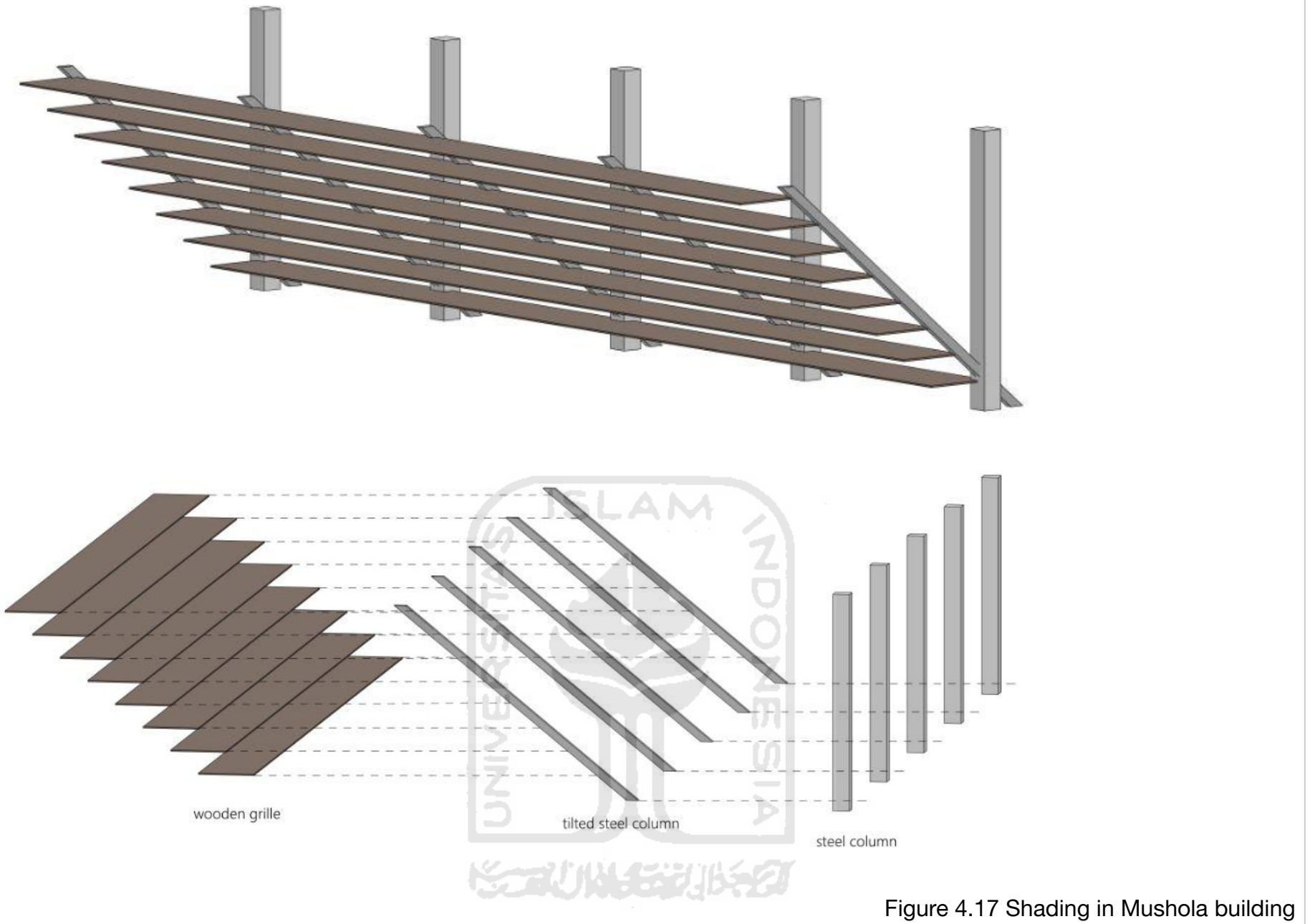


Figure 4.17 Shading in Mushola building
Source : Writer, 2021

Building envelope

The building envelope used to response the sun from the east and the west. The configuration was created to blocked the direct sunlight but still manage to let the wind enter the building freely. The material used is wooden grilled and steel column to support the grilled.

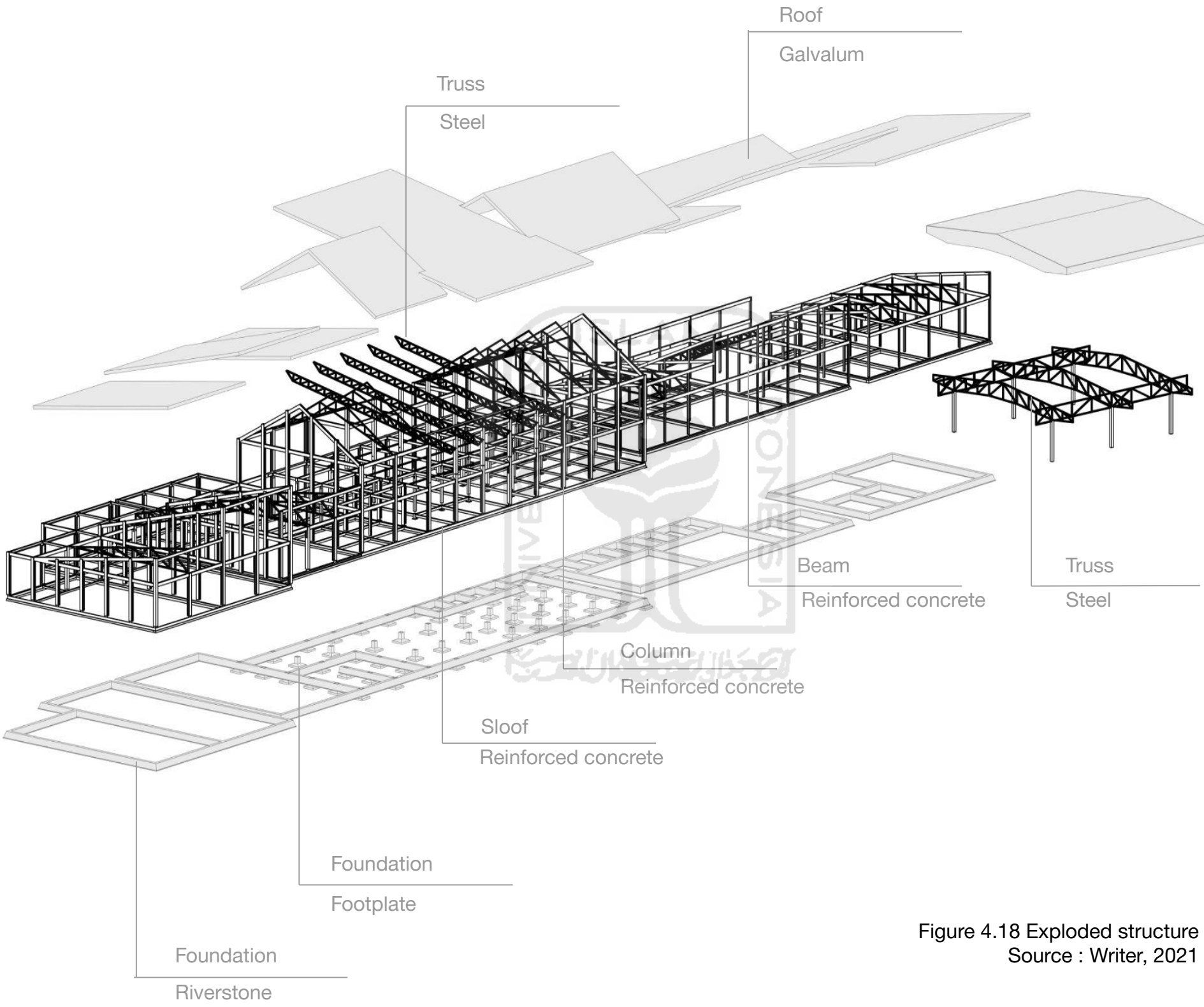


Figure 4.18 Exploded structure
Source : Writer, 2021

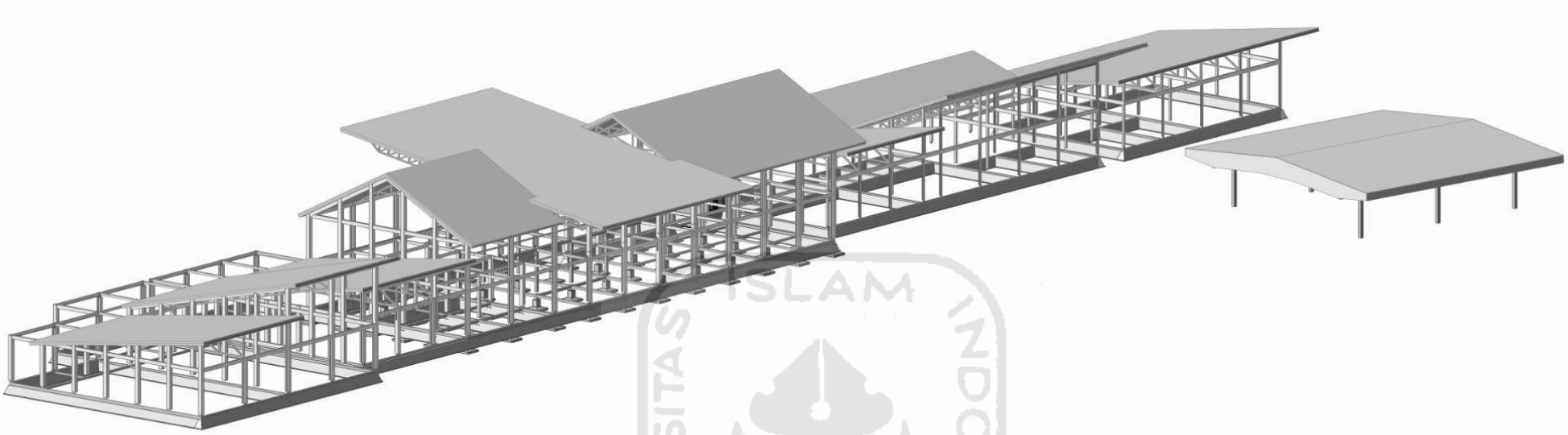


Figure 4.19 building structure
Source : Writer, 2021

Building structure

The structure used the existing building structure from the foundation, column and beam. While for the roof structure used the new structure which is the steel truss. Meanwhile for the insertion, it used the footplate foundation, steel column and beam.

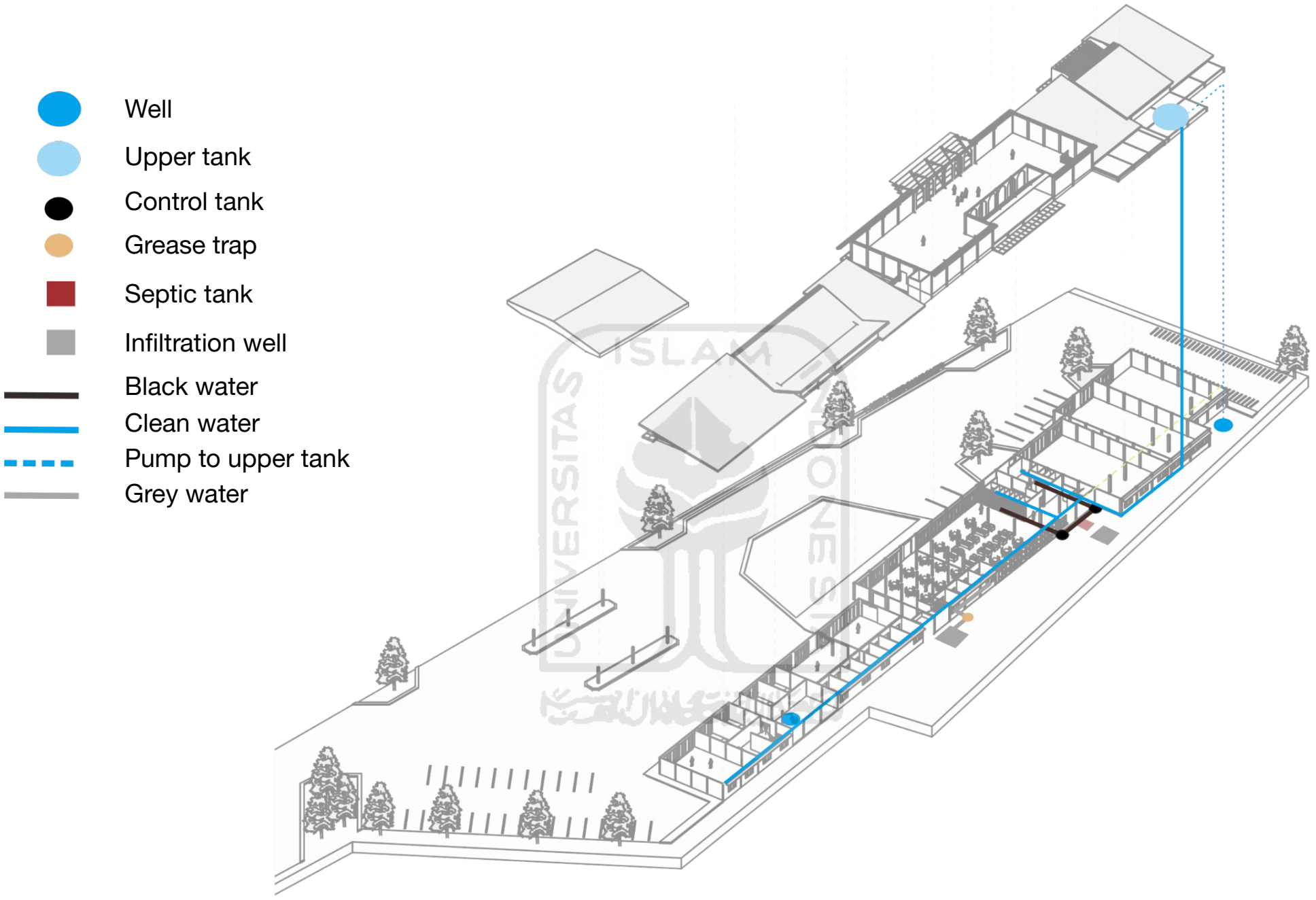


Figure 4.20 axonometric plumbing
Source : Writer, 2021

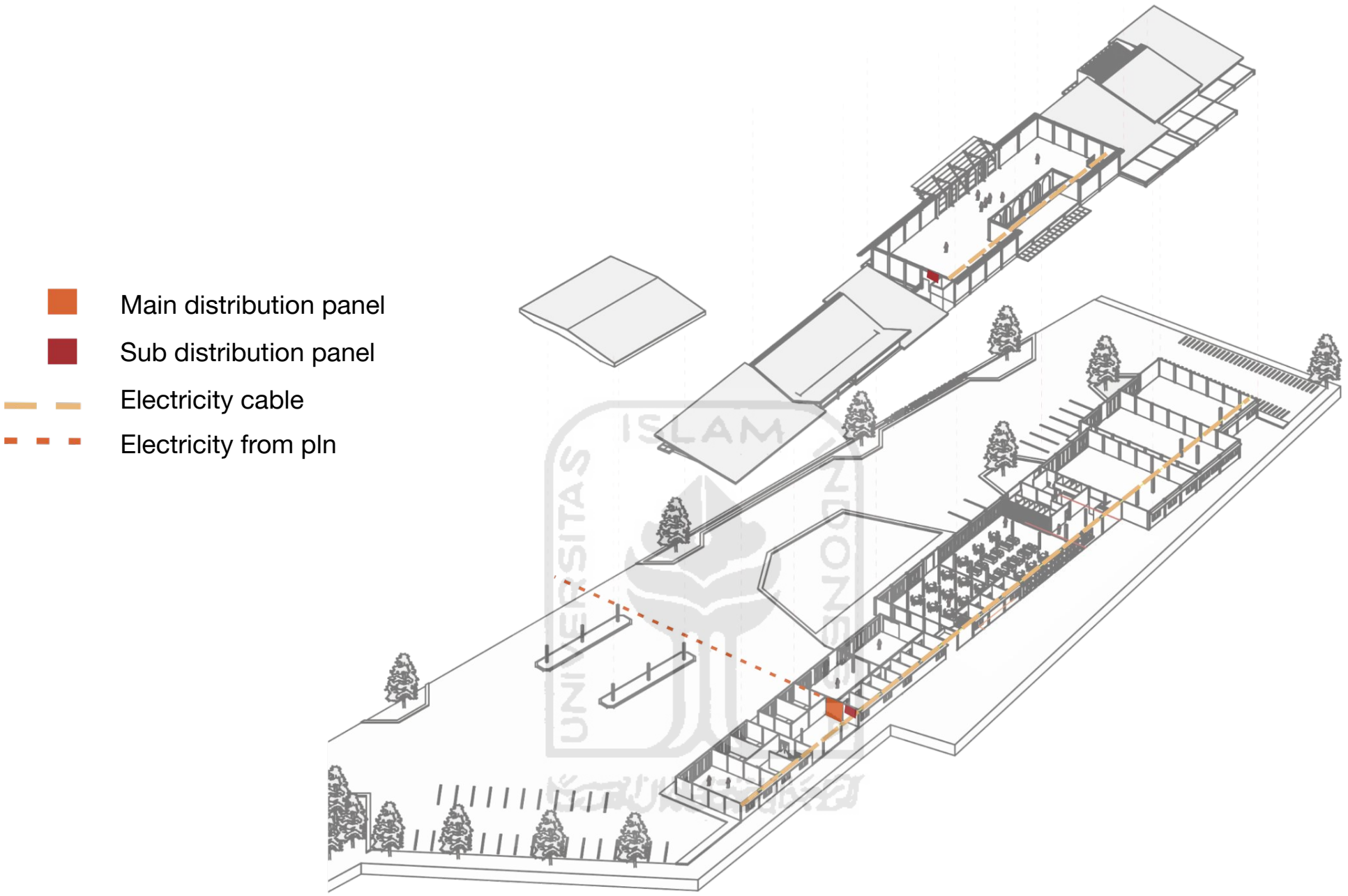


Figure 4.21 axonometric electricity
Source : Writer, 2021

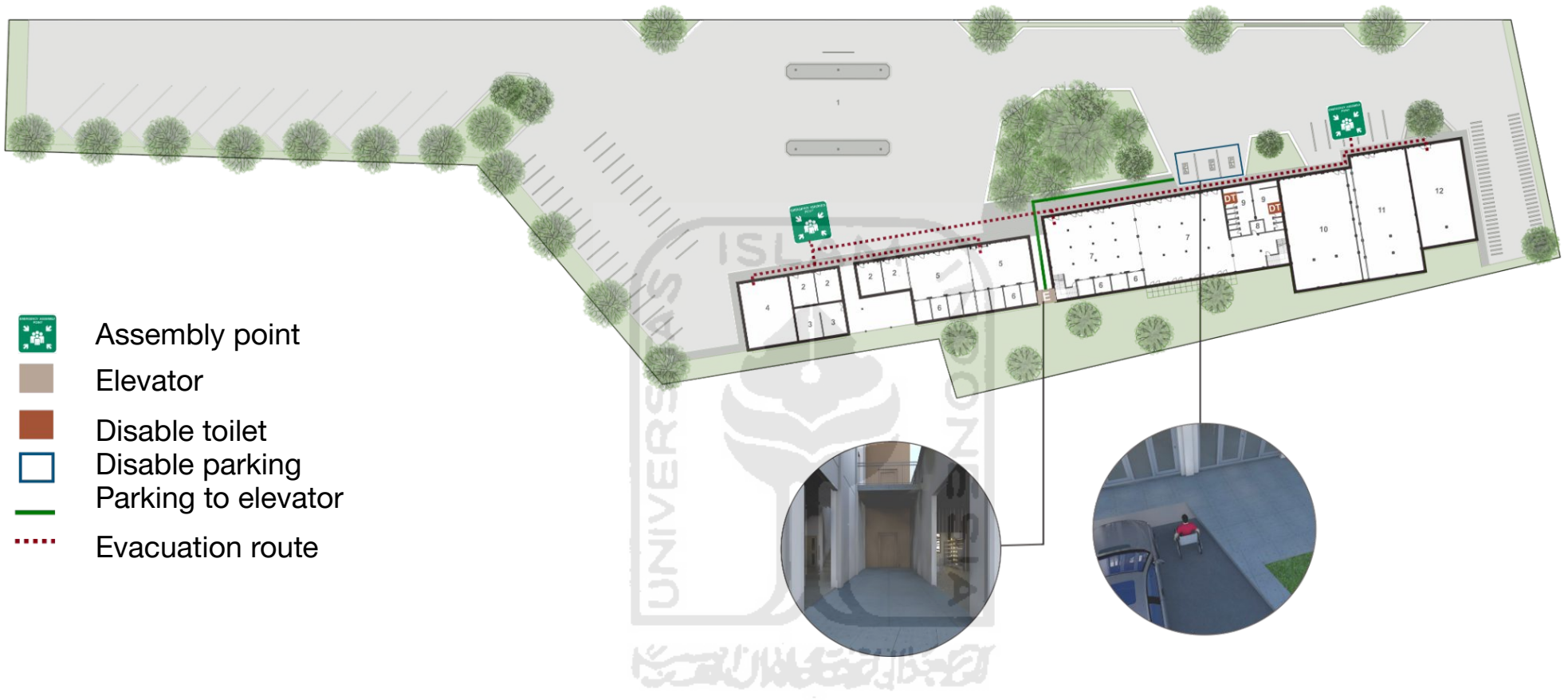
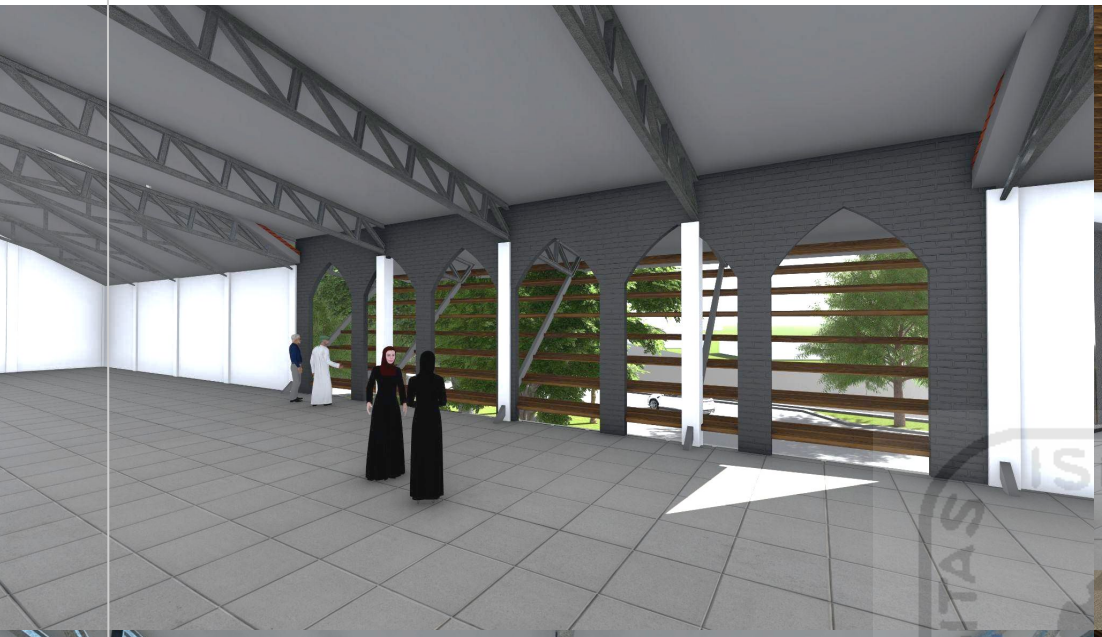


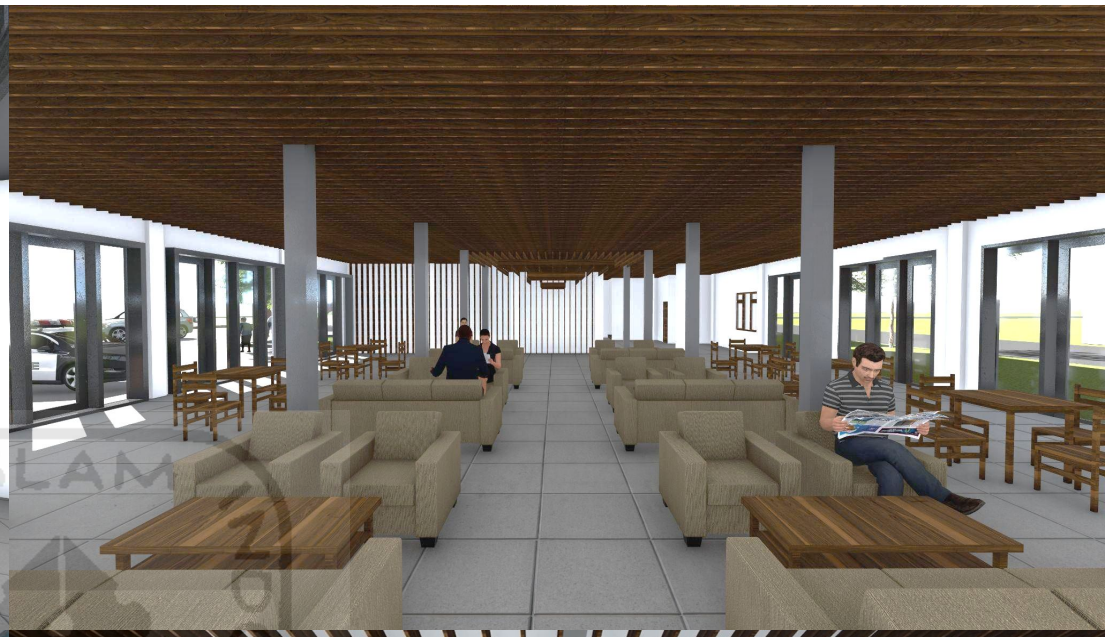
Figure 4.22 universal design scheme
Source : Writer, 2021

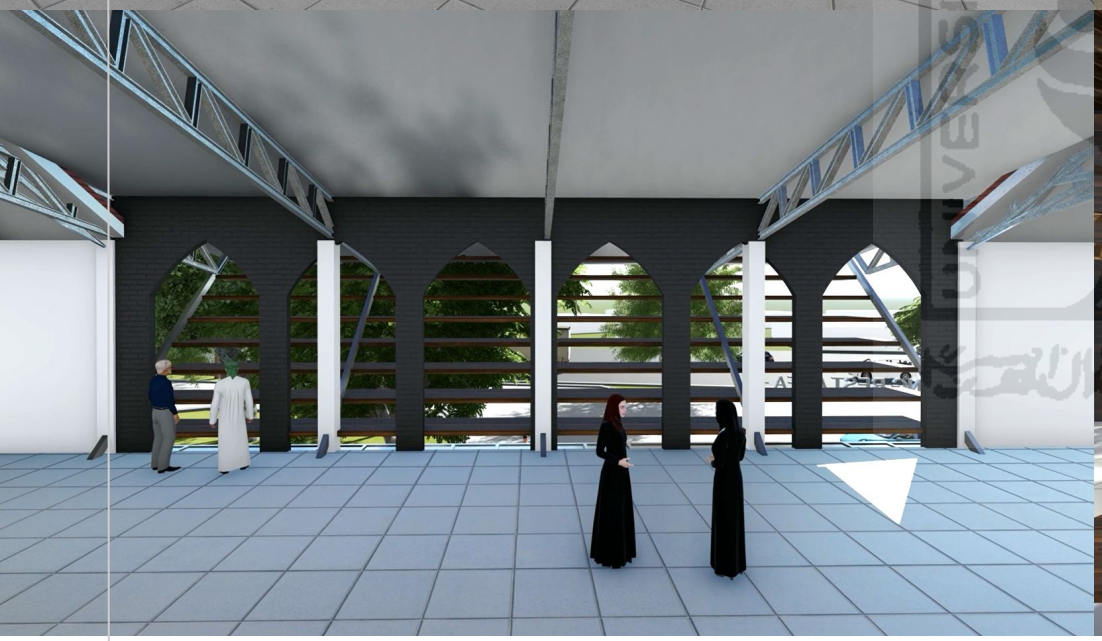
Universal design

The site was completed with disable parking, disable toilet, and also elevator. There are two disable toilet, one for women and one for men. The site was pretty much an open area so that the all of the building can reach the assembly point easily.

Figure 4.23 Exterior perspective
Source : Writer, 2021







Picture 4.24 Interior render
Source : Writer, 2021

CHAPTER

05

DESIGN EVALUATION

Proof of space effectiveness

The space that is demolished was the unused kiosk that has not so strong structure. The number of kiosk that is demolished are 29 kiosk.

The rental price for the kiosk is 3 million per year. Thus, the government gains the following profit:

- 3.000.000 x 29 kiosk = 87.000.000 per year

If the kiosk was demolished and change the function into bus parking. The government will gains following profit:

- 5.000 x 126 bus per day x 365 day = 229.950.000 per year.

Thus, it can be said that the kiosk in the western part will give more profit to the government rather than the kiosk. The bus parking was one of the facilities that is important to the site.

The kiosk that demolished and change into car parking lot was 2 kiosk. The profit comparison between the kiosk and the car parking is:

- 3.000.000 x 2 kiosk = 6.000.000 per year
- 2.000 x 246 car per day x 365 day = 179.580.000 per year

The car parking give more profit to the government and it also one of the important facilities that previously.

The beauty clinic and cafe restaurant building was actually belong to the individual because the rent was the land. The deal was it rent for 15 years and after it pass of the 15 years, the building belongs to the government. The agreement will be end in 2023, so that repurposing the existing building into Roadside Service Station function will be profitable to the government.

Figure 5.1 New design of bus terminal
Source : Writer, 2021

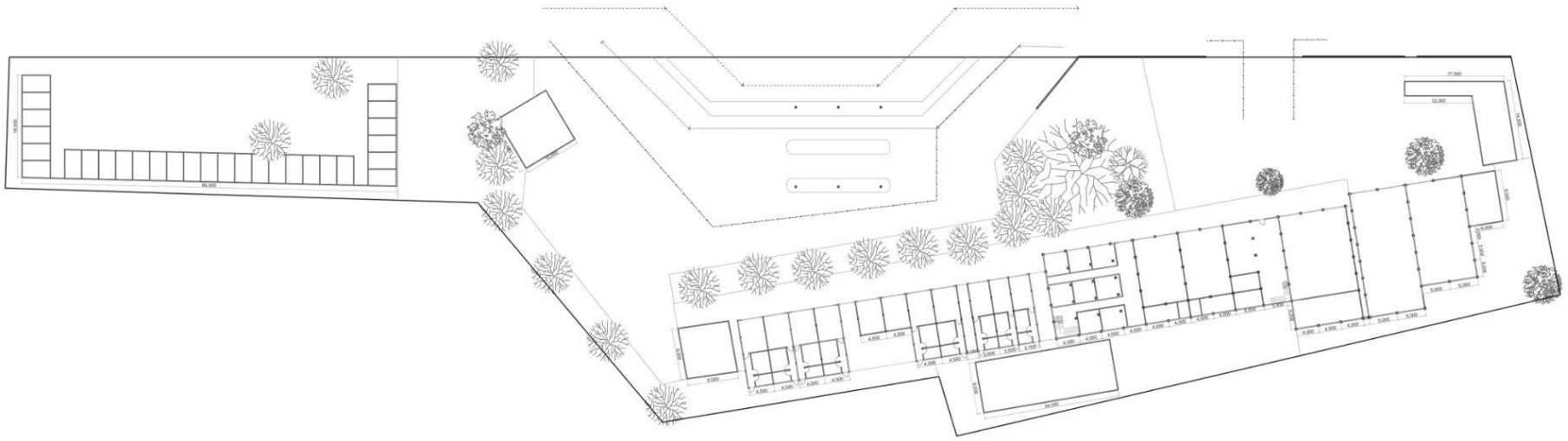
Terminal building design

The terminal building change the design into the completely new one. The design created so that it gives unity to the new kiosk building.

Figure 5.2 New design of pedestrian
Source : Writer, 2021

Pedestrian in front of the kiosk

Widening the pedestrian in front of the kiosk building. The pedestrian width bring back to the existing.



Picture 5.3 Existing site plan
Source : Writer, 2021

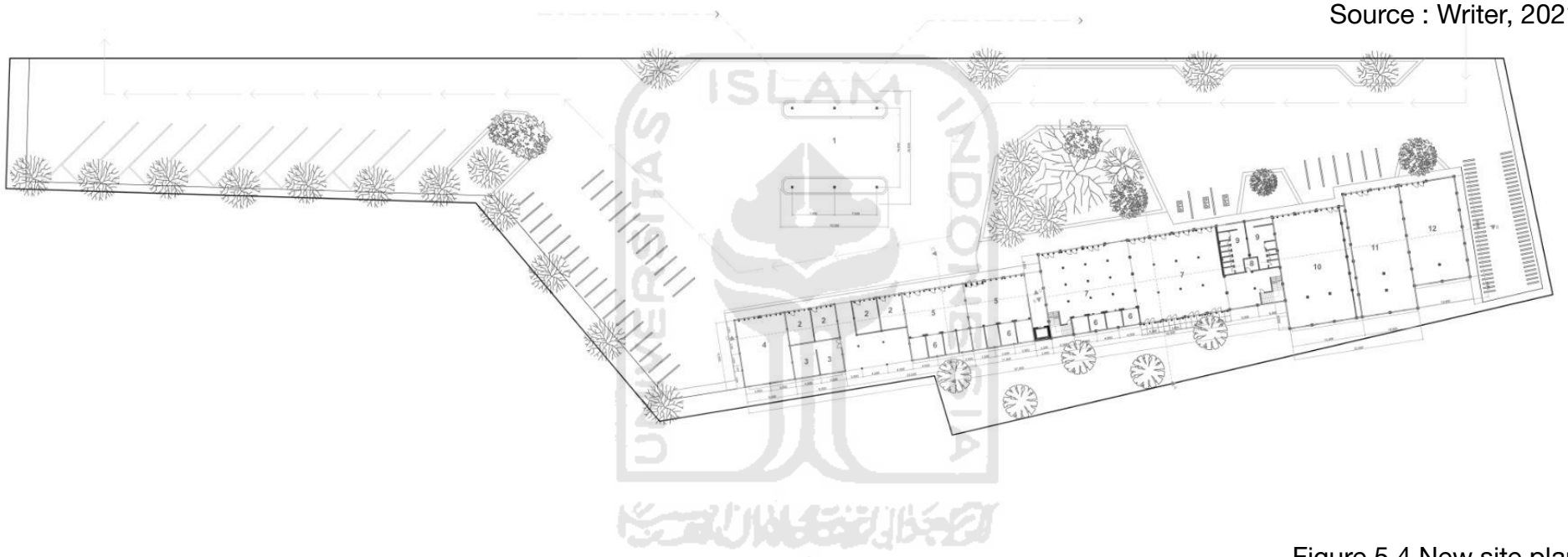


Figure 5.4 New site plan
Source : Writer, 2021

Before after site plan

The site plan shows that the existing circulation of the bus and also the car inside the site. The existing site plan shows some of the building that breaking the rules such as the border and the building of street vendors that starts to become permanent.

Figure 5.5 Existing of Penggung bus terminal
Source : Google map, 2021

Figure 5.6 New Penggung rest area
Source : Writer, 2021

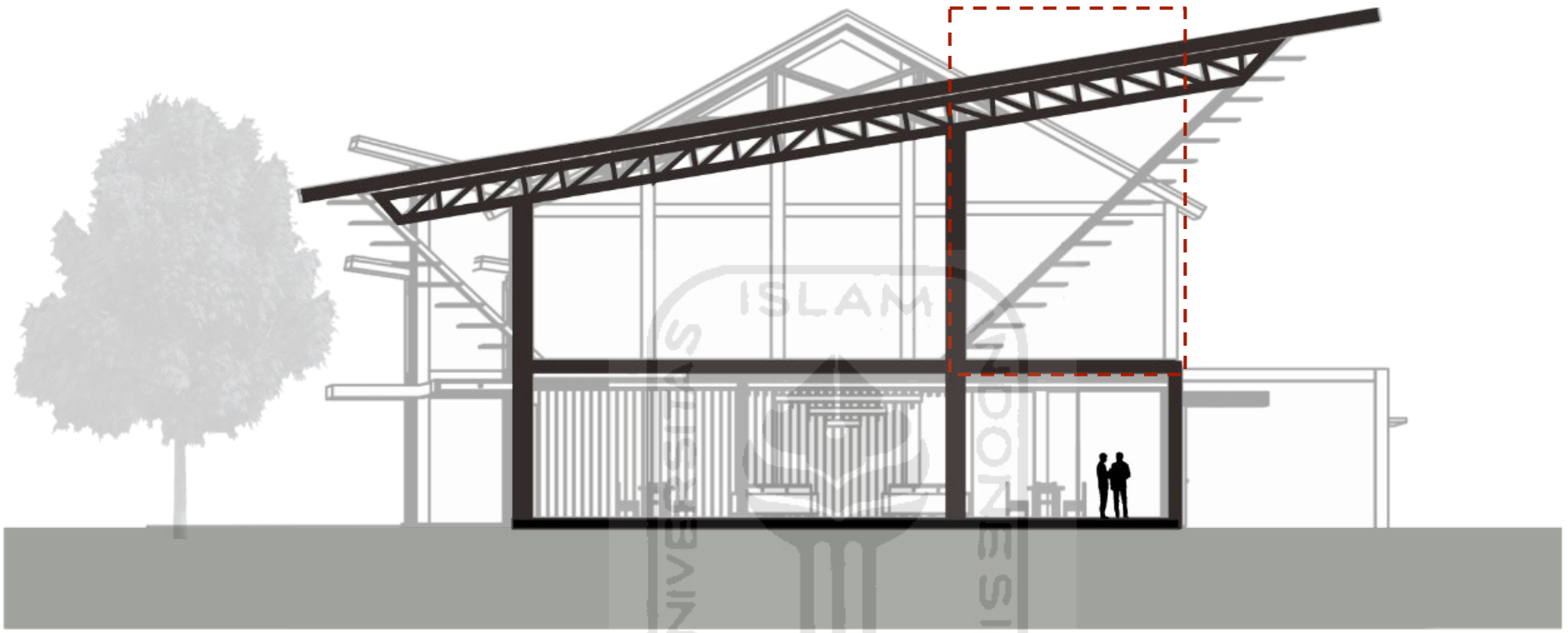


Figure 5.7 Section of the extension building
Source : Writer, 2021

Empty room for the shading

This configuration of shading creates an empty room, this happens as the consequences of the shading. The shading already proof that it effective to decrease the excessive daylight.

Figure 5.8 line to difference the lane
Source : Writer, 2021

Create street line

Create street line to divide the bus and the car lane. Because now days, the bus only exist in the morning, so that the lane can be used by the other vehicle when there are no bus that enter.

Figure 5.9 Landscape as gate
Source : Writer, 2021

Redesign the landscape for the border

Create landscape that direct the bus to the terminal so that it makes them easier to navigate.

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ATTACHMENT

Detailed Engineering Drawing

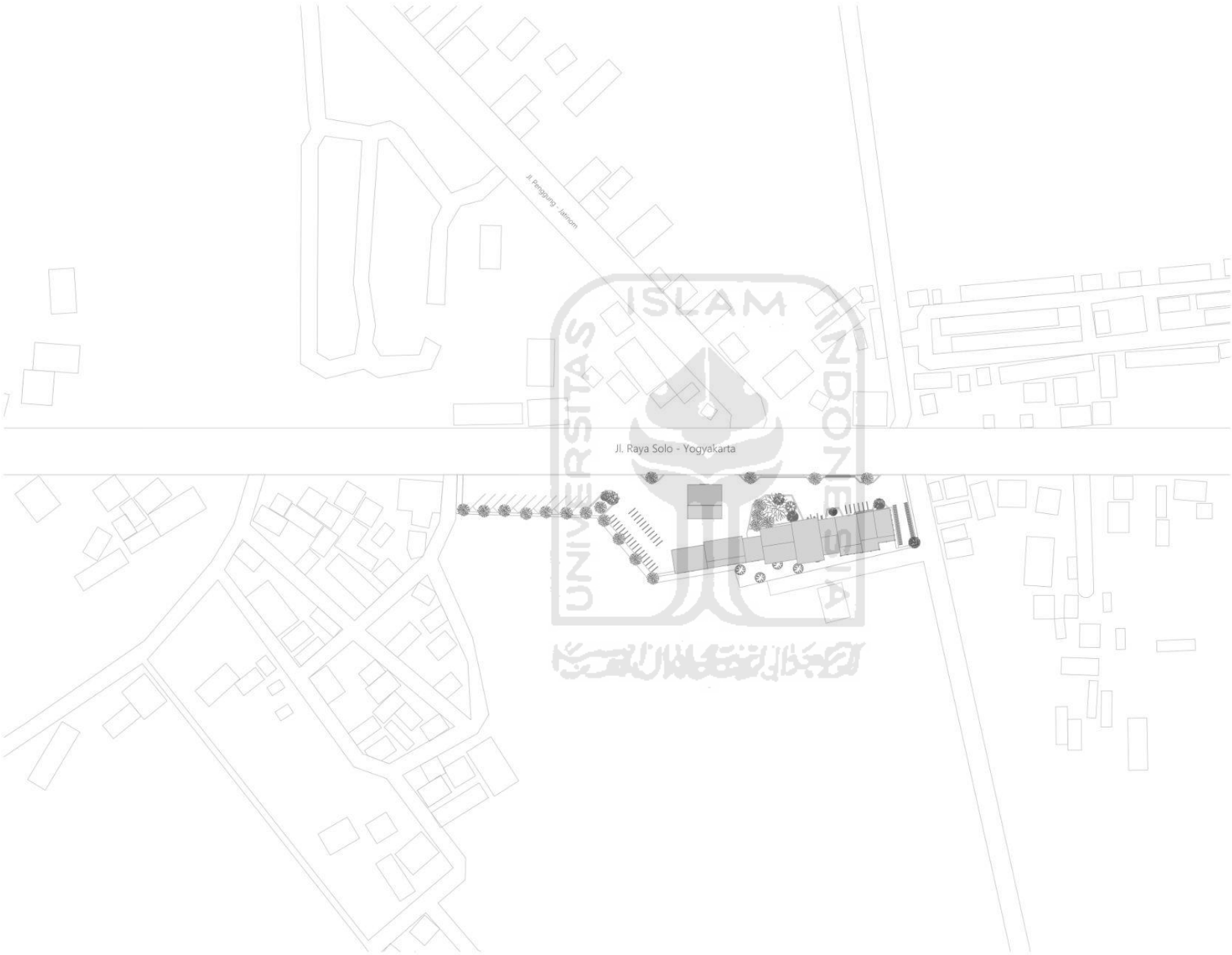
Architectural Presentation board

3D Model

QR Codes

LIST OF ATTACHMENT

Detailed Engineering Drawing



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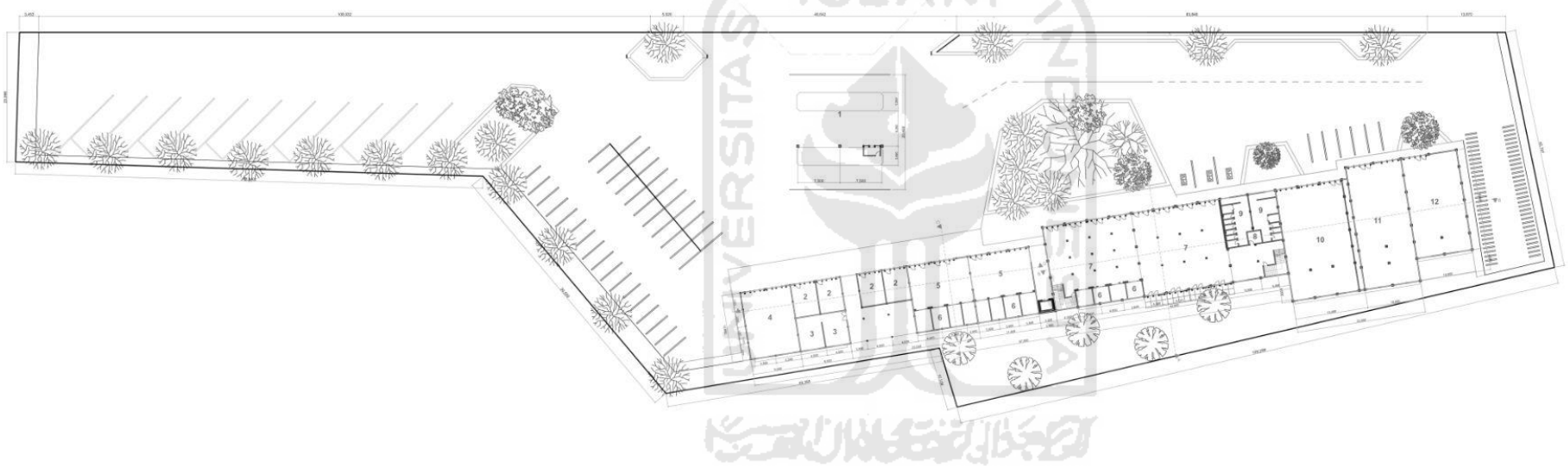

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DESCRIPTION

1: bus terminal
2: bus ticket agent
3: bus terminal office
4: car repair shop
5: rest area entrance
6: retail stals
7: sitting area
8: janitor
9: toilets
10: traffic management
11. emergency response
12: information post

Bus circulation
car circulation
banyan tree
glodokan tiang tree
mango tree
bintaro tree
ketapang tree
ketapang kencana tree

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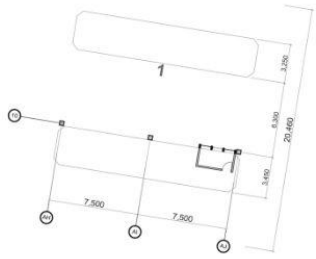

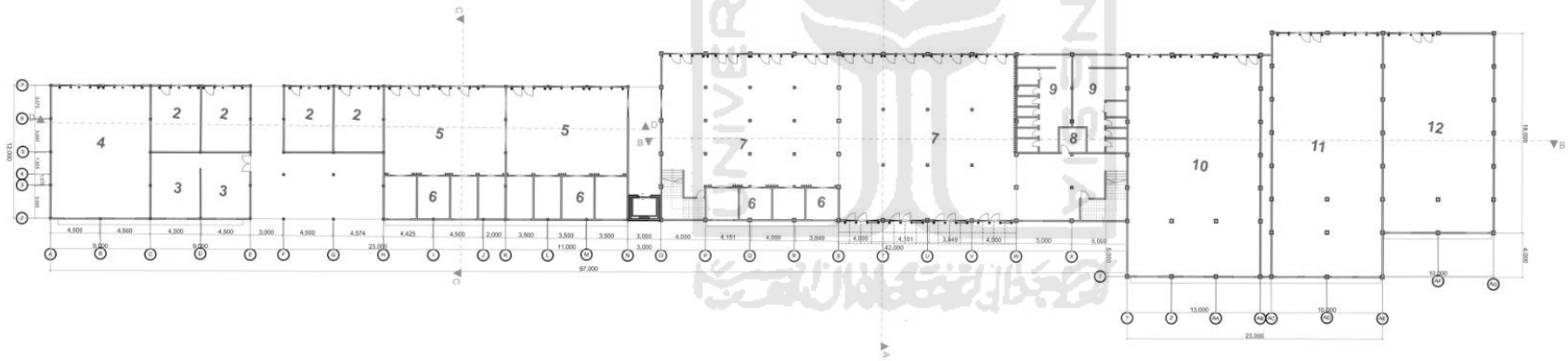

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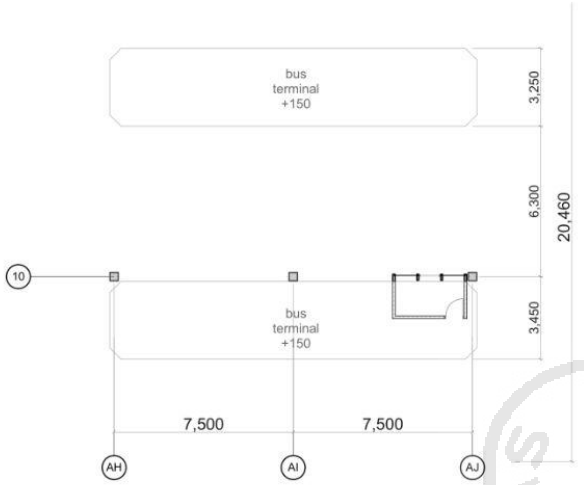

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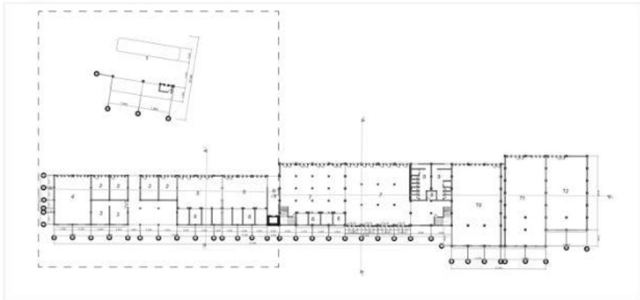

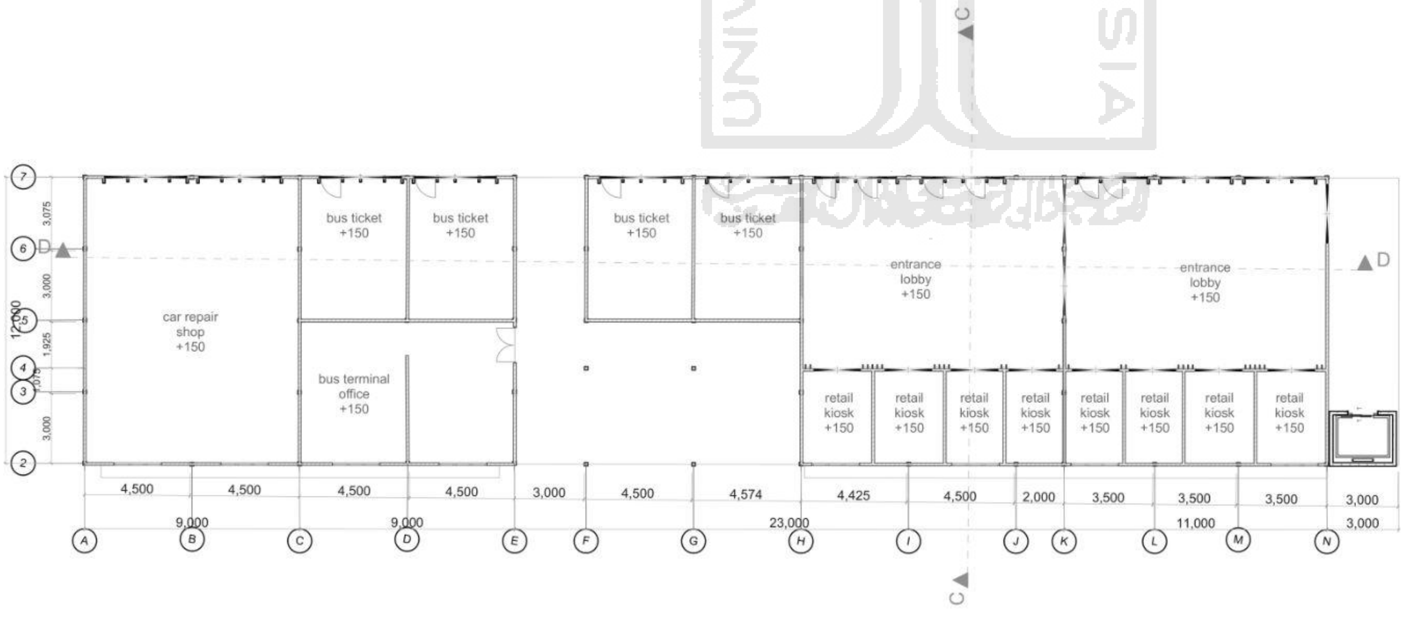

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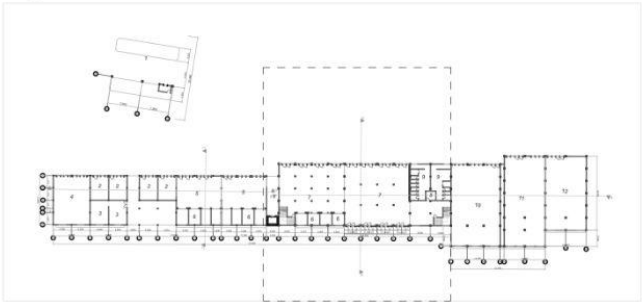

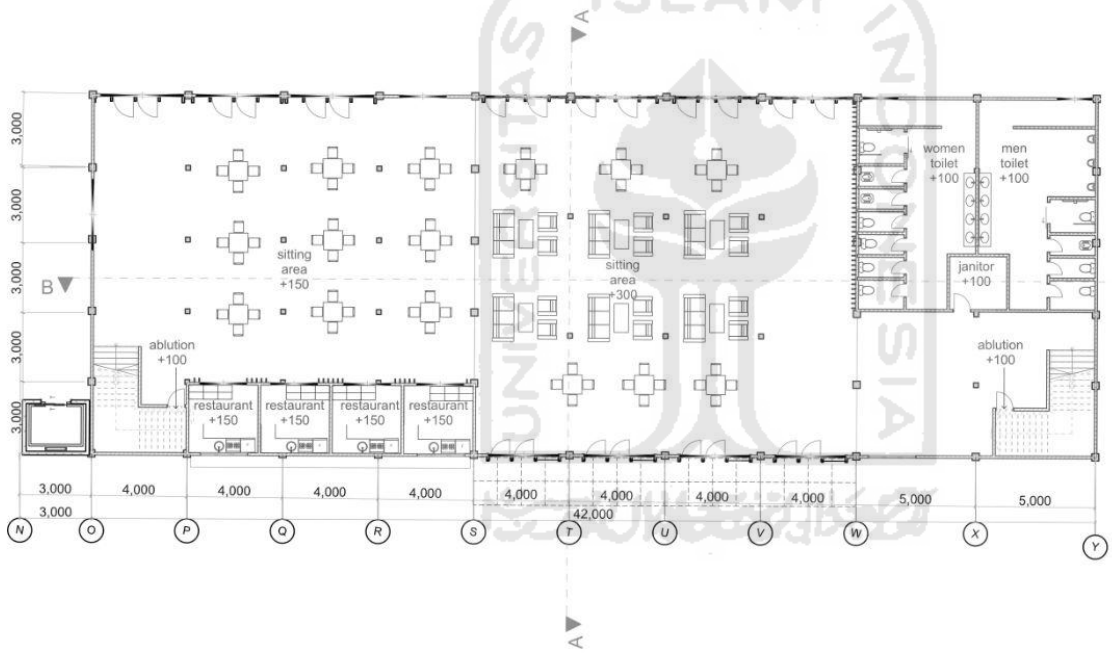

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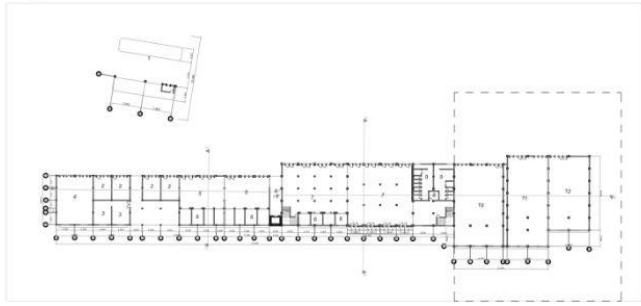

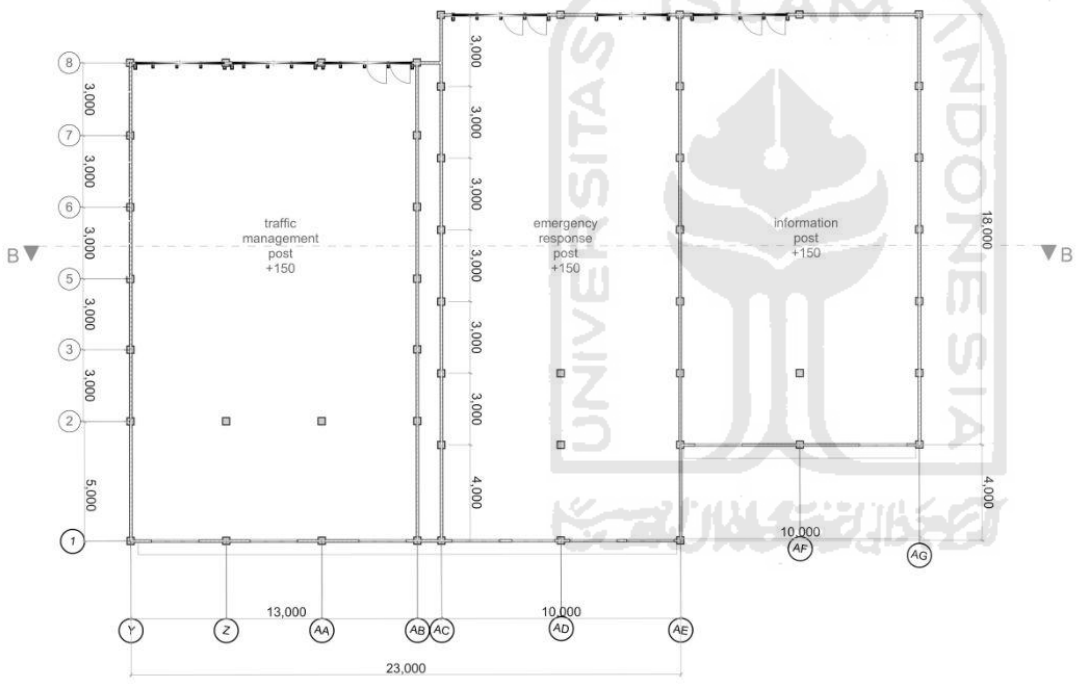

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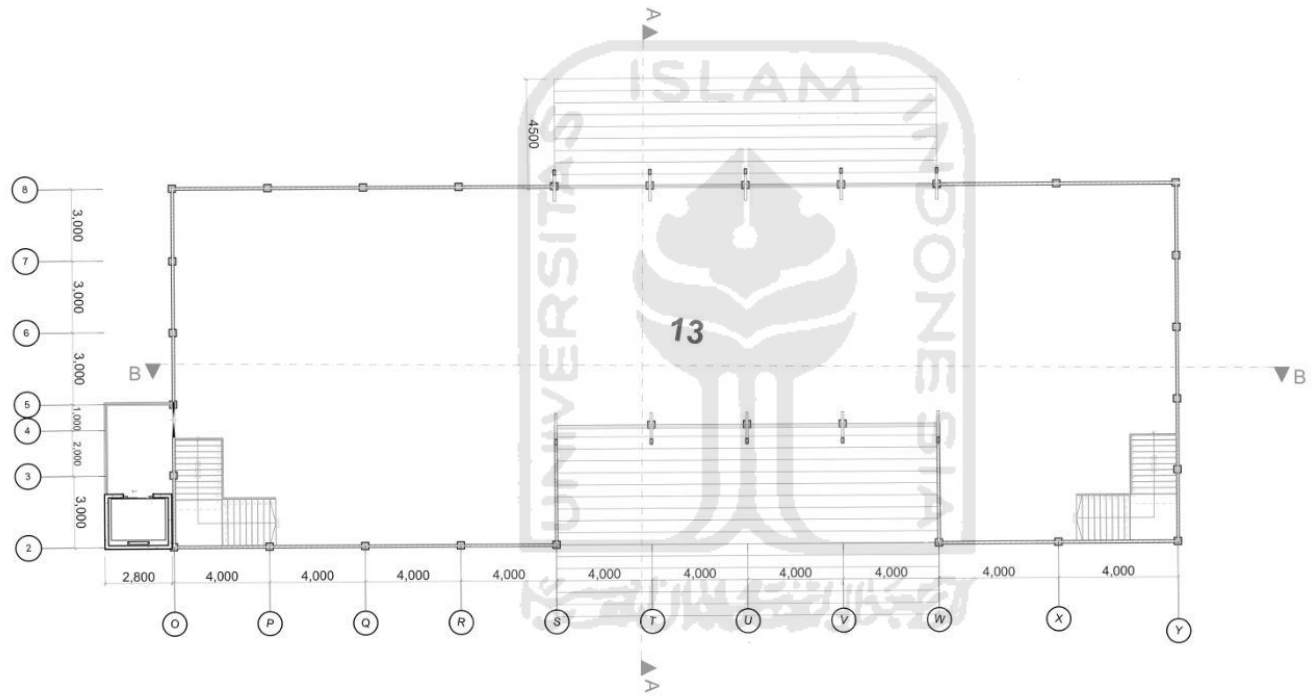

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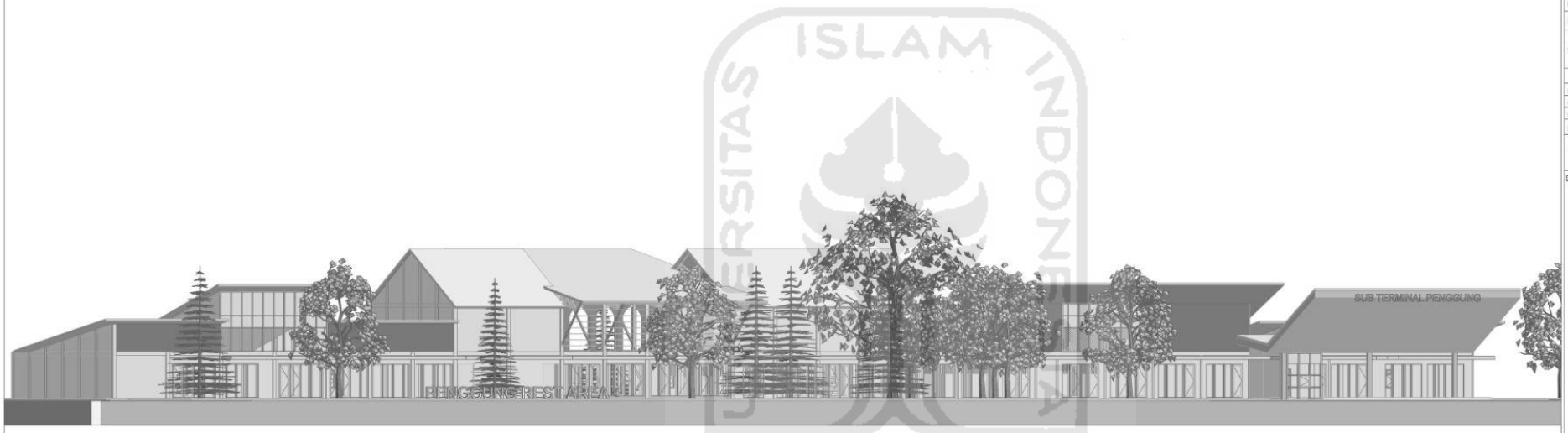

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Position no. TYPE

DESCRIPTION

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PAGE

TOTAL
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COURSES
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Class
IP

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PENGGUNG REST AREA + JL Solo-Yogyakarta, Klaten, Coor. Klaten	
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NOTES

PAGE | TOTAL 36

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DESCRIPTION

NOTES

PAGE	TOTAL
	36

COURSES	Class
Final Architectural Design Studio	IP

INSTITUTION	
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PROJECT	
PENGGUNG REST AREA + Jl. Solo-Yogyakarta, Klaten, Cepet, Klaten	
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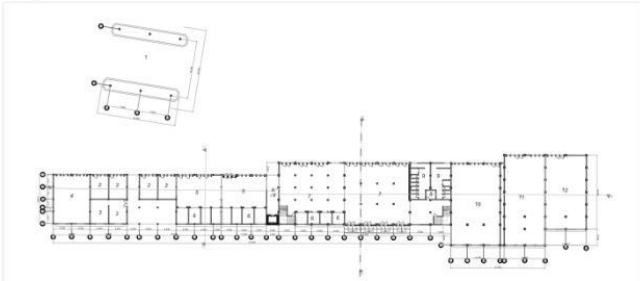

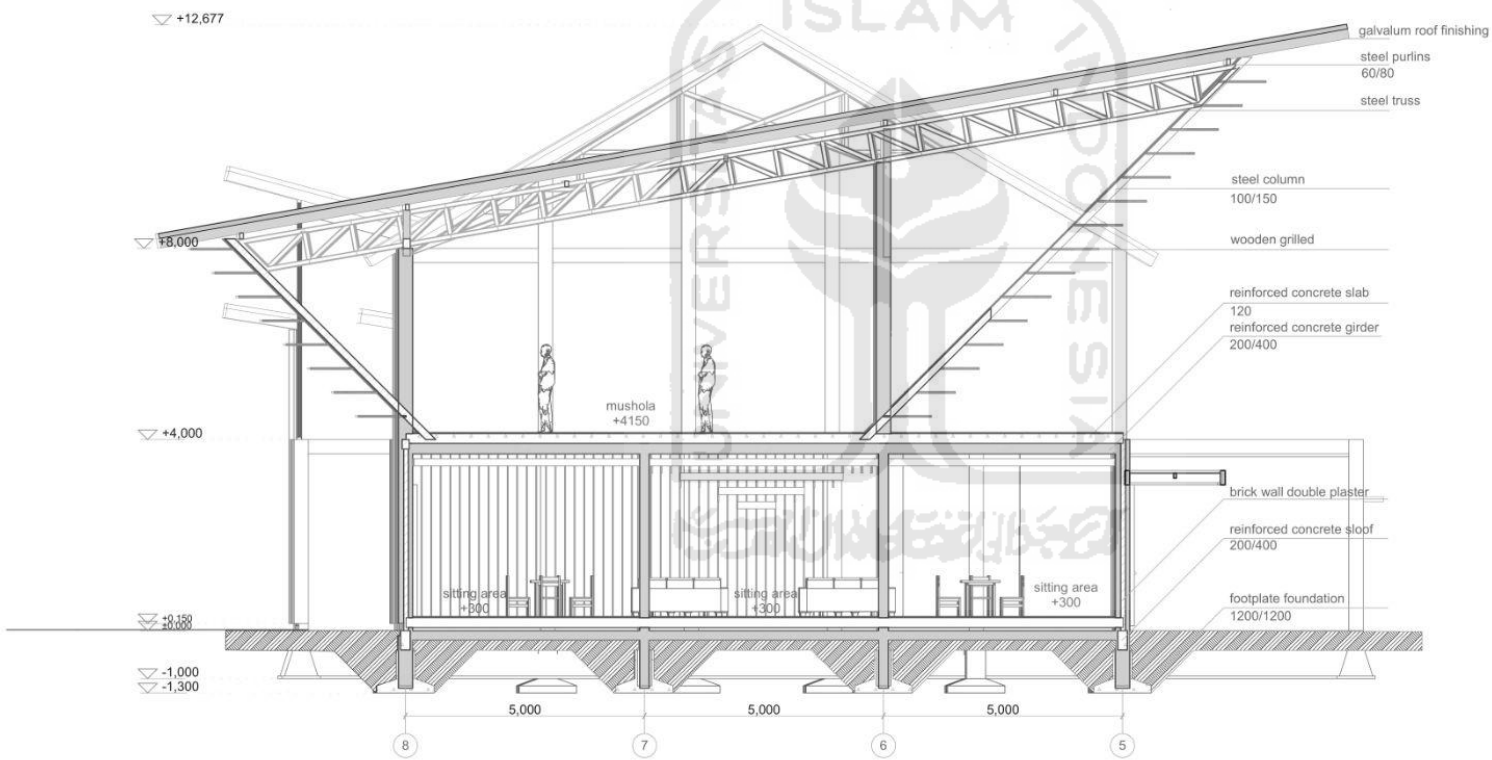

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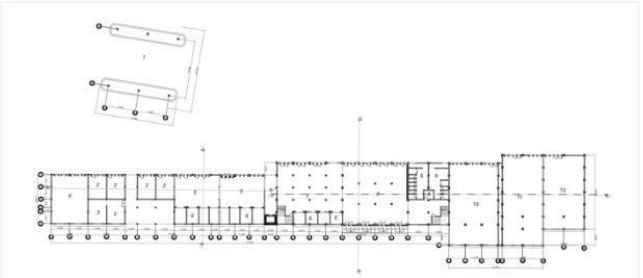

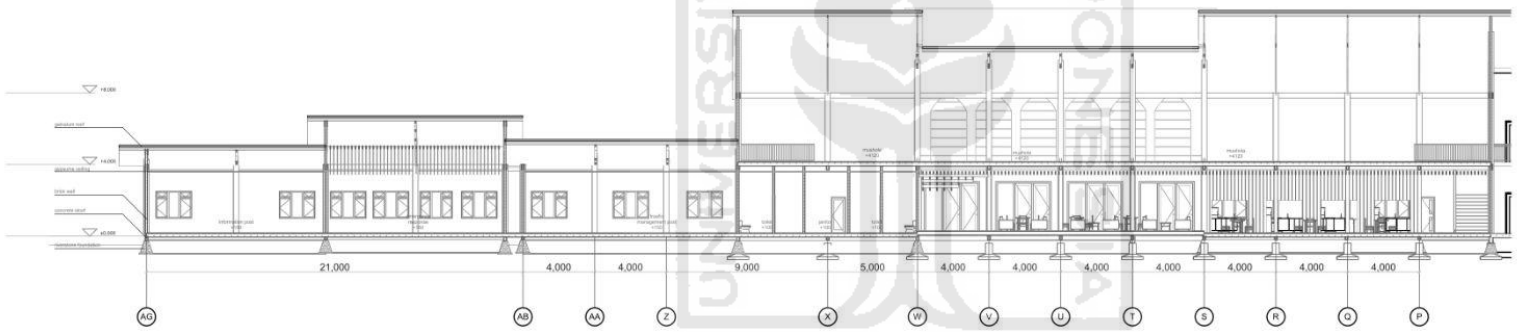

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PAGE	TOTAL
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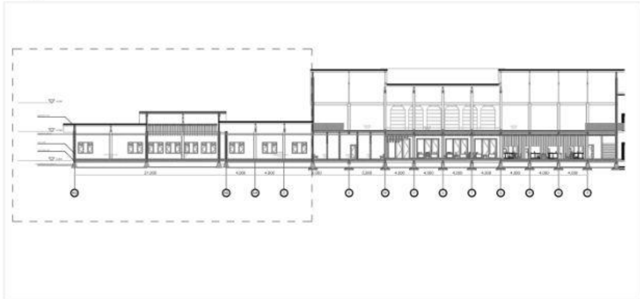

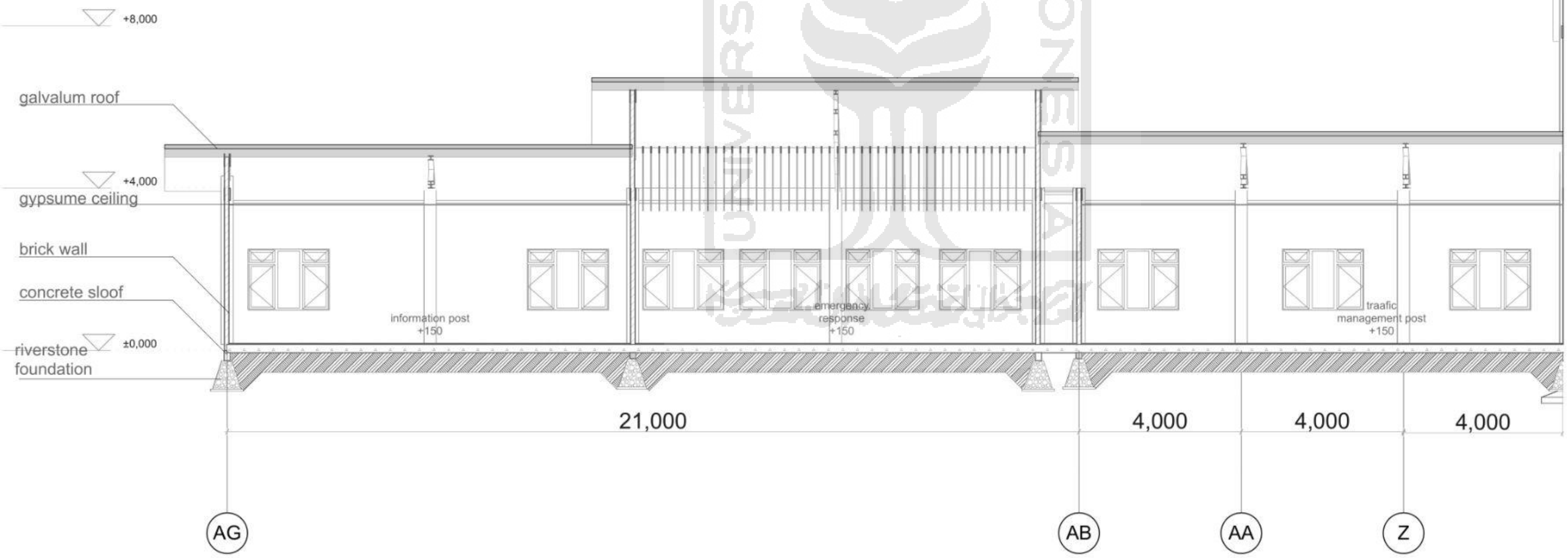

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with Roadside Service Station Concept

ARCHITECT STUDENTS	ID
GALIH INDRASWARI	17512001

DOSEN PEMBIMBING
Dr. YULIANTO P. PRIHATMAJI, S.T., M.T., IAI, IPM

DOSEN PENGUJI
PROF. NOOR CHOLIS IDHAM

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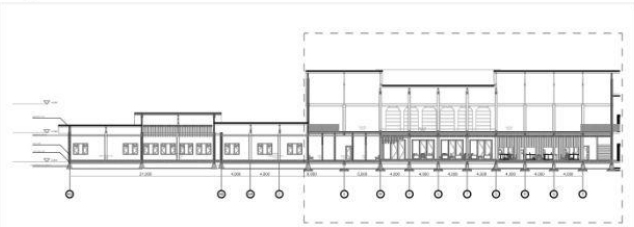

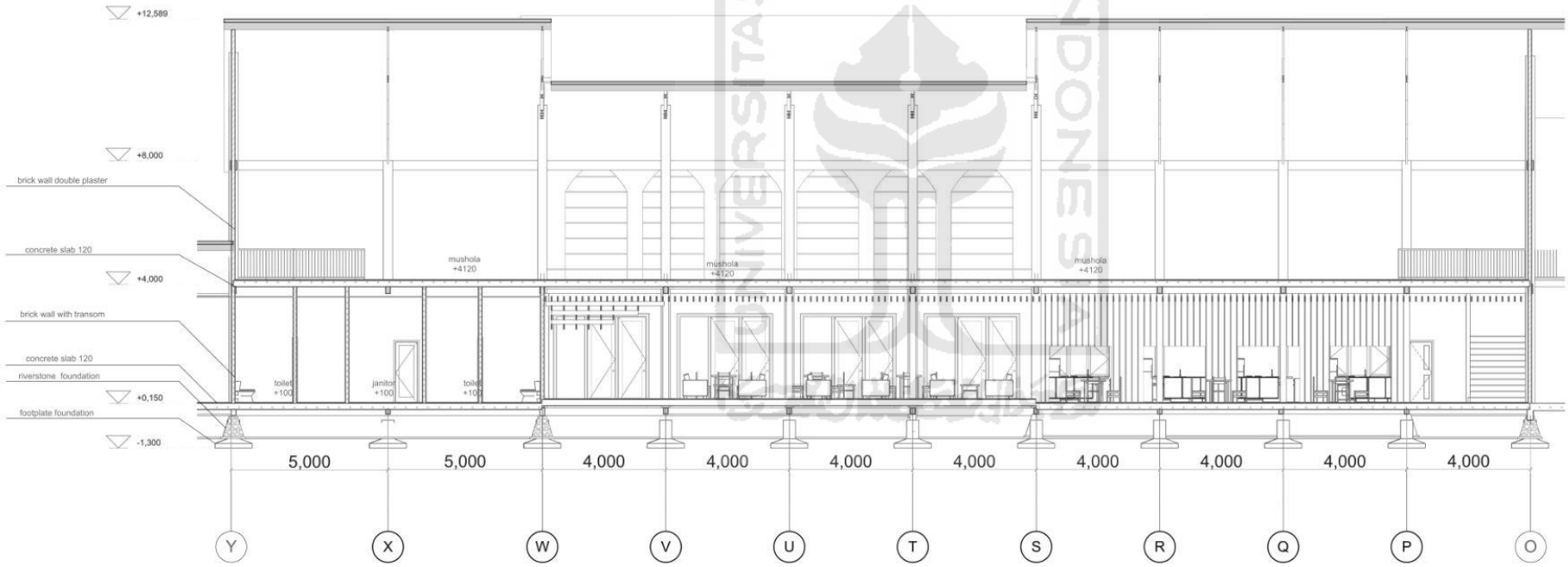

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PENGGUNG REST AREA + Jl. Solo-Yogyakarta, Klaten, Cepet, Klaten	
PENGGUNG REST AREA + with Roadside Service Station Concept	
ARCHITECT STUDENTS	ID
GALIH INDRASWARI	17512001
DOSEN PEMBIMBING Dr. YULIANTO P. PRIHATMAJI, S.T., M.T., IAI, IPM	
DOSEN PENGUJI PROF. NOOR CHOLIS IDHAM	
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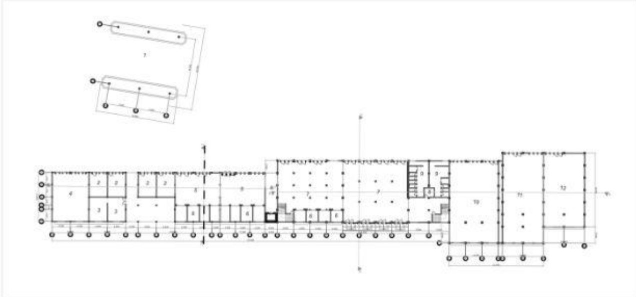

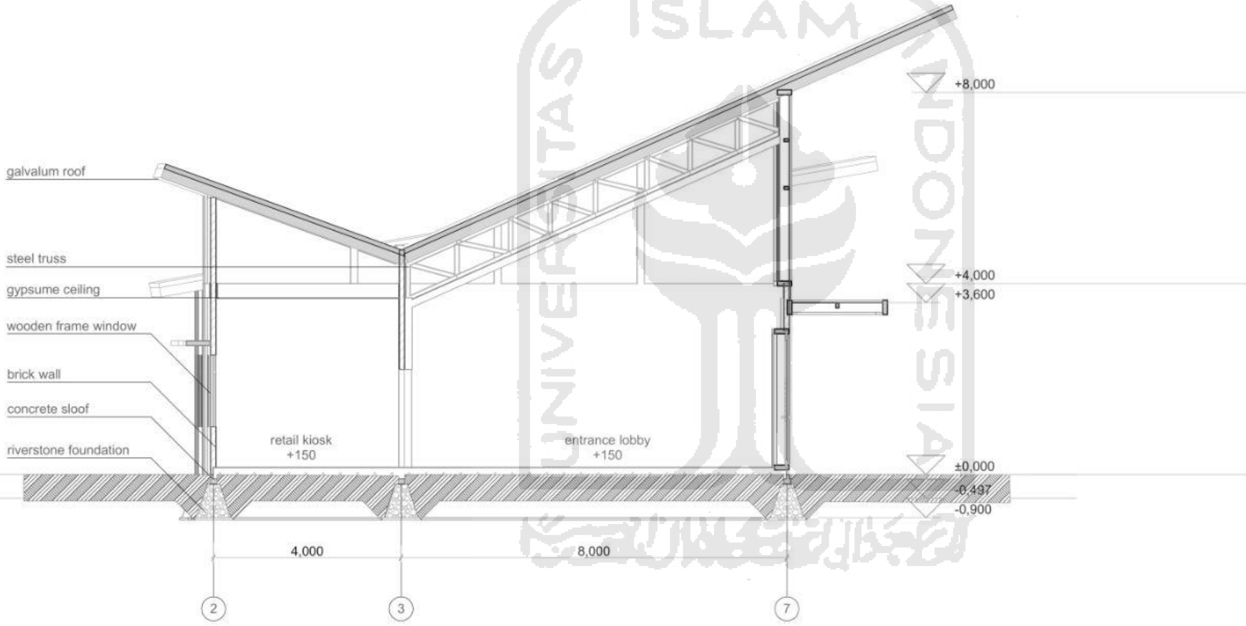

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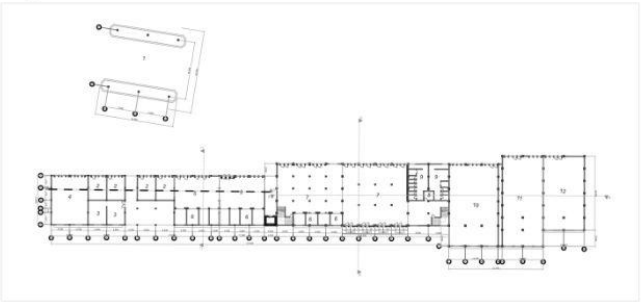

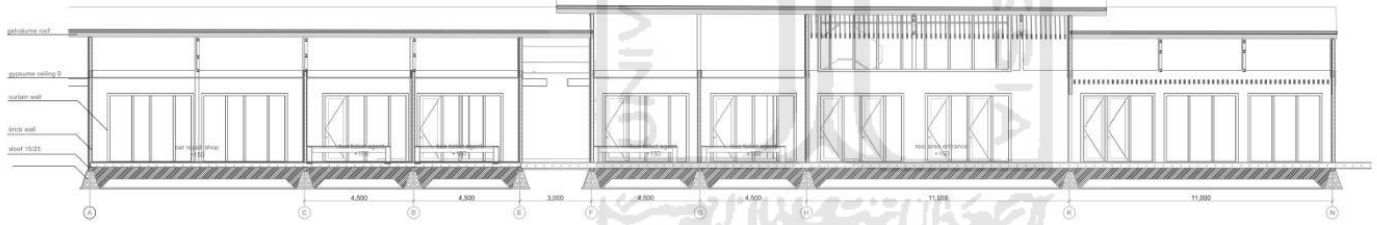

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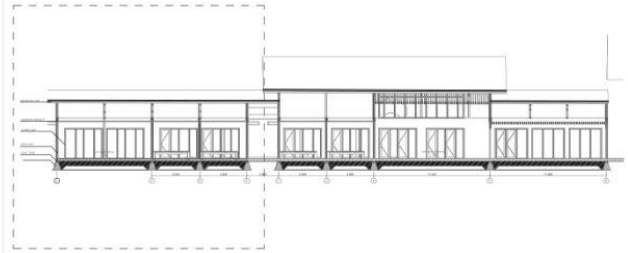

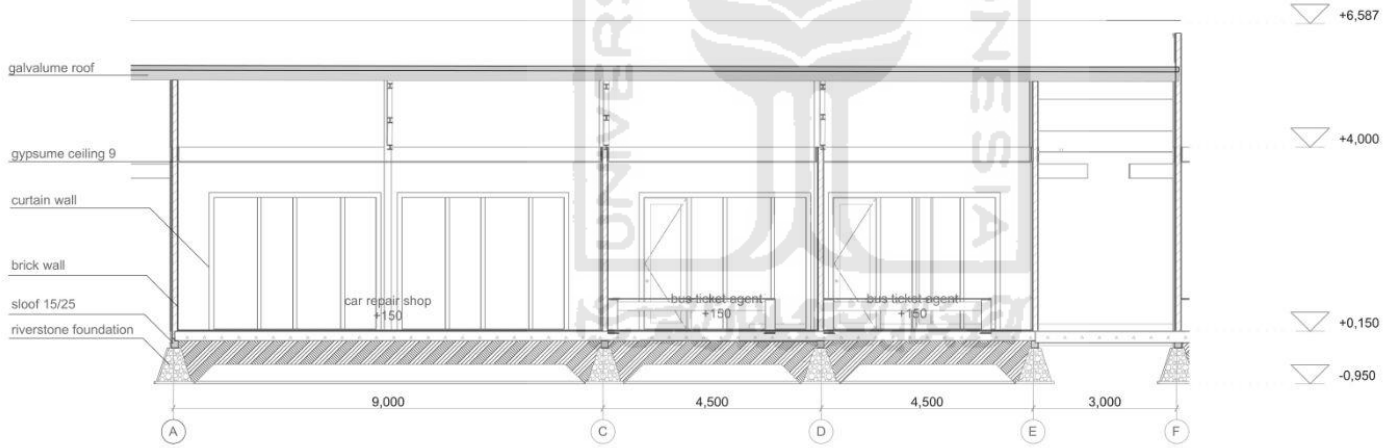

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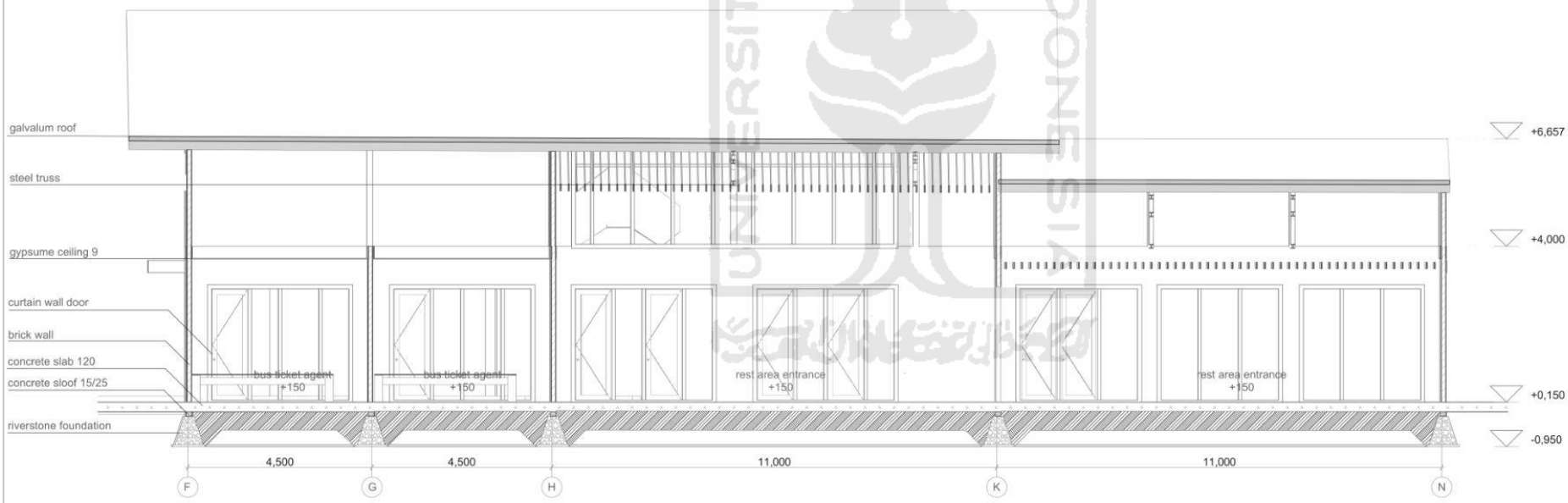

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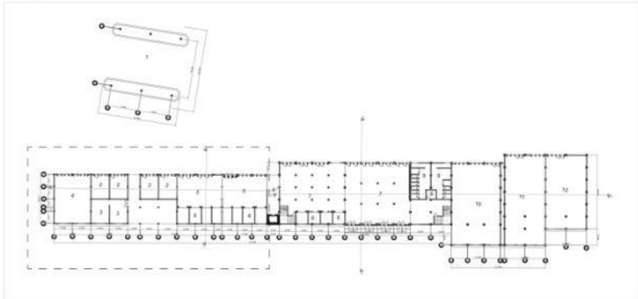

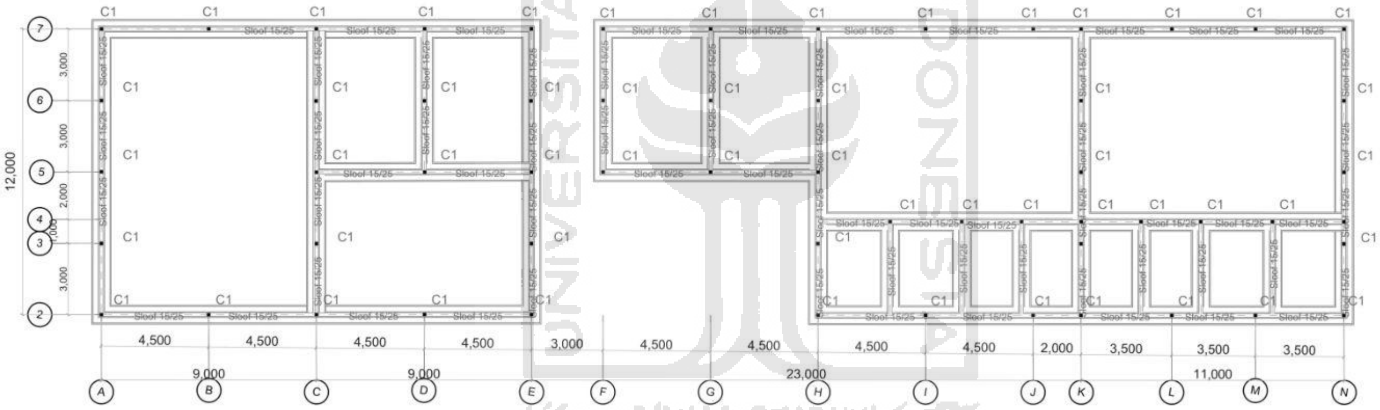

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Position no. TYPE

DESCRIPTION

C1: concrete column 150/150

C2: concrete column 300/300

C3: concrete column 200/200

C4: steel column 200/200

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COURSES	Class
Final Architectural Design Studio	IP

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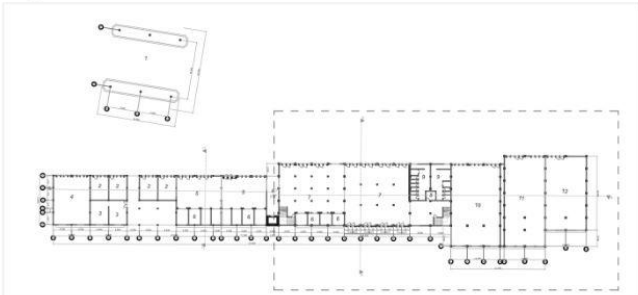

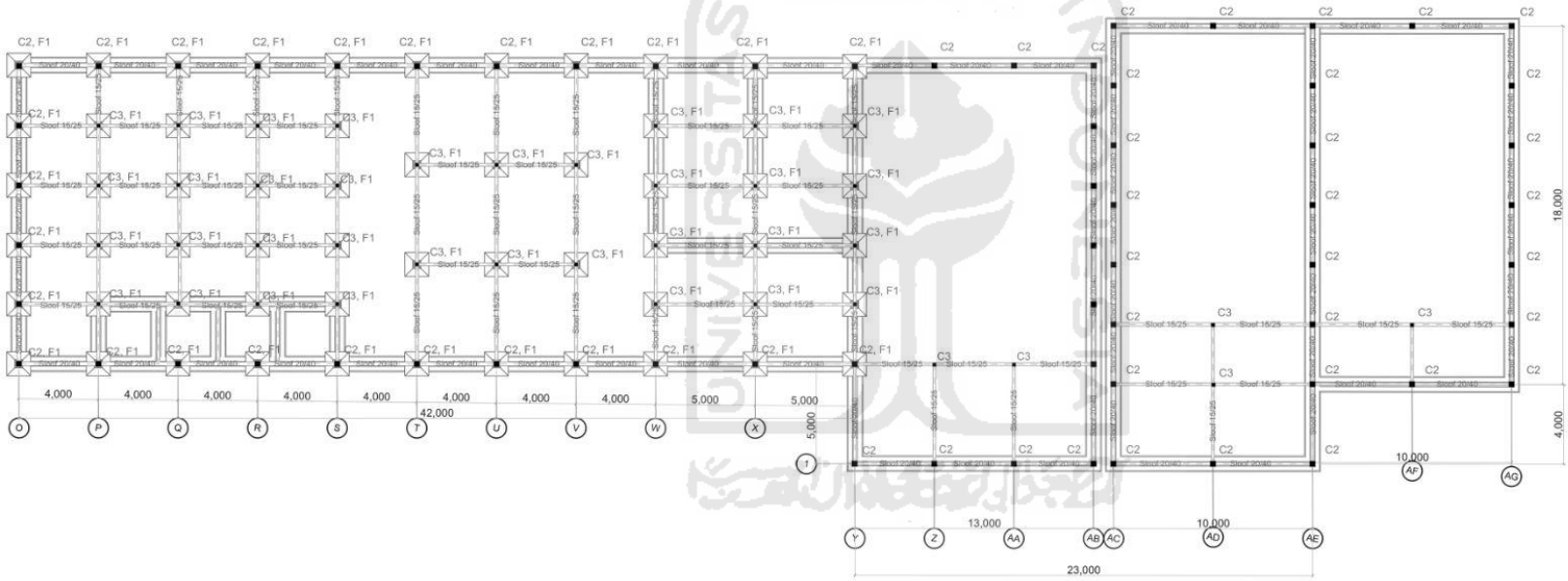

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GALIH INDRASWARI	17512001
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DESCRIPTION

C1: concrete column 150/150

C2: concrete column 300/300

C3: concrete column 200/200

C4: steel column 200/200

F1: foot plate foundation 1200/1200

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PAGE	TOTAL 36
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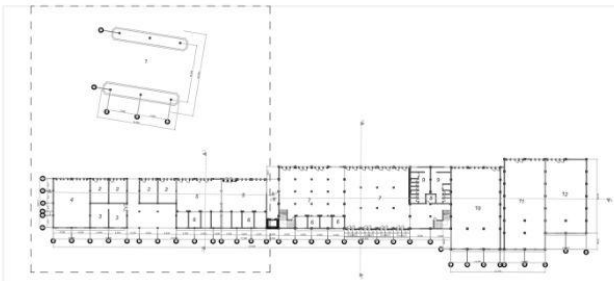

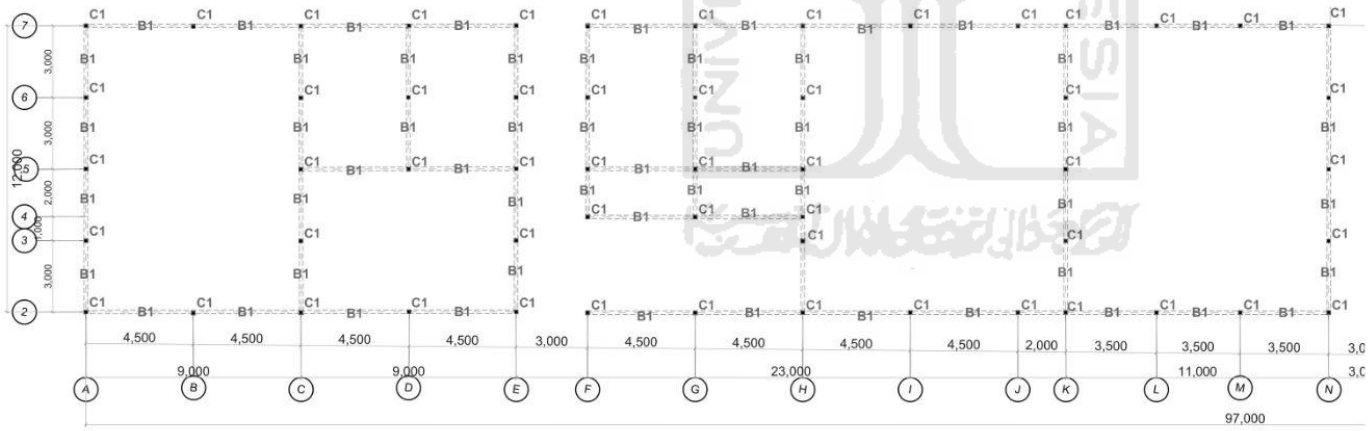

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PENGGUNG REST AREA +
Jl. Solo-Yogyakarta, Klaten, Cepet, Klaten

PENGGUNG REST AREA +
with Roadside Service Station Concept

ARCHITECT STUDENTS	ID
GALIH INDRASWARI	17512001

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Position no. TYPE

DESCRIPTION

C1: concrete column 150/150

C2: concrete column 300/300

C3: concrete column 200/200

C4: steel column 200/200

B1: concrete girder 150/200

B2: concrete girder 200/400

B3: concrete girder 150/300

B4: steel girder 200/300

B5: steel beam 150/200

NOTES

PAGE TOTAL 36

COURSES: Final Architectural Design Studio

Class IP

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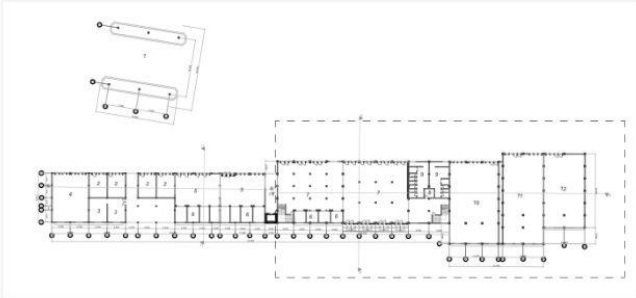

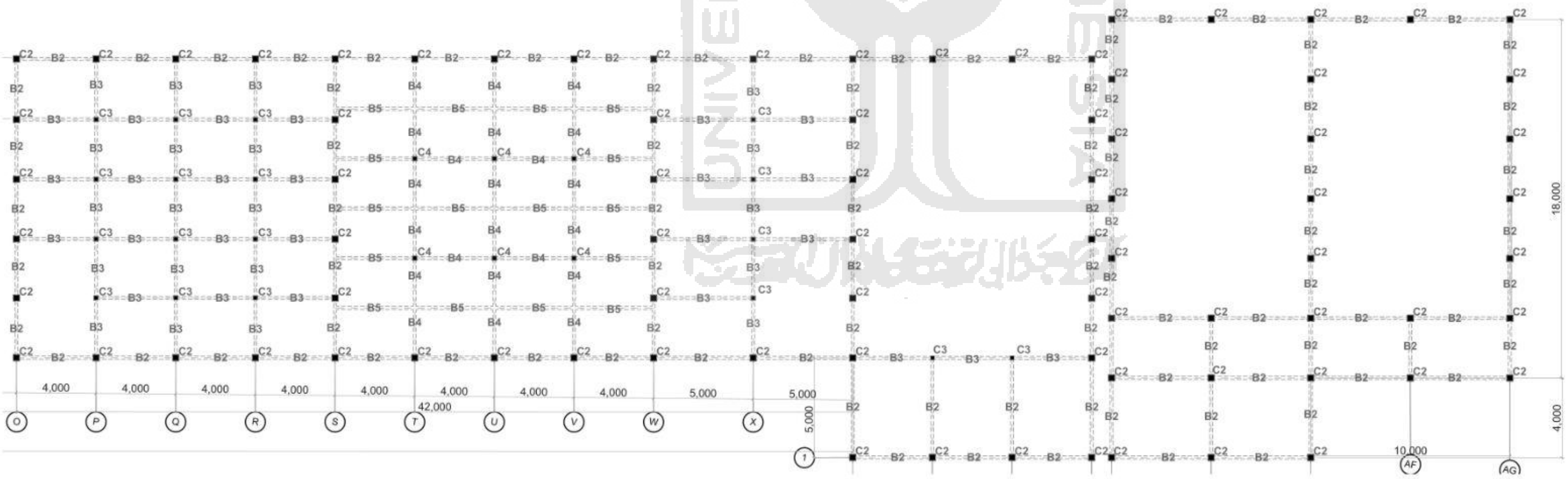

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UNIVERSITAS ISLAM INDONESIA

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PENGGUNG REST AREA +

PENGGUNG REST AREA +
with Roadside Service Station Concept

ARCHITECT STUDENTS	ID
GALIH INDRASWARI	17512001

DOSEN PEMBIMBING
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Position no. TYPE

DESCRIPTION

C1: concrete column 150/150

C2: concrete column 300/300

C3: concrete column 200/200

C4: steel column 200/200

B1: concrete girder 150/200

B2: concrete girder 200/400

B3: concrete girder 150/300

B4: steel girder 200/300

B5: steel beam 150/200

NOTES

PAGE | TOTAL 36

COURSES
Final Architectural Design Studio

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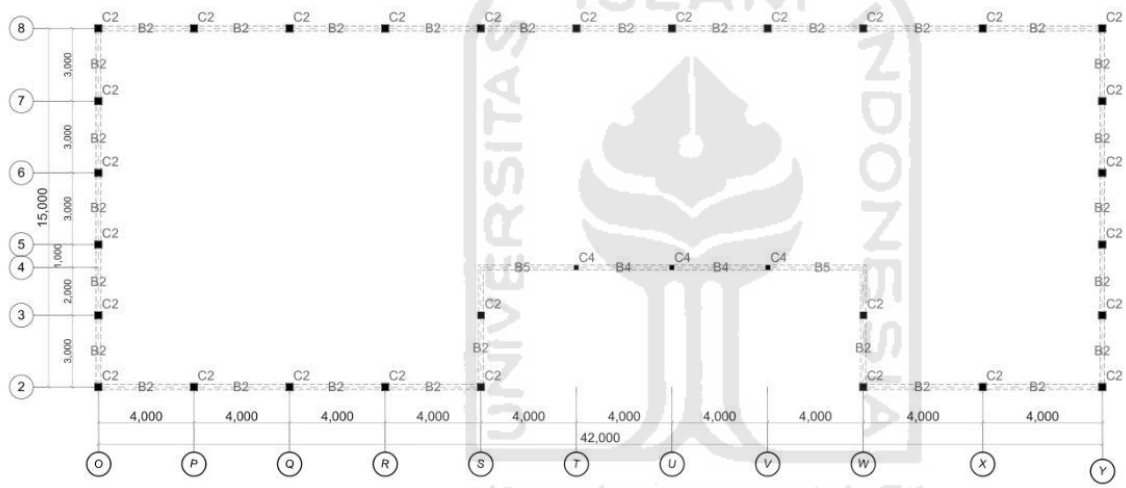

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PENGGUNG REST AREA +
Jl. Solo-Yogyakarta, Klaten, Cepor, Klaten

PENGGUNG REST AREA +
with Roadside Service Station Concept

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GALIH INDRASWARI	17512001

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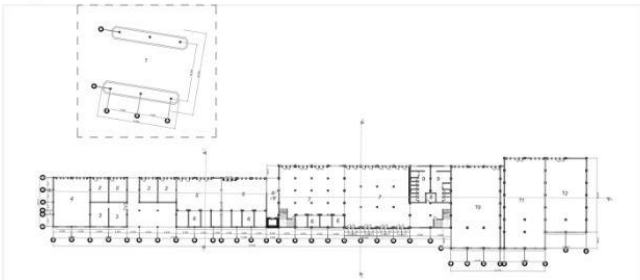

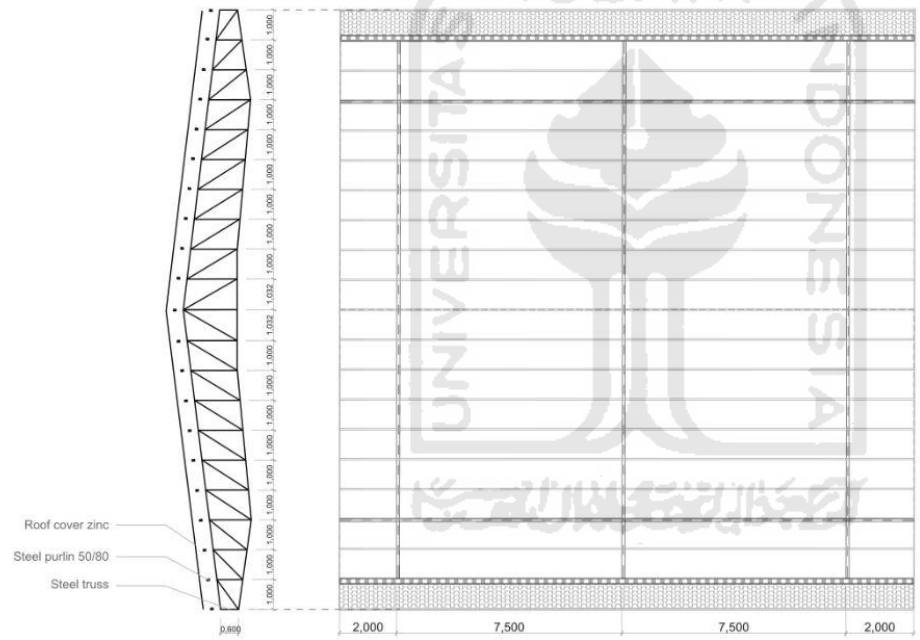

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ARCHITECT STUDENTS	ID
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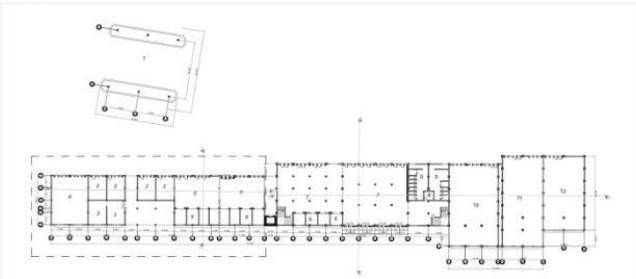

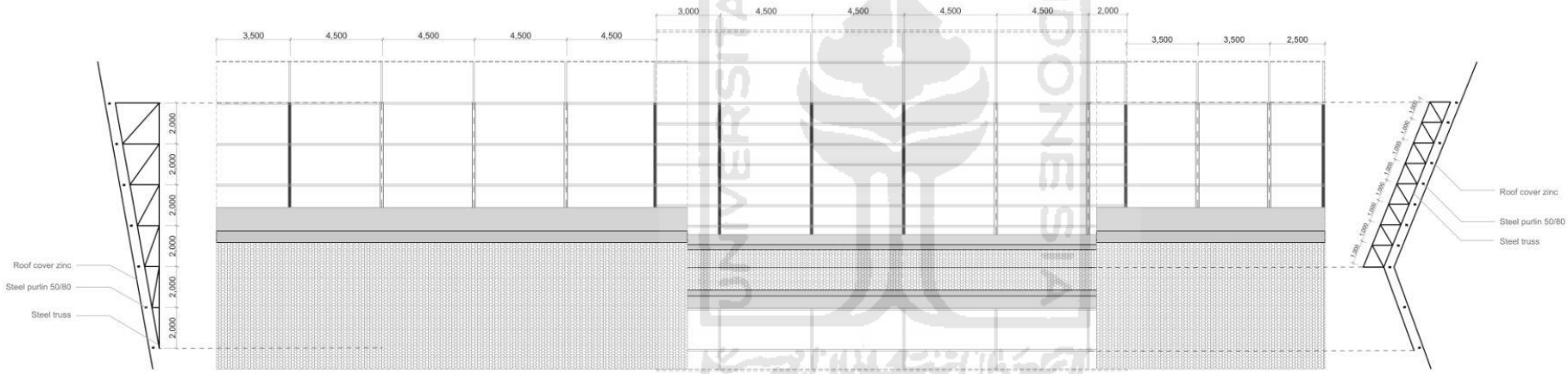

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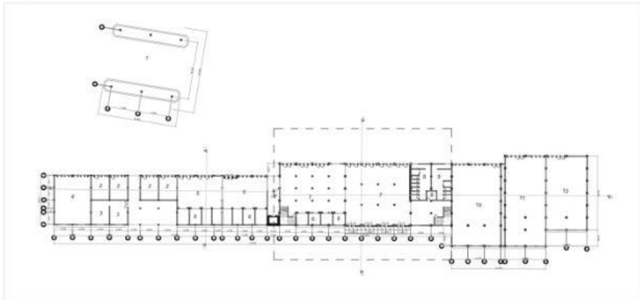

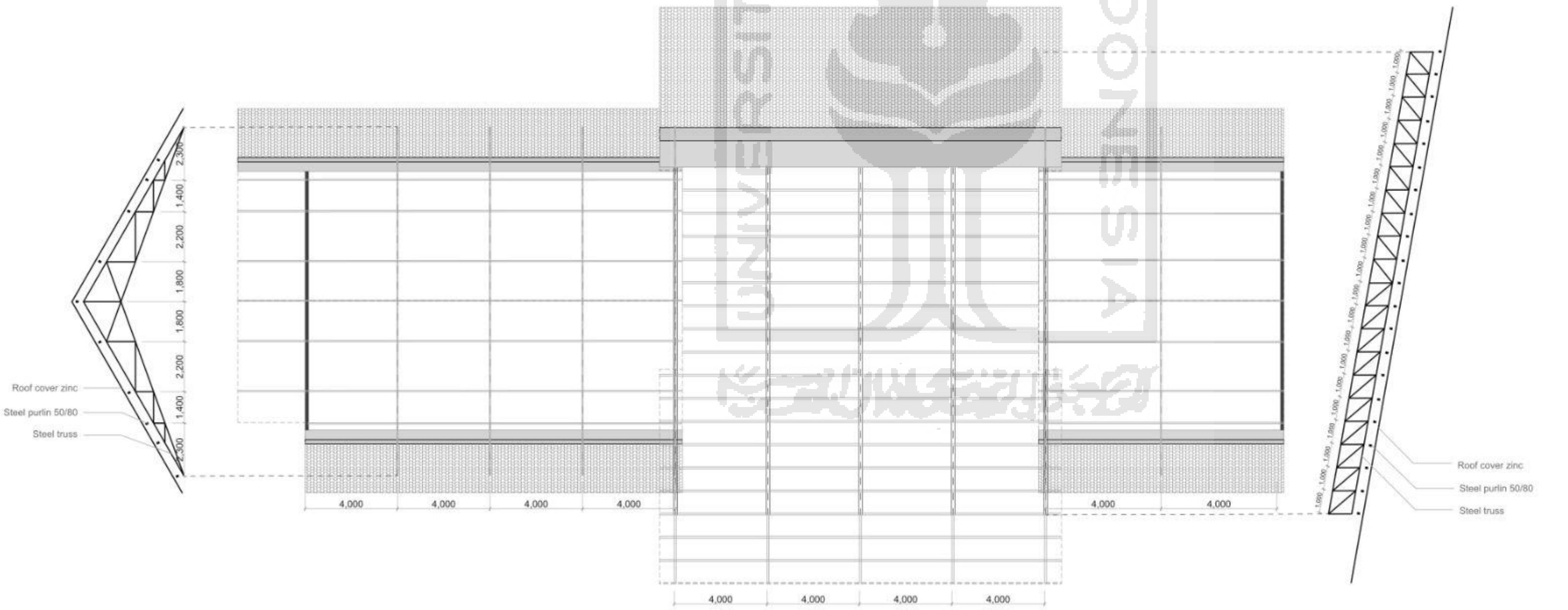

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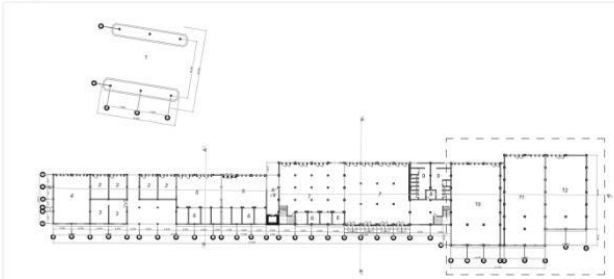

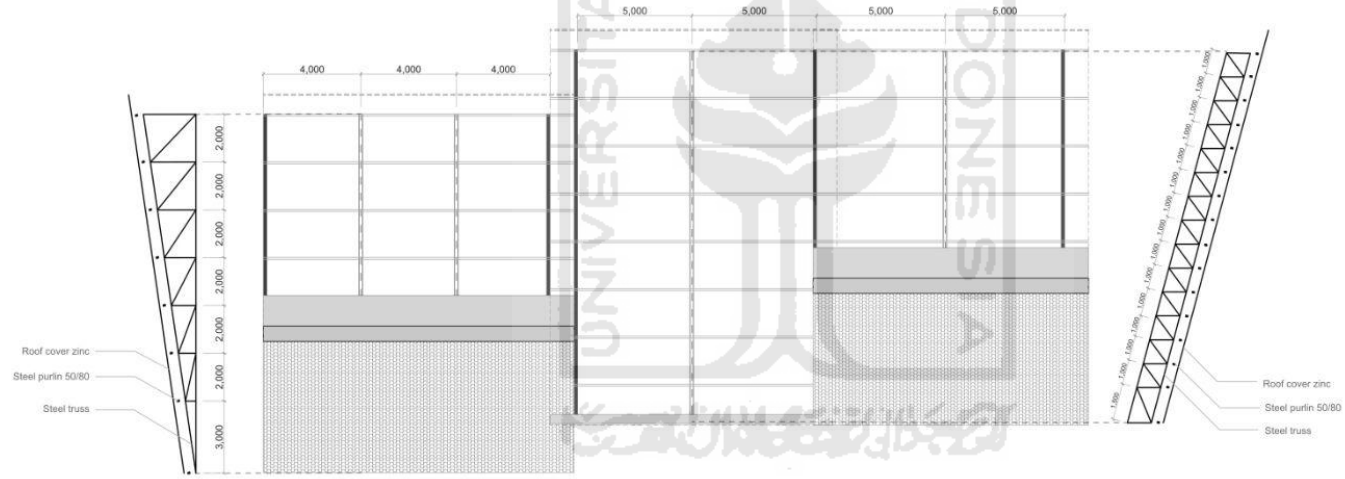

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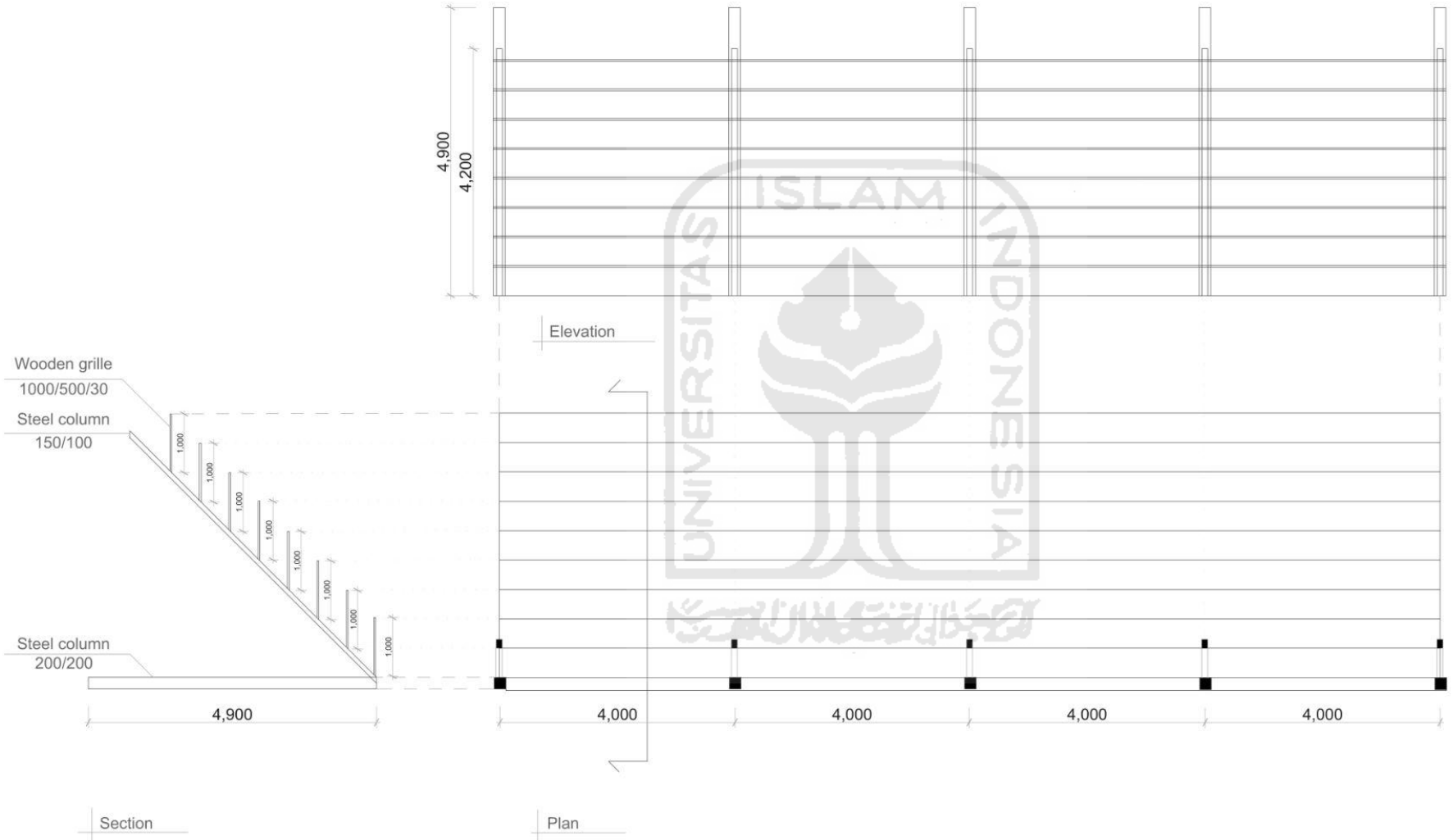

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PAGE	TOTAL
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COURSES	Class
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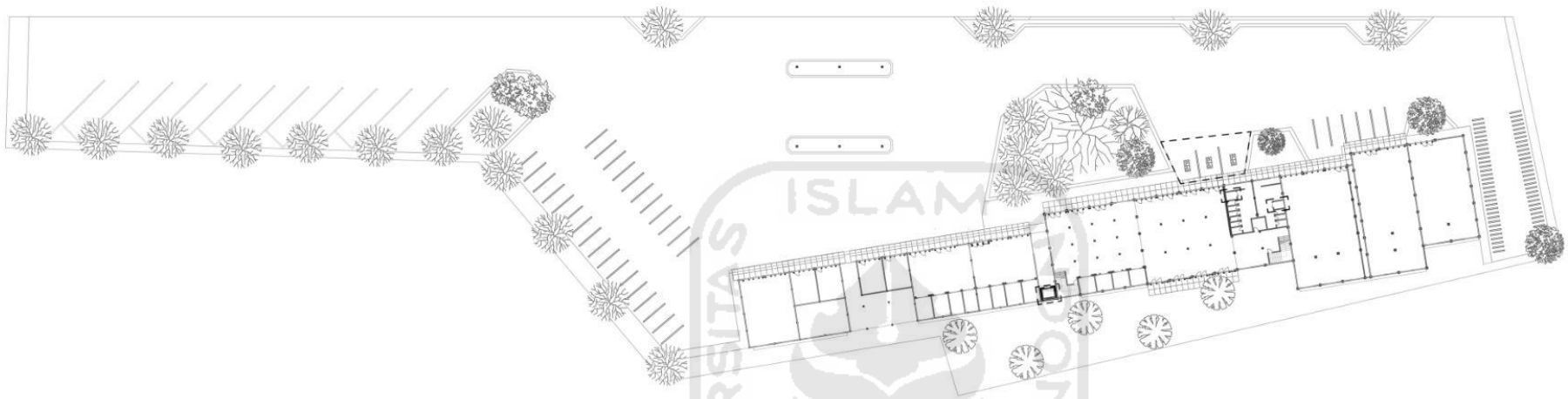
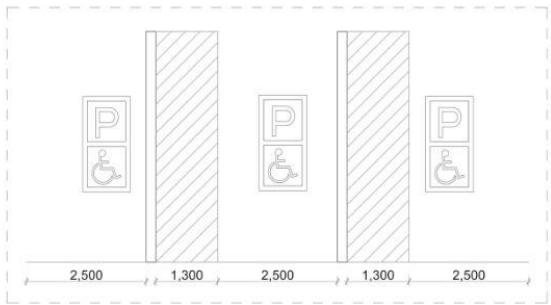
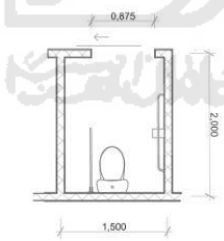




disable parking detail



disable toilet detail

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PENGGUNG REST AREA + with Roadside Service Station Concept	
ARCHITECT STUDENTS	ID
GALIH INDRASWARI	17512001
DOSEN PEMBIMBING Dr. YULIANTO P. PRIHATMAJI, S.T., M.T., IAI, IPM	
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PAGE	TOTAL 36
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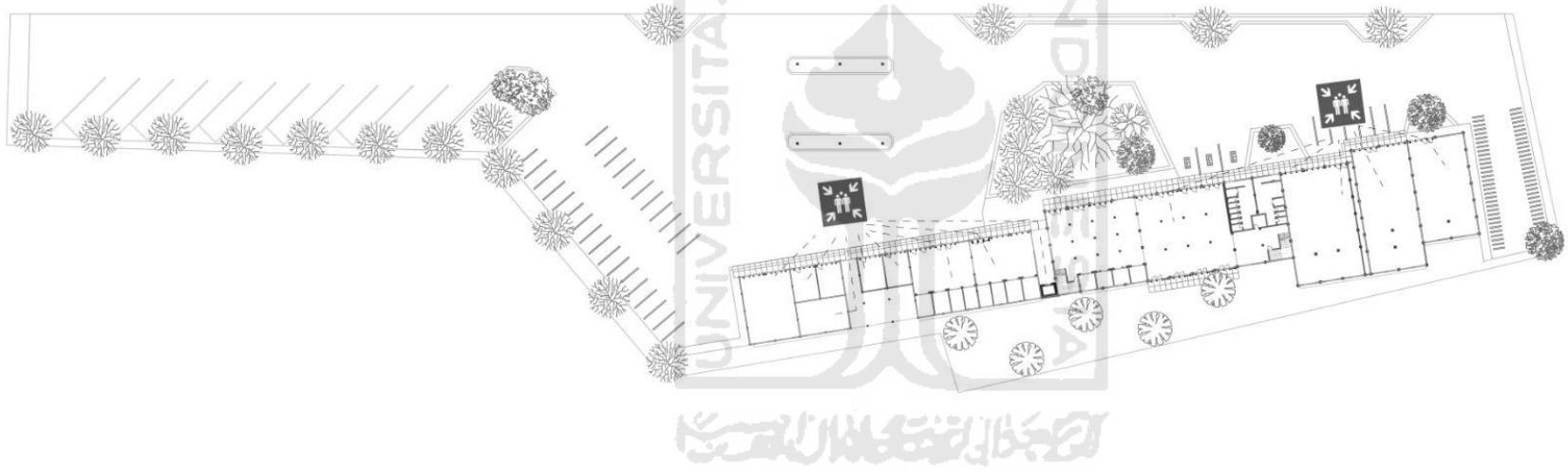

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Position no. | TYPE

DESCRIPTION

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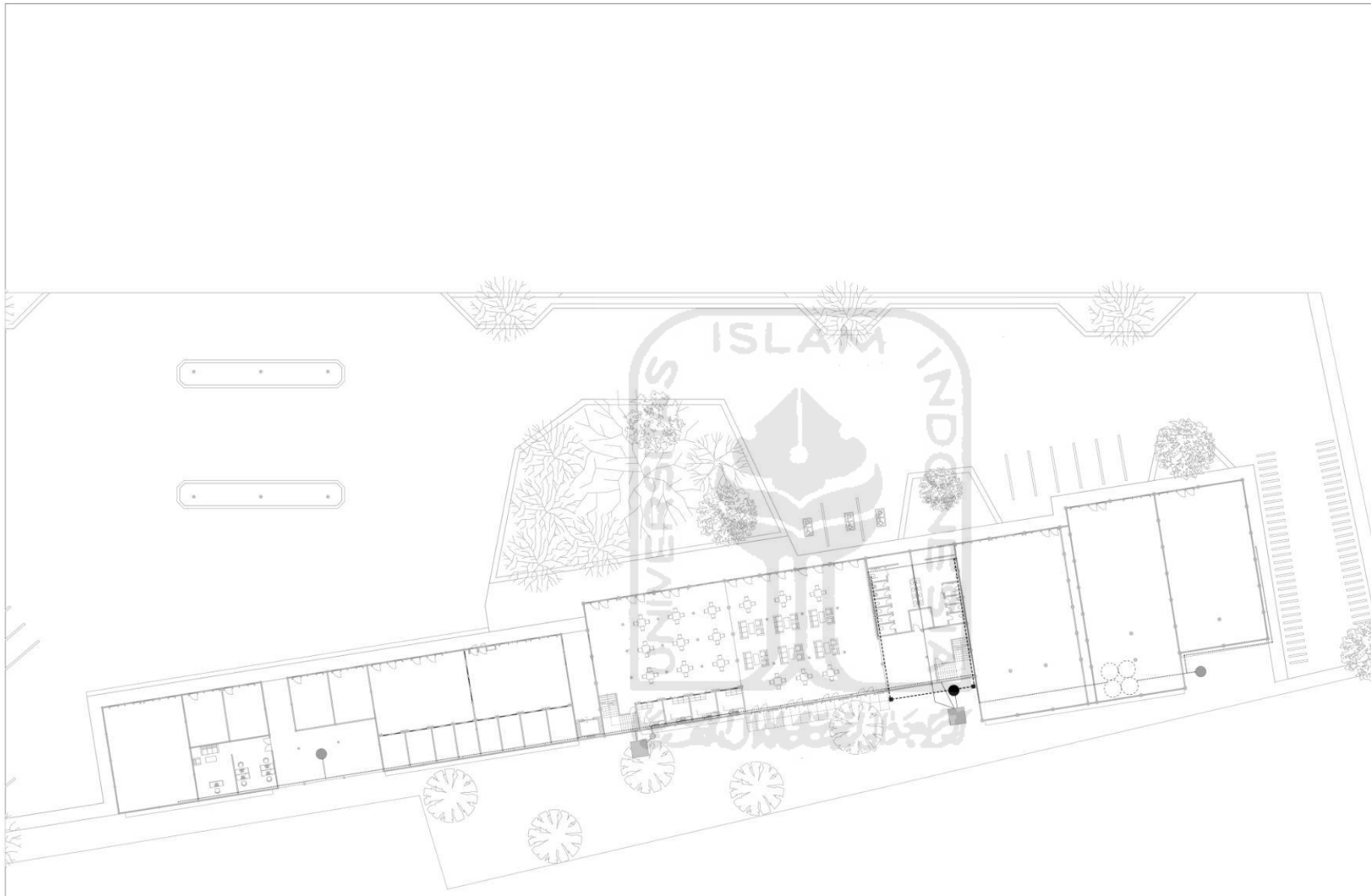
COURSES	Class
Final Architectural Design Studio	IP



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Position no. TYPE

DESCRIPTION

- infiltration well
- control tank
- septictank
- greese trap
- well
- water reservoir
- black water
- clean water
- grey water

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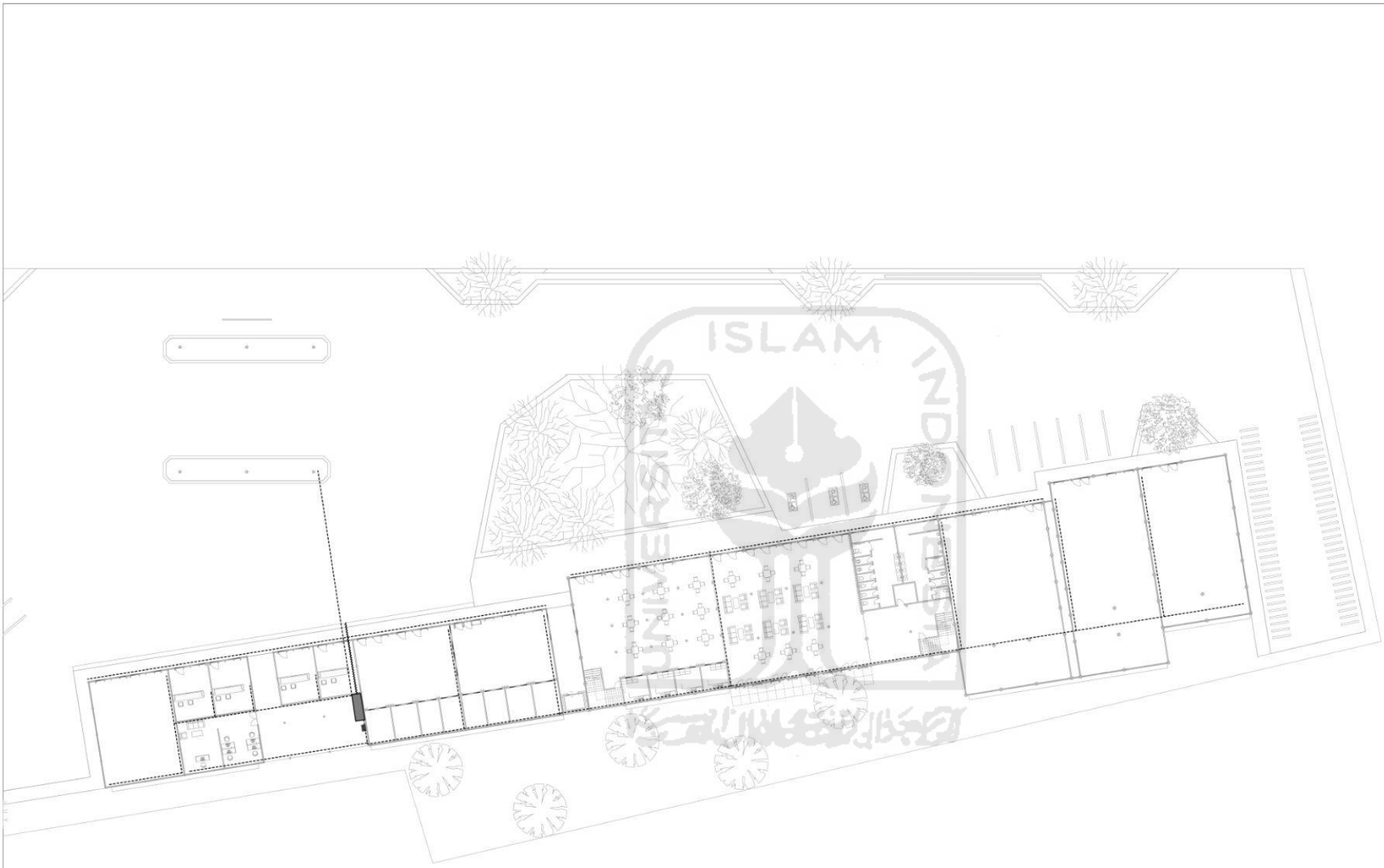
PAGE	TOTAL
	36

COURSES	Class
Final Architectural Design Studio	IP



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Position no. TYPE

DESCRIPTION

- MDP
- SDP
- electricity cable
- elctricity from PLN

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PAGE	TOTAL
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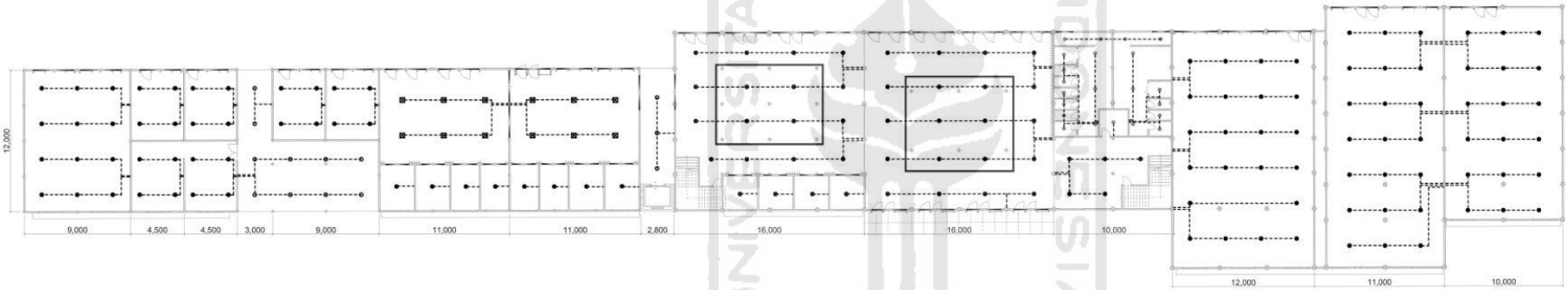
COURSES	Class
Final Architectural Design Studio	IP



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Position no. TYPE

DESCRIPTION

- downlight
- baret lamp
- hanging lamp
- fitting lamp
- LED lamp
- electricity cable

NOTES

PAGE	TOTAL
	36

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Final Architectural Design Studio	IP

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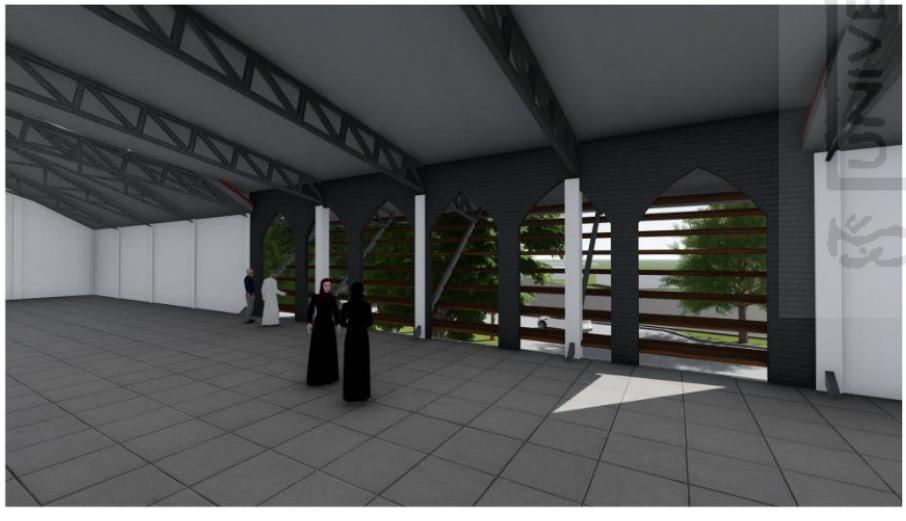

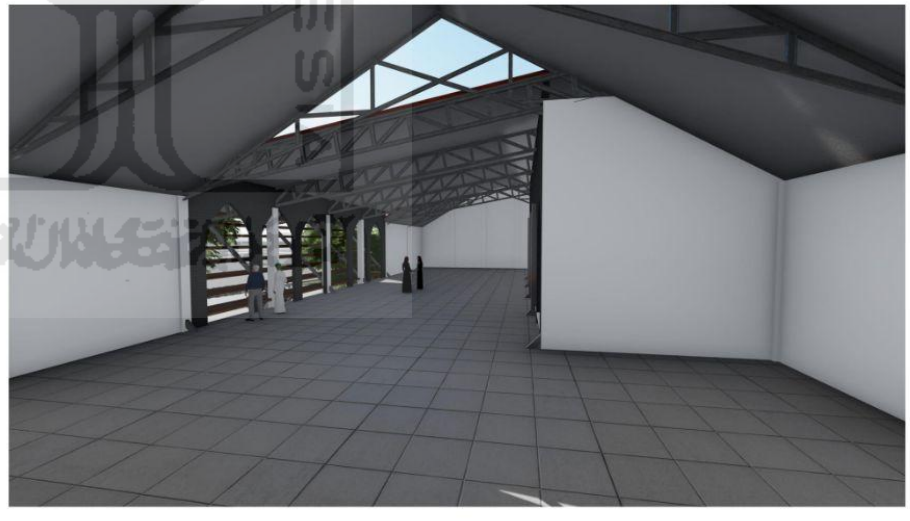

INSTITUTION

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UNIVERSITAS ISLAM INDONESIA

PROJECT

PENGGUNG REST AREA +
Jl. Solo-Yogyakarta, Klaten, Cepet, Klaten

PENGGUNG REST AREA +
with Roadside Service Station Concept

ARCHITECT STUDENTS | ID

GALIH INDRASWARI | 17512001

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DOSEN PENGUJI
PROF. NOOR CHOLIS IDHAM

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PAGE | TOTAL 36

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Architectural Presentation Board

PENGGUNG REST AREA +

REDESIGN OF PENGGUNG BUS TERMINAL AS REST AREA
IN KLATEN CENTRAL JAVA WITH ADAPTIVE REUSE CONCEPT

1 Background

Penggung Terminal which is located on Jl. Klaten - Solo, Klepu, Ceper, Kec. Karanganom, Klaten Regency, Central Java is a type C passenger terminal. Buses that stop at this terminal are buses heading for Jogja-Solo and Semin-Penggung. Other rural bus fleets are no longer available.

The decrease in the number of bus passengers between Yogyakarta-Solo and Gunungkidul-Klaten has made the Penggung terminal empty of visitors. According to Syahputra 2020, people prefer to use trains to travel from Yogyakarta to Solo, or vice versa. Public interest in using public transportation has also decreased and they prefer to use private vehicles.

2 Issues and Problem

Lack of visitors in Penggung bus terminal
The Penggung terminal is now empty of visitors. This is due to a decrease in the number of bus passengers who have begun to switch to other modes of transportation, such as commuter lines and private vehicles.

Towards the dead place
Land use on the Penggung bus terminal is not optimal. The terminal is equipped with several facilities such as a merchant kiosk, toilets, and a prayer room. However, the arrangement of these facilities was ineffective.

Strategic place with untapped potential
Penggung terminal and market is located on the edge of the Solo-Yogyakarta highway. This location is very strategic and has enormous potential.

How to re-active bus terminal?
"In the future, we will change the concept of all terminals. The concept is that there are other supporting facilities from the terminal, "said Rizal (ministry of transportation staff).

The upcoming Jogja-Solo toll road

3 Site Location

Penggung bus terminal is located on Jalan Solo-Jogja Klepu, Ceper, Klaten Regency, Central Java. The current location conditions are in the form of a terminal building and several kiosks with a land area of 12328 m2. The location is next to Jalan-Solo Jogja so that in circulation and accessibility it is very easy to reach. Located next to a national road that connects 2 tourist cities, makes Pengging bus terminal mostly traversed by private and public vehicle drivers. The heavy traffic on Jalan Solo-Jogja and the activities around the Penggung bus terminal have made this terminal known to many people, especially tourists who want to go to Yogyakarta via the trans Java toll.

4 Design Aims

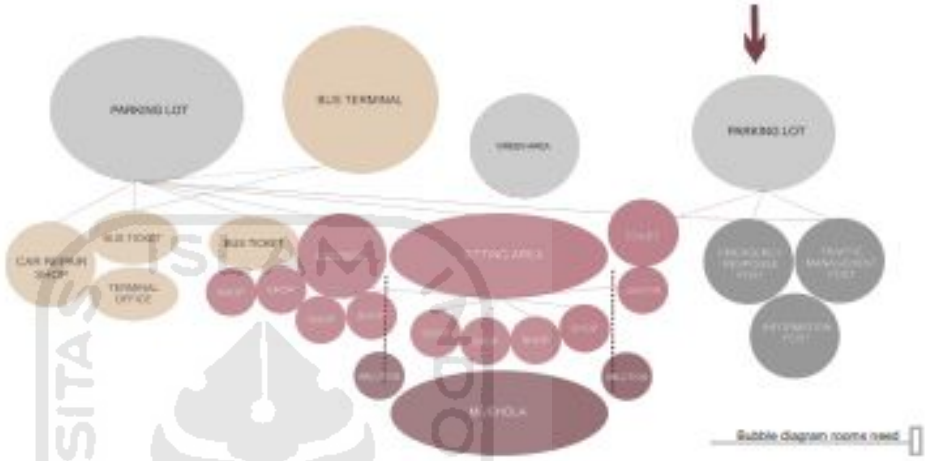
Design Aims
Can redesign the rest area and bus terminal at the Penggung terminal that is able to apply the adaptive reuse principle

Design Objectives
The target users in this rest area design are the Jogja-Solo national road drivers, bus passengers, and also the local community.

Designing a rest area in the Penggung sub-terminal area with the adaptive reuse principle so that the land does not become a dead space but still maintains the history of the site.

Designing safe circulation for terminal users and rest areas.

Able to make land efficient.



Bubble diagram rooms need

Design Method 5

The solution to the problem of dead space in the existing building of the Penggung bus terminal will be carried out by means of adaptive reuse. The building reused with additional function, namely a rest area with the concept of a roadside service station. Adaptive reuse of buildings is carried out is insertion using barrier compatible by aligning additional building with local architecture.

In the rest area part, passive design principles are also carried out so that the users can rest comfortably because the building pays attention to spatial comfort, visual comfort, and also indoor air quality.

Site Analysis 6

Wind
The diagram for Klaten shows days per month, where the wind reaches certain speed. Most of the wind came from the south and the south east.

Sun
The sun shine from the east to the west, the existing building has the east-west configuration. This gives advantage to the day lighting but disadvantage to the thermal.

Access
The site located besides the main road of Solo-Yogyakarta national road. It also have access to the Penggung-Jatinom road.

Site Zonning

Design Concept 7

Building mass concept
The building mass was kept from the existing. Some of the building is demolished because the structure is not so strong and have high risk for the future. There are also street vendors that tried to build a semi permanent building and it will not be preserved. The main structure of the terminal is kept and also the kiosk.

Adaptive Reuse Concept
The existing building that is preserved is the structure of the platform and vertical structural component such as the column and beam. While the roof was change to give a fresh new look. The local building that is chosen to be the reference in this insertion is tobacco warehouse or los mbako.

Passive design concept
The building has strategy to achieve the building comfort by passive design, there are spatial comfort, visual comfort and also indoor air quality. 2 out of those 3 used the site potential such as the wind and the sun from the nature.

The building tried to provide convenience to the user by using passive design. The natural daylight was used to give visual comfort and maximize the potential view of the site. The building that exposed by the sun longer facade so that it put with a lot of opening to let the daylight comes through the building.

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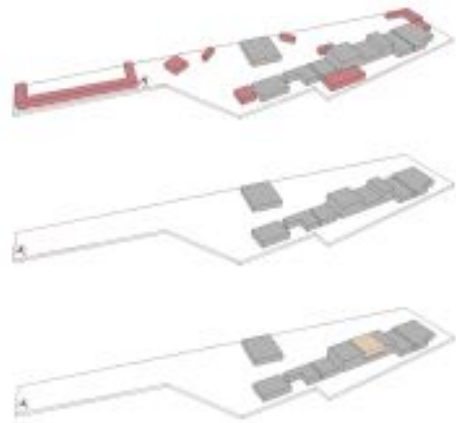
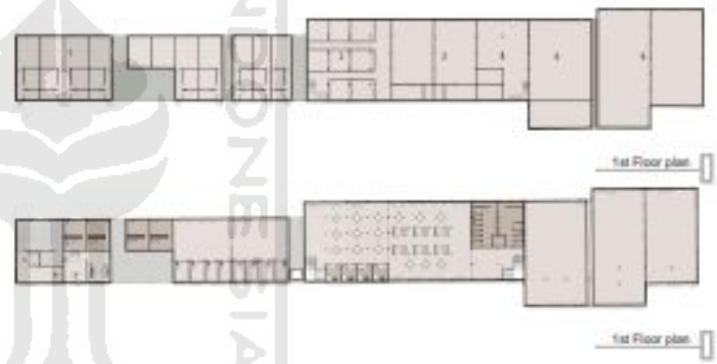


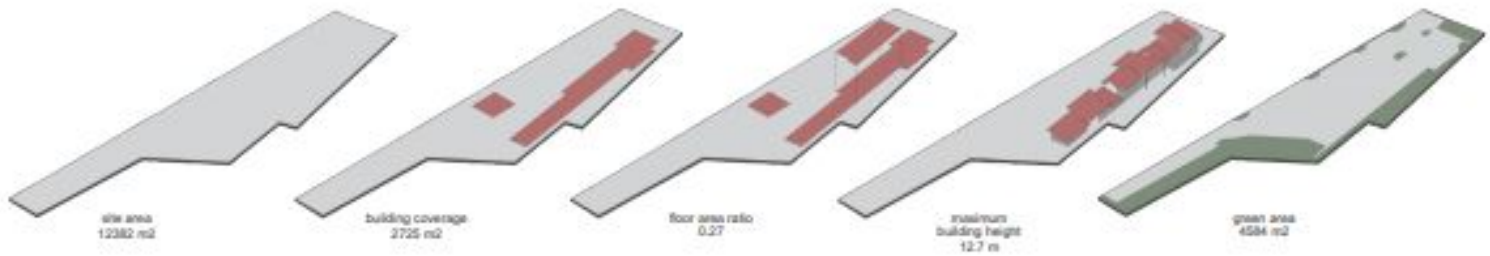
Adaptive reuse concept

Site plan



1st Floor plan

2nd Floor plan

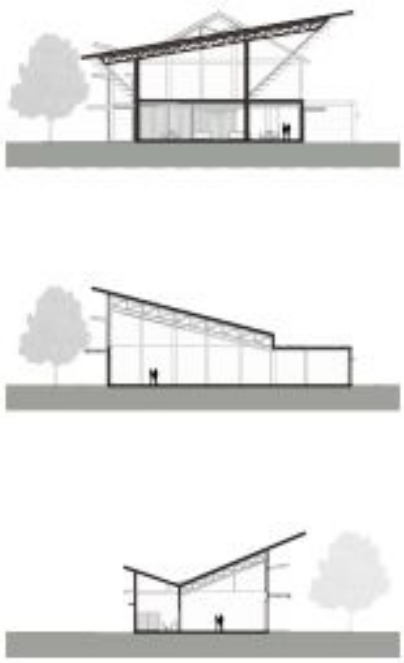


Design Result

Site plan
The site plan concept is to maintain the existing bus terminal building and the kiosk building. The circulation for the inter city bus that stop also maintained. The difference is that it provide more parking lot for the vehicle and also clearer path between the bus and also the car.

Plan
The concept of the plan is to put all of the new function and maximize the space that is provide by the existing. The centre used as the main rest area function which is the sitting area and shops. The roadside service station function located in the other edge so that it has divert access and separate from other function.

Result of redesigning
The problem from the existing plan is that it has a lot of building that is empty. Some also turn into housing for the whole family when it should be used as the retail building. In the new plan, there are not much area that is change, the border wall and the structure of platform and vertical structure are still used, but the partition wall are removed so that it can accommodate the new function.



3D Model


PENGGUNG RESTAREA +
SUB TERMINAL PENGGUNG


PENGGUNG RESTAREA +


PENGGUNO REST AREA

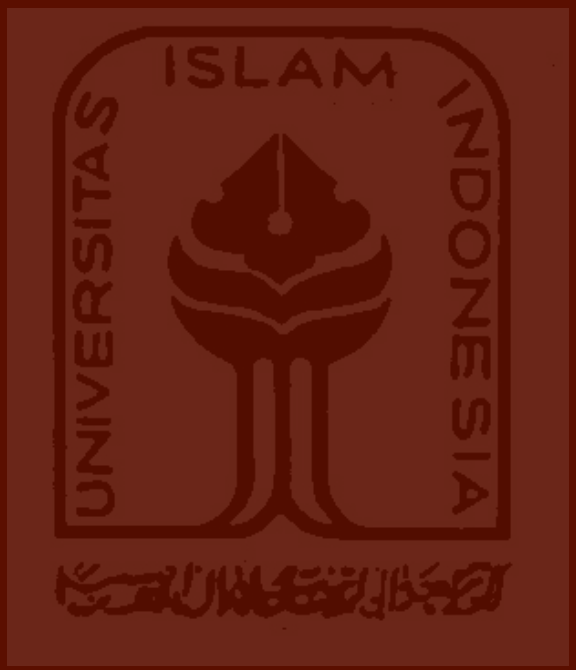
QR Codes

QR 3D Model Video

QR APREB

QR DED

QR Video Presentation



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