

# Final Architectural Design Studio

## Design of Eco-Edu Forest Visitor Center in Bunder National Reserve, Playen, Gunungkidul by Environmental Design Approach

**R3** REKA  
RUPA  
RUANG

**BUNDER**  
ECO-EDU FOREST

**Student:** Sofiana Estiningtyas (17512133)

**Supervisor:** Dr. Ing. Putu Ayu P. Agustiananda , S.T., M.A





# AUTHENTICATION SHEET

Final Architectural Design Studio Entitled

**Design of Eco-Edu Forest Visitor Center in Bunder National Reserve,  
Playen, Gunung Kidul  
with Environmental Design Approach**

**Student's Full Name**

Sofiana Estiningtyas

**Student's Identification Number**

17512133

**Has been evaluated and agreed on**

Yogyakarta, 27<sup>th</sup> July 2021

**Supervisor**

Dr. Ing. Putu Ayu P. Agustiananda, S.T., M.A

**1st Jury**

Dr. Ir. Revianto Budi Santoso, M.Arch

**2nd Jury**

Prof. Noor Cholis Idham, Ph.D., IAI

**Acknowledge by**



  
Dr. Yulianto P. Priharmaji, IPM, IAI.

# ABSTRACT

Forest conversion poses a serious threat to the forests' ability to carry out their ecological functions. With the increasing demand for urban infrastructure and commercial purposes, the effects of unsustainable forest utilization can be seen such as decreased filtration rate, decreased biodiversity, until the changes of global carbon balance because of the decreased forest contribution to reduce gas emissions.

Minister of Environment and Forestry (LHK) Siti Nurbaya on the commemoration of International Forest Day (HFI) 2021 mentioned that restoration and sustainable utilization will overcome the climate change crisis and threaten the loss of biodiversity. Meanwhile, the acts can simultaneously produce the environmental goods and services needed for sustainable development.

Special Region of Yogyakarta (DIY) covered until 17% forest total areas has TAHURA Bunder (Taman Hutan Raya) that categorized as National Reserve in Playen District, Gunung Kidul. With a total area of up to 634 Ha, TAHURA presenting the beauty of a wild forest with a variety of flora and fauna. The edu-eco forest concept is promoted by the government as a combination between environmental learning and nature-based recreation. Hence, the existing infrastructures and facilities are not yet considered the environmental design optimally. The proposed design as the visitor center for Bunder eco-edu forest focusing on the solution of low-impact construction and sustainable water and waste management. Meanwhile, in providing the visitors' unique experience to exploring nature, the spatial layout of the forest is formed based on the potential visit while acts as a hub to manage the visitors' spatial flow.

Keywords: edu-eco forest, forest utilization, visitor center, environmental design.



## INTRODUCTION PAGE

Praise and gratitude to Allah SWT who has given His mercy and love, so that the author can survive so far completing his education at the Department of Architecture at the Islamic University of Indonesia and completing the Final Undergraduate Project entitled "Design of Eco-Edu Forest Visitor Center in Bunder Nature Reserve, Playen, Gunungkidul by Environmental Design Approach.

The author realizes that the process of preparation and implementation of this Bachelor's Final Project can not be done apart from the support of many parties, therefore the author would like to express his appreciation and gratitude to:

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Yogyakarta, 27th July 2021  
That stated,



Author  
Sofiana Estiningtyas

## STATEMENT OF AUTHENTICITY PAGE

I'm Sofiana Estiningtyas as the author of this book, declare that all parts of this work except those mentioned in reference is the author's original work. Ideas in the writing and working process of this final project are came from the author with considering the supervisors input. The final result of the project are submitted to the Department of Architecture of Islamic University of Indonesia to be used for educational purposes and publications with intellectual property rights owned by the author.



Yogyakarta, 27th July 2021

That stated



Author

Sofiana Estiningtyas

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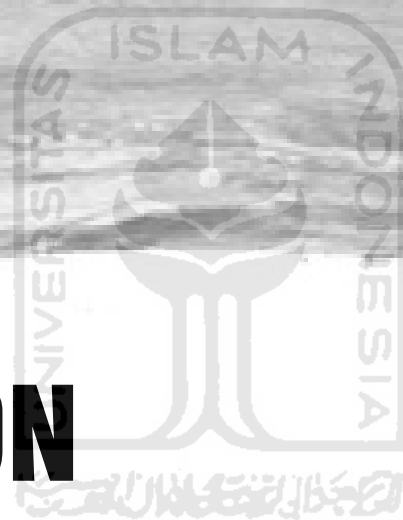
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# 01





# INTRODUCTION

BACKGROUND AND ISSUES  
PROBLEM FORMULATION  
METHOD  
DESIGN FRAMEWORK  
ORIGINALITY

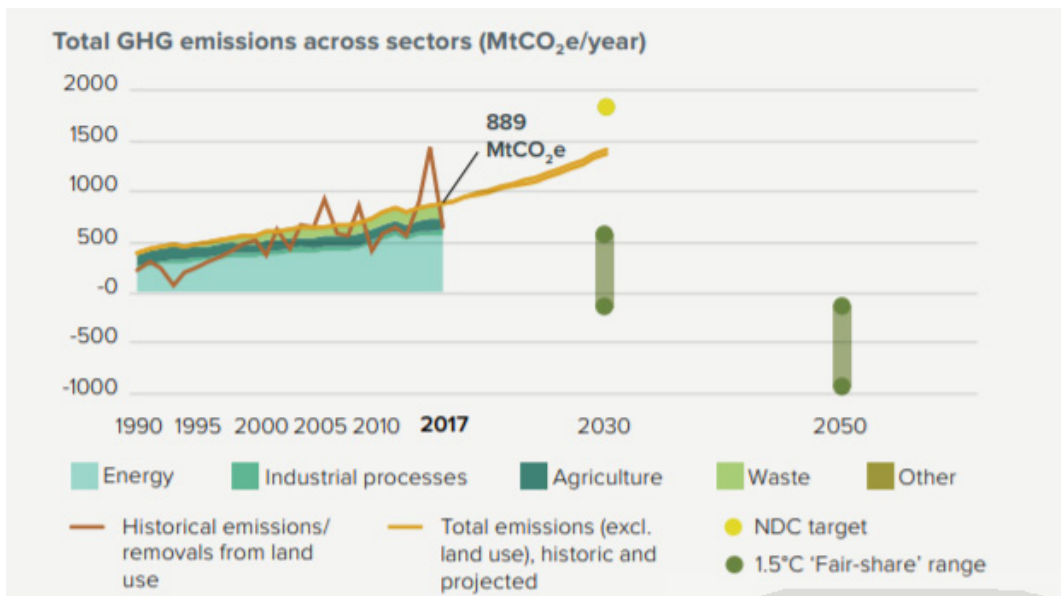
# 00/ Forest Conversion: Environmental Damage to Social Welfare Impact



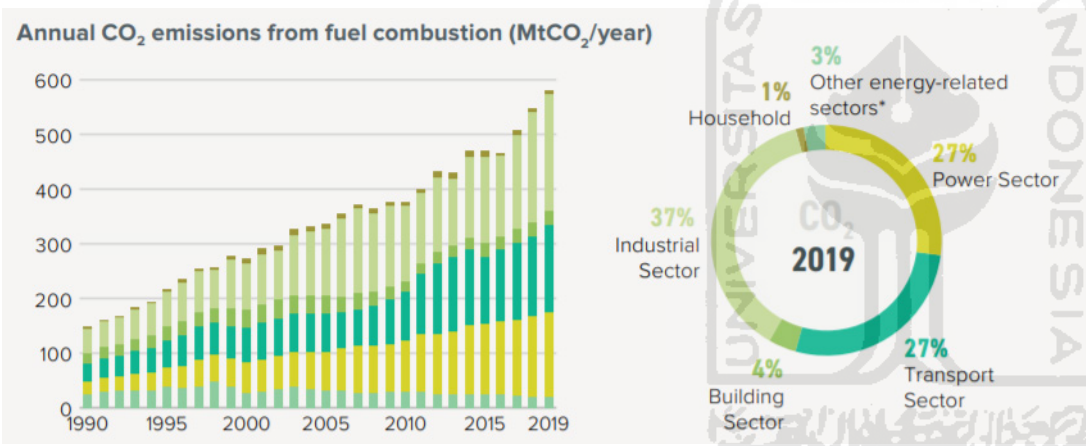
In several studies conducted by scientists, increasing extreme weather from year to year is the result of climate change. Global climate change, in more detail, is triggered by the accumulation of polluting gases in the atmosphere, especially as a result of human activities such as burning fossil fuels, industry, exploitative land use that have contributed to increasing Greenhouse Gases (GHG) such as Carbon Dioxide (CO<sub>2</sub>), Methane, (CH<sub>4</sub>), Nitrous and Oxide, (N<sub>2</sub>O), Hydro Fluorocarbons (HFCs), Per Fluorocarbons (PFCs), and Sulfur Hexafluoride (SF<sub>6</sub>) which accumulate and are absorbed in the atmosphere.

Indonesia's emissions (excluding land-use) almost doubled between 1990 and 2016 and are projected to continue growing until at least 2030. The forestry and energy sectors contribute the most to current emission levels. Indonesia is on track to overachieve its NDC (excluding land-use) based on current policies, indicating a significant potential for the government to scale up its climate action. Significant effect will be required to become 1.5 °C compatible. 1.5 °C-compatibility can be achieved via strong domestic emissions reductions. This can be supplemented with contributions to global emissions-reduction efforts. Emissions from the forestry sector could increase by as much as 300 MtCO<sub>2</sub>e by 2030. With current policies (excluding land-use) Indonesia could meet its unambitious national mitigation target, which is not compatible with the Paris Agreement. Indonesia will need to scale up climate action to become 1.5 °C 'fair-share compatible.

Figure 1.0.1  
Deforestation in Indonesia  
Source: <https://www.ecowatch.com/massive-deforestation-in-indonesia-2563843601.html>



Sources: Gütschow et al., 2019; Climate Action Tracker, 2020



Sources: Gütschow et al., 2019; Climate Action Tracker, 2020

Indonesia is a country that is blessed with the largest tropical forest in the world plus a variety of biodiversity. Forest area reaches 94.1 million hectares or 50.1 percent of the total land area in Indonesia. Tens of millions of Indonesians depend directly on these forests for their livelihoods. Either by taking forest products for daily needs or by becoming a job in the wood processing sector. Forests are also home to the extraordinary diversity of flora and fauna in Indonesia.

Climate change caused by decreasing the carrying capacity of forests due to increased interaction between people and forests (development interests, agriculture, reservoirs, etc.) makes an area vulnerable to hydro-meteorological disasters (extreme weather, drought, and landslides). A further impact has the potential to reduce the level of community welfare.

Minister of Environment and Forestry (LHK) Siti Nurbaya in commemoration of International Forest Day (HFI) in 2021 said that there are several approaches to achieve sustainable forests, namely making large-scale efforts in the context of restoring degraded land, planting and restoring land activities, and also empowering communities to manage forests sustainably. Restoration and sustainable forest management will overcome the climate change crisis and the threat of loss of biodiversity, while simultaneously producing the environmental goods and services needed for sustainable development.

Table 1.0.1  
Total GHG Emissions  
Sources: Gütschow et al.,  
2019; Climate Action Tracker,  
2020

Table 1.0.2  
Annual CO<sub>2</sub> Emission  
Sources: Gütschow et al.,  
2019; Climate Action Tracker,  
2020

# 01/ Tangible and Intangible Resources in Special Region of Yogyakarta



Yogyakarta Special Region Province is known as City of Students, City of Culture, and the City of Tourism. The research of Kemp et al. (2012b) mentioned that brand associations can play a major role in helping consumers build, develop, and express their identity. The association of city branding can occur if the people can bond in realizing the positive values that are carried, where these values have indeed provided concrete experiences about the character of the city to others.

Yogyakarta as a City of Students has a diverse student population from many regions, with City conditions that are comfortable for learning and activities, have costs affordable, and supportive living development of science. One of the effects of its magnitude the student population in Yogyakarta is development of supporting facilities for education and discovery learning facilities that not limited only for formal education but also non-formal education including character and

Figure 1.1.1  
Yogyakarta Aerial View  
Source: <https://akiso-to.com/wp-content/uploads/2020/05/Aerial-View-of-The-City-of-Yogyakarta-in-Java-Indonesia-1536x1007.jpg>

cultural education nor environmental education.

Moreover Yogyakarta was chosen in the ASEAN City of Culture event by the ASEAN ministers in the 2018-2020 period. This is supported by the fact that Yogyakarta is rich in culture, both from its tangible culture and intangible culture. . The cultural potential in Yogyakarta itself can be divided into the tangible culture in the form of cultural heritage and cultural heritage objects, and intangible culture such as representations, expressions, knowledge, or skills of humans as a legacy of local culture.

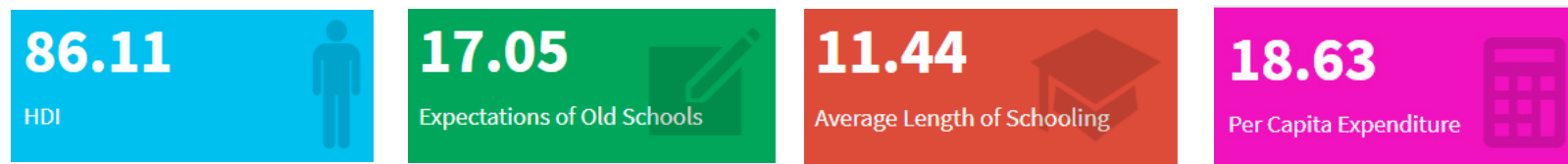
In realizing development in these three sectors, of course there are advanced human resources to support its progress. The Central Bureau of Statistics Yogyakarta (BPS) released the Human Development Index (HDI) in 2021 in 5 regions in Yogyakarta. As a result, Gunungkidul's HDI score is still the lowest in the Special Region of Yogyakarta. In detail, the HDI figures in Yogyakarta City are 86.61, Sleman Regency 83.84, Bantul Regency 80.01, Kulonprogo Regency 74.64 then Gunungkidul Regency 69.98.

Head of the Gunungkidul Central Statistics Agency, Rintang Awan Eltribakti Umbas said the Human Development Index figure in Gunungkidul from 2019 increased by 0.2. The HDI itself is obtained from the Life Expectancy Rate (AHH), Expectancy of School Years (HLS), Average Length of Schooling (RLS), and per capita expenditure. He admitted, constraints in the education sector were the most central obstacles in increasing HDI. Whereas, per-capita expenditure also two times lower than the Municipality of Yogyakarta. It means that the regional income still maintaining low.

The three sector of education, culture, and tourism should work together in actualizing the images of the city by providing the space and interactive program that possible to have uniqueness in each region in Special Region of Yogyakarta. Gunung Kidul as one of the Region that has many potencies of the natural sources and cultures to be offers expected will have a good progress in realize the sectors by enhancing th education qualities, tourism and culture promotion.

Table 1.1.1  
Human Development  
Index Yogyakarta vs  
Gunung Kidul  
Source: [https://ipm.bps.  
go.id/](https://ipm.bps.go.id/)

### HDI Yogyakarta



### HDI Gunung Kidul



Human Development Index Yogyakarta vs Gunung Kidul (2018)

# 02/ Tourism Potencies in Yogyakarta: Forest Development into Nature-Based Tourism (NBT)

Another call given to this city is “The City of Tourism”. The diversity of tourism with various attractions and complete facilities is an attraction for tourists to visit. With the uniqueness of each region of Yogyakarta, a place can be developed into a tourist attraction by its own people. As the example forest

In fact, this sector contributed significantly to regional income by 10.35 percent or equivalent to Rp.10.2 trillion with economic growth of 8.89 percent. Unfortunately, since the COVID-19 pandemic, the tourism sector in Special Region of Yogyakarta has experienced a decline. The government is starting to make new adaptations to recover from this situation including human resources and health, hygiene, and security facilities. Then compile the CHS (Cleanlines, Health, Safety (Security)) protocol including educational videos for tourism business actors. The implementation of the CHS protocol which is supported by Governor Regulation Number 28 of 2020 serves as a guideline for all industries and is known as the ‘Pranatan Anyar Plesiran Yogya’ Guide.

The Head of Marketing of Dispar DIY, Marlina Handayani, said that most people prefer to visit nature-based tourism that is open and quite private. He said in the future he would apply the *pentahelix concept* where the government, industry (business), community, media, and academics could work together to integrate to restore tourism in DIY optimally.

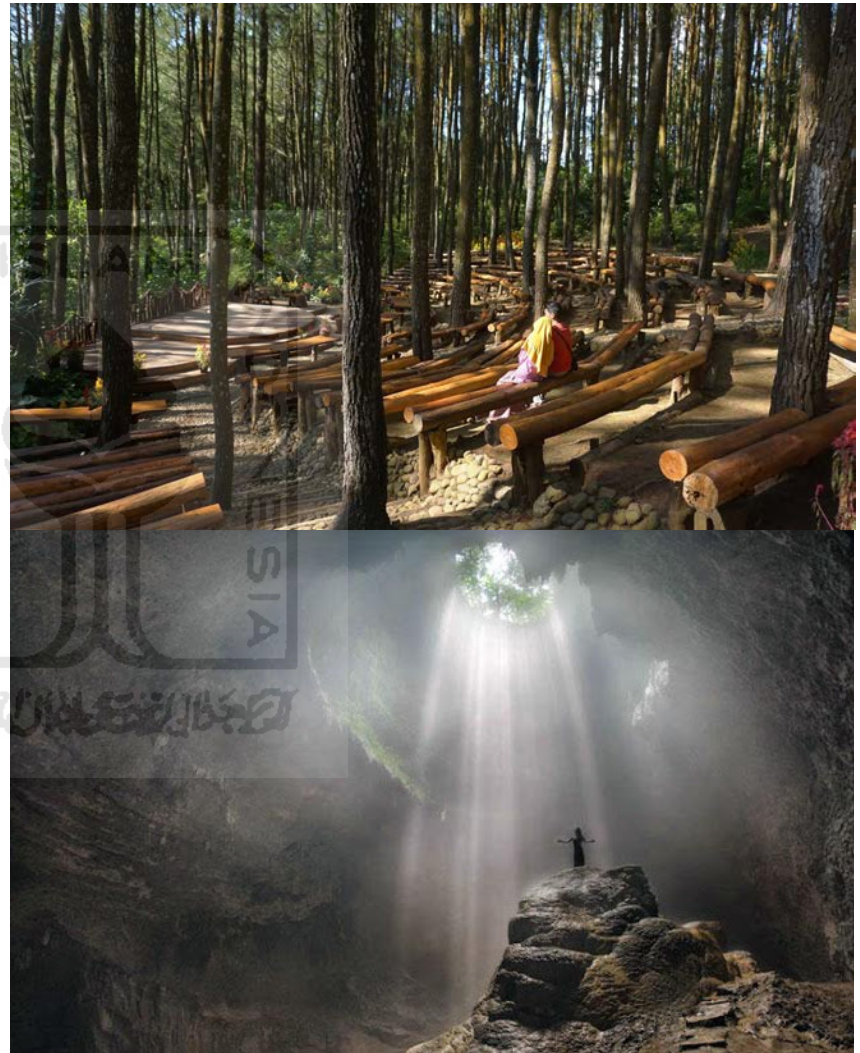


Figure 1.2.1 Pine Forest Mangunan Bantul  
Source: Google

Figure 1.2.2 Jombang Cave Semanu, Gunung  
Kidul Source: Google



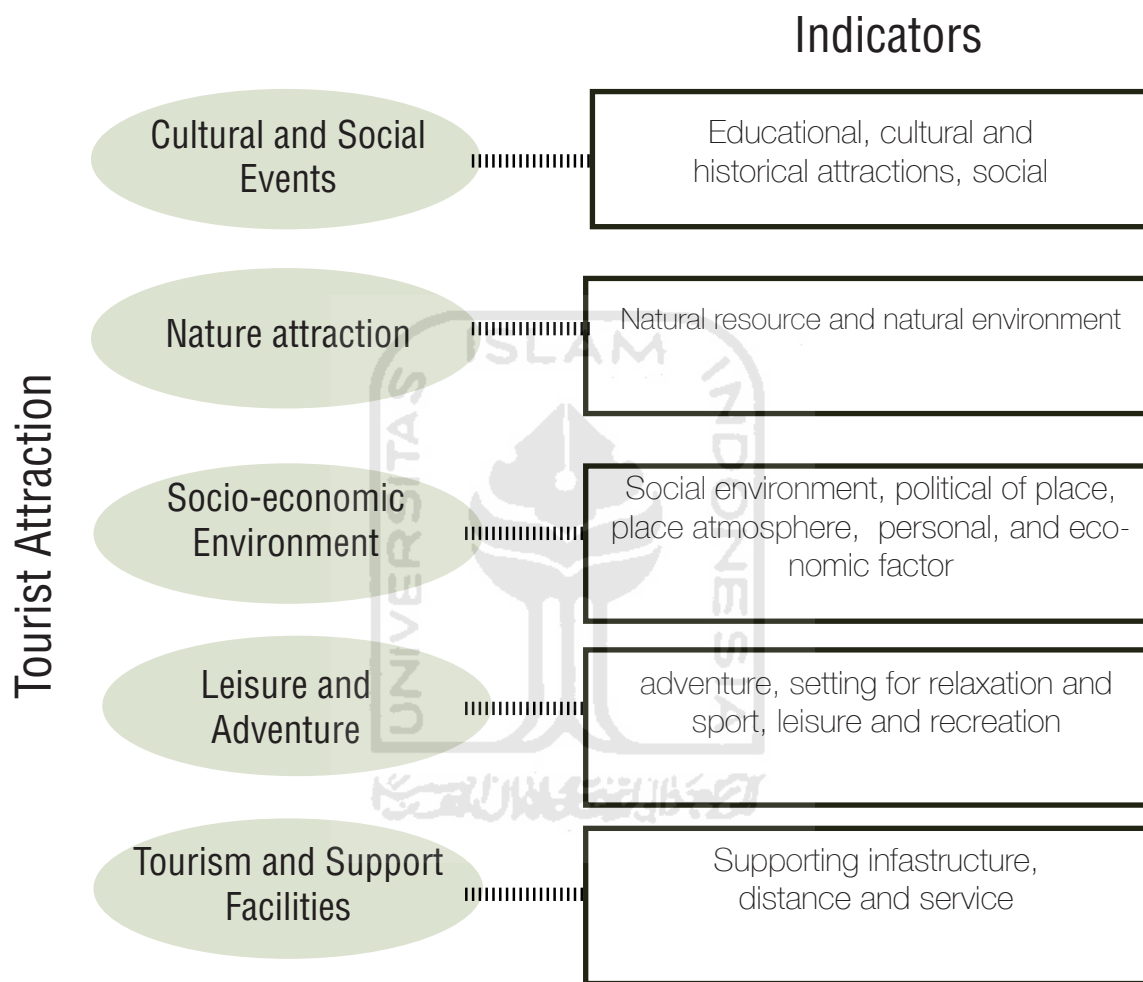


Table 1.2.1 Indicators that influence tourist attraction  
Source: Adapted from Amindo (2015)



# 03/

# Sustainable Forest Utilization

## From Management into Built-Environment Construction

Yogyakarta have a lot of natural wealth resources that can be managed into Nature-Based Tourism (NBT). We can easily find nature tourism that managed by local communities in each region of Yogyakarta. This kind of tourism is popular with eco-tourism term. As the main purpose to enjoying and studying the ecological environment, this tourism also offers affordable cost. Defined as travel to natural areas that conserves the environment and sustain the well being of people, the eco tourism having minimum degradation of environment because of low-impact facilities and accommodation.

Stated in Erlis, et. al (2013) on the research by "An analysis of tourist carbon footprint in Indonesia – The case of D.I. Yogyakarta", they found that national park and cultural conservation-based destinations in Yogyakarta have lowest carbon produced from the energy of transportation and accommodation by only 13% or 156,252.19 kg CO<sub>2</sub>.

“

**Study nature, love nature, stay close to nature, it will never fail you.**

**—Frank Lloyd Wright**



but also designing the site and landscape. The role of architect in eco-tourism is very important. As designer architect is create the environment in environment itself. The created images of the site depends on how the natural areas can be managed and built

In build the environment on nature-based tourism, there are some key element to achieve the site sustainability start from the form, space organization, until the material and construction method.

Eco tourism is become the consideration in involving multi stake holder in managing an areas. So its expected that the following principles such as conserving nature, preserving culture, and sustains the well being of people with minimum destruction of the site will be achieve and giving the worthy return to the related stake holders.



Eco-tourism in Yogyakarta itself so far already following the principles.

As the good example, Wanagama Forest in Gunung Kidul. Divides into some blocks, Wanagama have a lot of potencies such as flora and fauna diversities. that manage into tourism spot that adhere to nature-conservation behaviour. The other example is in Pine Mangunan, they also provides space to performing the local culture. So that, the eco tourism not only conserving the nature, but also preserving the culture.

In achieving sustainability of tourism, is not enough by maintaining well the potency and site values,

---

Figure 1.3.1 Forest managed into Nature-Based Tourism in Bantul, DIY.

Source: Author

# Forest Potencies and Utilization in Yogyakarta for Conservation, Education, Tourism, and Culture

## Conserving Nature and Preserving Culture

Law No. 41 of 1999 concerning Forestry stated that the forest is a unitary ecosystem in the form of a stretch of land containing biological natural resources which is dominated by species trees in communion with their environment, which are one with the others cannot be separated. The types of forests in Indonesia are based on their function:

### 1. Protected Forest

protection for life support systems regulate water management, prevent flooding, control erosion, prevent seawater intrusion, and maintain soil fertility.

### 2. Conservation Forest

#### a) Natural reserve forest

is forest with certain characteristics which has a main function as an area preservation of flora, fauna and diversity ecosystem and function as a buffer area life. Natural reserve forest area consists of reserves nature, wildlife reserves and hunting parks.

#### b) Natural conservation forest

Forest with certain characteristics, both on land and in the waters has a buffer system protection function life, preservation of plant species diversity and animals, as well as sustainable use of natural resources biology and its ecosystem. Nature conservation areas consist of top national parks, tahura and natural tourism parks.

#### c) Production forest

production forest is a forest area which has the main function of producing forest products.

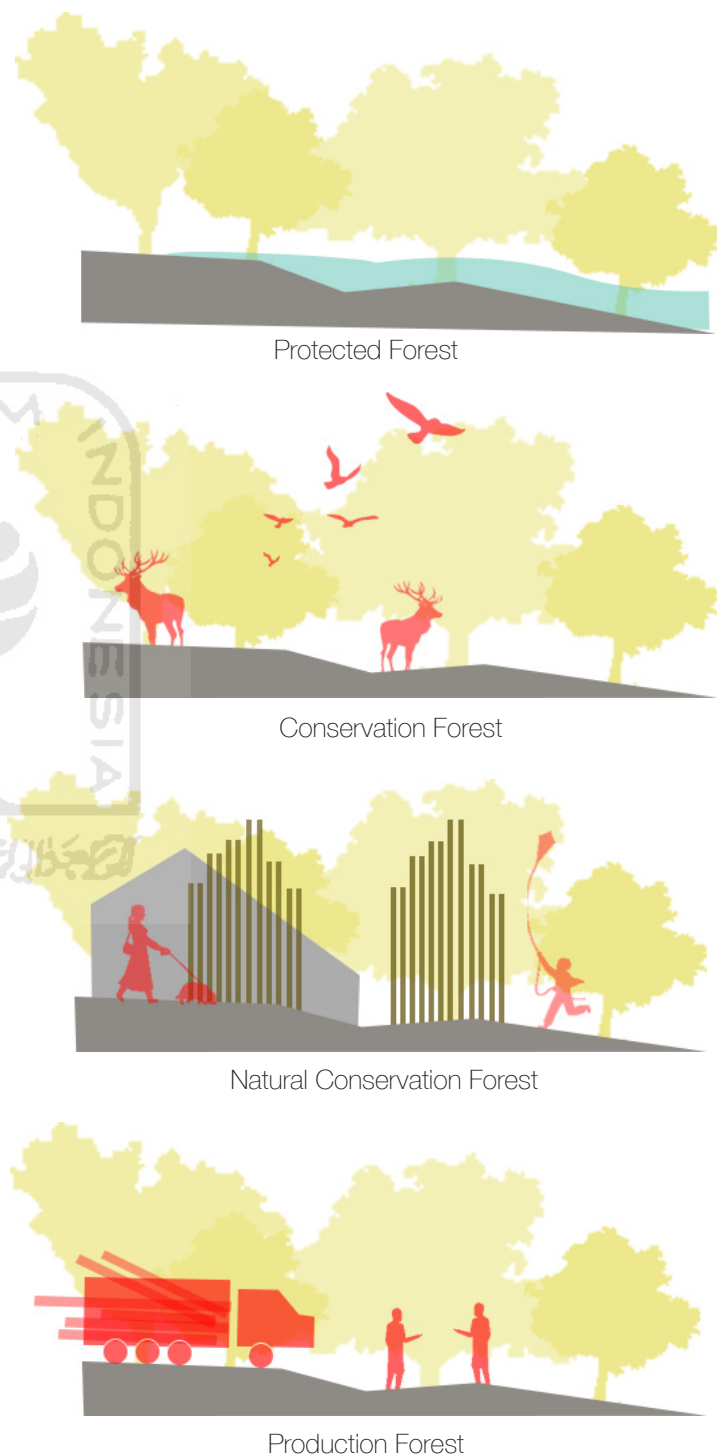


Figure 1.4.1 Forest Utilization  
Source: Author

The large potential of natural wealth in the Special Region of Yogyakarta makes nature-based tourism more popular with the community. In Imogiri, Bantul, South of Jogja City, for example, some conservation forest managed by locals into Nature-Based Tourism. Some forests, such as the Pinus Mangunan and Becici Peak opened for cultural space and outdoor learning with supporting facilities such as food culinary and public restrooms.

The utilization of forest besides conserving the natural wealth and promotes regional culture, is none other than the initiation of local residents to receive financial independence in return. Adhering to the principle of conservation, forest utilization in Yogyakarta pays close attention to environmentally friendly and locality-based designs that can be seen from the construction which suitable with the bio-physical conditions.

In utilize forest into Nature-Based tourism, the local authorities should maintaining well the potencies of the forest including the landscape and ecological value inside, so the sustainability of forest still preserved yet it gives the feedback to social-economic sector of the areas.

## Grand Forest Park (Taman Hutan Raya) Bunder Playen, Gunung Kidul, DIY

Bunder Grand Forest Park (Natural Conservation Park) is a natural conservation area for the purpose of collecting natural or non-natural plants and or animals, native species and/or non-native species, which are not invasive and are used for the purposes of research, science, education, to support cultivation, culture, tourism, and recreation. TAHURA Bunder is located about 30 km from the city of Yogyakarta, precisely in Gading III, Gading, Playen, Gunung Kidul Regency, Special Region of Yogyakarta on the edge of Jalan Raya Jogja-Wonosari. Bunder Forest covering an area of 634.10 hectares, located in the Gading area of Playen District, Gunungkidul Regency, was originally a



Figure 1.4.2 Bunder Forest Potencies for Conservation, Tourism, and Educational Purpose  
Source: Google

Permanent Production Forest (HPT), its status was changed to a Grand Forest Park (TAHURA) as part of a Nature Conservation Area (KPA) in accordance with a Ministerial Decree. Forestry on February 11, 2014. The Special Region of Yogyakarta province itself has state forests covering 18,000 hectares or 5.36% of its total area. In its management, 628.05 hectares are under the auspices of the Yogyakarta Natural Resources Conservation Agency (BKSDA), 1,728.28 hectares are under the Mount Merapi National Park (TNGM), 634.10 hectares are under Tahura, and 15,724.5 hectares are under the auspices of the Department. DIY Forestry and Plantation.



**05/**  
**Discourse on TAHURA**  
**Bunder Development:**  
**Eco-Edu Tourism Forest**



TAHURA Bunder that located on the edge of Jalan Raya Jogja-Wonosari still looks deserted until now because it has not generally been promoted to the public. The lack of attractions at TAHURA Bunder makes this place is still not very popular, unless there is an interesting event/program to invite people to the forest. TAHURA Bunder have several blocks with different function and use. Rest Area in Bunder for example, besides use for the stop over, it also can be functioned as camping ground and gathering event in daily use. While for the other block is rather use for educational and research purpose besides the main use to conserve the natural resource. Thus the recreational thing such as playing ground build here.

Several big annual events that gather the public ever held in TAHURA Bunder areas such as the Reog and Jathilan festi-

val 2017 and the festival of traditional food culinary and traditional children's games in 2019. The utilization of Taman Hutan Raya Bunder actually very flexible, but for the building and facilities provision is very limited because of the regulation of Conservation Park itself.

The serious development of TAHURA to be opened for edu-eco tourism is still a discourse until now. In 2021, DLHK DIY plans to concern to develop the Flora and Fauna Station (SFF) as education tourism program. However, it is still unclear what it will look like.

As stated in Special Region of Yogyakarta Regulations No. 13 of 2013 about Taman Hutan Raya Bunder Management, in utilize the TAHURA

into other function such as education or tourism it should considering where are the natural potencies and resources which can be used to accommodate that activities. Whereas it should stay on track with nature conservation function and keeping the ecosystem balance. So, the development of facilities should be considering the relevancies and can be utilized in long-term used. Besides the openness of management by involving multistakeholder can be supporting the optimization of TAHURA development.

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Figure 1.5.1 Fauna Station Bunder  
Source: Author



## 06/ SITE HISTORICAL BACKGROUND AND THE FUTURE PLANNING TAMAN HUTAN RAYA BUNDER

The Bunder Forest Park was inaugurated by Sri Sultan Hamengkubuwono X in 2012 with a total area of 634 hectares. Divided into several function blocks, utilization of Bunder Forest is only allowed to be cleared 10% of the total land. TAHURA Bunder has previously been opened into forest education tourism and is planned to be developed into an edu-eco tourism forest in 2021. However, according to the latest information from the Head of the Bunder Forest Park Office, Sabam Benedictus Silalahi, he said that the current direction of TAHURA's development is still unclear, because since forestry regulations moved to the provincial level, Sultan Hamengku Buwana X wants full forest restoration and minimizes physical activities at site. This led to a halt in the initial plan for for-

est development to become edu eco tourism. The Head of Utilization Section, Laksana Jati Jaya, also added that the Bunder Forest has links to the Yogyakarta palace on several of its sites. However, until now, DLHK is still conducting studies related to this potential. Bunder Forest as a conservation function in its development so far it is felt that it has not paid much attention to the principle of conservation itself, where the building facilities that are erected should pay good consideration to environmental friendly designs.

The history of the site which is also related to the palace has made a request to establish facilities according to the zoning principle of spatial planning with Javanese philosophical architecture. Toufik as the Head of the TAHURA Field in our interview, said that the Sultan advised that some of the infrastructure that was built was not in accordance with the rules of Javanese spatial planning and should be

reviewed. For example, a toilet near the entrance gate is considered impolite because the toilet should be in the wingking (back). Then there is also the placement of vegetation such as bamboo which should be placed in the back because basically it grows wild in the back of the yard. Apart from the spatial layout itself, Toufik added that the arrangement of network infrastructure such as water and sewage is still not integrated. In an interview with the author, he agreed that environment-based architecture could be a solution to solve the problem of structuring in Bunder Forest to achieve a more sustainable use and minimize environmental damage to the forest.

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Figure 1.6.1 Bunder Camping  
Ground Gate  
Source: Author

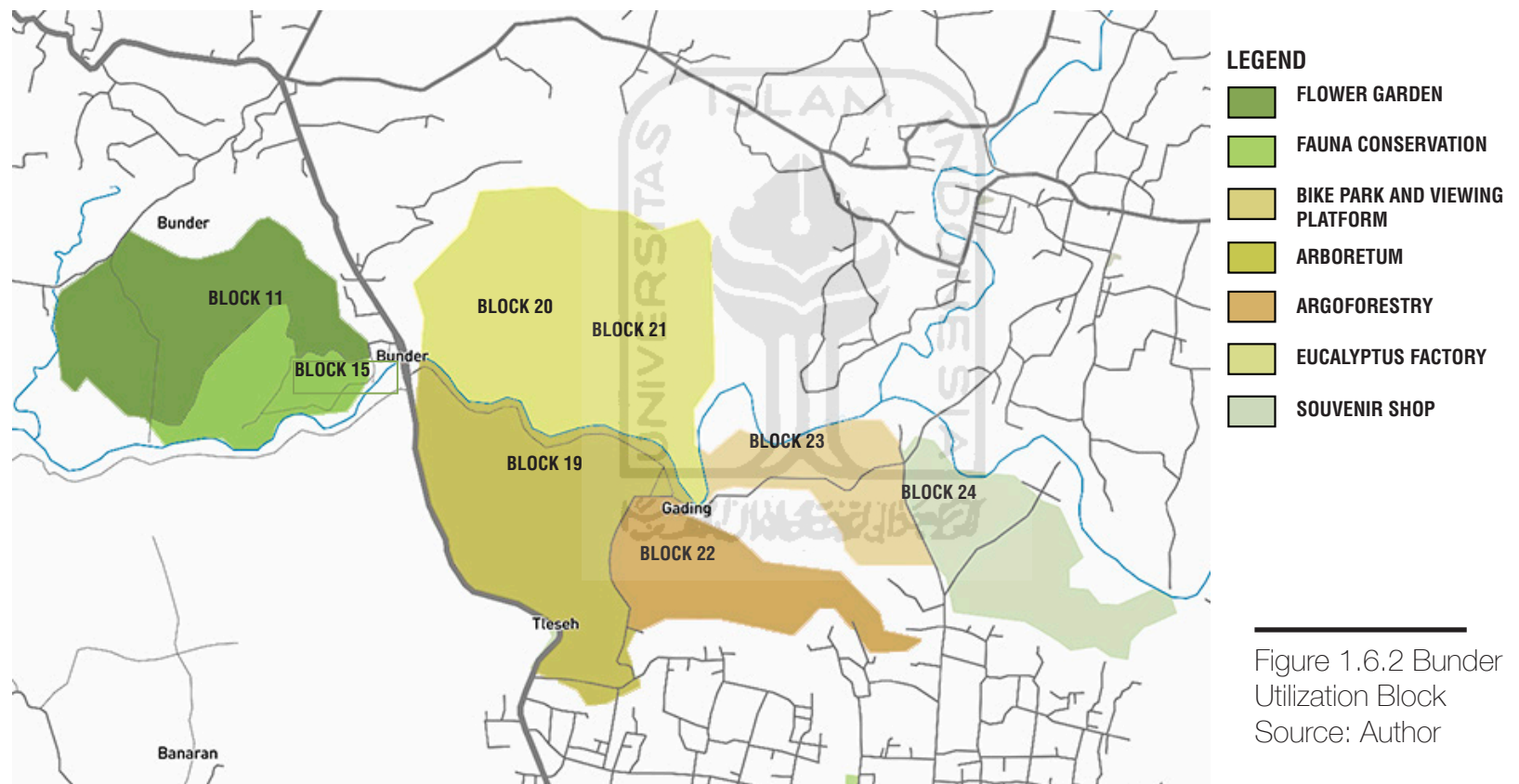


## 07/ EXISTING BLOCK UTILIZATION

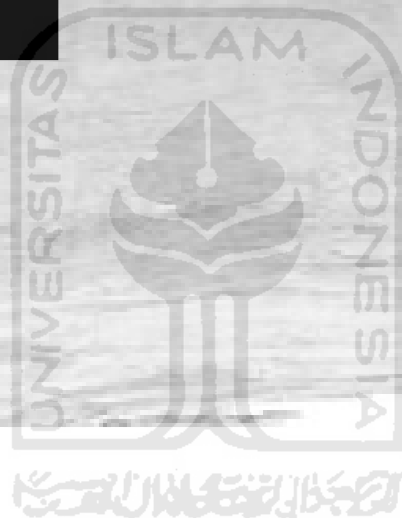
### TAMAN HUTAN RAYA BUNDER/BUNDER NATIONAL RESERVE

In utilize the TAHURA itself, there are block division with specific purpose and function. Based on article 4 about areas utilization and function, TAHURA's area can be divide into:

- protection system for natural potencies;
- conservation of plant and animal species diversity;
- sustainable use of natural resources and the ecosystems;
- cultivation and production of floras and faunas;
- research, science, education; and
- supporting cultural reservation, tourism and recreation [8].



# 02

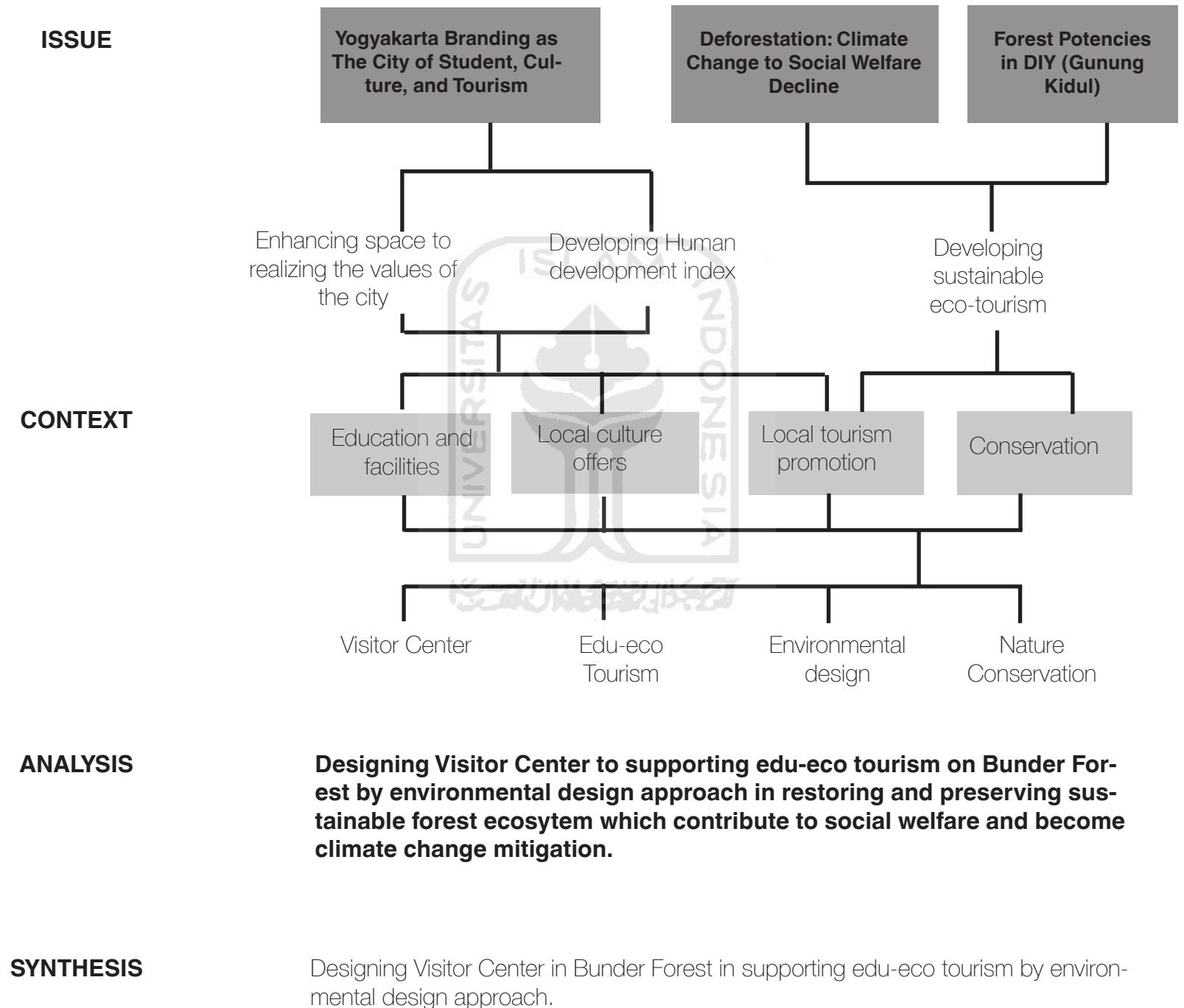


# **ANALYSING DESIGN AND PROBLEMS SOLUTION**

MIND MAPPING  
PROBLEM FORMULATION  
METHOD  
ORIGINALITY  
FRAMEWORK OF THINKING



# MIND MAPPING



# PROBLEM FORMULATION

## General Question

How to design TAHURA Bunder Visitor Center in supporting edu-eco tourism program with environmental design approach?

## Specific Question

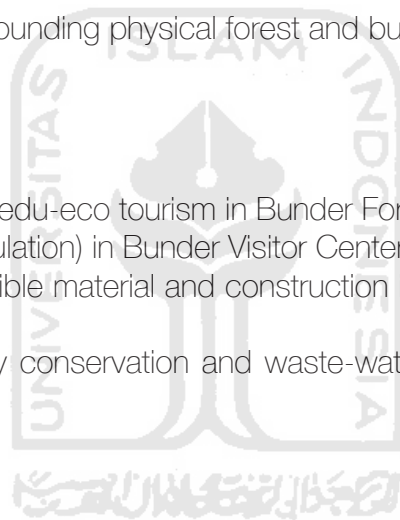
1. How to design program and function to support edu-eco tourism in Bunder Forest?
2. How to design form and space sequences (circulation) in Bunder Visitor Center which are giving memorable experience?
3. How to design Bunder Visitor Center with reversible material and construction in minimize site intervention as nature-conservation forest?
4. How to give the mutual impact between the surrounding physical forest and building by utilize energy conservation and water and waste management in site?

## Goals and Target

1. How to design program and function to support edu-eco tourism in Bunder Forest?
2. How to design form and space sequences (circulation) in Bunder Visitor Center which are giving memorable experience?
3. How to design Bunder Visitor Center with reversible material and construction in minimize site intervention as nature-conservation forest?
4. How to design Bunder Visitor Center by energy conservation and waste-water management that giving mutual impact to Bunder Forest?

## Problem Limitations

1. Physical and non-physical potencies in Bunder Forest in supporting edu-eco tourism program.
2. Natural conservation principles and behaviour.
3. Contextual design in responding the context and surrounding environment.
4. Reversible material and construction for Nature-Based Tourism (NBT).
5. Environmental design approach: energy conservation and waste-water management.



## NON-ARCHITECTURAL ISSUES

- Deforestation impact to forest ecology, environmental damage, and social welfare declined.
- Yogyakarta potencies of forest and potency to utilize the forest for the purposes of tourism, education, and culture.
- Development of edu-eco forest program in TAHURA Bunder by the Government.

## ARCHITECTURAL ISSUES

- Unsustainable built construction for TAHURA Bunder environment as natural reserve.
- Inadequate facilities for visitor to experiencing edu-eco forest (forest learning and recreation).

How to design visitor center to optimize experience of forest learning and recreation in TAHURA Bunder with minimum forest damage and disturbance by environmental design approach?

1. How to design the spatial layout in forest to support environmental learning experience while still maintaining the forest principle of conservation?
2. How to create visitor center for Bunder Natural Reserve with adaptive construction and low-impact materials that minimize site damage?
3. How to manage architectural utilities for site sustainability by maximize water conservation and waste management?

# METHOD



## PRIMARY DATA

Primary data collection is the method to collect the data from the first person as the source. The source in TAHURA Bunder is from DLKH DIY, the forest conservation administrator, and also the local communities that lives in the remote areas of TAHURA Bunder. The interview was doing to knowing the historical background of Bunder, functionalism of forest, the built infrastructures and facilities and the main natural source that can be found in some areas.



## SECONDARY DATA

Secondary data help to obtaining some information and data from journal, book, website, and other relevant literature sources. From the obtained data such as biophysical condition, geological data, and natural wealth and source of Bunder Forest, provided data used to planning the criteria of design that related with the physical context and surrounding environment. Besides, to learn about thematic review it needs to find further about the approach that use in this project by



## FIELD OBSERVATION

The field observation was conducted to match the data obtained by directly come to the site and observing what are served in site. In observation activity the author create some sketches such as schematic plan of existing building and site visualization. Documentation such as photos also taken especially in Bunder Forest's physical condition.

## DESIGN APPROACH METHOD

Based on the data collection method the approach that fits with the project design are:

1. Program and function that supporting the functionalism of visitor center as information, education, and interpretative media.
2. Building integration with the natural context and surrounding environment by contextual design and nature-conservation approach
3. Designing Visitor Center with local material, form, and coincide tectonic solution which are harmony with the context and surrounding environment.

## DATA ANALYSIS METHOD

In analysing the data and site to designing visitor center in Bunder Forest it start from the macro analysis and continued to micro analysis.

### A. Macro Analysis

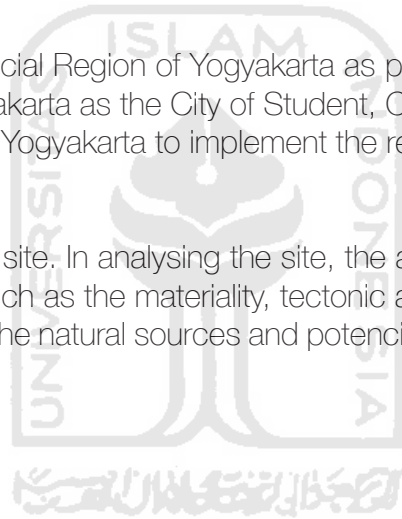
Macro analysis start from the urgent issues on Special Region of Yogyakarta as province to knowing what the needs of people that will be accommodated in design project. Yogyakarta as the City of Student, Culture, and Tourism needs to re-strengthen di city image by distribute the network in all regions in Yogyakarta to implement the relevant actualization.

### B. Micro Analysis

Micro analysis was doing by studying the choosen site. In analysing the site, the author analysing the relation between site and the outside. The techniques to build the building such as the materiality, tectonic architecture, form, and scale also considered. As the principles of nature conservation approach, the natural sources and potencies in Bunder Forest also determined to create the coherence spatial layout and function.

## DESIGN EVALUATION METHOD

Design evaluation method have the purpose to knowing the success as the answered design to Special Region of Yogyakarta citizens, especially Gunung Kidul Region that needs an imporvement on educational tourism network. The evaluation will be conducted by interviewing the local communities towards the result of Bunder Forest Visitor Center in accommodating edu-eco tourism program.





# ORIGINALITY

## **Design Tourism Areas and Rest Area Facilities in Bunder Forest, Patuk, Gunung Kidul. Walking Experience as the Basic to manage appearance, circulation between building based on Natural Potencies Bunder Forest**

Type : Undergraduated Thesis (S1)  
 Writer : Amelia Ratnawati  
 University : Islamic University of Indonesia  
 Year : 2005  
 Typology : Tourism and Rest Area

Amelia Ratnawati try to enhance the rest area in Bunder by identifying the circulation pattern in the rest area and applying traditional architecture for it appearance. With the existing condition of arid yard, she tried to integrating landscape elements into the arrangement of the rest area as walking experience. Different with the authors, in creating Bunder Visitor Center the site choosen is in conservation block (TAHURA Bunder). In develop visitor center by supporting facilities of edu-eco tourism program, the author considering the natural potencies and resource in TAHURA block. The author redesign the abandoned facilities and unsustainable infrastructure in existing site by environmental design approach and considering the facilities relevancies to education and special interest tourism that adhering the principle of nature conservation park.

## **Historical potential development TAHURA (Forest Park) Ir. H Djuanda in the architecture of a tourism area based on the eco-culture connectivity of Curug Dago-Tahura**

Type : Community Service (PKM-M)  
 Writer : Tito Gunawan Wigono; Santoso, Amirani Ritva; Herwindo, Rahadhian Prajudi; Wijayaputri, Caecilia; Dimas Hartawan Wicaksono.  
 University : Universitas Katolik Parahyangan  
 Year : 2015  
 Typology : Tourism and Facilities

The project are trying to observing the problem from cultural aspect in Curug Dago and Tahura Djuanda. They try to respect the historical value between two place by creating place to living with culture and nature. Meanwhile by different approach of environmental design, the author try to more focus in giving the relevance facilities that beneficial to supporting the nature conservation and special interest tourism (eco-edu tourism) that can give the economic benefits to surrounding people and the region. Whereas, the space to meet between the local and visitor (local culture offer) can be adapted also in the Bunder Visitor Center as the principle of eco tourism which are build environmental awareness and cultural respect.

### Redesign "Museum Kayu Wanagama" with Edu-Tourism Architecture Approach

Type : Undergraduated Thesis (S1)  
 Writer : Chandra Puspa Dietya  
 University : Gadjah Mada University  
 Year : 2016  
 Typology : Museum (Visitor Center)

In her design Chandra she represent the architectural of wood as the interpretative media and education feature of Wanagama Forest. Moreover she played with outdoor circulation to giving the visitor chances in exploring the Wanagama forest. As the goals, the project of Wood Museum not only use to educate the people of the Wanagama heritages, but also inspiring and awakening the people of the nature-conservation behaviour and environmental awareness. It has the similarity of author project goals of place making. The different is, the site in Tahura Bunder will have different potencies to be managed. So, the consideration towards the natural sources and site arrangement will impact to the form and construction method in supporting edu-eco tourism program.

### Planning and Design of Astronomic Observatory in National Reserve Park, Lampung

Type : Undergraduated Thesis (S1)  
 Writer : Diana Yunita  
 University : Sriwijaya University  
 Year : 2019  
 Typology : Observatory Building (Visitor Center)

Diana Yunita designing astronomic observatory for educational, research, and tourism purpose. Because of the function of sains observatory she present high-tech image on the building . However she still responding the physical condition of the site as National Reserve Park (TAHURA). While the author programming the Visitor Center in TAHURA Bunder is more on reviving the memories of socio-systems of Bunder that still located in Karst Mountain Area of Gunung Kidul. Besides, contextual design is focusing in create the integration of building within the site in form, spatial organization, and construction method that aware to the Bunder environment as conservation forest.

## NON-ARCHITECTURAL ISSUES

- Deforestation impact to forest ecology, environmental damage, and social welfare declined.
- Yogyakarta potencies of forest and potency to utilize the forest for the purposes of tourism, education, and culture.
- Development of edu-eco forest program in TAHURA Bunder by the Government.

## ARCHITECTURAL ISSUES

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1. How to design the spatial layout in forest to support environmental learning experience while still maintaining the forest principle of conservation?
2. How to create visitor center for Bunder Natural Reserve with adaptive construction and low-impact materials that minimize site damage?
3. How to manage architectural utilities for site sustainability by maximize water conservation and waste management?

1. Location and context study.
2. Visitor center building typology.
3. Nature conservation principle study.
4. Environmental design study.

1. Visitor center functionalism.
2. Spatial programming and organization.
3. Nature conservation principles
4. Environmental design strategy: site analysis, low-impact construction and material (reversible building); and waste and water management.

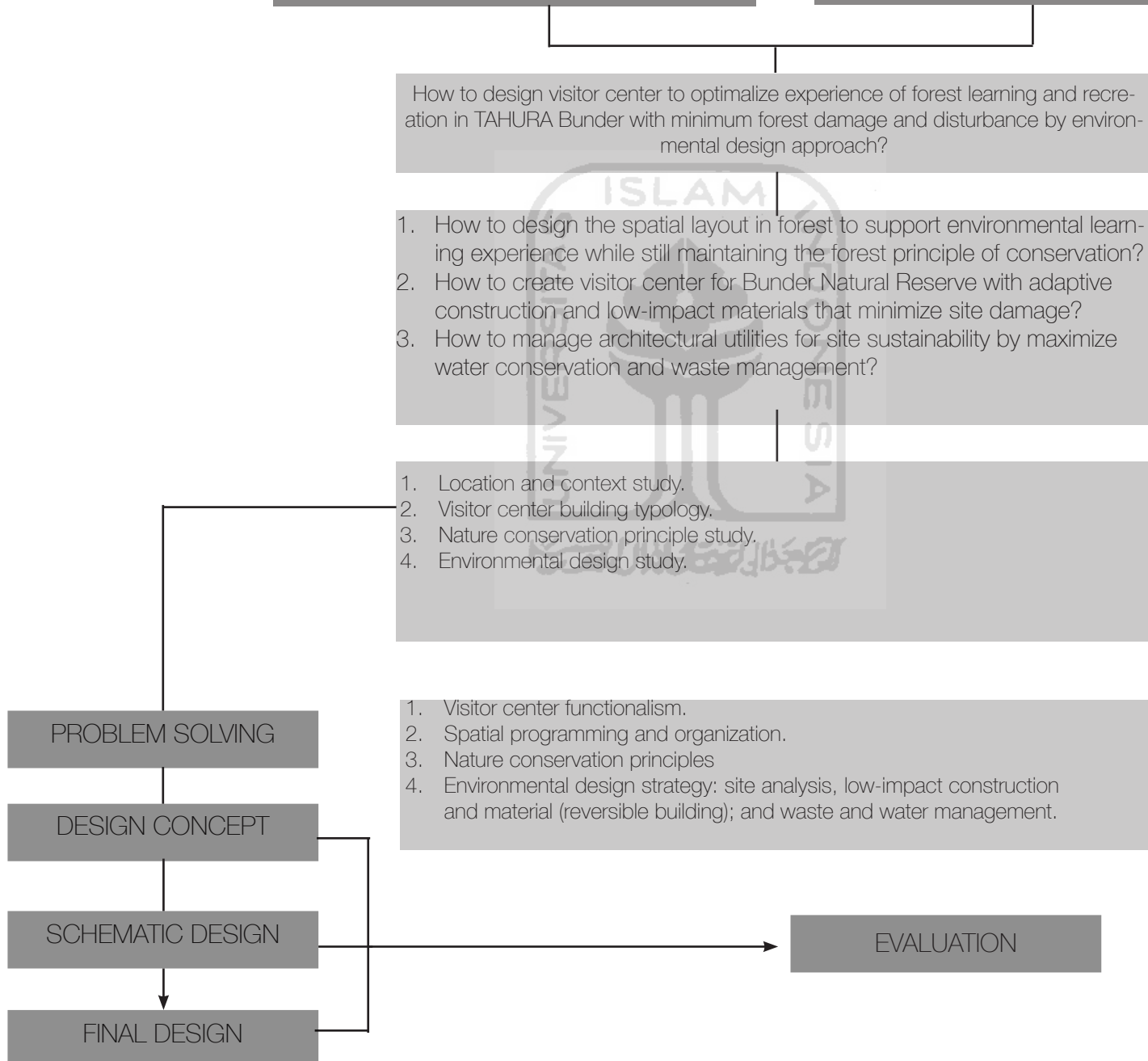
PROBLEM SOLVING

DESIGN CONCEPT

SCHEMATIC DESIGN

FINAL DESIGN

EVALUATION

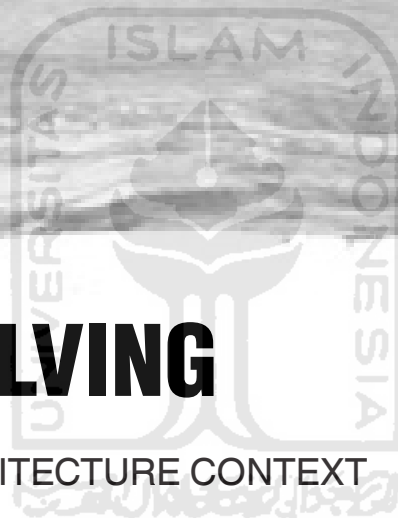


# 03



# DESIGN PROBLEM AND PROBLEM SOLVING

STUDY OF LOCATION, SITE, AND ARCHITECTURE CONTEXT  
THEORETICAL REVIEW  
SPATIAL PROGRAMMING  
PRECEDENTS  
ANALYSIS  
SITE PLANNING CONCEPT  
MASS CONCEPT  
ENVELOPE CONCEPT  
UTILITY CONCEPT



# PLAYEN DISTRICT

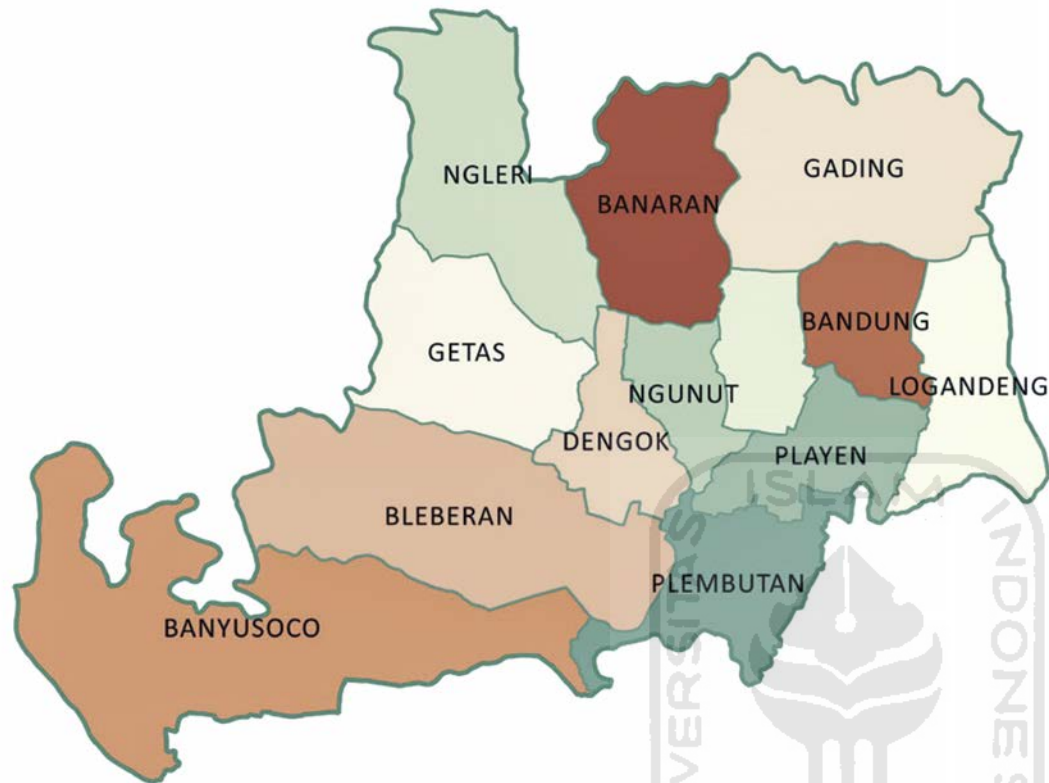


Figure 3.1.1 Playen Sub-District Maps  
Source: BPS Kabupaten Gunung Kidul (2020)

Geographically, Playen Subdistrict is in the west of Gunungkidul Regency. The Subdistrict of Playen is surrounded by the administrative areas of Patuk and Gedangsari Subdistricts on the north side, then Wonosari Subdistrict on the east side. Meanwhile, the southern region is bordered by Paliyan and Panggang Subdistricts. The western region is bordered by Bantul Regency. Playen Subdistrict has an area of 105.26 km<sup>2</sup> or 7.09 percent of the total land area of Gunungkidul Regency and is the second largest administrative area of the 18 sub-districts in Gunungkidul Regency. This Subdistrict is divided into 13 villages. The largest village is Banyusoco Village with an area of 20.35 km<sup>2</sup>. Meanwhile, Ngunut Village has the smallest area, which is 2.37 km<sup>2</sup> or covering 2.25 percent of the total area of Playen Subdistrict.

Playen Subdistrict is traversed by Jalan Negara along about 8.7 km which connects 3 villages, namely Gading, Bandung and Logandeng. Then as many as 9 villages passed the Provincial Road. The number of Subdistrict roads has been able to connect villages in Playen Subdistrict, either within the sub-district or with other sub-districts.

# BUNDER FOREST ZONING

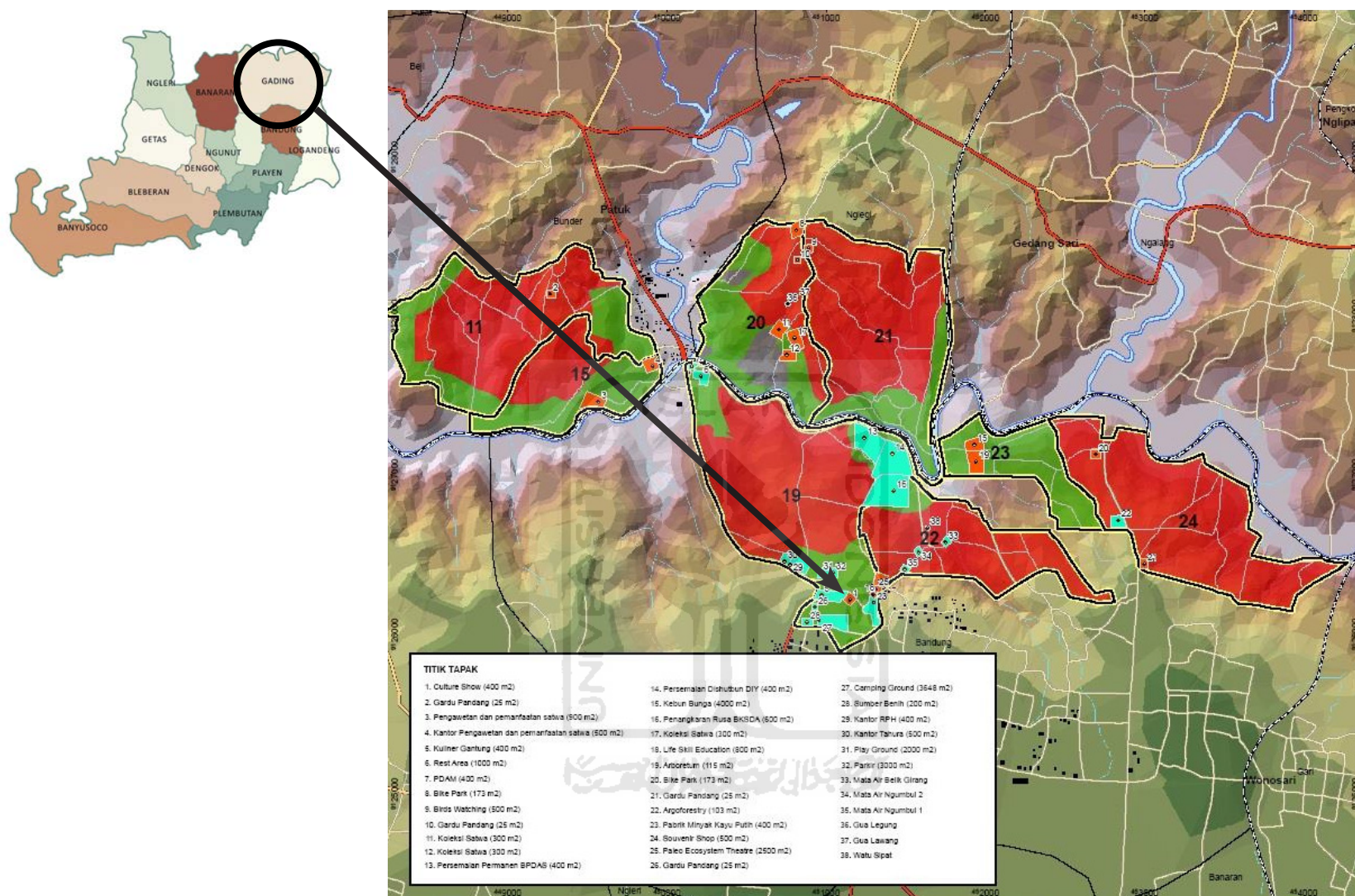


Figure 3.1.2 Bunder Zoning  
Source: TAHURA Bunder  
(Facebook)

TAHURA Bunder is located at Gading III, Gading, Playen, Gunung Kidul Regency, Special Region of Yogyakarta 55861. In block utilization TAHURA Bunder separate into three blocks. The red zone by protection block, the green zone by utilization block, and the grey with special function. While for the zone TAHURA consists of three zones, by Zone I of cycling area, camping ground, hanging culinary and culture shows, Zone II consisting of a research center, eucalyptus oil factory, a nursery and the center of the deer broodstock, then Zone III is designated as a place 46 reptile breeding, bird park, animal collection and agroforestry, arboretum and karst paleobotany.

# EXISTING AND IMMEDIATE SURROUNDING

## SURROUNDING

OYO RIVER



REST AREA



WANAGAMA FOREST



Figure 3.1.3 Immediate Surrounding  
Source: Author





## BLOCK UTILIZATION



ARBORETUM



ENTRANCE TAHURA  
BUNDER



TAHURA BUNDER  
CULTURE PARK



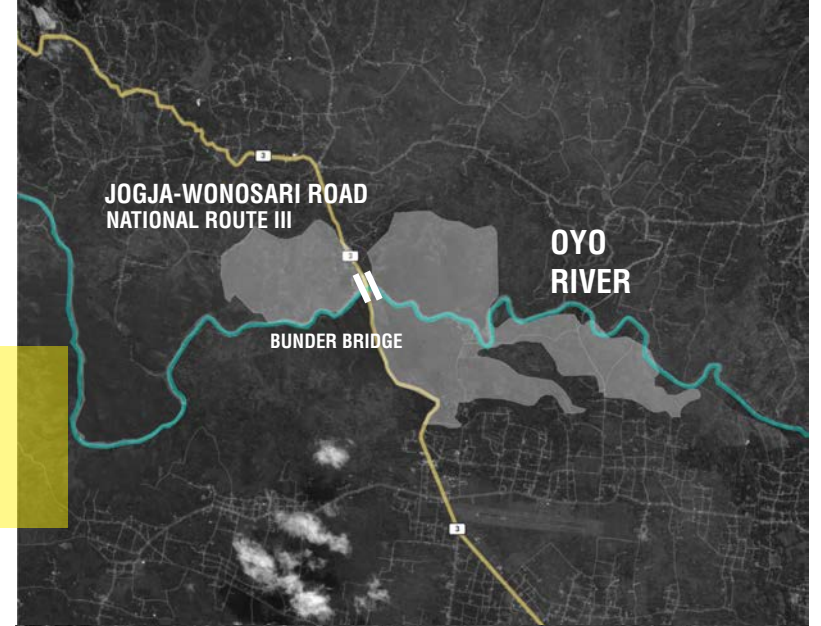
RUSA TIMOR  
CONSERVATION

# MACRO SITE ANALYSIS

## TAMAN HUTAN RAYA BUNDER/ BUNDER NATIONAL RESERVE

Bunder Forest located strategic in the edge of Jogja-Wonosari main road that included in National Route III. Included on Playen District, Gunung Kidul, the access it's about 30 km from the center of the Yogyakarta city.

# 1



Bunder Forest with total area of 634.10 hectares is located crossing with Wanagama Forest with the same function of edu-eco tourism forest.

# 2



Bunder Forest maximize the function with opening the block utilization for Taman Hutan Raya/Grand Forest Park that spread into some block. In accommodating education and tourism the existing site is located in the east zone on Gading III with the main features such as fauna station, arboretum, culinary space, camping ground, playground, and culture show.

# 3



# SITE LOCATION

## TAMAN HUTAN RAYA BUNDER/BUNDER NATIONAL RESERVE

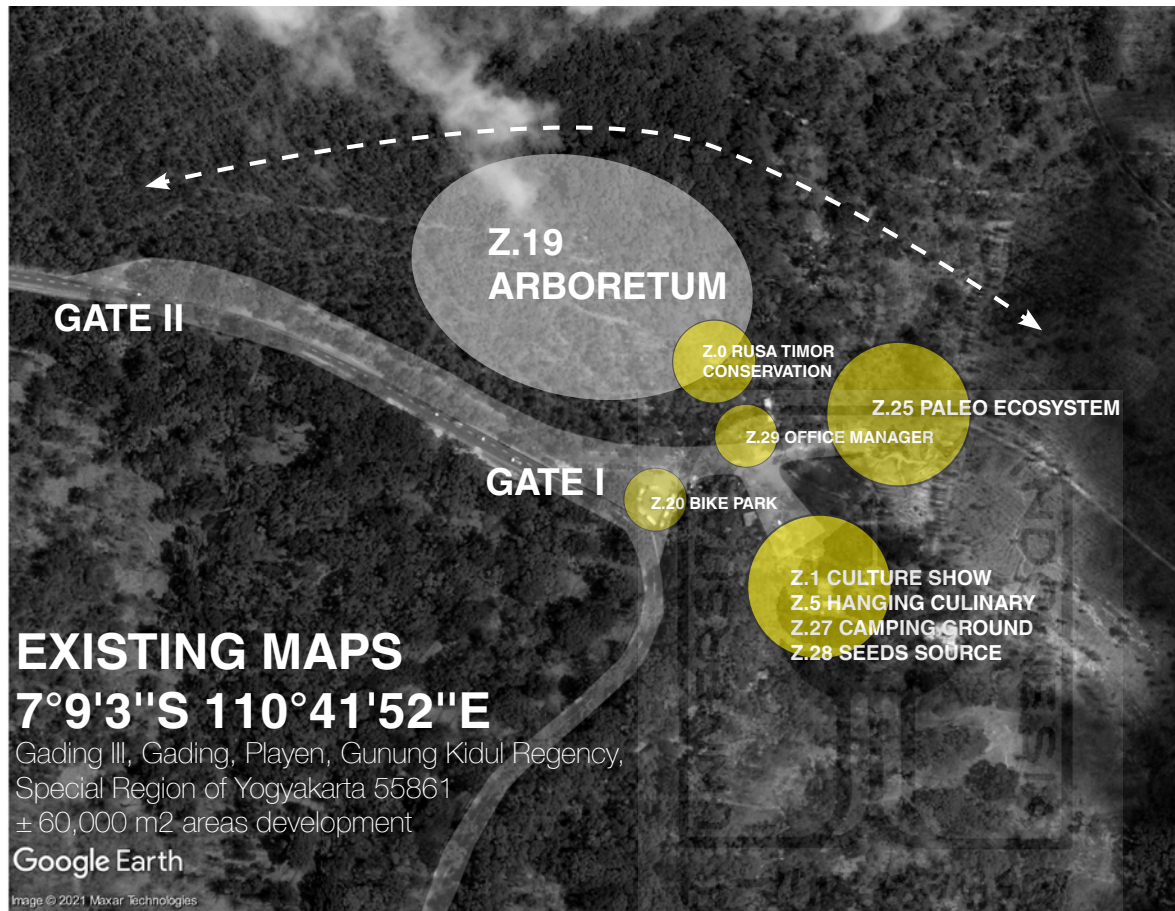
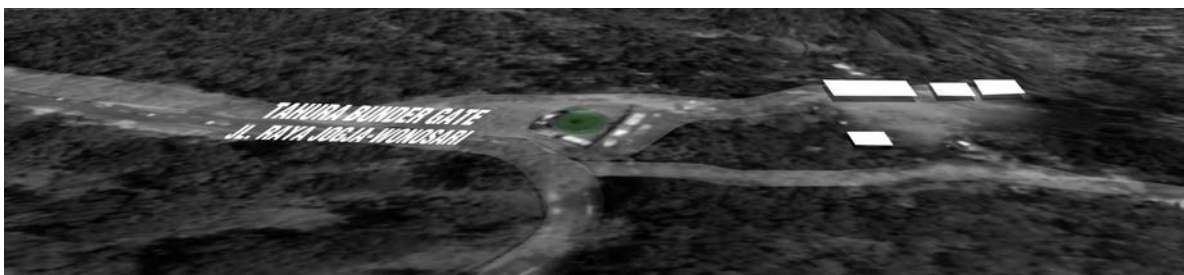


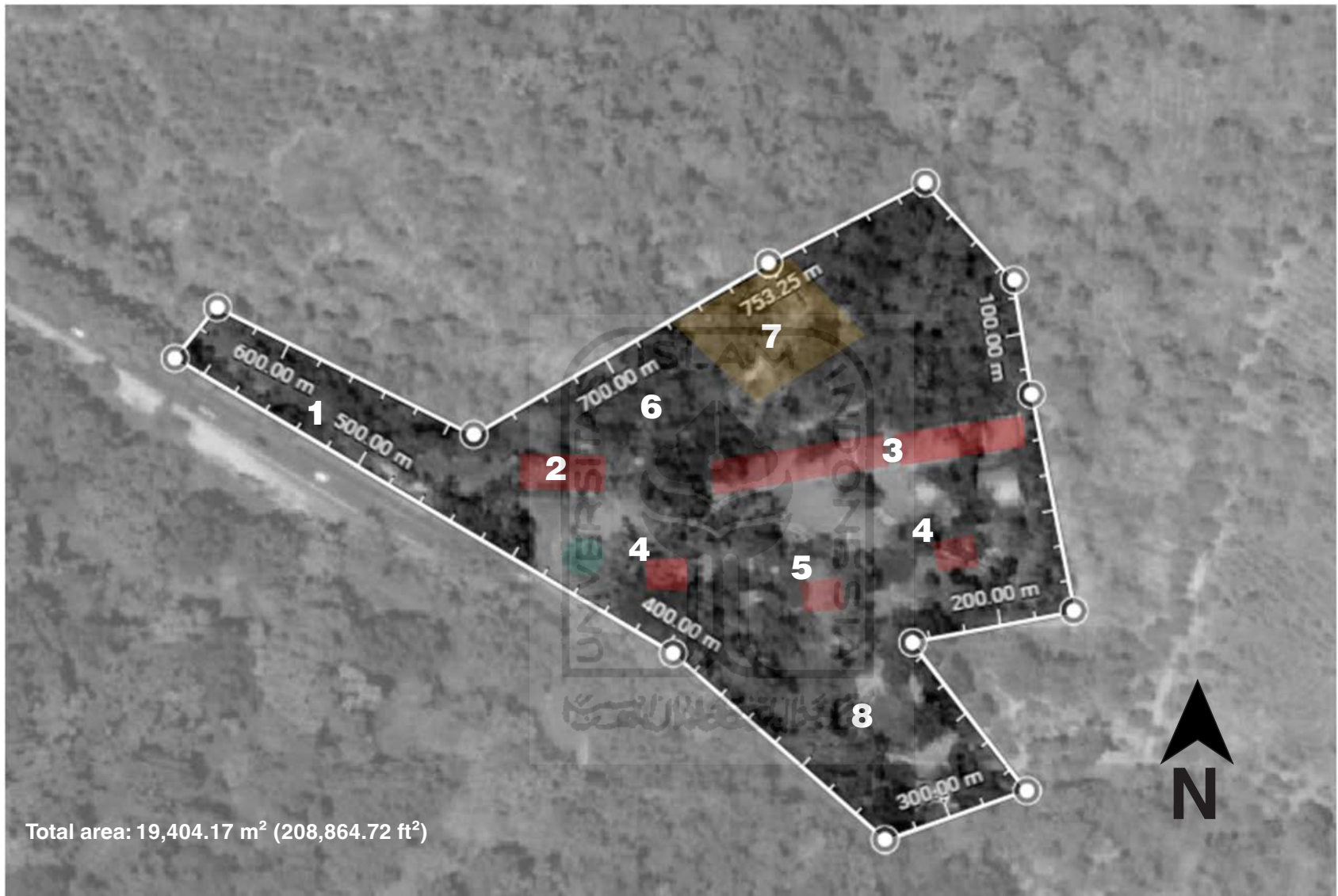
Figure 3.1.4 Site Location  
 Source: Google Earth



The chosen site located in block 19 that sub-divided with zoning for conservation function and edu-eco tourism facilities. In actualize the program of edu-eco tourism in Bunder, the author proposed to planning the program and facilities in Bunder that adhere to the regulation of nature conservation and considering the surrounding context of TAHURA Bunder by environmental design approach.

# EXISTING SITE MORPHOLOGY

TAMAN HUTAN RAYA BUNDER/BUNDER NATIONAL RESERVE

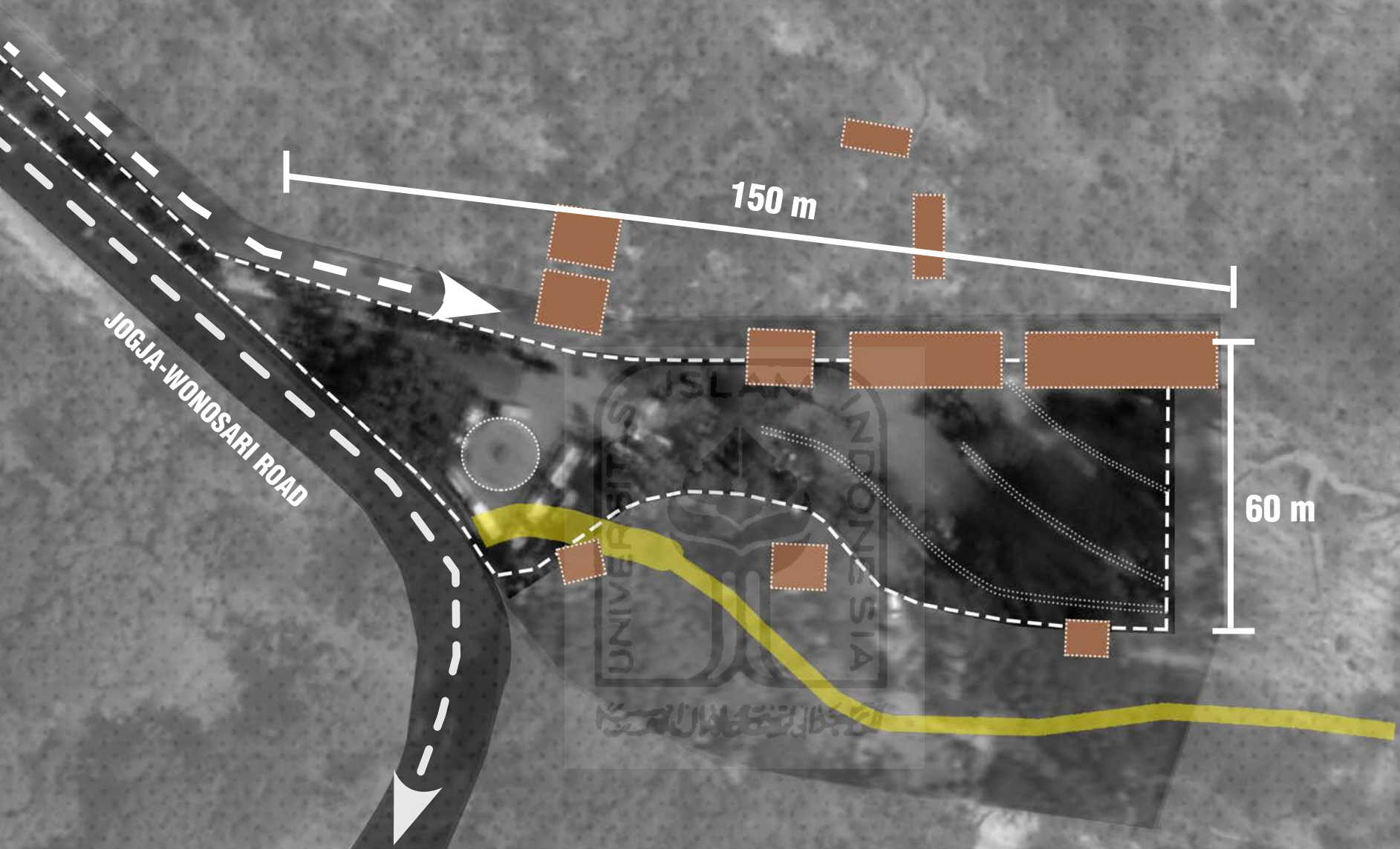


## LEGEND

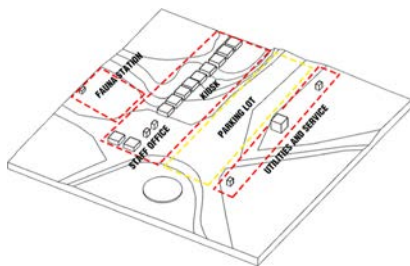
1. Gate Enter and Exit
2. Staff Office and Ticketing
3. Kiosk
4. Toilet
5. Observation Tower
6. Playground
7. Rusa Timor (Javan Rusa) Conservation
8. Camping Ground

Figure 3.1.5 Existing Site Morphology  
Source: Author

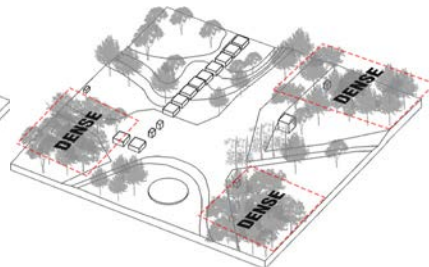
# MICRO SITE ANALYSIS



MAJOR FEATURES



TREES GROWTH



WATER CURRENT

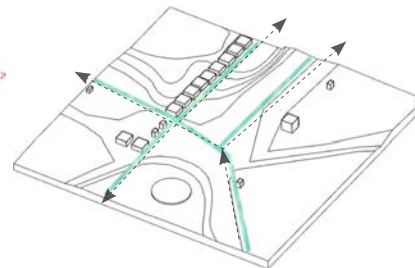


Figure 3.1.6 Major Features  
Source: Author

# REGULATION

## DEFINITION

Article 36b paragraph (2) Grand Forest Park/TAHURA is a nature conservation area for the purpose of collecting natural or non-natural plants and / or animals, native species and / or non-native species, which are not invasive and utilized for research purposes. science, education, supporting cultivation, culture, tourism and recreation. TAHURA Bunder includes the development of a research forest area in the Paliyan District (Gunungkidul Regency) and the development of a nature conservation area.

## ZONING REGULATION

Article 73 paragraph (2) RTRW GUNUNGKIDUL REGENCY NO. 6 YEAR 2011 Zoning regulations for nature conservation areas are prepared with the following provisions:

- a. the use of space is dominated for activities with the aim of developing science knowledge, education, tourism and recreation;
- b. prohibition of activities other than those referred to in letter a;
- c. construction of buildings is limited only to support the activities as intended in letter a;
- d. prohibition against the construction of buildings other than those referred to in letter c; and
- e. prohibition against planting flora and releasing animals that are not flora and fauna endemic to the region.

## BLOCKS CLASSIFICATION

Article 5 paragraph (1) TAHURA areas divided into blocks based on ecosystem, types, function, and forest utilization planning.

Tahura can be used for:

- a. research and development of science and technology;
- b. conservation education and awareness raising;
- c. rich collection of biodiversity;
- d. storage and / or absorption of carbon, utilization of water and energy water, heat and wind and nature tourism;
- e. utilization of wild plants and animals in order to support cultivation in the form of provision of germplasm;
- f. traditional use by local communities; and
- g. population development through captivity in order reproduction of animals or artificial propagation of plants in a semi natural environment.

## MANAGEMENT PRINCIPLES

### BENEFITS

EDUCATION, ECONOMY, ECOLOGY, SOCIAL, CULTURE

### SUSTAINABLE

CONSERVING THE FOREST

### JUSTICE

MULTISTAKEHOLDERS

### TOGETHERNESS

COLLABORATION

### OPENNESS

OPEN PARTICIPATION

### COHESIVENESS

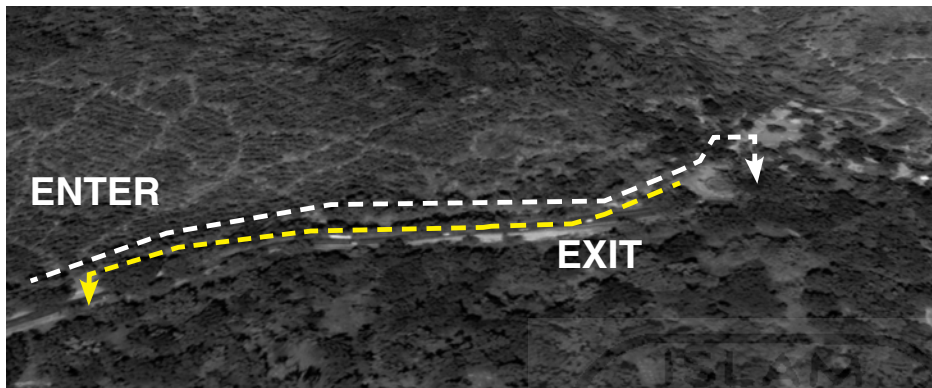
CONSIDERING NATIONAL AND REGIONAL INTEREST

Table 3.1.1 TAHURA Bunder Management Principles  
Source: Author

# BUILDING, FEATURES, AND INFRASTRUCTURE

## TAMAN HUTAN RAYA BUNDER/BUNDER NATIONAL RESERVE

# 1



TAHURA Bunder have main access from Jalan Raya Jogja-Wonosari from the North gate. The separate road have 9 m wide to accommodate enter and exit from The TAHURA. Near the west gate there are one exit gate but not opened by the staff because the curve of road-turns is dangerous to turning to the North (Yogyakarta).



# 2

## STAFF OFFICE AND TICKETING



By 3.5 m to 3.5 m, the staff office is serving the ticketing and visitor information. In the west side of the office there are shelter for motorcycle parking and sitting area for the staff and the guest. While in the east of the office there is praying area.

## BUILDING, FEATURES, AND INFRASTRUCTURE

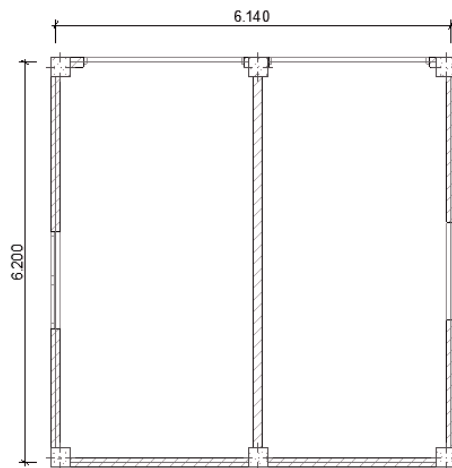
TAMAN HUTAN RAYA BUNDER/BUNDER NATIONAL RESERVE

# 3

### KIOSK



#### 1 KIOSK

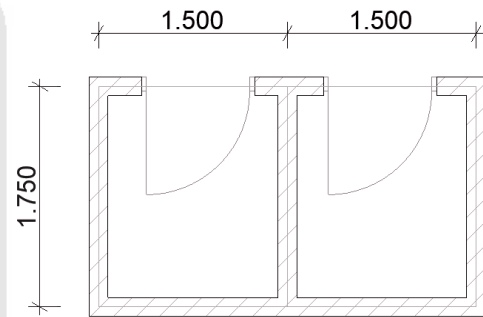


#### TOTAL: 9 KIOSK

The kiosk consist of 9 units are used for culinary and snacks corner. The slope contour make the kiosk in different level.

# 4

### TOILET



Toilet A located near the gate. Consist of two rooms, the toilet are quite small by length 1.5 meters to 1.75 meters. While the toilet B by the same size is located in the east zone, quite far from the gate. Those two toilets condition is not good because of the low maintenance.

# 5

### OBSERVATION TOWER

The observation tower located in the south of the Kiosk. By height up to 7 meters, the observation tower made of massive concrete with stone finished. The function of the tower is to observing the surrounding zone of TAHU-RA, but the height of building is not enough accommodate enough the good point of surrounding view.





# BUILDING, FEATURUES, AND INFRASTRUCTURE

## TAMAN HUTAN RAYA BUNDER/BUNDER NATIONAL RESERVE



### 6 PLAYGROUND

The playground is located behind staff office and beside rusa timor conservation. The playground in Bunder is only consist of playing stuff for children.



### 7 RUSA TIMOR CONSERVATION

Rusa Timor Station consist of one small hut that sheltering 13 tails of Rusa Timor with the feed box inside. The station is slightly idented inside to the quiet area in the north of the mushola.



### 8 CAMPING GROUND

The camping ground areas is quite same with the playground because it founds many playing zones installation and the sitting place. The camping ground provides the flexibility to held a big event to gather the public such as camping, festival event, art performance, etc.

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Figure 3.1.7 Existing Building

Source: Author





# VISITOR CENTER

## PROGRAMMING

### SPATIAL CHARACTER

#### EDUCATION

Activities	Room Types	Specific Functions	Accommodation
Experiment/Researching	Scientific matter, private	Studying and research	Laboratorium
Feeding, Breeding, Caring	Boundaries, safety, comfortability, odors	Get to know the fauna and fauna's caring	Fauna Station
Planting	Open space, outdoor	Environmental study and conservation	Botany Garden
Observing/Appreciating	Slow phase movement	Studying the natural heritages of Bunder	Exhibition/ Museum
Sharing	Conducive, interactive, comfortable	Educator and informant discussion	Discussion room

#### SOCIO-CULTURE

Activities	Room Types	Specific Functions	Accommodation
Gathering	Flexible, Wide	Resting, admiring, eating, etc.	Amphitheater
Performing	Focal point, flexible	Promoting local culture offers	Amphitheater

#### COMMERCIAL

Activities	Room Types	Specific Functions	Accommodation
Buying/Selling	Inviting, promising, attractive	Promoting local product and craft from Bunder	Exhibition hall
Empowering	Flexible, openness	Economic actor empowerment (local communities)	Workshop room

#### SERVICE

Activities	Room Types	Specific Functions	Accommodation
Resting	Wide, comfortable	Resting, sitting, etc.	Rest room
Eating	Orderly, comfortable	Having meals.	FnB room
Washing/Restroom	Accessible for all groups, safe	Cleaning, washing.	Rest room
Praying	Clean, comfortable, conducive	Praying.	Prayer room

Table 3.1.3 Programming  
Source: Author

# THEORETICAL REVIEW

## Edu-eco Tourism Forest

### An Eco-Tourism with Nature Conservation Behaviour

Natural conservation park hold the principle of protecting natural living source and minimal deconstruction of natural areas. It means the development of natural conservation park should have minimum intervention to its environment. In managing the natural resource by different kinds of use, the knowledge about conservation should be understood first. These are in line with Environmental Education (EE) that was initially utilized in 1965 by the Royal Society of London, with a definition associated to the preservation of life systems. Besides, Environmental Education should not be restricted only to construction of the ecological knowledge, but also to inspire the participation of community in build the environmental behaviour that sustainable towards the environment.

TAHURA Bunder program in planning to develop edu-eco tourism program in their function. Edu-eco tourism itself is the concept of ecotourism combining environmental education. As it roles, ecotourism is a nature-based tourism that contributes to conservation, through generating funds for protected areas, creating employment opportunities for local communities, and offering environmental education. Bringing the environmental education in tourism not only the tools to understanding and awakening environmental behaviour towards the site, but also giving a lot of knowledge and information towards the sites values as well as the manifestation of natural and cultural heritages that can be found in the areas.

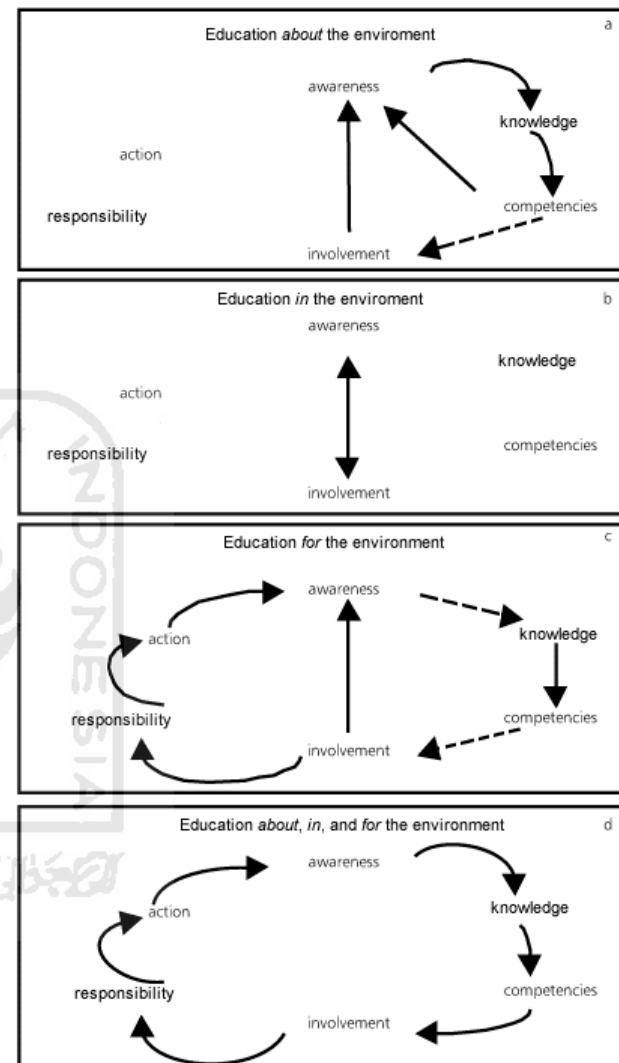


Table 3.2.1 The focus of the Environmental Education diagram (adapted from Santos J, etc on Tilbury, 1995).

## Edu-eco Tourism Forest

### Eco-Tourism Definitions and Principles

Based on Lindberg & McKercher (1997) was defined as tourism and recreation that is both nature-based and sustainable. J. Stephen, Page and Dowling, K Rose (2000) summaries the principles based of eco-tourism into five points:

1. Nature Based
2. Ecologically Sustainable
3. Environmentally Educative
4. Locally Benefits
5. Generates Tourist Satisfaction

Then Dimitrios Diamantis (2010) on his research also found that from many definitions of eco-tourism it consist of:

1. Natural-based component

The main issue is that ecotourism can be located in protected and non-protected areas, that is wht eco-tourism has similarities with natural-based tourism.

2. Sustainable management component

In most cases cotourism abolish the 'tourism-centered' syndrome and adopt the 'nature-centered' approach in order to reflect sustainability. This also arises from the different direct and indirect costs and benefits that impact to the environmental, economic, and socio-culture aspect.

3. The educational/interpretation component

the different types of environmental education/training programmes highlighted a number of issues. Currently, neither interpretation nor training programmes are widely used within ecotourism and in cases where they do apply they tend to have a different perspective with eco-tourism principles. As an evaluation, the needs and the demands of both stakeholders and consumers must be considered to ahchieve both equal benefits.

Yesser, P (2012) also stated that besides those principles, the legalityaspect such as local rules, zoning, regional regulation, and environmental regulation must be adhered. In addition the good cooperation with multi-stake holders especially the local communities as main actor also have the main role in realize sustainable tourism, here refers to eco-tourism.



## **Environmental Design Approach: A Concept for Sustainable Forest Built Environment**

The management of sustainable forests is the main key in reducing the rate of greenhouse gases (GHG), such as the emission of Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Fluorocarbons, and Sulfur Hexafluoride (SF<sub>6</sub>). However, the increasing demand for forest land as a medium for human interaction as well as large-scale use creates threats of forest degradation and imbalance of the ecosystem in it. Therefore, using and processing a forest into a new environment requires a lot of consideration. Forests in Indonesia, from their function, can be classified into conservation, production, and even forest as ecosystem protection, which then have limitations and strict consideration in their use.

Nature conservation park has the function of conserving flora and fauna; research and education; tourism; and culture provides an opportunity to utilize forests to give a mutual impact on the surrounding community. In its implementation to achieving sustainable forest, site analysis needs to be carried out related to potencies and constraints, then regulations regarding the area until the type of construction, and eco-friendly materials. Environmental design considerations have a role in minimizing the impact of damage to forest ecosystems. Because the forestry and energy sectors contribute the most to current emission levels, forest management with environmental design seems appropriate to the author's proposed project.

**Environmental design** is the process of addressing surrounding environmental parameters when devising plans, programs, policies, buildings, or products<sup>1</sup>. It seeks to create spaces that will enhance the natural, social, cultural and physical environment of particular areas<sup>2</sup>. **Environmental design** have broad domain and its application can be adapted based on the site context. Based on Alison G.Kwok, AIA dan Walter T. Grondzik on "The Green Studio Handbook: Environmental Strategies for Schematic Design", there are six strategies to achieve the sustainable built project such as envelope, lighting, heating, cooling, energy production, and water and waste management.

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1 Caves, R. W. (2004). *Encyclopedia of the City*. Routledge. p. 225.

2 Chermayeff, Serge (1982). Richard Plunz (ed.). *Design and the public good : selected writings, 1930-1980*. Cambridge, Massachusetts: MIT Press. ISBN 978-0-262-16088-9.

## Analysing the Context

### Site Analysis to Building Organization

The designer must look at the site up close and from afar. One must read the site, and learn from what is apparent, invisible, and ephemeral. The effects of the Earth's tilt cause the patterns of sun angles as well as atmospheric stirrings that produce wind. Some data, such as wind speed or solar insolation, can usually be found synthesized and packaged on the Internet or in a library. Other data, such as noise levels or circulation patterns, must be observed on site. The essence of site analysis is finding the resources and identifying the problems of a site in the context of the project and the designer's values. It is also useful to look at vernacular architecture, which, of necessity, used the envelope and materials to mitigate climate impacts on a building. Knowledge of an appropriate climate response is implicit in many traditional ways of building and in the living patterns of the occupants.

The architectural program (in commissioning terminology, the Owner's Project Requirements) developed by the architect and client determines the underlying potential for building performance. Based upon layout and orientation, the forms implicit in every potential building bear within themselves the possibility of responding well or poorly to a given climate and context.

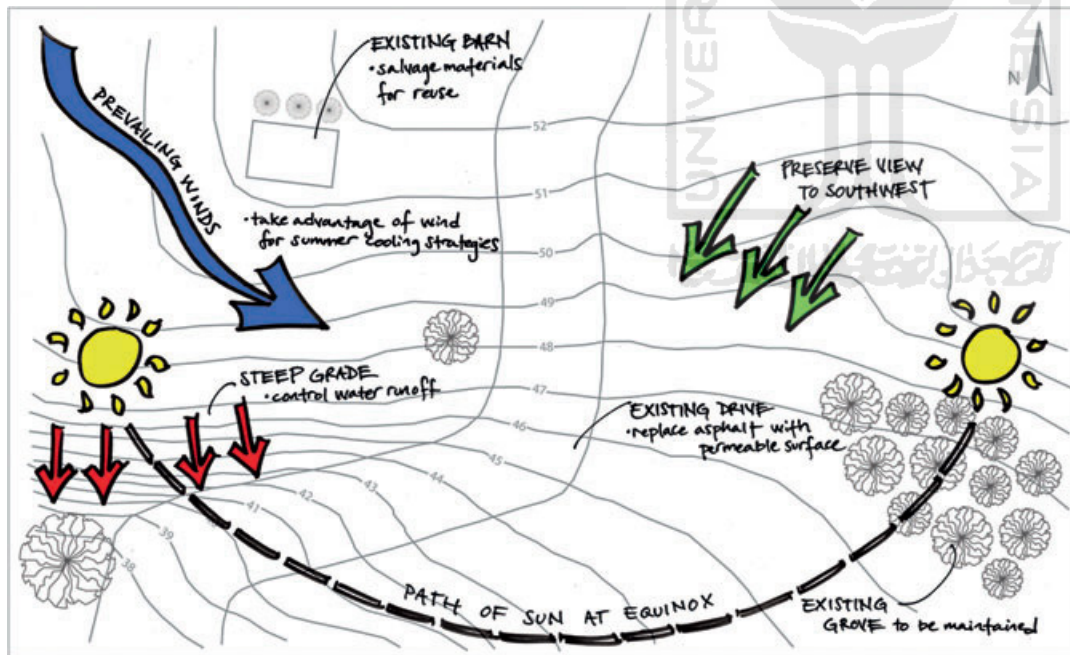


Figure 3.2.1 The focus of the Environmental Education diagram (adapted from Santos J, etc on Tilbury, 1995).

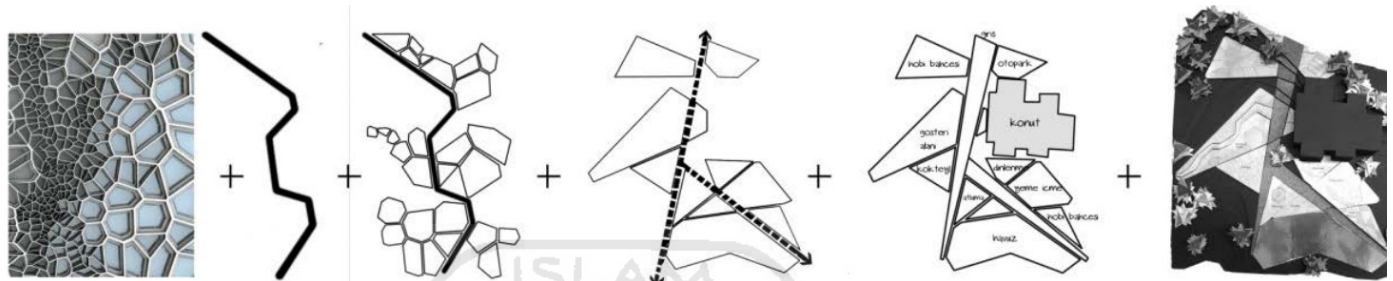


## Analysing the Context

### From Concept to Form in Landscape Design

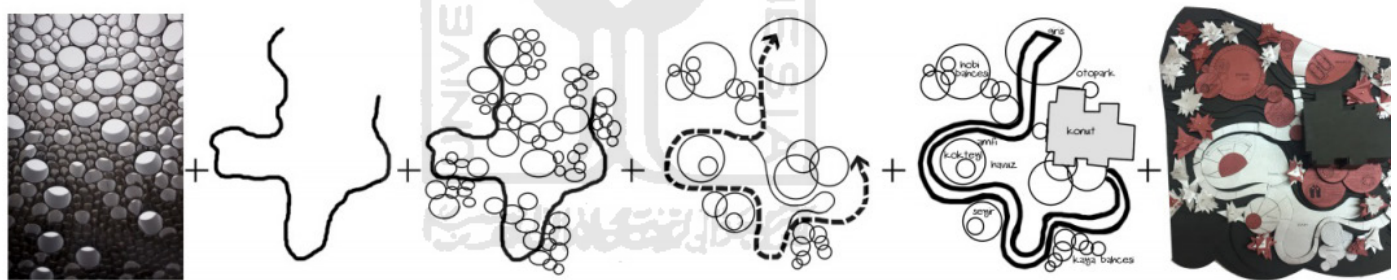
The landscape designs are shaped by considering the topography of the area to be designed, the structural elements on it, the desires of the users if there is any and the functionality of the area (Düzenli et al., 2017). It means that during the design process, all the inventories belonging to the area to be designed are obtained and the possibilities of using the space are determined. By the study of Karadeniz Technical University on Environmental landscape the students and lecturers was identifying the pattern that found in built-surrounding and try to propose the space solution and form based on the determination.

### Dynamism



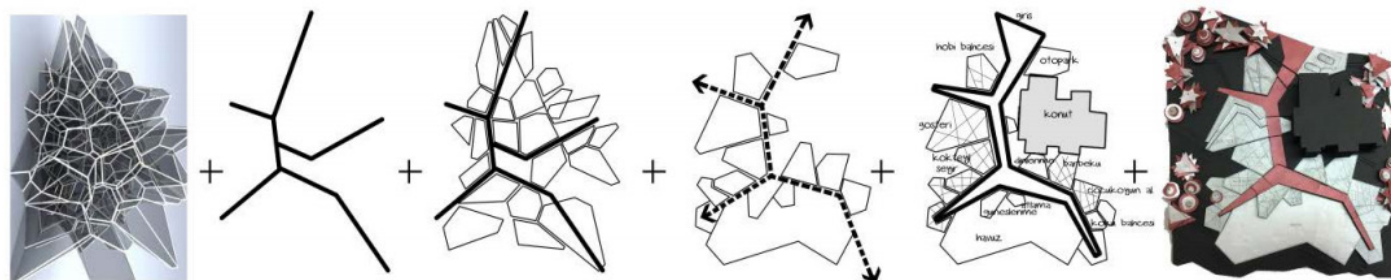
Dynamic is related by movement and livability. At the same time this form is has the similarity of character in National Athlete built environment which are appropriate with Athlete character which are active and movable. The researcher transforming the concept of dynamic by combining movable pattern and non fixed asymmetrical together into moving form.

### Path to Eternity



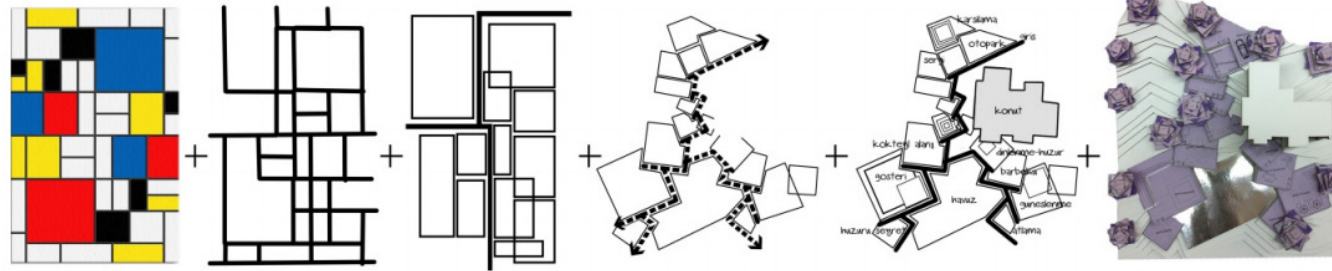
The researcher reflect the water and pool by the water droplets structure. When the water drops, the forms expressing the transportation of water following the form. The transformation concept lead the path to eternity forms.

### Rythm



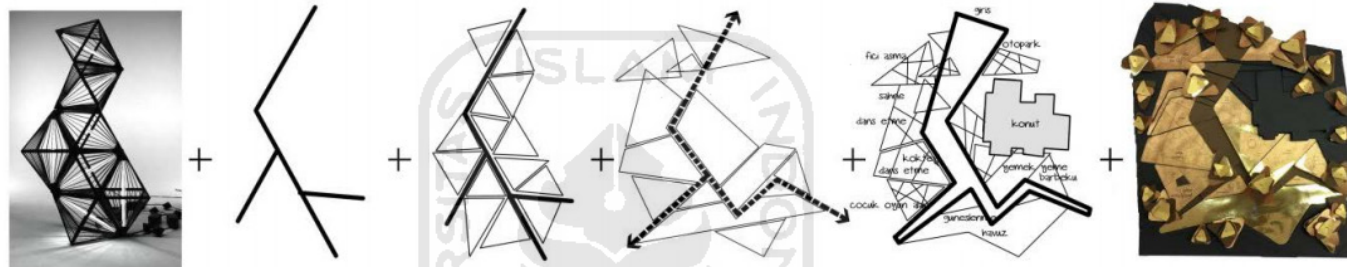
The sample taken is the music rythm. The researcher found that harmony between notes in the formation of rythm/repetition lead the transportation flow divided into sub circulations. This sub-circulation was designed as rythmical arms in the form of human figures.

## Peace



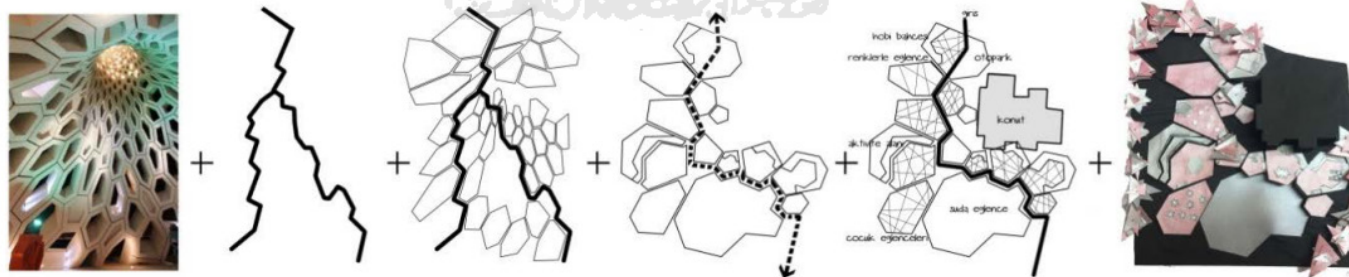
The taken example is a painter who finds peace by painting that was considered to be the user and rectangular and square canvas forms were used to reflect the concept. The sizes of the forms varied according to the nature of the activities to be performed in the spaces

## Energy



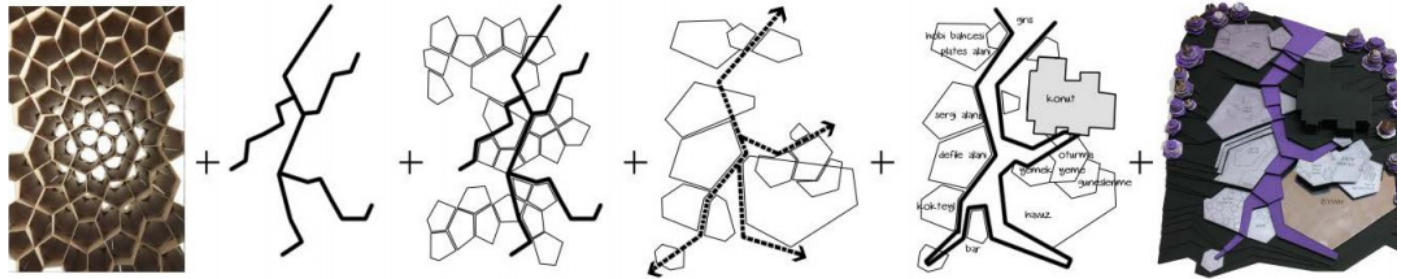
The asymmetrical line in dancing express the energy. The researcher use the kind of hip hop dances and studying the characteristic. The body shape created by hand arm, leg foot and torcos in dance led the designer resulting the geometrical form.

## Entertainment



The researcher find the form which are dynamic and movable in a shared space with multi-parts form. The space resulting the relation that were transferred into consecutive geometric forms after the distraction/abstract form

## Sustainability



The user search in nature-space and take the example of bees ecosystem with their honeycombs. It found that the bees creates hexagonal form in the forefront in visualizing their facade as the podium, cocktail, and exhibition space for the bees. Within the process the sustainability was reflected in hexagonal form.

## Intersection



The crowded space of multi-family become the chosen sample. The space that use for interaction between the family member shows the cross space relation. The intersection line with amorphous lines of the arc form is effective in transformation of the concept into the form

Figure 3.2.2 Finding Landscape Pattern

Sources: Karadeniz Technical University on Environmental landscape

In this project Nilgun and Makgulenur (2019) conclude that in determining the form it depends on many factors:

1. User profile: user profile has the wider range from human, animals, or plants as the user. The characteristic factor by the user lead the designer in considering the transformation from the concept into the realistic form.
2. User's desires: user desires in this case is the desire of the user in using the space for the possible activities.
3. Land/site potencies : the relation within the elements inside the site can lead the designer to observing the pattern appears.
4. Designer desires: the designer desires itself is how the designer negotiate with the fix elements and with their thinking process able to transform the ideas into the clear formation.

In step by step concept process that delivered by the students/researchers, the created spaces was accordance with the character/nature of the activities. This method can be applied in the process of multidiscipline work, especially landscape. As a result of all this process; it implied the importance of the obedience of user's requests, design thinking process, idea expansion, and monitored process in conceptualizing the concept into forms.

Based on the Frank Lloyd principles, materials and structural construction are included on the key elements to gain the integration with the surrounding environment. The context of TAHURA Bunder which is natural conservation park become the consideration in obeying the rules of minimal destruction and adhering the principles of nature-conservation. In the most cases reversible construction method because it minimizing the damage. Reversible Building Design (RBD) also seen as a design that takes into account all life cycle phases of the building and focuses on their future use scenarios. Reversible building offers the solution on reusing building, system, products, and materials that have high transformation potencies (Durmisevic, 2019)

The transformation of form can be divided into: mono function, trans-function, and multidimensional. In determine the spatial transformation the following combination was made specify such as

1. Typology in combination with the depth and block width.
2. Typology in combination with type and core position
3. Typology in relation to the core, block dimension, structural system, and method of construction.
4. Floor to ceiling height in the combination to the block dimension, type of construction, floor thickness, and facade opening.

Three key elements of reversible building can be identified by

1. Spatial
2. Structural
3. Material reversibility

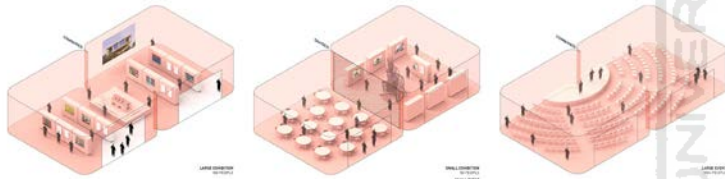


Figure 3.2.3 Space Flexibility

Source: <https://www.murraylegge.com/center-for-architecture>

### Spatial Reversibility

The spatial reversibility focus on the capacities of space and structure to accommodate different functions without causing major reconstruction work, demolition, and material loss.

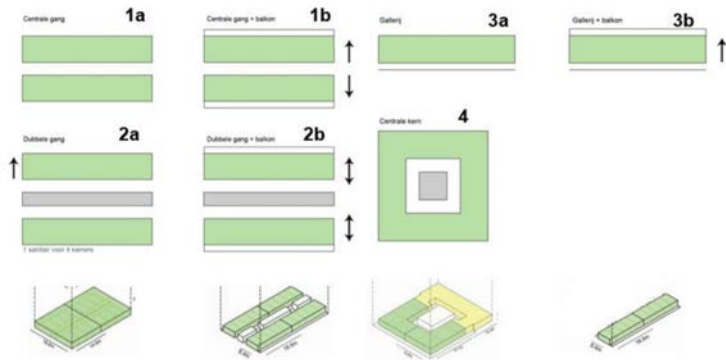


Figure 3.2.4 Type of plan layout

Source: Durmisevic (2019)

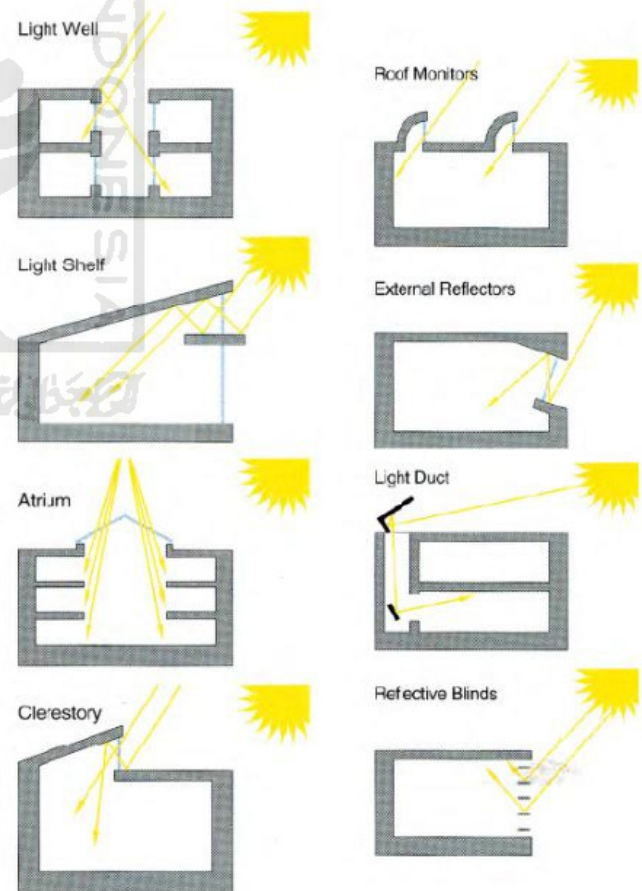


Figure 3.2.5 Natural lighting access experiment in different form

Source: Agm2d Website

## Reversible Building

### Principles of Elements, Components, and Systems

A structure is reversible if its elements/components/systems are defined as independent parts of the building structure. In determining the reversible structure, firstly the designer should define the function/ activity and how the provided space will interact. The relation within the space will be the concern in physical structures state such as the materials selection and construction techniques.

There are following aspect that impact to the result of reversible structure,

- Functional independence;
- Systematisation;
- Element relation;
- Configuration of base element;
- Assembly/dissassembly sequences;
- Geometry and morphology;
- Type of connections.
- Life cycle coordination of elements

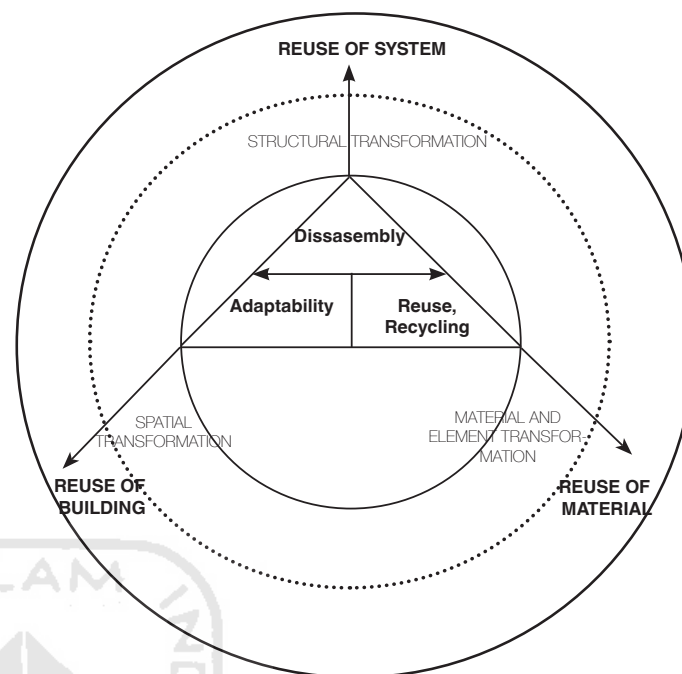


Table 3.2.2 Reversible design protocols adapted on Durmisevic (2006)

### 1. Functional Independence

Functional decomposition used to classified the building part based on it function and behaviour. The function of the building can be divided into support system, enclosing, service system, and partition. Each of these can further be subdivided into sub-sections (subsystems) such as: foundation, frame, floor, façade, roof, inner walls, ventilation, heating system, water system, electrical system, etc. Each functions have different behaviours such as lighting, heating, ventilating, and also deals with force of tension and compression.

### 2. Systematisation

Building system represent the major system that used in the building. The system is the highest material level of technical composition and contains a number sub-levels, such as: sub-systems / components, elements, and materials. The type of system can be distinguish on how much element assemble/ disassemble on site.

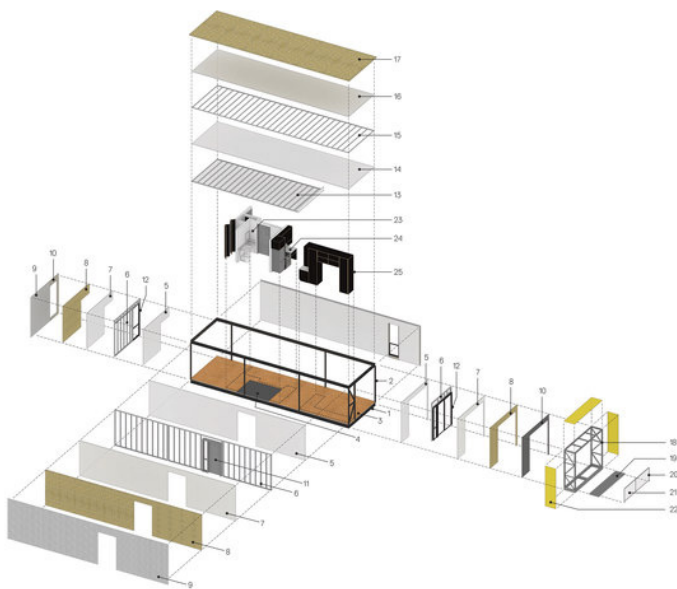


Figure 3.2.6 Building part and assemble method

Source: <https://www.architonic.com/fr/project/garrison-architects-urban-post-disaster-housing-prototype/5102498>

### 3. Relationship of Pattern

Relationship of the pattern can be defined by the relation of building elements in one independent structure. Relation also can be defined by vertical position relation such or horizontal position. In example vertical position distinguish the function of the space, while horizontal position use to classified the same function and typical activities.

### 4. Configuration of Base Element

The building system carried specific function on two level,  
 a. The function to connecting the elements within the cluster  
 b. The function to perform as an intermediary with other clusters.

### 5. Geometry and Morphology

Reversibility is affected by the geometry of product edge. This interface design and specification of the connection type. This research found six situations that can be defined as suitability of geometry in disassemble. Two major distinctions can be made between open and interpenetrating geometry.

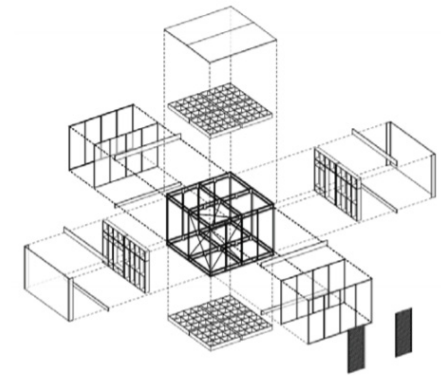


Figure 3.2.7 The assembly relation between facade, infill, foundation, roof, and structural system. Source: Durmisevic (2019)

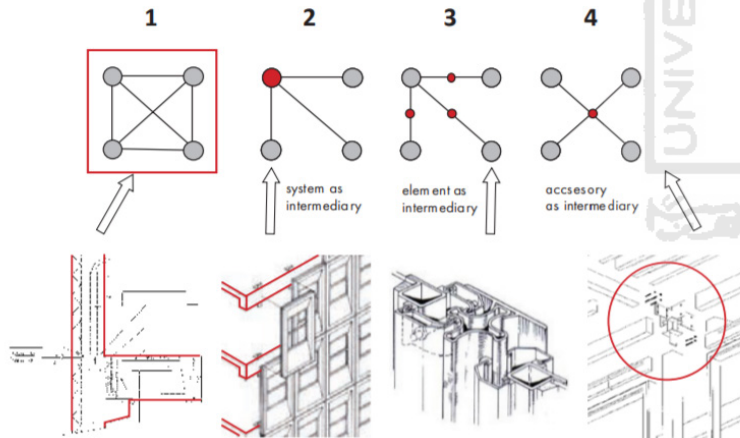


Figure 3.2.8 (1) The whole building with its exterior walls, interior walls is a base (2) loadbearing structure as a base element ( building level) (3) frame within a system as a base (system level) (4) intermediary connection which connects multiple elements as a base (element level)  
 Source: Durmisevic (2019)

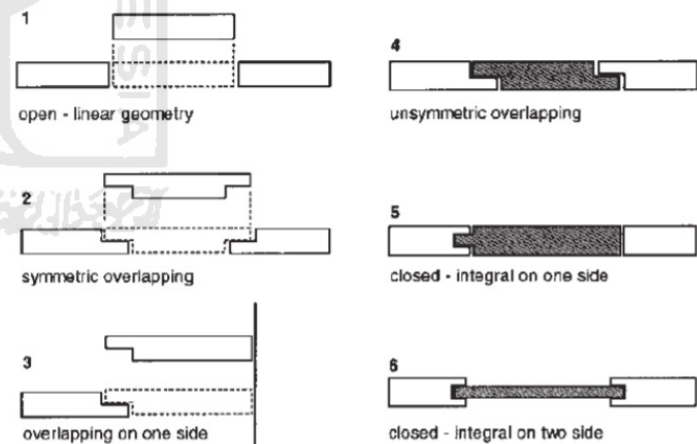


Figure 3.2.9 Overview of principles geometries of product edge  
 Source: Durmisevic (2019)



Figure 3.2.10 Illustration of gravity principle of assembly. All parts can be assembled in parallel and create connection only with the main frame. Sources: GTB Lab

## 6. Assembly/Disassembly Sequences

In assembly/dissassembly, sequence affected by life cycle of materials, type of materials, geometry of product edge, and type of connections.

Sequences in assembly represent the complexity of the structure and dependencies between building elements. The way we assemble a building sets the mirror image of the building during its transformational and disassembly phase. The sequences itself can be divide into:

1. Gravity.
2. Parallel.
3. Closed circle.
4. interlock.
5. Sequential.

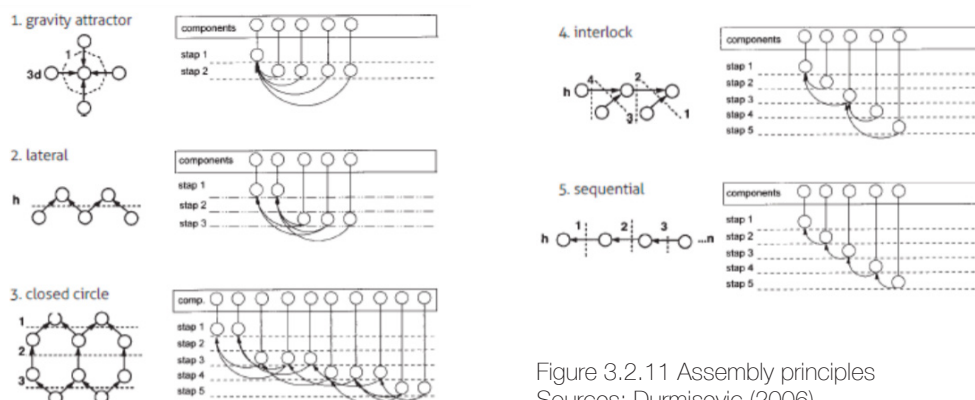
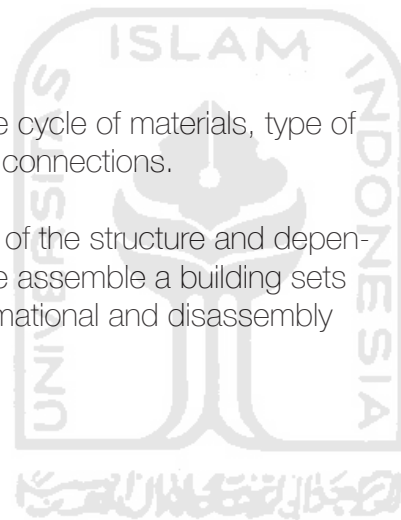
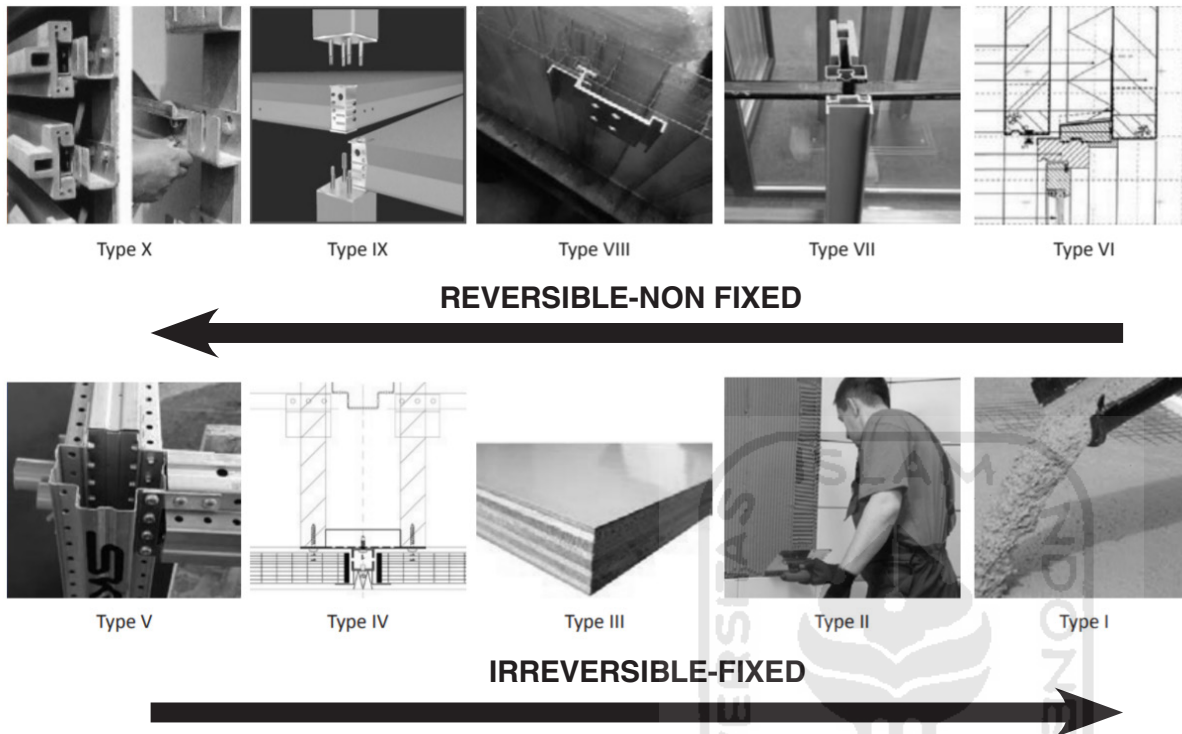


Figure 3.2.11 Assembly principles  
Sources: Dumisevic (2006)

## 7. Connection



### Type of Connection:

- Type I: Direct connection with chemicals
- Type II: Indirect connection with chemicals irreversible material
- Type III: direct connection with chemical reversible materials
- Type IV: direct insert connection
- Type V: undirect insert connection
- Type VI: direct connection by third connector
- Type VII: Interlock connection between two materials
- Type VIII: Intermediary connection between two materials
- Type IX-X: Connected by gravity force

Figure 3.2.12 Type of connection  
Source: Adapted from Durmisevic (2019)

Non-fix connection is easier the process of separation on building part and building element recovery. It allows the minimum destruction of the material to be reuse in the future planning. The non-fix connection usually needs more technic and special technologies in making such as cutting lasser machine.

Disassembly characteristics of a connection depend on:

- the number of connection devices,
- type of the material used in connection, and
- the form of a component's edge

## 8. Life Cycle Coordination of Material

In life cycle coordination for transforming the reversible structure, the considerations can be divided into two aspect:

- a. assembly of materials which have different life cycles.
- b. assembly of materials whose functions have different life cycles.



## Environment Management - Water and Waste Management in Forest

In many regions of the world, accounting for water is critical and can be done by catchment, re-use, and reducing water use, which requires the implementation of strategies at both the building and site scales. When approaching design decisions regarding water, we must understand that water is not a renewable resource, but a fixed resource that is experiencing decreased availability in many parts of the world. Accounting for resources and their use in buildings and onsite is an essential step toward net-zero water usage.

At the site scale, water use reductions can be achieved by using greywater or harvested rainwater for landscape irrigation. Reduced water runoff and increased groundwater recharge can be achieved through reductions in paved surface areas, the use of pervious materials where paving is required, bioswales, water retention areas, and constructed wetlands.

Green features such as waterless urinals and composting toilets may require special training or instructions for building occupants. These features, and others such as pervious pavement and bioswales, also require revised maintenance procedures. Designers and building owners should educate operations personnel about the environmental intent, as well as the operation and maintenance requirements, of these systems.

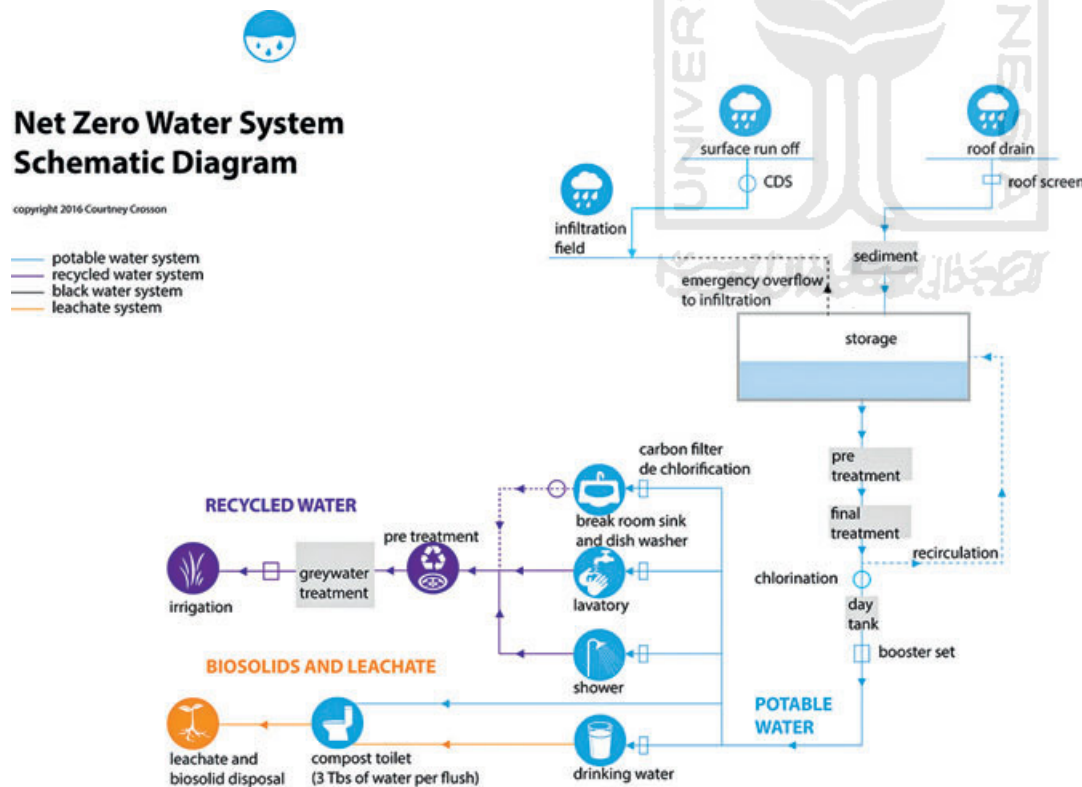


Table 3.2.3 Schematic diagram of a net-zero water system. COURTNEY CROSSON



Figure 3.2.13 The 65,000 gallon [246,052 L] forest wetland pond near the entry of the Tillamook Forest Center in Tillamook, Oregon, functions to harvest and store rain water for the fire sprinkler system; provides non-potable water for heat exchange for the cooling system; and serves as a reservoir for structural and wildland fire fighters in the surrounding region.

Several types of water are of concern during the building design process, with the type being defined primarily by its quality. Appreciating the impacts of each type on the environment is a precursor to the beneficial design of water-related building features.

**Potable water** is water that is fit for human consumption. Such water typically arrives at a building from a public utility after transport, pressurization, and substantial treatment. Potable water is the highest quality of water found in buildings (other than health-care facilities). Potable water, as is the case with building materials, carries a marked embodied energy burden. As a result of historical precedent, this high-quality water is typically used for all purposes in a building—including toilet flushing and irrigation, which do not require potable-quality water.

**Stormwater** generally refers to rainfall that is led from building and site surfaces to a place of retention or disposal. Retention is typically on site; disposal is typically to a public conveyance system and thence to a remote discharge location. The stormwater is mixed with sanitary drainage in combined sewer systems, where it is treated to the same standard as biologically-active human wastes. Such mistreatment of stormwater carries a marked energy burden and negative environmental effects during heavy rainfall events.

# BUILDING TIPOLOGY

## Visitor Center Roles in Nature-Based Tourism (NBT)

Nature or wildlife visitor centers having an important roles in attracting and educating the visitors. They also have the channeling function, with the centers guiding visitor spatial patterns and, for many visitors, and provides facilities for undirect experience of wildlife. Thus, they may act to inspire the visitors while avoiding or minimizing environmental/site disturbance [12].

In making decisions, prospective tourists face several key challenges about what destinations, events, activities, and attractions they will visit. First, many tourism products are intangible and therefore cannot be viewed or trialed prior to purchase. Second, tourism products tend to be expensive, particularly if they involve multiple destinations or large distances. Third, time and effort considered when choosing which products to be purchased—particularly if itineraries encompass destinations, activities, and attractions that are unfamiliar, uneasy to be accessed, or has geographically distant [13].

Visitor center can be seen as an active promotor for the related attraction and destination. They act as gateways and central information and interpretation points, Visitor center can determine the times of the day to visit certain attractions and/or suggest alternative locations for less crowded experiences. [14] In other words, visitor center are hubs that utilized to manage the flow of visitors in a destination.

Based on The role of Visitor Centres in UNESCO Designated Sites Workshop (2018), the generic functions that are common to most visitor centres are,

### 1. Information

Provides information concerning the values of the site (designation, activities, experience, etc), to facilitate its understanding and appreciation; and facilitating the site's visit (schedules, itineraries, services, codes of conduct, etc.).

### 2. Education

Facilitates to increasing the understanding, appreciation, and conserving-behaviour of the heritage and the surrounding environment.

### 3. Accessibility

Act as an entry point to the site by supporting mobility, overcome physical barriers, enjoy virtual reconstructions, as well as to promote access through a complementary recreational, or cultural offer.

Furthermore, another potentials can be found in Visitor Center's role are [14],

#### 1. Interfacing

Act as a meeting point that connecting towards local and visitors not only by physical use but also through the knowledge and understanding about the site.

#### 2. Integrating

Providing the opportunity for their greater involvement in relevant socio-economic dynamics as supporter for local development

#### 3. Inspiring

Visitor center can inspiring the visitor to have appreciative behavior towards the site value and the diversity as well as the manifestation in the areas.

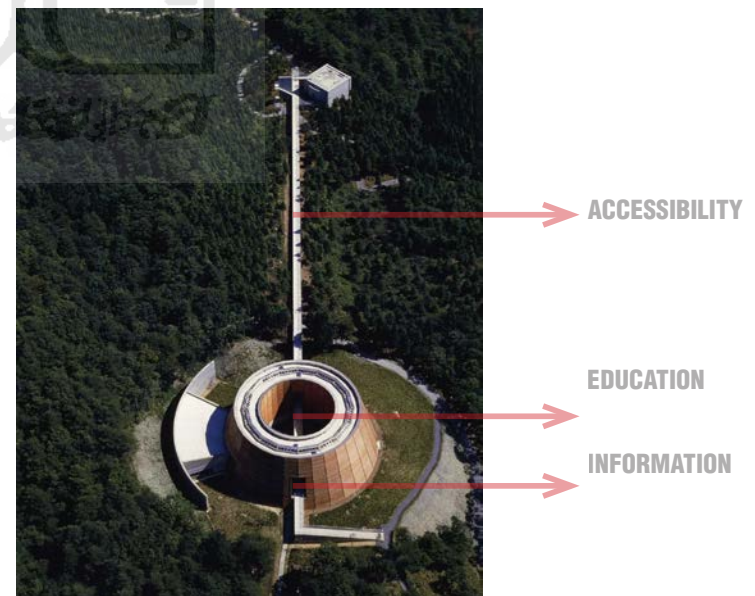


Figure 3.2.14 Tadao Ando Museum for Wood Culture  
Source: <https://www.inexhibit.com/mymuseum/the-museum-of-wood-culture-japan-tadao-ando/>

## Architecture as A Result of Human Interaction with Nature Javanese Cosmology

The Yogyakarta city landscape is a manifestation of the Javanese way of seeing their world (Javanese cosmology) which is manifested in the form of city planning, values and governance by the Kraton Yogyakarta, and also by the surrounding community. Javanese people believe that between "container" and "content" it is necessary to have balance, parity, harmony, and even integration so as to create inner peace, prosperity and prosperity in life and life. The parallel between the container and the contents is symbolized by the existence of a concept of unity between the microcosm (human) and the macrocosm (the universe) (Nugroho, 1996: 18-20).

The common interpretation also can be found in Nusantara Architecture that has those three elements. The interpretation also commonly found in Nusantara Architecture that has those three elements. First, the relationship with the creative soul (wastu), namely construction is the

embodiment of the spirit of creation which has dimensions of truth, beauty, and goodness which always maintains harmony with the environment (nature and its people); second, relations with resources (kalang), namely construction oriented towards beauty and blessings (harmony of nature for the sake of survival and life); and third, the relationship with the form (wewangunan), namely construction is an expression of the appropriateness of the human life attitude in maintaining harmony with nature and the living space with the community.

Noeradyo (1997) stated that there are 4 classification of life philosophy based on Javanese people: human to God, human to nature, human to social, and human to individual.

Relation	Life Philosophy	Meaning
Human to God	<ul style="list-style-type: none"> <li>- Manunggaling kawula gusti</li> <li>- Manekung pujabrata</li> <li>- Mesu budi, mesu cipta</li> <li>- Rila, anrima</li> <li>- Sumeleh</li> </ul>	<ul style="list-style-type: none"> <li>- The unity of noble values towards humans</li> <li>- Gives safety</li> <li>- Get a gift from the Almighty</li> <li>- Accept it wholeheartedly</li> </ul>
Human to Nature	<ul style="list-style-type: none"> <li>- Hamemayu Hayuning Bawana Pasrah/ Sumeleh</li> </ul>	<ul style="list-style-type: none"> <li>- Make nature harmonious</li> <li>- Surrender (to God)</li> </ul>
Human to Human (Social)	<ul style="list-style-type: none"> <li>- Tapa Salira</li> <li>- Rukun agawe santosa loma</li> <li>- Gotong royong</li> <li>- Adil paramarta</li> <li>- Setya suhu</li> <li>- Tanggel jawab boten lewerweh</li> <li>- Leres ing samubarang damel</li> <li>- Pinter saliring kawruh</li> <li>- Susila anur raga</li> </ul>	<ul style="list-style-type: none"> <li>- An attitude of respecting others</li> <li>- Adaptive to other culture/newcomers to enrich local cultural values)</li> <li>- The nature of giving</li> <li>- Be honest with others</li> <li>- Responsible and not arrogant</li> <li>- Clever to ingratiate others and not selfish</li> <li>- Knowing the manners</li> </ul>
Human to Individual	<ul style="list-style-type: none"> <li>- Gotong gilig wiji tuwuh ing sela</li> <li>- Sareh</li> <li>- Sumeleh</li> <li>- Prasaja</li> </ul>	<ul style="list-style-type: none"> <li>- Determination</li> <li>- The orientation of life lies in the body itself</li> <li>- Patient</li> <li>- Surrender</li> <li>- Aware</li> <li>- Open</li> </ul>

Table 3.2.4 The Relationship of Javanese Humans to the Philosophy of Life and Its Meaning  
Source: Noeradyo (1977) in Soedigdo, 2014

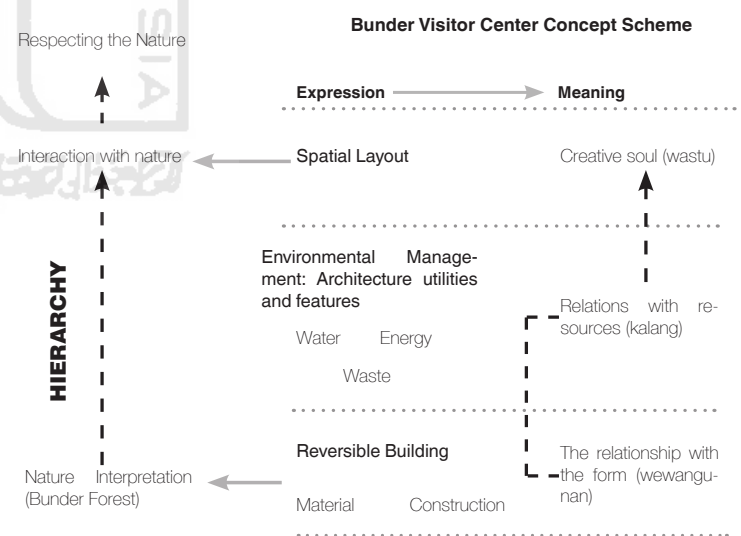


Table 3.2.5 Spatial Hierarchy  
Source: Author's Analysis

## PRECEDENTS - BUILT PROJECT

**Museum of Wood Culture/**

Tadao Ando

The Museum Of Wood Culture (Japanese: is a museum in the Kansai region, Japan, focused on the role of wood and forests in Japanese and international culture; the museum is possibly better known outside Japan for its iconic building designed by internationally-acclaimed architect Tadao Ando.

Located in a 415-acre site, the museum designed by Ando, with a total floor area of 29,000 square feet, comprises two constructions, a small concrete-made box-shaped building and a circular timber pavilion (actually based on a 32-sided polygon, a triacontadigon), connected by a 650-foot long raised walkway flanked by the forest.

The timber pavilion is a monumental structure, with a diameter of 150 feet with a central void 72 feet across, clad with ribs and boards made in local cedarwood; a circular pond is located in the middle of the void.

## Project learnt:

Between the outer and the inner skins, a spiral ramp leads to an impressive ring-shaped exhibition space dominated by imposing columns. Tadao Ando also play with lighting illumination: The roof includes an array of radial skylights that softly illuminate the exhibition gallery. He also utilize the building material (woods) as the reflection of the forest natural sources and as the education media to the visitor.

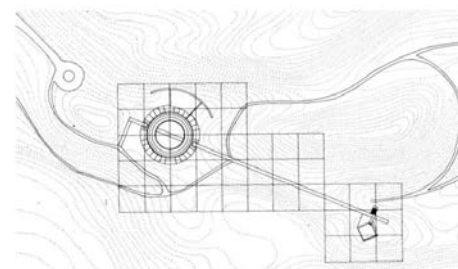


Figure 3.3.1 Wood Construction  
in The Museum of Wood Culture  
Source: Inexhibit

## Wasit Natural Reserve Visitor Centre/ X Architects

Wasit Natural Reserve was originally a waste-water and rubbish dump. The rehabilitation process of the damaged eco-system started in 2005 by removing 40,000m<sup>2</sup> of rubbish, replanting 35,000 trees, healing the land from toxic chemicals and conserving of the Unique salt flats and costal sand dunes. The new visitor center is established on site to continue protecting the natural environment, educate people on the richness of the wetland ecosystem and provides information about the birds



Figure 3.3.2 Wasit Natural Reserve  
Source: Archdaily

The architecture of the center blends with its surroundings and maximize the existing topography to minimize the visual impact on the natural scene. When visitors arrive, a pathway leads them underground into a linear Gallery. A fully transparent wall allows the visitors to experience the birds' natural environment and become part of it.

Project learnt:

The form of the visitor center was arranged by each room that directing the view to each physical potency in Wasit Natural Reserve. Like the gallery that direct to the lake, the room is utilize to maintaining the view of Ibis Bird. The 'X' form are created to avoiding the bulding blocking one anothers. So the physical potencies can be exposed by all direction. In TAHURA Bunder the areas are divided into many block that spread into some areas, considering the form making are intended to take the potencies of the site like in Wasit Natural Reserve Visitor Center.

## Panama Rainforest Discovery Center/

ENSITU - Patrick Dillon

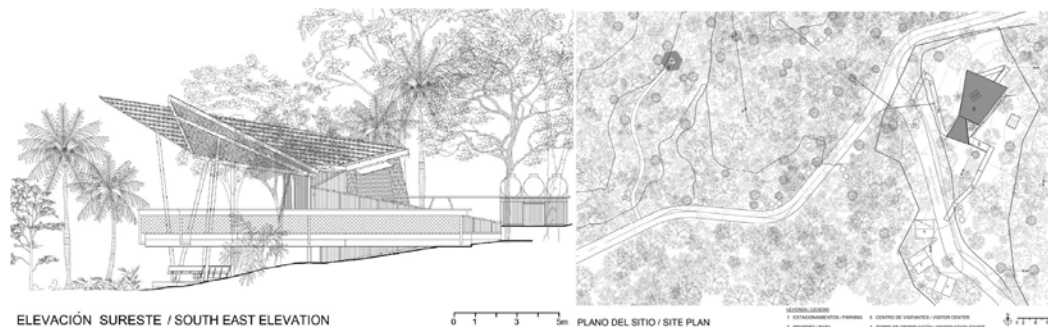


Figure 3.3.3 Panama Rainforest Discovery Center

Source: Archdaily

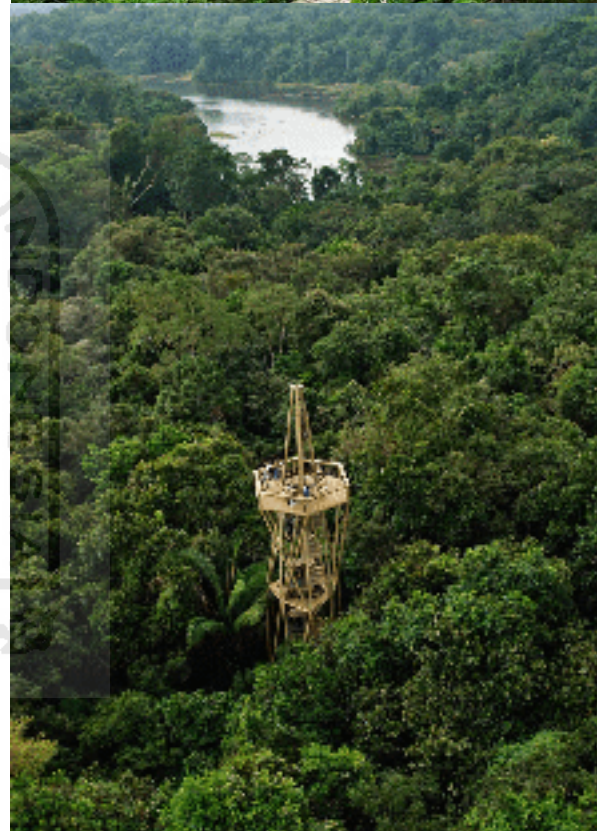
In the homage of ornitology Eugene Eisenmann during the 1950s and 60s and continuing to protecting and conserving the bird from Panama, the Panama Rainforest Discovery Center build. Consist of a 150 m<sup>2</sup> visitor center, a 32m (100 ft.) tall observation tower and 2 kms of pathways on a 20 hectare lowland humid tropical forest site contiguous to the world famous Pipeline Road and the Soberanía National Park.

Architect Patrick Dillon (ENSITU) designed a visitor center and observation tower “off the grid” to have minimum impact and degradation on each site, and each in its own way reflects sustainable design principles, including building facilities at previously impacted sites ( visitor center sites were de-nuded in the 80’s by the US Soldiers to build tropical test facilities).

The building use generate the energy by installing photovoltaic panels, use of recycled building materials (structural steel, panels and wood floors), collection, treatment and consumption of rainwater, treatment and recycling of waste and other wastes and integration of ventilation systems naturally.

Project learnt:

Sustainable construction is not about how building adapt by minimum de-struction of environment, but also can take the profit by the environment and impact to the wider aspect. Development of edu-eco tourism facilities in TAHURA Bunder Forest should connected to the environment by pay attention to the type construction by reversible design and lightweight construction as PRDC did. Remembering the forest is a natural conservation park, it should have the minimum negative impact to the areas. Panama Rainforest Discovery Center give the inspiration that by maximizing the potencies of small areas only, the experience of forest still can be perceived by the visitor.



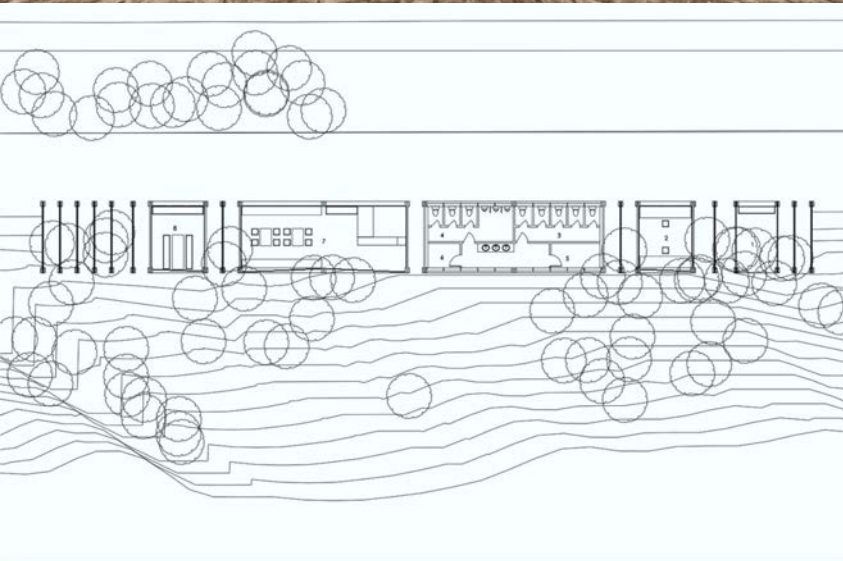


Figure 3.3.4 Pine Pavilion  
Source: Archdaily

## Pine Pavilion/ DnA – Design and Architecture

Pine Pavilion are located alongside Song-yin River dam and facing Xiahuangty Village Across a fish pond. By their main concern to preserving the pine trees, the pavilion concept is framing the pines trees. The wooden structural panels slice up the building to divide the program, preserve pine trees and create passages from the dam to the fishpond by linear structure.

Project learnt:

The pavilion try to provides users experience in enjoying the surrounding pine trees environment by simple passages. The material used are closely to the context of pine trees by wooden structure that giving low impact to the site.



# Savannah House/ LAM Architects



The Savannah House is the conservation shelter for giraffes. The building built with untreated wood with FSC-label and grasses as reed and pressed bamboo which are convenient and friendly for the animals even the human as the visitor.

The roofing use transparent material that allows the sunlight accessing the giraffes space. The room also has body heating for the giraffes when the cold season come. The heater was made by burning the woodchips materials instead of fossil fuels.

Project learnt:

As the main function to take care of the animals, the building is prioritize the house holder (giraffe) first without override human comfortability as the visitor. Becoming the education recreation, this shelter is put consideration for spatial organization and programming to separate the zone into public building, private zone (girrafe) and the care-taker zone. The material preferences taken is eco-friendly for the user and its surrounding environment. This is become the consideration to understanding the space relationship in Bunder Forest by studying the potential in its site, what to be conserves and what to be observes.

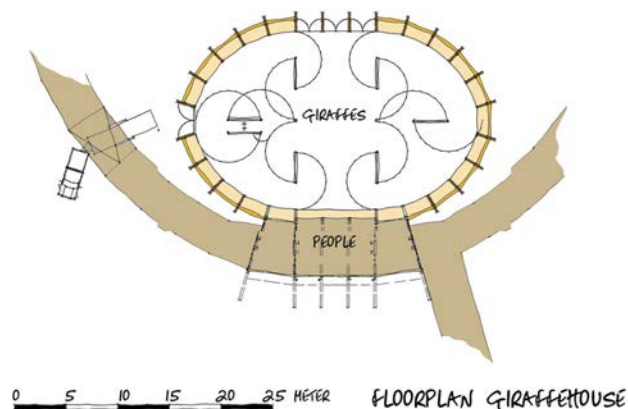


Figure 3.3.5 Savannah House  
Source: Archdaily

# Whiting Forest of Dow Gardens/ Metcalfe



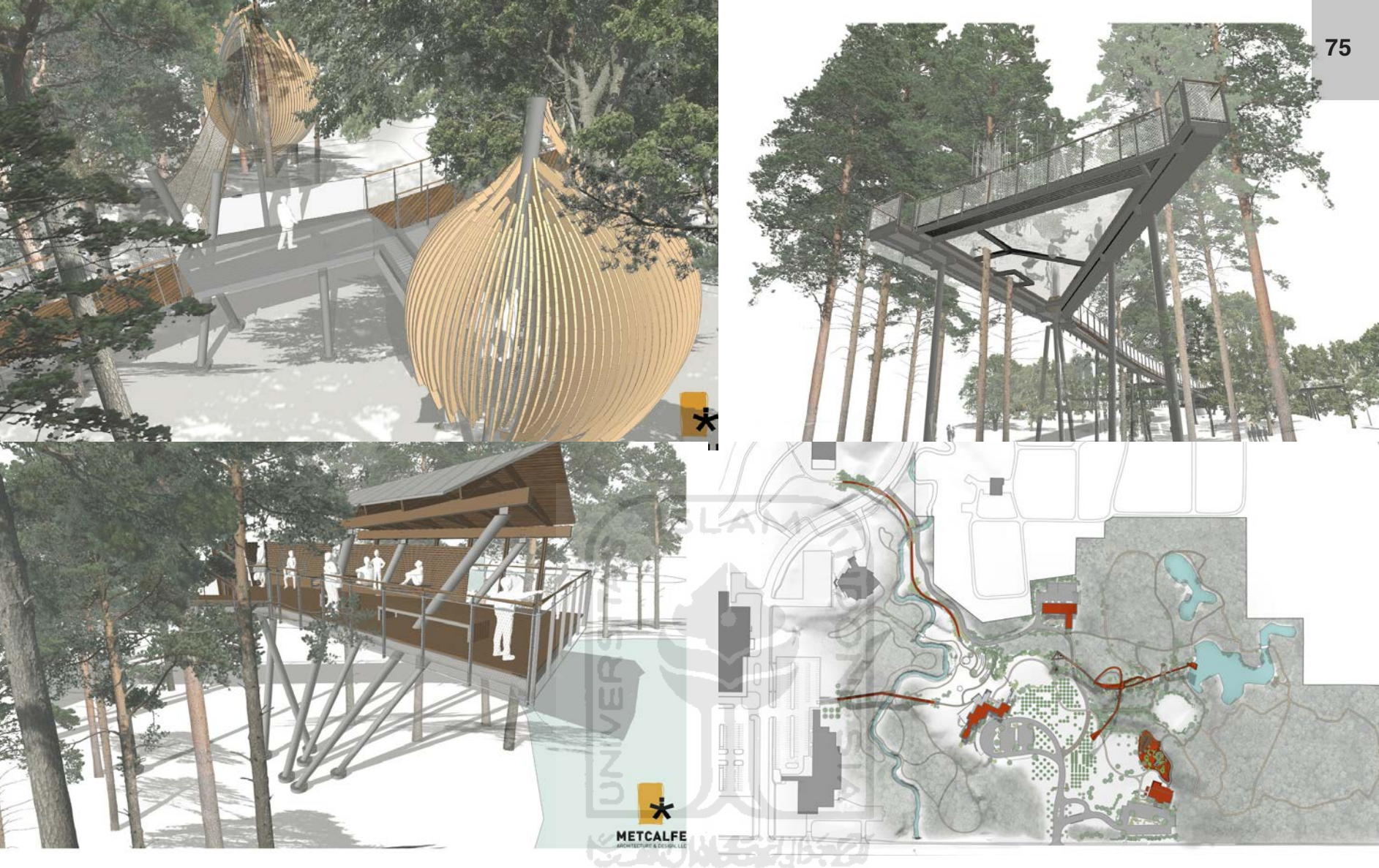
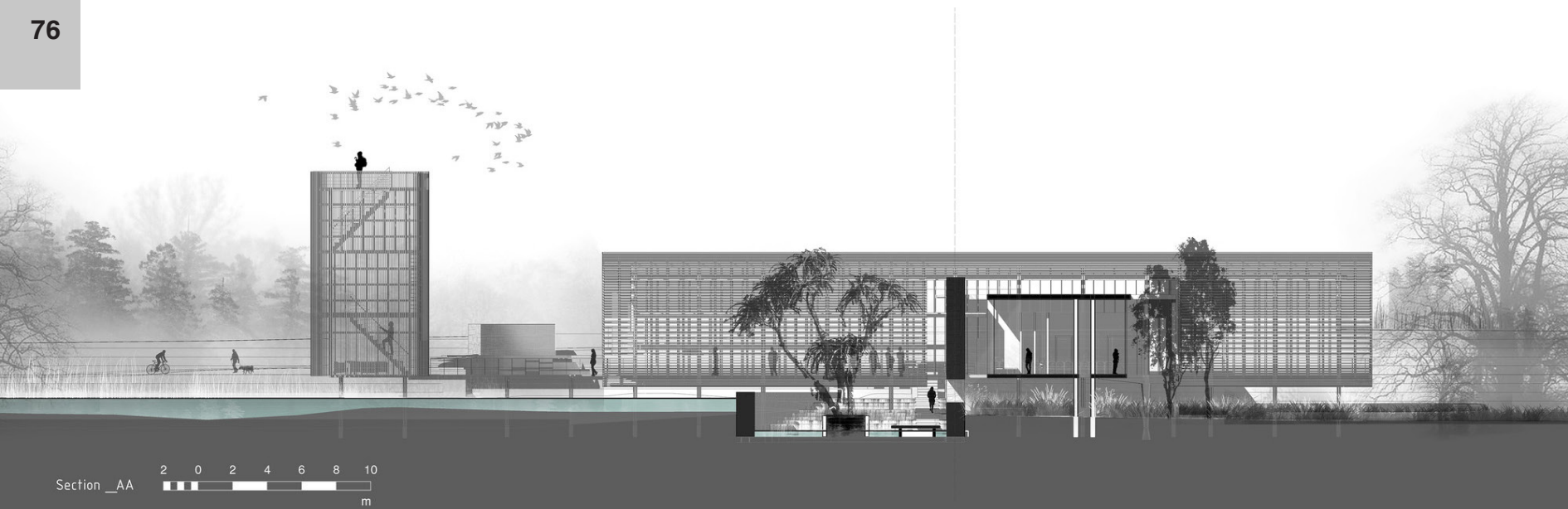


Figure 3.3.6 Whiting Forest of Dow Gardens  
Source: Archdaily

Whiting Forest of Dow Gardens is the nature play project to experience the Dow Gardens complex in Midland, Michigan. The project creates a dynamic network of bridges, paths, and tree canopy walkways that are engaged with gathering points and interactive features. Experiencing 54-acre pine forest with unexpected vantage points, the building construction provides walkways that are dominated by steel and wood. As the reversible construction, this project is dealing with the site by being adaptive to the natural trees rather than open and clear the land. It's proof by the installation that lets the trees interfere with the building.

#### Project learnt:

As the purpose is to give the closeness to nature, the building actualizes it by giving the crossing walkways in some height to possibly let the visitor not only enjoy observing the surrounding but directly attach to nature by touching the trees and the leaves. The height level possible lets the visitor approach the visual landscape that cannot be maximized when they were on the ground. Each space sequence in this building has its function: as an information center, walkways, gathering, discussing, and observing.



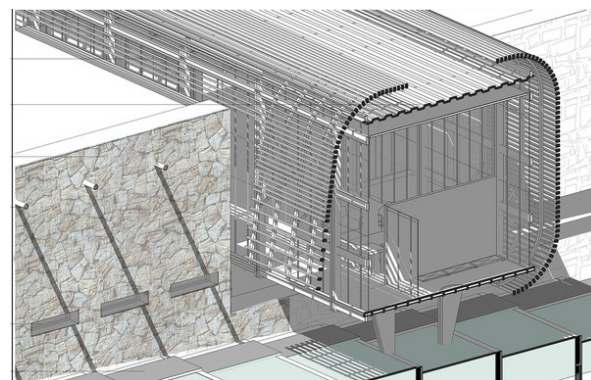
# PRECEDENTS - COMPETITION

## Educational Centre in Kenya's Karura Forest/Boogertman+Partners

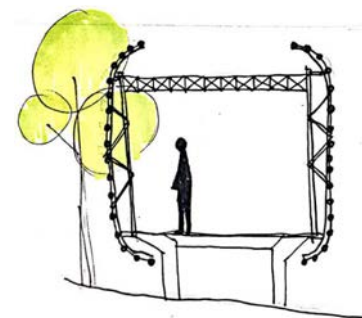
Competition	: Karura Forest Environmental Education Trust
Award	: First Place
Project Name	: Karura Forest Environmental Education Centre (KFEEC)
Architects	: Boogertman+Partners Architects
Location	: Karura, Kenya
Project Year	: 2014



## 1 low carbon footprint material



## 2 reversible techniques



## 3 sufficient use of water and energy

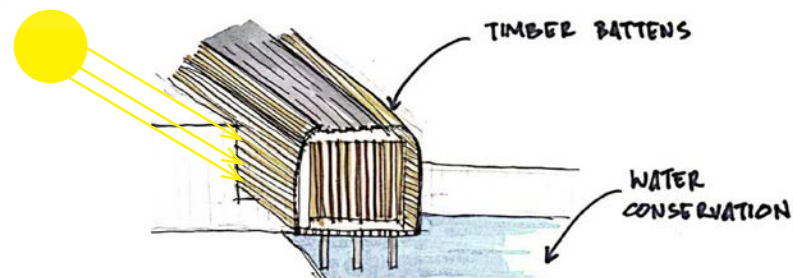


Figure 3.3.7 Educational Centre in Kenya's Karura Forest  
Source: Archdaily

Winning the competition to design a new education centre for the Karura Forest Environmental Education Trust in Kenya's Karura Forest Reserve, the vision for the site is for "a world-class transformational education centre focusing on environmental sustainability in the region, with an emphasis on the youth." Attempting to "change attitudes towards the management and the conservation of the environment, in particular forests, and the sustainable use of natural resources through education programming," the centre will aim to "sensitize and educate people on current and emerging national and global environmental issues."



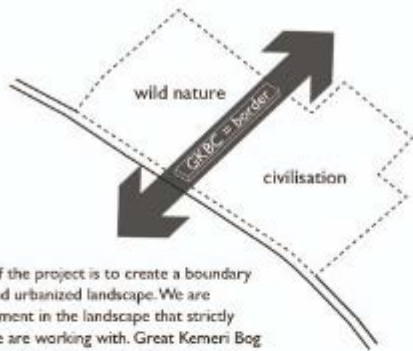
KEMERU NACIONĀLAIS  
PARKS

# PRECEDENTS - COMPETITION

## GREAT KEMERI BOG VISITOR CENTER

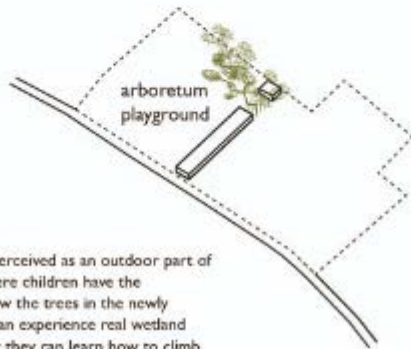
The competition won by Jan Tomas Ciesla, Miroslav Krátký, and Iva Potůčková from the Czech Republic that creates rectangular-bar form that effectively creates a simple yet striking entranceway to the park. Its use of natural materials and the varied layout of its vertical facade module give it a natural aesthetic in keeping with its surroundings. As the gateway to the Great Kemeru Bog the project is the most effective entry by the rectangular-bar form set perpendicular to the entry drive firmly separates the vehicular entry from the camping grounds and pedestrian network of pathways, and orient the visitors through a single access point that also becomes the starting point for the bog's network of wooden boardwalks. The sectional drawing expressing the use of natural material and adaptable construction. The vertical facade that consists of repeated module by harsh block forming a more natural aesthetic that clearly reflects to the surrounding trees of the forest.

Figure 3.3.8 Great Kemeru  
Bog Visitor Center Entrance  
Source: World Architecture



### Concept

The main theme of the project is to create a boundary between nature and urbanized landscape. We are proposing new element in the landscape that strictly divides location we are working with. Great Kemer Bog Visitor Center is a new gateway to the Great Kemer National Park.



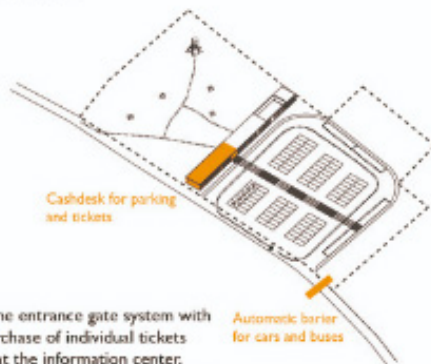
### Playground

Children's playground is perceived as an outdoor part of the information center. Here children have the opportunity to get to know the trees in the newly planted arboretum, they can experience real wetland meadow with its plants or they can learn how to climb the trees.



### New Gateway to the National Park

In our proposed project we are moving main entrance to the park from the original road to the central part of the newly designed building. The object also remains transparent in the other parts of its massing in order to feel like gate to the nature behind it.



### Ticketing System

We propose to combine the entrance gate system with parking tickets and the purchase of individual tickets and souvenirs for visitors at the information center. This system allows you to regulate the parking time on the premises and the better control of the entrance to the park.

### Detailed Section

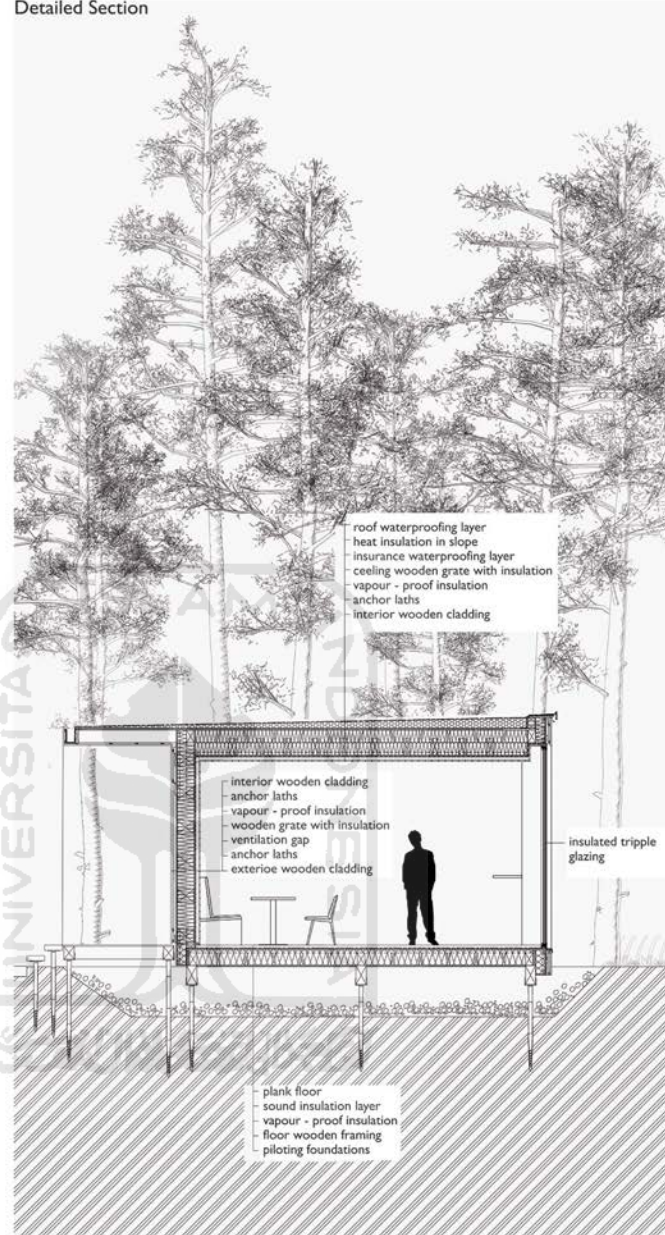


Figure 3.3.9 Partial Section  
Source: World Architecture



## PRECEDENTS - FINAL PROJECT

### Panama Rain Forest/ Louise Bjørnskov Schmidt

The project come from Pascasarjana Student of Bartlett University that proposed educational ecology facilities for Panama Rainforest Complex. The building circles the lake to give the visitor experience of the immersive ecology. Besides he want to raise the visitor awareness toward the environment. The material of steel rigg and plates are used by elevated construction system.

Figure 3.3.10 Panama Rainforest  
Complex Situation  
Source: Dezeen





Project learnt:

The spatial allocation of the program shows the good conversation with the ecology. Can be seen by the circles-hub that are effective enough to provides more experience to exploring the surrounding. The use of steel rig and steel plates is rather contrast to the pristine environment, yet the designer try to contributes to fewer interventions to site by reversible technique.

---

Figure 3.3.11 Panama Rainforest  
Complex Exterior  
Source: Dezeen

# ANALYSIS AND RESPON BASED ON THE SITE CONTEXT

## CLIMATIC AND GEOGRAPHICAL ANALYSIS

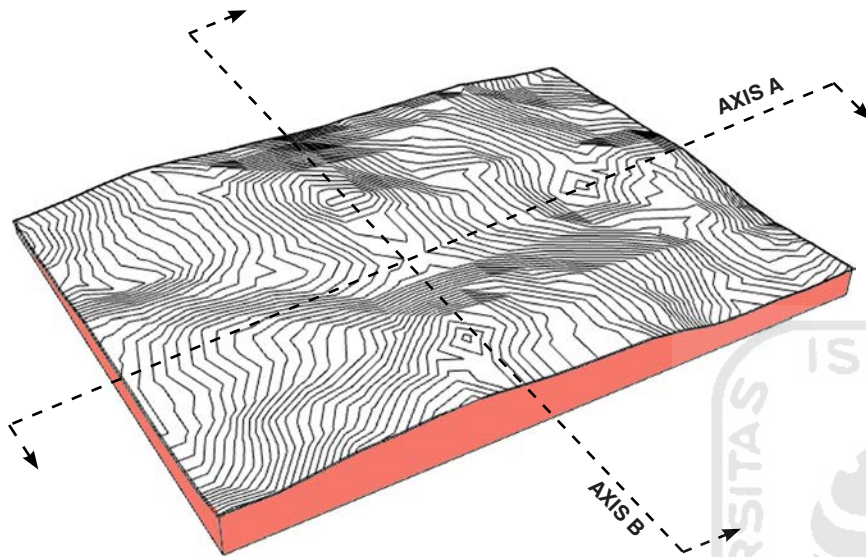


Figure 3.4.1 Site Morphology  
Source: Author

Figure 3.4.2 Site Section  
Source: Author



**SECTION A-A'**

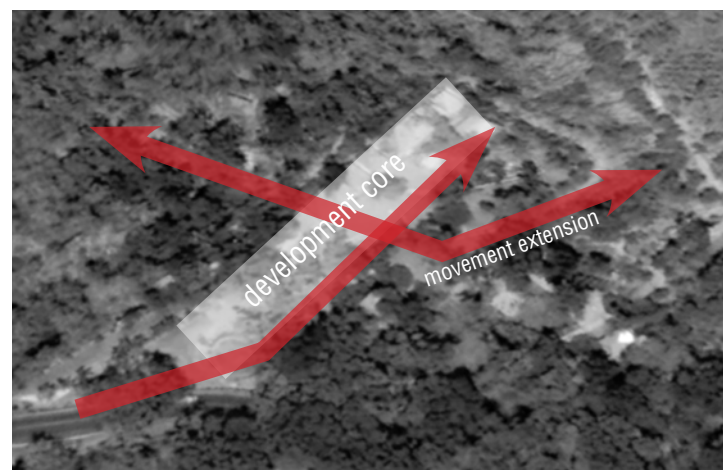


**SECTION B-B'**

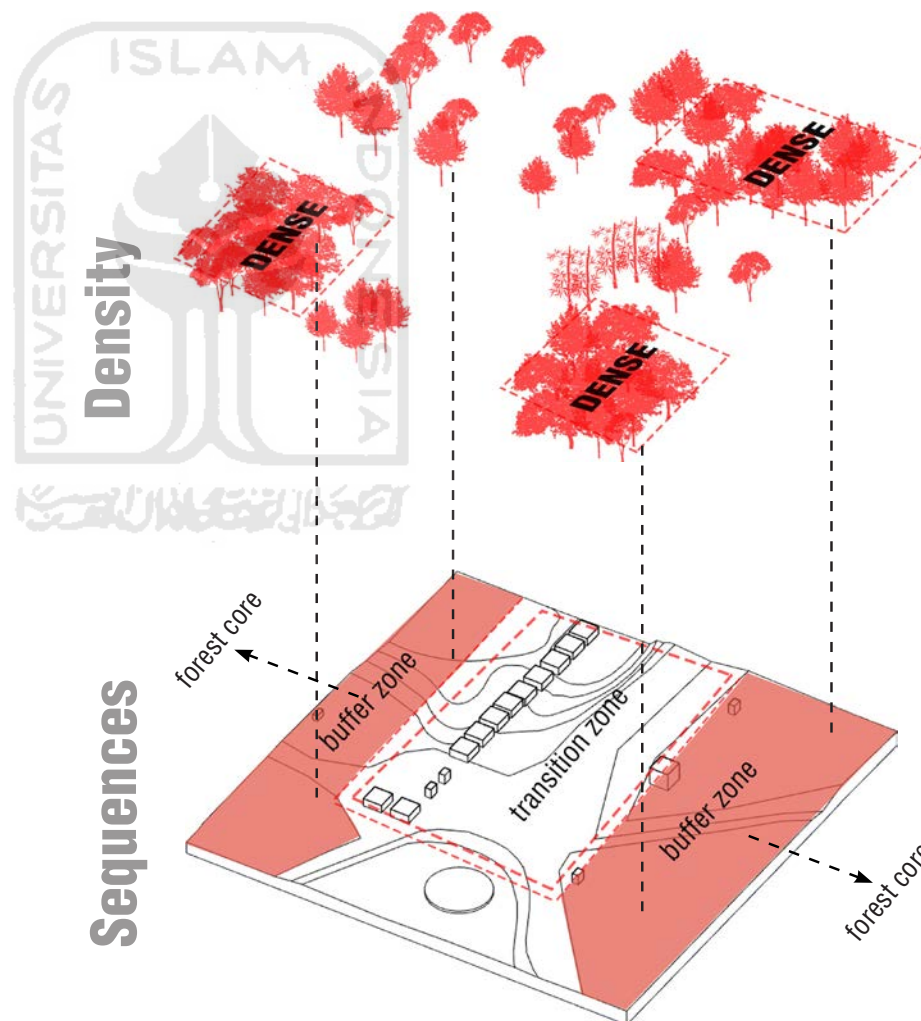
# EXISTING SITE MORPHOLOGY

The definitive boundaries from the trees giving the linear pattern of movement in some directions. This directions orient the visitors in experiencing the space in each zone in TAHURA Bunder.

## Movement



The open land in TAHURA impact to the order of vegetation in some zone. The visual weight in each zone is slightly different each others. The diagram besides visualize how the visual weight of vegetation in existing site can be classified into dense area and arid zone.



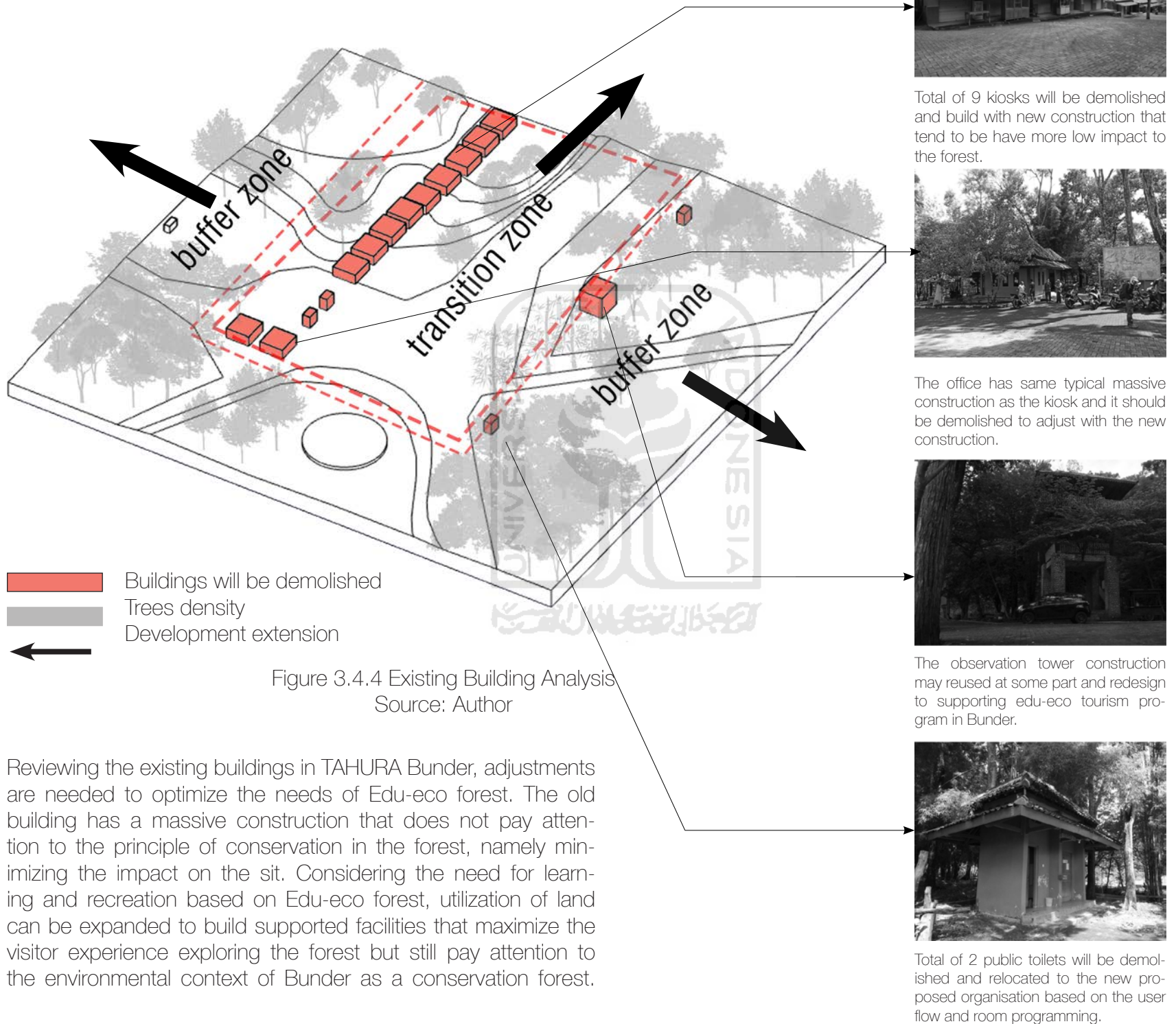
## Sequences

Based on the built features and infrastructure in TAHURA, the forest may be classified into 3 zones such as ZONE I as transition zone, ZONE II as buffer zone, and ZONE III as the forest core.

Figure 3.4.3 Existing Site Analysis  
Source: Author

# EXISTING BUILDING ANALYSIS

## BUILDING AND FACILITIES PLANNING



# EXISTING UTILITIES ANALYSIS

## EXISTING UTILITIES AND WATER FEATURES

The gradual development of TAHURA Bunder into recreation forest has made the place having disintegrated system for utilities features such as water and waste management. According to Taufik the Field Chief of TAHURA Management, the forest has been easier the process of reserving the water and managing the waste because of TAHURA is the large green area with high permeability. Eventhough, the disintegrated system seems not effective for TAHURA development in longterm with increases facilities to support edu-eco tourism, so it needs to re-evaluate before going to redesign the more sustainable waste and water management in TAHURA that having more low-impact to site.

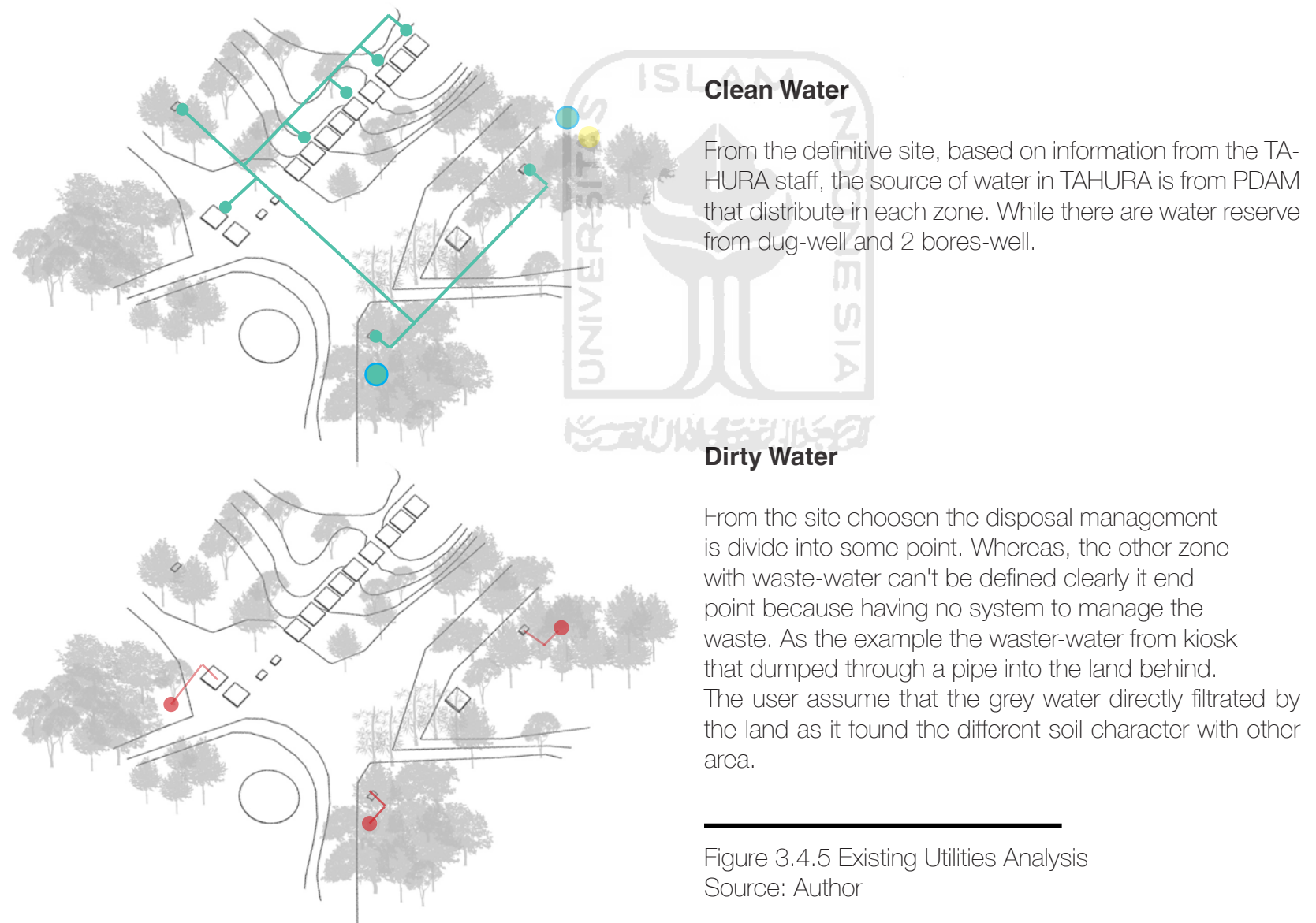


Figure 3.4.5 Existing Utilities Analysis  
Source: Author

# DEFINING EXISTING SITE AMENITIES

## PATTERN IN PHYSICAL SITE

### USER PROFILE



Visitor



Staff



Fauna: Deer

### USER'S DESIRE

Observing

Learning

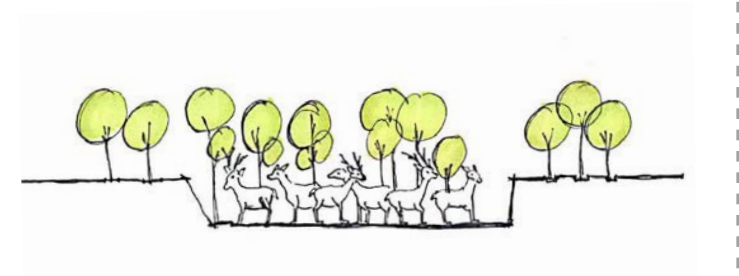
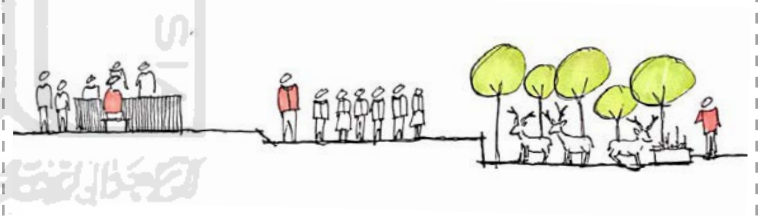
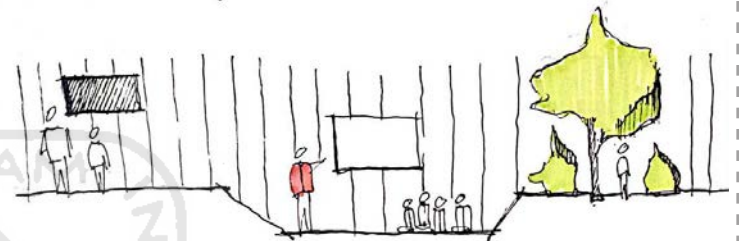
Finding

Serving

Sharing

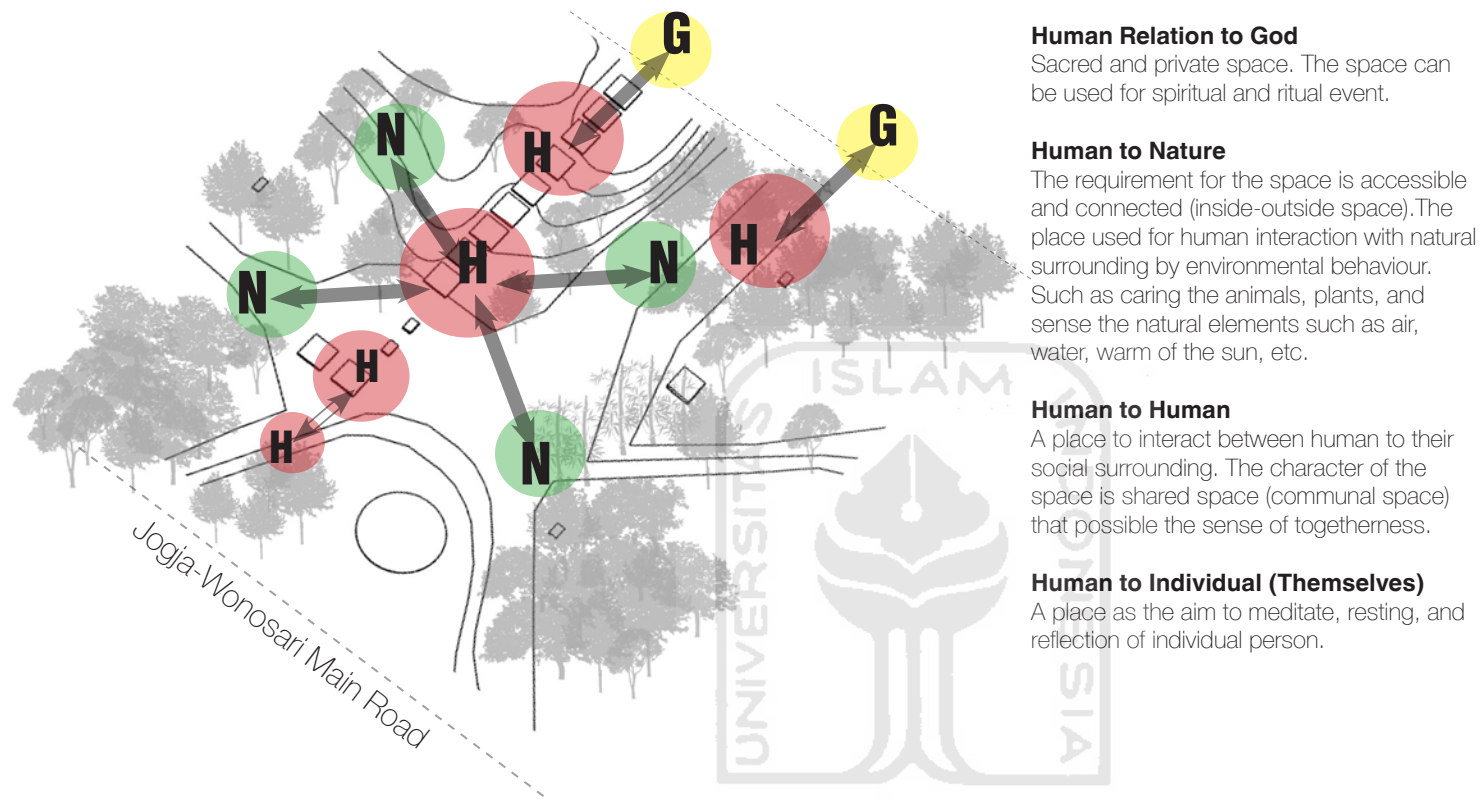
Be cared for

Live in nature



# JAVANESE LIFE PHILOSOPHY

## SPATIAL RELATION



### Human Relation to God

Sacred and private space. The space can be used for spiritual and ritual event.

### Human to Nature

The requirement for the space is accessible and connected (inside-outside space). The place used for human interaction with natural surrounding by environmental behaviour. Such as caring the animals, plants, and sense the natural elements such as air, water, warm of the sun, etc.

### Human to Human

A place to interact between human to their social surrounding. The character of the space is shared space (communal space) that possible the sense of togetherness.

### Human to Individual (Themselves)

A place as the aim to meditate, resting, and reflection of individual person.

As stated by Noeradyo (1977) in Soedigdo, 2014 in the book of The Relationship of Javanese Humans to the Philosophy of Life and Its Meaning, there are 4 classification of life philosophy based on Javanese people:

1. Human to God.
2. Human to nature.
3. Human to social.
4. Human to it individual.



Figure 3.4.6 Spatial Relation

Source: Author

# VISITOR CENTER SETTING - SPATIAL FLOW

As the context of Bunder as Grand Forest Park, the visitor center has the major role to manage the visitor experience, preparing the attraction and becoming the educational space to inform the visitor towards Bunder Forest and related environmental education. Based on the typology the author divided the major features that will bring into the concept of spatial organization.

According to Cabot (1958) there are three types of placements for visitor centers:

1. At or near the park entrance
2. En route between entrance and possible destination.
3. At a terminus.

In his placement identification, Cabot (1958) described the entrance center has the role to set the mood for the park should introduce the site potencies before the visitor orientation. Secondly the en route center that act as the interpretation is more challenging because it must provide both an introduction and a synopsis of the park values already passed, as well as the encouragement to get those values of importance that lie ahead. Then the terminal center was described as one which must also provide a synopsis of park values as well as the introduction to and interpretation of the nearby park features which are probably the reason for the location of the center.

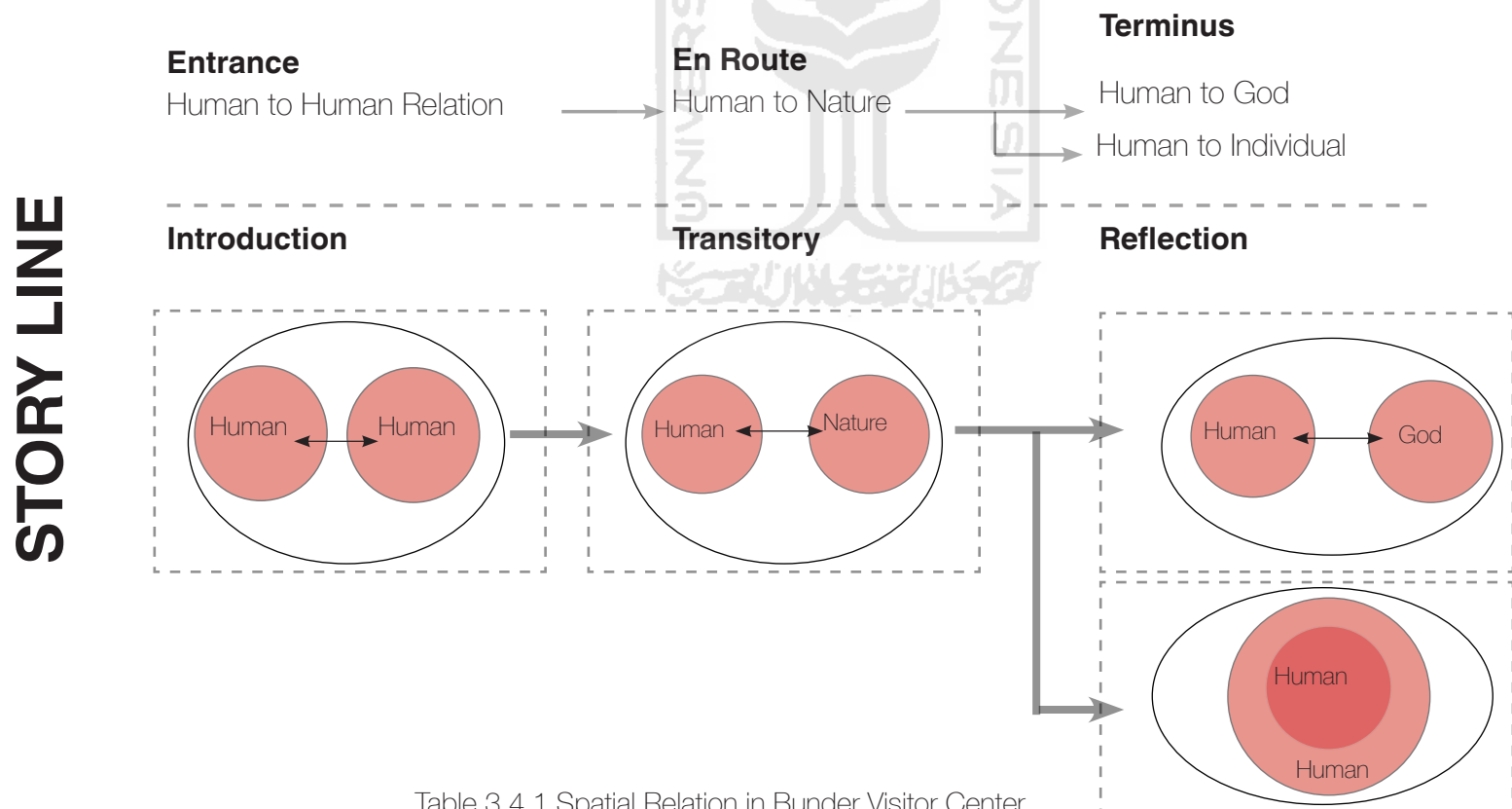


Table 3.4.1 Spatial Relation in Bunder Visitor Center  
Source: Author's analysis



# Entrance Point

## Information Space

The information space allow the visitor to creates the expectation regarding a potential visit. Such as what they can discover in the visitor center itself nor outside the building. As the welcoming space this is the meeting point between the staff and the visitor before directing the visitor to enjoy the site visit.

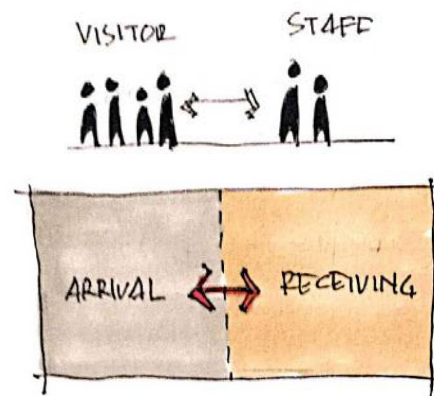


Figure 3.4.7 Entrance Concept  
Source: Author's analysis

## En Route Point

### Cabinets of Wonder

The space is to exhibit the collection of curiosities and rarities that manifest in Bunder Forest. In giving the education about the Bunder environment, cabinets of wonder maximizing the visitor abilities to have the special capture of Bunder Forest and specimen in nature that cannot observed directly in forest exploration.

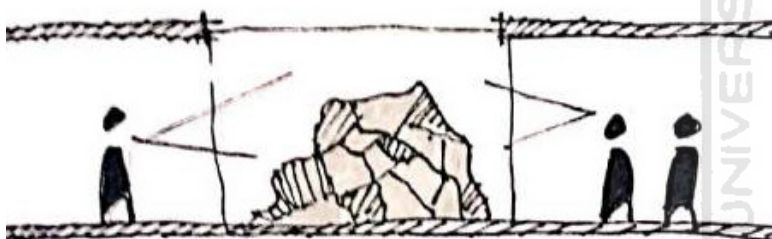


Figure 3.4.8 Nature Exhibition  
Source: Author's analysis

Moreover the space has role to accommodating the interaction between the visitor with the nature. The activities giving the mutual impacts on both side, consist of caring the fauna, planting, and other related activities to participate in nature.

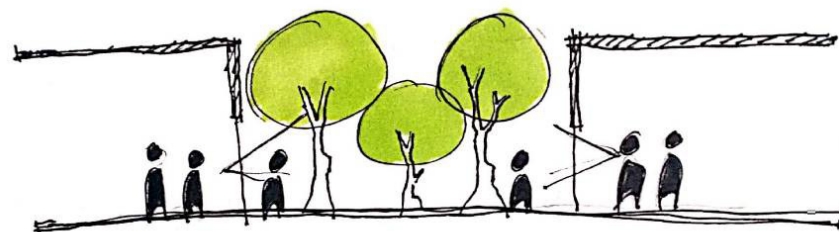


Figure 3.4.9 Nature Exhibition  
Source: Author's analysis

# Terminus/Final Point

## Reflection Space

The space provokes the opportunities to remembering/recall the experiences towards nature after exploring Bunder Forest. The space may provides the wider extense to collect the groups to sharing the experience or take a break with breathable view and ambience.

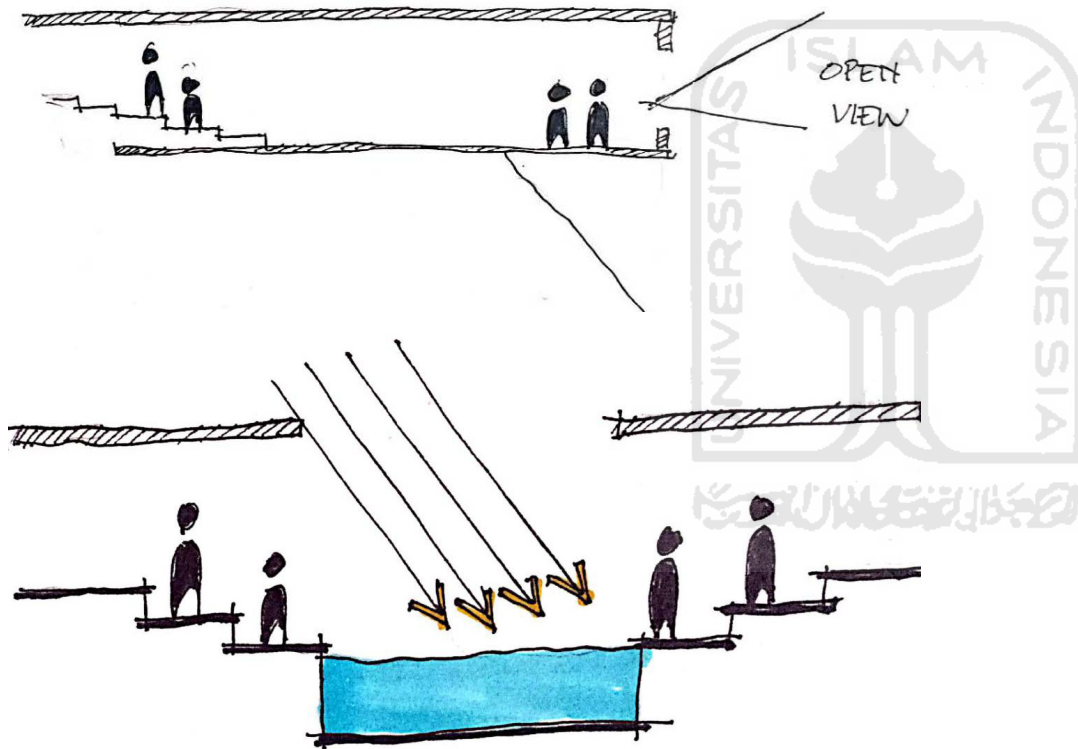


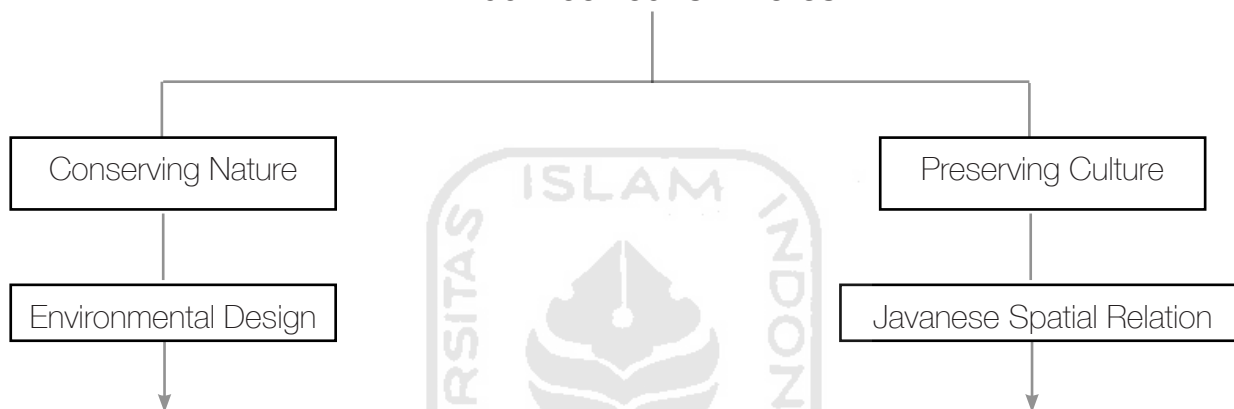
Figure 3.4.10 Reflection Space  
Source: Author's analysis

# CONCEPT RESPONSE IN MASSING

## EDU-ECO TOURISM FOREST

### Bunder Forest Visitor Center

#### Edu-Eco Tourism Forest



#### **Analysing the context**

Finding the site planning pattern based on the user profile, user's desires, land/site potencies.

#### **Reversible building**

Spatial relation of space and reversible structure and material for the visitor center

#### **Waste and water management**

Conserving the water by zero run off and waste management by zero waste

#### **Visitor Center Function and Spatial Allocation**

**Entrance:** The information space allow the visitor to creates the expectation regarding a potential visit.

**En Route:** The space has role to accommodating the interaction between the visitor with the nature.

**Terminus/Final Point:** The space provokes the reflection behaviour and opportunities to recalling experiences towards nature.

# SWOT

Internal

Eksternal

## Strength

- Strategic location in the roadside of Jogja-Wonosari main road.
- Various utilization zones with flora and fauna resources.
- Existing building to support edu-eco tourism.
- Various contour possible to maintain the view in some spots.

## Weakness

- Vehicular entrance and exit gate in one way direction.
- Bad circulation/connection between the zones.
- Unsustainable building construction and materiality in responding the site context.
- Bad management of waster-water.

## Threat

- Congestion in one access point.
- Vulnerable collapsed trees.
- Avalanche possibility in some areas.
- Wildfire potencies from physical activities.

## S-T

- Maintaining good accessibility to the site by considering the safety aspect and efficiency.
- Considering the nature conservation principles and environmental design approach in manage edu-eco tourism with maximizing the site potencies.
- Avoiding high risk physical activities that endanger the visitor or the site itself.

## W-T

- Providing good circulation for vehicular and pedestrian on site.
- The clear division boundaries between public zone and private (protection zone).
- Solution for sustainable construction and building materials that responding the context.
- Water conservation and waste management.

## Opportunity

- Awakening environmental behaviour and environmental knowledge in society.
- Great support for local residents (social and economy).
- Edu-eco tourism feedback to support reforestation by visitor/community participation in related events.
- Tourism profit to support forest preservation development and facilities maintenance.

## S-O

- Program and features to support environmental learning and recreation in Bunder.
- Local empowerment and UMKM supporting facilities.
- Forest as the meeting point between the visitor and locals (socio-culture offers)

## W-O

- Spatial arrangement by clear definitive zone that accommodate the function of conservation, education, recreation, and culture.
- Building as the education media and interpretation of Bunder Forest
- Features to support building and site sufficiency by water utilization and energy.

**VISITOR CENTER**  
**BUNDER GRAND FOREST PARK**  
 Conserving the Nature Preserving the Culture

project

issues

**DIY special heritages as The City of Student, Culture, and Tourism**

**Un-sustainable use of forest: Management into Built-Environment Construction**

Enhancing space to realizing the values of the city

Sustainable development and forest utilization

context

**TAHURA Bunder Edu-Eco Forest**

Conservation

Education

Recreation

Culture

general problem

**How to design visitor center to optimize experience of forest learning and recreation in TAHURA Bunder with minimum forest damage and disturbance by environmental design approach?**

specific problem

How to design the spatial layout in forest to support environmental learning experience while still maintaining the forest principle of conservation?

How to create visitor center for Bunder Natural Reserve with adaptive construction and low-impact materials that minimize site damage?

How to manage architectural utilities for site sustainability by maximize water conservation and waste management?

literature study

**Nature Conservation Principle**

**Visitor Center Typology**

**Environmental Design**

**BUNDER GRAND FOREST PARK**

Edu-Eco Tourism Facilities and Infrastructures

Site Context, Material and Construction, and Utilities

Site Analysis

Programming

Space Sequences

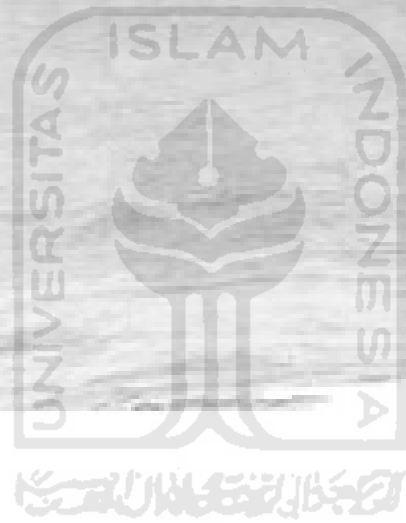
Reversible Building

Water and Waste Management

synthesis

**Designing visitor center to optimizing TAHURA Bunder visitor's experiences of forest learning and recreation with minimum site damage and disturbance by environmental design approach.**

# 04





# ANALYSIS AND RESPOND

Spatial Concept  
Visitor Center Allocation Setting  
Mass Concept  
Environmental Design Concept  
Visual Imageries

# SPATIAL CONCEPT

IDENTIFY AREAS: ZONES, CONNECTION, FOCAL POINT, BUILDING ALLOCATION

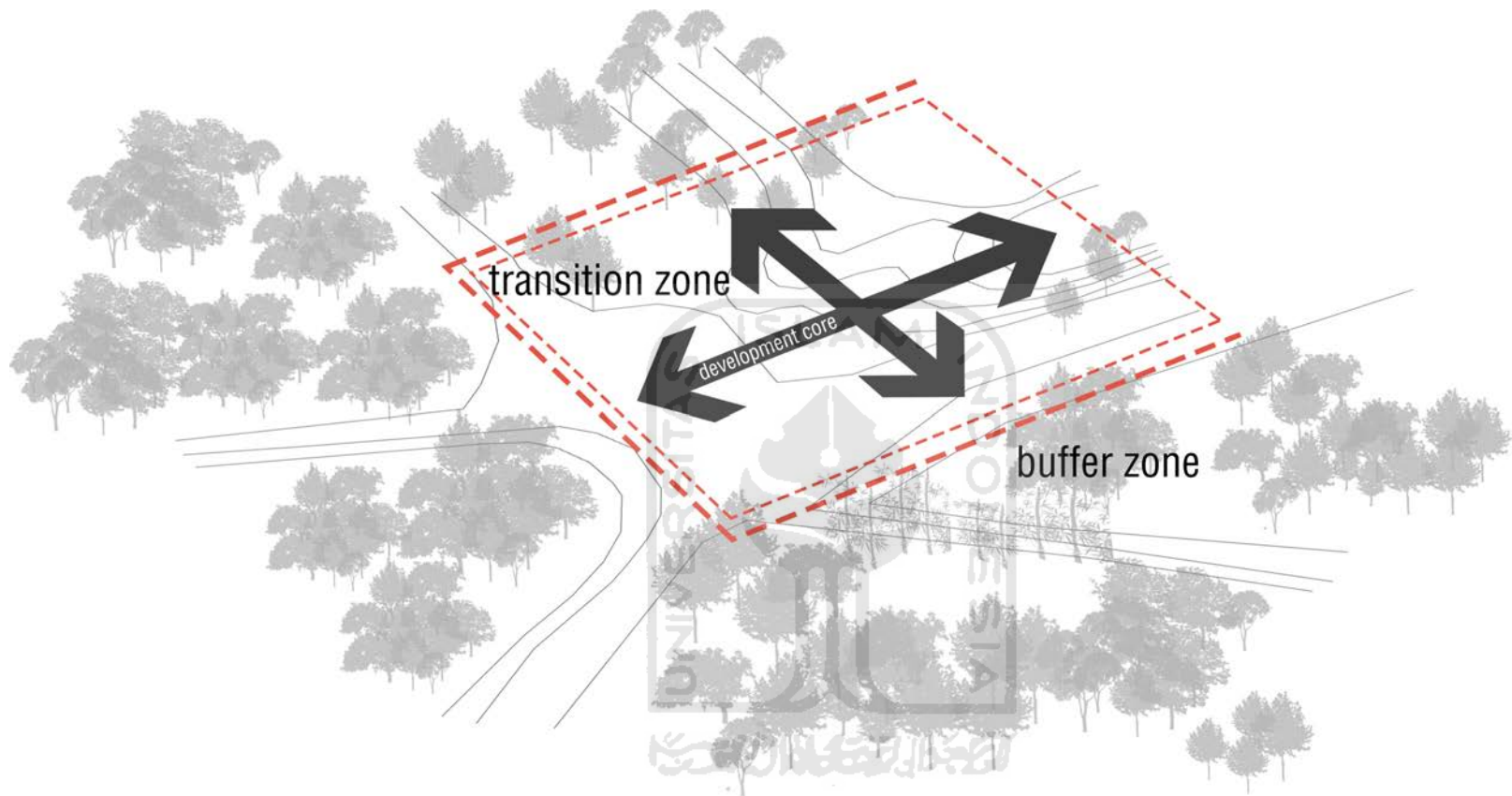


Figure 4.1.1 Zone Identification  
Source: Author's analysis

**Core area:** as the protected areas, as they act as reference points on the natural state of the ecosystems represented by the biosphere reserves.

**Buffer zone:** contiguous to the core area, the activities in the buffer zone are organized and also have the objective to protect the conservation. The buffer zone might be an area to accommodate the education purpose, training, tourism, and recreation facilities.

**Transition Zone:** as the outermost part of the biosphere reserve, settlements, cropping, forestry, and recreation activities are allowed in sustainable manner yet not too limited as the physical activities in the buffer zone.



# SPATIAL CONCEPT

IDENTIFY AREAS: ZONES, CONNECTION, FOCAL POINT, BUILDING ALLOCATION

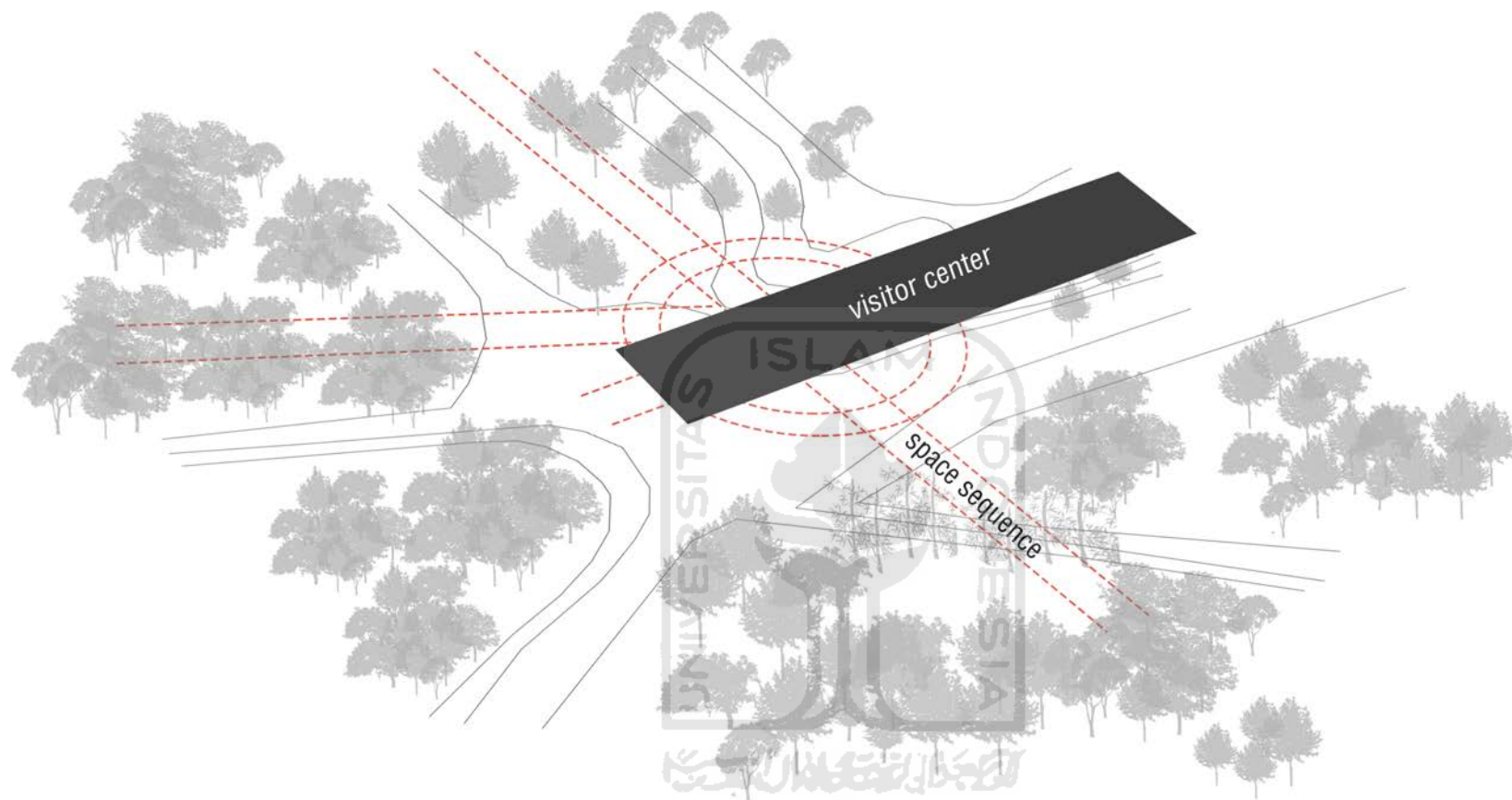


Figure 4.1.2 Sequences and Connection  
Source: Author's analysis

The existing development located in the centralized setting and provide separate sequences for the visitor to exploring the forest. Walkways are available in several areas connecting separate facilities within the forest. For example, the fauna station on the north side and also the camping ground on the south side

# SPATIAL CONCEPT

IDENTIFY AREAS: ZONES, CONNECTION, FOCAL POINT, BUILDING ALLOCATION

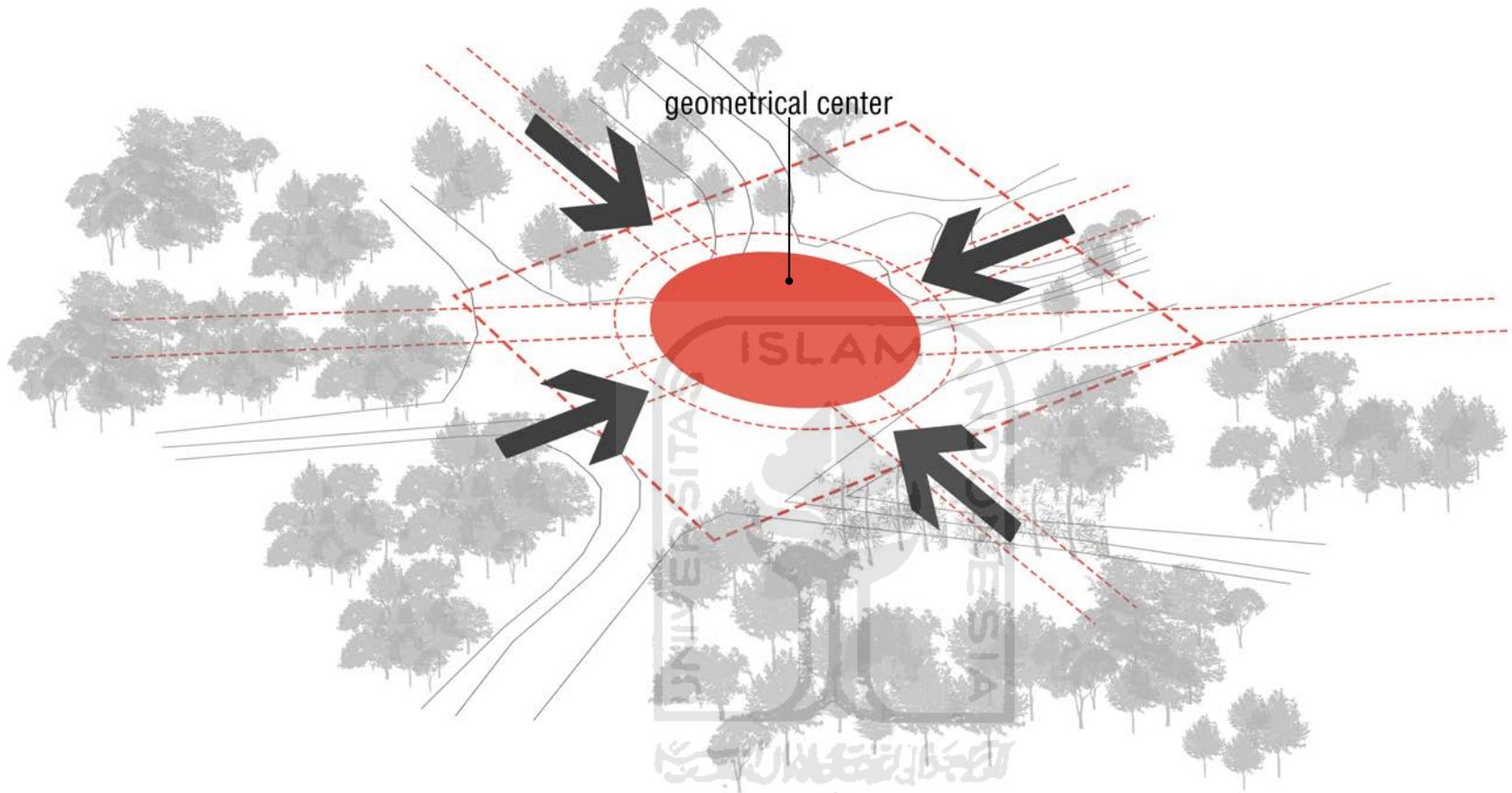


Figure 4.1.3 Transition Zone Utilities as Focal Point  
Source: Author's analysis

The central area in the transition zone has more flexible open area to be developed as a central building or as the main building that serves to receive visitors. Primary building in the center can be set as a gateway to orient visitor to the deeper forest areas to get more experience toward environmental learning and recreation of Bunder Eco-Edu Forest.

# SPATIAL CONCEPT

IDENTIFY AREAS: ZONES, CONNECTION, FOCAL POINT, BUILDING ALLOCATION

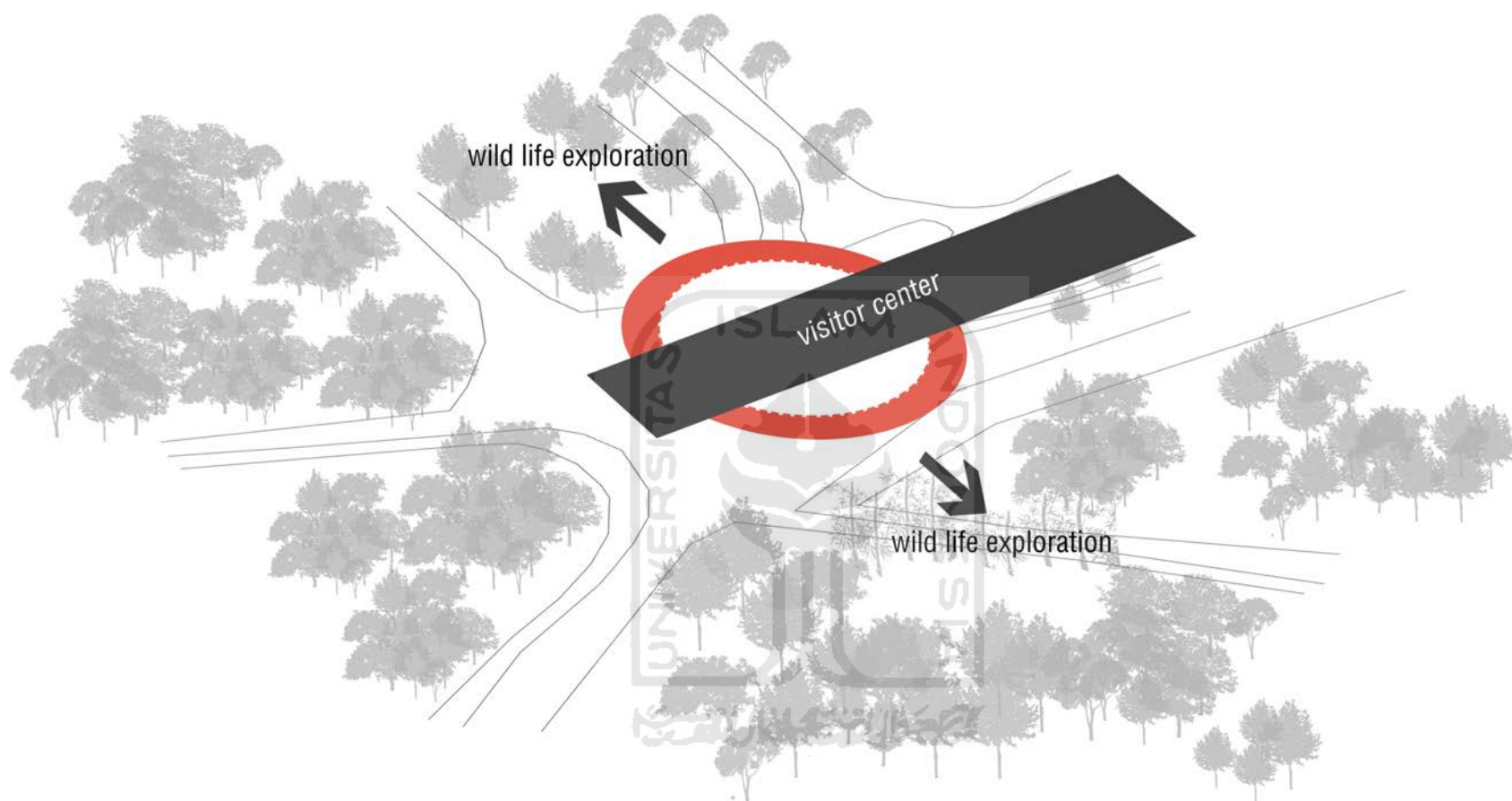
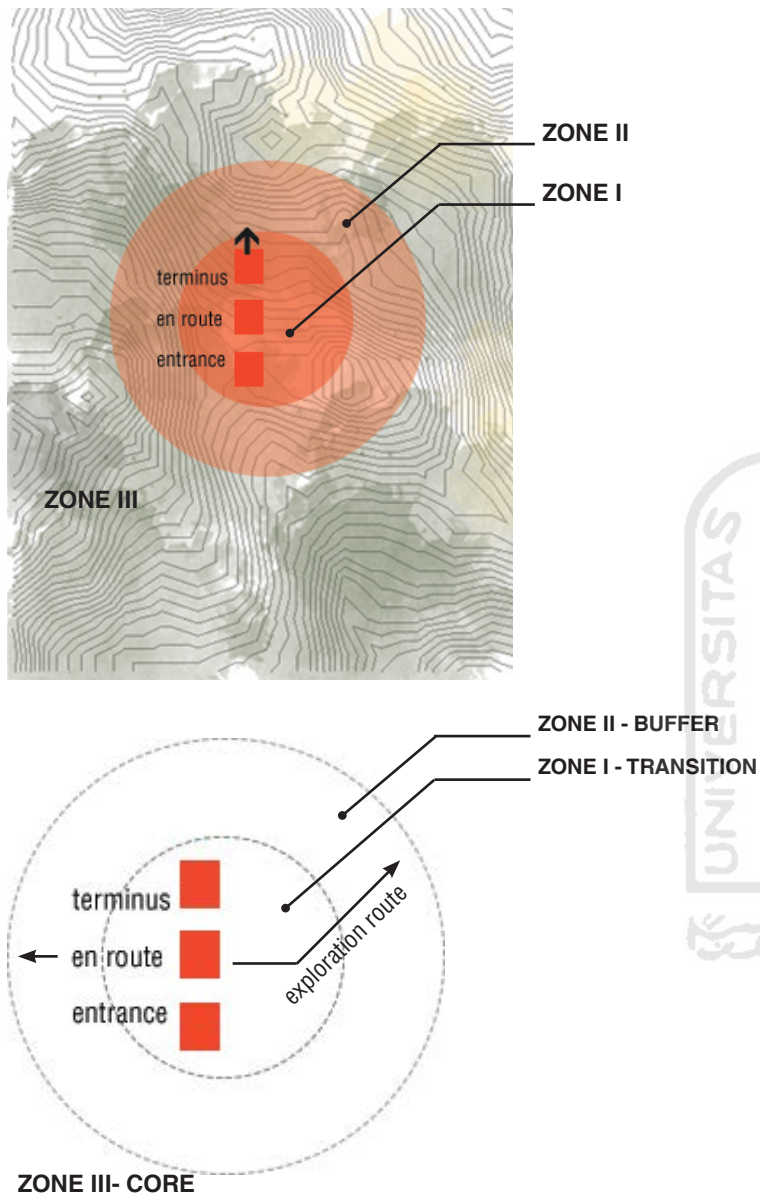


Figure 4.1.4 Extension Scheme of Building Allocation

Source: Author's analysis

The development of supporting facilities will be extensive to optimize visitor experience of environmental learning and recreation in wider preferences. To explore the forest, the zone is prepared to the buffer zone. With several additional supporting buildings for transit and also the end of the journey

# VISITOR CENTER SETTING - ALTERNATIVE 1



## CENTRALIZED SETTING

The centralized setting allowed to maximize the development in the ZONE I (transition zone/utilization zone) as the replacement for the existing building on TAHURA Bunder. Giving the new experience for eco-edu forest, the setting are arranged start from the entrance, en route as transitory space, and end up in the terminus as the goals of the exploration.

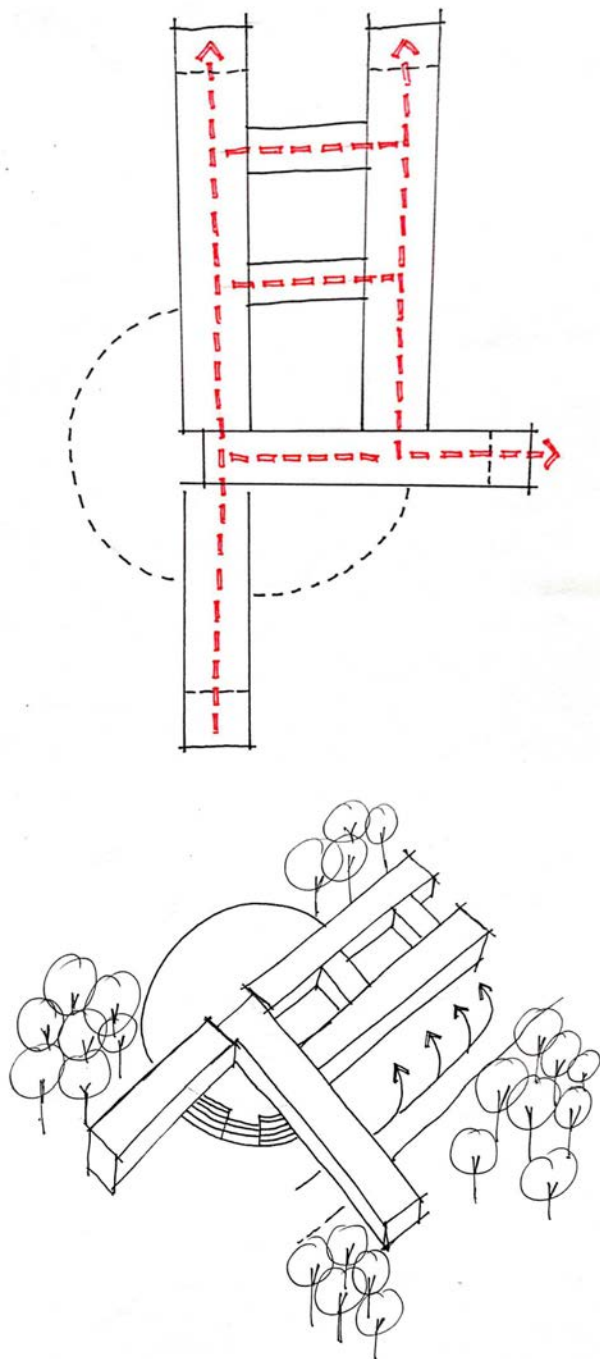


In the centralized setting, the core building act as a gate to the visitors to explore the wider forest. To give the visitor preferences into wider exploration, ZONE II as buffer zone possible to be develop into elevated path until the ZONE III as the core area

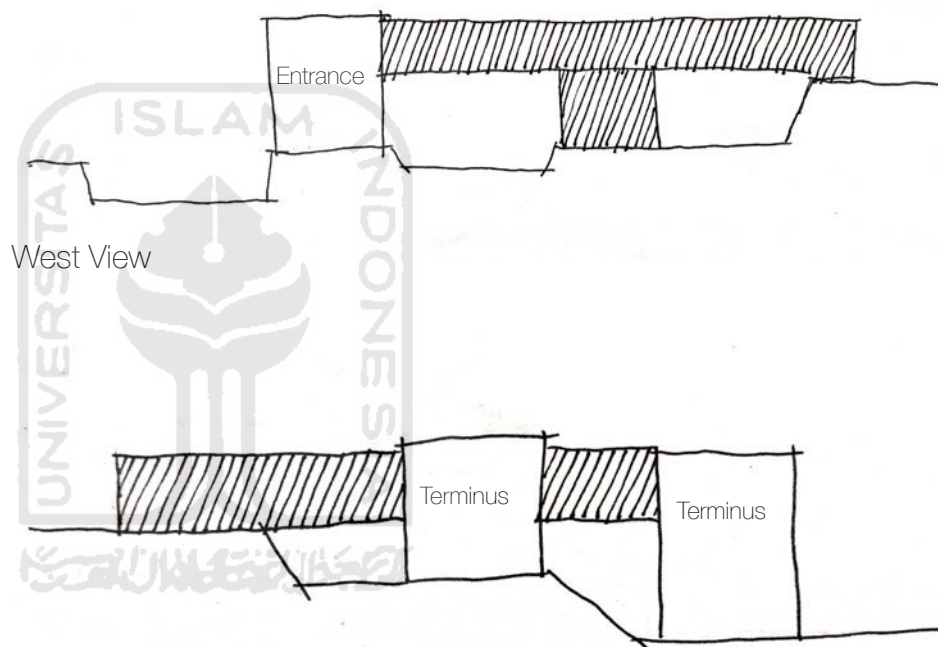
Figure 4.1.5 Allocation setting (Alternative 1)

Source: Author

## SPATIAL RELATION - ALTERNATIVE 1



East View



Entering the visitor center from the north, in entry point visitor will be lead to get an early information about the potential visit, then going to interact with the animals in the middle of walking experience.

As different elevation of the topography between the north and the south the building are separate in two zone. At the middle located the crossing route to another building as a gallery.

In the east side of each building mass located the final point (terminus) as the place for reflection and contemplate.

Figure 4.1.6 Spatial Relation (Alternative 1)  
Source: Author

## MASSING CONCEPT - ALTERNATIVE I ENTRANCE

INFORMATION SPACE

1 The foyer divided into two parts as semi-outdoor receiver and indoor receiver. As the semi-outdoor receiver the staff welcoming the visitors by entrance gate in the west part that facing the south. After the conditioning the staff let the visitors entering the indoor receiver to giving the introduction about the potential visit in the visitor center itself nor the Bunder forest.

2 As the semi-outdoor receiver the structure differentiate from the indoor receiver by the massivity of wood construction.

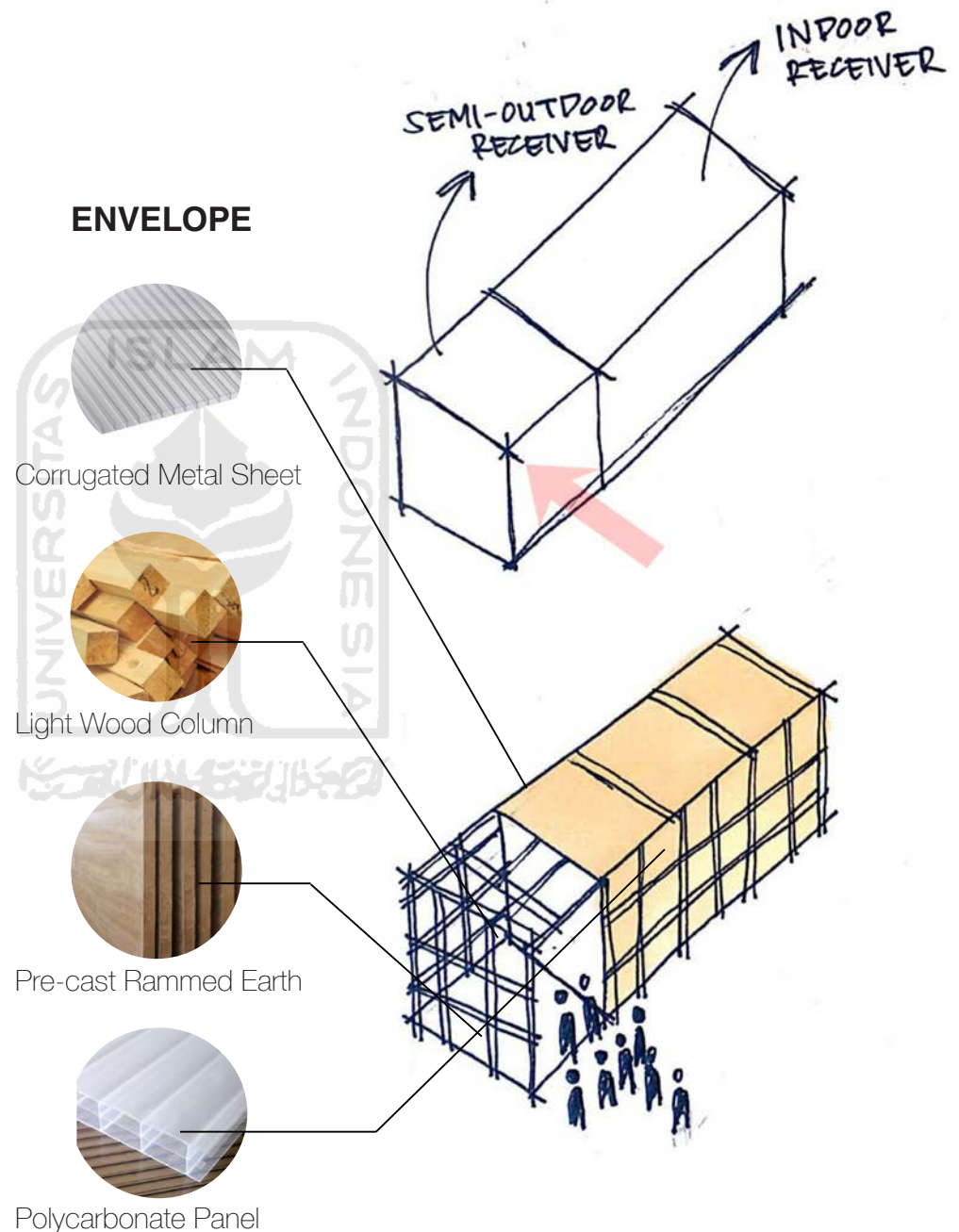


Figure 4.1.7 Entrance Concept (Alternative 1)  
Source: Author

## EN ROUTE

### NATURUM (NATURE ROOM) AND CABINETS OF WONDER (EXHIBITION)

1

As transitory space, the transition orient the visitor to interact with the nature. In giving the user experience to enjoying the nature, the space consist of hallway that separated into route to observing the fauna and the route for exhibition purpose that used to enjoying the specimen in nature that manifested from Bunder Forest.

2

Has the same function to observing, admiring, and studying the nature these 2-routes having the same character of slow moving phase.

As one configuration of structures, the hallways distinguish by the massiveness of envelope.. The route to interact with the flora and fauna are tend to be open.

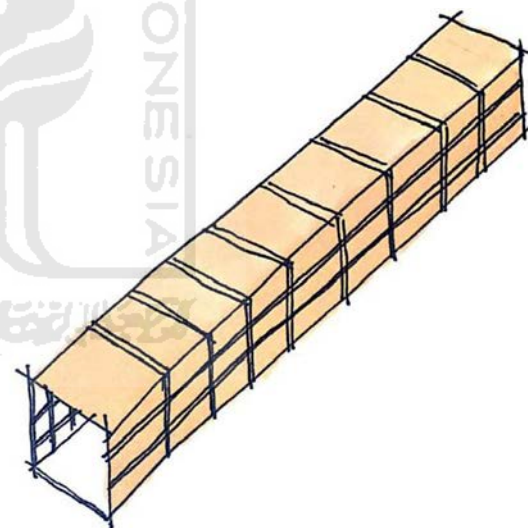
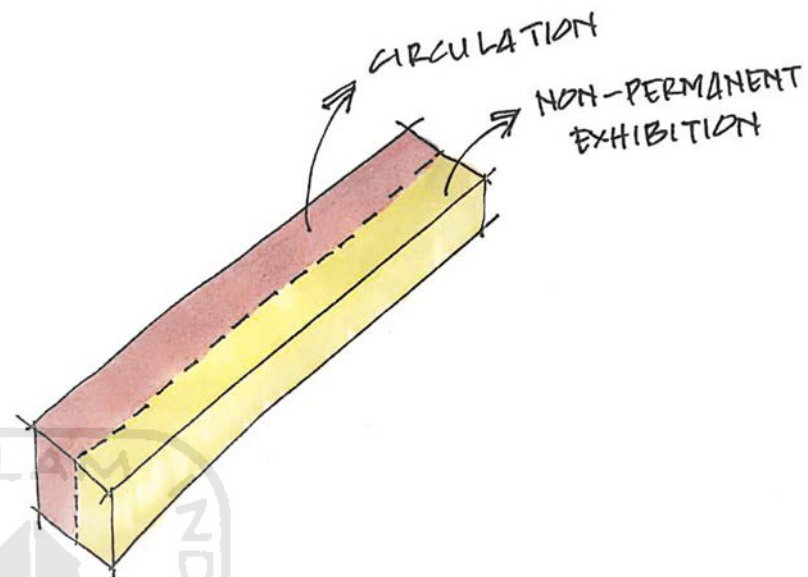


Figure 4.1.8 En-Route Concept (Alternative 1)  
Source: Author

## TERMINUS

### The Form of Human Relation

1 Terminus is the point that offers the visitor to rest and recalling the memory of exploration with breathtaking view and calming ambience. The space has supported ambience to meditate and having spiritual activities. This underlined to be the interaction between human to God and human to human itself as the life philosophy of Javanese people.

2 As the terminus, the space giving different speciality after the nature-exploration. In between located two crossing hallways above the water conservaion pool that facing each other.

3 The end of the terminus is an two-jutting out hallways from the edge of the hill. This possible the visitor to maintaining the wider view while they getting more breeze and touched by the warm sun.

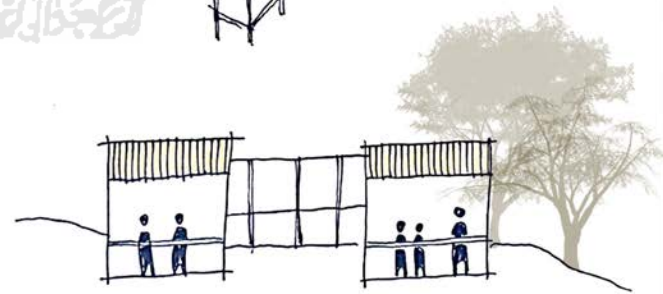
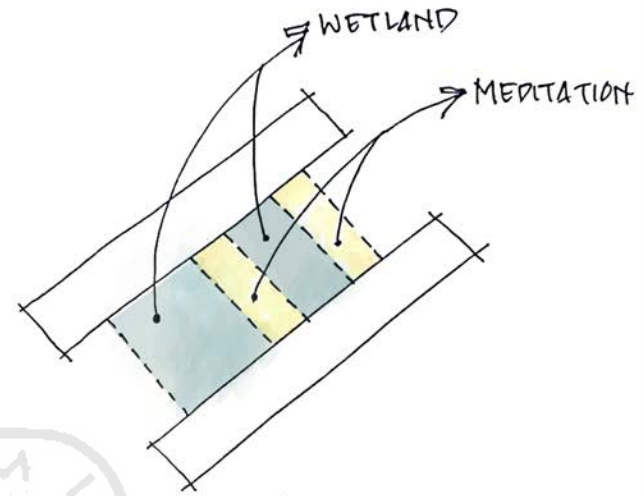


Figure 4.1.9 Terminus Concept (Alternative 1)  
Source: Author



## SITE PLAN - ALTERNATIVE 1

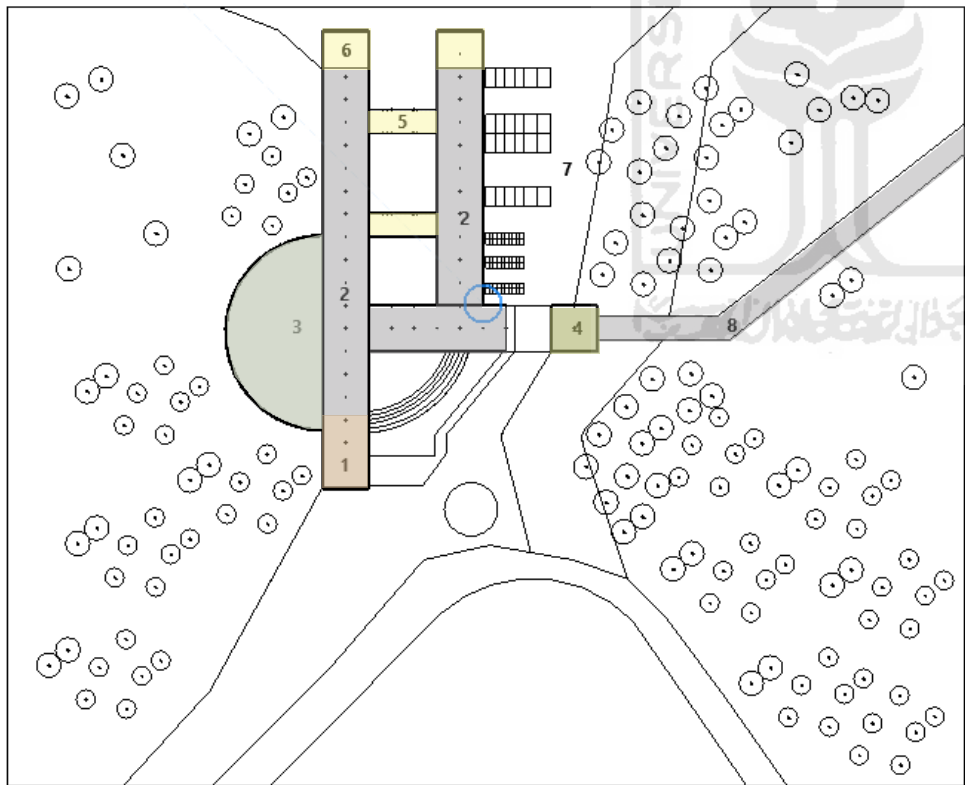
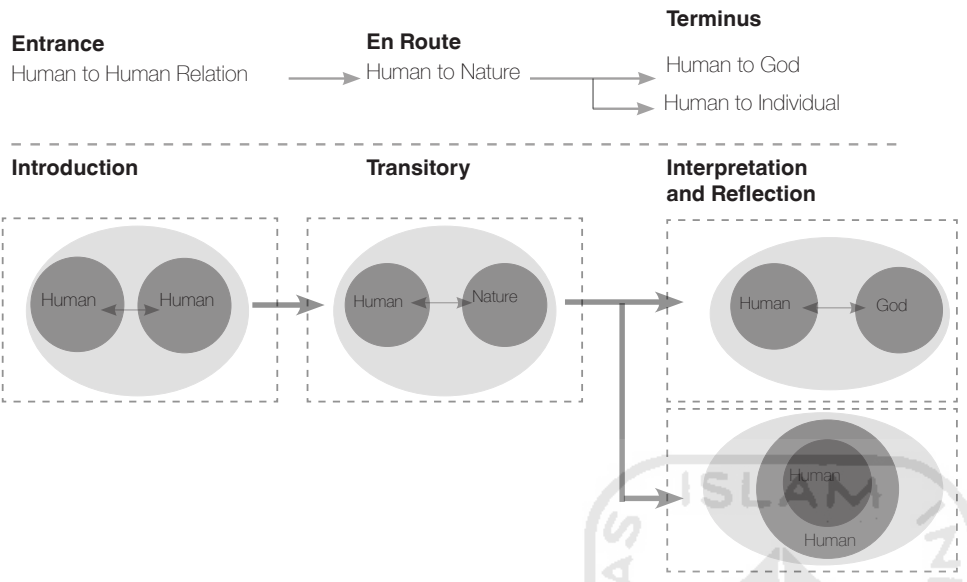


### LEGEND

- |                       |                     |
|-----------------------|---------------------|
| 1. FOYER              | 6. VIEWING PLATFORM |
| 2. EXHIBITION HALLWAY | 7. PARKING          |
| 3. FAUNA STATION      | 8. ACCESS TO FOREST |
| 4. EXIT               | 9. WET LAND         |
| 5. MEDITATION HALLWAY |                     |

Figure 4.1.10 Site Plan  
Source: Author

**STORY LINE**



- Entrance
- Route
- Terminus
- Nature Room
- Exit

Figure 4.1.11 Story Line Bunder Visitor Center (Alternative 1)  
Source: Author

## ENVIRONMENTAL DESIGN - CONCEPT

## ZERO RUN OFF

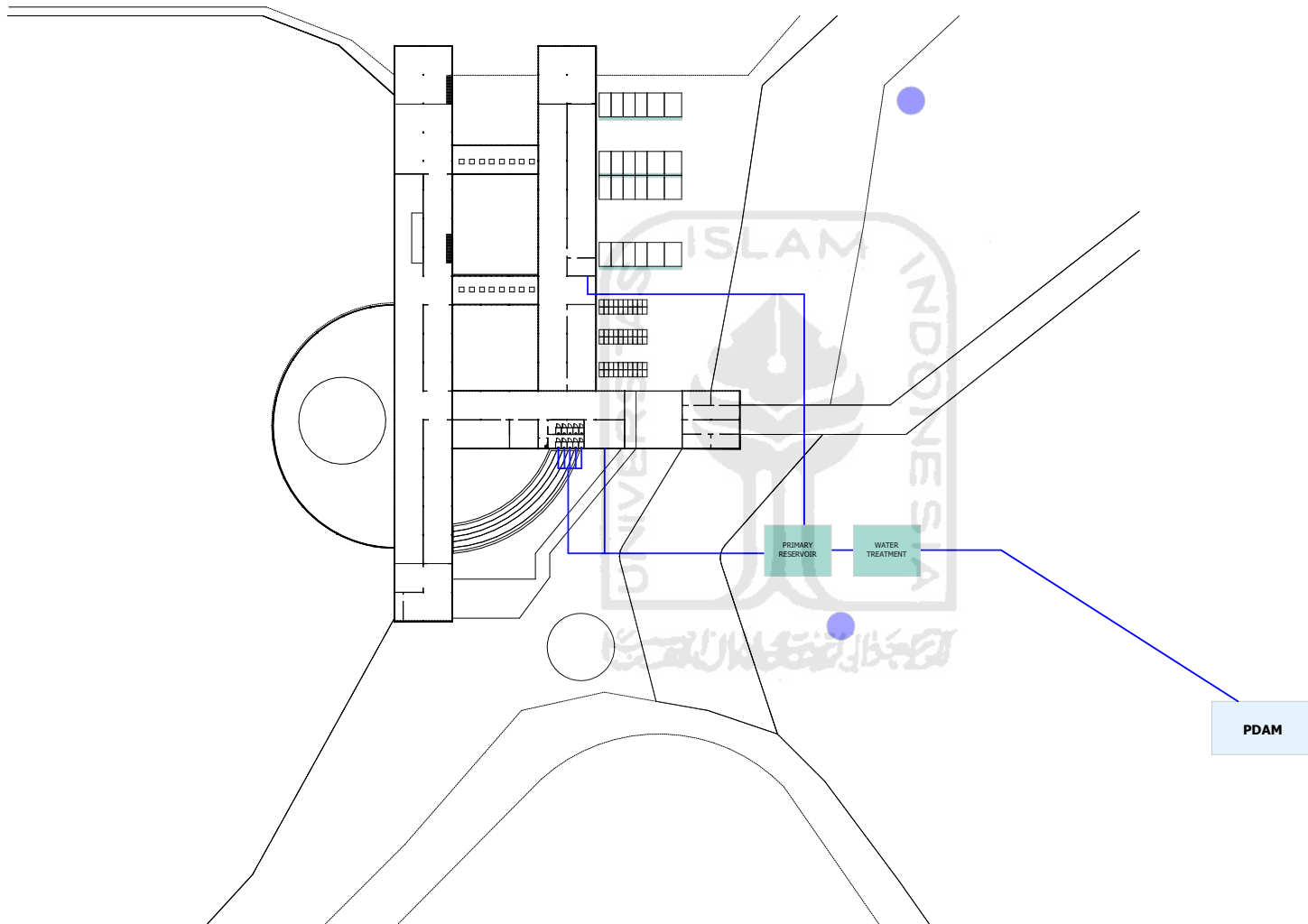




Figure 4.1.12 Zero Run Off (Alternative 1)  
Source: Author

**LEGEND**

-  INFILTRATION WELL
-  DISTRIBUTION LINE

# ENVIRONMENTAL DESIGN - CONCEPT

## ZERO WASTE MANAGEMENT

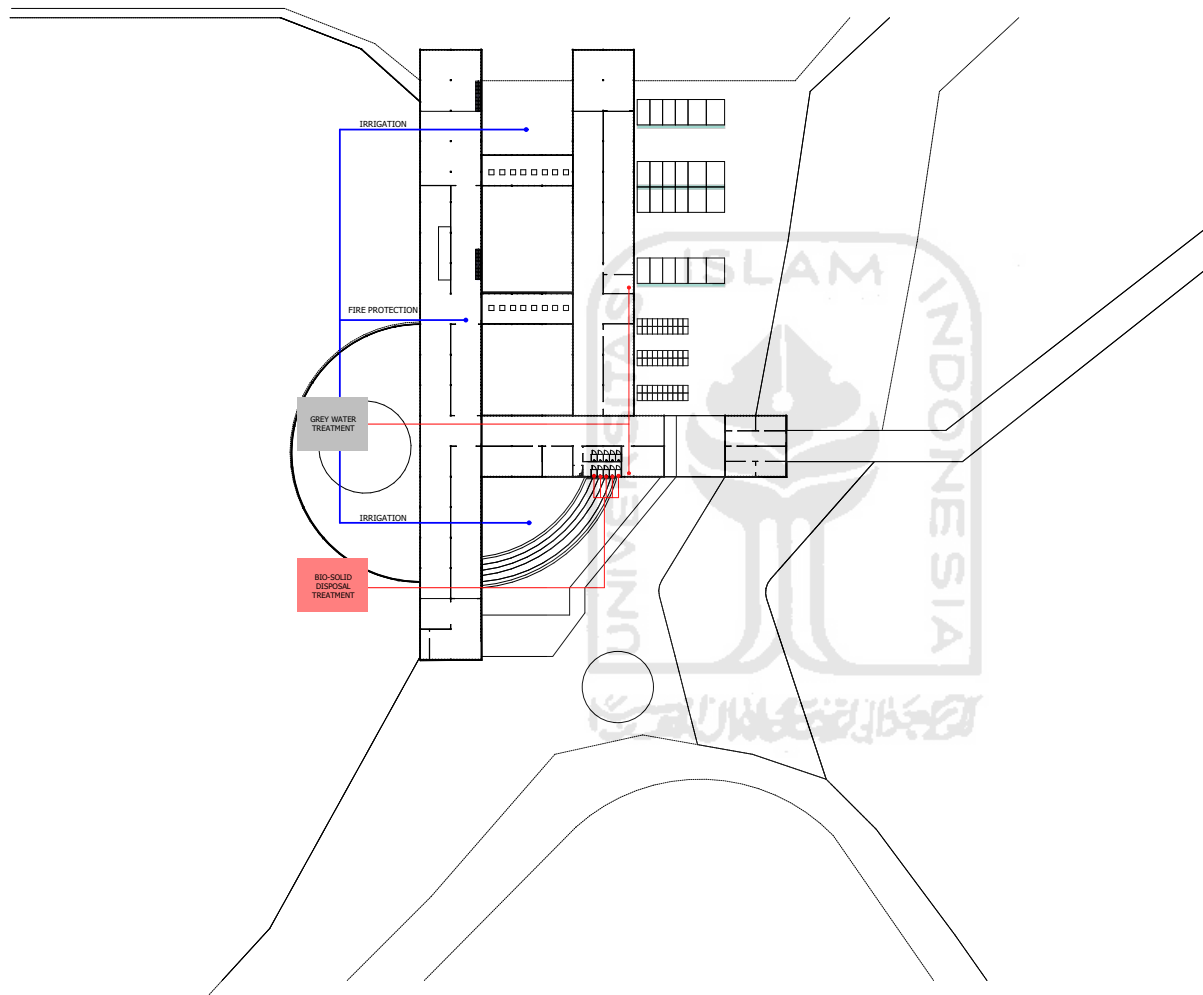


Figure 4.1.13 Waste Management (Alternative 1)  
Source: Author

## PAVING - HARDSCAPE

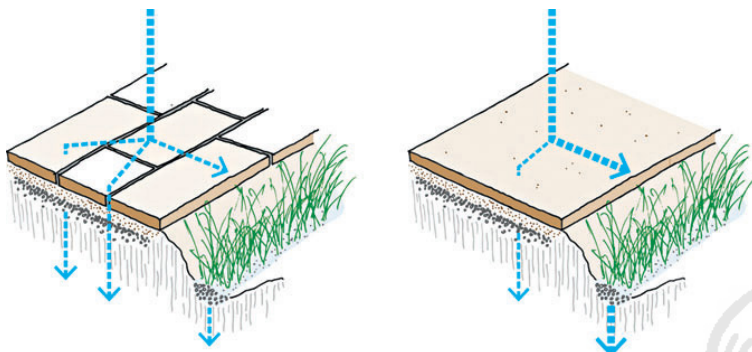


Figure 4.1.14 Architectural Utilities (Alternative 1)  
Source: Author

Porous block pavement systems are constructed from modular interlocking brick, stone, or concrete elements assembled on site into surfaces that provide channels through which water can flow to the underlying substrate.

## BIOSWALE - PARKING AREA

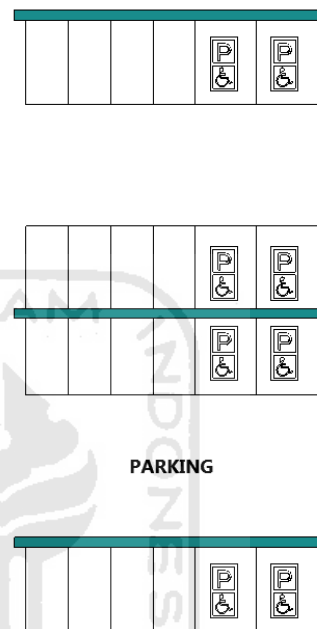


Figure 4.1.15 Bioswale (Alternative 1)  
Source: Author

Located in the parking area as the vehicles boundaries, BIOSWALES are densely vegetated open channels designed to attenuate and treat stormwater runoff. These drainage ways have gentle slopes to allow runoff to be filtered by vegetation planted on the bottom and sides of the swale.

## RETENTION POND - MEDITATION HALLWAYS

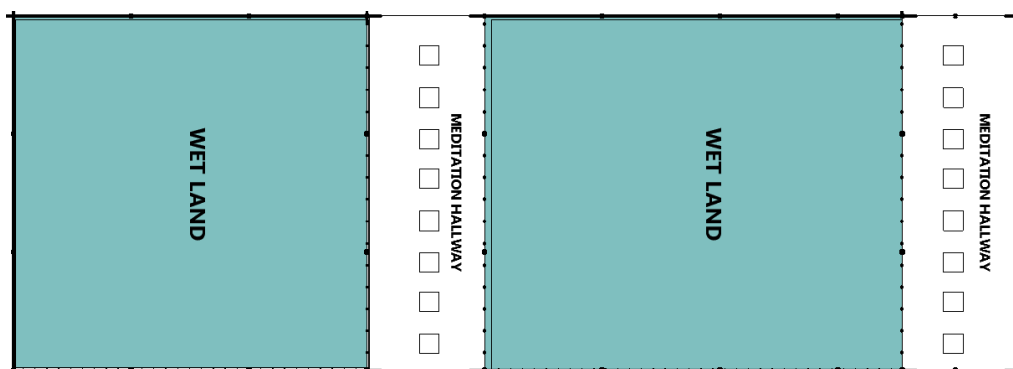
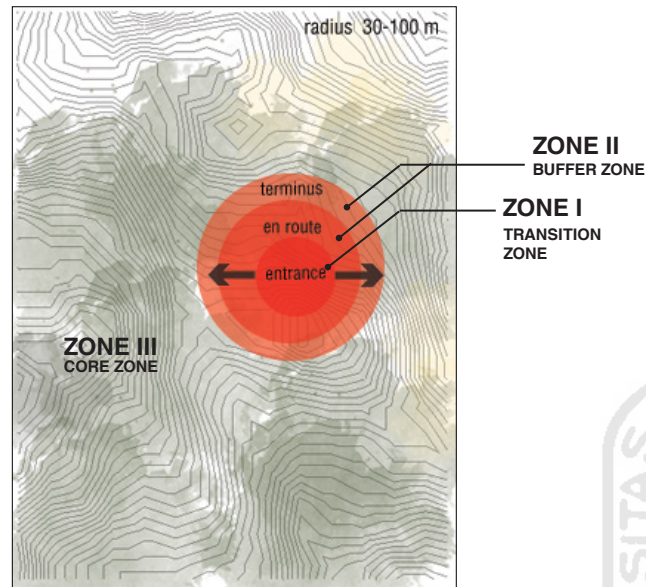


Figure 4.1.16 Retention Pond (Alternative 1)  
Source: Author

RETENTION PONDS (also called detention ponds) are designed to control stormwater runoff on a site—and, in some cases, to remove pollutants from the retained water. Stormwater control strategies include ditches, swales, ponds, tanks, and vaults. These generally function by capturing, storing, treating, and then slowly releasing stormwater downstream or allowing it to infiltrate into the ground.

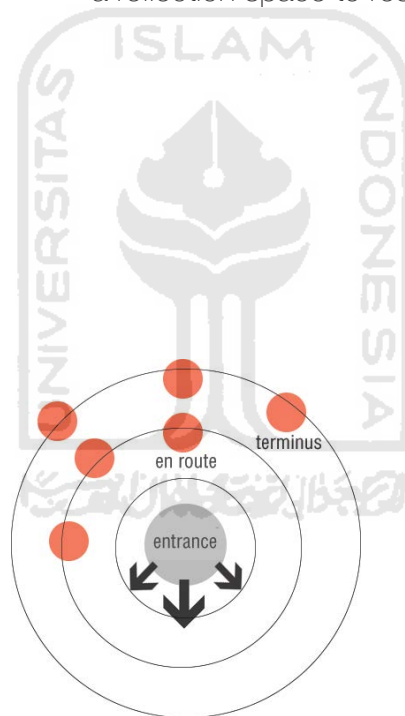
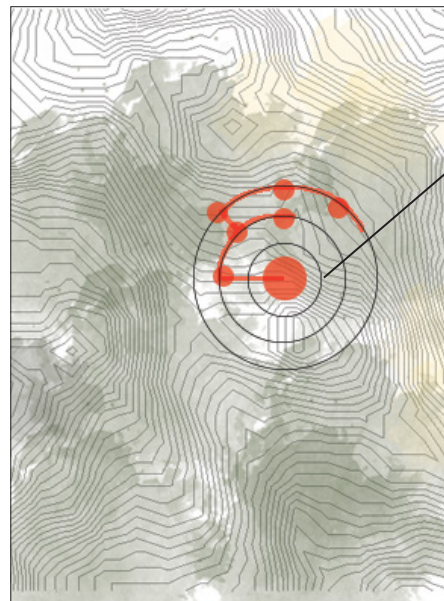
## VISITOR CENTER SETTING - ALTERNATIVE 2



### DECENTRALIZED SETTING

Based on the analysis, the setting allocate based on the zone structures that classified based on the TAHURA Bunder existing. From the ZONE I that defined by transition zone, ZONE II as buffer zone, and ZONE III as the core area of the forest.

The facilities for edu-eco forest placed in transition zone and end up in buffer zone. Start from the entrance as the gate in ZONE I, the visitors continued the exploration to en route to meet the terminus as a reflection space to rest and recalling the memory.



main road) playing roles as meeting place between the visitors and the forest attendant to give an overview of forest potential visit.

Moving from the gate to the transitory area, the access accommodated by the linked elevated-hub and in every 50 m round the visitors will meet the cabinet of wonder as indoor memory that act as the transitory space.

Each phase of spatial organisation are arranged by the needs to accommodate the visitor experience of forest-learning.

Information Area as the gate is facing the west direction (to the

After exploring the cabinet of wonder the visitor will meet the final point as the goal of the experience and possible the visitor to recalling the memories after the exploration by the breathtaking vibes of surrounding landscape.

Figure 4.2.1 Allocation Setting  
(Alternative 2)  
Source: Author

# VISITOR CENTER FLOW - ALTERNATIVE 2

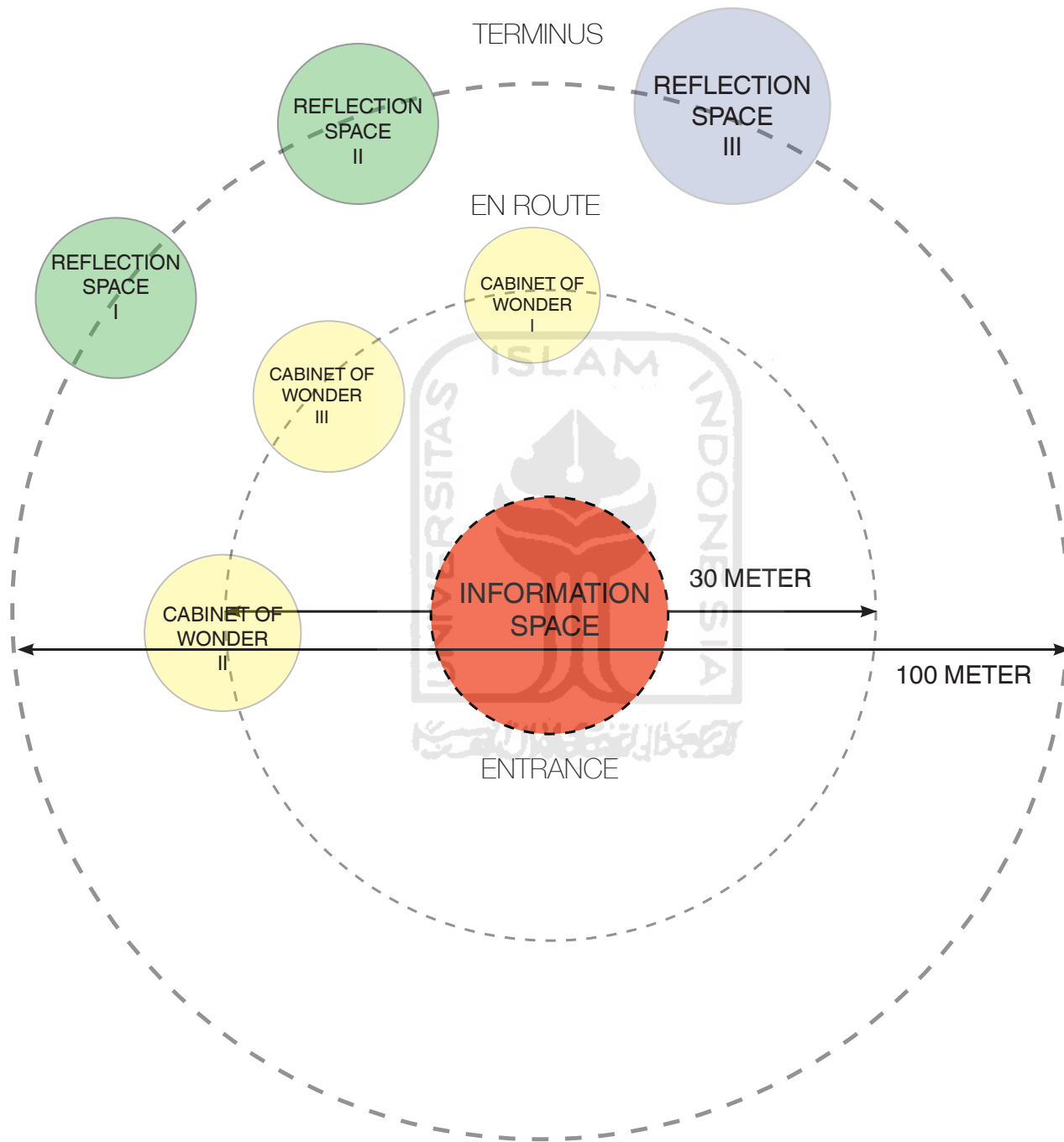


Figure 4.2.2 Visitor Center Flow  
(Alternative 2)  
Source: Author

## SPATIAL RELATION - ALTERNATIVE 2

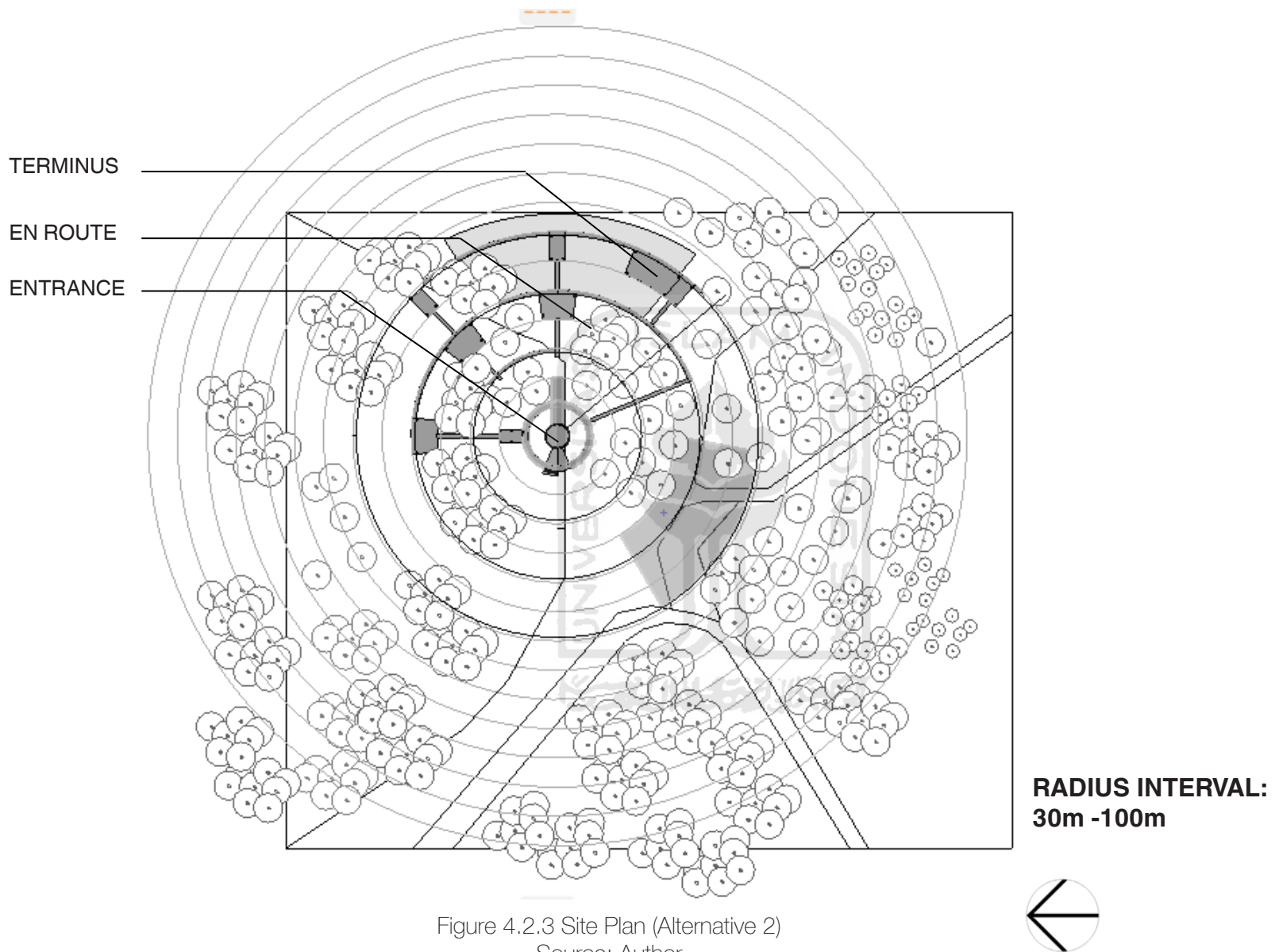


Figure 4.2.3 Site Plan (Alternative 2)  
Source: Author

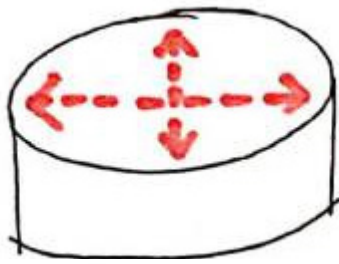


## MASSING CONCEPT - ALTERNATIVE 2

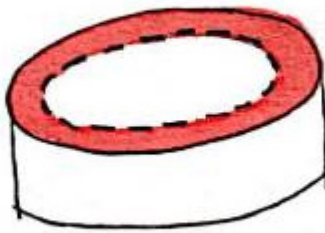
### ENTRANCE

#### INFORMATION SPACE

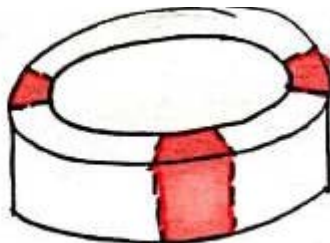
The information space as the visitor's first receiver are needed as the information space. As the focal point this entrance are created into rounded shape that will be faces by other supported building mass



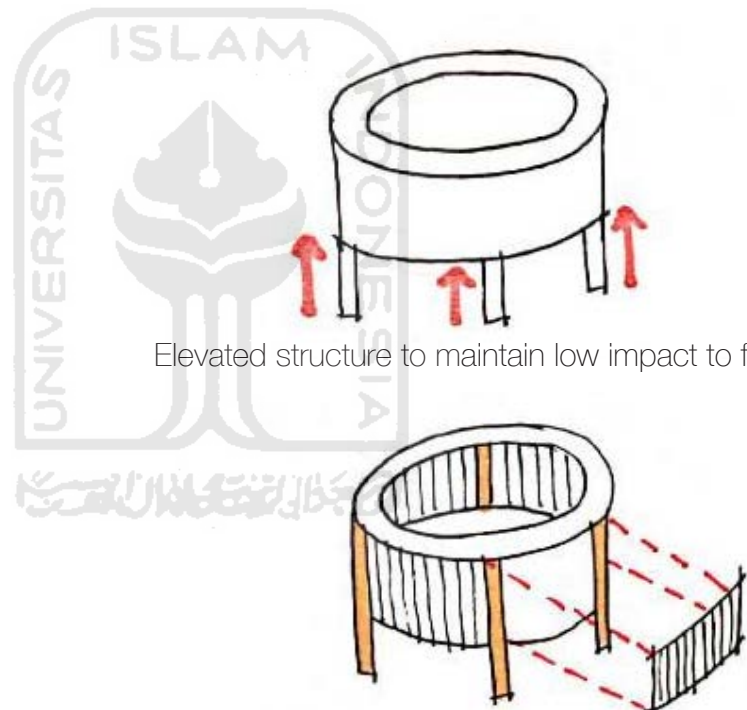
The entrance as primary building use circular shape



The void in the center is adaptive for room extension



The access open and orient to the potential visit



Elevated structure to maintain low impact to forest soil

Applying pre-fab materials as the objectives of reversible building

Figure 4.2.4 Entrance Concept (Alternative 2)

Source: Author

## EN ROUTE/TRANSITORY SPACE

NATURUM (NATURE ROOM) AND CABINETS OF WONDER (EXHIBITION)

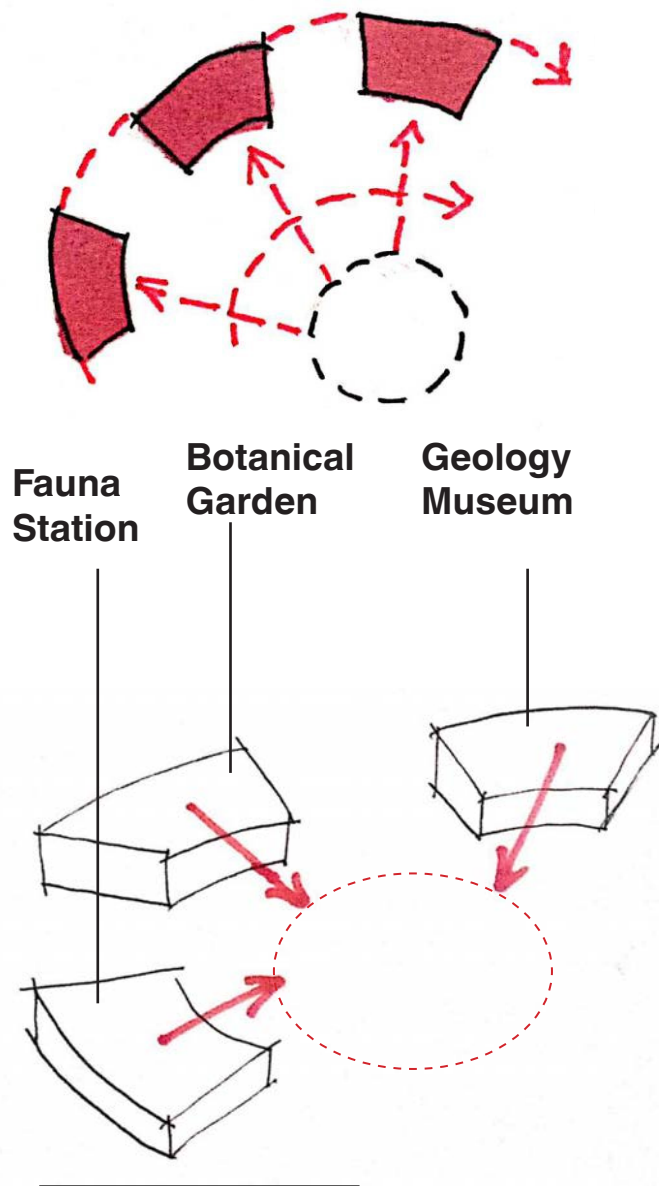
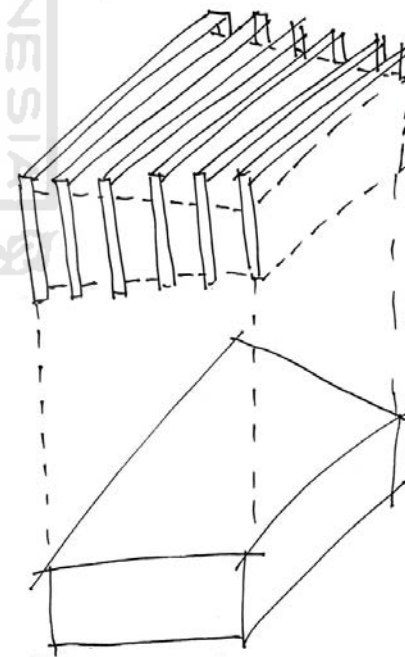


Figure 4.2.5 En-Route Spatial Concept  
Source: Author

As transitory space, en route orient the visitor entering buffer zone to interact with the nature. In giving the user experience to enjoying the nature, the visitor moved to each transitory by elevated pathwalk.

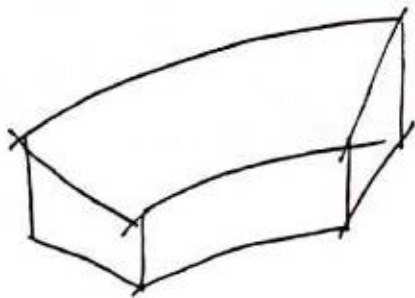
Transitory provided 2 access for visitor preferences of exploration. The shortest distance designated for vulnerable groups easiness and also the shortcut for emergency route.



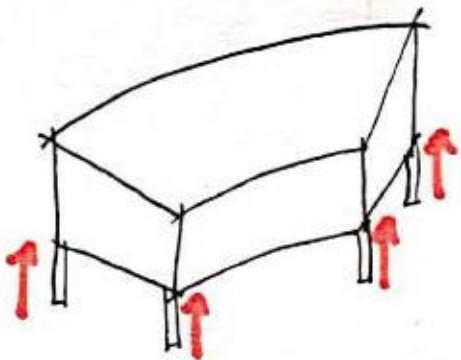
The structure used are by pre fabricated material that can be assemble in site adjusted to the requirement of the space.

## EN ROUTE

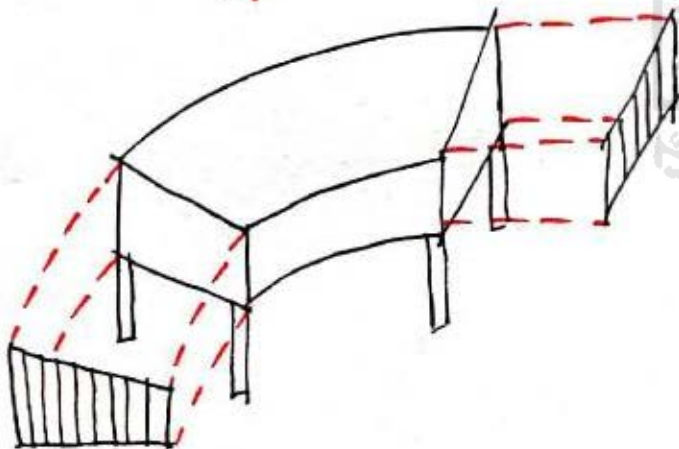
NATURUM (NATURE ROOM) AND CABINETS OF WONDER (EXHIBITION)



The mass is the sectional part of circular mass that orient to the center



The elevated structure used to achieve the low impact to site

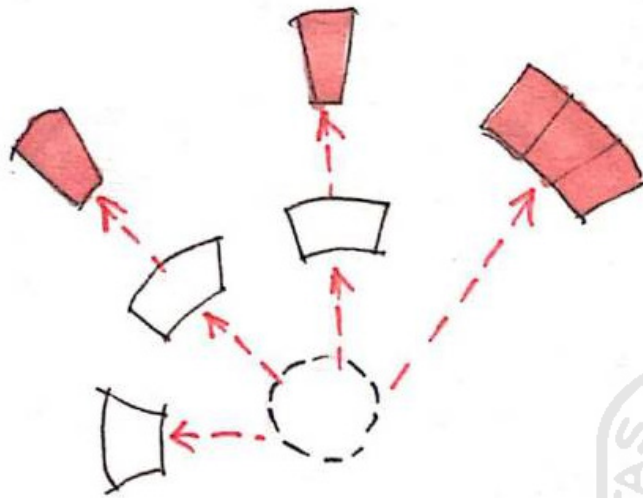


Pre-fab material are applied to easier the assemble and dissemble of the building.

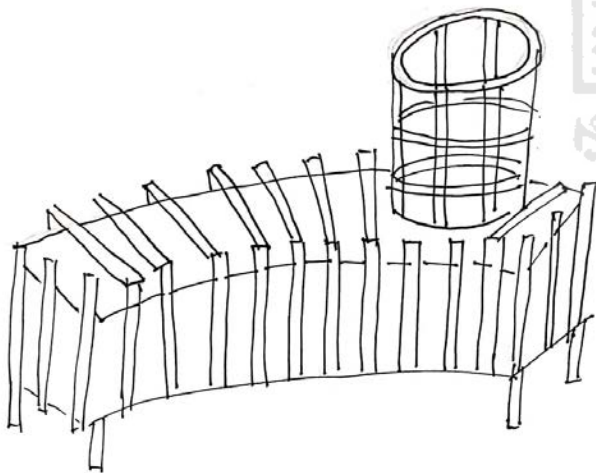
Figure 4.2.6 En Route Mass Concept  
Source: Author

## TERMINUS

### Reflection Space



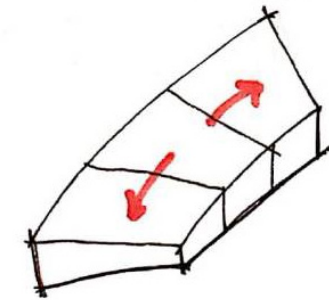
Terminus is furthest route of journey and the final point of the exploration. Terminus offering potential view for the visitor and the breathtaking landscape to rest.



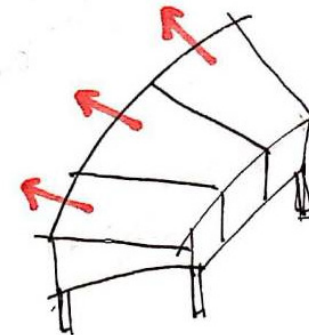
Observation platform are provided with circular stair as the access to the top to accommodate the visitor to maintaining the view to the hill around the forest



The small modul



The small modul extension



Rounded edge possible the wider effect to maintaining the view



Figure 4.2.7 Terminus Mass Concept  
Source: Author

## VISITOR CENTER IMAGERIES - ALTERNATIVE 1

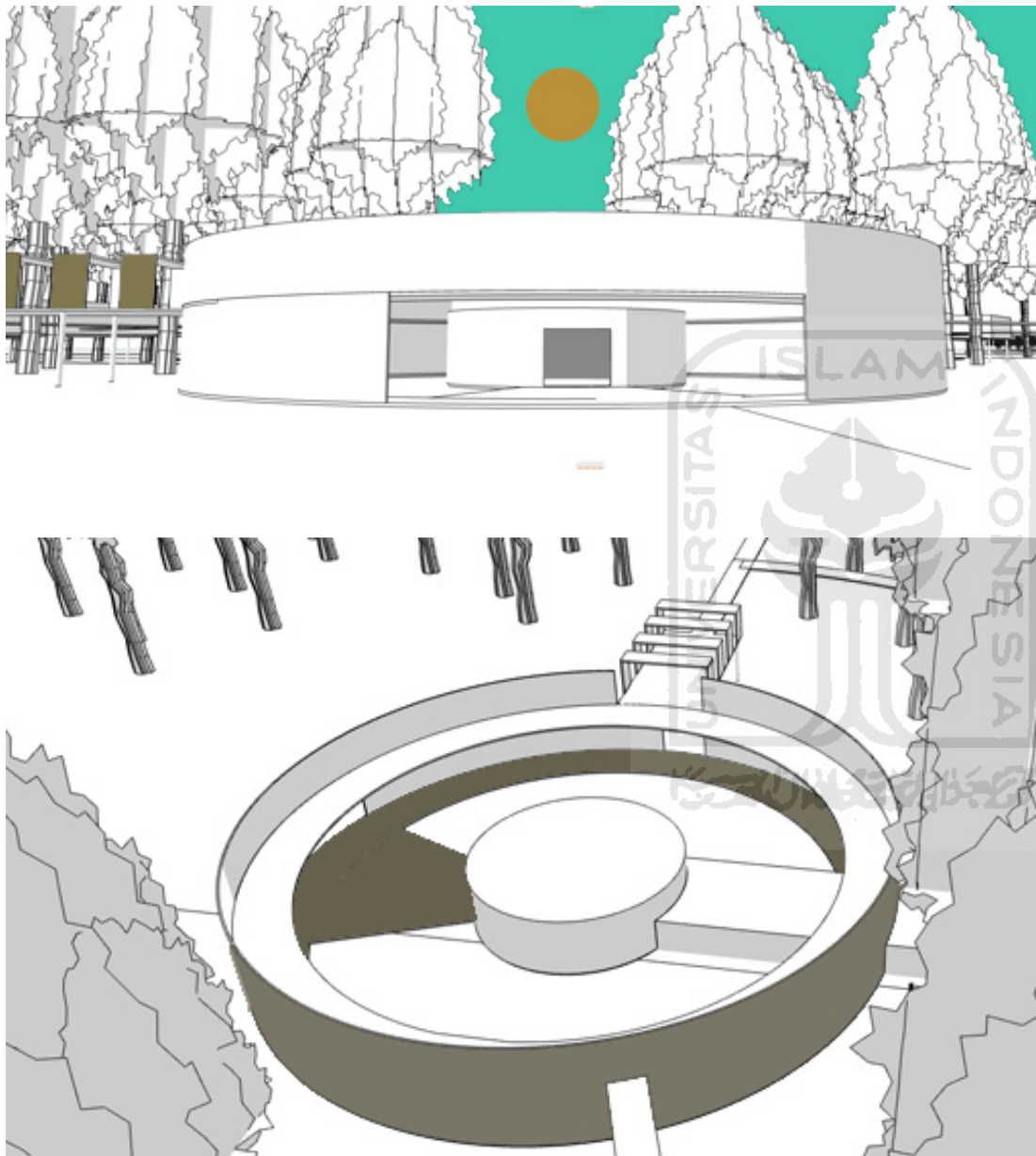


Figure 4.2.8 Entrance View  
Source: Author

### ENTRANCE

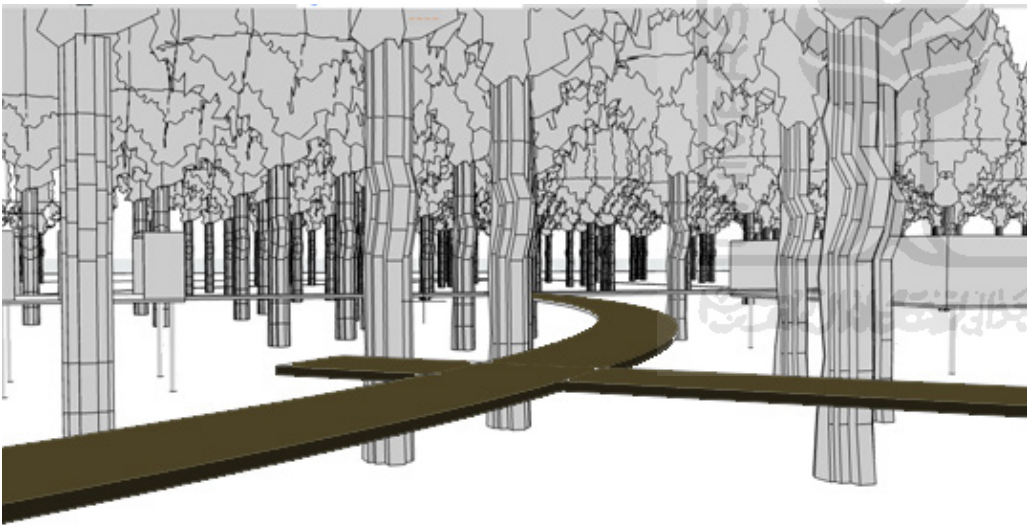
#### INFORMATION SPACE

Entrance is the part where the visitor is instructed and introduced about the potential visit. The space is divided into two parts of semi-outdoor and indoor hall.

This part is as the point between human interaction where the staff deliver the information directly to the visitors. Before the departure trip, the participant conditioning is at the outside hall.



Figure 4.2.9 En Route View  
Source: Author



## EN ROUTE/TRANSITORY SPACE

NATURUM (NATURE ROOM) AND CABINETS OF WONDER (EXHIBITION)

As transitory space, the transition orient the visitor to interact with the nature. In giving the user experience to enjoying the nature, the space consist of hallway that separated into route to observing the fauna and the route for exhibition purpose that used to enjoying the specimen in nature that manifested from Bunder Forest.



Figure 4.2.10 Museums View  
Source: Author

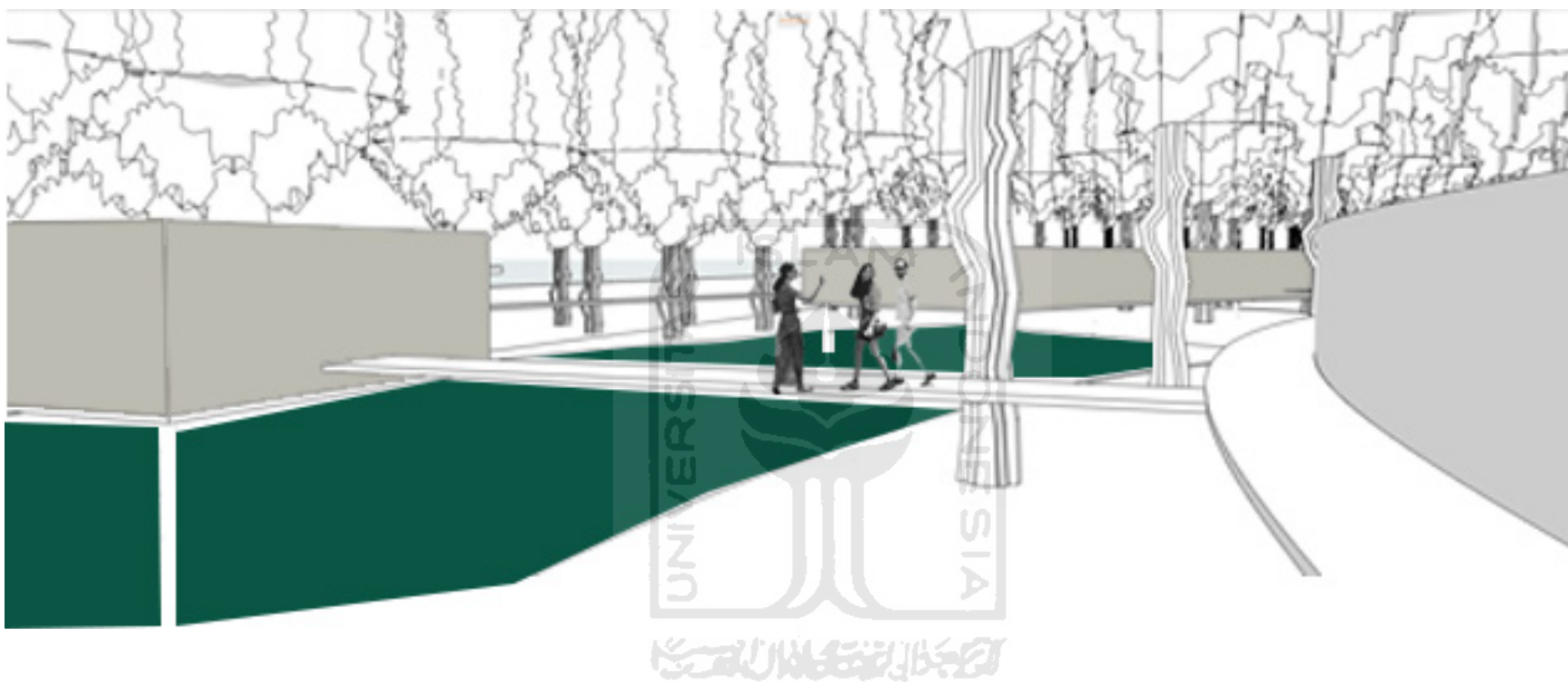
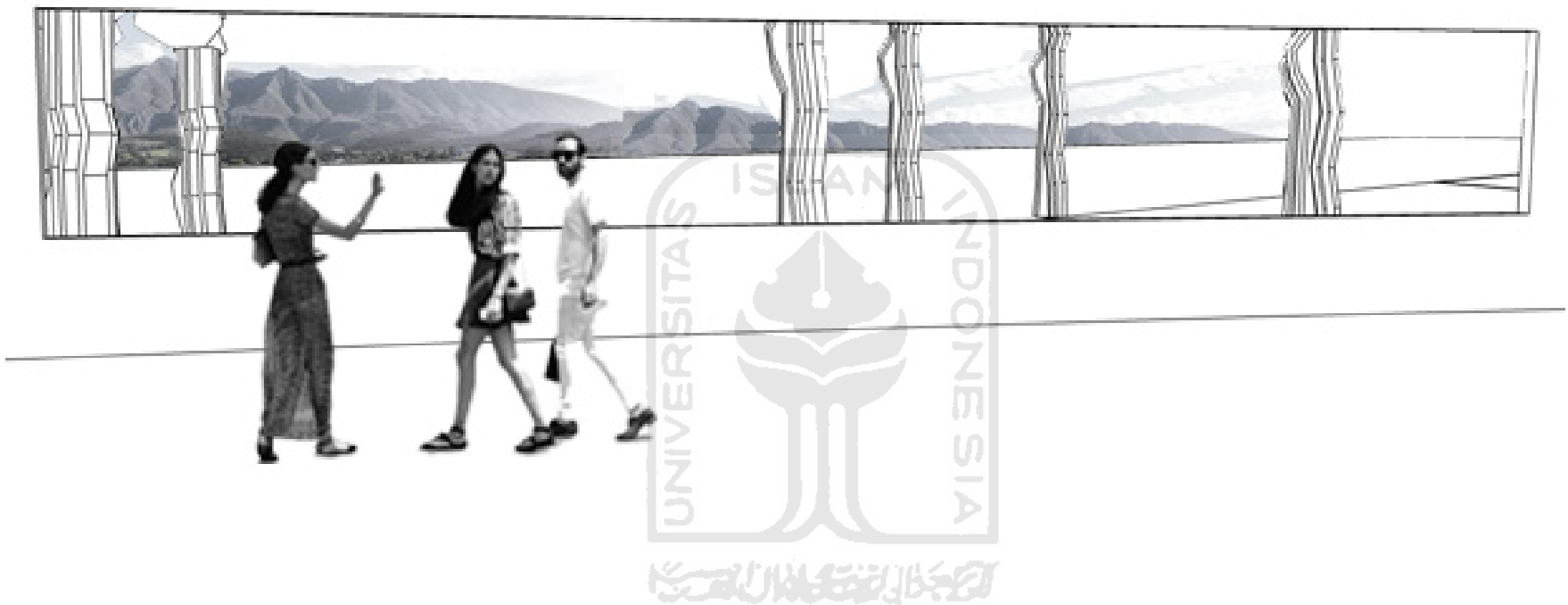


Figure 4.2.11 Terminus (Reflection Space) View  
Source: Author





## TERMINUS

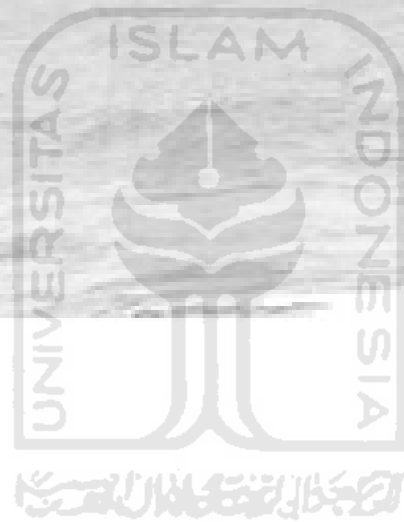
### Reflection Space

Terminus is the point that offers the visitor to rest and recalling the memory of exploration with breathtaking view and calming ambience. The space has supported ambience to meditate and having spiritual activities. This underlined to be the interaction between human to God and human to human itself as the life philosophy of Javanese people.

---

Figure 4.2.12 Terminus (Reflection Space) View  
Source: Author

# 05



# DESIGN DESCRIPTION

PROPERTY SIZE  
SITEPLAN  
FLOOR PLAN  
ELEVATION  
SECTION  
PARTIAL SECTION  
STRUCTURE  
ENVELOPE  
INTERIOR DETAIL  
UTILITIES  
PERSPECTIVE INTERIOR  
PERSPECTIVE EXTERIOR



## SPACE REQUIREMENTS AND STANDARD

FUNCTION	SPACE	STANDARD	CAPACITY	QUANTITY	TOTAL AREA (sqm)
EDUCATION AND CONSERVATION	Information Center	1.5 m <sup>2</sup> /person	2	1	30
	Hall	1.5 m <sup>2</sup> /person	100		150
	Fauna Station	2 m <sup>2</sup> /animal	20	1	40
	Laboratorium	1.5 m <sup>2</sup> /person	10	1	150
	Botany Garden	n/a	n/a	1	5000
	Exhibition/Display	2m <sup>2</sup> /person	75	1	150
	Discussion Room	2m <sup>2</sup> /person	20	2	80
	Lavatory	1.5 m <sup>2</sup> /person	5	2	15
	Warehouse	10 m <sup>2</sup>		2	20
	Total				5635
	Circulation (40%)				7679
FUNCTION	SPACE	STANDARD	CAPACITY	QUANTITY	TOTAL AREA (sqm)
SOCIO-CULTURE OFFER	Amphitheater	1.5 m <sup>2</sup> /person	100	1	1500
	Loading Dock	50 m <sup>2</sup>		1	50
	Preparation room	50 m <sup>2</sup>		1	50
	Total				1600
	Circulation (40%)				2240
FUNCTION	SPACE	STANDARD	CAPACITY	QUANTITY	TOTAL AREA (sqm)
COMMERCIAL	Food and Beverages	3 m <sup>2</sup> /person	30	1	90
	Souvenir Shop	2m <sup>2</sup> /person	10	1	20
	Workshop Room	2m <sup>2</sup> /person	15	1	30
	Lavatory	1.5 m <sup>2</sup> /person	3	1	4.5
	Total				144.5
	Circulation (40%)				202.3

FUNCTION	SPACE	STANDARD	CAPACITY	QUANTITY	TOTAL AREA (sqm)
SERVICE AND OTHERS	Ticketing	1.5 m <sup>2</sup> /person	2	1	3
	Security	1.5 m <sup>2</sup> /person	2	2	6
	Generator Room	40 m <sup>2</sup>		1	40
	Transformer Room	18 m <sup>2</sup>		1	18
	LVMDP Room	16 m <sup>2</sup>		1	16
	MDP Room	15 m <sup>2</sup>		1	15
	Pump Room	9 m <sup>2</sup>		1	9
	ME Room	4 m <sup>2</sup>		1	4
	Air Conditioning Centre	4 m <sup>2</sup>		1	4
	Communication System Center	4 m <sup>2</sup>		1	4
	IPAL	24 m <sup>2</sup>		1	24
	Total				143
	Circulation (20%)				171.6

FUNCTION	SPACE	STANDARD	CAPACITY	QUANTITY	TOTAL AREA (sqm)
PARKING	Praying Room	1.5 m <sup>2</sup> /person	20	1	300
	Bike Parking	1.44 m <sup>2</sup>	15	1	21.6
	Motorcycle Parking	1.5 m <sup>2</sup>	50	1	75
	Car Parking	12.5 m <sup>2</sup>	15	1	187.5
	Bus Parking	36 m <sup>2</sup>	3	1	108
	Truck Parking	50 m <sup>2</sup>	2	1	100
	Total				792.1
	Circulation (30%)				1030

Table 5.1.1 Space Requirements and Standard  
Source: Author

**TOTAL AREA= 11322.9**

## SITUATION

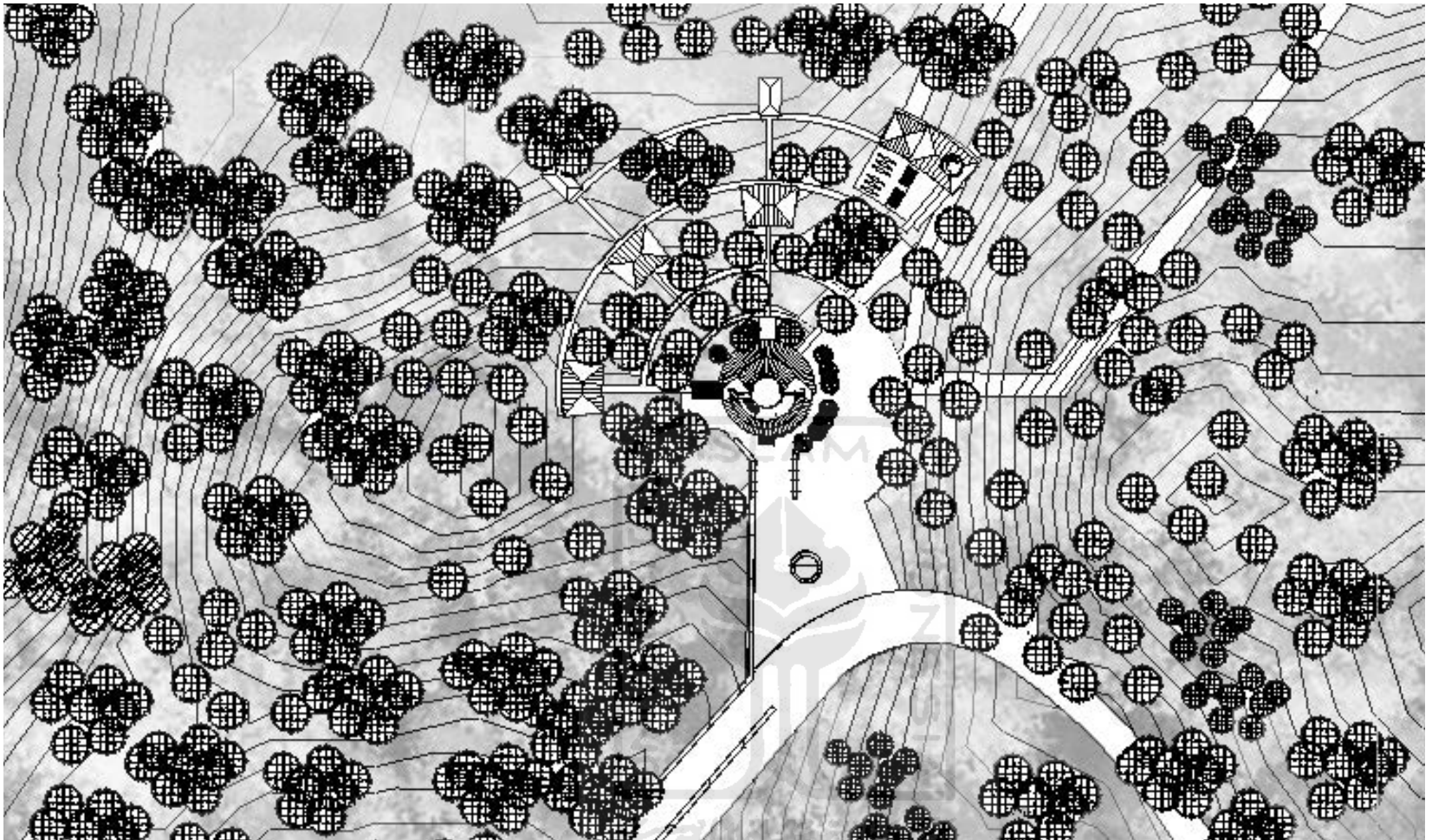


Figure 5.1.1 Bunder Eco-Edu Forest Situation  
Source: Author

The mass are distribute in some areas by directing to the primary building in the center. Each building maximizing the access of natural air and lighting by circumference opening . While the radial circulation give preferences by affordable distance.

### **INFORMATION AREA AS THE GATE**

Introduction/overview of forest potential visit.

### **CABINET OF WONDER (TRANSITORY)**

Different thematic museums are linked by elevated-hub in 50m radial interval.

### **REST ZONE AS REFLECTION SPACE**

The final point possible the visitor to recalling the memories after the exploration.

# PLAN

## ENTRANCE

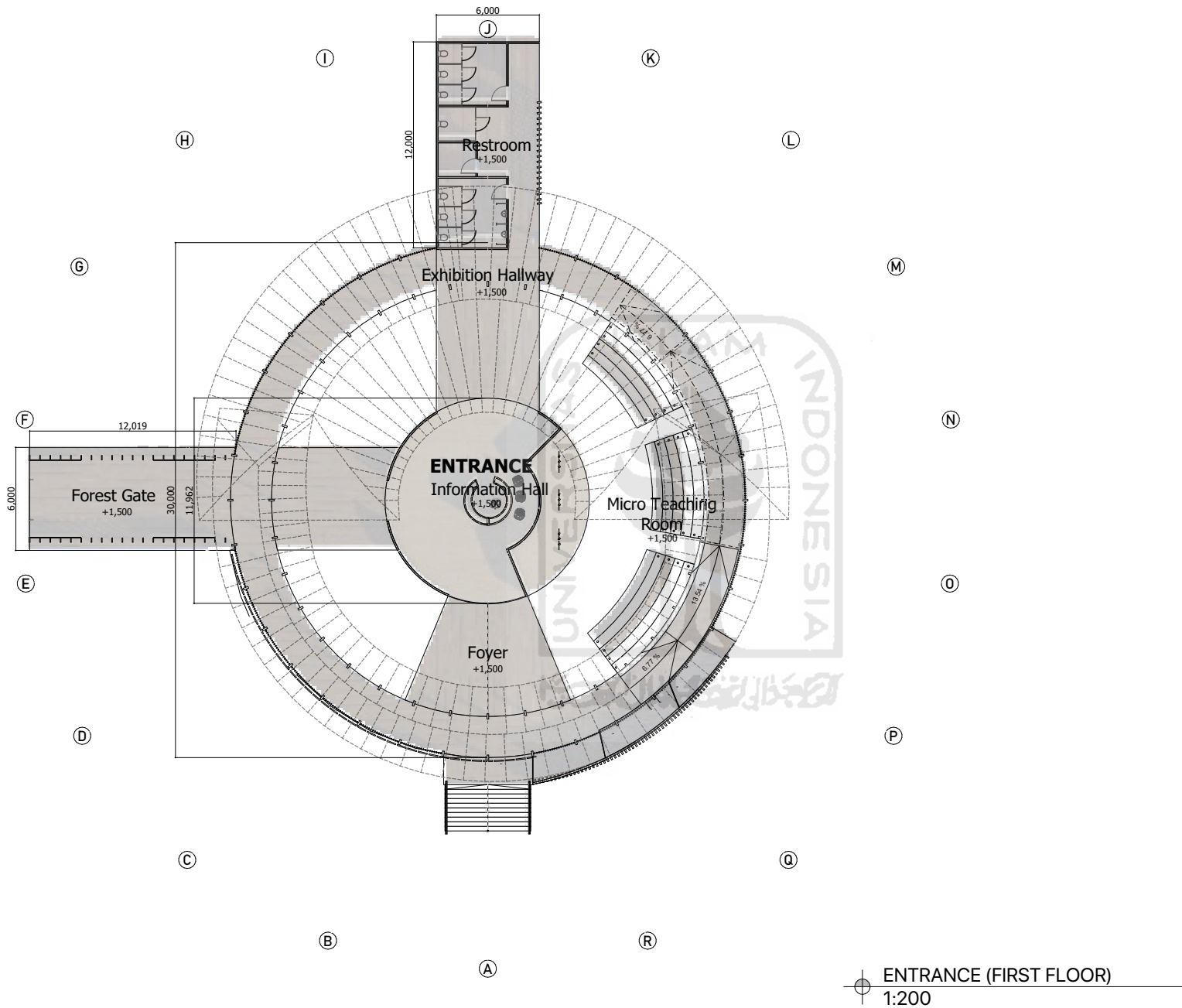


Figure 5.1.2 Entrance Plan  
Source: Author

# EN ROUTE

## FAUNA MUSEUM

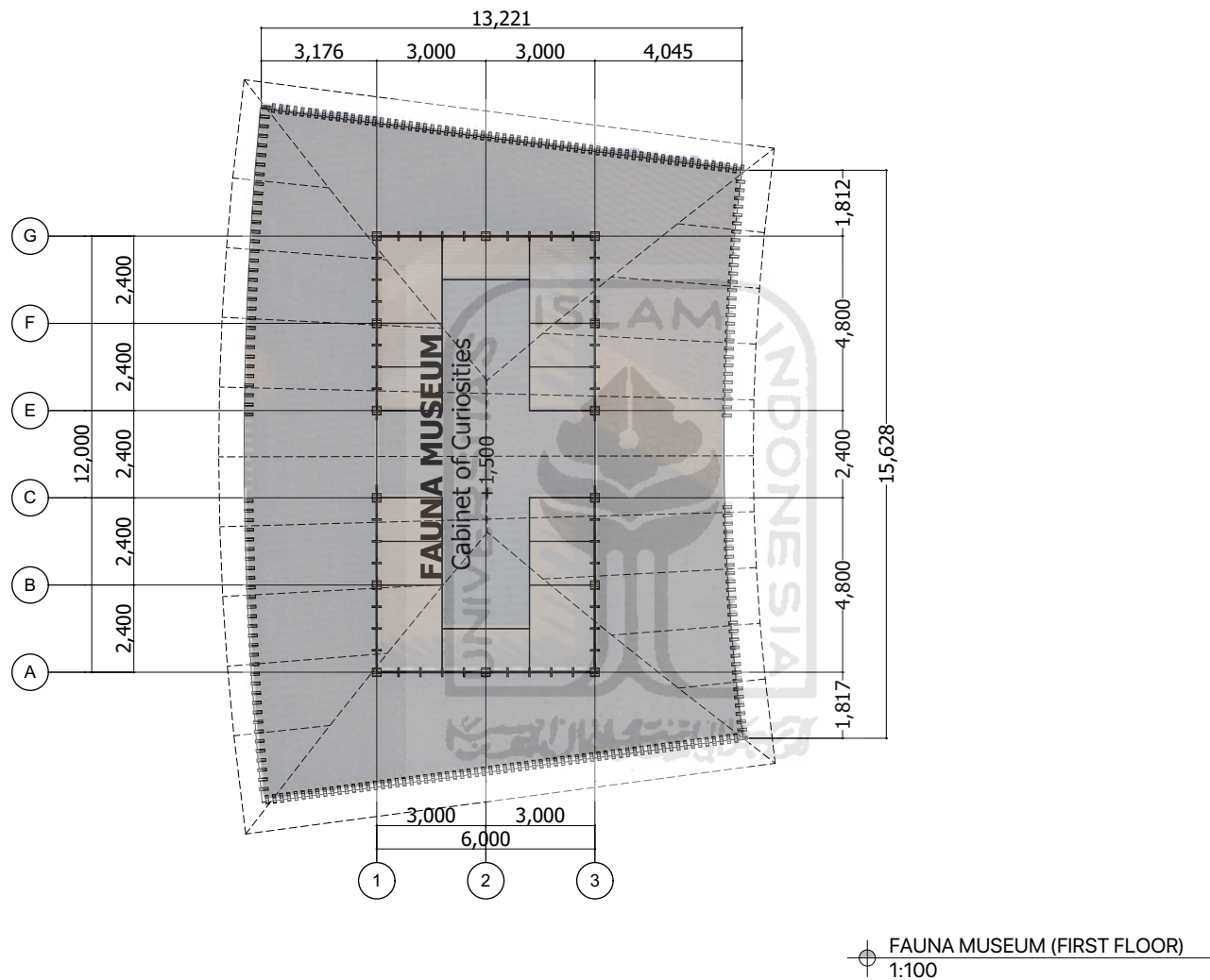
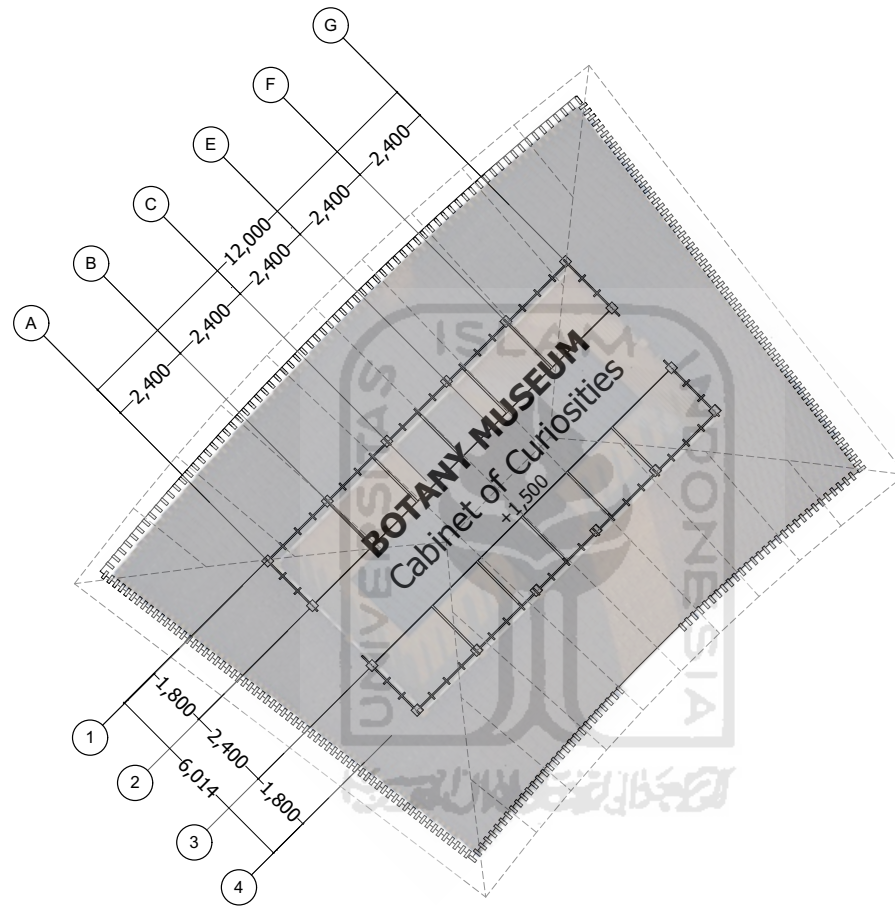


Figure 5.1.3 Fauna Museum Plan  
Source: Author



# EN ROUTE

## BOTANY MUSEUM



⊕ BOTANY MUSEUM (FIRST FLOOR)  
1:100

Figure 5.1.4 Flora Museum Plan  
Source: Author

# EN ROUTE

## GEOLOGY MUSEUM

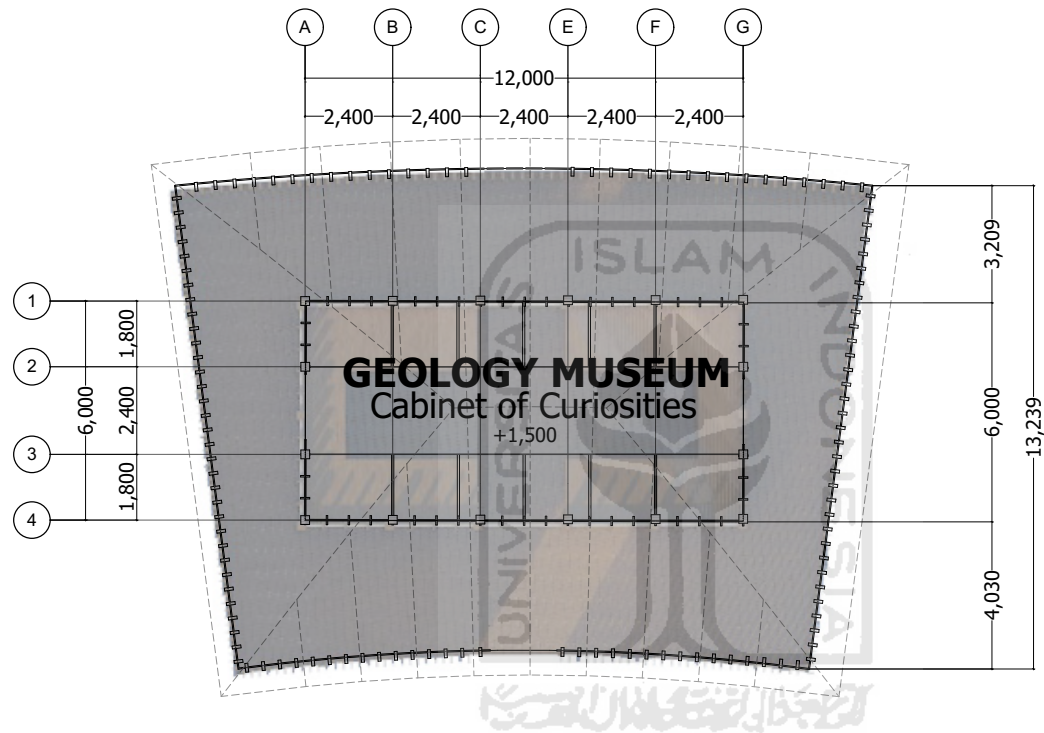


Figure 5.1.4 Geology Museum Plan  
Source: Author

⊕ GEOLOGY MUSEUM (FIRST FLOOR)  
1:100

# TERMINUS

RESEARCH AND DORM

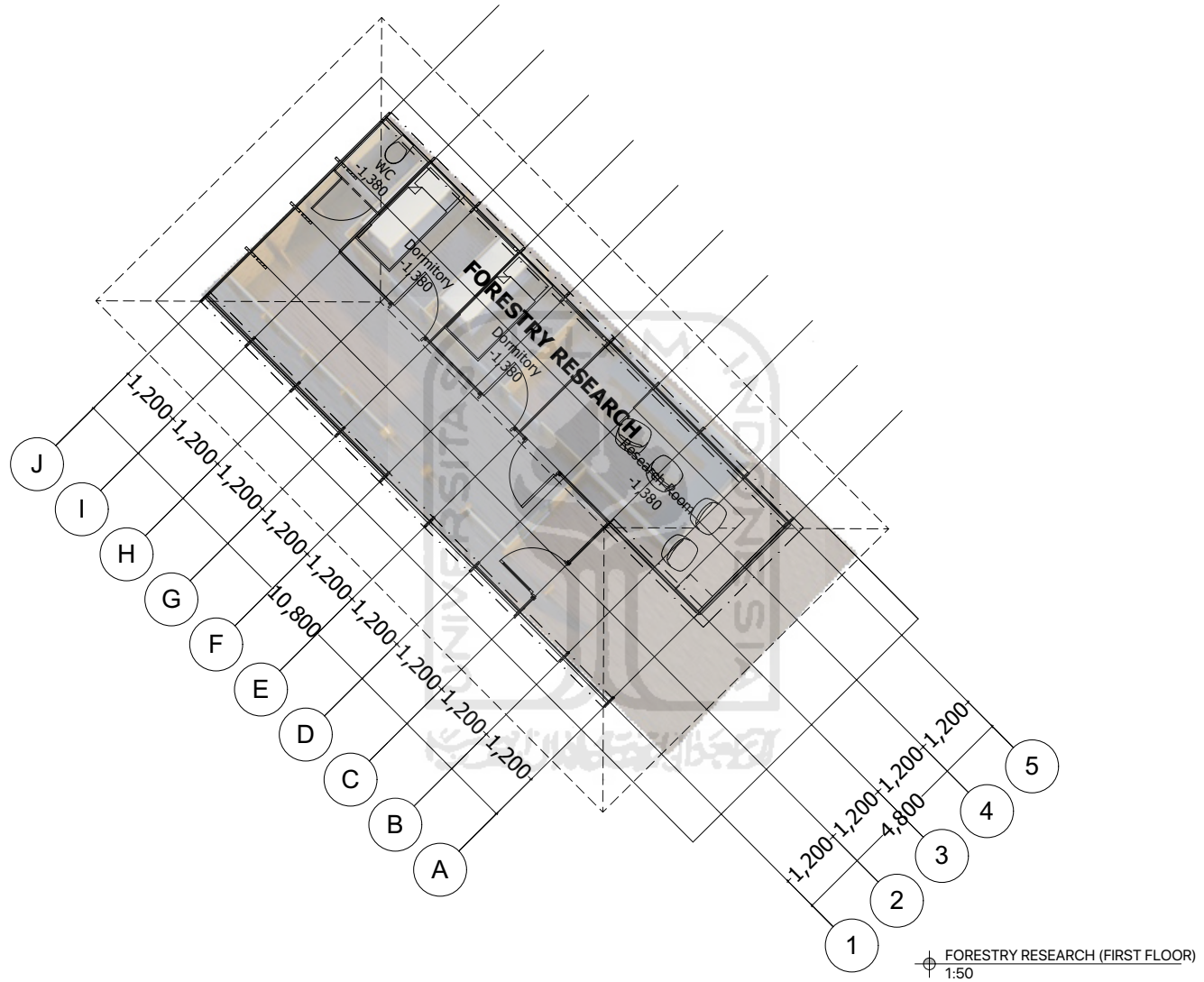


Figure 5.1.5 Research and Dormitory Plan  
 Source: Author

# TERMINUS

## WORKSHOP

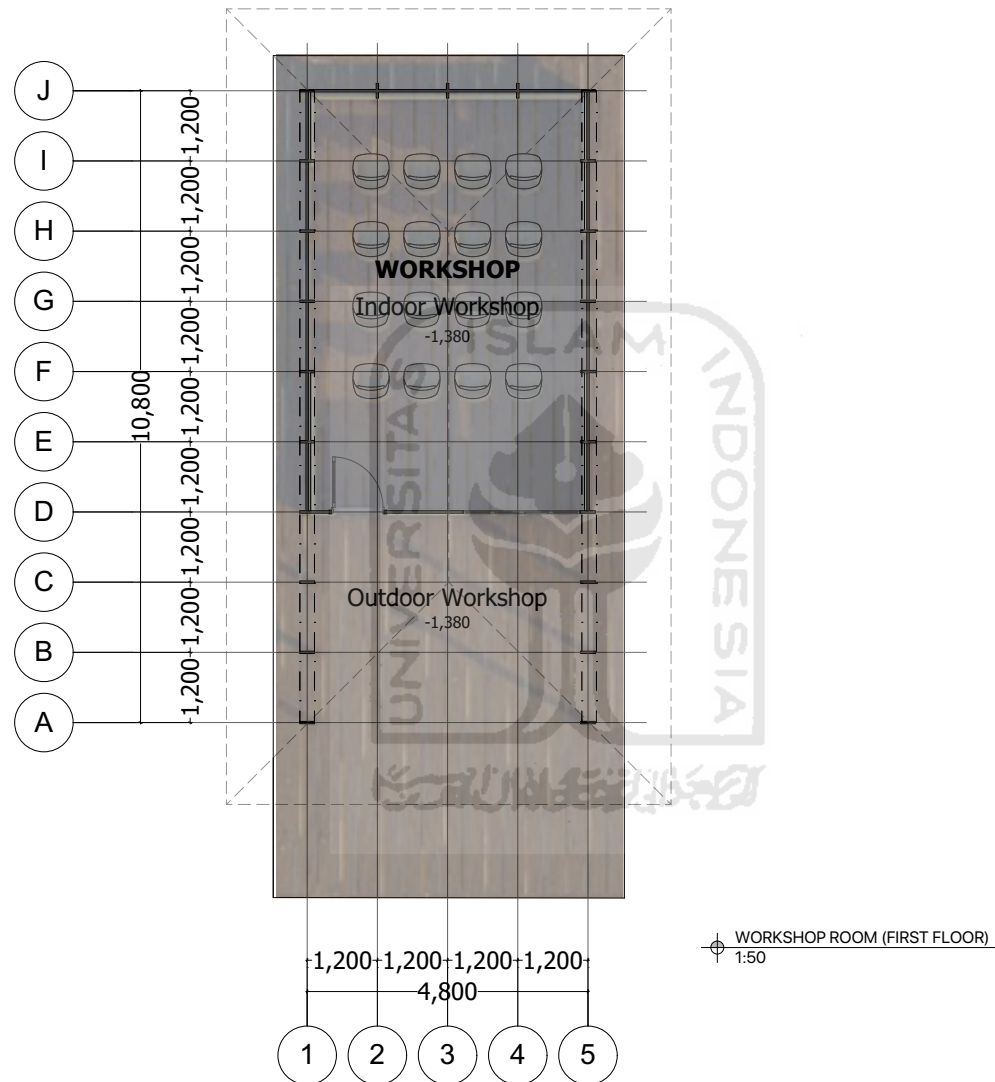


Figure 5.1.6 Workshop Plan  
Source: Author

# TERMINUS

## SOUVENIR SHOP

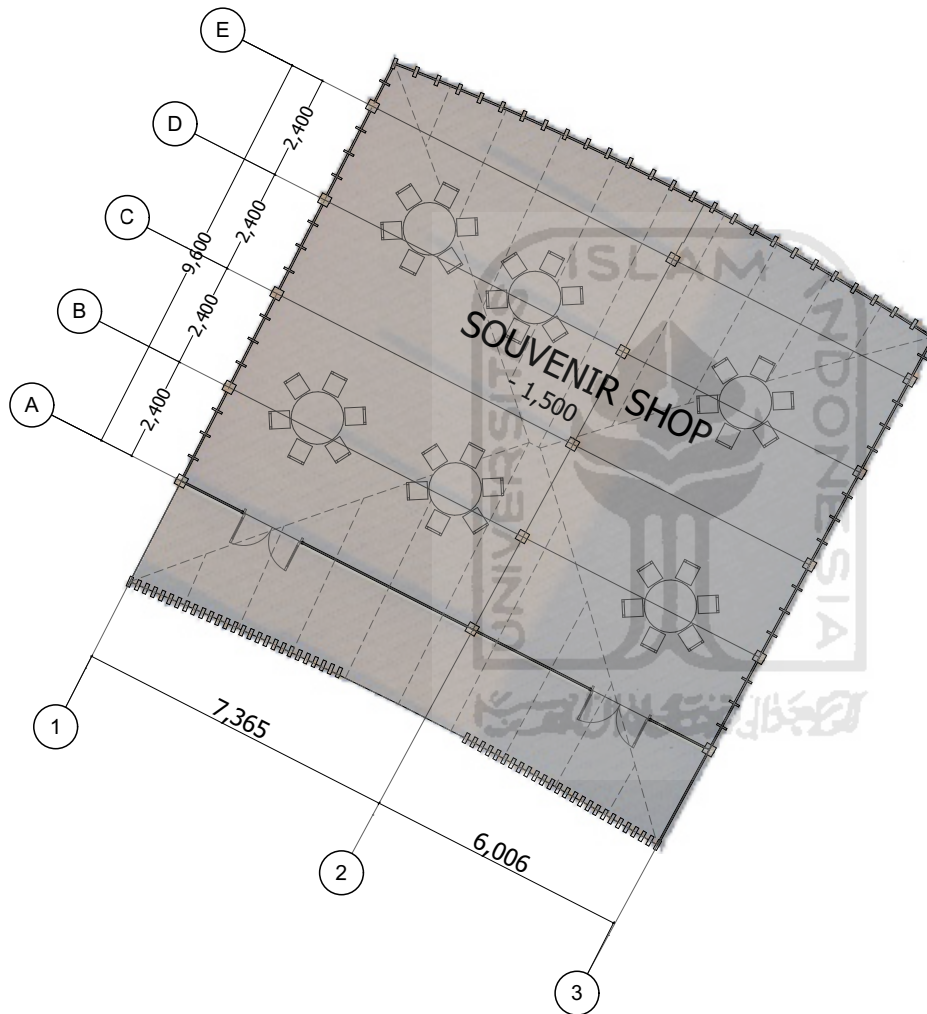


Figure 5.1.7 Souvenir Shop Plan  
Source: Author

⊕ SOUVENIR SHOP (FIRST FLOOR)  
1:100

# TERMINUS

## CULINARY AREA

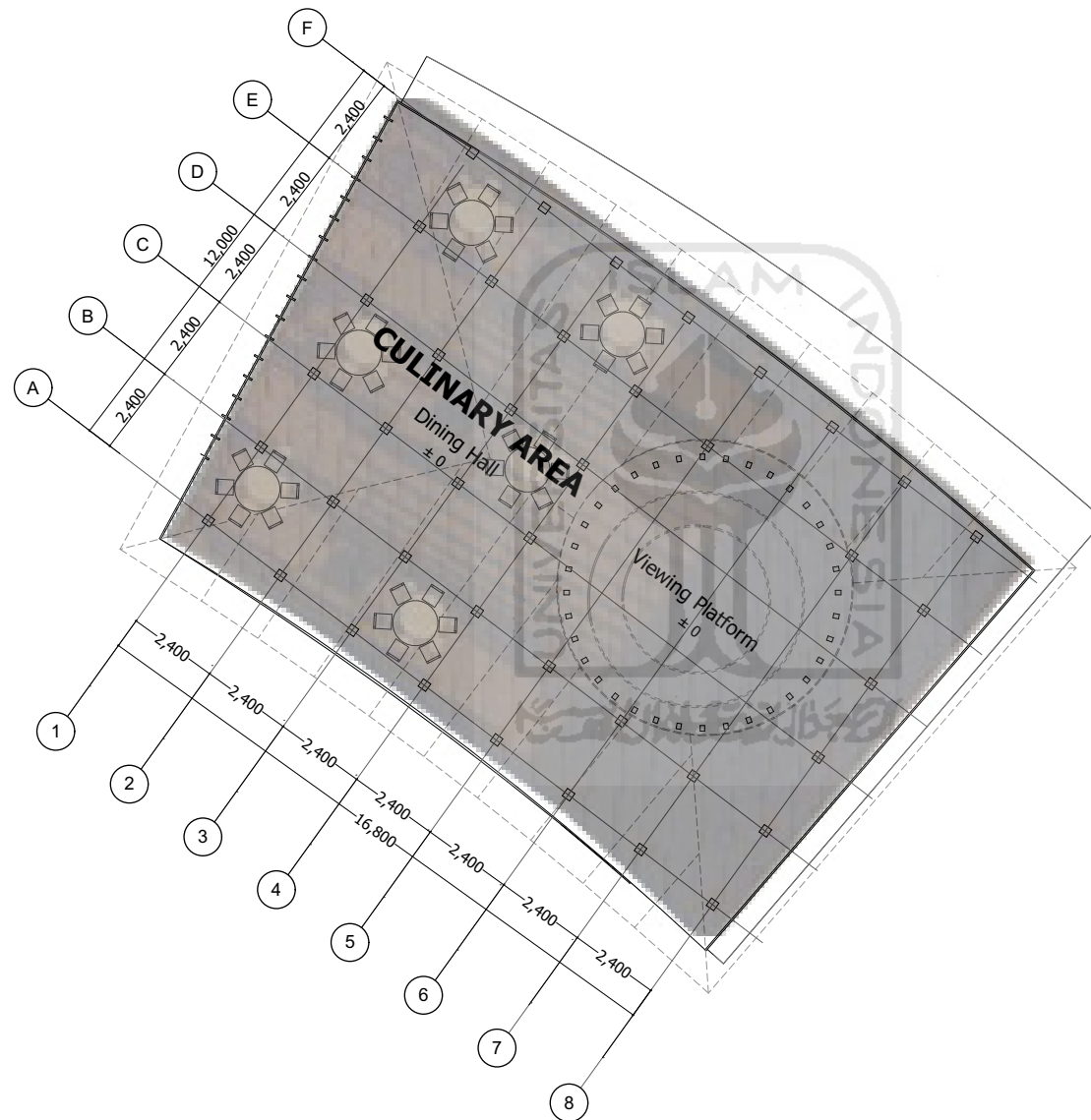


Figure 5.1.8 Culinary Area Plan  
Source: Author

⊕ CULINARY AREA (FIRST FLOOR)  
1:50

# ELEVATION

## LANDSCAPE

### SOUTH ELEVATION

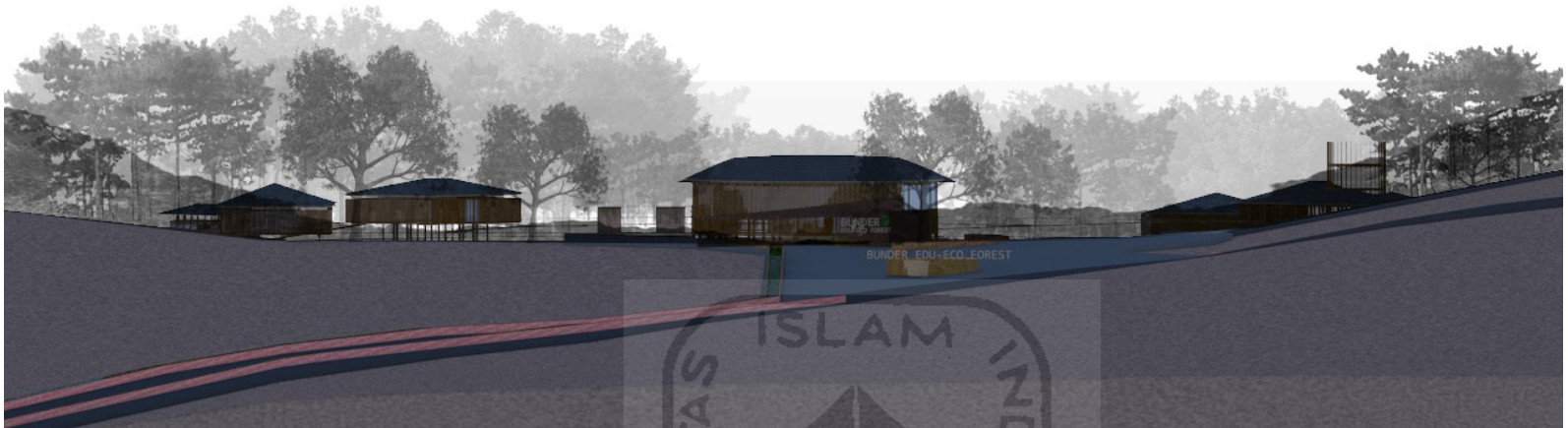


Figure 5.1.9 South Elevation  
Source: Author

### NORTH ELEVATION



Figure 5.1.10 North Elevation  
Source: Author

## WEST ELEVATION



Figure 5.1.11 West Elevation  
Source: Author

## EAST ELEVATION



Figure 5.1.12 East Elevation  
Source: Author



# SECTION LANDSCAPE

## SECTION A-A'



Figure 5.1.11 Section A-A'  
Source: Author

## SECTION B-B'

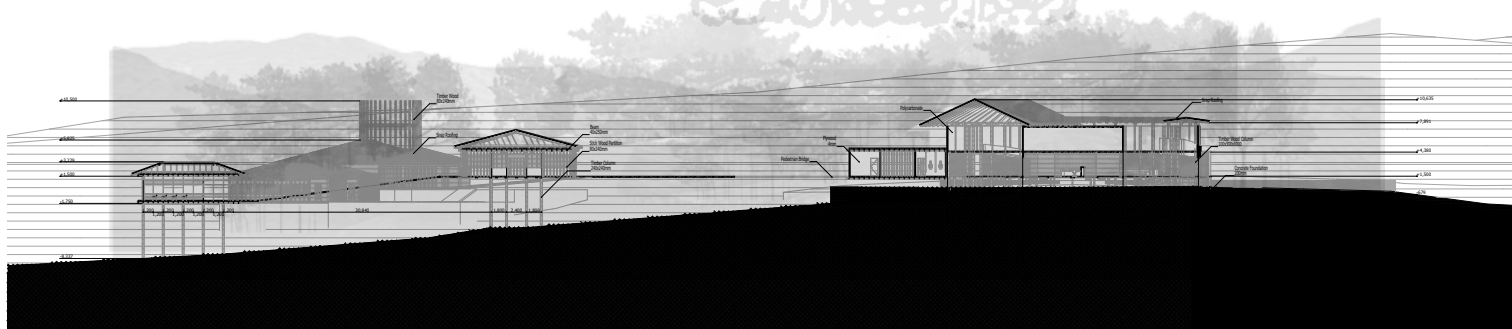


Figure 5.1.12 Section B-B'  
Source: Author

## SECTION

### PARTIAL SECTION OF ENTRANCE

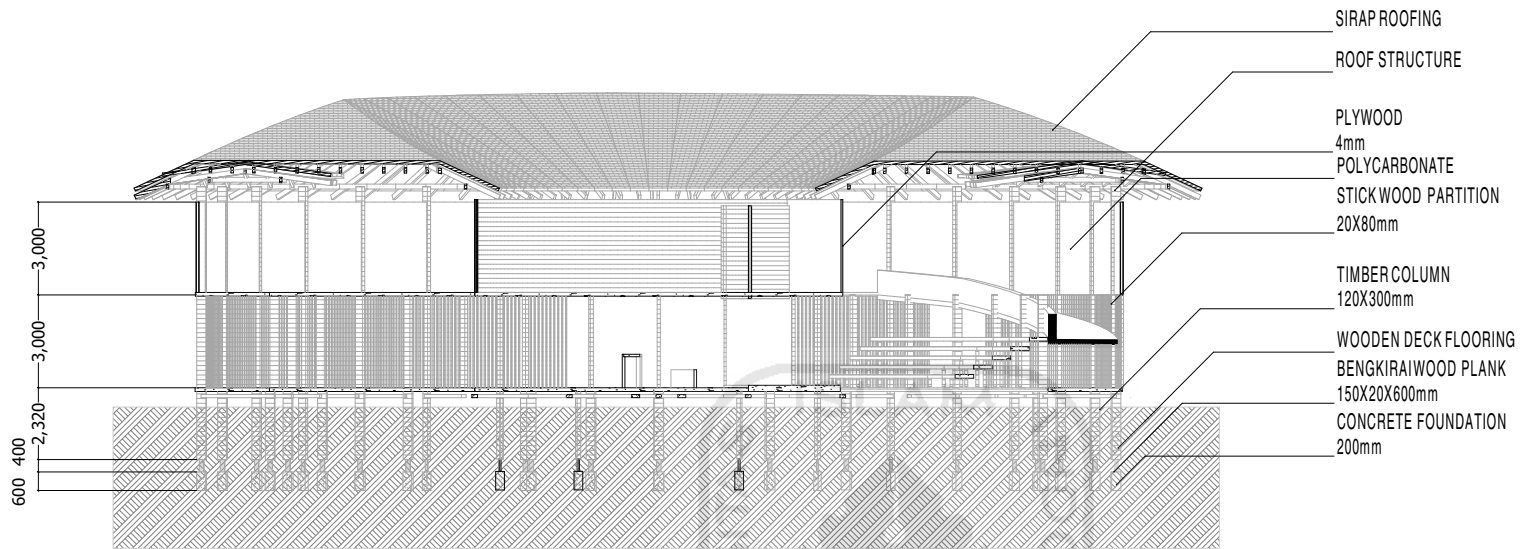


Figure 5.1.13 Partial Section Entrance

Source: Author



Figure 5.1.14 Structural Scheme Entrance

Source: Author

## SECTION

### PARTIAL SECTION OF CABINET OF WONDER (EN ROUTE)



Figure 5.1.15 Structural Scheme Thematic Museum  
Source: Author

The thematic museums separate into 3 types: Fauna, Flora, and Geology. The building has the same replicated modul of form and structure. The cabinet in the museum are adjusted based on the object size that kept inside.

## FAUNA MUSEUM



Figure 5.1.16 Interior Section Fauna Museum  
Source: Author

The fauna museum is the first transit museum from the entrance building transition. This museum stores all the discoveries and richness of fauna related to the Bunder forest.

## FLORA MUSEUM



Figure 5.1.17 Interior Section Flora Museum

Source: Author

The flora museum is the second transit museum from the fauna museum transition. This museum stores all the discoveries and richness of flora that found and lives in Bunder forest.

## GEOLOGY MUSEUM



Figure 5.1.18 Interior Section Geology Museum

Source: Author

The geology museum is the final transit museum from the flora museum transition. This museum stores all the discoveries and richness of geological thing inside the forest. Some process are explained through information panel and the speciment kept inside the cabinet.

## SECTION

### PARTIAL SECTION OF RESEARCH AND DORMITORY



Figure 5.1.19 Research Building Modul  
Source: Author

The research building are provide to accomodate the advance research and environmental learning about the Bunder Forest. Small science-laboratorium and lodging also provided to support the researchers/learners, complete with rest rooms and toilet to optimize the research process.

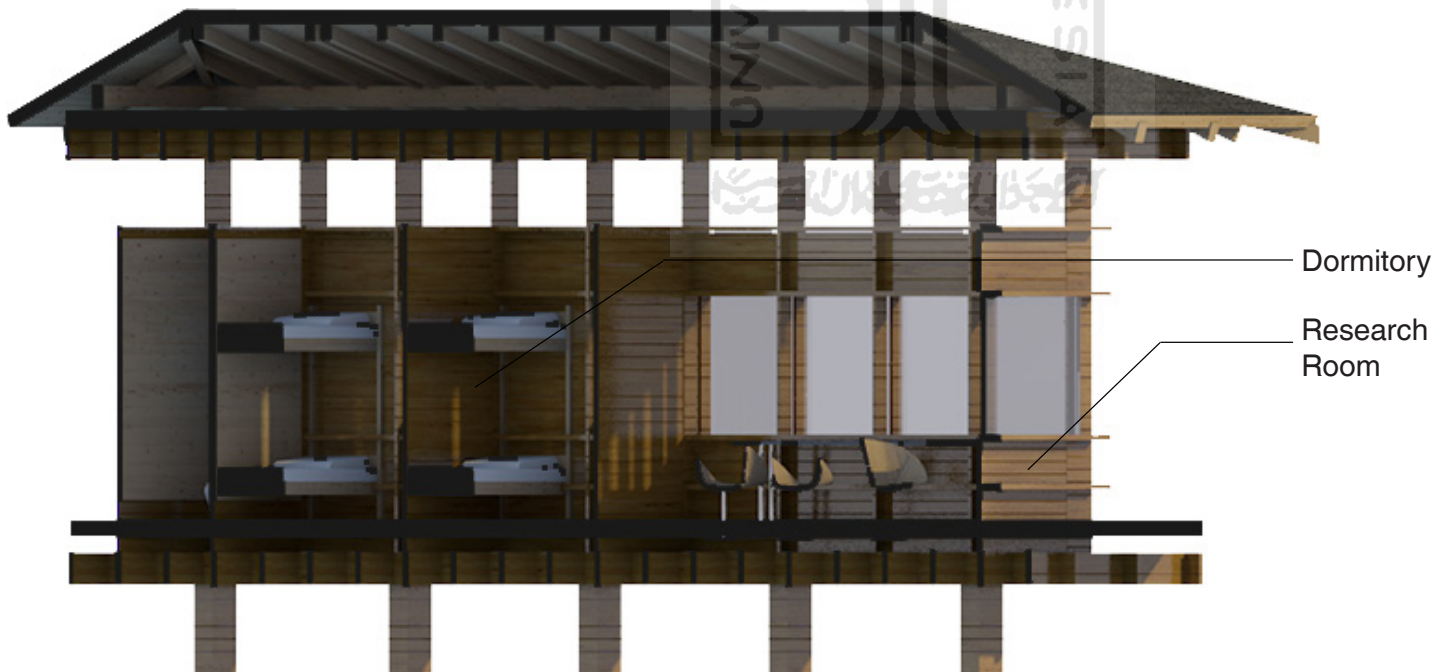


Figure 5.1.20 Interior Section Research Building and Dormitory  
Source: Author

## SECTION

### PARTIAL SECTION OF WORKSHOP ROOM



Figure 5.1.21 Workshop Room Modul  
Source: Author

Workshop room are provided to support empowerment of local community about forest utilization and program to support forest sustainability. Workshop room can accommodated up to 12-15 persons/room. And some addition in the porch can be use up to 6 persons.

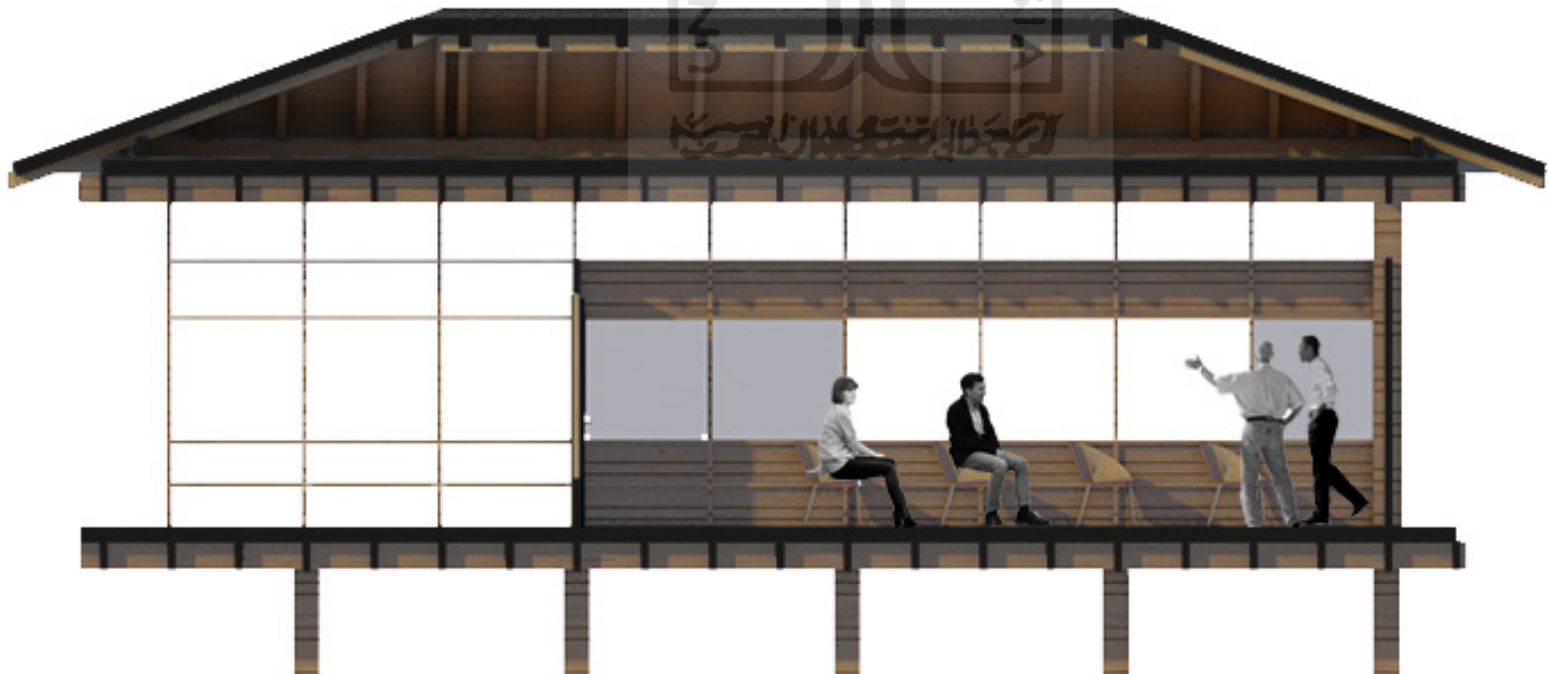


Figure 5.1.22 Interior Section Workshop Room  
Source: Author

## SECTION

### PARTIAL SECTION OF SOUVENIR SHOP AND CULINARY AREA

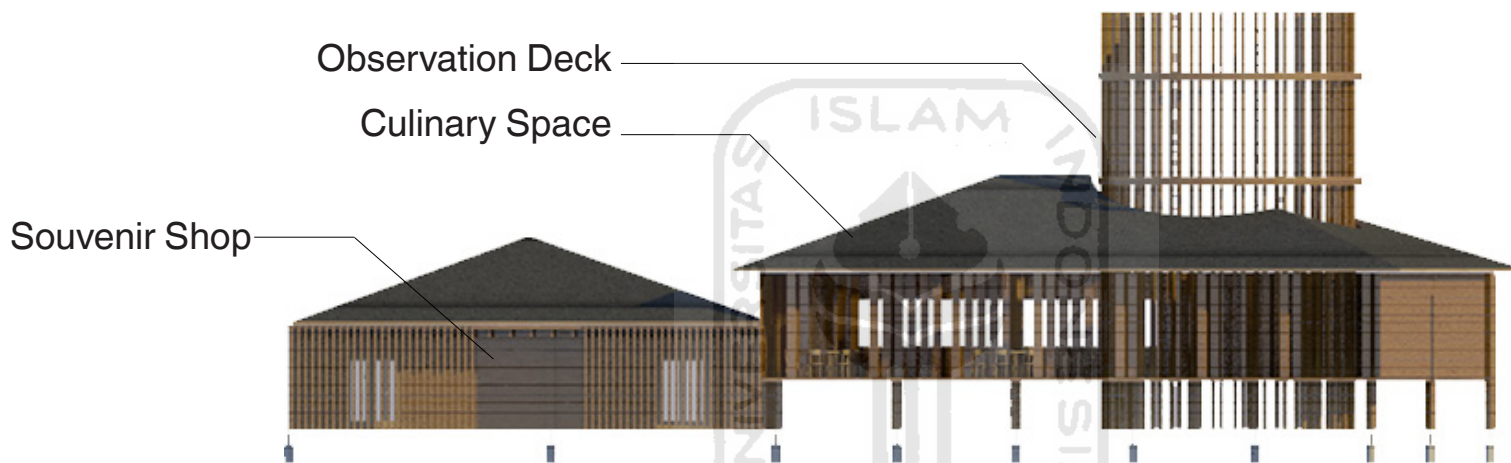


Figure 5.1.23 Partial Section Souvenir Shop and Culinary Area

Source: Author

Souvenir shop and culinary space are the final building of forest experience of environmental learning and recreation. Souvenir shop as the first enter selling various knick-knacks and goods resulting from the forest products that managed by local communities. Meanwhile culinary space is the rest zone for the visitor after a long exploration. Completed with observation deck to take post-photos surrounding the Bunder Landscape.

# STRUCTURE - REVERSIBLE BUILDING

## REVERSIBLE BUILDING

The context of TAHURA Bunder which is natural conservation park become the consideration in obeying the rules of minimal destruction and adhering the principles of nature-conservation. **Reversible Building Design (RBD) Reversible building** take as an approach that offers the solution on reusing building, system, products, and materials that have high transformation potentials. This system are easily assembled/disassembled on site so would have minimum impact to forest.



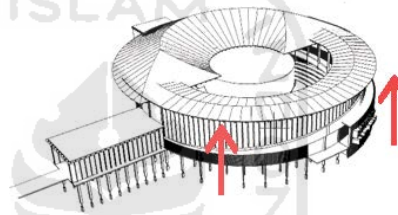
Reversible Connection



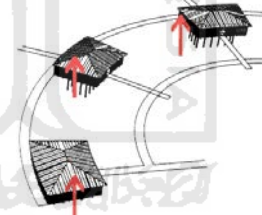
Systematization



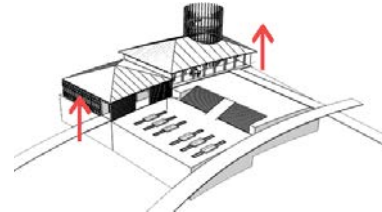
### MODUL AND STRUCTURES



### ENTRANCE AS THE GATE



### CABINET OF WONDER



### REST ZONE/REFLECTION SPACE

### MATERIALS



Sirap Roofing



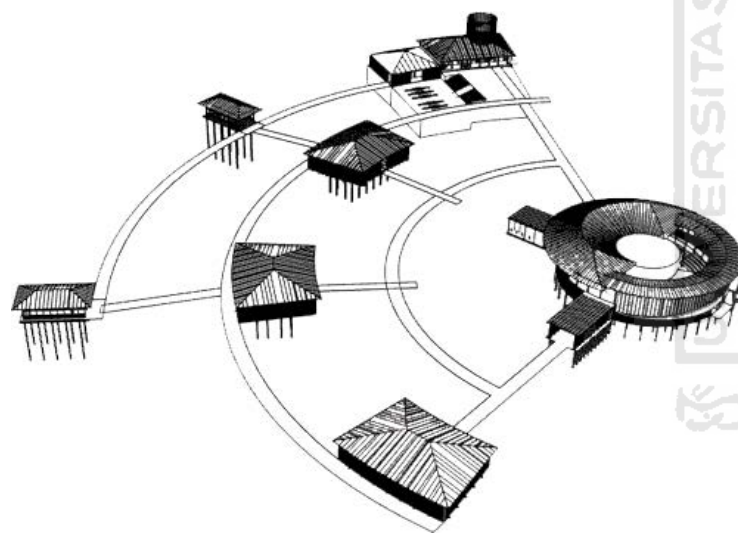
Timber Wood



Plywood 4mm



Polycarbonate Panel



Each mass having elevated structure to minimize the soil forest damage from building weight. The pedestrian bridge are provide as the access from one facilities to others. The radial access gives the preferences to exploring the potential visit in Bunder Natural Reserve.



# STRUCTURE - REVERSIBLE BUILDING STRUCTURAL SCHEME

ENTRANCE

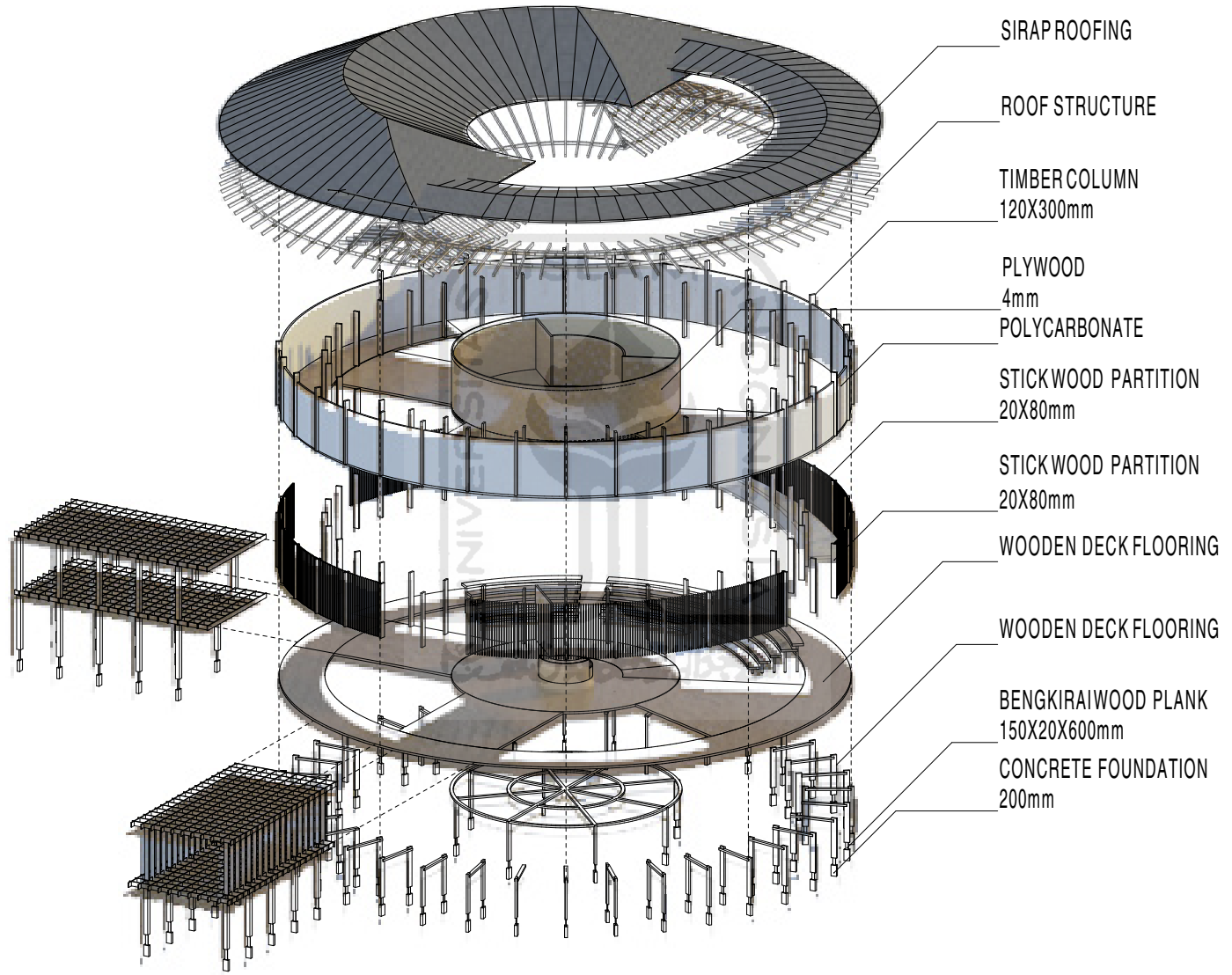


Figure 5.1.24 Structural Scheme Entrance  
Source: Author

# STRUCTURAL SCHEME

CABINETS OF WONDER (TERMINUS)

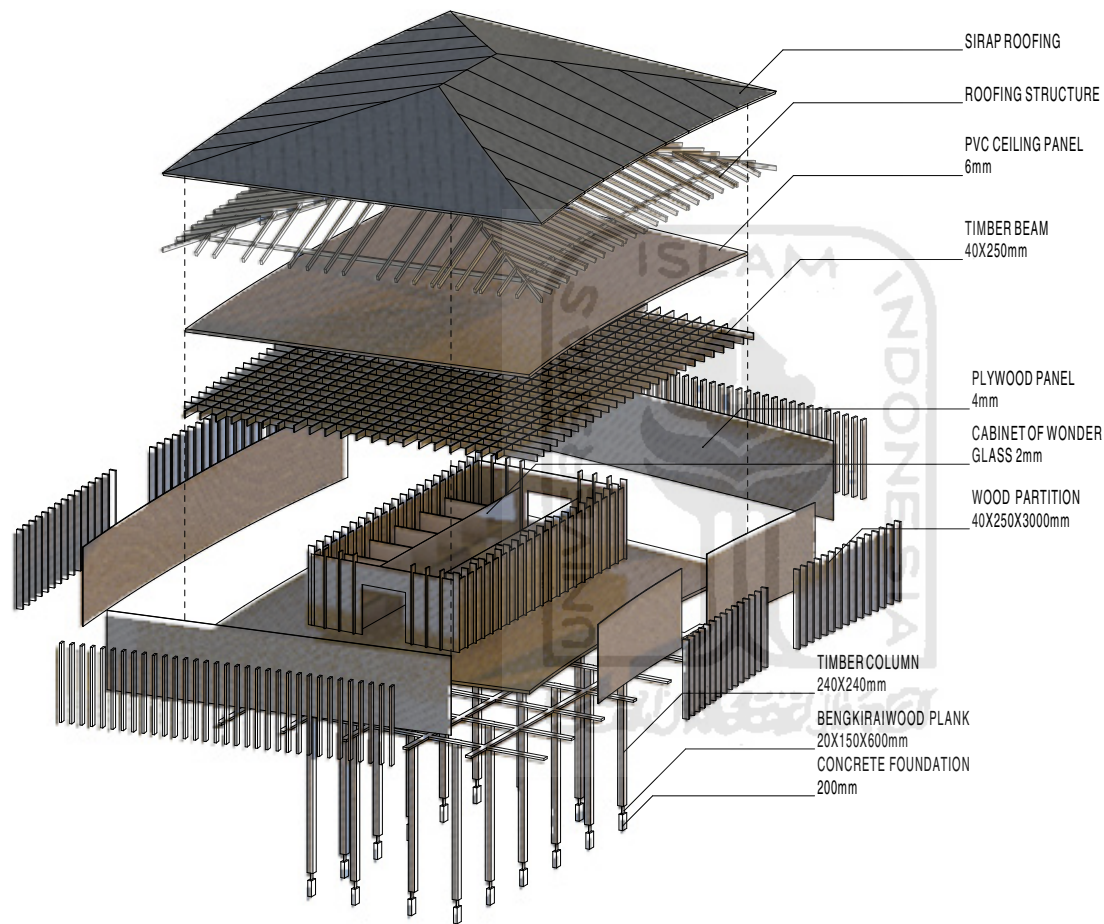


Figure 5.1.25 Structural Scheme Thematic Museum

Source: Author

# STRUCTURAL SCHEME

RESEARCH ROOM AND DORMITORY

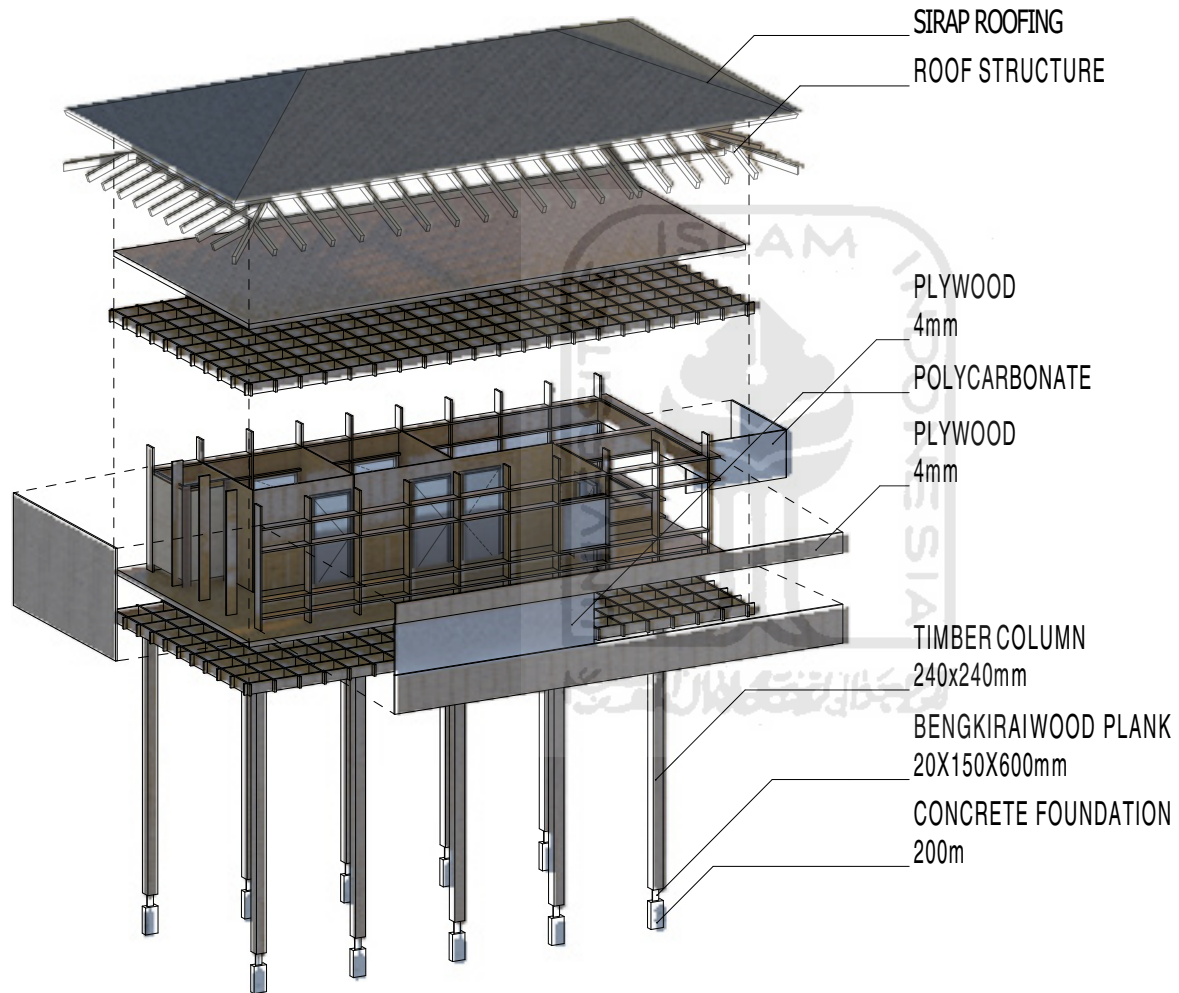


Figure 5.1.26 Structural Scheme Research and Dormitory

Source: Author

# STRUCTURAL SCHEME

## WORKSHOP ROOM

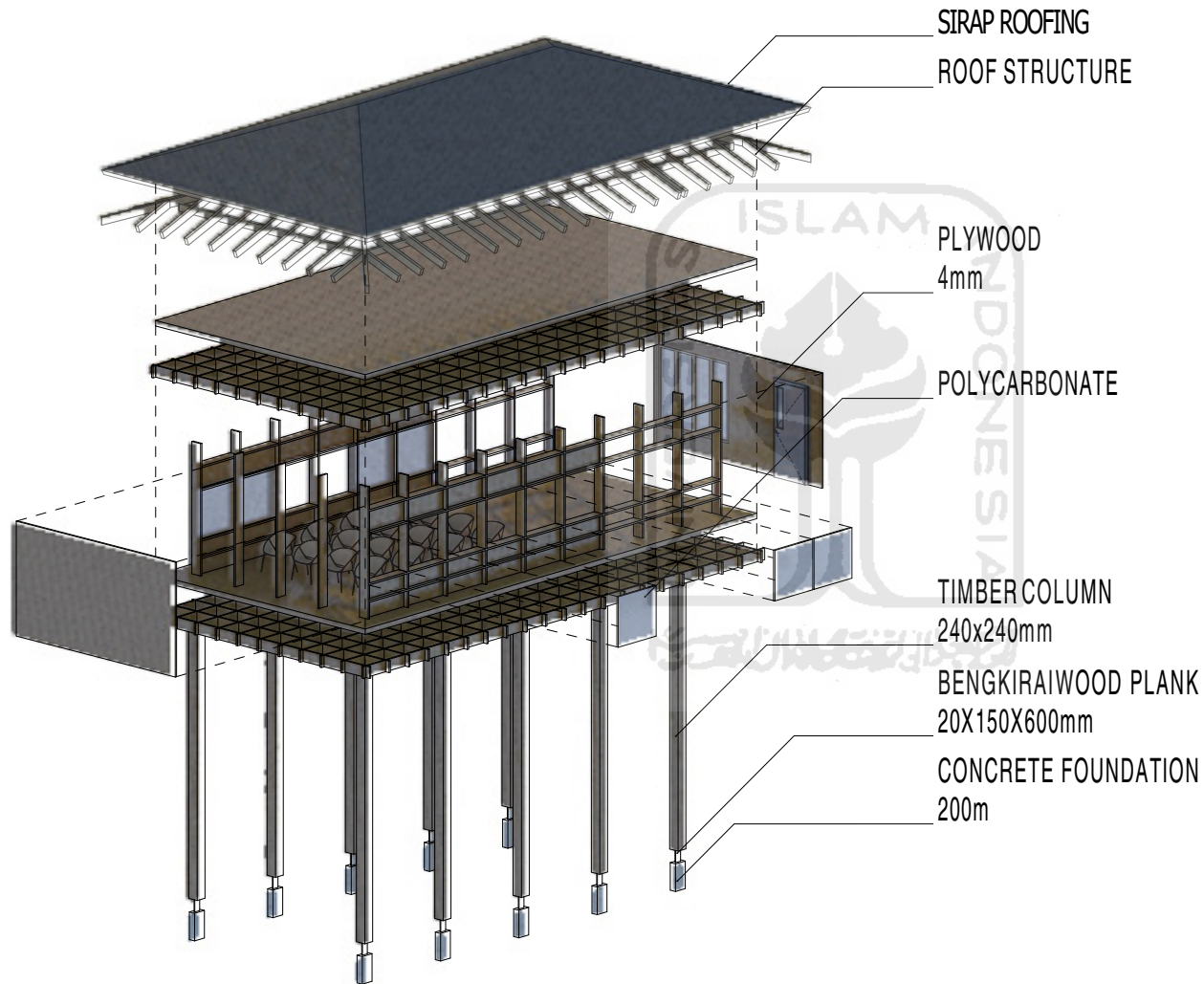


Figure 5.1.27 Structural Scheme Workshop

Source: Author

# STRUCTURAL SCHEME

## SOUVENIR SHOP AND CULINARY AREA

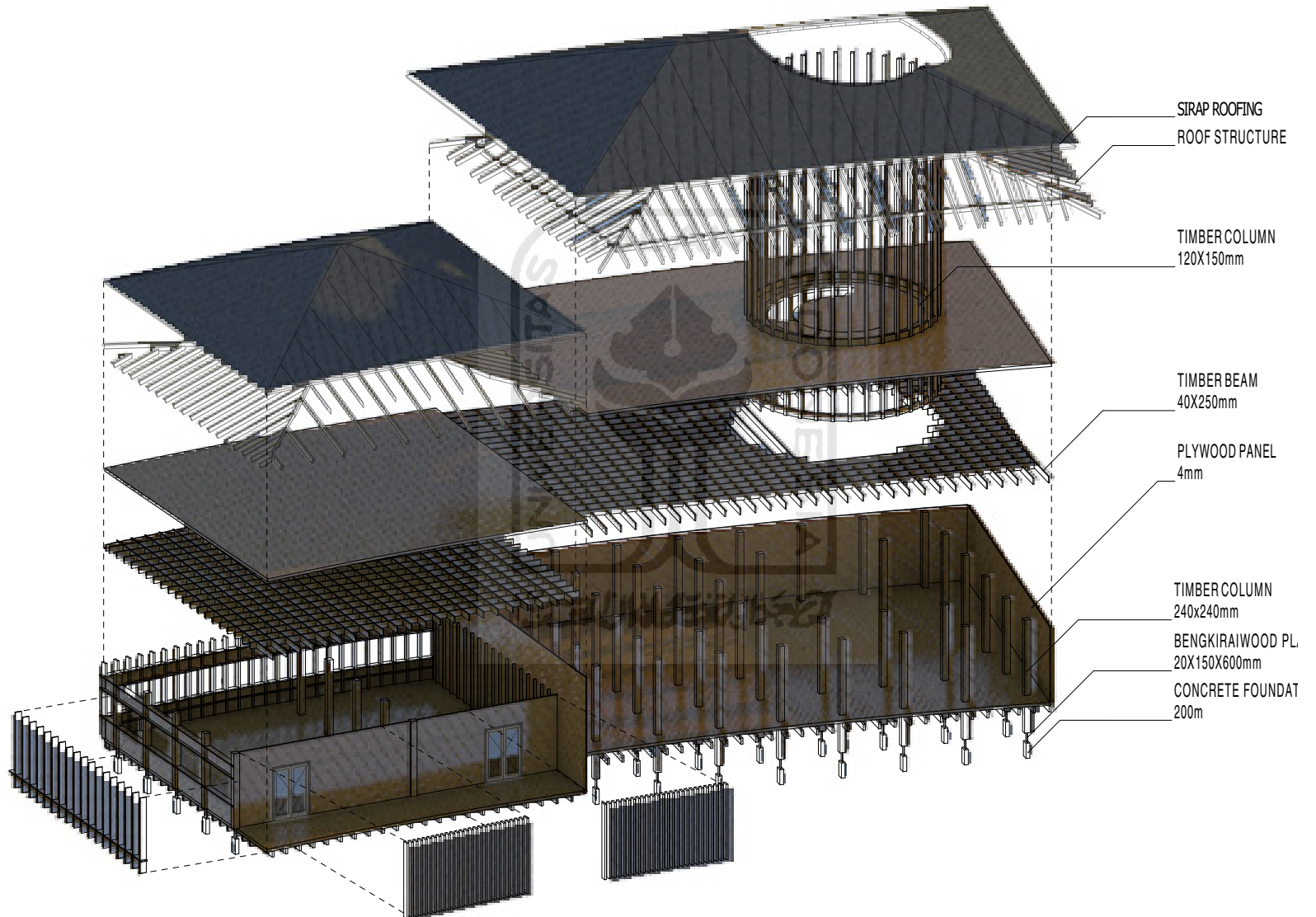


Figure 5.1.28 Structural Scheme Souvenir Shop and Culinary Area  
Source: Author

# CLEAN WATER SYSTEM

## WATER DISTRIBUTION

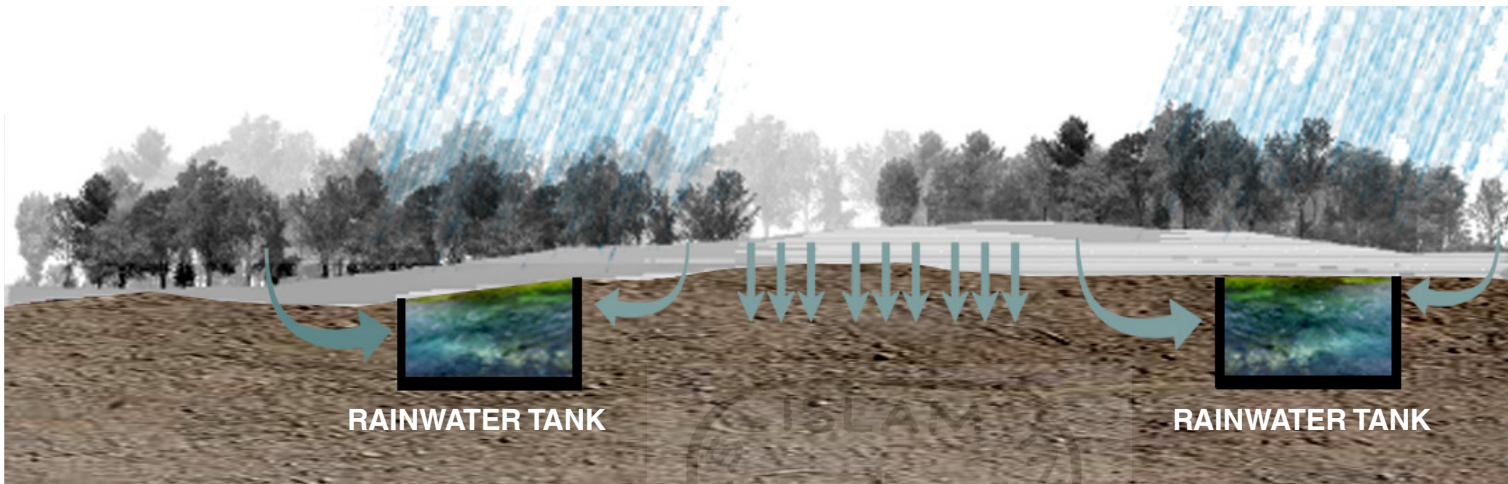


Figure 5.1.29 Clean Water System  
Source: Author

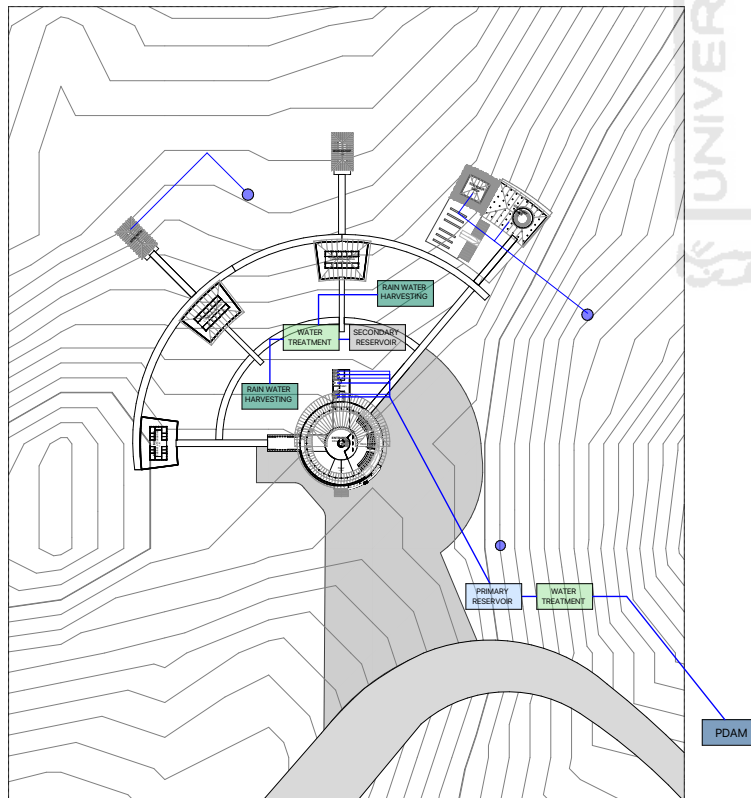


Figure 5.1.30 Clean Water Plan  
Source: Author

Water conservation at site can be achieved by using harvested rainwater for landscape irrigation. Reduced water runoff and increased groundwater recharge achieved through reductions by the use of paving surface with high filtration and also water retention areas. The water treated and keep on the rainwater tank before redistribute again.

# WASTE MANAGEMENT SYSTEM

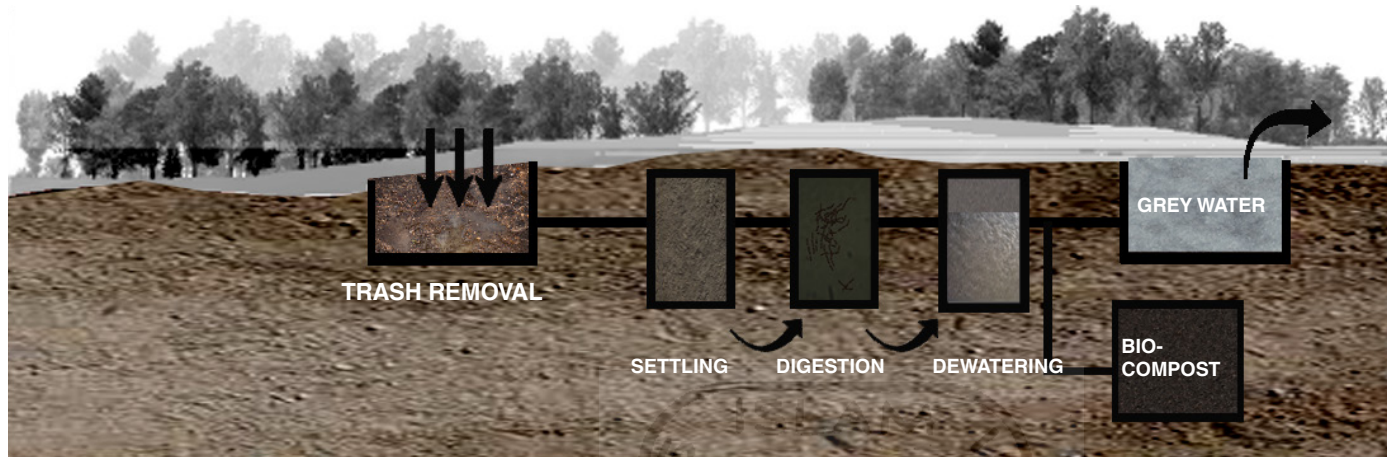


Figure 5.1.31 Waste Treatment  
Source: Author

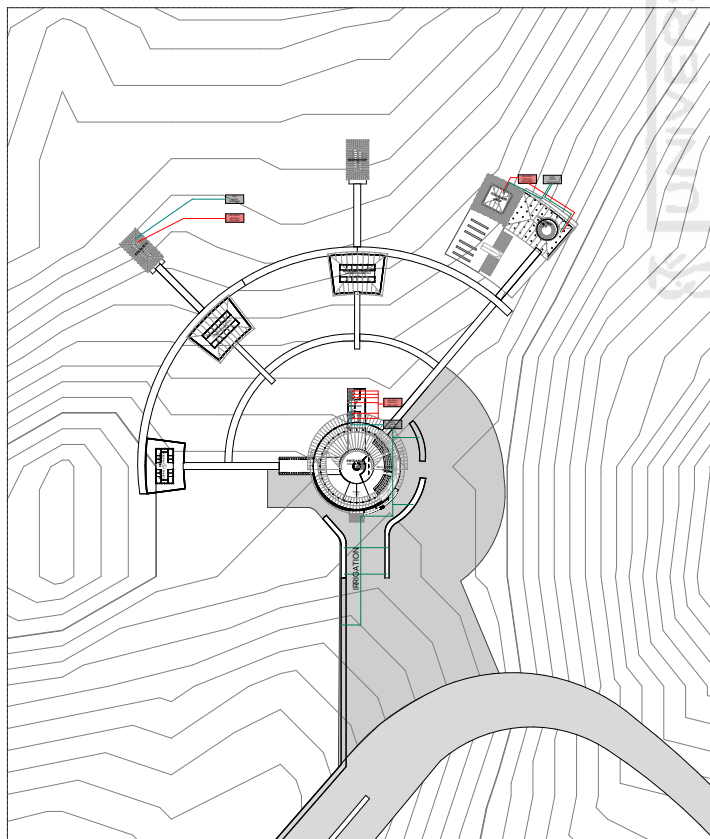
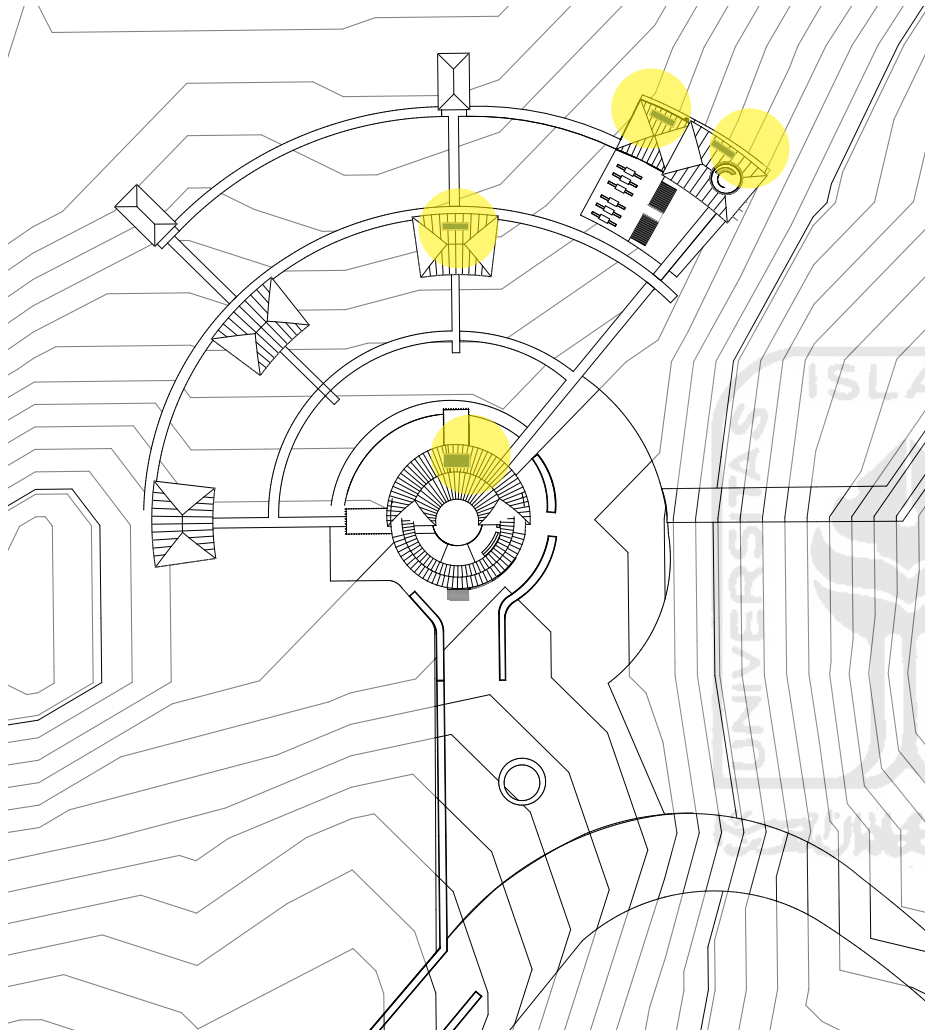


Figure 5.1.32 Waste Management Plan  
Source: Author

The maintenance of waste by bio-system treatment are used to minimize environmental pollution especially the forest soil. The process resulting grey water for sub-surface irrigation and also bio-solid waste (compost).

The process start from trash removal then settling and degrade by biological bacteria. After that the residual liquid will be process to separate into the grey water and solid waste that become bio-compost.

## ENERGY SUPPLY SCHEME



Energy supply by means of taking advantage of the sun is one of the infrastructure concepts to bring out natural values in building. Use of solar panels done to produce at least 50% energy for the whole building. By using Sanke-lux with capacity 200Wp, the panels are needed approximately 32 panels.

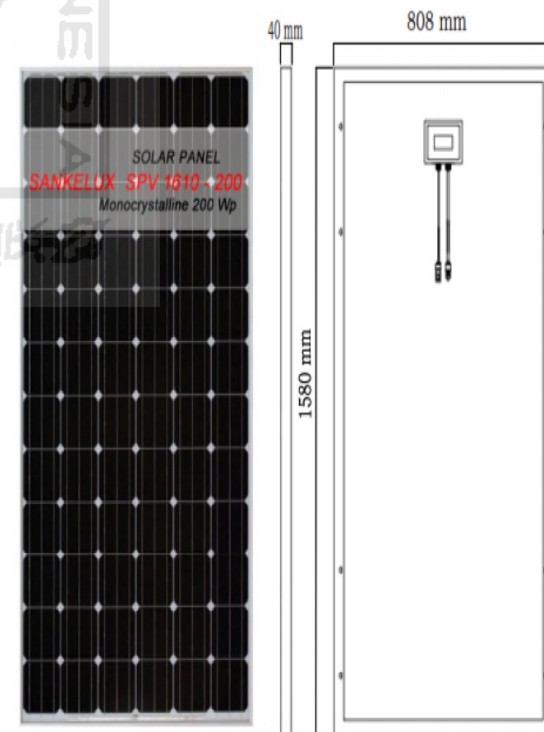


Figure 5.1.33 Energy Supply Scheme  
Source: Author

Source: <https://www.sankelux.co.id/product?id=11>



## NATURAL AIR CIRCULATION SCHEME PASSIVE STRATEGY

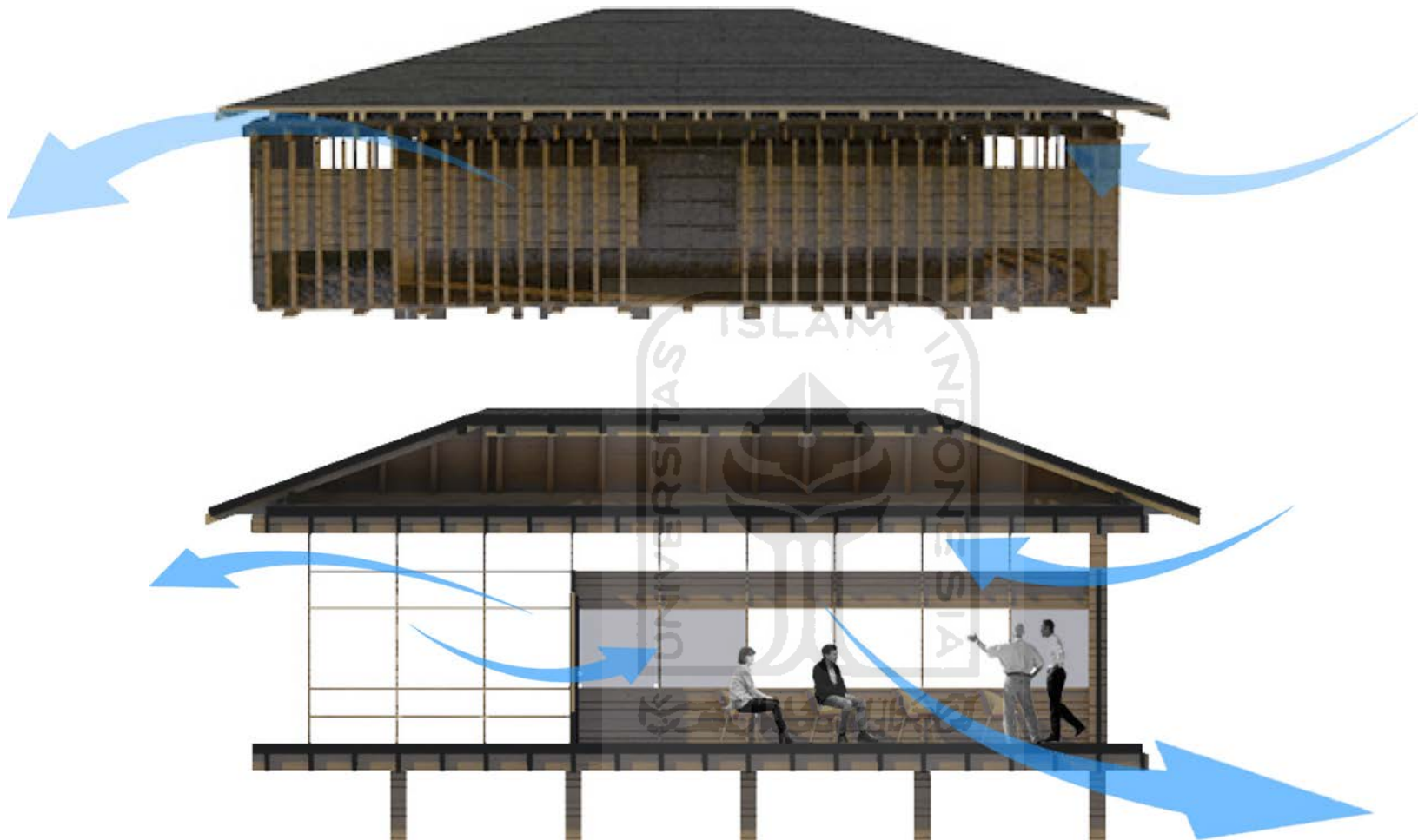


Figure 5.1.34 Air Circulation Scheme  
Source: Author

The scheme shows the airflow circulation from the museum and workshop supporting building. Almost all masses using circumference opening to allowing the air pass through the gap.

## NATURAL LIGHTING SCHEME

### PASSIVE STRATEGY

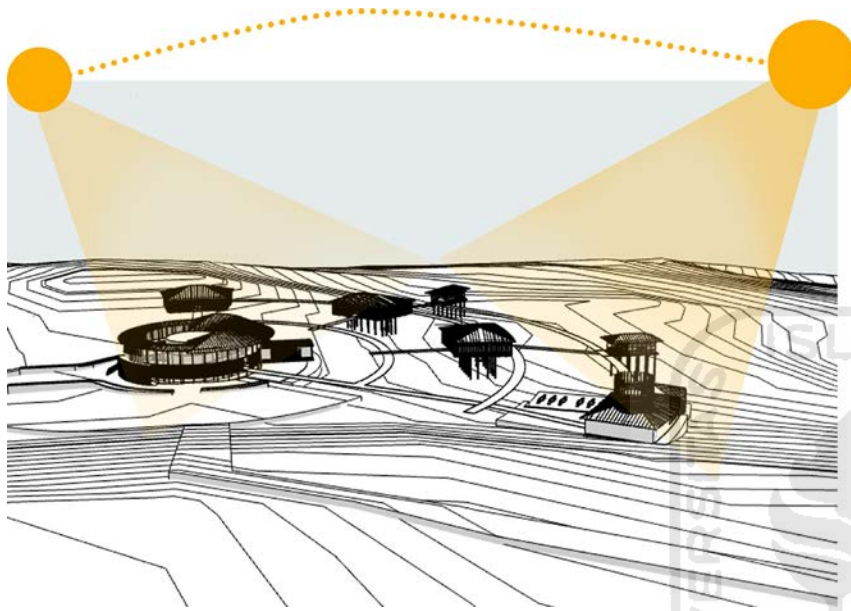


Figure 5.1.35 Natural Lighting Scheme  
Source: Author

The scheme shows sun path that illuminate the building all-day. The temperature that radiates from the trees are cooler will be balance by the combination between plywood and transparant material that use by building. Because it regulates the access of lighting and allowing heat radiation to warming up the visitor in the forest learning exploration.

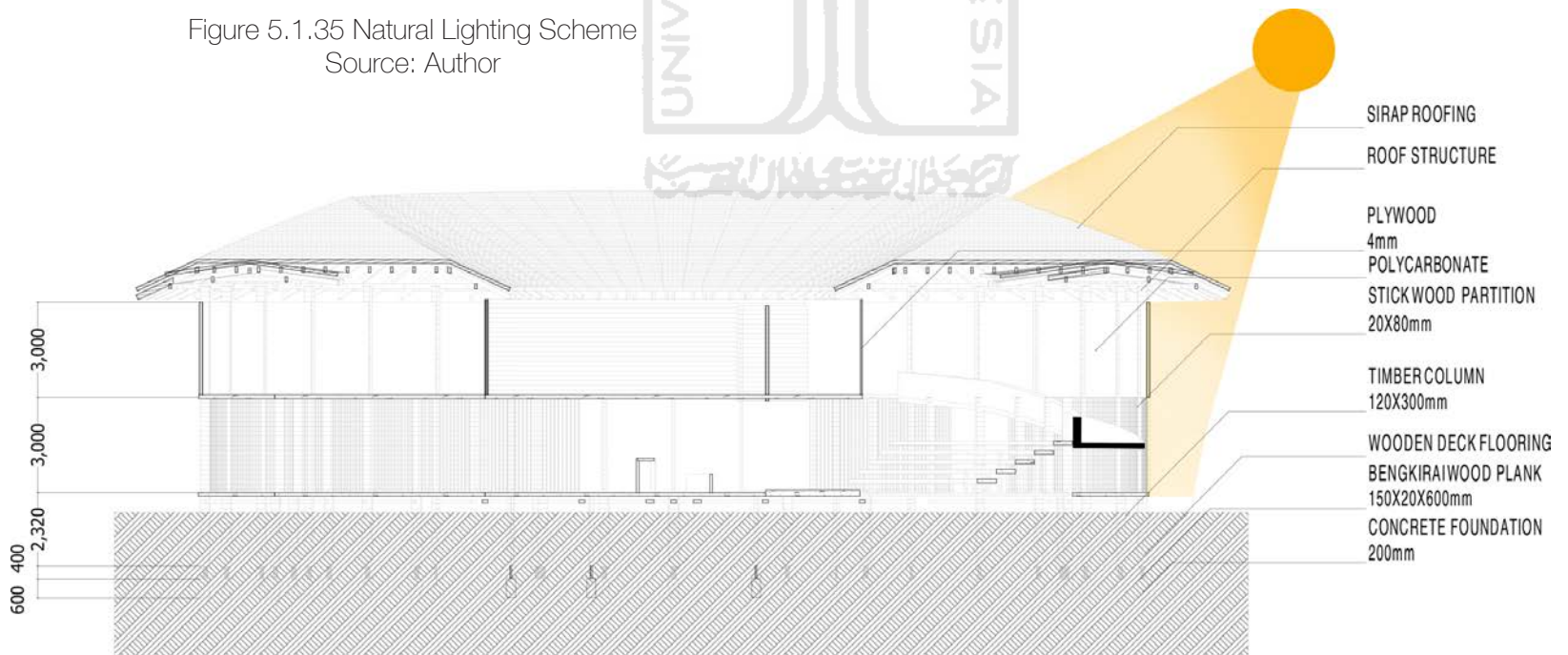
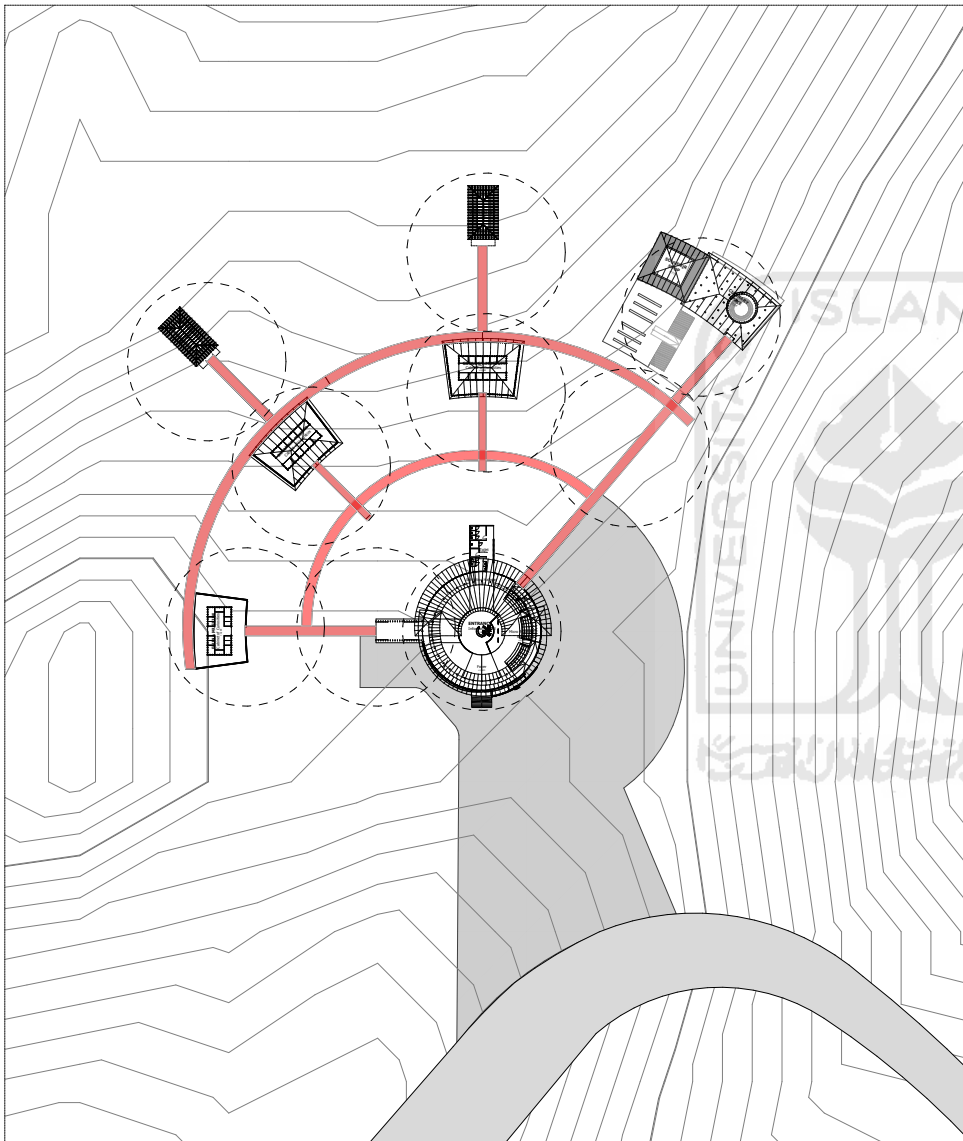


Figure 5.1.36 Partial Natural Lighting Scheme  
Source: Author

## FIRE PROTECTION SCHEME

### FIRE PROTECTION AND EVACUATION ROUTE

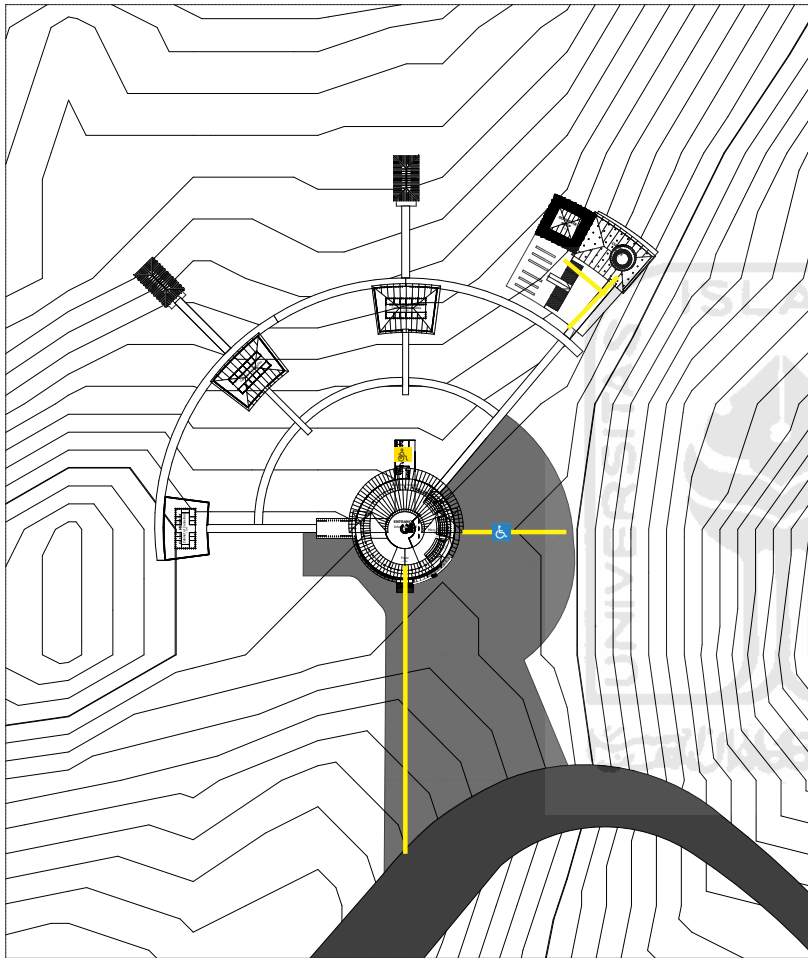


Evacuation routes are marked with red color zones in the figure. The pathways/ pedestrian bridge are interconnected to form a radial circulation with road short-cuts at every 50m interval which gives preference to the exit gate (to the transition zone).

Transition zones with less vegetation than other zones allowing easy-evacuation in case of forest fires. Meanwhile the transition zone as central setting is hardscape and has stable surface which is minimal from landslides.

Figure 5.1.37 Fire Evacuation Scheme  
Source: Author

## BARRIER FREE DESIGN DISABLE FACILITIES



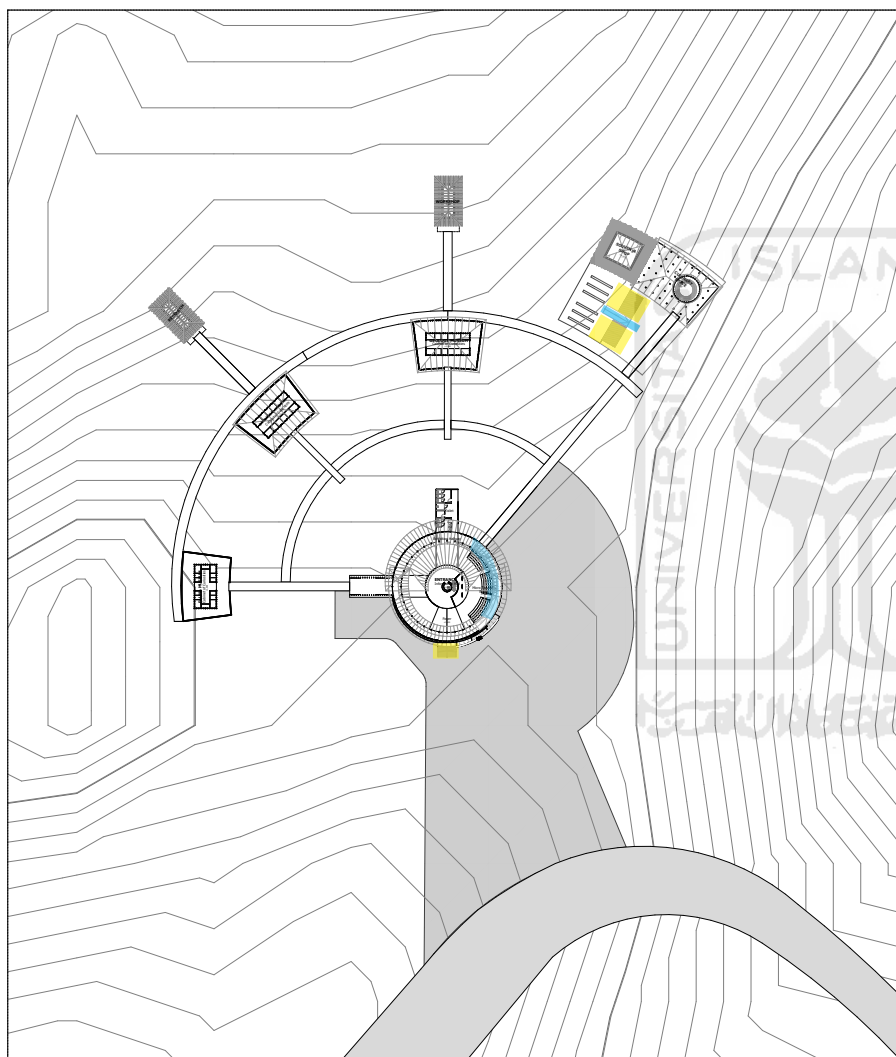
Entering the visitor center the sightless/blind people lead by guiding block. The guiding block also place in parking lot and rest zone.

The vertical transportation are accommodate with stairs and ramps in some point. And for the exploration the radial circulation itself can lead the vulnerable groups experiencing the forest with some preferences distance.

Another public facilities is parking lot and toilet that disable friendly.

Figure 5.1.38 Barrier Free Design Scheme  
Source: Author

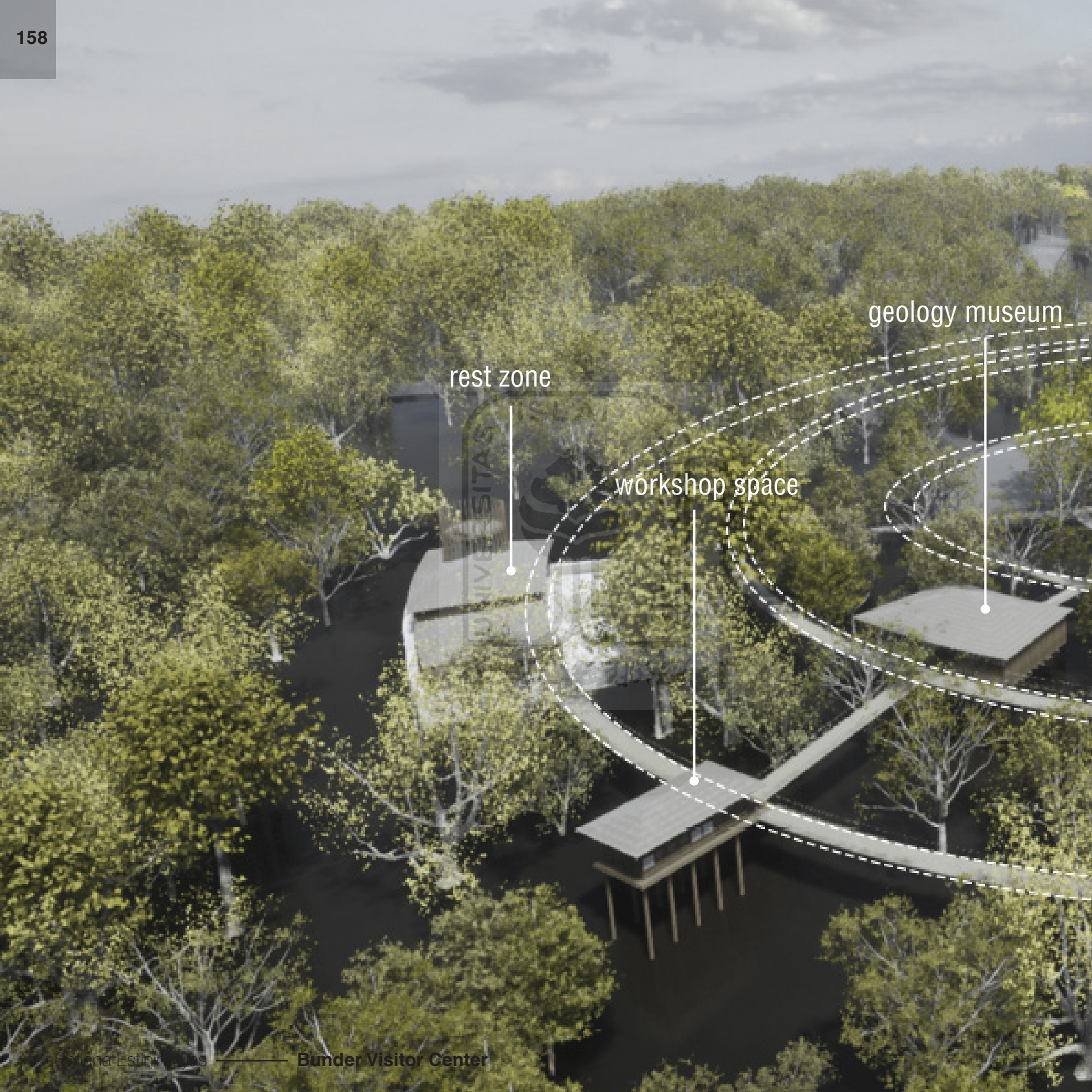
## VERTICAL TRANSPORTATION SCHEME STAIR AND RAMP



The vertical transportation accommodated by stairs and ramps. To achieve an eco-edu forest that is more disable-friendly, the ramp is used as a vertical transportation for a 2-story building and also sitting stages in the rest zone that has the characteristic of stepping ground.



Figure 5.1.39 Vertical Transportation Scheme  
Source: Author



rest zone

workshop space

geology museum



entrance

flora museum

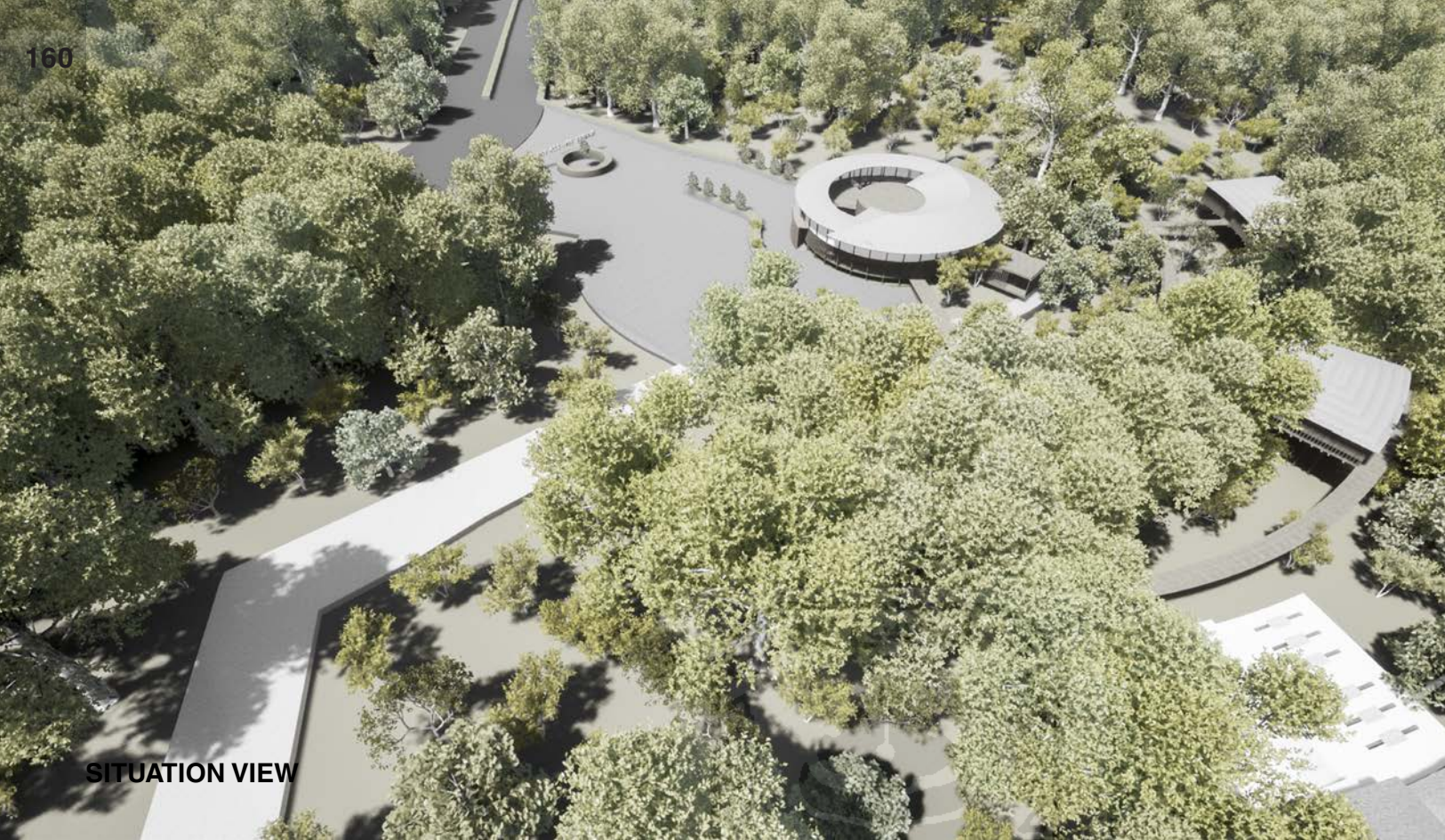
fauna museum

entrance

research and dormitory

en-route

terminus



**SITUATION VIEW**



**ENTRANCE**





**MICROTEACHING AND PERFORMANCE HALL**



**PEDESTRIAN BRIDGE**



**FAUNA STATION (RUSA TIMOR/JAVAN RUSA)**



**CABINET OF WONDER (FAUNA MUSEUM)**



**CABINET OF WONDER (FLORA MUSEUM)**



**CABINET OF WONDER (GEOLOGY MUSEUM)**



**RESEARCH AND DORMITORY EXTERIOR**

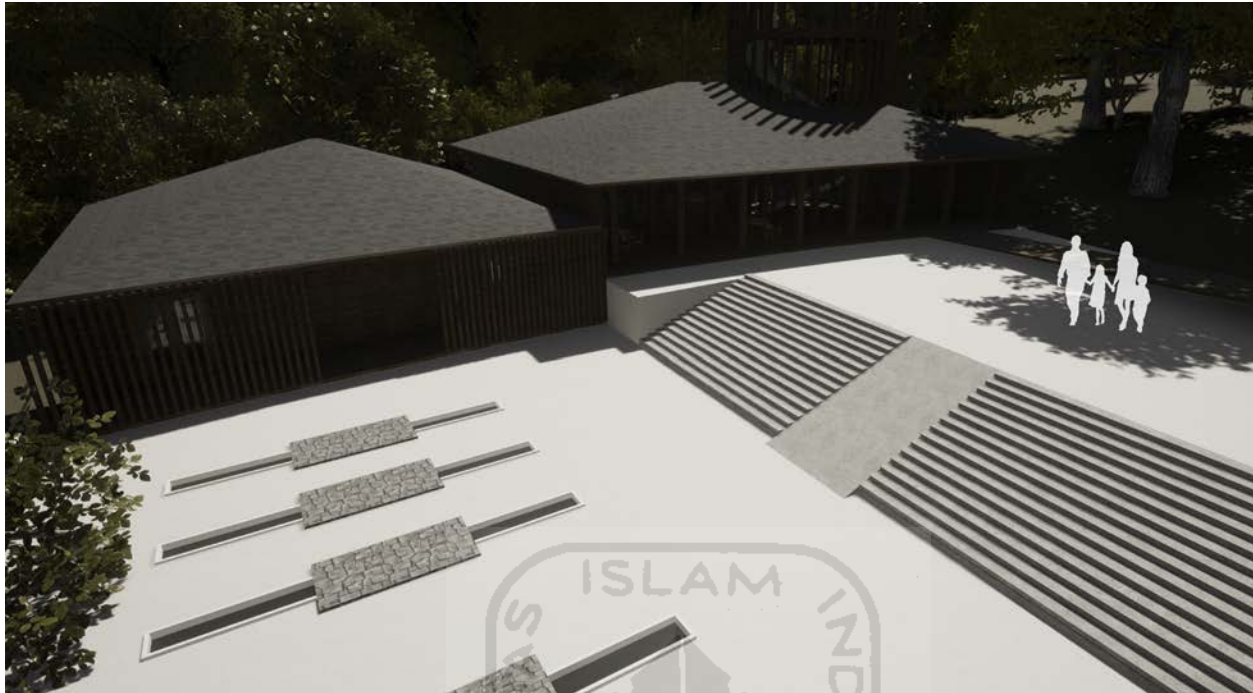


**RESEARCH AND DORMITORY INTERIOR**



**WORKSHOP ROOM**





**SOUVENIR SHOP AND CULINARY SPACE**



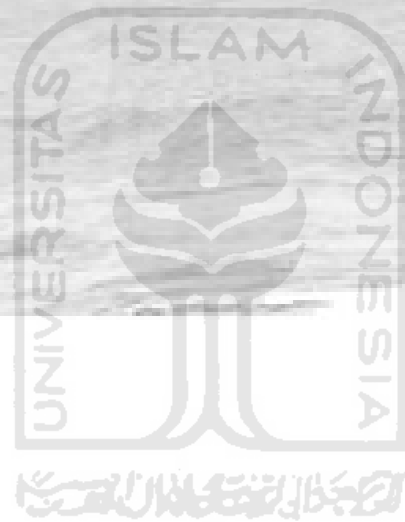
**CULINARY SPACE INTERIOR**





**REST ZONE/REFLECTION SPACE**

# 06



# DESIGN EVALUATION

Argumentation in the Form Making  
Arrangement of Micro-teaching Stage and Seating  
Relocation of Public Restroom  
Cabinets Arrangement  
Outdoor Circulation Insertion

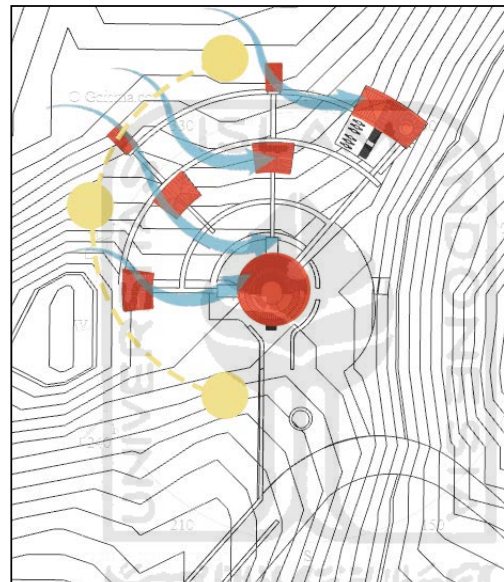
Based on the evaluation results, there are some parts responded by examiner and supervisor. This improvement is expected to be a better design reference for readers.

## 1. Argumentation in the form making



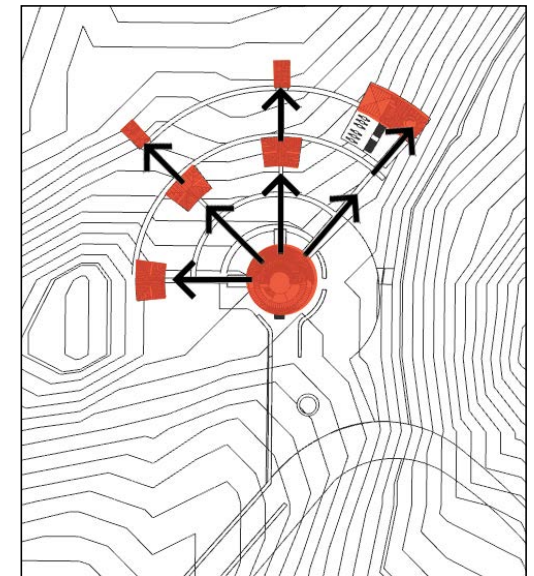
### SPATIAL ORGANISATION

Each phase of spatial organisation are arranged by the needs to accommodate the visitor experience of forest-learning. By decentralized system that already defined based on potential visit and zone, the arrangement are considered having more less impact rather than the previous building.



### MASS ORIENTATION

The mass are distribute in some areas by directing to the primary building in the center. Each building maximizing the access of natural air and lighting by circumference opening. While the radial circulation give preferences by affordable distance.



### SITE PLANNING

#### INFORMATION AREA AS THE GATE

Introduction/overview of forest potential visit.

#### CABINET OF WONDER (TRANSITORY)

Different thematic museums are linked by elevated-hub in 50m radial interval.

#### REST ZONE AS REFLECTION SPACE

The final point possible the visitor to recalling the memories after the exploration.

Figure 6.1.1 Process of Form and Spatial Arrangement

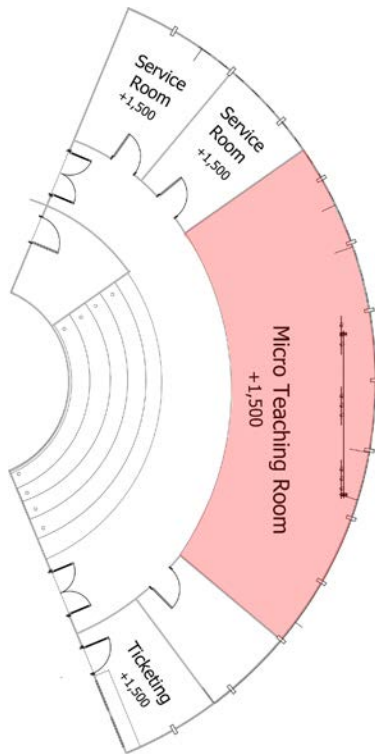
Source: Author

## 2. Arrangement of Microteaching Stage and Seating

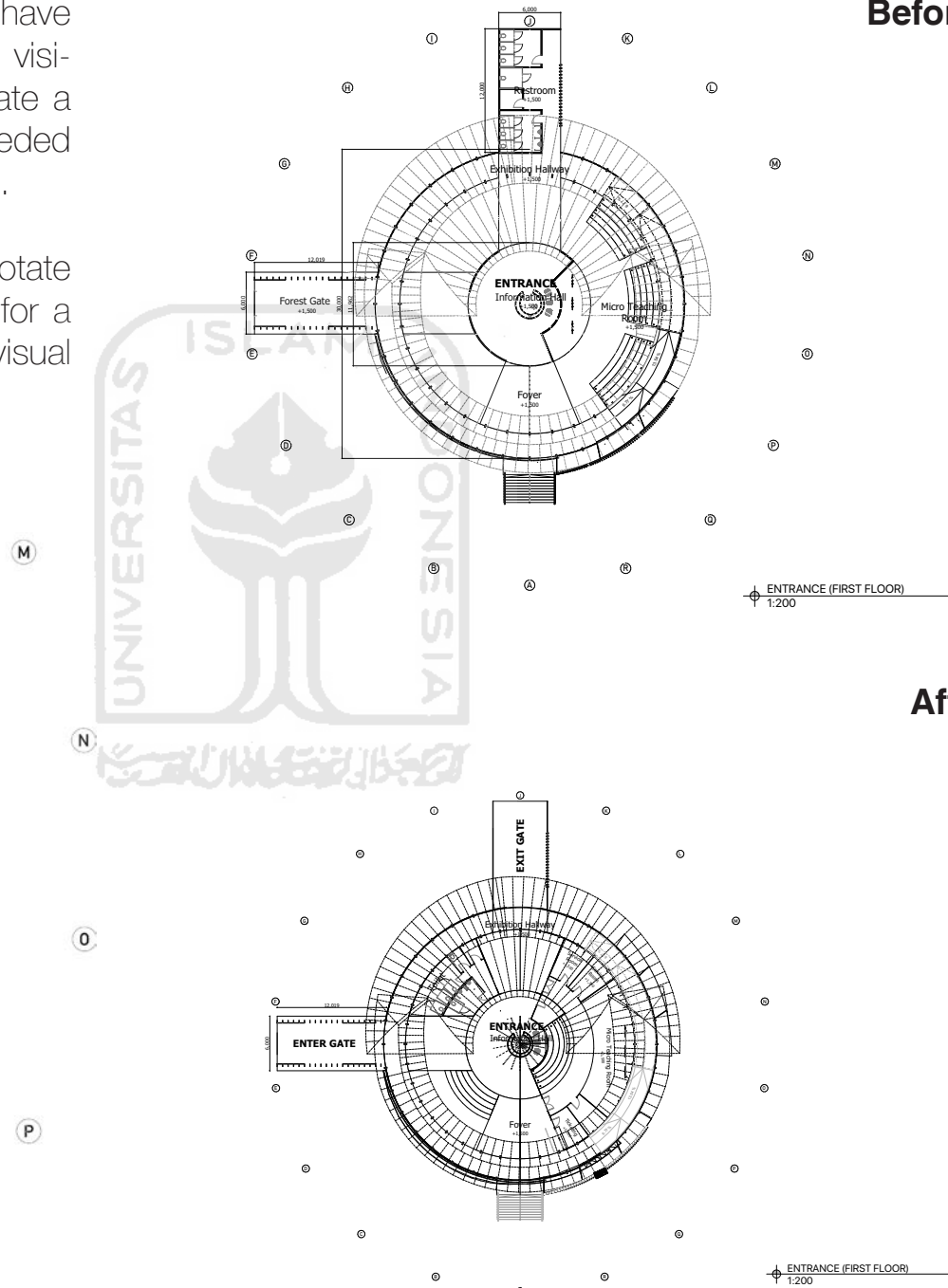
The previous microteaching room have protruding stage that interferes the visitor visibility to the presenter. To create a comfort visibility, little adjustment needed to regulate the seating and the stage.

Therefore the author proposes to rotate the stage in the opposite direction for a more comfortable and spacious visual view.

### After



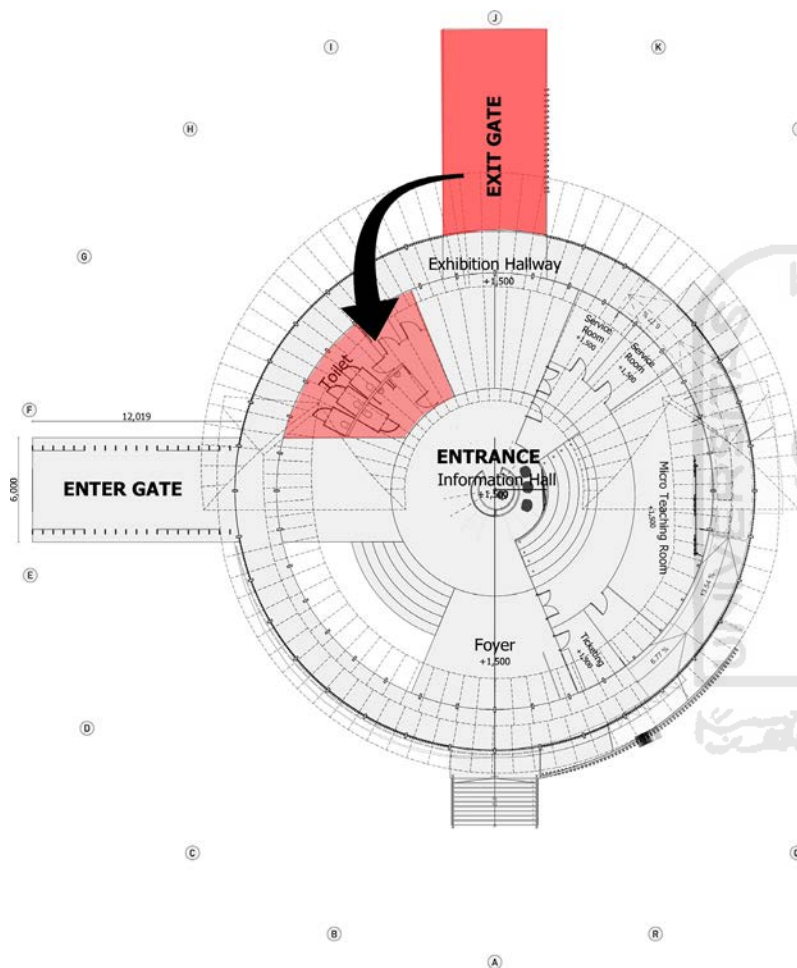
### Before



### After

Figure 6.1.2 Microteaching Room Revision  
Source: Author

### 3. Relocate public restroom



The previous location of public restroom considered inappropriate to place in the Y-axis direction, whereas the function of X-axis is to guide the visitor to entering the forest.

The new proposal is to relocate the public restroom in the circular plan and the create the Y-axis as the exit gate.

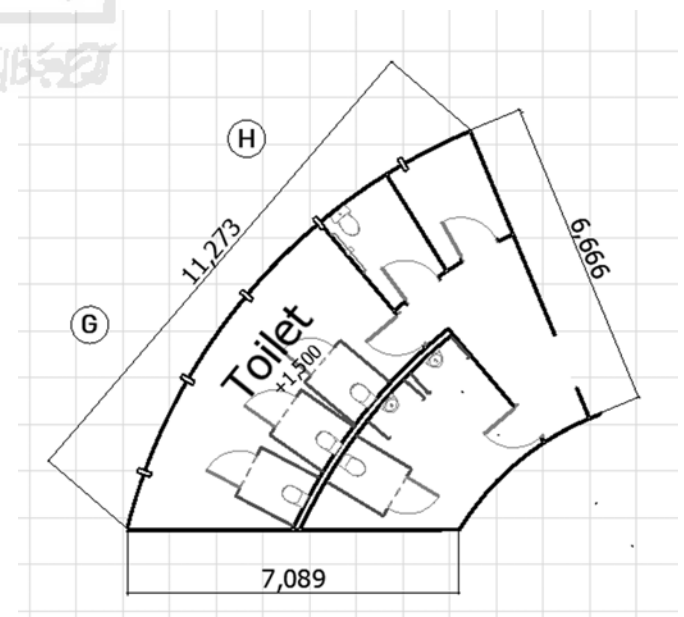
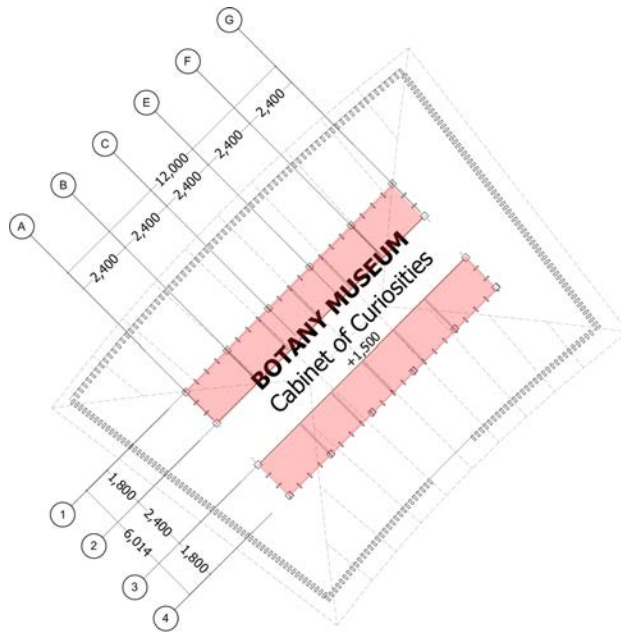


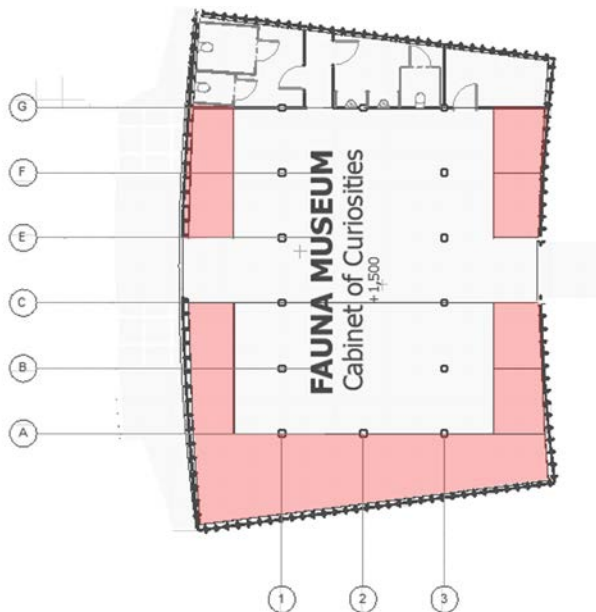
Figure 6.1.3 Restroom Revision  
Source: Author

#### 4. Cabinet of Wonder Circulation and Cabinet Arrangement



##### Before

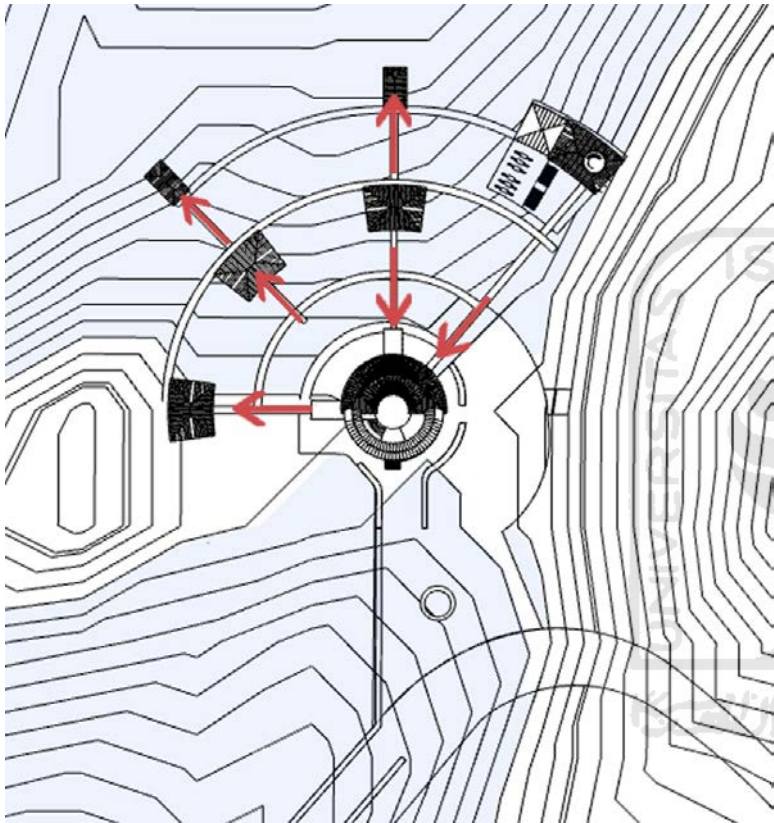
Concerning to the size of the cabinet in the middle, the examiners worrying about the size that is not suitable for storing specimens in nature. As the previous cabinet located in the middle, the circulation in the middle is only one way. While outside of the cabinet is the left space that actually could be use to displaying the object too.



##### After

As the examiners inputs, the author proposed to removing cabinet in the middle, then relocate the cabinet surrounding the room. So it left the wider space as the circulation that allows more visitors to enjoy nature objects at one time.

Figure 6.1.4 Cabinet Arrangement Revision  
Source: Author



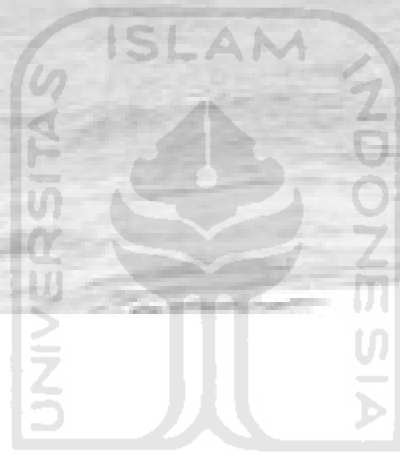
### 5. Outdoor Circulation Insertion

Concerning the relocation of public restroom in the Y-axis, the author proposed new function for the Y-axis. As the prominent axis, the exit gate replacing the previous function as public restroom. The access from the exit gate are added and linked to the last exploration of cabinet of wonder. Meanwhile it can be the alternative pathways by shorten the distance for the visitor that can't take longer exploration of the forest.

Figure 6.1.5 Exit Gate Addition  
Source: Author



# 07



## **ATTACHMENT**

Plagiarism Check  
Architectural Presentation Board  
Technical Drawing (Separate Attachment)  
References

## **SURAT KETERANGAN HASIL CEK PLAGIASI**

Nomor. 1609918189/Perpus./10/Dir.Perpus/VI/2021

*Bismillahirrahmanirrahim*

*Assalamualaikum Wr. Wb.*

Dengan ini, menerangkan Bahwa:

Nama : Sofiana Estiningtyas  
Nomor Mahasiswa : 17512133  
Pembimbing : Dr. Ing. Pulu Ayu P. Agustiananda, S.T., M.A.  
Fakultas / Prodi : Fakultas Teknik Sipil Dan Perencanaan/ Arsitektur  
Judul Karya Ilmiah : Nature Based Tourism (NBT) in Conserving Nature and Culture Visitor Center of Eco-Edu Forest in Taman Hutan Raya Bunder, Playen, Gunung Kidul by Environmental Design Approach

Karya ilmiah yang bersangkutan di atas telah melalui proses cek plagiasi menggunakan Turnitin dengan hasil kemiripan (*similarity*) sebesar 9 (Sembilan) %.

Demikian Surat Keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

*Wassalamualaikum Wr. Wb.*

Yogyakarta, 21 Juni 2021

Direktur



Joko S. Prianto, SIP., M.Hum

# ECO-EDU FOREST VISITOR CENTER BUNDER NATIONAL RESERVE with Environmental Design

CONSERVING NATURE - PRESERVING CULTURE



SPECIAL REGION OF YOGYAKARTA

GUNUNG KIDUL REGENCY

BUNDER, PLAYEN DISTRICT

Conservation

Education

Recreation

Culture



## PROJECT OVERVIEW



### FOREST CONVERSION IMPACT TO ECOLOGICAL FUNCTION

Tens of millions of Indonesians depend directly on forests for their livelihoods. Indonesia as a country that is blessed with the largest tropical forest in the world plus a variety of biodiversity have the forest area reaches 94.1 million hectares or 50.1 percent of the total land area in Indonesia. Meanwhile forest conversion poses a serious threat to the forests' ability to carry out their ecological functions.



### UNSUSTAINABLE FOREST UTILIZATION

With the increasing demand for urban infrastructure and commercial purposes, the effects of unsustainable forest utilization can be seen such as decreased filtration rate, decreased biodiversity, until the changes of global carbon balance because of the decreased forest contribution to reduce gas emissions.



### FOREST UTILIZATION ADHERING CONSERVATION PRINCIPLE

By considering the nature-conservation, restoration and sustainable utilization will overcome the climate change crisis and threaten the loss of biodiversity. Meanwhile, the acts can simultaneously produce the environmental goods and services needed for sustainable development.

## SITE LOCATION

### BUNDER NATIONAL RESERVE

Bunder Grand Forest Park (Natural Conservation Park) is a natural conservation area for the purpose of collecting natural or non-natural plants and or animals, native species and/or non-native species, which are not invasive and are used for the purposes of research, science, education, to support education, culture, tourism, and recreation. TAHURA Bunder is located about 30 km from the city of Yogyakarta, precisely in Gading II, Gading, Playen, Gunung Kidul Regency, Special Region of Yogyakarta on the edge of Jalan Raya Jogja-Wonosari.



## SITE CONDITION



### LEGEND

- |                               |   |
|-------------------------------|---|
| 1. Gate Enter and Exit        | 5. Playground                           |
| 2. Staff Office and Ticketing | 6. Rusa Timor (Javan Rusa) Conservation |
| 3. Toilet                     | 7. Observation Tower                    |
| 4. Kiosk                      | 8. Camping Ground                       |

**S**  
**W**  
**O**  
**T**

- Strategic location in the roadside of Jogja-Wonosari
- Various division zones of flora and fauna resources.
- Existing building to support edu-eco tourism.
- Various contour possible to maintain the view in some spots.

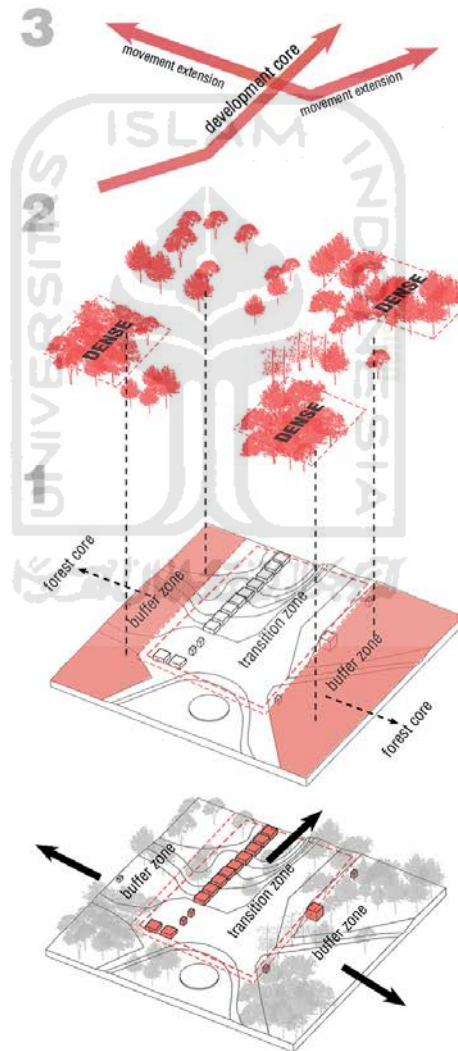
- Bad circulation/connection between the zones.
- Unsustainable building construction and materiality in responding the site context.
- Bad management of water-water.

- Awakening environmental behaviour and environmental knowledge in society.
- Local residents great support (social and economy).
- Edu-eco tourism feedback to support reforestation by visitor/community participation in related events.
- Tourism profit to support forest preservation development and facilities maintenance.

- Congestion in one access point.
- Vulnerable collapsed trees.
- Avalanche possibility in some areas.
- Wildlife potencies from physical activities.
- Loss of biodiversity.

## SITE MORPHOLOGY

### READING THE LANDSCAPE PATTERN



### Movement

The definitive boundaries from the trees giving the linear pattern of movement in some directions. This diagram orient the visitors in experiencing the space in each zone in TAHURA Bunder.

### Density

The open land in TAHURA impact to the order of vegetation in some zone. The visual weight in each zone is slightly different each others. The diagram besides visualization how the visual weight of vegetation in existing site can be classified into dense area and zone.

### Sequences

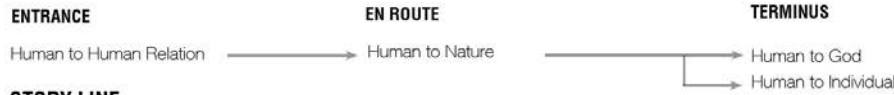
Based on the built features and infrastructure in TAHURA, the forest may be classified into 3 zones such as ZONE I as transition zone, ZONE II as buffer zone, and ZONE III as the forest core.

## PROJECT PROPOSAL

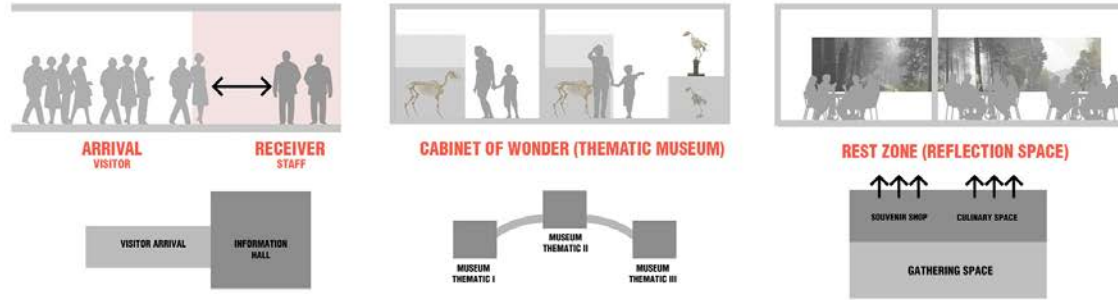
Reviewing the existing buildings in TAHURA Bunder, adjustments are needed to optimize the needs of Edu-eco forest. The old building has a massive construction that does not pay attention to the principle of conservation in the forest, namely minimizing the impact on the site. Considering the need for learning and recreation based on Edu-eco forest, utilization of land can be expanded to build supported facilities that maximize the visitor experience exploring the forest but still pay attention to the environmental context of Bunder as a conservation forest.

- Buildings will be demolished
- Trees density
- Development extension

## EXPLORATION PHASE CABOT THEORY (1958) VS. JAVANESE LIFE PHILOSOPHY



### STORY LINE INTRODUCTION



#### Information Space

The information space allow the visitor to creates the expectation regarding a potential visit. Such as what they can discover in the visitor center itself nor outside the building. As the welcoming space this is the meeting point between the staff and the visitor before directing the visitor to enjoy the site visit.

#### Cabinets of Wonder

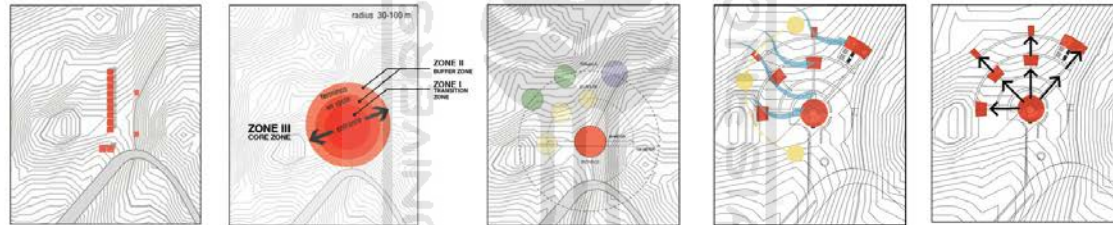
The space is to exhibit the collection of curiosities and rarities that manifest in Bunder Forest. In giving the education about the Bunder environment, cabinets of wonder maximizing the visitor abilities to have the special capture of Bunder Forest and specimen in nature that cannot observed directly in forest exploration.

#### Reflection Space

The space provides the opportunities to remembering/recall the experiences towards nature after exploring Bunder Forest. The space may provides the wider extense to collect the groups to sharing the experience or take a break with breathable view and ambience.

## ALLOCATION SETTING

### VISITOR CENTER OF BUNDER NATIONAL RESERVE



#### EXISTING ZONE

The existing facilities are place in the linear direction and have centralized organisation. Considered not adhered the conservation and less degradation to the environment, the mass will be demolished and change by the new supporting facilities for edu-eco forest.

#### DEFINING ZONE

The facilities for edu-eco forest placed in transition zone and end up in buffer zone. Start from the entrance as the gate in ZONE I, the visitors continued the exploration to en route to meet the terminus as a reflection space to rest and recalling the memory.

#### SPATIAL ORGANISATION

Each phase of spatial organisation are arranged by the needs to accommodate the visitor experience of forest-learning. By de-centralized system that already defined based on potential visit and zone, the arrangement are considered having more less impact rather than the previous building.

#### MASS ORIENTATION

The mass are distribute in some areas by directing to the primary building in the center. Each building maximizing the access of natural air and lighting by circumference is opening. While the radial circulation give preferences by affordable distance.

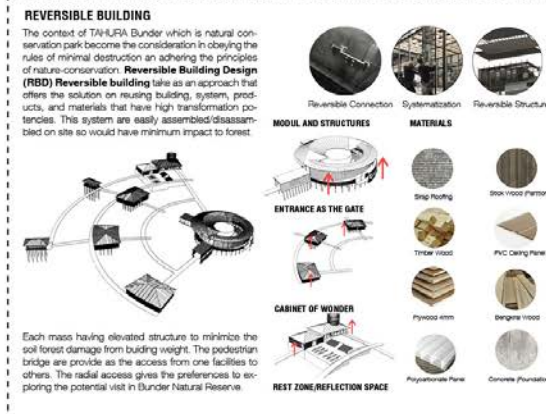
#### SITE PLANNING

**INFORMATION AREA AS THE GATE**  
Introduction/overview of forest potential visit.

**CABINET OF WONDER (TRANSITORY)**  
Different thematic museums are linked by elevated-hub in 50m radial interval.

**REST ZONE AS REFLECTION SPACE**  
The final point possible the visitor to recalling the memories after the exploration.

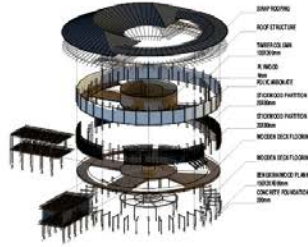
## ENVIRONMENTAL DESIGN STRATEGIES



## STRUCTURE - REVERSIBLE BUILDING

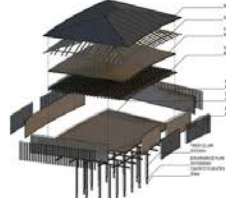
### STRUCTURAL SCHEME

ENTRANCE



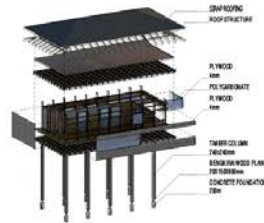
### STRUCTURAL SCHEME

CABINETS OF WONDER (TERMINUS)



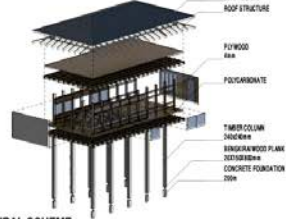
### STRUCTURAL SCHEME

RESEARCH ROOM AND DORMITORY



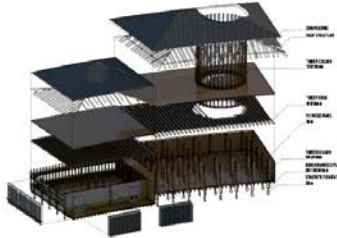
### STRUCTURAL SCHEME

WORKSHOP ROOM

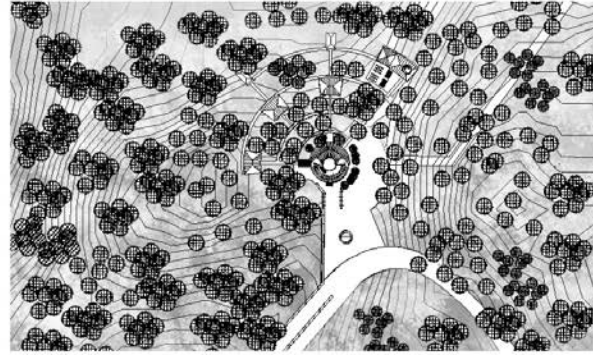


### STRUCTURAL SCHEME

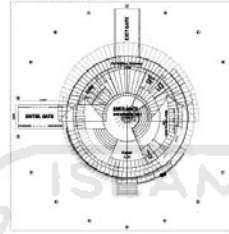
SOUVENIR SHOP AND CULINARY SPACE



## SITE PLAN



### ENTRANCE



### EN ROUTE

FALUNA MUSEUM



BOTANY MUSEUM



GEOLOGY MUSEUM

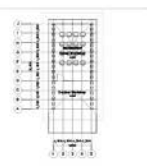


### TERMINUS

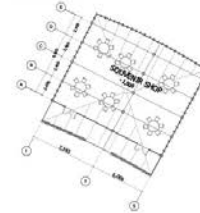
RESEARCH AND DORM



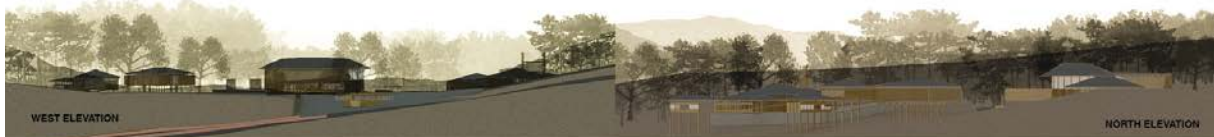
WORKSHOP



SOUVENIR SHOP



CULINARY SPACE



WEST ELEVATION

NORTH ELEVATION



EAST ELEVATION

SOUTH ELEVATION



SITUATION VIEW



ENTRANCE



MICROTEACHING AND PERFORMANCE HALL



PEDESTRIAN BRIDGE



FAUNA STATION (RUSA TIMOR/JAVAN RUSA)



CABINET OF WONDER (FAUNA MUSEUM)



CABINET OF WONDER (FLORA MUSEUM)



CABINET OF WONDER (GEOLOGY MUSEUM)



SITUATION VIEW



RESEARCH AND DORMITORY EXTERIOR



RESEARCH AND DORMITORY INTERIOR



WORKSHOP ROOM



CULINARY SPACE INTERIOR



SOUVENIR SHOP AND CULINARY SPACE

REST ZONE/REFLECTION SPACE



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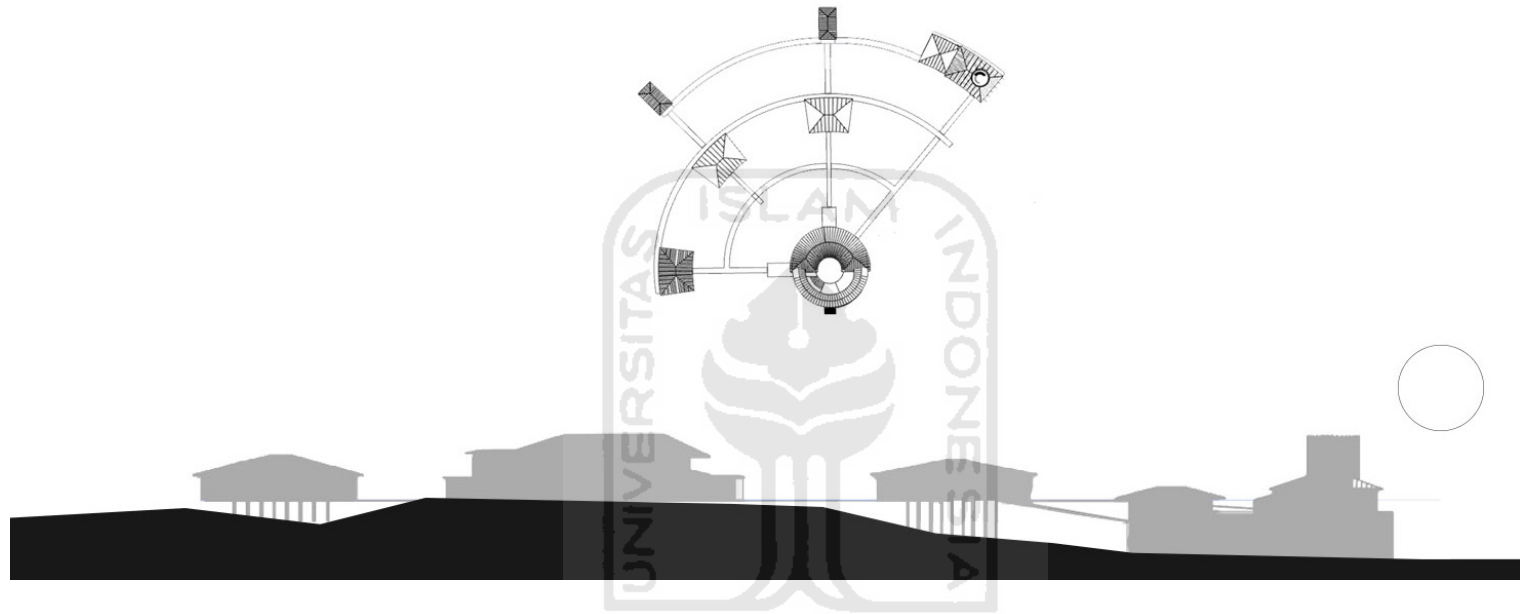
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## Eco-Edu Forest Visitor Center in Bunder National Reserve, Playen, Gunungkidul by Environmental Design Approach



Tens of millions of Indonesians depend directly on forests for their livelihoods. Indonesia as a country that is blessed with the largest tropical forest in the world plus a variety of biodiversity have the forest area reaches 94.1 million hectares or 50.1 percent of the total land area in Indonesia. Meanwhile forest conversion poses a serious threat to the forests' ability to carry out their ecological functions. With the increasing demand for urban infrastructure and commercial purposes, the effects of unsustainable forest utilization can be seen such as decreased filtration rate, decreased biodiversity, until the changes of global carbon balance because of the decreased forest contribution to reduce gas emissions. By considering the nature-conservation, restoration and sustainable utilization will overcome the climate change crisis and threaten the loss of biodiversity. Meanwhile, the acts can simultaneously produce the environmental goods and services needed for sustainable development.