



Final Architectural Design Studio

Design of

Salatiga Creative Hub

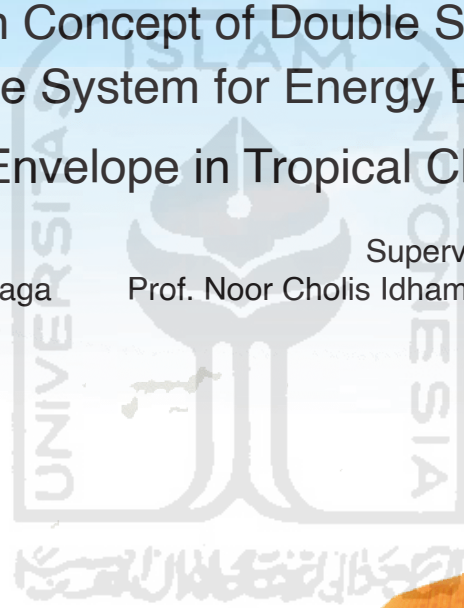
with Integration Concept of Double Skin Facade
and Passive System for Energy Efficient
Building Envelope in Tropical Climate

by:

Bryan Putra Parsada Sinaga
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Supervisor:

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SALATIGA CREATIVE HUB

FINAL ARCHITECTURAL DESIGN STUDIO

DESIGN OF SALATIGA CREATIVE HUB WITH INTEGRATION CONCEPT OF DOUBLE SKIN FACADE AND PASSIVE SYSTEM FOR ENERGY EFFICIENT BUILDING ENVELOPE IN TROPICAL CLIMATE



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DEPARTMENT OF ARCHITECTURE
FACULTY OF CIVIL ENGINEERING AND PLANNING
UNIVERSITAS ISLAM INDONESIA
2021

STUDIO AKHIR DESAIN ARSITEKTUR

PERANCANGAN SALATIGA CREATIVE HUB DENGAN KONSEP INTEGRASI DARI FASAD GANDA DAN SISTEM PASIF UNTUK SELUBUNG BANGUNAN YANG EFISIEN ENERGI DI IKLIM TROPIS



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2021**



PAGE OF APPROVAL

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**Design of Salatiga Creative Hub
with Integration Concept of Double Skin Facade and Passive System
for Energy Efficient Building Envelope in Tropical Climate**

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FOREWORD

Assalamu'alaikum Warahmatullahi Wabarakaatuh

Praise and gratitude I pray to Allah SWT because with the abundance of His grace, I was able to complete a Final Architectural Design Studio with title “ Design of Salatiga Creative Hub with Integration Concept of Double Skin Facade and Passive System for Energy Efficient Building Envelope in Tropical Climate”. This Final Architectural Design Studio was prepared and submitted as a condition for obtaining a Bachelor of Architecture (S.Ars) degree at the Faculty of Civil Engineering and Planning at the Universitas Islam Indonesia. In addition, the writing of this Final Architectural Design Studio is intended to provide knowledge to readers about Double Skin Façade and Passive System.

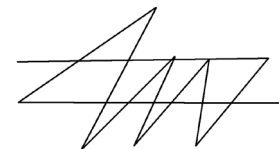
This Final Architectural Design Studio was completed through many difficulties, the completion of the Final Architectural Design Studio cannot be separated from the guidance, motivation, and material and non-material assistance from various parties. Therefore, I do not forget to say thank you to:

1. Allah SWT, who has given smoothness and health in the work of the Final Architectural Design Studio.
2. My Beloved family for the prayer, moral support and for the blessing that has been given to me.
3. Prof. Noor Cholis Idham, ST., M. Arch., Ph. D. as the supervisor for the Final Architectural Design Studio who has provided opportunities, helped and guided patiently so that Final Architectural Design Studio could be completed.
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5. My fellow BAHAMUT friends at UII Architecture, Muhammad Kemal Adro, Haidarullah Dhia Mu Afa, Abi Dzar Ghifari, and Fernan Cagucay Santoso as well, who always encourage each other in completing Final Architectural Design Studio.
6. My friends, who always give me enthusiasm in doing my Final Architectural Design Studio.
8. All my friends in Architecture 2017.
9. All parties who have helped me without being able to write one by one.

I realize that this Final Architectural Design Studio is still far from perfect and there are many shortcomings due to various limitations. For this reason, I will accept constructive criticism and suggestions afterwards. I hope that Final Architectural Design Studio can be useful for all those who read it. May Allah SWT always give mercy and guidance to all of us, Amin.

Wassalamu'alaikum Warahmatullahi Wabarakaatuh.

Yogyakarta, July 27th 2021



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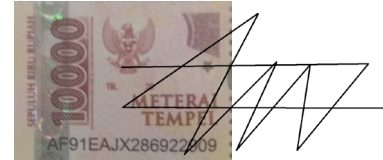
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Demikian Surat Keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

Wassalamualaikum Wr. Wb.

Yogyakarta, 9 Juli 2021

Direktur



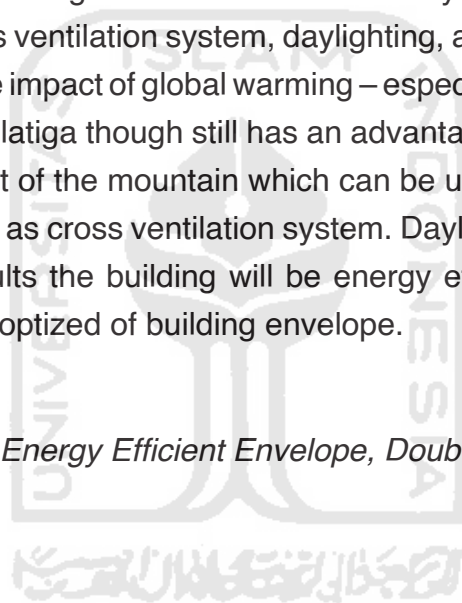
Joko S. Prianto, SIP., M.Hum

ABSTRACT

Salatiga is a small city with many young adult and college student having problems in finding work in the city. Due to the small area, not many office or big company having branch there, making it hard for young adults to work in their hometown. Creative Hub is a solution in which providing working environment for people to either work remotely, having rentable space for companies to rent, or as a space to promote people's art through exhibitions. The many usage of Creative Hub is needed but the availability of the function should be adapting user's need. If there is an event then the building should be able to hold it but if it is just a normal day then the space should be adapted to co-working space for example. The adaptability of building space to accommodate different functions is essential to have high-performing Creative Hub.

The integral part of building which cause many old building needs to use Air Conditioning System and Artificial Lighting during daytime is non-optimized building envelope design. Double Skin Façade System is one of the form of designing building envelope to enhance passive system such as cross ventilation system, daylighting, and such to be optimized in energy efficiency. Energy efficiency is one of the solution to reduce the impact of global warming – especially in reducing the usage of Air Conditioning System and wasteful daytime Artificial Lighting. Salatiga though still has an advantage in located in slope of mountain is that the natural wind current is quite strong from upper part of the mountain which can be used to cool of building temperature naturally with good ventilation system – which usually called as cross ventilation system. Daylighting can also be implemented additionally to even further improve energy efficiency. In results the building will be energy efficient or atleast energy saving in terms of electricity usage of cooling and lighting due to the optimized of building envelope.

Keyword: *High-Performance, Space Adaptability, Energy Efficient Envelope, Double Skin Façade, Passive System Integration*



ABSTRAK

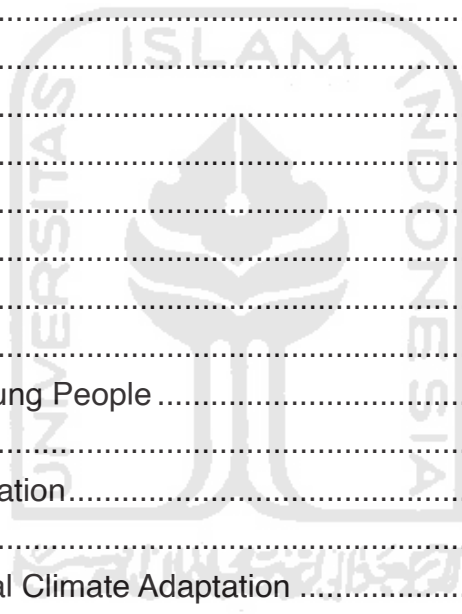
Salatiga merupakan kota kecil dengan banyak anak muda dan mahasiswa yang kesulitan mencari pekerjaan di kota tersebut. Karena wilayahnya yang kecil, tidak banyak kantor atau perusahaan besar yang memiliki cabang di sana, sehingga sulit bagi kaum muda untuk bekerja di kota asalnya. Creative Hub adalah solusi yang menyediakan lingkungan kerja bagi orang-orang untuk bekerja dari jarak jauh, memiliki ruang yang dapat disewa untuk disewa perusahaan, atau sebagai ruang untuk mempromosikan karya seni masyarakat melalui pameran. Banyaknya penggunaan Creative Hub diperlukan tetapi ketersediaan fungsi harus menyesuaikan dengan kebutuhan pengguna. Jika ada acara maka gedung harus bisa menyelenggarakan tetapi jika hanya hari biasa maka ruangnya harus disesuaikan dengan co-working space misalnya. Kemampuan beradaptasi ruang bangunan untuk mengakomodasi fungsi yang berbeda sangat penting untuk memiliki Creative Hub yang berkinerja tinggi.

Bagian penting dari bangunan yang menyebabkan banyak bangunan tua perlu menggunakan Sistem Pendingin Udara seperti Air Conditioner (AC) dan Pencahayaan Buatan seperti lampu pada siang hari adalah desain selubung bangunan yang tidak optimal. Double Skin Facade System merupakan salah satu bentuk perancangan selubung bangunan untuk meningkatkan sistem pasif seperti sistem ventilasi silang, pencahayaan alami, dan sebagainya agar dapat dioptimalkan efisiensinya. Efisiensi energi merupakan salah satu solusi untuk mengurangi dampak pemanasan global – terutama dalam mengurangi penggunaan Air Conditioning System dan lampu di siang hari. Salatiga memiliki keunggulan yaitu terletak di lereng gunung adalah bahwa arus angin alami cukup kuat dari bagian atas gunung yang dapat digunakan untuk mendinginkan suhu bangunan secara alami dengan sistem ventilasi yang baik – yang biasa disebut sistem ventilasi silang. Pencahayaan alami pada siang hari juga dapat diterapkan sebagai tambahan untuk lebih meningkatkan efisiensi energi. Hasilnya gedung akan hemat energi dalam hal penggunaan listrik pendingin dan penerangan karena selubung gedung yang dioptimalkan.

Kata Kunci: Kinerja Tinggi, Kemampuan Beradaptasi Ruang, Amplop Hemat Energi, Facade Kulit Ganda, Integrasi Sistem Pasif

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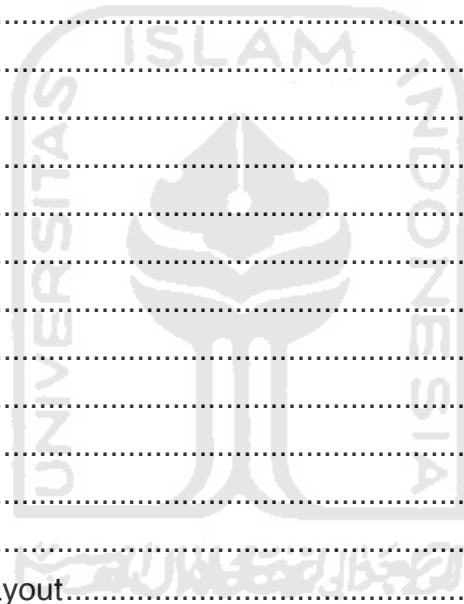


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Chapter 1 Introduction

Description

Introduction chapter contains an overview of the whole paper. From background to issues and how to solve them with architectural design.

Contents

- 1.1 Title Clarity
- 1.2 Design Premise
- 1.3 Background
- 1.4 Problem Formulation
- 1.5 Problematique
- 1.6 Design Method
- 1.7 Thought Process
- 1.8 Originality

1.1 TITLE CLARITY

1.1.1 Title :

Design of Salatiga Creative Hub with Integration Concept of Double Skin Facade and Passive System for Energy Efficient Building Envelope in Tropical Climate

1.1.2 Emphasis :

Creative Hub is a result of working cultures nowadays tends to have many collaboration while sometimes also showcasing products there. Open Design approach is implemented to make sure the functions of the Creative Hub are suitable with the needs and interests of the users. The right adjustment of function and the space in specific times can boost building performance in terms of building usage. While Integration Concept of Double Skin Facade and Passive System is implemented for the building to be comfort in natural way and reducing operational cost of the building. Hence, the Creative Hub will maximize space usage within the building and minimize operational cost but still providing comfortable and suitable working space for the users. With this setting, the users are expected to have more productive working capabilities in the Creative Hub.

1.1.3 Definition :

• Creative Hub

A Creative Hub is a real or virtual location that brings together creative individuals. It serves as a convenor, offering a venue and resources for networking, business growth, and community participation in the creative, cultural, and technological sectors. (Peschl, 2007)

• Integration

The technique of bringing different parts together is known as integration..

• Double Skin Façade

A building structure with two skins, or facades, that are positioned in such a way that air flows through them is known as a double-skin façade. (Leslie, 2015)

• Passive System

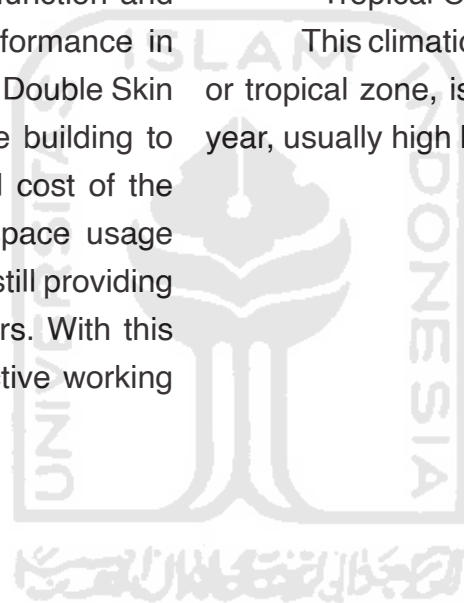
Without the need of electricity or other non-renewable energy sources, passive systems are integrated into a structure to conduct heat transmission and storage. (Agrawal, 1992)

• Energy Efficient Building Envelope

Throughout the year, an energy-efficient building envelope saves money on heating and cooling. This can be done by the use of energy-efficient equipment or the inclusion of extra energy-saving controls. (Trubiano, 2004)

• Tropical Climate

This climatic zone, which is generally found in the equatorial or tropical zone, is defined by high temperatures throughout the year, usually high humidity, and high precipitation. (Dunlop, 2008)



1.2 DESIGN PREMISE

Salatiga also known as pension city due to many retired people from 90's bought home for retirement there. Nowadays, Salatiga has grown to diverse populated city with many young people, can be grandchildren of the retired people or newcomer who came to study in highschool or university here. Sadly, freshgraduate tends to work outside of the city rather than staying in Salatiga, due to the chance of working for bigger corporation is small due to little to none of their branch office in the city. "Salatiga Creative Hub Integration Concept of Double Skin Facade and Passive System for Energy Efficient Building Envelope in Tropical Climate" basically is a public facility with functions such to enable them to work in Salatiga. The approach of Energy Efficient Building Envelope is to make sure the users are comfortable inside of the Creative Hub, with relying mostly in natural windflow and daylighting. This natural atmosphere will hopefully uplift the mood of the users to be more productive on their work.



1.3 BACKGROUND

1.3.1 Creative Hub as Place to Facilitate Young People

Salatiga also known as pension city due to many old people from 90's bought home for retirement there. The problems arise due to young people have less chance to work in their own hometown. Creative Hub is the perfect solution that fit the needs of the people due to various function it can have such as Co-Working Space, Collaborative Space, Workshops, Meeting Rooms, Exhibition, etc.can facilitate the young people have oppurtunities to channel their passion and reach their dream in their hometown.

Table 1.1 Data of Probable User

(source: <https://salatigakota.bps.go.id/site/pilihdata.html>)

Wilayah Kecamatan	Tenaga Kerja Industri Kecil (Jiwa)
	2019
Argomulyo	6 865
Tingkir	3 216
Sidomukti	3 329
Sidorejo	1 237
Salatiga	14 647

It can be seen potential users from creative industry workers are much spread across the city's districts. Most of them resides on sub-urban district, but can be centered in Sidorejo due to it being most accessible from other district.

Research done in 2017 identify most of the creative workers are self-employed or selfmade. (Woro, 2017) This means that they most likely still work at home to fulfill their needs. With right function and tools, it is better to work at rentable functional workshop that the Creative Hub can provide. Innovation and collaboration are also the characteristic of creative worker. Creative Hub can be the space for collaboration between them in Salatiga.

1.3.2 Building Typology and Ownership

Due to the rising of creative workers, building typology should be commercial. But without clear revenue stream to interest investor, the building should be owned by community of creative workers and the revenue from the building should be used to maintain and enhanced the building itself.

13.3 Potential of Salatiga's Geographic Location

The average all-day temperature in Salatiga is between 22,40-24,10 C. According to SNI 03-6572-2001, the range of cool-comfortable is between 20.50-22.80 C, while the range of optimum comfort is between 22.80-25.80 C. Thus, it is possible for buildings in Salatiga to not rely on Air-Conditioning system which worsen global warming effects. (Sinaga, n.d.)

But, if cold nights temperature data are taken away from the equation to get the day-only temperature data, it's not close to being comfortable. On hot days, the average temperature is 290-330 C, while the average overall day-only temperature is 260-310 C. This means that temperature at daytime is still not comfortable and the ones that should be taken into the calculation.

The key to achieve comfort without air conditioner is cross-ventilation system. Cross-ventilation is a system which drives air from openings at one side of a building through to the other. It's success depends on the tightness of the building envelope – the physical separator between the interior and the exterior elements of a structure.

Cross-ventilation can be applied in buildings, but it has some shortfall such as lack of diversity in designing building envelope, the opening, and the deficiency of the system if there were to put interior inbetween the openings. Deriving from this system however is to maximize the airflow itself. Airflow is the movement of air, with the knowledge of airflow movement pattern in set conditions, it is possible to achieve good airflow without having 2 parallel openings.

1.3.4 Lack of Efficient Building Envelope

It is typical for the building envelope to fail to achieve the declared performance requirements due to improperly specified materials. This might be due to mistakes made during the production, handling, or storage of the product or its components. Which they come into touch with or have insufficient thermal movement, structural capacity, or water penetration resistance performance standards. Subcontractors attempting to decrease the weight, size, or quantity of building envelope components (aluminum, glass, sealants, flashing, etc.) required on a project can potentially cause problems. As a result, the materials selected may not function or have the potential to meet the requirements. (How and Why Building Envelopes Fail, from a Building Forensics Expert | Building Design + Construction, n.d.)

This problem is no exception in Salatiga as the day is quite hot and the night is too cold, meaning there is some air leaking in the envelope, unsuitable material, etc.

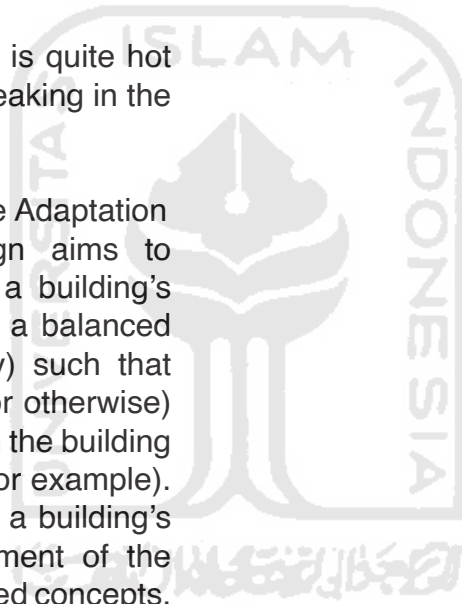
1.3.5 Double Skin Façade System in Tropical Climate Adaptation

In general, energy-free architectural design aims to achieve the following ecological goal: maintaining a building's thermal, ventilation, and lighting environment within a balanced comfort range (both qualitatively and quantitatively) such that significantly less additional energy (non-renewable or otherwise) is required, regardless of the external forces acting on the building (temperature, humidity, wind, rain, or sun radiation, for example). Those contributing to the correct selection of a site, a building's location and orientation, and the internal arrangement of the building's program rooms are among its most often used concepts. (Trubiano, 2004)

Double skin façade in tropical climate tends to be the outer layer to decrease the building room's gain of the direct solar heat, however the trapped heat in the intermediate space between layers can help in reducing the hot weather away from the inner layer of the building.

1.3.6 Background Conclusion

With using air captivity between the double skin to act as an active cooling mechanism to reduce heat from direct sunlight. As addition to prevent heat, fresh air intake should still be able to cross ventilate through the building, thus some alternation from closed double skin façade like in Europe may be needed. Some openings which won't cause air leak in the night or can be closed for optimal usage can be implemented. The materials of the skin can also be alternate with local materials instead of glass. Shading devices could also be integrated to the envelope to optimize daylighting performance.



1.4 PROBLEM FORMULATION

1.4.1 General Problem

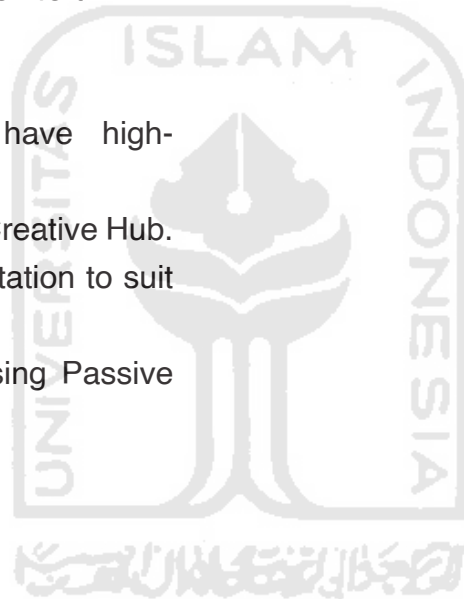
- a. How to solve user-end function to have high-performing building with Open Design Approach?
- b. How to improve adaptability of space usage with Open Floor Design Approach?

1.4.2 Specific Problem

1. How to apply Double Skin Façade in Tropical Climate at mountain slope region?
2. How to integrate Passive System to Double Skin Façade at Building Envelope to have indoor health comfort?

1.4.3 Goals

1. Having user-oriented functions to have high-performing Creative Hub.
2. Having adaptability of space usage of Creative Hub.
3. Having Double Skin Façade with adaptation to suit the mountain region in Tropical Climate.
4. Achieve indoor health comfort with using Passive System and Double Skin Façade System integration.



1.5 PROBLEMATIQUE

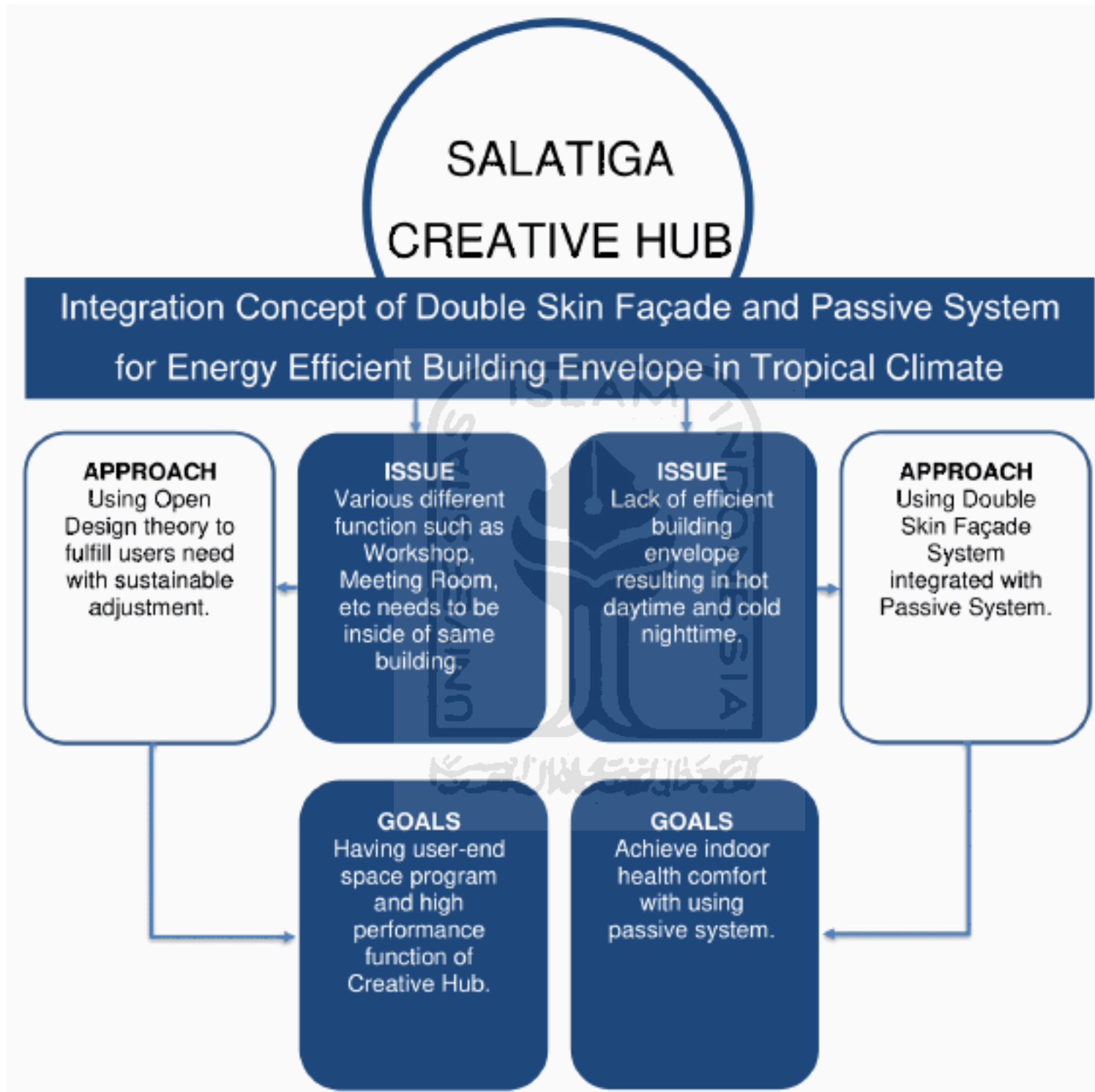


Figure 1.1 Problematique Chart

(source: Author, 2021)

1.6 DESIGN METHOD

To solve issues that have stated, the flow of this design phases includes:

1. Design Study Phase

The design study problem phase is carried out by collecting data and facts in accordance with the context of the design issue. Such data can be in the form of factual data in the field, precedent studies and architectural studies theory related to Creative Hub, Open Design Theory, Open Floor Approach and Double Skin Façade.

2. Design Variable Analysis Phase

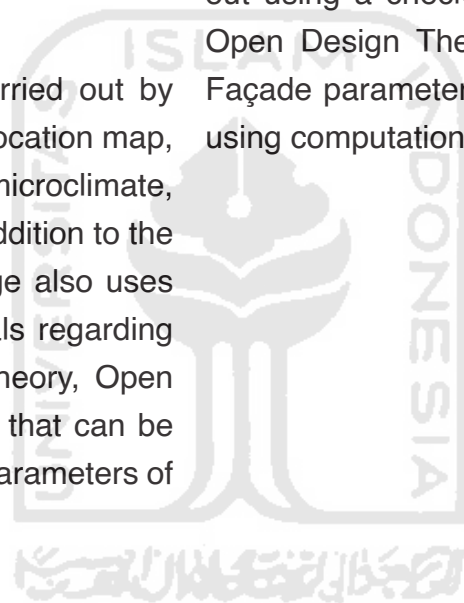
The design problem variable analysis phase is carried out by making a study of the location context including the location map, location area, documentation around the location, microclimate, accessibility and conditions around the location. In addition to the location context that uses primary data, at this stage also uses secondary data through literature books and journals regarding libraries in general, Creative Hub, Open Design Theory, Open Floor Approach and Double Skin Façade. The data that can be used as a reference in designing this library are the parameters of the concept and the study of libraries in general.

3. Design Concept Phase.

The design concept phase is the problem solving by producing a concept alternatives that will be made in accordance with the design study and analysis of the variables, these things will be processed to become a Creative Hub design with Double Skin Façade.

4. Design Synthesis Phase

The design synthesis phase is where the concept that has been made and is mature will become a complete design from the initial phase to the concept phase after which it can be tested at the design test phase. The design test phase is carried out to test the suitability of the design with the quality that must be achieved based on predetermined variables, especially Creative Hub, Open Design Theory, Open Floor Approach and Double Skin Façade and to test the extent to which the design of the design problem is in accordance with the design approach. Design testing is carried out using a checklist according to the criteria of Creative Hub, Open Design Theory, Open Floor Approach and Double Skin Façade parameters. In addition, the checklist will also be tested using computational methods to measure design performance.



1.7 THOUGHT PROCESS

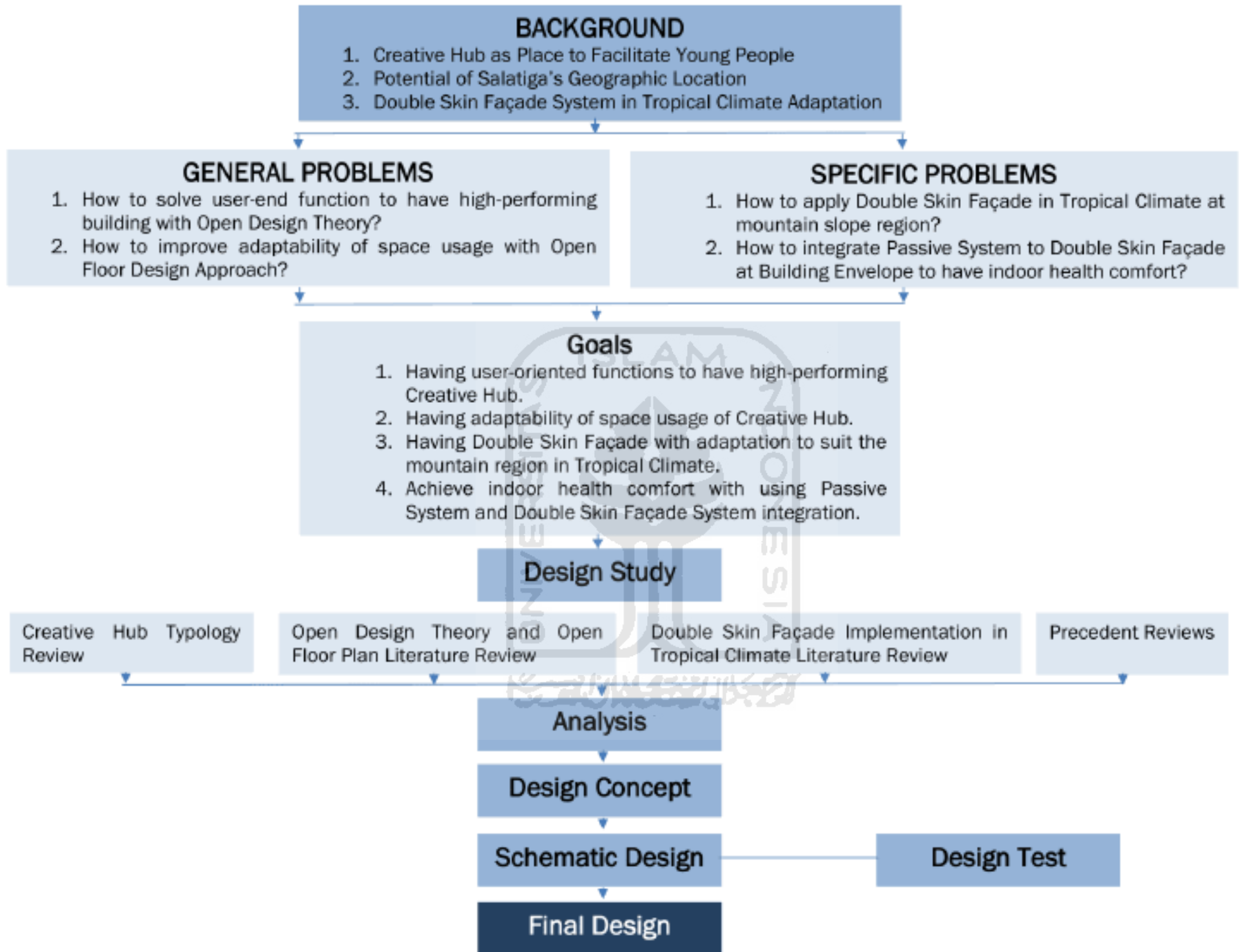


Figure 1.2 Thought Process Chart

(source: Author, 2021)

1.8 ORIGINALITY

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

A.

Title : Perancangan Pusat Kreatif Sleman di Yogyakarta dengan Pendekatan Arsitektur Biofilik
 Authors : Junian Achmad Mahendra, 16512016
 Location : Yogyakarta
 Approach : Biofilik
 Institution : Universitas Islam Indonesia
 Problem : Lack of creativity space designed specifically for creativity purpose.
 Similarity : Intend on designing creative space creatively.
 Differences : Different approach, with this project having energy efficient envelope approach.

B.

Title : Perancangan Apartemen Mahasiswi di Babarsari Yogyakarta dengan Konsep Efisiensi Energi
 Authors : Firda Faizal Bashir, 12512104
 Location : Yogyakarta
 Approach : Energy Efficiency
 Institution : Universitas Islam Indonesia
 Problem : Temperature in urban area rose 6.86°C from 24.80°C to 31.66 ° C. Energy in buildings is the greatest.
 Similarity : Energy efficiency approach in reducing building's contribution in urban temperature rose.
 Differences : Different use of skin system, with this project double skin façade system is use.

C.

Title : Perancangan Simpul Kreatif Notoprajan, Yogyakarta "Dengan Pendekatan Fleksibilitas Ruang dan Penerapan M3K (Mundur, Munggah, Madhep Kali)
 Authors : Sakinah Ishmah Ismail, 15512163
 Location : Yogyakarta
 Approach : Flexibility Design
 Institution : Universitas Islam Indonesia
 Problem : Creative Hub as active variable to increase the economic value of Notorajan creative industry players
 Similarity : Designing creative hub to enable people to work in their home city.
 Differences : Different approach, with this project open design is used to make sure it is user-end.

Chapter 2 Design Study

Description

Design Study chapter contains contextual review, literature reviews of approaches, and precedent reviews. The study the used in design concept in latter part of the paper, while the variables learnt can be used to measure design performance during design test.

Contents

- 2.1 Contextual Reviews
- 2.2 Literature Reviews
- 2.3 Precedent Reviews
- 2.4 Building Codes

2.1 CONTEXTUAL REVIEWS

2.1.1 Location Context :

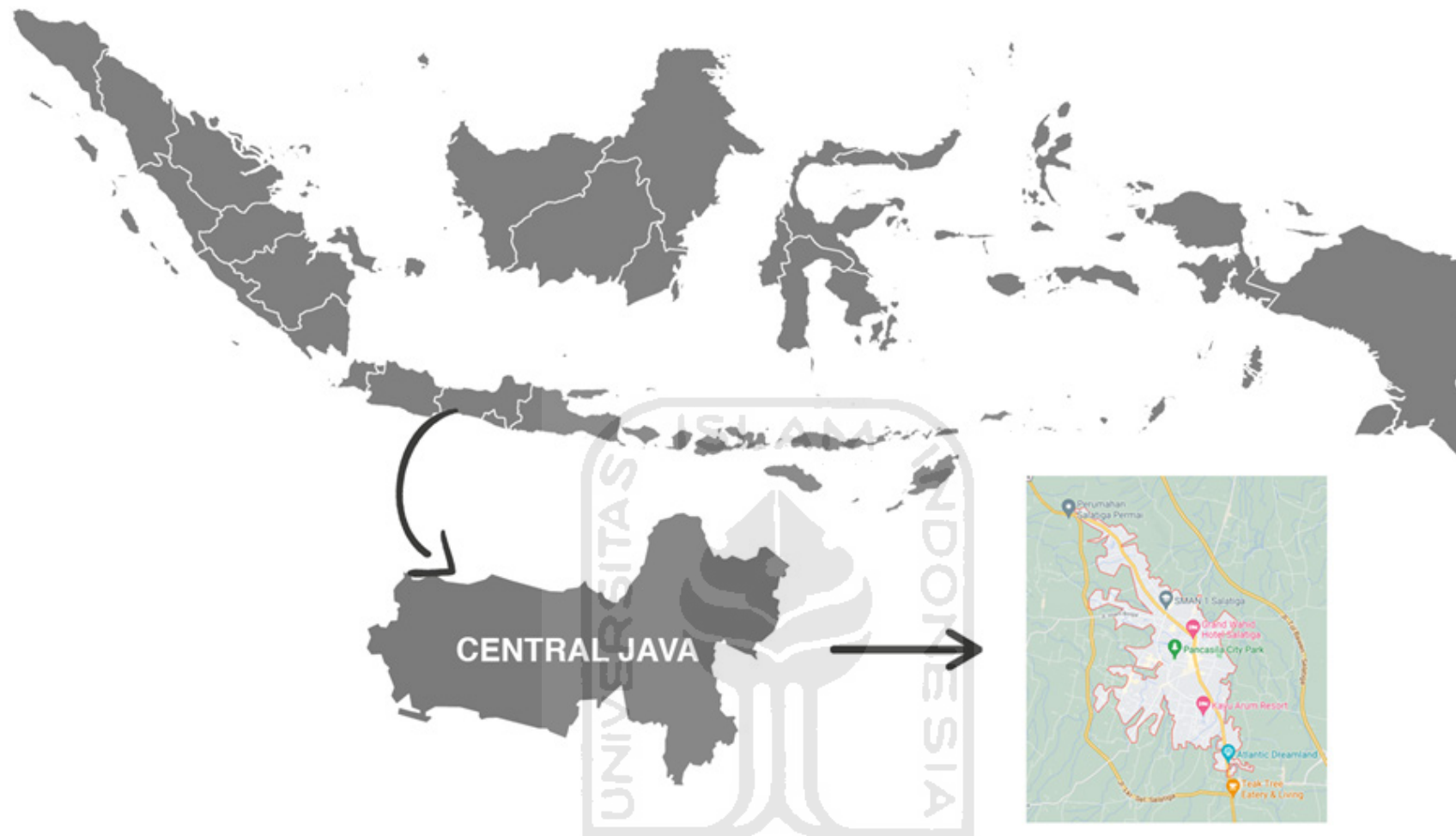


Figure 2.1 Location
(source: Author, 2021)

Salatiga is a city in the Indonesian province of Central Java. According to the 2010 census, it has a population of 171,327 people; the most current official estimate (as of mid-2019) is 194,084. It is an administratively autonomous city enclaved inside Semarang Regency, located at the foot of Mount Merbabu (3,142 m) and Mount Telomoyo, between the towns of Semarang and Surakarta.

Salatiga is located in Indonesia, 48 kilometers south of Semarang and 54 kilometers north of Surakarta. Its altitude varies between 450 and 800 meters. According to the Köppen climatic classification, Salatiga has a tropical monsoon climate (Am), with an average annual rainfall of 2,668 mm and temperatures ranging from 24.1 °C in October to 22.4 °C in January.

2.1.2 Site Study

2.1.2.1 Site Alternative 1

Location : Jl. Patimura No.10, Salatiga, Kec. Sidorejo, Kota Salatiga, Jawa Tengah

Site Area : +- 5000m²

Reasons :

- Located at the center of the city which means in walking distance from other big public buildings such as market, mall, government instances, etc.

- Located strategically near angkutan hub (orange box) and directly located at angkutan route (yellow line) which means the location is accessible from all over the city by using public transport.

- Surrounding buildings are quite low to still have strong wind current.

Existing Condition :

There is already building with function of shops in the site. However, during the pandemic period many of the shops has been closed for extended period of time.

Site Ownership

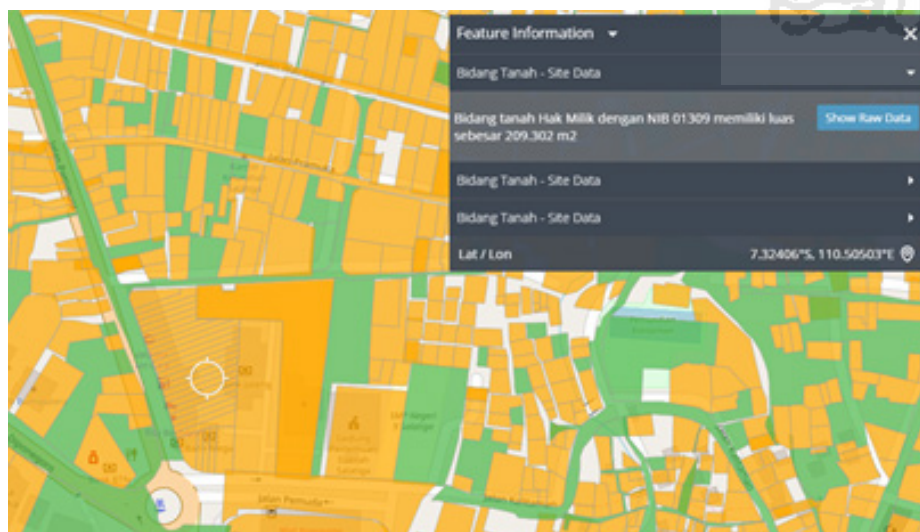


Figure 2.2 Site 1 Ownership (source: Atri, 2021)

Site Access



Figure 2.3 Site 1 Location and Accessibility (source: Author, 2021)

Existing Condition

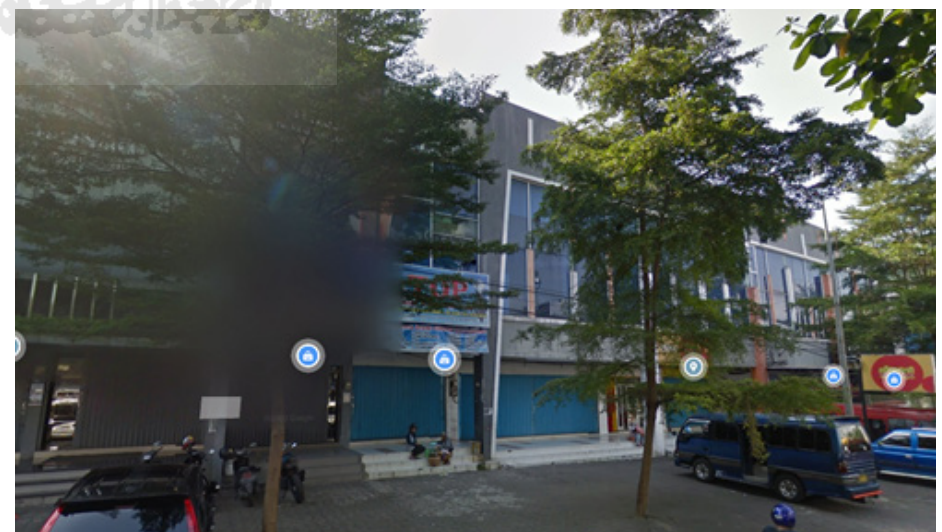


Figure 2.4 Site 1 Existing Condition (source: Google Maps, 2021)

2.1.2.1 Site Alternative 2

Location : Jl. Diponegoro No.38, Salatiga, Kec. Sidorejo, Kota Salatiga, Jawa Tengah

Site Area : +- 3000m²

Reasons :

- Located at the main street connecting the city to the suburb area which is easily accessible.
- Located near major educational buildings, and minor industry district, which make it easier to access with walking.
- Good site orientation for daylighting
- Lower to none surrounding buildings (depend on from which side looked from)
- Big space for site development regarding noise reduction.

Existing Condition :

The site is empty but there is a barrier for cancelled mall project from late 2017.

Site Access



Figure 2.6 Site 2 Location and Accessibility
(source: Author, 2021)

Site Ownership

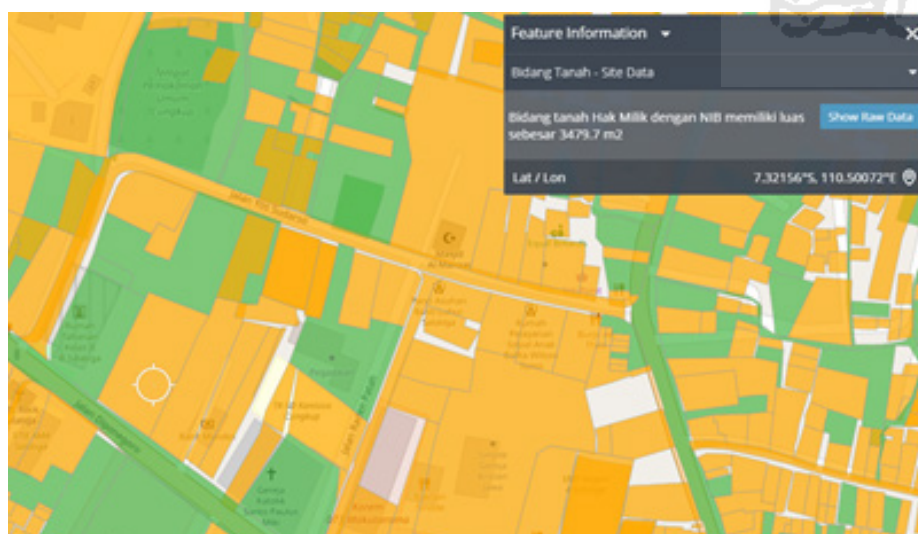


Figure 2.5 Site 2 Ownership
(source: Atri, 2021)

Existing Condition



Figure 2.7 Site 2 Existing Condition
(source: Google Maps, 2021)

2.1.2.3 Chosen Site

Important aspect or variables about the site?

1. Regarding the Location
 - Should be easily accessible (either via walking or public transportation)
 - Located in suburban area for lesser city noise
2. Regarding Creative Hub as Function
 - Need enough space to implement different usage of function (indoors and outdoors)
 - Preferably enough space for site development to reduce noise

3. Regarding Double Skin Façade Implementation

- Orientation of the site should favor daylighting while reducing direct sunlight
- Preferably site with lower surrounding buildings to still have strong wind current

Table 2.1 Chosen Site Alternatives
(source: Author, 2021)

Variables	Alternative Site 1	Alternative Site 2
Accessible	<ul style="list-style-type: none"> - Accessible with Angkutan Umum number 2. - Located near Angkutan Station so accessible from all part of the city. <p>Very Good (2 points)</p>	<ul style="list-style-type: none"> - Accessible with Angkutan Umum number 2. <p>Good (1 point)</p>
Suburban Noise	<ul style="list-style-type: none"> - Quite much due to located in center of the city. <p>Not Good (0 point)</p>	<ul style="list-style-type: none"> - Not so much due to located near education facilities. <p>Good (1 point)</p>
Enough Space Outdoor and Indoor	<ul style="list-style-type: none"> - Little outdoor space and limited inside space due to existing building. <p>Not Good (0 point)</p>	<ul style="list-style-type: none"> - Lots of space to be built into outdoor and indoor space due to being open site. <p>Very Good (2 points)</p>
Site Orientation	<ul style="list-style-type: none"> - North to South with building facing East and West which is direct sunlight. <p>Not Good (0 point)</p>	<ul style="list-style-type: none"> - North to South with flexibility in designing building orientation. <p>Good (1 point)</p>
Surrounding Building Height	<ul style="list-style-type: none"> - Not very heigh or dense so wind current won't be affected much. <p>Good (1 point)</p>	<ul style="list-style-type: none"> - Not very heigh or dense so wind current won't be affected much. <p>Good (1 point)</p>
Total	3 points	6 points (Chosen)

2.1.2.4 Neighbourhood

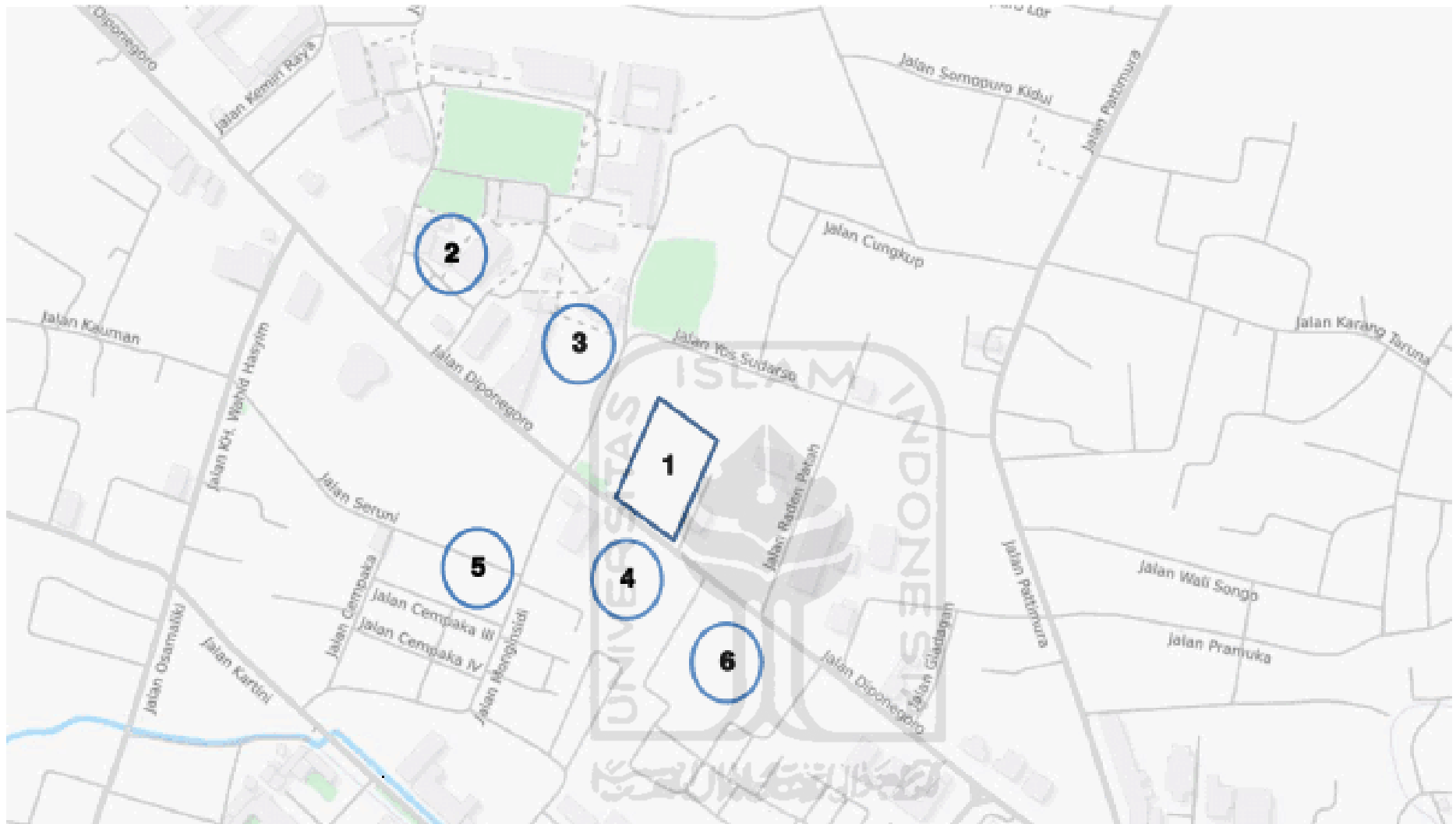


Figure 2.8 Site Neighbourhood
(source: Author, 2021)

Information:

1. Site
2. UKSW
3. Satya Wacana Highschool
4. STIE AMA
5. Shopping District
6. KODIM

There are many surrounding public facilities especially many educational function. It means that the probable users of coworking space such as students will be easier to access the creative hub. This also normalizing the habit of younger people to work or study as collective in the hub, which is better as they will have better tolerance with other people and the creative drive will also be lifted.

2.1.2.5 Site Boundary



Figure 2.9 Site Boundary
(source: Author, 2021)

Site Boundary:

- North East : Open land
- South East : Depo
- South West : STIE AMA
- North West : Local Prison

The surrounding of the site is not very dense in mass and not so crowded either. Open land on north east means wind circulation can breeze through the building easily. Depo on south is probably the only thread of noise that could come to the site if the depo is crowded. STIE AMA on south west is similar on probability of noise coming from it at university entrance and exit hour. Lastly on north west there is a local prison which isn't crowded at all.



Figure 2.10 North East Boundary
(source: Author, 2021)

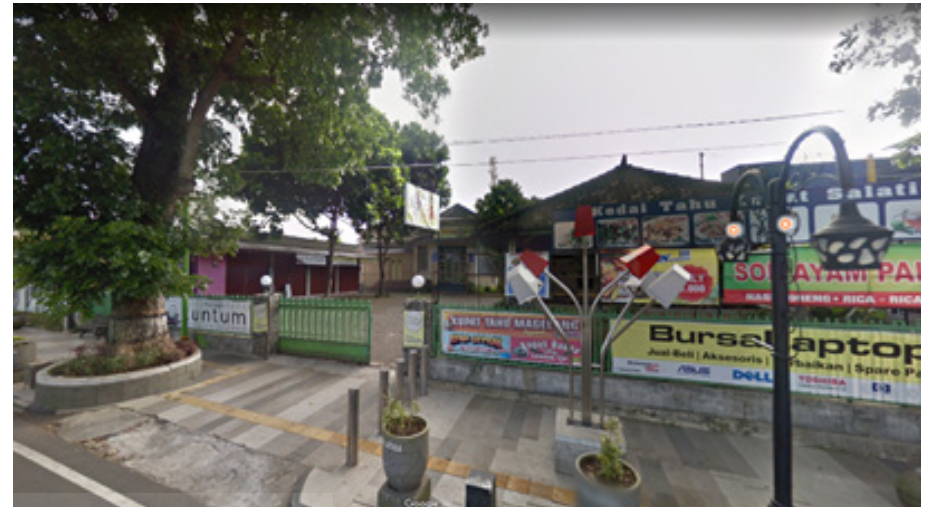


Figure 2.12 North West Boundary
(source: Author, 2021)



Figure 2.11 South East Boundary
(source: Author, 2021)



Figure 2.13 South East Boundary
(source: Author, 2021)

2.1.2.6 Site Accessibility

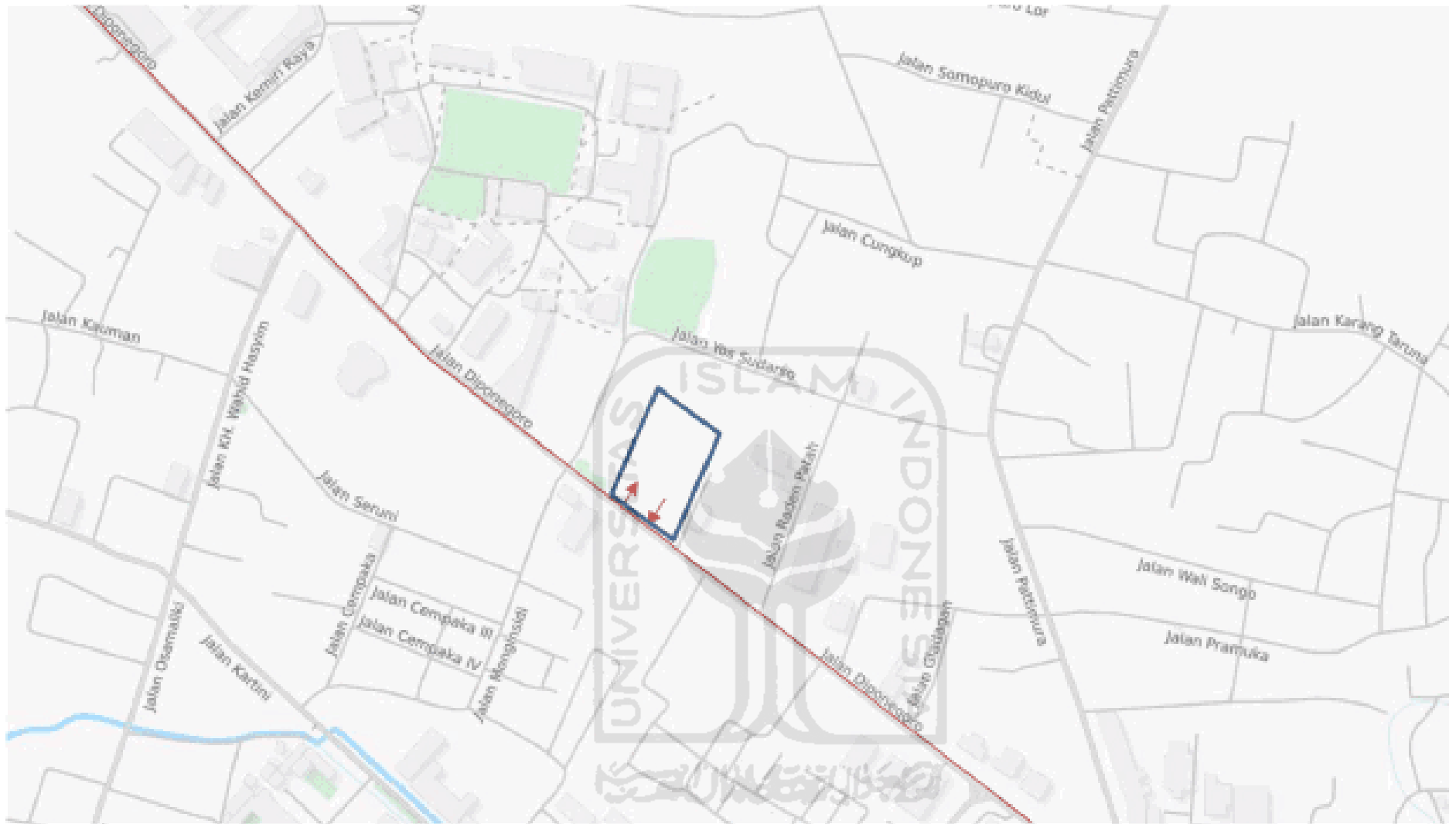


Figure 2.14 Site Accessibility
(source: Author, 2021)

- Red line : Angkutan Kota Number 2 Road
- Red arrow : In and out site circulation

Due to the site being direct from main road, it has dedicated pedestrian walk which means enough space to drop people if they commute using Angkutan Kota. Then, they can enter site directly, or if the user use private transportation they can go in and out the site directly too.

2.1.3 Climatological

2.1.3.1 Cloudy, Sunny, and Precipitation Days

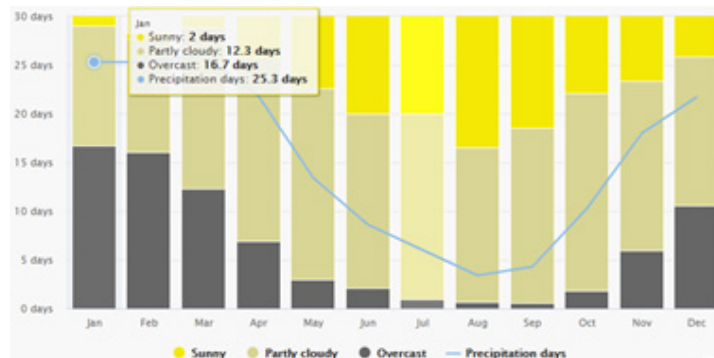


Figure 2.15 Cloudy, Sunny, and Precipitation Days

(source: www.meteoblue.com, 2021)

Over the course of a month, the graph displays the number of sunny, partly cloudy, overcast, and precipitation days. Sunny days are those with less than 20% cloud cover, partly cloudy days are those with 20-80% cloud cover, and overcast days are those with more than 80% cloud cover.

2.1.3.2 Sun Path Diagram

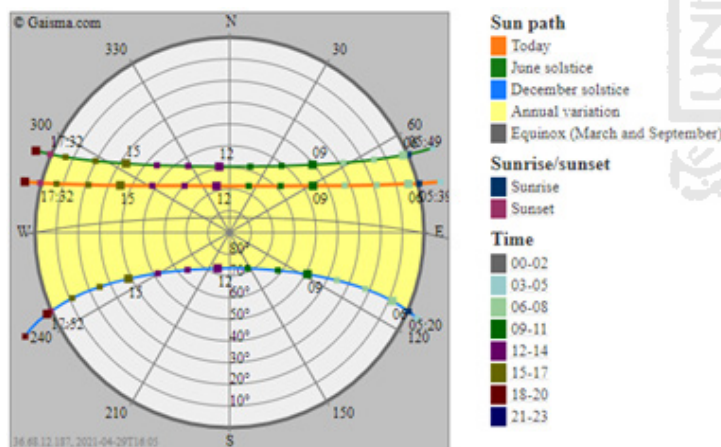


Figure 2.16 Sun Path Diagram

(source: www.gaisma.com, 2021)

The sun is primarily on the north side of the structure, as can be seen in the chart. Building Orientation, Spacing Angles Between Building Mass, Shading Devices, and Ceiling Height will all be affected.

2.1.3.2.1 Building Orientation

In the hot, humid tropics, minimizing environmental burdens is a top issue. Build on a hill's summit or windward side, especially on a north or south facing slope. Site away from sources of air pollution, such as industry and motor traffic, if at all feasible; on impacted areas, use plants to limit exposure.

Individual structures may be longer, having a long axis running east to west. This is due to the ability to regulate overhead sun, which can come from either north or south, using roof overhangs, but the low rising and setting sun is more difficult to prevent. Cross ventilation by prevailing breezes can also be facilitated by 'shallow' building designs.

2.1.3.2.2 Spacing Between Building Mass

Some of the forms that can be formed:

- Linear Forms: A linear form that expresses movement or procession.
- Radial Forms: Radiating linear shapes that radiate outward from a centrally placed core piece.
- Clustered Forms: Visually organized into a cohesive, non-hierarchical arrangement, with visual features that are extremely comparable.
- Grid Forms: Regularly spaced points (where the grid lines connect) and regular spaced fields form a geometric pattern (defined by grid lines)

The angle of sunlight is affected by the building's height. We can count the length of shadow devices if we know the height of the structure. This is likewise true for HSA and the building's width and length.

2.1.3.2.4 Ceiling Heights

The formula $(\text{length} + \text{width}) / 2$ is commonly used to calculate the height of a plafond. A 3x4 meter room, for example, will have a 3.5 meter ceiling. Plafond must be taller than the width of the room, or it will appear to be a corridor. Because it is hot throughout the year, the typical height of a plafon in Indonesia is 2.8 m - 3.2 m. The greater the height of the plafond, the better the air circulation.

2.1.3.3 Average Temperature

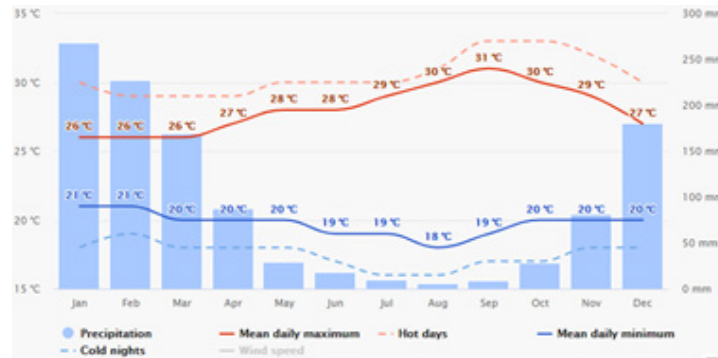


Figure 2.17 Average Temperature

(source: www.meteoblue.com, 2021)

The quantity of rain has an influence on the micro temperature of the region, as previously indicated, with temperatures decreasing from June to August due to the drier climate during the dry season. The design of building openings would be changed in response to the graph of yearly temperature conditions in Salatiga given above, so that air may circulate freely.

2.1.3.4 Relative Humidity



Figure 2.18 Relative Humidity

(source: weather-and-climate.com, 2021)

On a year-round basis, the Relative Humidity is fairly high, as can be seen in the graph. The comfort standard is about 40% to 50%, therefore some tweaking is required to make it comfortable.

2.1.3.5 Windspeed

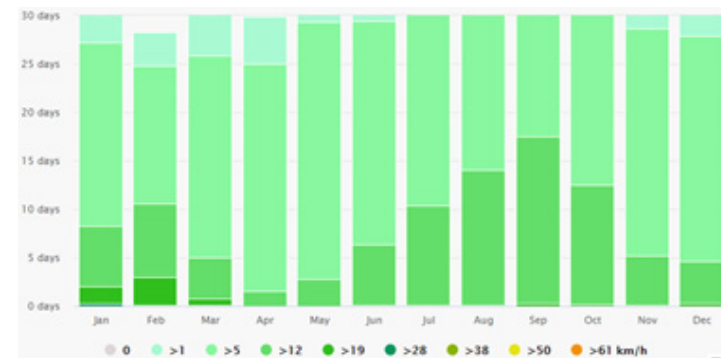


Figure 2.19 Windspeed

(source: www.meteoblue.com, 2021)

1 ms, 5 ms, and 12 ms are the most frequent windspeeds. It is rather severe as raw data and might be difficult. However, because the building is surrounded by other nearby buildings, the pace may be significantly slower.

2.1.3.6 Windrose

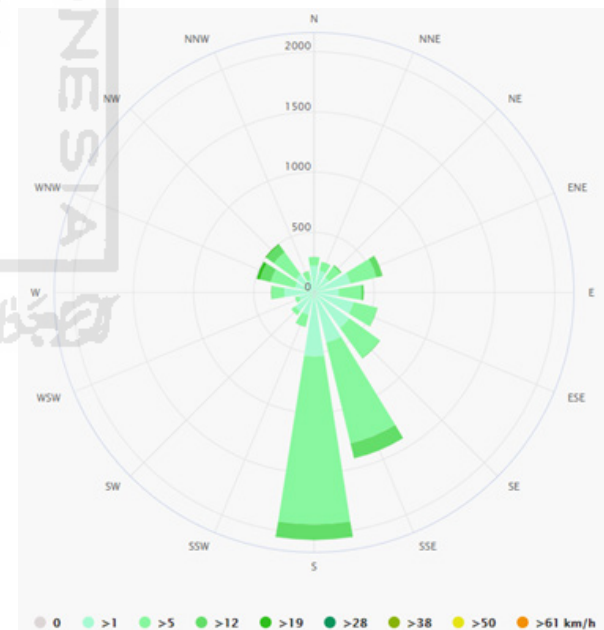


Figure 2.20 Windrose

(source: www.meteoblue.com, 2021)

According to the windrose map, the Salatiga area has the highest wind exposure rate from north to south and southeast. The direction of the wind can influence the shape and envelope of a building's design, especially when it comes to its orientation.

2.1.3.7 Giovani-Milne Bioclimatic Chart

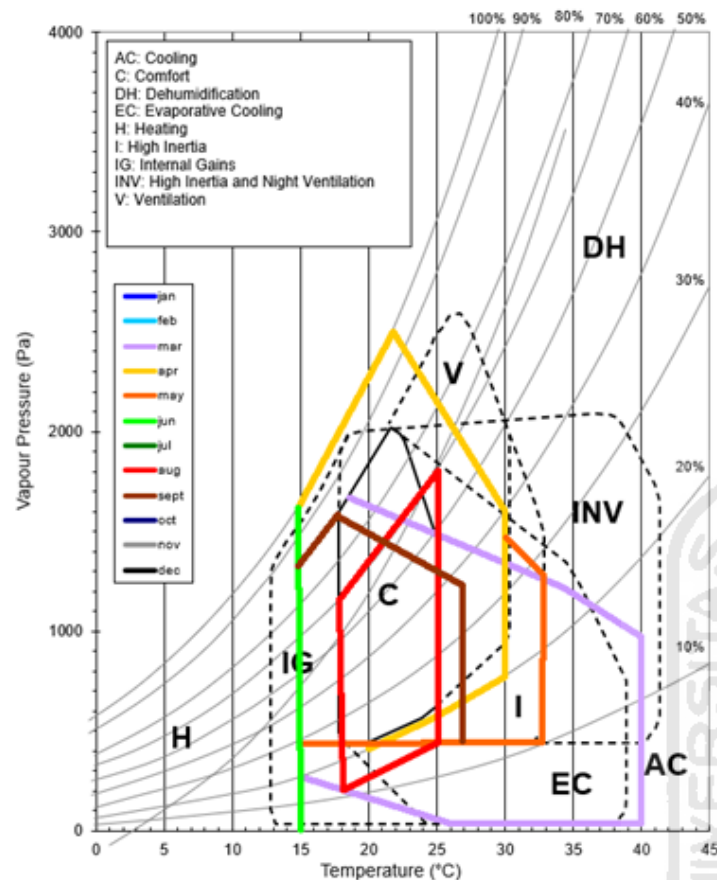


Figure 2.21 Giovani-Milne Bioclimatic Chart

(source: Author, 2021)

The Giovani-Milne Bioclimatic Chart is used to assess the current circumstances of Average Temperature, Relative Humidity, and Windspeed. The chart shows that the weather in Salatiga can be a little chilly, a little comfortable, or a little hot. Ventilation, shade devices, and evaporative cooling are examples of solutions based on the chart.

2.1.3.7.1 Ventilation

Natural ventilation is said to be the simplest and most cost-effective passive technique for every month in hot and humid locations. By shifting the outside and interior air through an aperture, it seeks to achieve a sufficient quantity of fresh air. Furthermore, increased ventilation increases the rate of evaporative and sensible heat loss from the body. Wind direction,

penetration area, inlet and outlet sizes, room volume, shading devices, fly screens, and internal barriers are all factors that should be carefully addressed in order to provide a comfortable amount of ventilation. (Santy and colleagues, 2017)

2.1.3.7.2 Shading Devices

Because the temperature is over 20 degrees Celsius, shading devices are beneficial. The shade device is an option for reducing sun radiation incidences. A smart shading plan can reduce cooling energy demands by up to 10%–20%. (Santy and colleagues, 2017)

2.1.3.7.3 Evaporative Cooling

The conversion of liquid water into vapor utilizing the heat energy in the air results in a lower air temperature. Evaporative cooling can be achieved using either an evaporative cooler or natural ventilation, depending on the area.

2.2 THEMATIC REVIEWS

2.2.1 Creative Hub Typology

2.2.1.1 Creative Hub in Indonesia

Salatiga is a small city but with quite dense population, mainly second and third generation of the pensioners that came to the city. This makes it hard for the younger generation to work for bigger company from the city, and many leaves for bigger cities. In WFH period, it can be seen that the struggles become more clear due to the lack of coworking space and bad internet connection in many area of the city that makes people and students having hard time to work and study.

Creative Hub is the perfect solution that fit the needs of the people due to various function it can have. Co-Working Space, Collaborative Space, Workshops, Meeting Rooms, Exhibition, etc can be made to fulfill the needs of the users.

Because many current Creative Hubs in Indonesia struggle to keep their income streams comparable to their operating costs, the Adaptive Reuse and Energy Efficiency method was adopted. Because Salatiga is situated on the Merbabu Mountain's slope, it is feasible to avoid using an air conditioner and rely only on natural cross ventilation. 2007 (Peschl) Each activity going on within an area reflects the uniqueness of that space. Code Margonda in Depok (West Java), a network collaborator who strives to respond to the requirements of any sort of community, from irregular Quran readings to Hacking meetings, exemplifies the vast range of conceivable activities. Their main purpose is merely to give shelter and space to members. Others, such as Impala in Semarang (Central Java), devote more to their creative networks, even if they finally have to filter prospective events owing to overwhelming demand. It is important to note that various values motivate different actions. These ideals serve as the primary filters for each space, as some are more altruistic than others. In contrast to their coworking competitors, these creative spaces are frequently driven by the concept of benefitting their community first before considering their economic strategy. 2007 (Peschl)

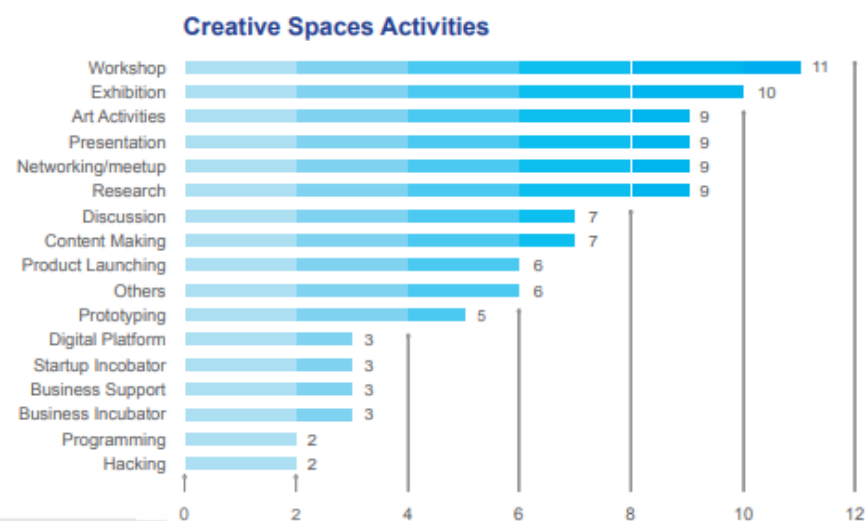


Figure 2.22 Creative Spaces Activities

(source: Mapping Creative Hubs in Indonesia, 2017)

The repetitive actions also suggest that areas establish a distinct emphasis or “niche” over time. Some venues have purposefully chosen a target market based on their founders’ networks or experience, while others have developed a distinct posture over time. Another possibility is that certain places have conducted market research in order to better understand their potential clientele or consumers. This is particularly true for coworking spaces that have a well-developed business plan that considers return on investment and growth predictions. 2007 (Peschl)

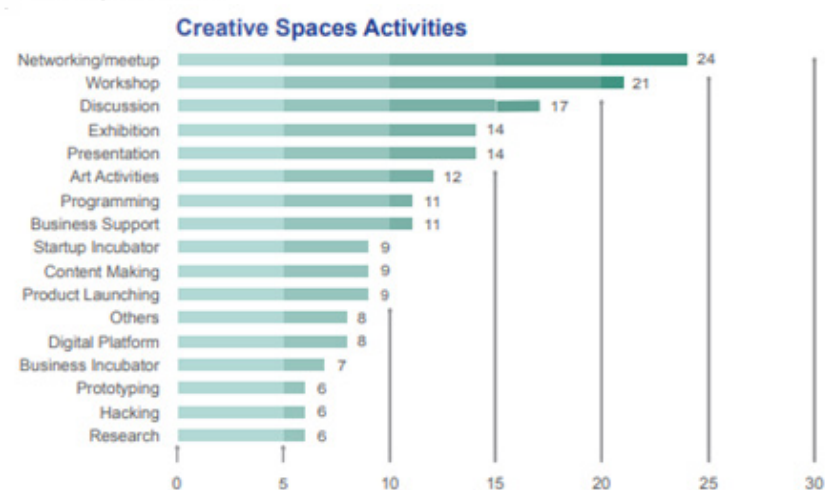


Figure 2.23 Creative Spaces Activities

(source: Mapping Creative Hubs in Indonesia, 2017)

Makerspaces, on the other hand, are more engaged with networking and meetings when they are not working on specific projects or goods. Making links with the business sector and other supporting actors is also common, since makerspaces must find their benefactors and users at the end of the day. 2007 (Peschl)

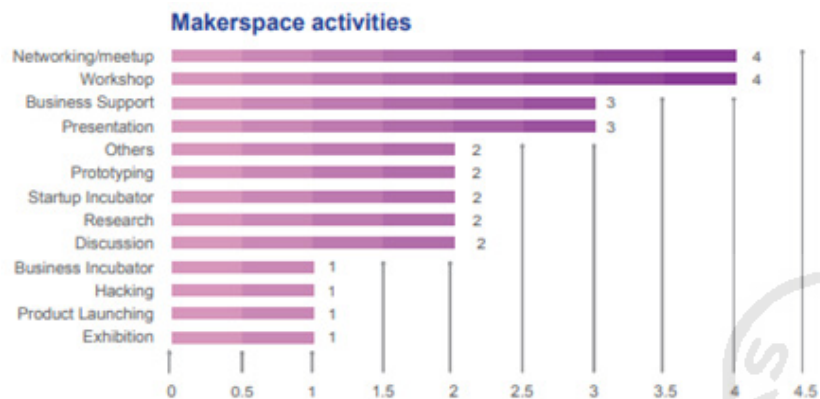


Figure 2.24 Makerspace activities

(source: Mapping Creative Hubs in Indonesia, 2017)

The majority of events organized by Indonesian creative hubs are focused on socio-cultural issues. This implies that places are generally involved with their community and social surroundings. As the second and third most common issues, affecting both activity and target audience, the rising tech sector and digital entrepreneurship have a big impact on their activities for audience of creative hubs. (Peschl, 2007)



Figure 2.25 Issues of activities

(source: Mapping Creative Hubs in Indonesia. 2017)

2.2.1.2 User Analysis

Table 2.2 User's Analysis
(source: Author, 2021)

USER ACTIVITY					
Category	Activity	User	Function	Type	
Collaboration	- Registration	- Student	- Lobby	Public &	
	- Discussion	- Creative	- Co-Working	Semi	
	- Doing homework	Workers	Space	Public	
	- Eat, drink	- Freelancer	- Meeting		
	- Presentation	- Public	Room		
	- Smoking		- Coffee Shop		
	Education	Seni Tari	- Student	Workshop	Public
- Mentoring		- Creative	Storage		
- Training		Workers	Room		
- Audio check		- Freelancer			
Batik		- Public			
- Mentoring					
- Making mock up					
- Preparation					
Seminar					
- Presentation					
- Preparation					
Exhibition	- Looking exhibit	- Creative	- Exhibition	Public	
	- Take photo	Workers	Area		
	- Preparation	- Freelancer	- Storage		
		- Public	Room		
Hangout	- Talking	- Public	- Hangout	Public	
	- Meetup		Space		
	- Eat, drink		- Coffee Shop		
	- Smoking				



Table 2.4 Management Analysis
(source: Author, 2021)

MANAGEMENT ACTIVITY				
Category	Activity	User	Function	Type
Leading	- Lead meetings	- Chief	- CEO Office	Private
	- Responsible of the Creative Hub	Executive Officer (CEO)	- Meeting Room	
Office Workers	Management	- General Manager	- Office	Private
	- Coordinate other staff	- Secretary	- Meeting Room	
	- Dividing tasks	- Treasurer		
	- Receive guest			
	Administration			
	- Assisting and Management	CEO		
	- Arrange meetings			
	- Arrange letters			
	- Making reports			
Information	- Giving information	- Public Relation	- Front Table	Semi-private
	- Advertising Creative Hub	Staff	- Office	
Building Operational and Safety	- Maintenance on building utility	- Technician	- MEE Room	Public
	- Maintain cleanliness	- Cleaning Service	- Security Office	
	- Maintain safety	- Security	- Staff Room	

2.2.1.3 Space Analysis

Table 2.5 Creative Hub Operational Hours
(source: Author, 2021)

Building Operational Hours			Coffee Shop	Smoking	10.00-20.00
Facility	Activity	Schedule	CEO Office	1 on 1 meeting	Monday to Friday
Lobby & Front Table	- Giving information and taking reservation	Monday to Sunday 10.00-20.00	Office	- Paperwork	Monday to Friday
Co-Working Space	- Working - Eat, drink	Monday to Sunday 10.00-20.00	Staff Room	- Print - Design	Monday to Sunday
Meeting Rooms	- Meeting - Presentation	Monday to Sunday 10.00-20.00	MEE Room	- Rest - Eat, drink	Monday to Sunday
Workshop	- Preparation - Handcraft - Mentoring	Monday to Sunday 10.00-20.00	Storage Room	- Storing building utilities	Monday to Friday
Exhibition Area	- Put up exhibit	Monday to Sunday 10.00-20.00	Security	- Storing equipment	Monday to Sunday
Hangout Space &	- Hangout - Eat, drink	Monday to Sunday	Post	- Security	Monday to Sunday

Creative Hub as a whole active everyday for public functions such as Co-Working Space, Workshop, Meeting Rooms, Exhibition Room, etc. The difference is the management office will have Saturday and Sunday off. This to increase overall performance of the building, meaning as many function as possible is available for the user to use.

2.2.2 Open Design Theory

2.2.2.1 Definition

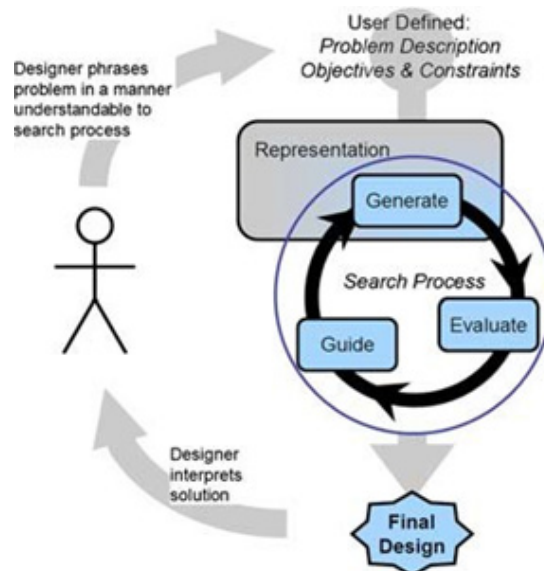


Figure 2.26 Open Design Flowchart

(source: ResearchGate)

Nobody makes all the decisions, and we generally revel in that fact while attempting to navigate the intricacies at hand. And, because no single party makes all of the decisions when a building is constructed throughout time, the structure must be adjusted to meet the demands and requirements of new technical standards. As a result, it's critical to regulate decision-making and construction such that the number of dependencies or attachments among the people involved is minimized. This reduces the probability of conflicts between the persons or actors inside them and the portions of the total they govern, and improves the possibility of balancing their common goals with the interests of individuals who occupy the space.

2.2.2.1 In terms of Creative Hub

Creative Hub as some aspects that can be surveyed through user on how it will be, such as:

- Function
- Layout
- Operating Hours
- Design Theme

However, to reduce complexity while still having user impact on the determining on how high the performance of the building, only building function that will be surveyed.

2.2.2.3 User Survey

On the survey, users were asked to fill:

- Job Background
- Age
- Defining Aspect in Creative Hub
- Which function to prioritized

Job background is needed to see how broad and objective the survey is. Age is to roughly confirm the background, whether it make sense or not. Defining aspect is more subjectif but can be taken into concept later on. Lastly, function to prioritized determine which function to be vocal in this Creative Hub.

2.2.2.4 Response Analysis

This is the result of the survey which were fill by 40 respondents.

Job Background

40 jawaban

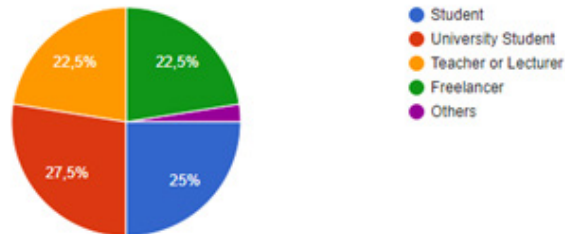


Figure 2.27 User's Job Background

(source: Author, 2021)

Age

40 jawaban

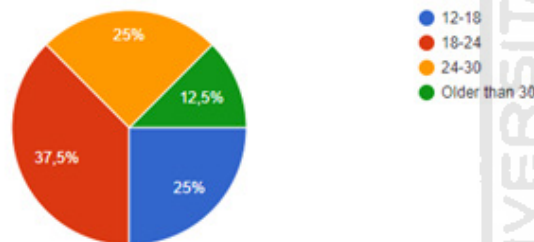


Figure 2.28 User's Age

(source: Author, 2021)

In your opinion, what to define good Creative Hub?

40 jawaban

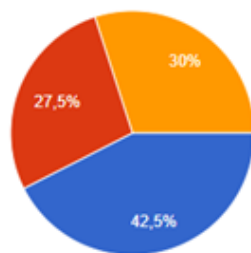


Figure 2.29 User's Interest in Defining Aspect of Creative Hub

(source: Author, 2021)

Which function of Creative Hub should be prioritized based on your job background?

40 jawaban

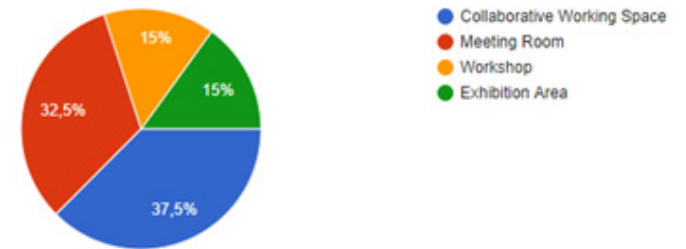
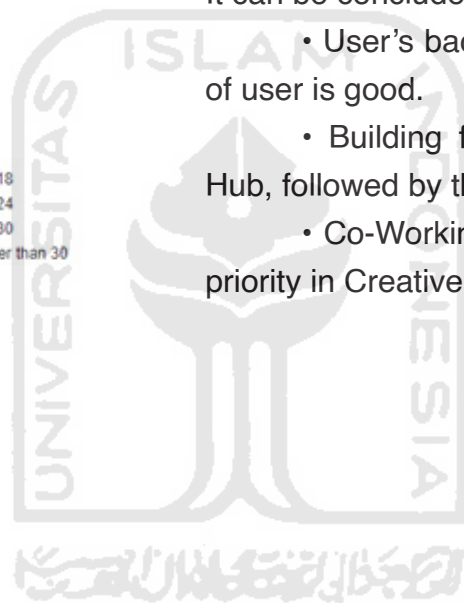


Figure 2.30 User's Priority in Function

(source: Author, 2021)

It can be concluded from this survey that:

- User's background are varied which means the diversity of user is good.
- Building functions are the defining aspect of Creative Hub, followed by the atmosphere.
- Co-Working Space and Meeting Room are top two user priority in Creative Hub.



2.2.3 Open Floor Plan Approach

In architectural and interior design, an open plan is any floor plan that maximizes the use of large, open areas while reducing the usage of tiny, enclosed rooms such as private offices. The term can also be used to describe the landscaping of housing estates, business parks, and other locations where property lines, such as hedges, fences, or walls, are not clearly defined.

While transitioning from cubicles to open workplaces (e.g., tables with no visible boundaries) is promoted as improving cooperation, it actually leads to less face-to-face contacts and decreased productivity.

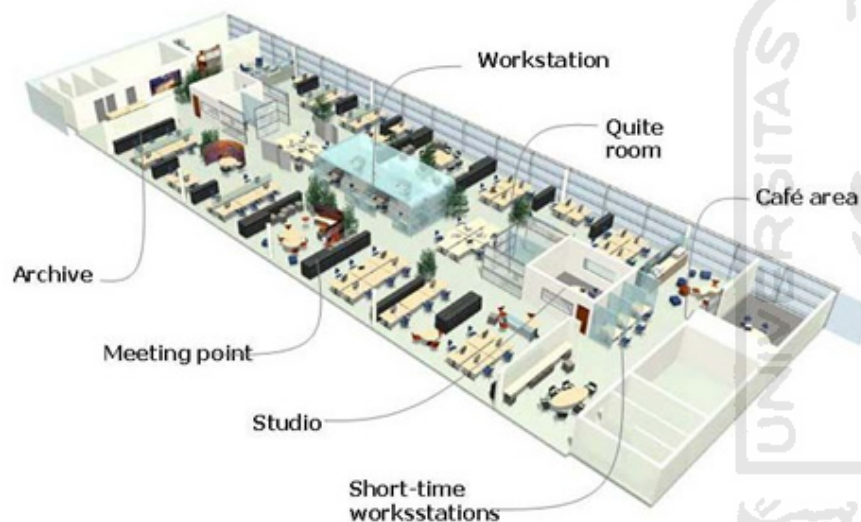


Figure 2.31 Open Floor Area MultiFunction

(source: ResearchGate)

Some of other variables which defines open floor plan benefits are:

2.2.3.1 Better Daylighting

Natural light can reach more areas with open floor layouts. The afternoon sun may also be used to create a beautiful outdoor environment while simultaneously providing light for indoor areas. When combined with the proper orientation, daylighting may be fully used.

2.2.3.2 Expands Small Spaces

Small spaces, such as cubicles or numerous partitions between rooms, are common in creative hubs or offices. Rather of creating small sections, open floor areas allow the space to be used as a whole. This will allow for future flexibility in layout and space use.

2.2.3.3 Eliminates Wasted Spaces

In relation to the preceding issue, there is often wasted space in corners or near furniture in a room or area. Because of the nature of open floor areas in terms of design and layout, these wasted spaces will be removed, and space utilization will be more efficient.

2.2.4 Double Skin Façade

This is a type of technology that bridges the gap between “active building systems” and “passive design principles.” It is based on the complete integration of a building’s exterior with its mechanical and electrical systems. Its three primary tasks are solar management, thermal heating and/or cooling, and natural ventilation, all with the objective of maximizing the energy reduction potential of both. Natural, fan-assisted, or mechanical ventilation of the cavity is possible. Apart from the type of ventilation used inside the cavity, the air’s origin and destination are influenced by a variety of factors, including the weather, the building’s usage, its location, the building’s operational hours, and the HVAC strategy. A double-skin façade, when properly constructed, may enhance access to daylight, convert sunlight into heat energy, collect heat energy for re-use in other sections of the structure, improve ventilation of interior rooms, and reduce the danger of outside air infiltration. Trubiano (2004)

Variables:

- o Daylight transmission, solar shading and thermal buffers
- o Heat transfer and heat recovery
- o Natural ventilation

The space between the two skins can be vented naturally or mechanically. In hot regions, the hollow may be vented out of the structure to reduce cooling demand and reduce solar gain. In each scenario, the presumption is that adopting this glazing design rather than a traditional glazing configuration will result in a greater insulative value.



Figure 2.32 Prototype of Double Skin Façade of Tennessee
(source: Design and Construction of High Performance Homes)

In tropical climates, the outer layer of a double skin façade is used to reduce direct solar heat gain in building rooms; nevertheless, trapped heat in the intermediate gap between layers can aid to keep hot weather away from the structure’s inner layer.

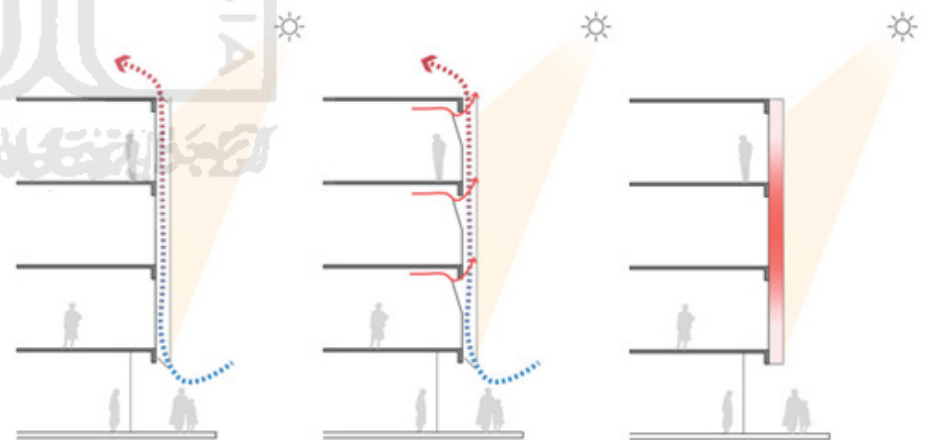


Figure 2.33 How Double Skin Façade Work
(source: ArchDaily)

2.2.5 Creative Community in Salatiga

Economic growth creativity in Salatiga is shown by the emergence of various industries that are carried out by young people, especially in the convection field, like batik and accessories. Creativity in the field of convection is visible with the emergence of various clothing brands in Salatiga. Activity overall production is done on a home scale by manual printing method or by printing machine, in the process of distribution and sales carried out by online media and sales through distributions and retail. The existence of a clothing brand in Salatiga can be seen from the activeness in participate in promotional events both in the school and city scope.

Table 2.6 Batik and Clothing Community

(source: Author, 2021)

Batik and Clothing Makers
Trendkill Apparel
Expired Rust
Omutt
Strenght Merch
Helliance Cooperated
Kagungan Project
ASKXORG
SAGA
Kaos Polos Salatiga
Plumpungan Store
Feelgood.ltd
Mengiginkanmu.ltd
SNDWCH
Elita
Kaos Koyor Salatiga
Gees
Mockingbird Avelin
Vshirt
Seviosa
Walk
Postmo
Goodlife
Yeahyeah Terror

Table 2.7 Accessories and Maker Community

(source: Author, 2021)

Accessories and Maker
Resick Shoes
Mr.Pack
Peacespot
Craftypoopy
The Essentials
J-Frame
Nina
Purplepum craft
Sangkar Kita
Quirkit
Pasxo Woodwork

2.2.6 Local Events in Salatiga

- Hampra Fest

The Hampra Fest event was held with the aim of strengthen inter-industry relations and facilitate consumers to get to know local brands from the city of Salatiga. This is a 6 month/yearly.



Figure 2.34 Hampra Fest

(source: instagram @hampra.fest)

Salatiga Fair

Salatiga Fair is an SME's and emerging industry show off which happened monthly.



Figure 2.35 Salatiga Fair

(source: salatiga.go.id)

- Salatiga Expo

Salatiga Expo is an annual celebration mid-year to reminds the achievement of the city.



Figure 2.36 Salatiga Expo

(source: salatiga.go.id)

- Pameran Arsip

Yearly event to remind citizens the history of Salatiga and its culture,



Figure 2.37 Pameran Arsip

(source: salatiga.go.id)

- Monginsidi Fest

Monginsidi Fest is a Street Food, Local Product Showcase & Talent Performance to support Salatiga local SMEs. This event happens every 3 month.



Figure 2.38 Monginsidi Fest

(source: instagram @monginsidifest)

2.3 PRECEDENT REVIEWS

2.3.1

1901 Poplar Innovation Hub / Medium Plenty

- OAKLAND, UNITED STATES
- Architects: Medium Plenty
- Area: 15000 ft²
- Year: 2019



Figure 2.39 1901 Poplar Innovation Hub / Medium Plenty
(source: ArchDaily)

Precedent Description:

Medium Plenty transformed a 15,000 sq ft industrial warehouse with the help of Kapor Capital, a foundation dedicated to investing in underrepresented entrepreneurs, into an approachable and flexible space that can be used by youth groups and start-ups to serve as a bridge to technology opportunities.

Adaptability - The building's open floor area is in the center, with closed space strewn about it. This creates a centralized environment for the flexible space, which is mainly utilized as social spaces such as Co-Working Space, Hangout Space, and so on, depending on the needs.

The design strategy aimed for activating the enormous space by including a range of multi-functional spaces and furnishings, as well as providing open and dedicated offices, big conference rooms, a community kitchen, and a lounge area.

Many pieces of furniture are built in a modular format to make assembly and disassembly easier. This modular method will come in helpful, especially when rearranging space, because it may be stretched throughout the entire room or just a small section of it.

1901 Poplar to be an appropriate site and space for their Corporate Headquarters as a means to engage with their community, as half of its users live in the Bay Area. By including brainstorming areas into the design, they will be able to work independently or as a group.

Plan

Analysis

Closed space

Open space

Closed space

Open floor space surrounded with closed space function for better circulation and zoning between noisy space and quiet space. Modular interior is also implemented.

Modular Interior

Kit of Parts
Type 2 Bench and Planter Potential Configurations

Kit of Parts
Screen Potential Configurations

The type of arrangement can be implemented corresponding with space needed. Then, the space will be placed according to its type.

2.3.2

Jakarta Creative Hub• **JAKARTA, INDONESIA**

• Jl. Kb. Melati 5 No.20, RW.8, Kb. Melati, Kecamatan Tanah Abang, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta



Figure 2.40 Jakarta Creative Hub

(source: ArchDaily)

Precedent Description:

Capturing user's interest is the soul of Jakarta Creative Hub. Its function range from Makerspace, Co Office, Classroom, Exhibition Space, Library, to Inspiration Corner. It has many macro function to micro function of a Creative Hub.

The wide range of function came from the pursue of a high-performing building, which means the functions in most of the operating hours is targeted to be filled with people using them.

Not only having closed function, Jakarta Creative Hub also have more open function such as Co-Working Space, and main hall which can be transformed into Exhibition Area.

This is to maximize building usage both in daily basis and in occasional such as Batik Exhibition, Art Exhibition – events which need more space can be held in these open areas there is no closed wall and the furnitures are easily adjustable.

These set of approaches, User-end and Open Floor Area approaches are suitable with Creative Hub spaces which can be crowded at times while also being quiet on most of the times. Having the ability to transform, and adjust space is one of the strongest feature of Jakarta Creative Hub.

Function Layout

Makerspace

Exhibition Hall



Diversity of function is needed to maximize building usage. However, the kinds of function should correspond to user's need and interest.

Function Layout

Co-Working Space



To ensure the function corresponding with user's need and interest, a survey is done to determine their priority of Creative Hub's function.

2.3.3

Genteng House / SASO Architecture Studio

- BEKASI, INDONESIA
- Architects: SASO Architecture Studio
- Area: 85 m²
- Year: 2019



Figure 2.41 Genteng House / SASO Architecture Studio

(source: ArchDaily)

Precedent Description:

Genteng House's core philosophy is as simple as a love for mother nature. Genteng Home was built on the site of an ancient house that had been there for many years. Because most of the materials in the ancient house were completely damaged, even a minor restoration couldn't help. No matter how awful things were, we couldn't help but think that donating such a large amount of garbage to our mother planet was inconceivable.

Located in a location where it is needed to develop a secondary skin façade to reduce heat entry into the structure, especially because we were in a high-temperature area where daily temperatures may reach up to 38°C. Even better, we could use some recycled components from the existing home.

Constructed a second skin by placing the roof tiles in a certain order, which covers the enormous aperture behind it while also serving as a unique visual feature for both the outside and inside.

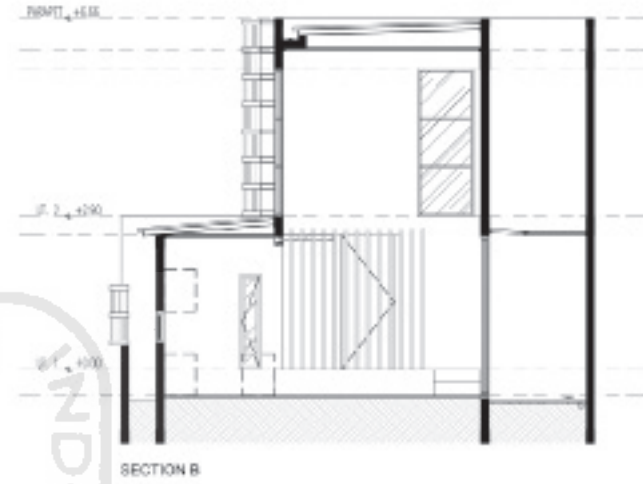
The home is a two-story structure with one master bedroom and two children's bedrooms. The first phase completed all structural and supporting work for this completely built phase. The owner will be able to live comfortably within the house during the renovations with this plan.

In our external design, this façade feature is the most prominent. However, it is more prominent in the inside, where it creates a magnificent effect and is seen via enormous glass windows. Sunlight enters the façade at different times of the day, creating patterns on the inner wall.

Plans



Section

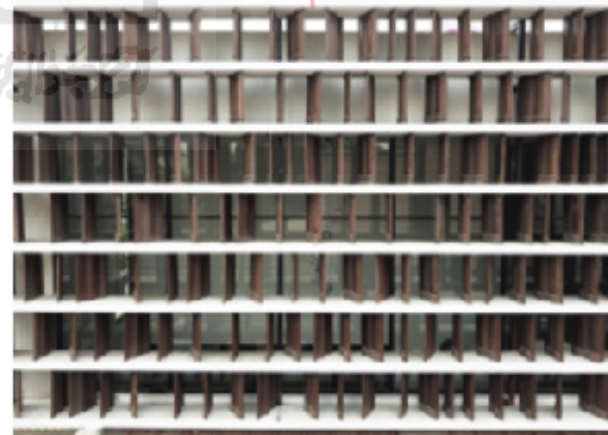


Secondary Skin



Secondary Skin

Material Arrangement



Secondary skin is implemented in a way which won't disturb windflow (vertically), while still allowing daylighting to come inside of the building.

Vertical arrangement of skin's material could be implemented.

2.4 BUILDING CODES

PERATURAN DAERAH KOTA SALATIGA NOMOR 7 TAHUN 2013 TENTANG PENYELENGGARAAN BANGUNAN GEDUNG

Pasal 5

(1) Fungsi Bangunan Gedung sebagaimana dimaksud dalam Pasal 4 diklasifikasikan berdasarkan tingkat kompleksitas, tingkat permanensi, tingkat risiko kebakaran, zonasi gempa, lokasi, ketinggian, dan/atau kepemilikan.

(2) Klasifikasi berdasarkan tingkat kompleksitas meliputi Bangunan Gedung sederhana, Bangunan Gedung tidak sederhana, dan Bangunan Gedung khusus.

(3) Klasifikasi berdasarkan tingkat permanensi meliputi Bangunan Gedung permanen, Bangunan Gedung semi permanen, dan Bangunan Gedung darurat atau sementara.

(4) Klasifikasi berdasarkan tingkat risiko kebakaran meliputi Bangunan Gedung tingkat risiko kebakaran tinggi, tingkat risiko kebakaran sedang, dan tingkat risiko kebakaran rendah. 16

(5) Klasifikasi berdasarkan zonasi gempa meliputi tingkat zonasi gempa yang ditetapkan oleh instansi yang berwenang. (6)

Klasifikasi berdasarkan lokasi meliputi Bangunan Gedung di lokasi padat, Bangunan Gedung di lokasi sedang, dan Bangunan Gedung di lokasi renggang.

(7) Klasifikasi berdasarkan ketinggian meliputi Bangunan Gedung bertingkat tinggi, Bangunan Gedung bertingkat sedang, dan Bangunan Gedung bertingkat rendah.

(8) Klasifikasi berdasarkan kepemilikan meliputi Bangunan Gedung milik negara, Bangunan Gedung milik badan usaha, dan Bangunan Gedung milik perorangan.

(9) Ketentuan lebih lanjut mengenai Klasifikasi Bangunan Gedung diatur dengan Peraturan Walikota.

Pasal 22 Ayat (1)

Penetapan KDB untuk suatu kawasan yang terdiri atas beberapa kaveling/persil dapat dilakukan berdasarkan pada perbandingan total luas Bangunan Gedung terhadap total luas kawasan dengan tetap mempertimbangkan peruntukan atau fungsi kawasan dan

daya dukung lingkungan. Penetapan KDB dibedakan dalam tingkatan KDB tinggi (lebih besar dari 60% sampai dengan 100%), sedang (30% sampai dengan 60%), dan rendah (lebih kecil dari 30%). Untuk daerah/kawasan padat dan/atau pusat kota dapat ditetapkan KDB tinggi dan/atau sedang, sedangkan untuk daerah/kawasan renggang dan/atau fungsi resapan ditetapkan KDB rendah.

Pasal 35

(1) Setiap Bangunan Gedung harus memenuhi persyaratan kemampuan untuk mencegah dan menanggulangi bahaya kebakaran sebagaimana dimaksud dalam Pasal 33 huruf b, melalui: a. sistem proteksi pasif; dan b. sistem proteksi aktif.

(2) Penerapan sistem proteksi pasif sebagaimana dimaksud pada ayat (1) huruf a didasarkan pada fungsi/klasifikasi risiko kebakaran, geometri ruang, bahan Bangunan terpasang, dan/atau jumlah dan kondisi penghuni dalam Bangunan Gedung.

(3) Penerapan sistem proteksi aktif sebagaimana dimaksud pada ayat (1) huruf b didasarkan pada fungsi, klasifikasi, luas, ketinggian, volume Bangunan, dan/atau jumlah dan kondisi penghuni dalam Bangunan Gedung.

(4) Setiap Bangunan Gedung dengan fungsi, klasifikasi, luas, jumlah lantai, dan/atau dengan jumlah penghuni tertentu harus memiliki unit manajemen pengaman kebakaran.

(5) Ketentuan mengenai tata cara perencanaan, pemasangan, dan Pemeliharaan sistem proteksi pasif dan proteksi aktif serta penerapan manajemen pengaman kebakaran berpedoman pada Standar Teknis yang berlaku. 31

(6) Ketentuan pada ayat (1) dikecualikan bagi rumah tinggal tunggal dan rumah deret sederhana.

Chapter 3

Design Concept

Description

The chapter contains concept exploration based on design study done in previous chapter.

According to the theory and variables a few alternatives were produced to then be chosen from which is more suitable.

Contents

- 3.1 Creative Hub as Mix-Used Facility
- 3.2 Site Planning and Building Mass Consideration for Maximizing Passive Systems
- 3.3 Building Forms to Support Existing Concepts
- 3.4 Building Elements and Systems

3.1 CREATIVE HUB AS MIX-USED FACILITY

Creative Hub is a place to work, present product, or to collab with other like-minded people. It is important to have supporting facilities other than the main ones to support and enable them better.

3.1.1 Functions of Creative Hub to Accommodate Creative Workers in Salatiga

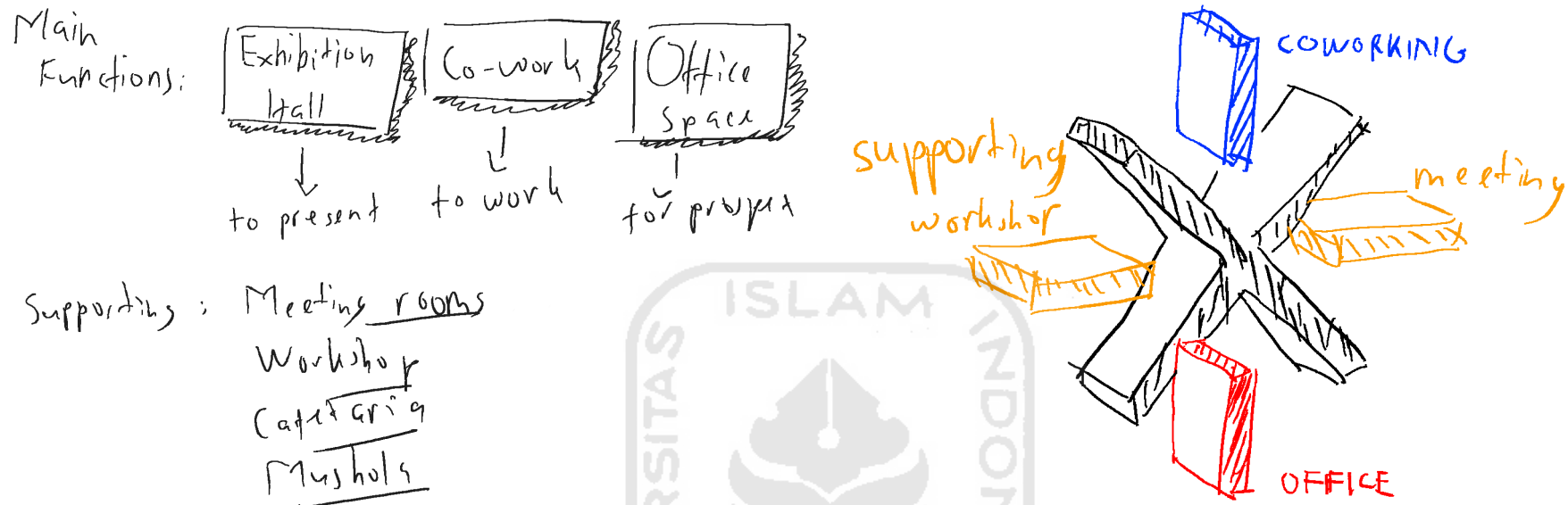


Figure 3.1 Functions Correlation at Creative Hub

(source: Author, 2021)

Most of the Creative Workers in Salatiga are working from their own home/workplace. A Creative Hub can come in as a standardized place where they can come and just focus on their craft, not worrying about utility cost etc.

3.1.2 Programming of Creative Hub Concept

The programming of Creative Hub can help to better understand which functions are the main and which are the supporting ones.

Table 3.1 Room Programming

(source: Author, 2021)

Programming			
Room Name	Capacity	Variables	Total Area
Lobby & Front Table	30	- Table	32m2
Co-Working Space	200	- Chairs - Tables - Single Work Table	400m2
Meeting Rooms	12	- Chairs - Table	43m2
Workshop	50	- Tables - Chairs - Sound System - Cupboard	90m2
Exhibition Area	80	- Wall Display - Table Display	180m2
Hangout Space & Coffee Shop	50	- Long Table - Tables - Chairs - Kitchen set	180m2
CEO Office	1	- Table - Chair	24m2
Office	6	- Tables - Chairs	40m2
Staff Room	10	- Table - Chairs	30m2
MEE Room	-	- Utilities	40m2
Storage Room	-	- Equipments	60m2
Security Post	-	- Table - Chair	12m2

3.1.3 Space Organization of Functions and It's Relation in Creative Hub

The placement of Main function and its support is crucial to have an efficient building arrangement. These space organization help in understanding its connectivity and distance from one and another

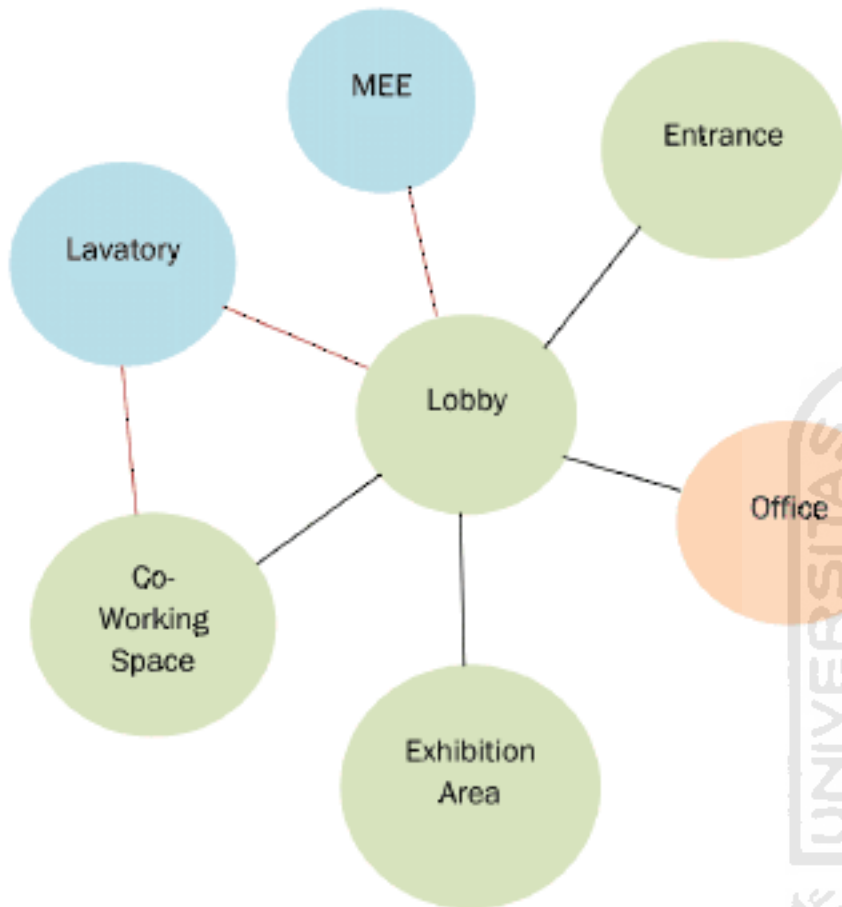


Figure 3.2 Lobby Organization
(source: Author, 2021)

Information :

- : Private
- : Public
- : Service

———— : Direct Access

———— : Indirect Access

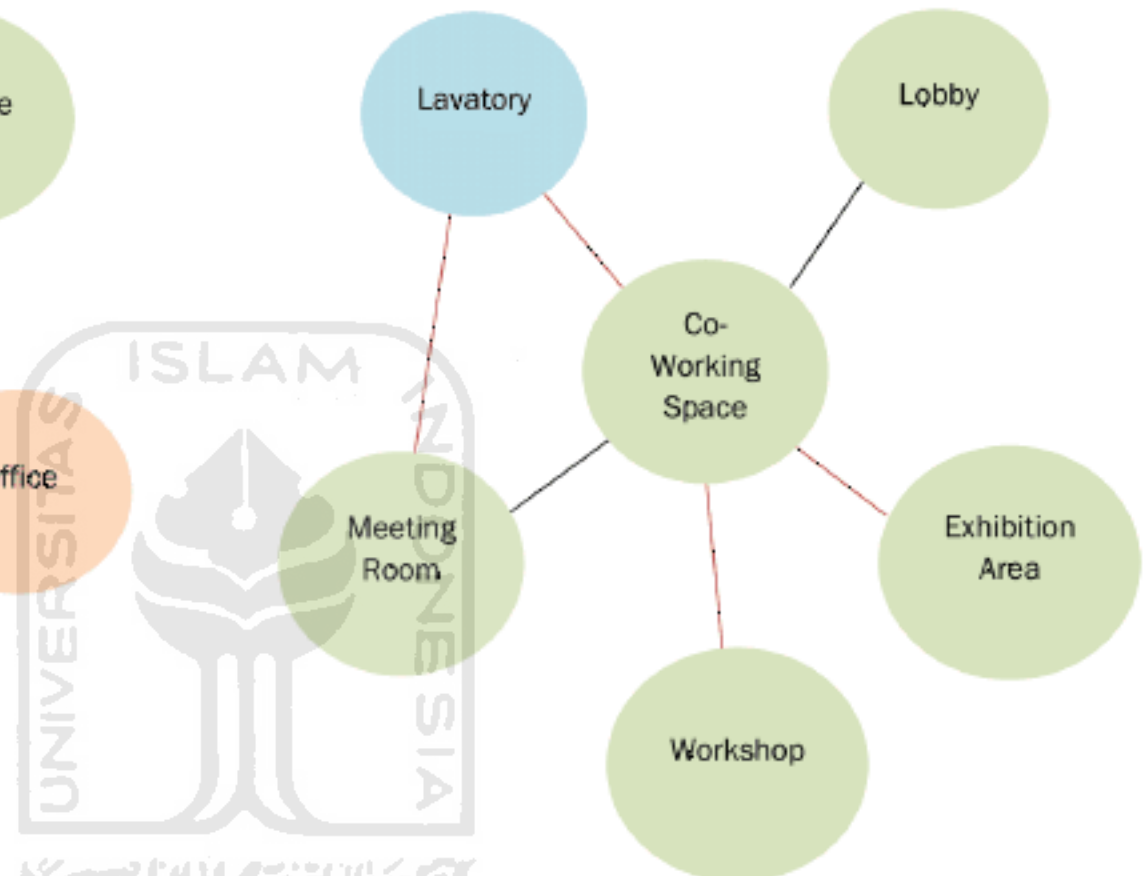


Figure 3.3 Co-Working Organization
(source: Author, 2021)

Information :

- : Private
- : Public
- : Service

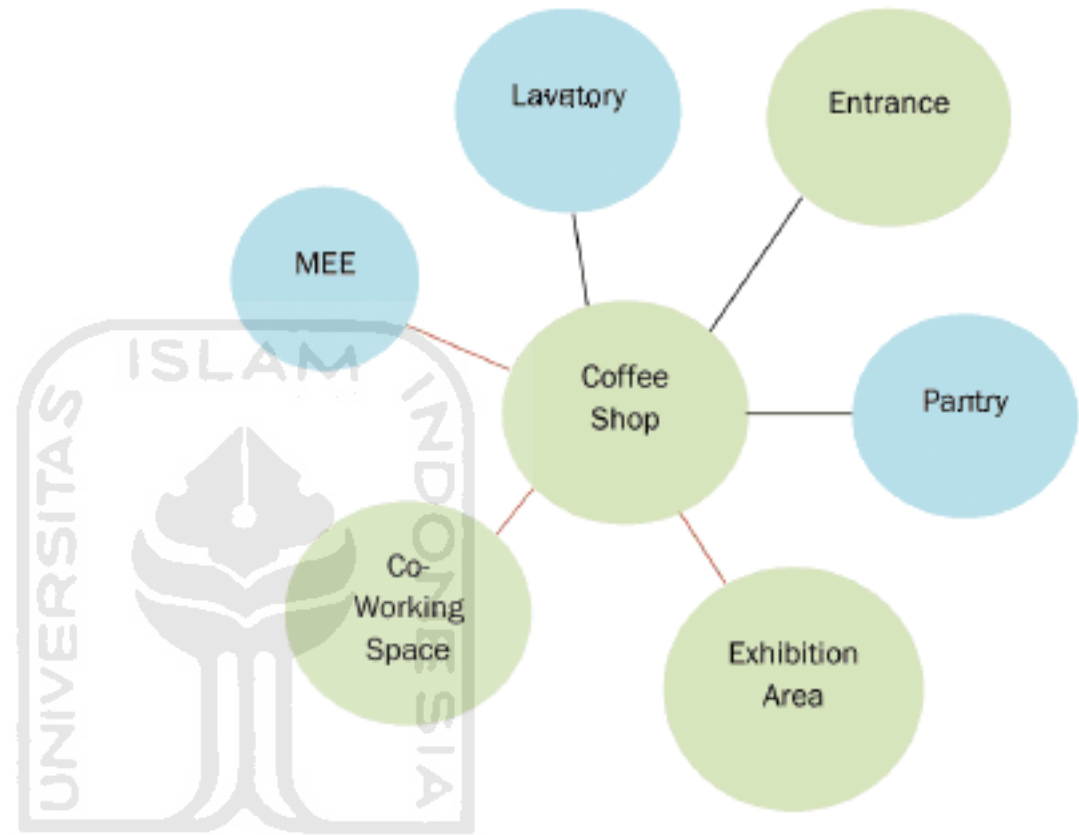
———— : Direct Access

———— : Indirect Access

Office Area



Coffee Shop Area



Information :

- : Private
- : Public
- : Service

— : Direct Access

-.- : Indirect Access

Figure 3.4 Office Organization
(source: Author, 2021)

Information :

- : Private
- : Public
- : Service

— : Direct Access

-.- : Indirect Access

Figure 3.5 Cafeteria Organization
(source: Author, 2021)

3.2 SITE PLANNING AND BUILDING MASS CONSIDERATION

Site Planning and Building Mass are essential considerations in maximizing passive systems such as daylighting and natural windrose.

3.2.1 Building Mass Arrangement to Maximize Passive Systems

Building mass placement, and size affect both daylighting and natural windrose which went through the building efficient or not.

Alternative 1:

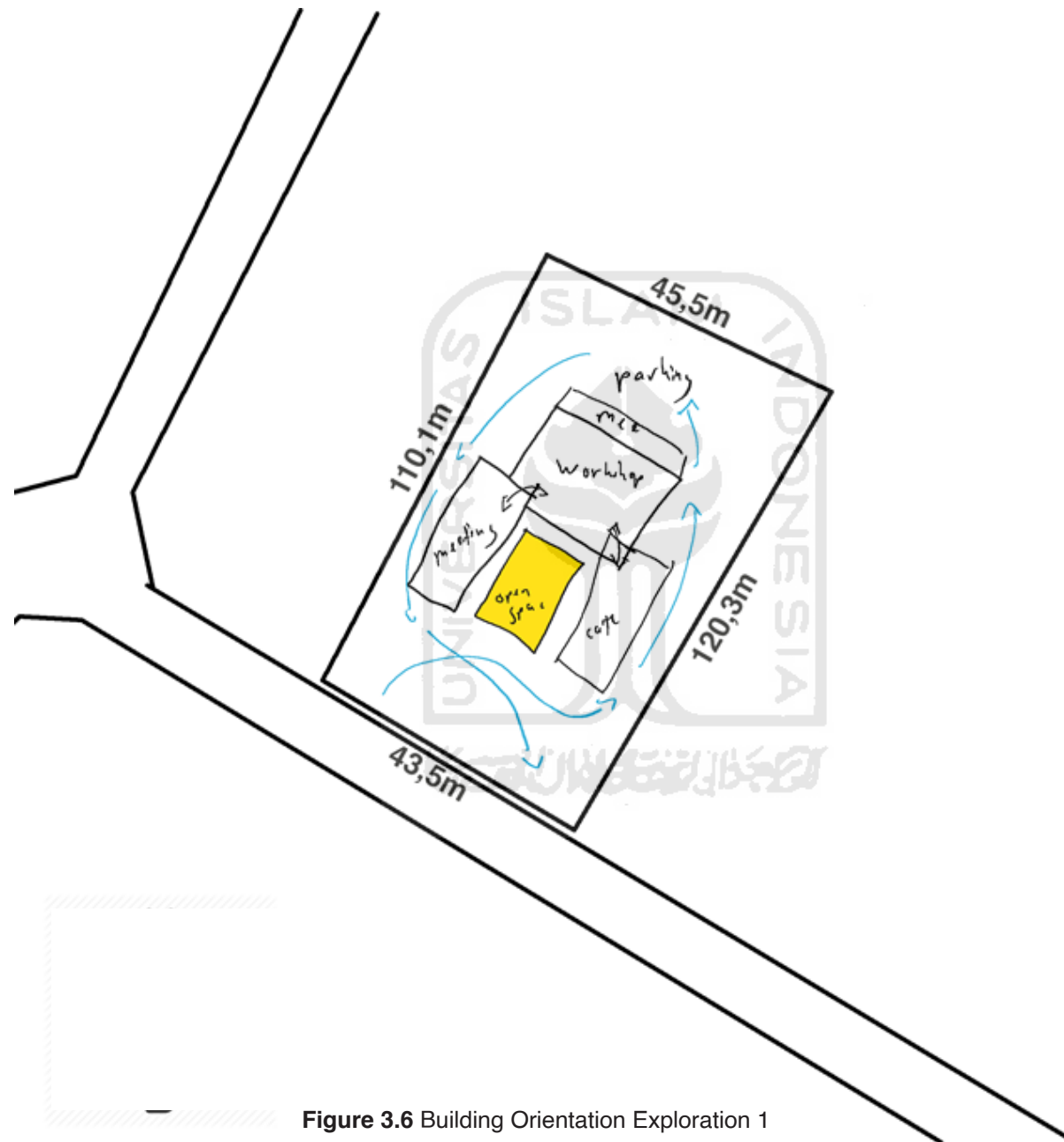


Figure 3.6 Building Orientation Exploration 1

(source: Author, 2021)

Emphasizes on using the whole site and enabling circulation. The mass aren't big but seamlessly connected to one and another for easier circulation. There is a centralized outdoor space where user can use it as semi amphiteater while still being close to the main building.

Alternative 2

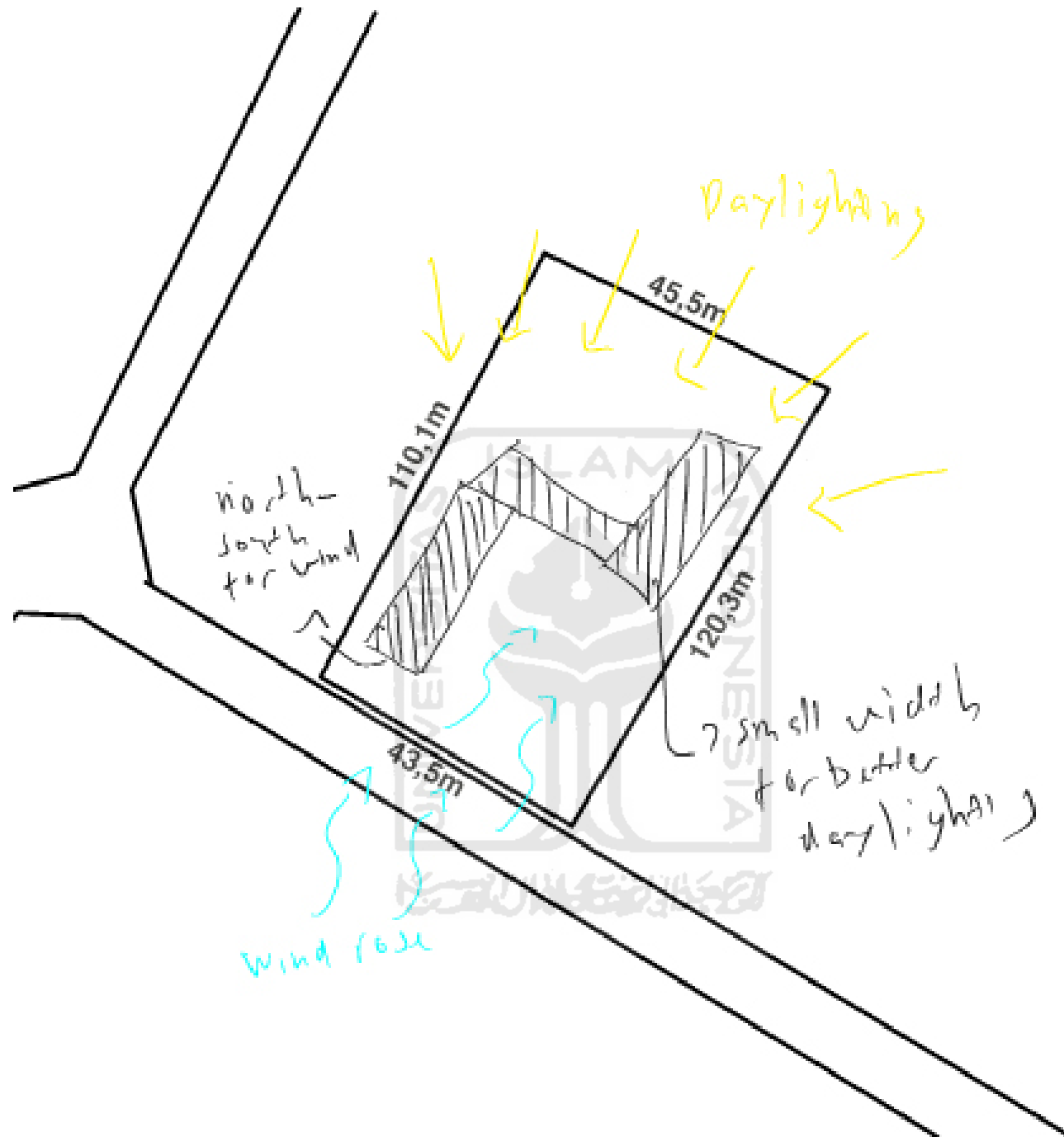


Figure 3.7 Building Orientation Exploration 2

(source: Author, 2021)

It can be seen that the building mass avoid direct sun radiation, except at the overpass while still maintaining maximum probable space for the sunlight to comes in. In the second part it can be seen that Mass A and Mass B will in direction with the strongest wind flow to provide cross ventilation system, while the overpass will have many opening to cool it down from direct sunlight radiation

Table 3.2 Chosen Mass Alternatives

(source: Author, 2021)

Variables	Alternative Mass 1	Alternative Mass 2
Orientation	Building lay out from North to South, it will have low heating and high daylighting. Very Good (2 point)	Building lay out from North to South, it will have low heating and high daylighting. Very Good (2 point)
Daylighting	Quite good on branch building, but isn't so good due to main building has 2 floor and the distance between each opening is quite far to have efficient daylighting. Good (1 point)	Very good with rectangular shape all of the building area has similar daylighting performance. The distance between each opening is near so daylighting from both side is expected to be efficient. Very Good (2 point)
Windflow	With landscaping manipulation and strong natural windflow, cross ventilation can be efficient. Very Good (2 point)	With landscaping manipulation and strong natural windflow, cross ventilation can be efficient. Very Good (2 point)
Spatial Arrangement	Function in closed building like Co-Working Space, Meeting Rooms, won't be disturbed with noise from Coffee Shop and Hangout space. But, it is needed to cross the site to reach it. Good (1 point)	Function in closed building like Co-Working Space, Meeting Rooms, won't be disturbed with noise from Coffee Shop and Hangout space. Both of the masses also connected with overpass so it's more comfortable. Very Good (2 point)
Total	6 points	8 points (Chosen)

3.2.2 Function Arrangement inside of the Building Mass

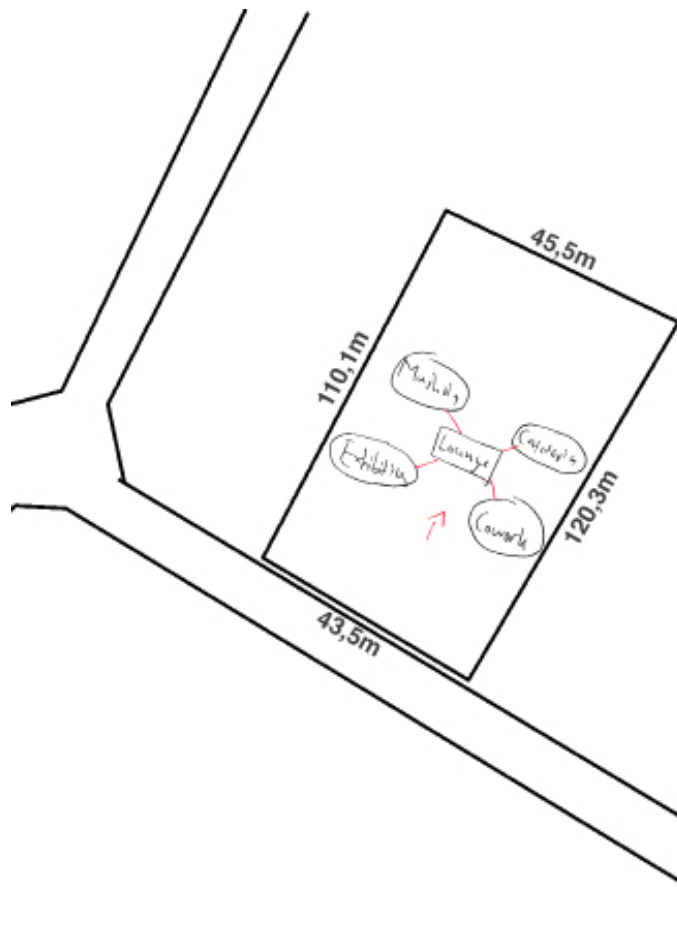


Figure 3.8 Function Arrangement
(source: Author, 2021)

Exhibition Hall and Coworking Space could be placed in front as the main inviting functions of the building, followed up by lounge that act as the center part of the site where people can circulate from one function to another. Supporting functions should be placed on the back.

3.2.3 Vegetation Arrangement to Reduce Surrounding Noise

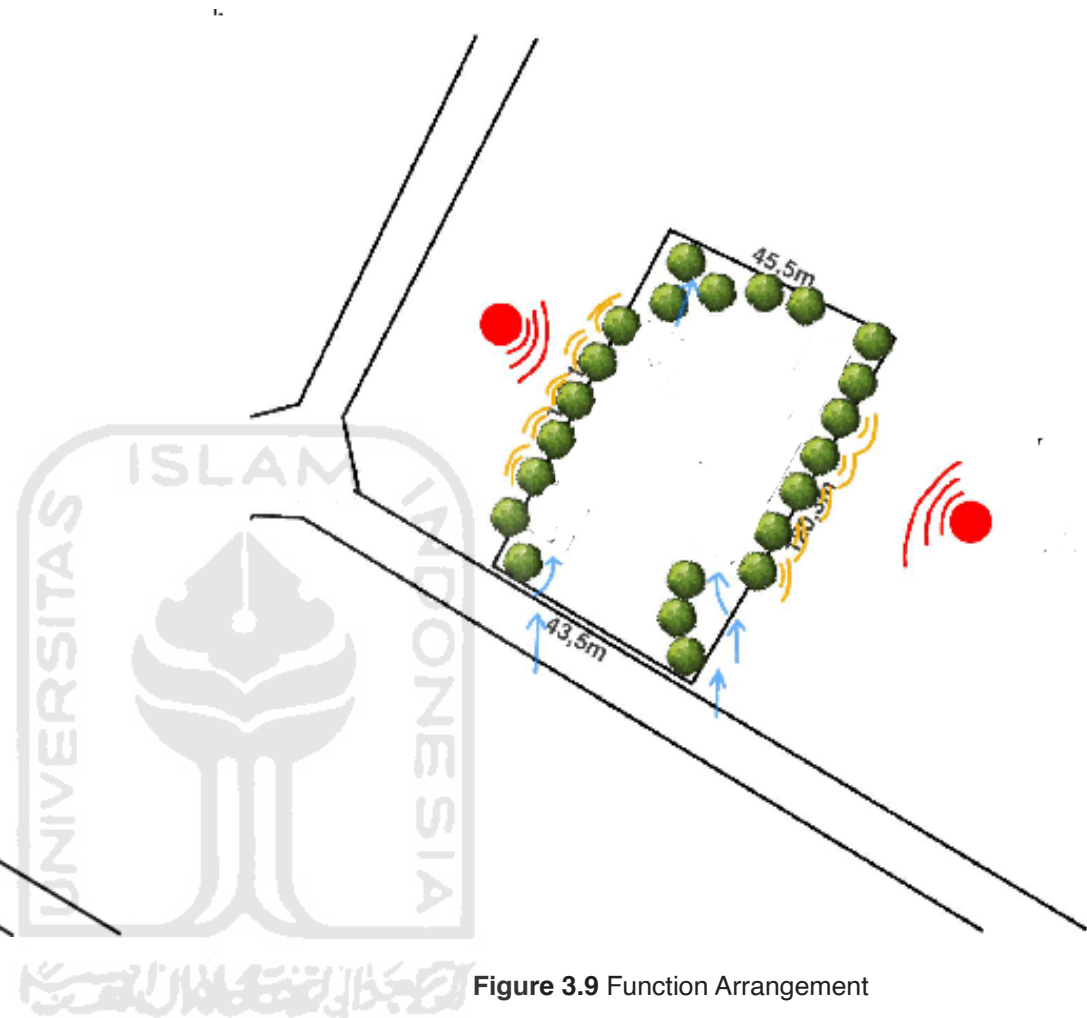


Figure 3.9 Function Arrangement
(source: Author, 2021)

Two considering factors in deciding landscaping are: windrose and noise source. In regards of windrose, as the strongest wind flew from South to North, adjustment in windflow is needed. With vegetations act as a wind guider, windflow can be directed to building mass to enable cross ventilation system.

As for noise source, it is needed to cancel the noise directly from the source. Due to the noise source comes from both sides of the site, some vegetations are needed to be arranged there to cancel or minimize the noise.

3.2.4 Access Circulation to Support User's Accessibility

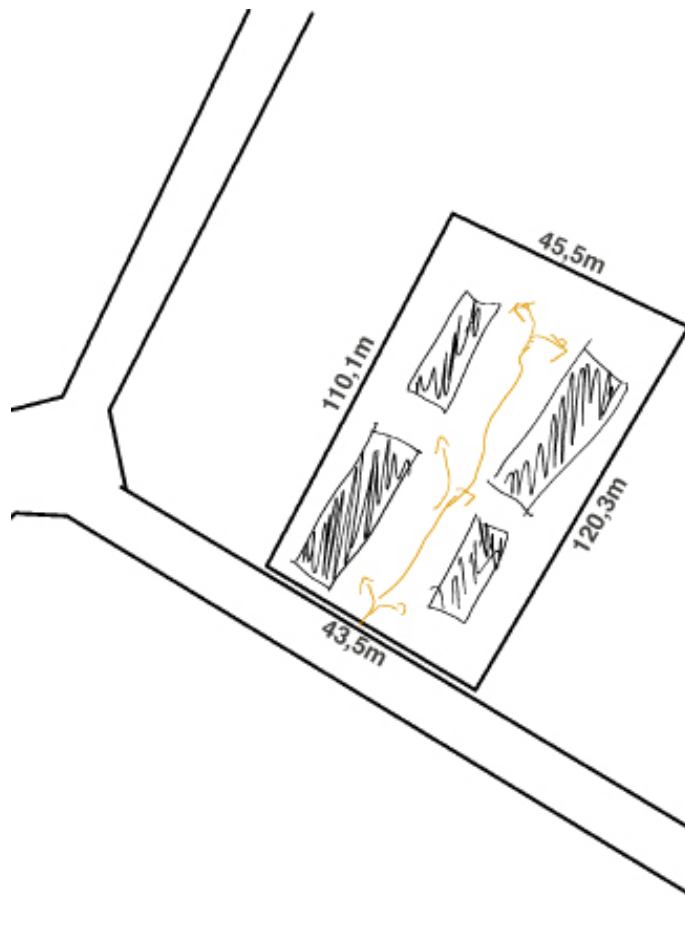


Figure 3.10 Access Circulation
(source: Author, 2021)

Due to each functions' distinct location and placement on the site. User should be able to walk from one to another through connected open space rather than through inner lobby. This accessibility concept can be supported with dedicated circulatory building where people can go to second storey through that building in the center.

3.2.5 Gathering Spaces to Support Collaboration

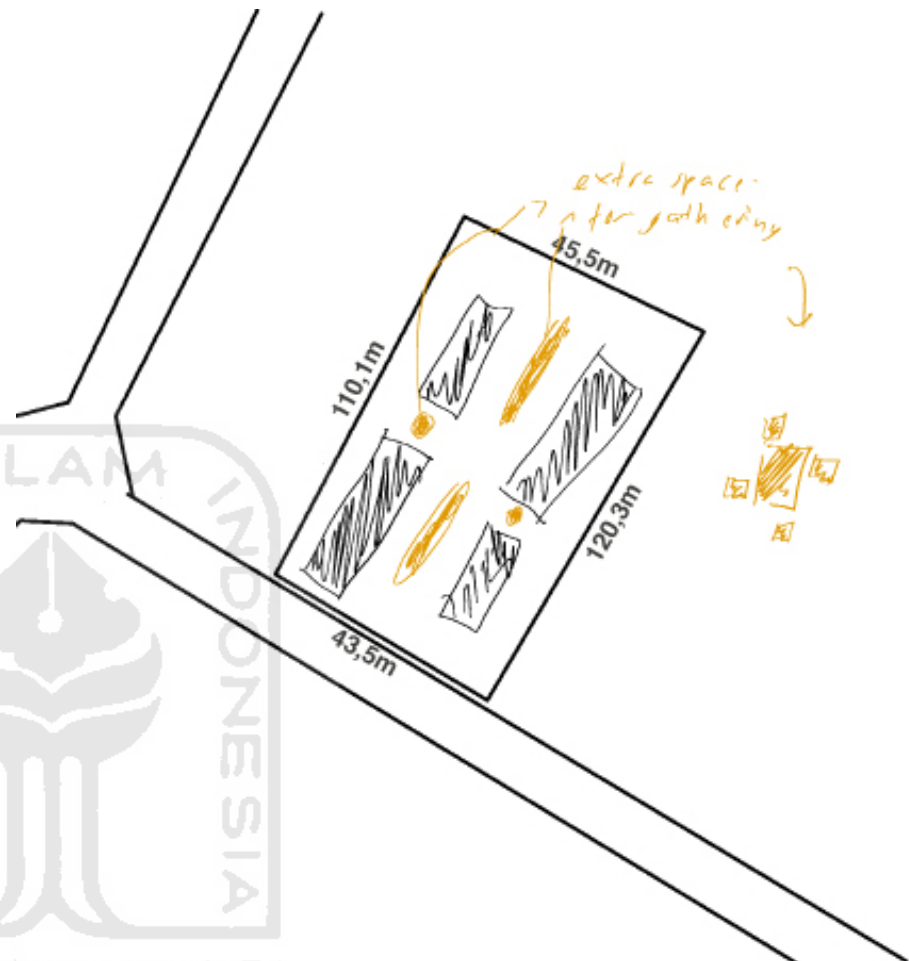


Figure 3.11 Gathering Spaces
(source: Author, 2021)

Extra space in between buildings are free space which can be used as additional gathering spaces for the users. This offer different atmosphere as most of other gathering spaces of are located inside of the building masses.

3.3 BUILDING FORMS

3.3.1 Building Form Suiting User Activity

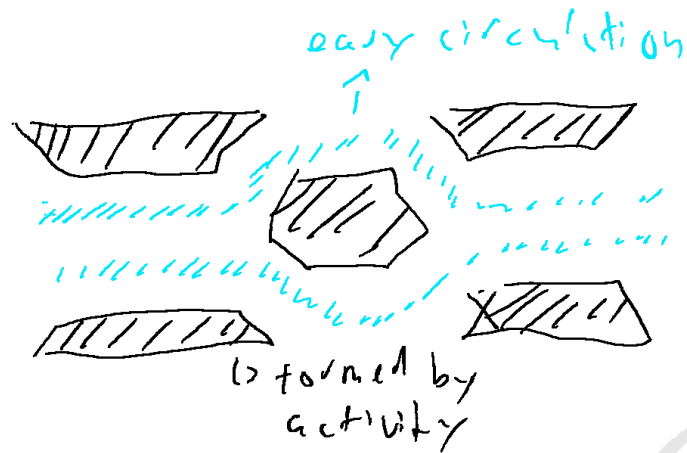


Figure 3.12 Building Form Suiting Activity
(source: Author, 2021)

The form of the building is affected by what activities are held/what function they provide. Coworking space and exhibition hall having different kind of form even though located directly above and under one and another due to different function they have.

3.3.2 Building Form Adjust to Circulation System for User's Accessibility

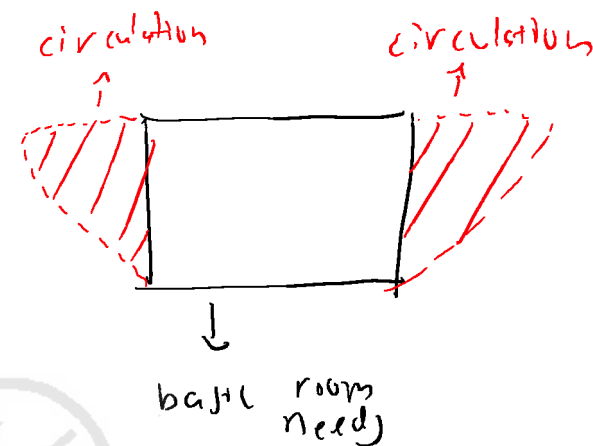
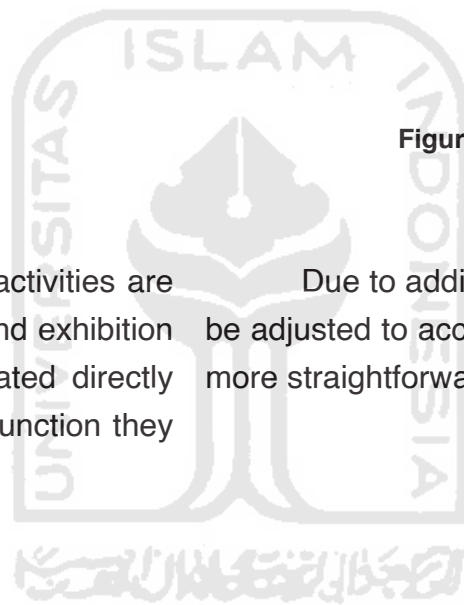


Figure 3.13 Building Form Suiting Circulation
(source: Author, 2021)

Due to addition to circulation system, the building form will be adjusted to accommodate stair or ramp. The addition is done in more straightforward way to not disturb main function.



3.3.3 Inviting Building Form to Attract Potential User

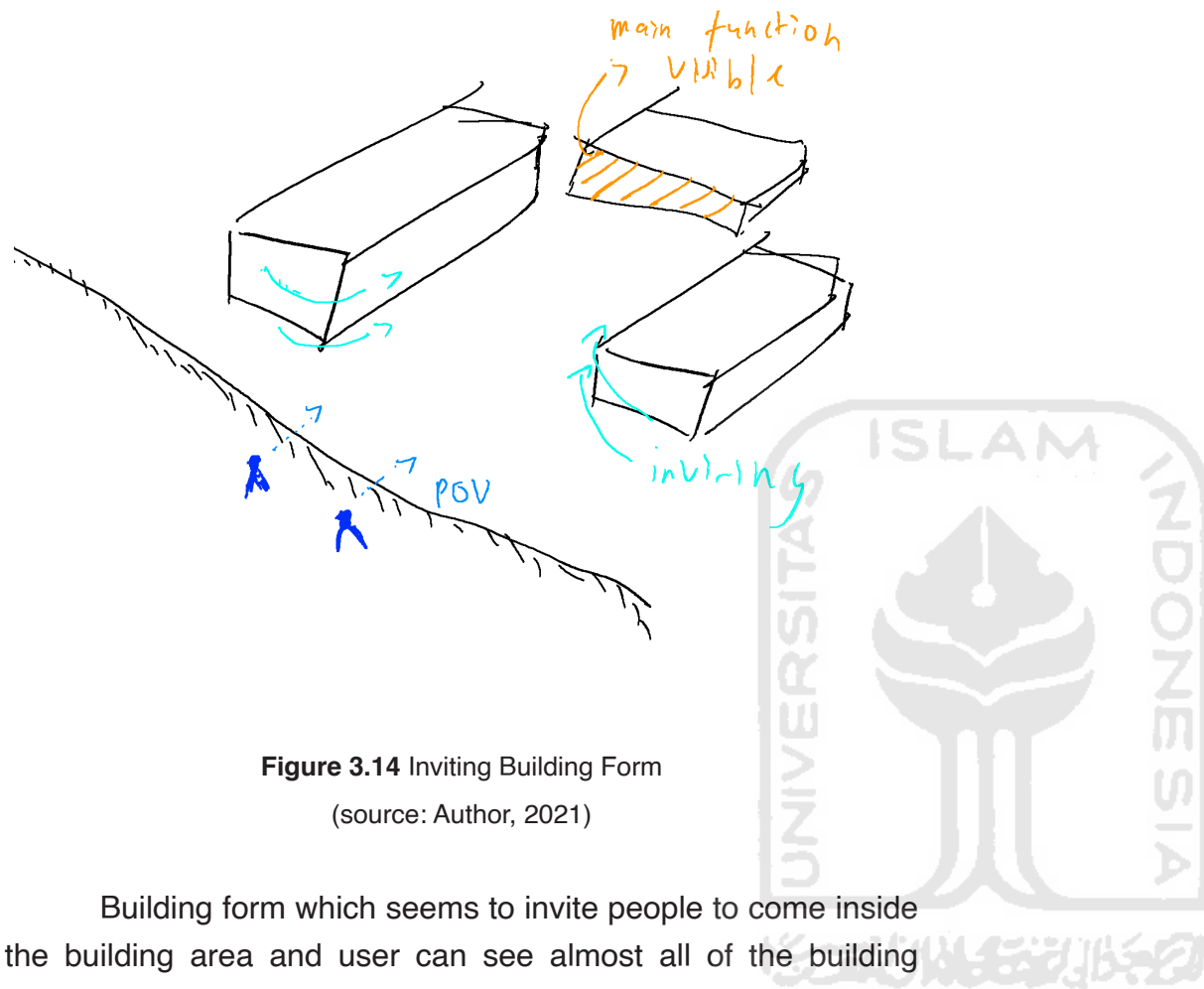


Figure 3.14 Inviting Building Form
(source: Author, 2021)

Building form which seems to invite people to come inside the building area and user can see almost all of the building masses will intrigue their interest to come visit the building.

3.4 BUILDING ELEMENTS

3.4.1 Double Skin Façade to Maximize Daylighting and Natural Air Ventilation

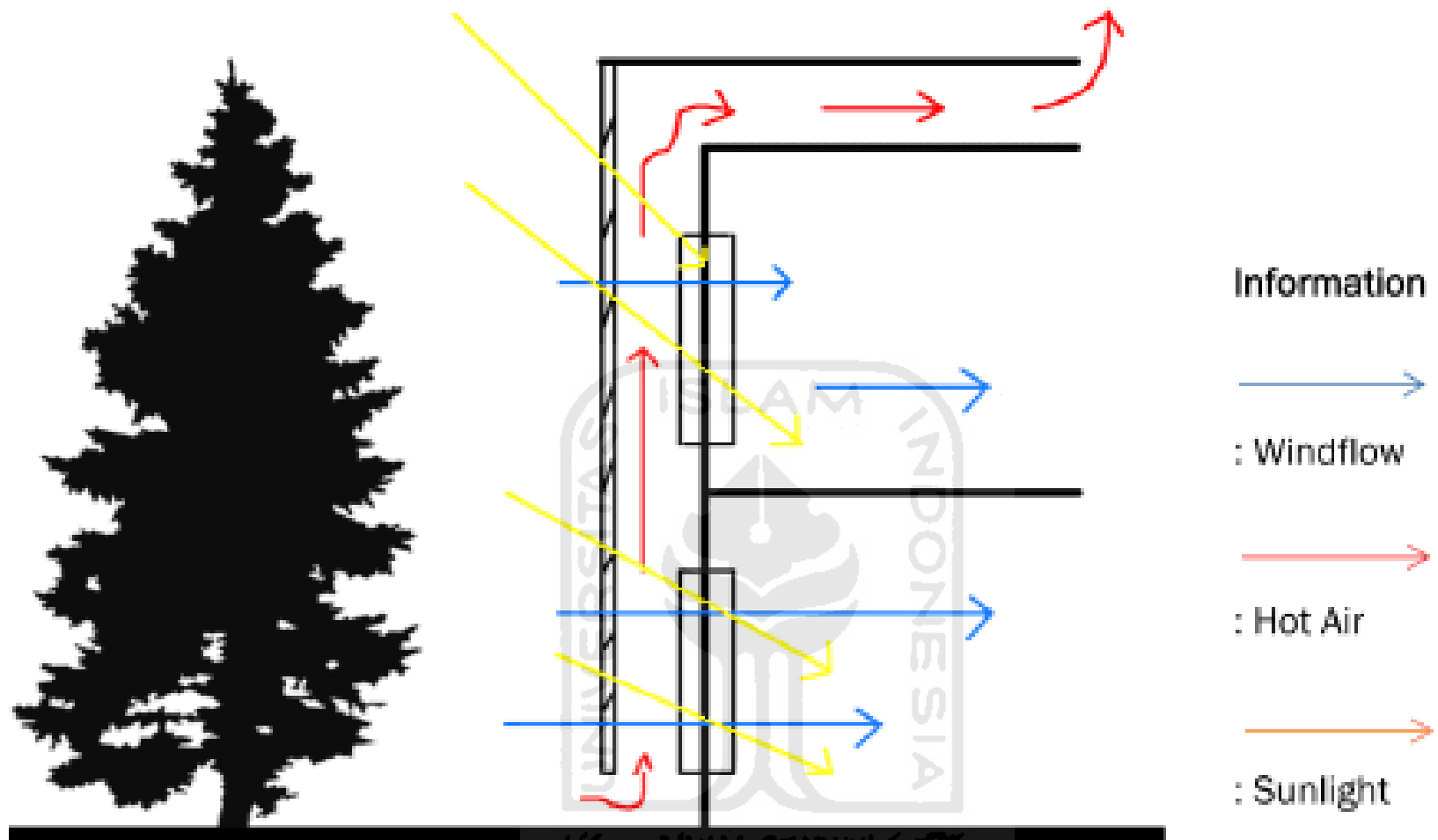


Figure 3.15 Double Skin Concept

(source: Author, 2021)

Double skin façade in tropical climate will tend to be open skin rather than closed approach similar to in Europe/Sub-Tropical. With this implementation, passive system will be more prevalent in cooling/lighting the building due to the openings while the skin façade act more of shading of daylighting and hot air circulation. With this alternative, it is needed to dug air canal which will be connected to the envelope itself as cooling mechanism. Not only just at the wall, but the canal is connected to the roof as well, if this system implemented in a comprehensive way, it will have huge impact.

3.4.2 Exhibition Hall/Co-Working Space Layout Depending on Activity

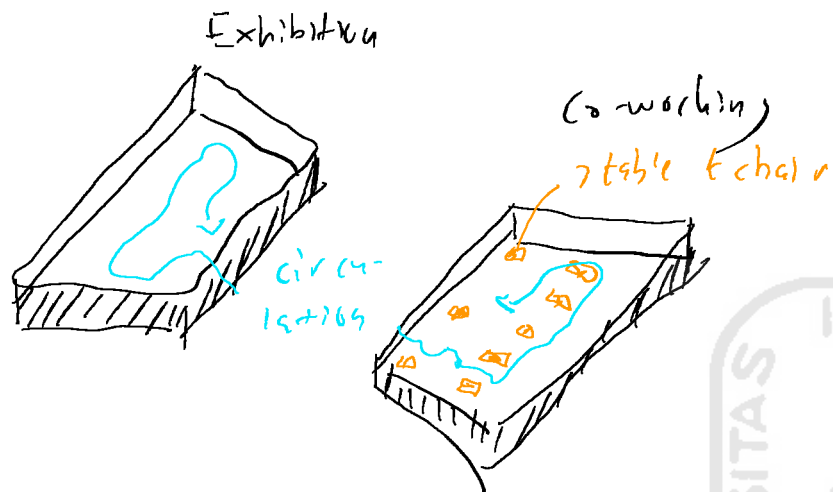


Figure 3.16 Exhibition Hall/Co-Working Space Layout

(source: Author, 2021)

Exhibition hall can be transformed into coworking space when the space is in vacant. The layout matters as it still need to provide the best for the users.

3.4.3 Rentable Office Space/Co-Working Space Layout Depending on its Availability

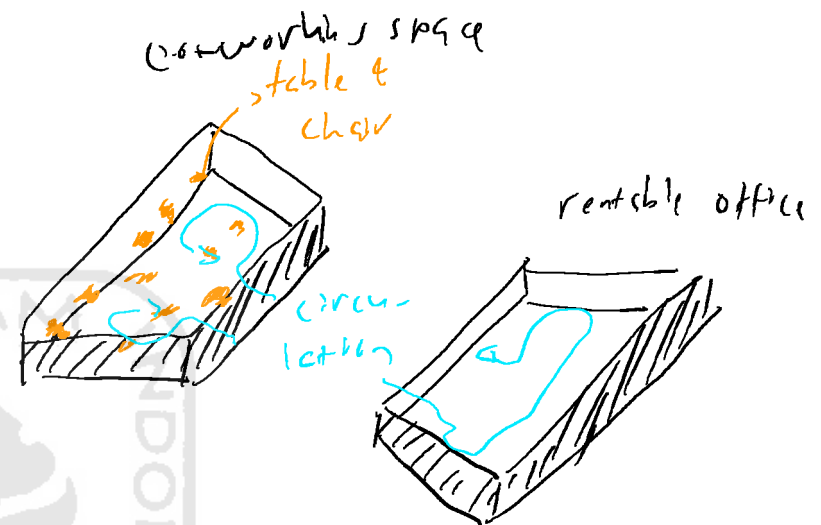


Figure 3.17 Rentable Office Space/Co-Working Space Layout

(source: Author, 2021)

Rentable office space on second floor can also be transformed into coworking space when it is vacant. The layout is more straight forward as the two functions are similar in a way.

3.4.4 Roof Structural System Supporting Secondary Skin

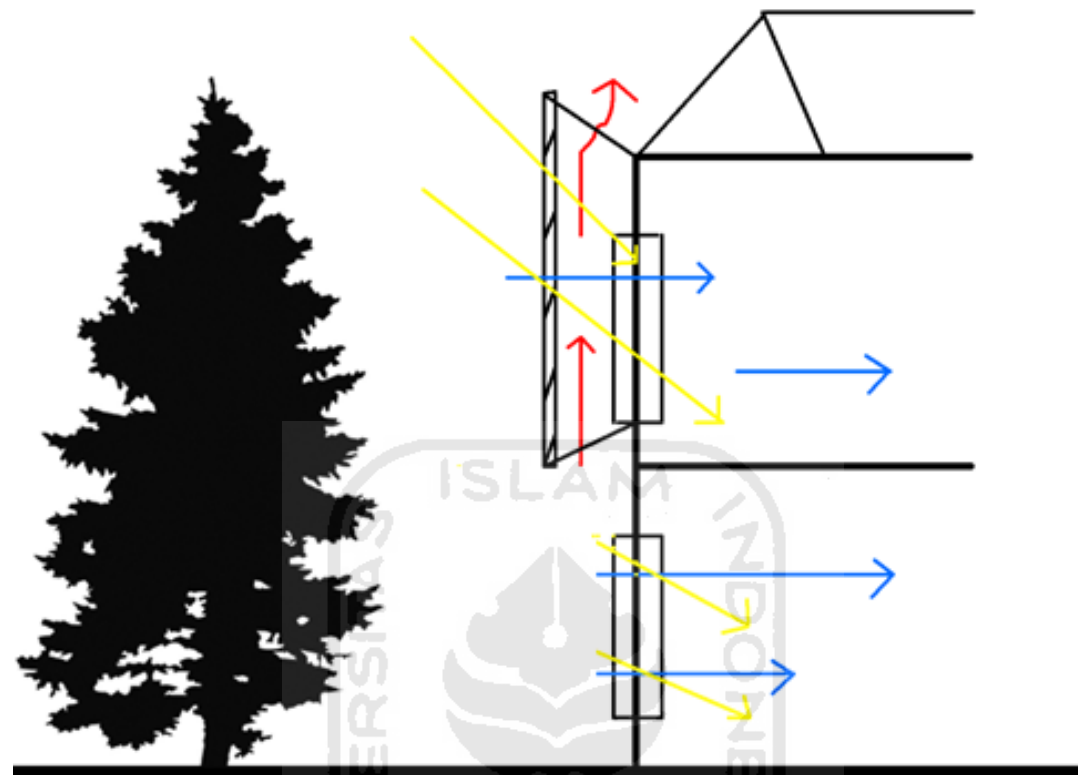


Figure 3.18 Double Skin Structural Support
(source: Author, 2021)

Secondary skin are attached or interconnected with roof structure. This is done to reduce overall structural weight to envelope which maybe consist of glass material.

Chapter 4

Building Design

Description

The chapter contains final design based from concept exploration done in previous chapter.

The final design will focus on solving main problems regarding Double Skin Facade performance to user's comfort and adaptability of building space usage.

Contents

4.1 Integration in Site Planning and Building Mass Consideration for Maximizing Passive Systems

4.2 Building Design to Support Existing Concepts

4.3 Building Elements and Systems Design

4.4 Simulation

4.1 INTEGRATION OF SITE PLANNING AND BUILDING MASS

4.1.1 Building Mass Arrangement to Maximize Passive Systems

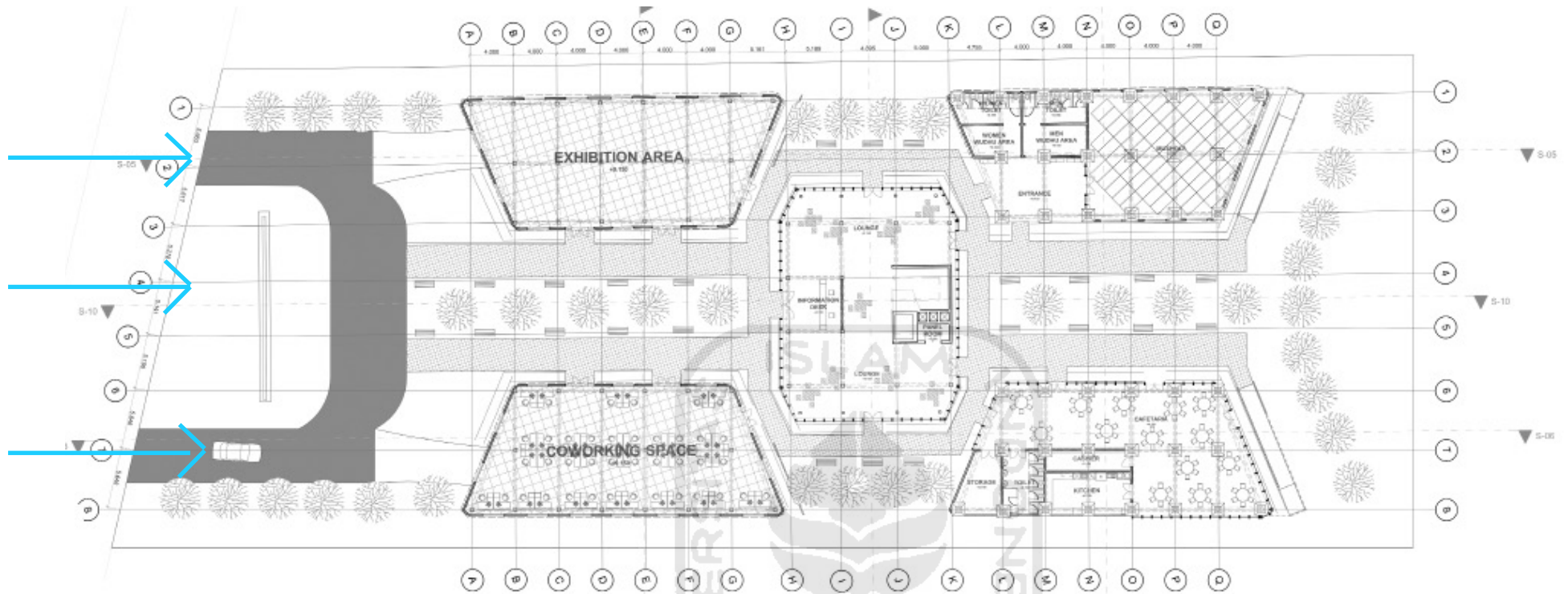


Figure 4.1 Integration of Site Planning and Building Mass

(source: Author, 2021)

It can be seen that the building mass avoid direct sun radiation, while the back building is protected by secondary skin. it can be seen that the building mass will in direction with the strongest wind flow to provide cross ventilation system, while the center building will have many opening to cool it down from direct sunlight radiation

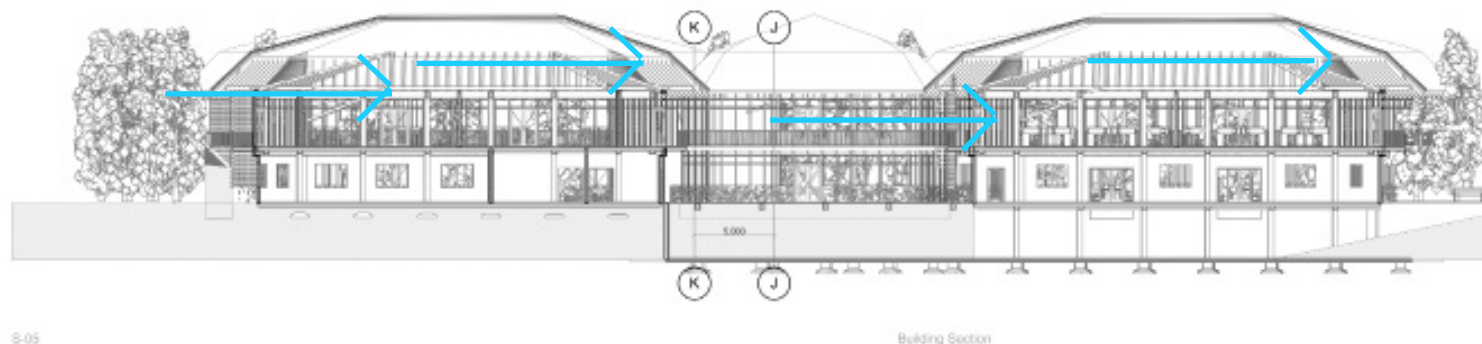


Figure 4.2 Integration of Site Planning and Building Mass

(source: Author, 2021)

4.1.2 Function Arrangement inside of the Building Mass

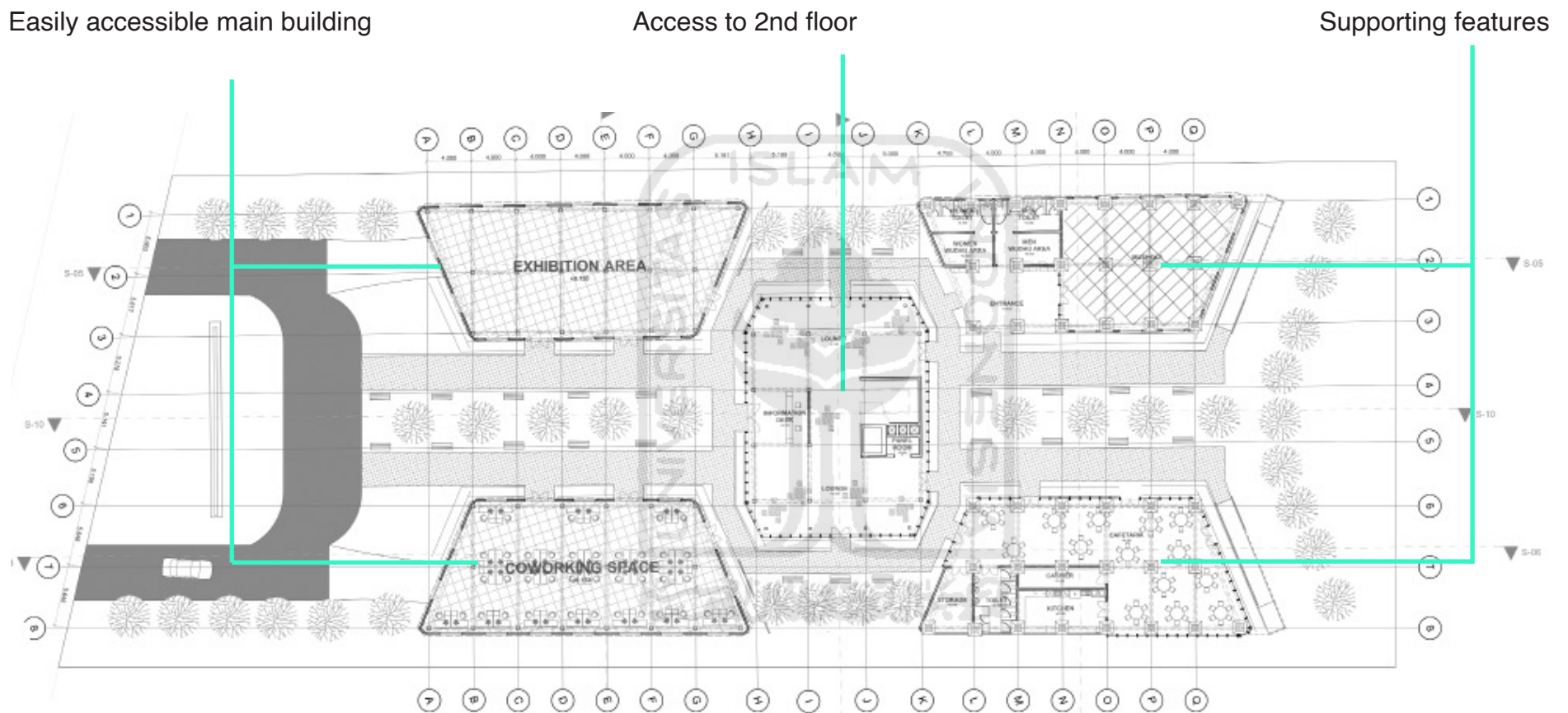


Figure 4.3 Function Arrangement Reason

(source: Author, 2021)

Exhibition Hall and Coworking Space could be placed in front as the main inviting functions of the building, followed up by lounge that act as the center part of the site where people can circulate from one function to another. Supporting functions should be placed on the back.

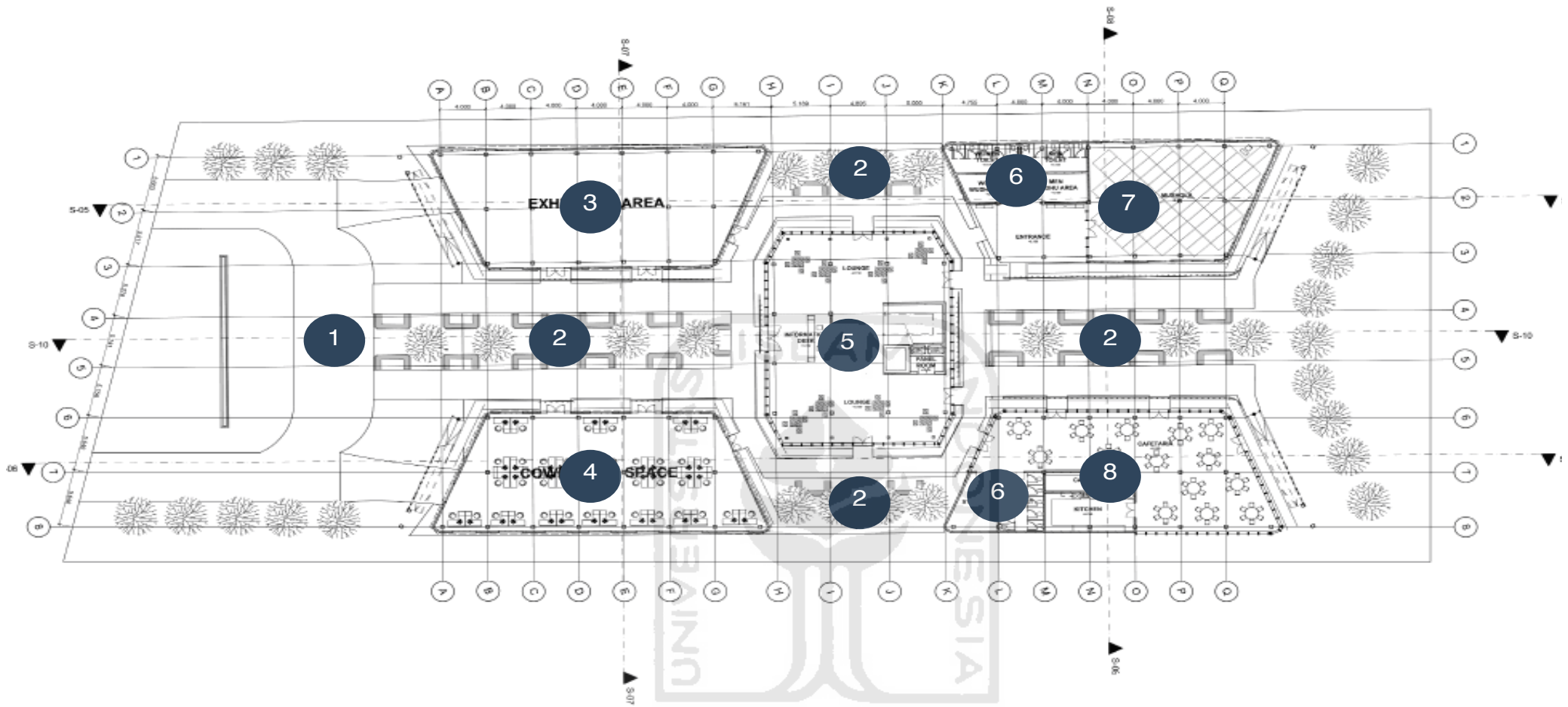


Figure 4.4 Function Arrangement

(source: Author, 2021)

INFORMATION

1. DROP-OFF
2. OUTDOOR GATHERING SPACES
3. EXHIBITION HALL
4. CO-WORKING SPACE
5. INDOOR GATHERING SPACE / LOUNGE
6. TOILET
7. MUSHOLA
8. CAFETARIA

3D Axonometry

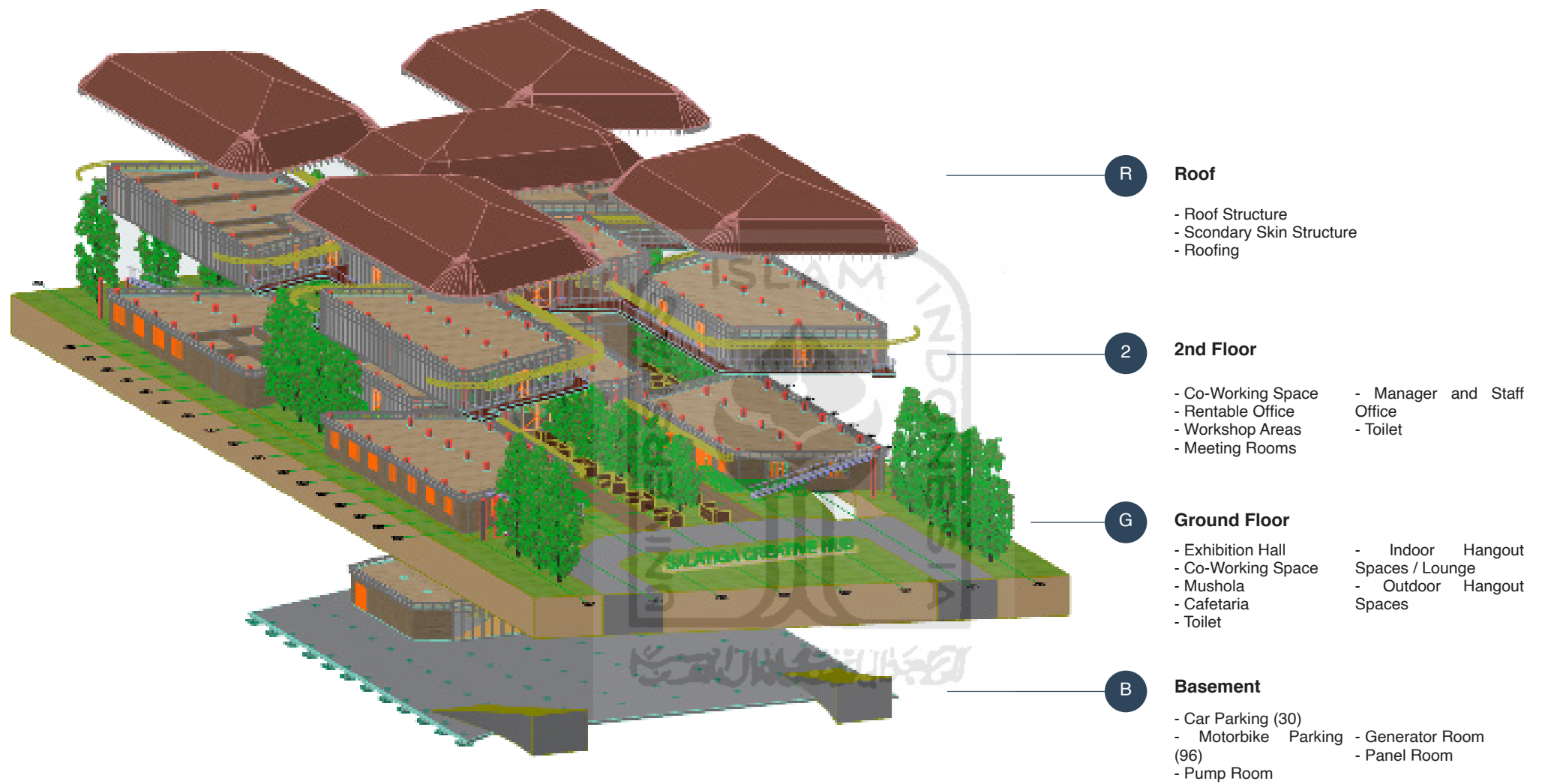


Figure 4.5 3D Axonometry
(source: Author, 2021)

4.1.3 Vegetation Arrangement to Reduce Surrounding Noise

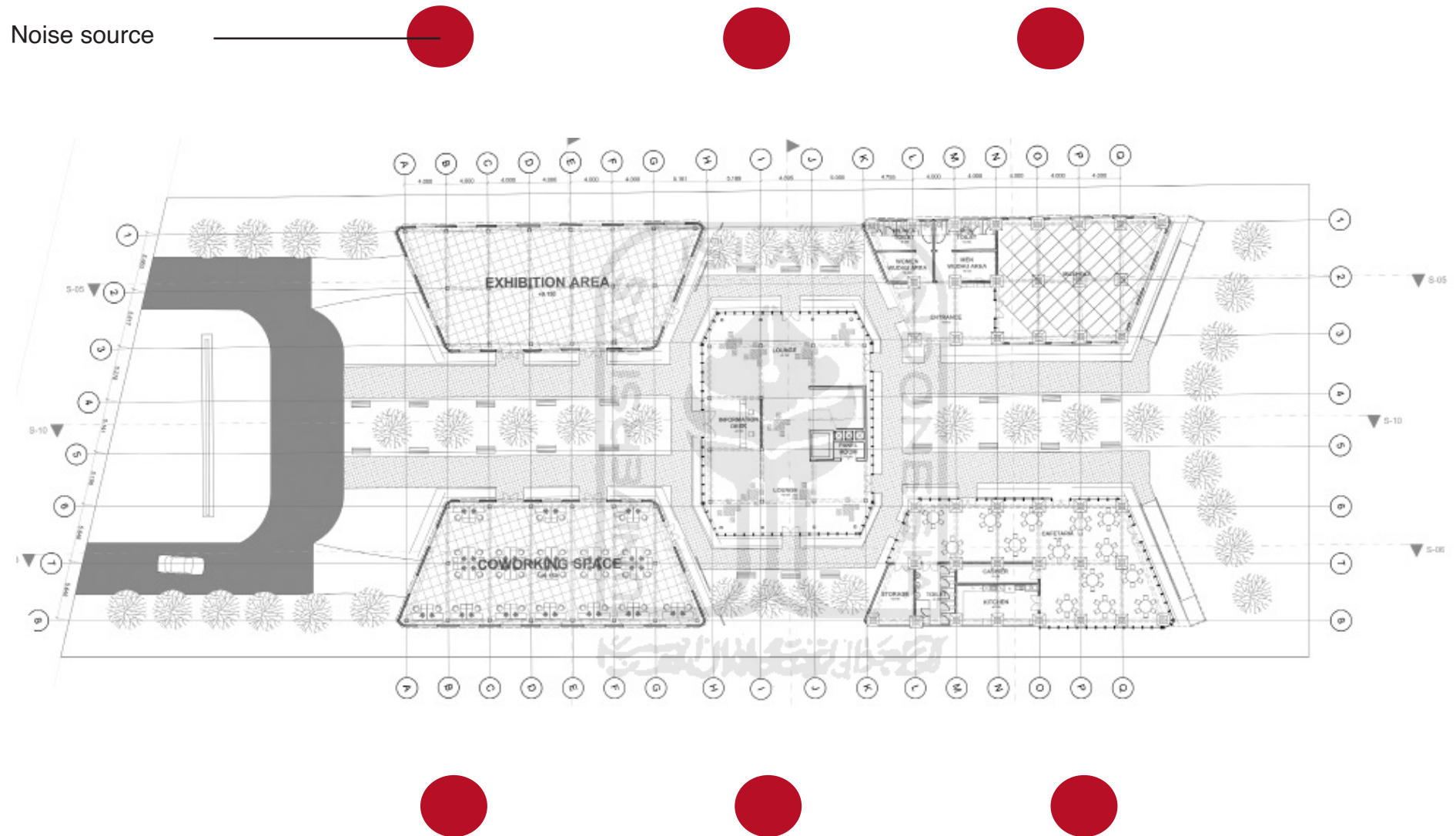


Figure 4.6 Vegetation Arrangement Reason

(source: Author, 2021)

Two considering factors in deciding landscaping are: windrose and noise source. In regards of windrose, as the strongest wind flew from South to North, adjustment in windflow is needed. With vegetations act as a wind guider, windflow can be directed to building mass to enable cross ventilation system.

As for noise source, it is needed to cancel the noise directly from the source. Due to the noise source comes from both sides of the site, some vegetations are needed to be arranged there to cancel or minimize the noise.

4.1.4 Access Circulation to Support User's Accessibility

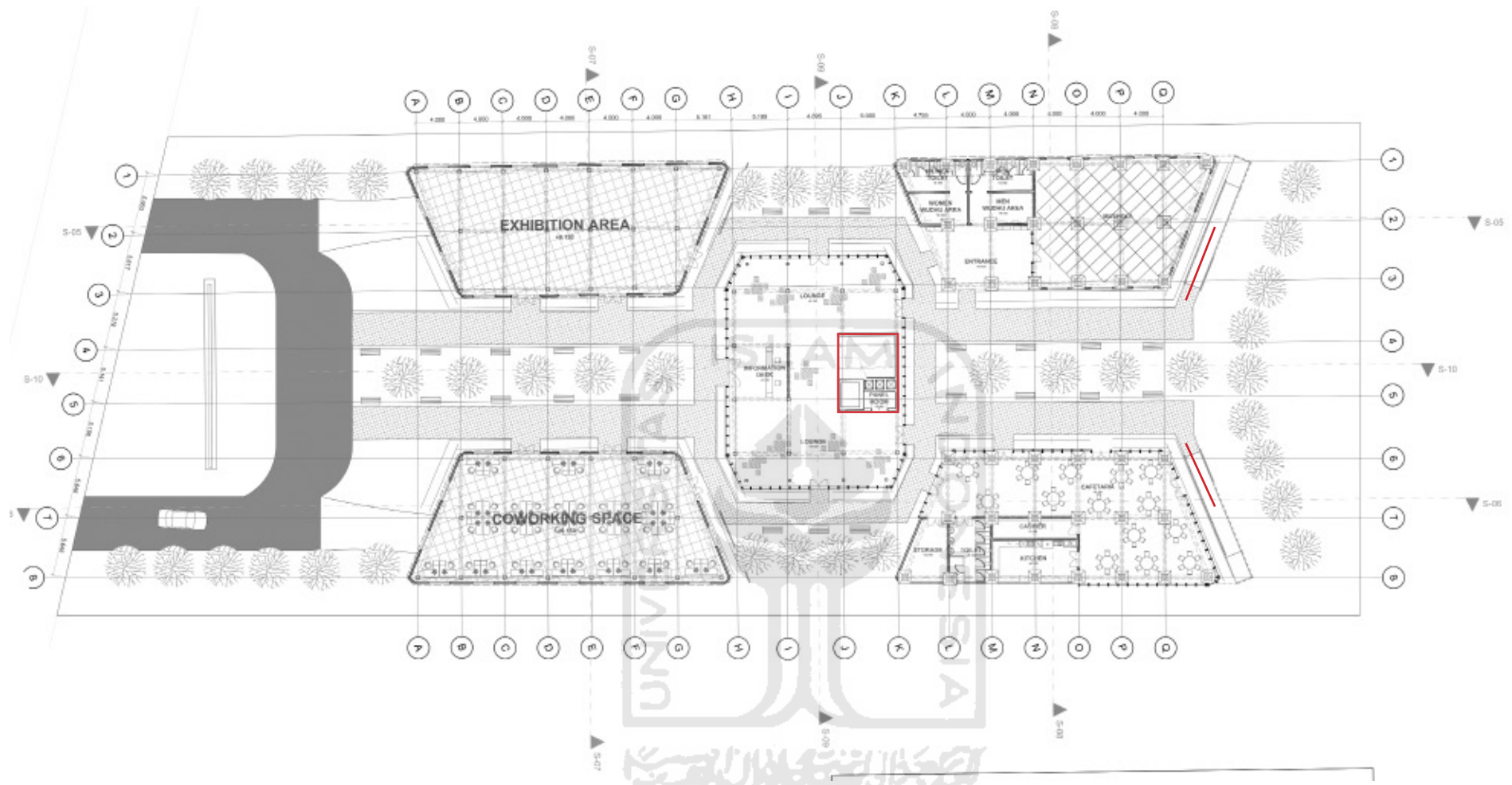


Figure 4.7 Access Circulation to Support User

(source: Author, 2021)



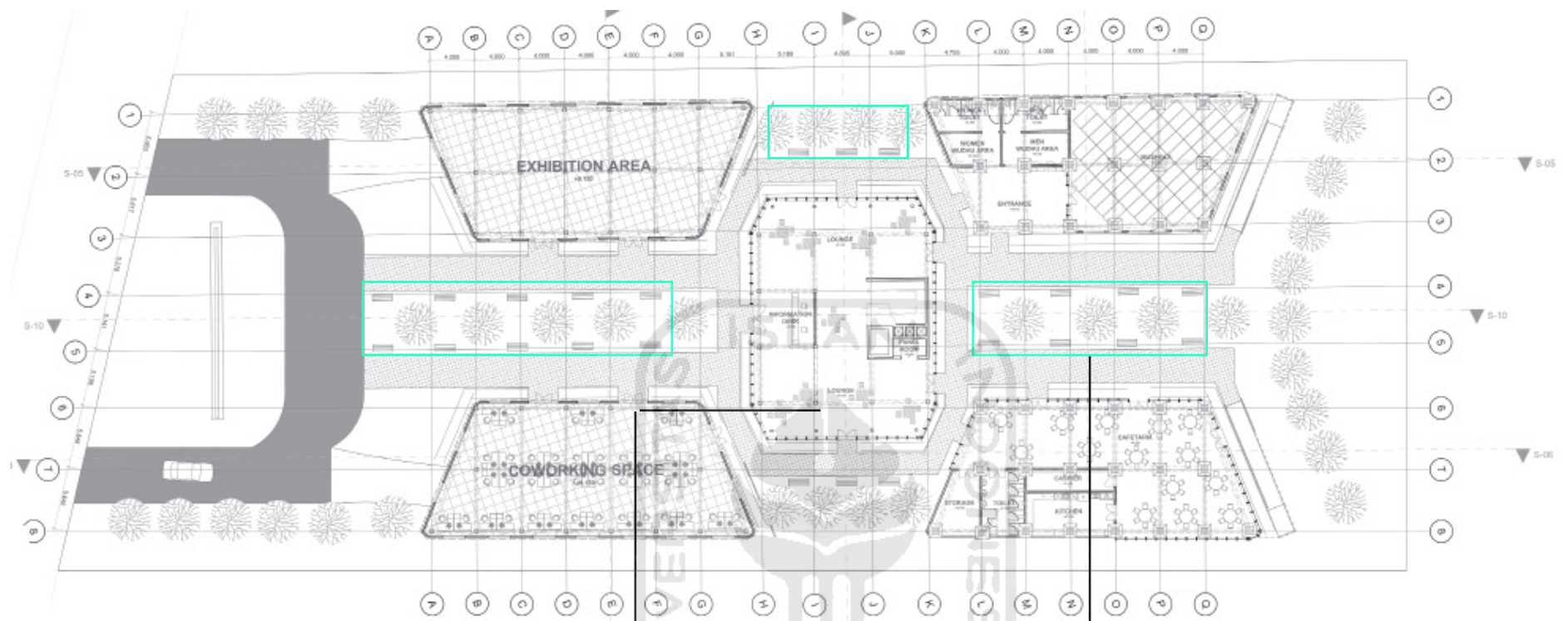
= ELEVATOR AND STAIR



= RAMP

Elevator, stair and ramp are placed in corners of building and in the center building of this site for easy accessibility for both normal and disabled users.

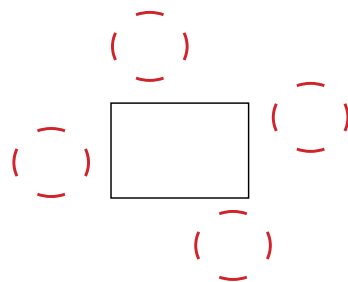
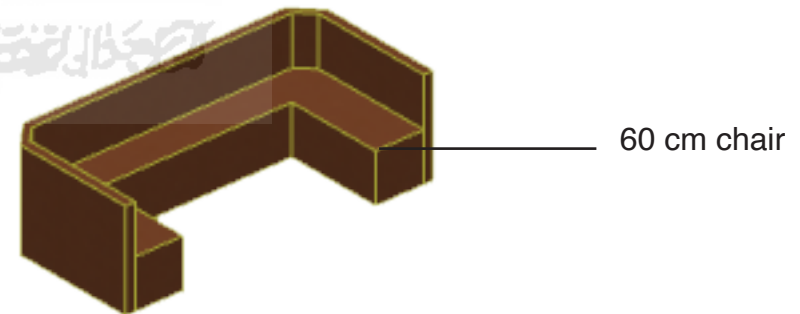
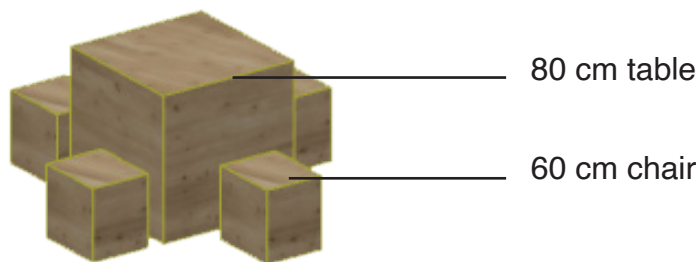
4.1.5 Gathering Spaces to Support Collaboration



Indoor

Outdoor

Figure 4.8 Gathering Spaces to Support
(source: Author, 2021)



Indoor hangout space provide better support in table and electricity socket. It is more formal but all of the people has same space.



Outdoor hangout space is more flexible and has a layout to support interaction. It is tho has less supporting facility,

Figure 4.9 Indoor Space Detail
(source: Author, 2021)

Figure 4.10 Outdoor Space Detail
(source: Author, 2021)

4.2 BUILDING DESIGN TO SUPPORT EXISTING CONCEPTS

4.2.1 Building Form Suiting User Activity

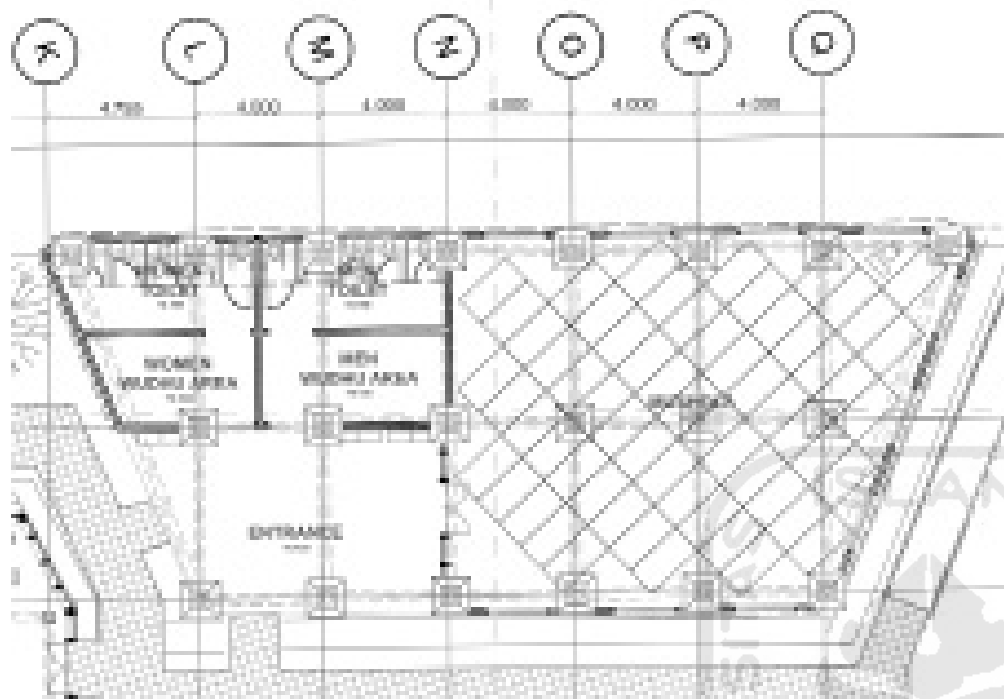


Figure 4.11 Building Form Suiting User Activity
(source: Author, 2021)

It can be seen that in both the plan and section of the building the spaces are maximalize to support user's or management need. The adjustment of building form has the reason to add space and better space atmosphere for the users.

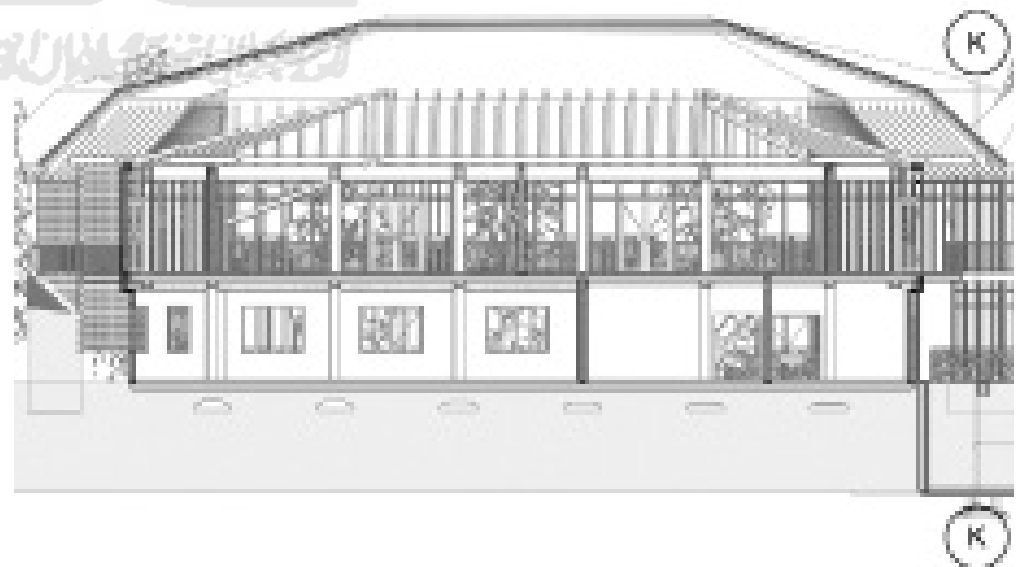


Figure 4.12 Building Form Suiting User Activity
(source: Author, 2021)

4.2.2 Building Form Adjust to Circulation System for User's Accessibility

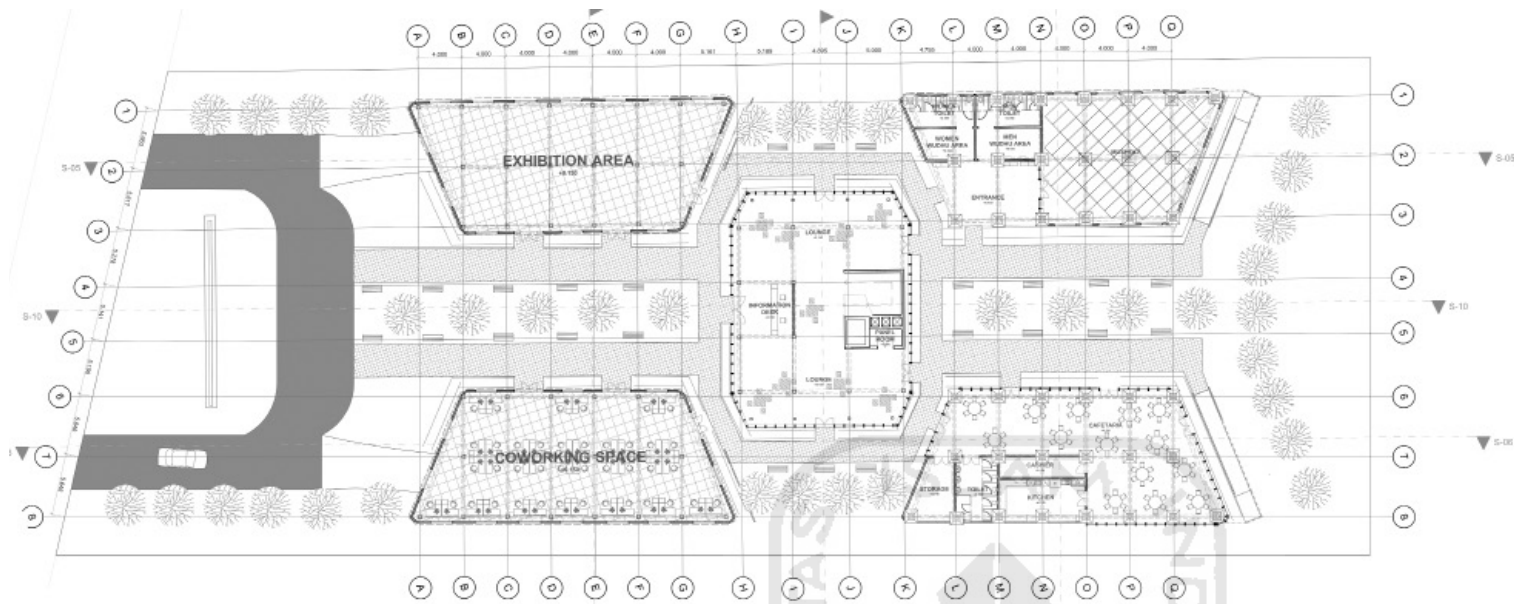


Figure 4.13 Building Form Adjust to Circulation System
(source: Author, 2021)

It can be seen that the circulation of site and on the building is formed from the gap of each building. This is done to ease user's mobility from one building to another as each function is located nearly to one and another.

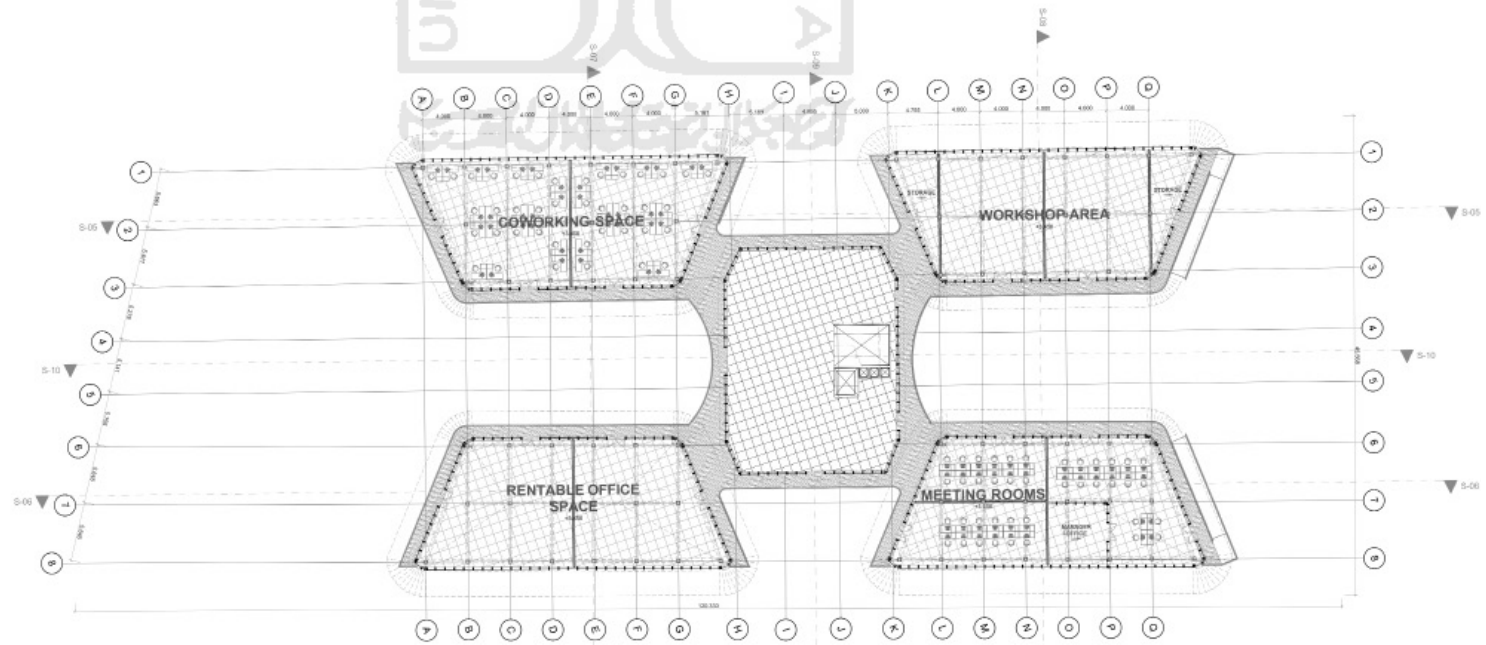


Figure 4.14 Building Form Adjust to Circulation System
(source: Author, 2021)

4.2.3 Inviting Building Form to Attract Potential User



Figure 4.15 Inviting Building Form to Attract Potential User
(source: Author, 2021)

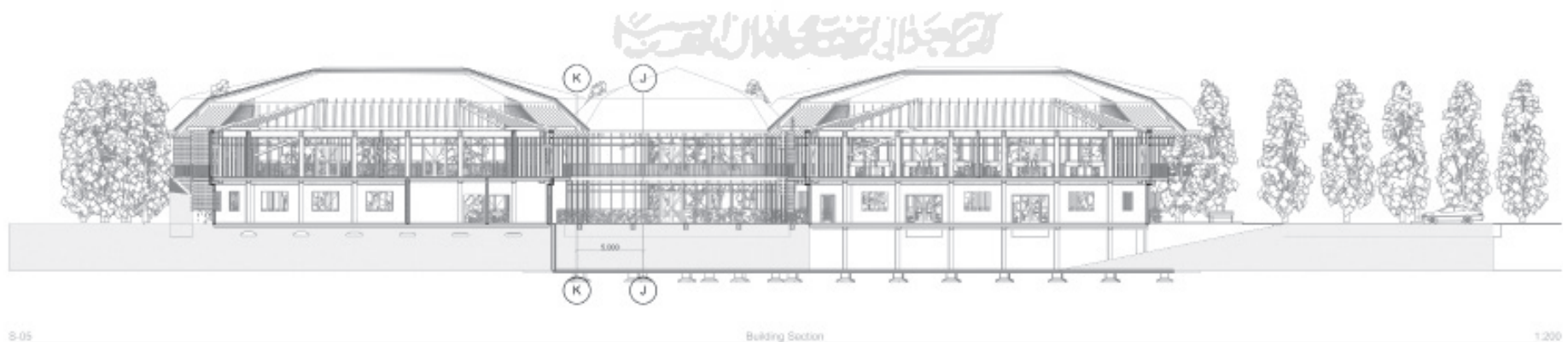


Figure 4.16 Inviting Building Form to Attract Potential User
(source: Author, 2021)

Building masses are design in a way to welcome people which see the building from the road, and the building envelope allows them to see what are the main function inside of the building. Coworking Space, Exhibition Hall, and Lounge are all visible from the main road, to further peak user's interest.

4.3 BUILDING ELEMENTS AND SYSTEMS DESIGN

4.3.1 Double Skin Façade to Maximize Daylighting and Natural Air Ventilation

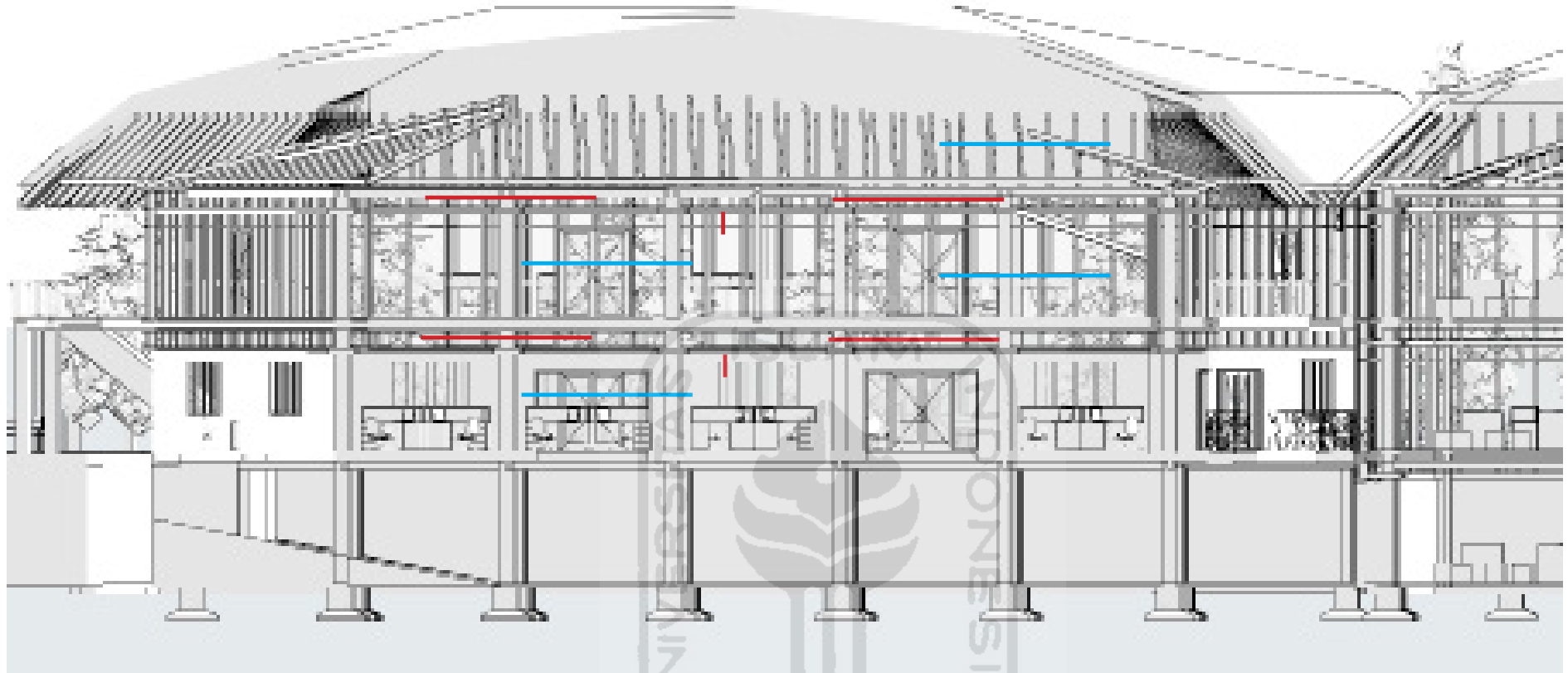
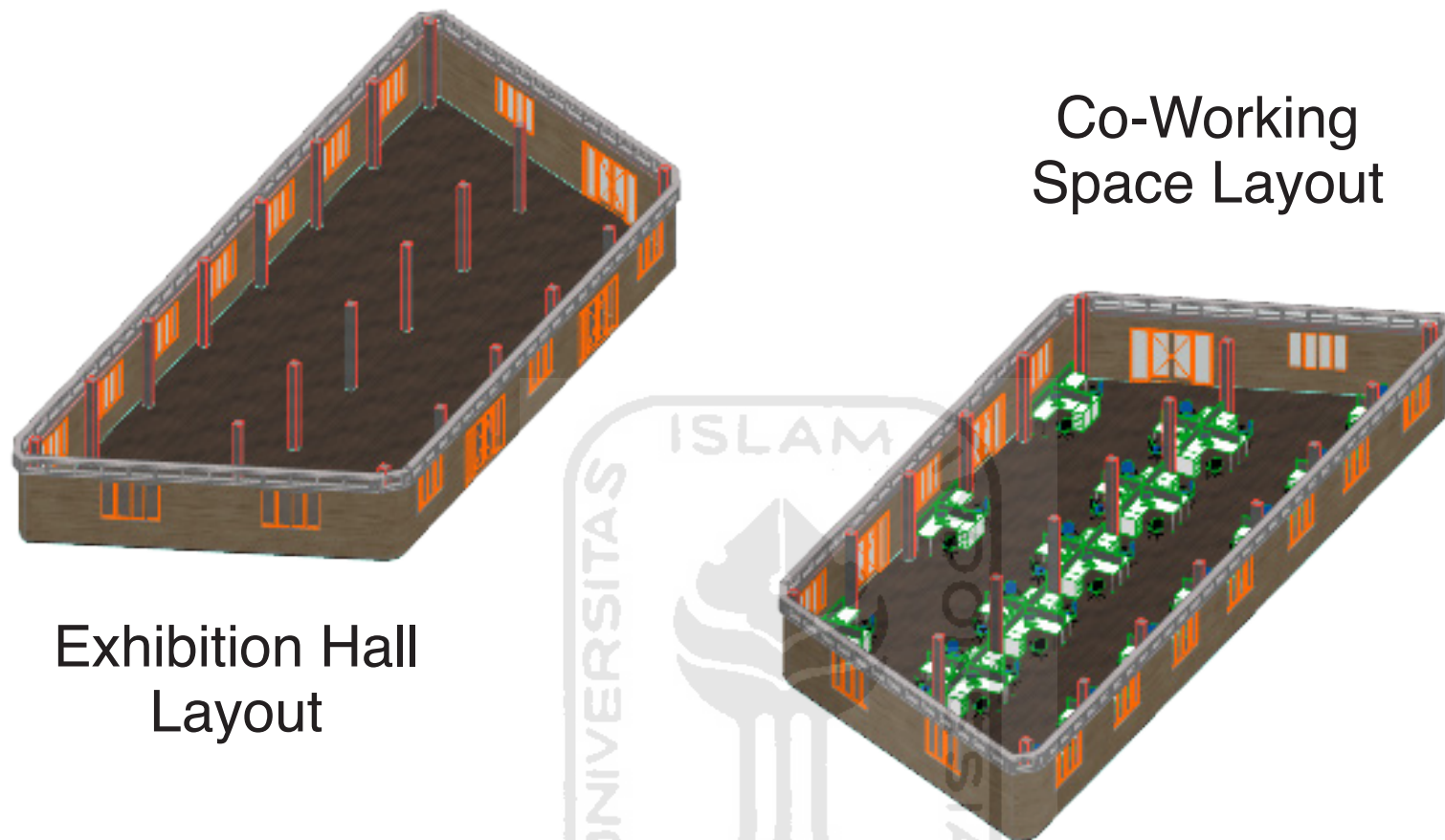


Figure 4.17 Double Skin Façade Mechanism

(source: Author, 2021)

This implementation of Double Skin Facade integrated with passive system will be more prevalent in cooling/lighting the building due to the openings while the skin façade act more of shading of daylighting and hot air circulation. It is also connected to the envelope itself which has cross openings to work as cooling mechanism.

4.3.2 Exhibition Hall/Co-Working Space Layout Depending on Activity



Exhibition Hall
Layout

Co-Working
Space Layout

Figure 4.18 Exhibition Hall/Co-Working Space Layout
(source: Author, 2021)

Front building are a designated Exhibition Hall/Coworking space area in which on special occasion it can be used as exhibition hall while on daily basis it can be used as Coworking space to maximize space usage. The layout of the Coworking space will adjust available space as collaborating work is done on the center and individual worker can work on the sides.

On the first floor, Exhibition Hall and Co-Working Space have the same area of **299,278m²**.

Salatiga is have some emerging batik/display art industry. On occasion the space can be used to promote their product, while if there is no vent, then the room will be adjusted on Co-Working Space to maximize building usage.

4.3.3 Rentable Office Space/Co-Working Space Layout Depending on its Availability

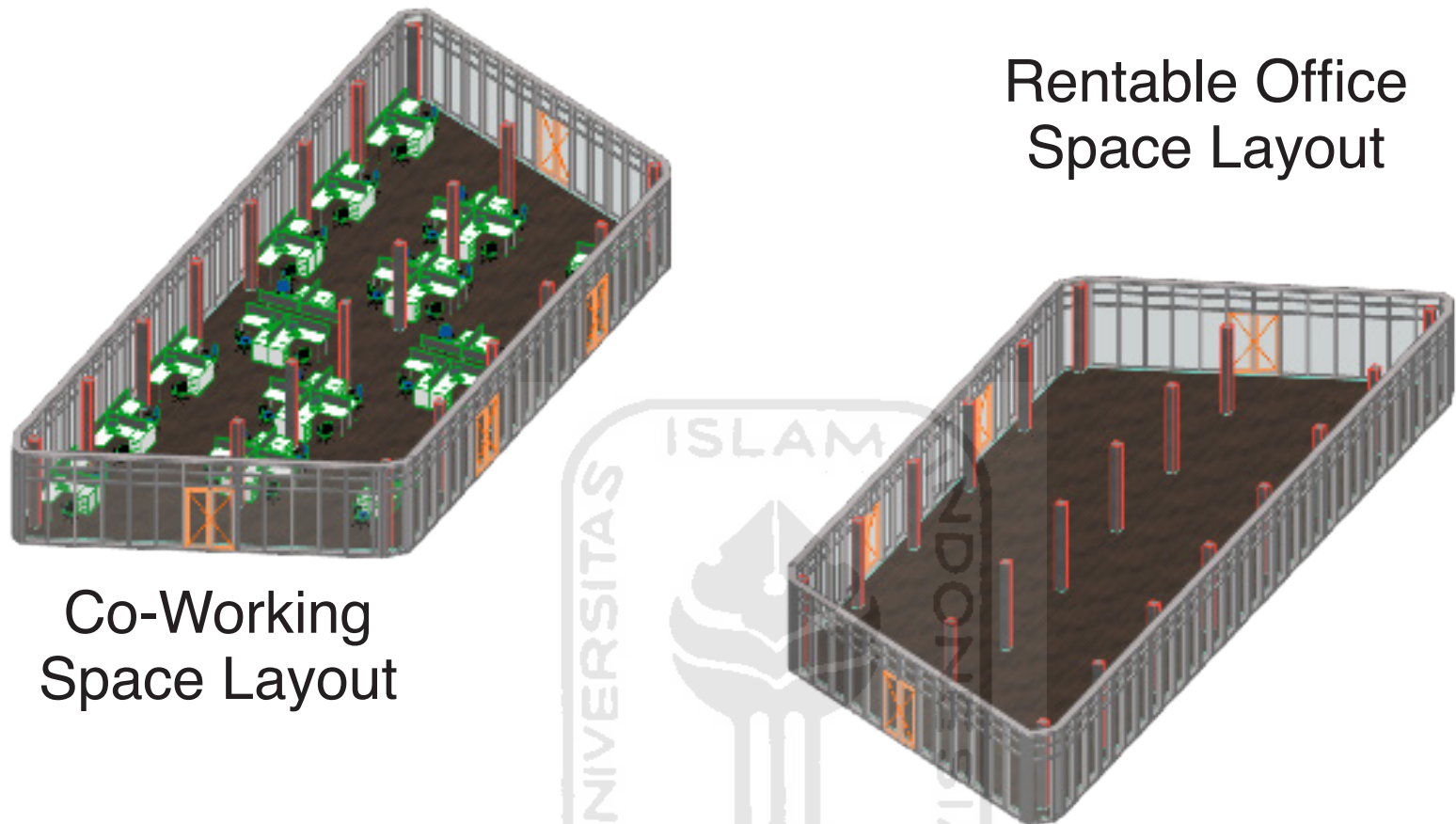
Co-Working
Space LayoutRentable Office
Space Layout

Figure 4.19 Rentable Office Space/Co-Working Space Layout
(source: Author, 2021)

Second floor of front building are a designated Rentable Office Space/Coworking space area in which where there is an indie or branching company can rent their office here while on daily basis it can be used as Coworking space to maximize space usage. The layout of the Coworking space will adjust available space as collaborating work is done on the center and individual worker can work on the sides. The difference with the first floor is that the space is cut in half.

On the second floor, Co-Working Space and Rentable Office Space have the same area of **299,278m²**.

If there is no rent, then the room will be adjusted on Co-Working Space to maximize building usage. If there is a rent then it can be used as Rentable Office Space to promote office growth in Salatiga.

4.3.4 Roof Structural System Supporting Secondary Skin

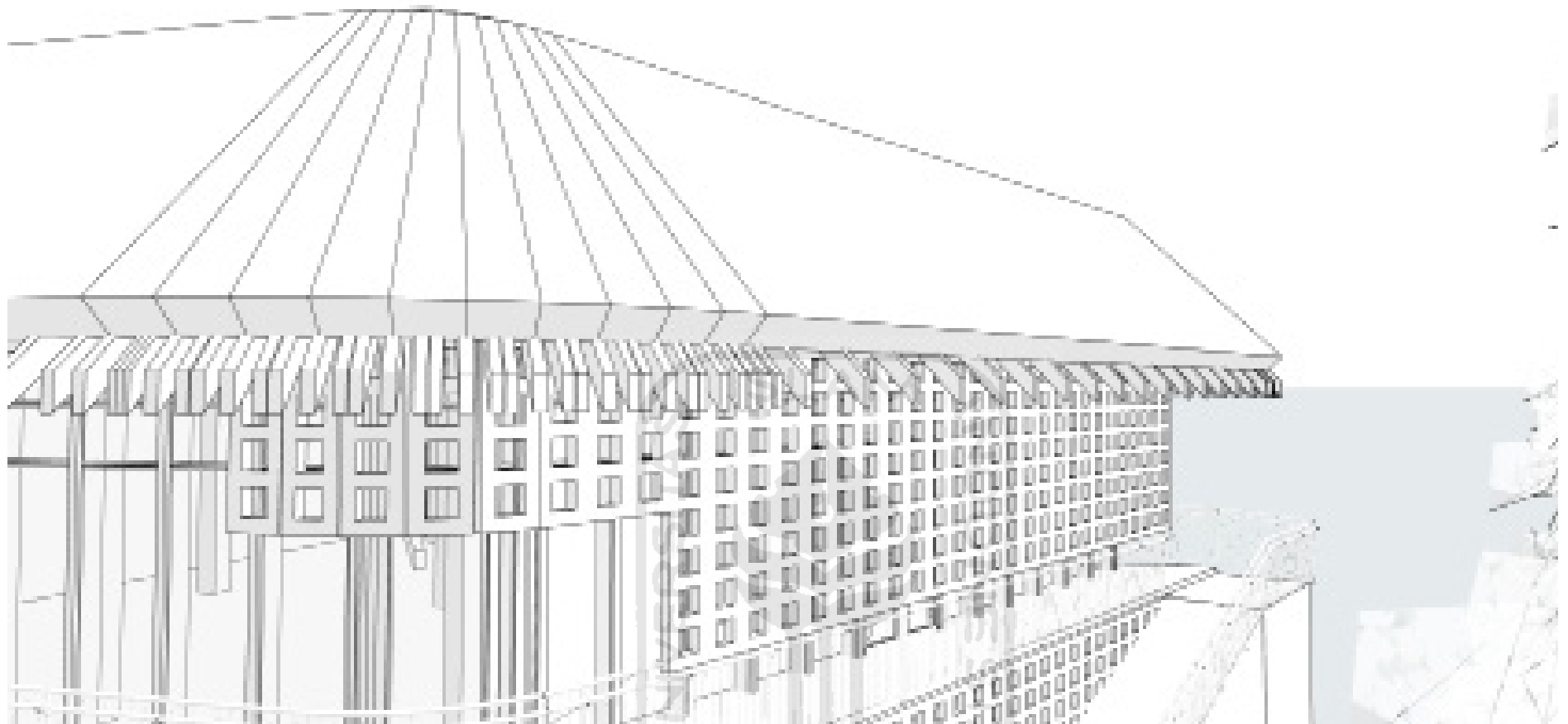


Figure 4.20 Roof Structural System Supporting Secondary Skin
(source: Author, 2021)



Secondary skin are attached or interconnected with roof structure. This is done to reduce overall structural weight to envelope which maybe consist of glass material. The secondary skin is attached on the stalk of the roof structure.

Figure 4.21 Roof Structural System Supporting Secondary Skin
(source: Author, 2021)

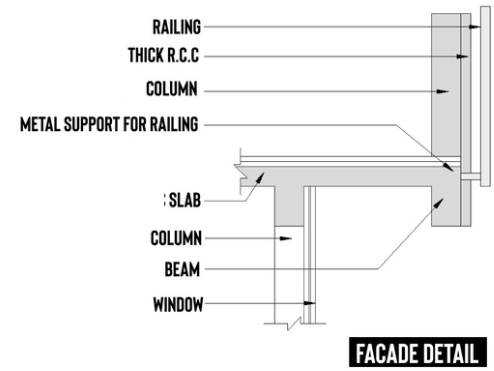
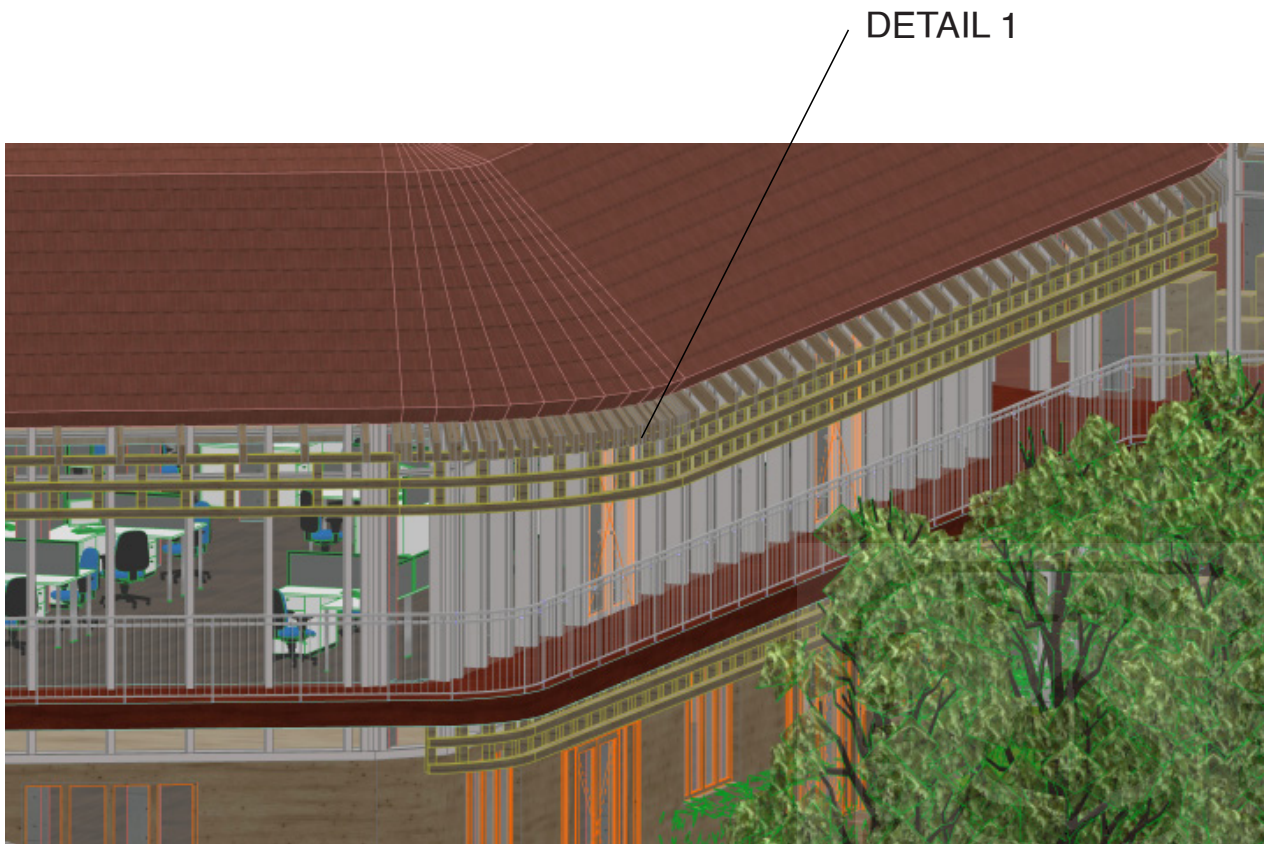


Figure 4.22 Facade Detail

(source: Author, 2021)

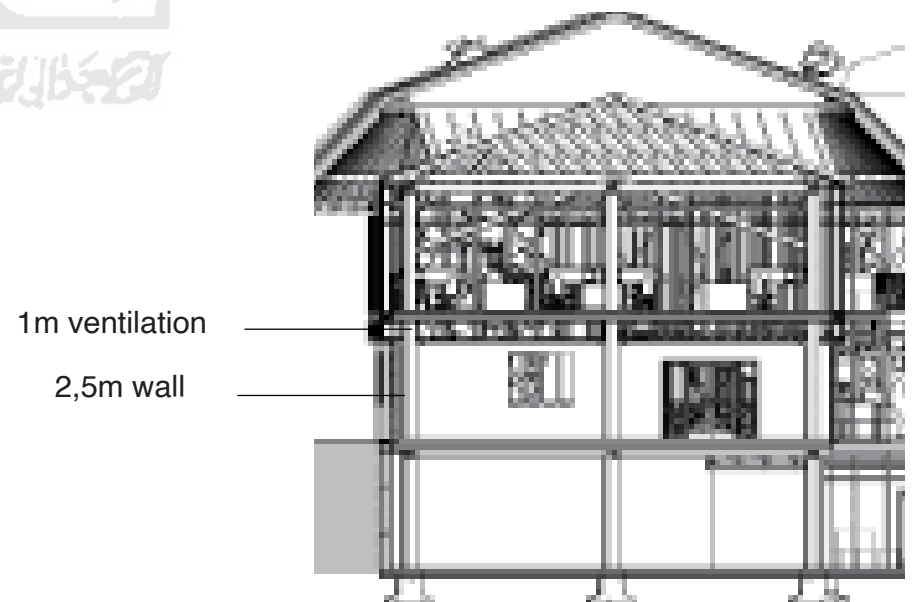


Figure 4.23 Envelope Detail

(source: Author, 2021)

STRRUCTURE AXONOMETRY

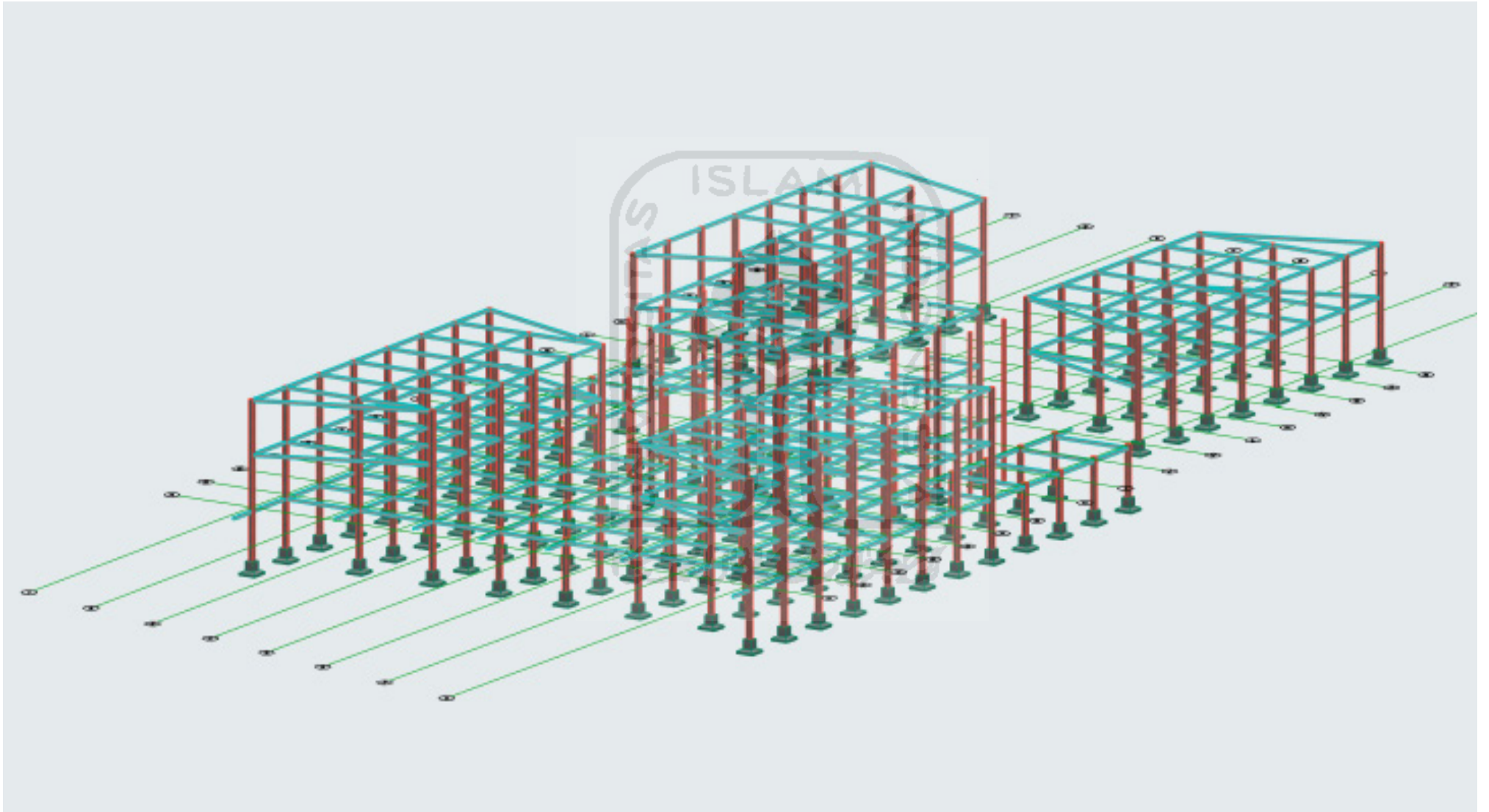


Figure 4.24 Structure Axonometry

(source: Author, 2021)

4.4 SIMULATION AND CONCLUSION

4.4.1 Simulation 4.4.1.1 Auto Desk Flow Design

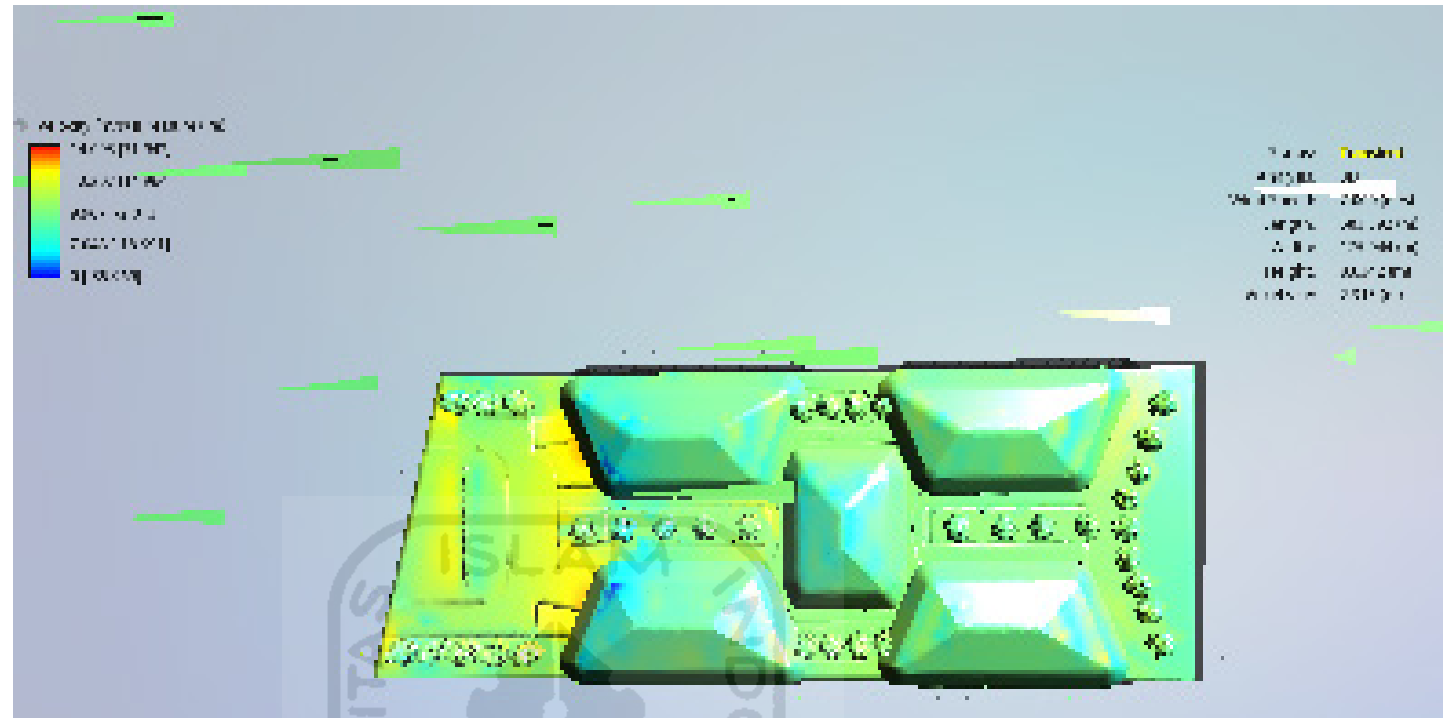


Figure 4.25 AutoDesk Simulation
(source: Author, 2021)

4.4.1.2 VELUX

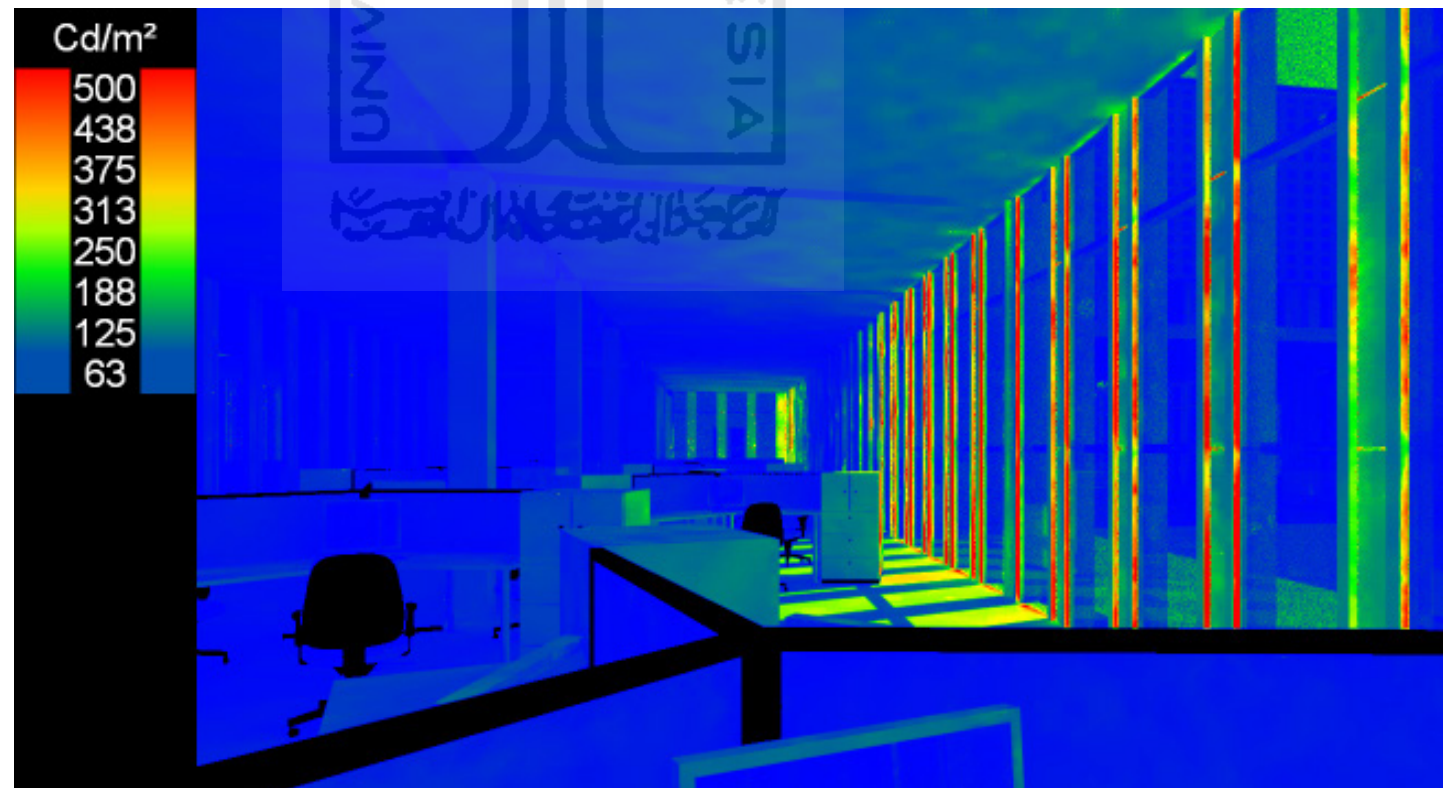


Figure 4.26 Velux Simulation
(source: Author, 2021)

Chapter 5

Design Evaluation


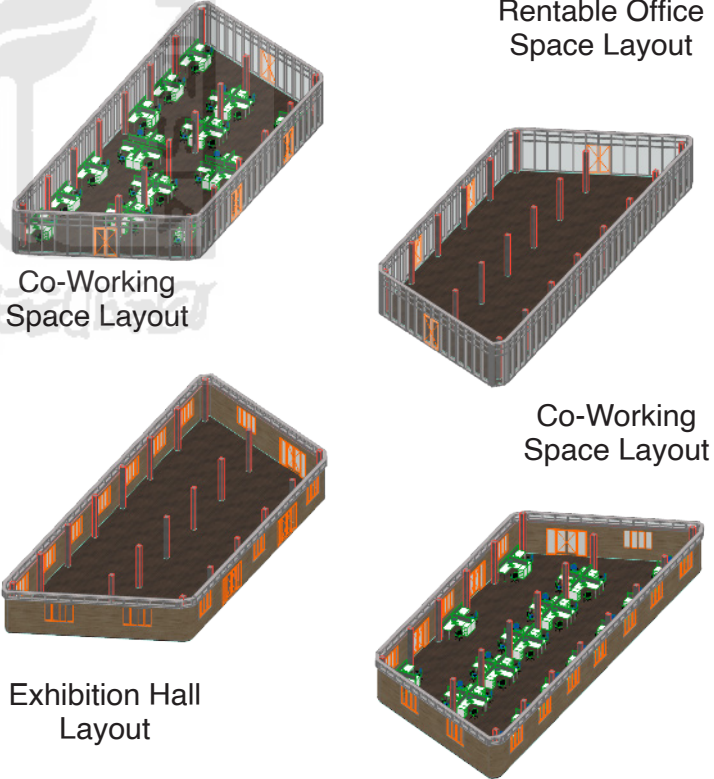
Description

The chapter contains final design evaluation from jury and its response. It also contains conclusion of the design.

Contents

- 5.1 Jury's Evaluation Response
- 5.2 Conclusion

5.1 JURY'S RESPONSE

Jury	Comment	Response	Detail	Page
Dr. Yulianto P. Prihatmaji, S.T., M.T., IAI, IPM	Who's the exact community user of the Creative Hub?	Economic growth creativity in Salatiga is shown by the emergence of batik and accessories. Creativity in the field is visible with the emergence of various maker brands in Salatiga.	Tables in page 32	32
	Where's the data of events that can take place inside of the Creative Hub?	Hampra Fest, Salatiga Fair, Salatiga Expo, Pameran Arsip, Monginsidi Fest, other non-scheduled occasional events.		33
	How do the multifunction / adaptability of the room works?	On the second floor, Co-Working Space and Rentable Office Space have the same area of 299,278m² . If there is no rent, then the room will be adjusted on Co-Working Space to maximize building usage. If there is a rent then it can be used oas Rentable Office Space to promote office growth in Salatiga.		66-67

Jury	Comment	Response	Detail	Page
<p>Dr. Ing. Putu Ayu P. Agustiananda S.T., M.A.</p>	<p>How to stimulate collaboration through gathering spaces?</p>	<p>Indoor hangout space provide better support in table and electricity socket. It is more formal but all of the people has same space. Outdoor hangout space is more flexible and has a layout to support interaction. It is tho has less supporting facility,</p>		<p>61</p>
	<p>How to stimulate creativity of the Co-Working Space?</p>	<p>Atmosphere of the Co-Working Space is calm and natural from the flooring materials and the vegetation placement. The ambience of warm lighting in night-time elaborate on the calmness of the space as well.</p>	<p>Daytime</p> <p>Four-set tables Individual tables</p> <p>Night-time</p> <p>Warm Lighting Pot vegetation</p>	

5.2 CONCLUSION

1. Having user-oriented functions to have high-performing Creative Hub is achieved through space adaptability of having 2 functions depending on the needs.

2. Having adaptability of space usage of Creative Hub is achieved through Open Floor Plan Approach.

3. Having Double Skin Façade with adaptation to suit the mountain region in Tropical Climate is achieved with optimum Double Skin usage only focusing on hot area (North) while the building envelope having maximum cross openings.

4. Achieve indoor health comfort with using Passive System and Double Skin Façade System integration is achieved proven with simulation of Windflow and Daylighting in both are comfortable (mostly green-blueish color)





VISUALIZATION





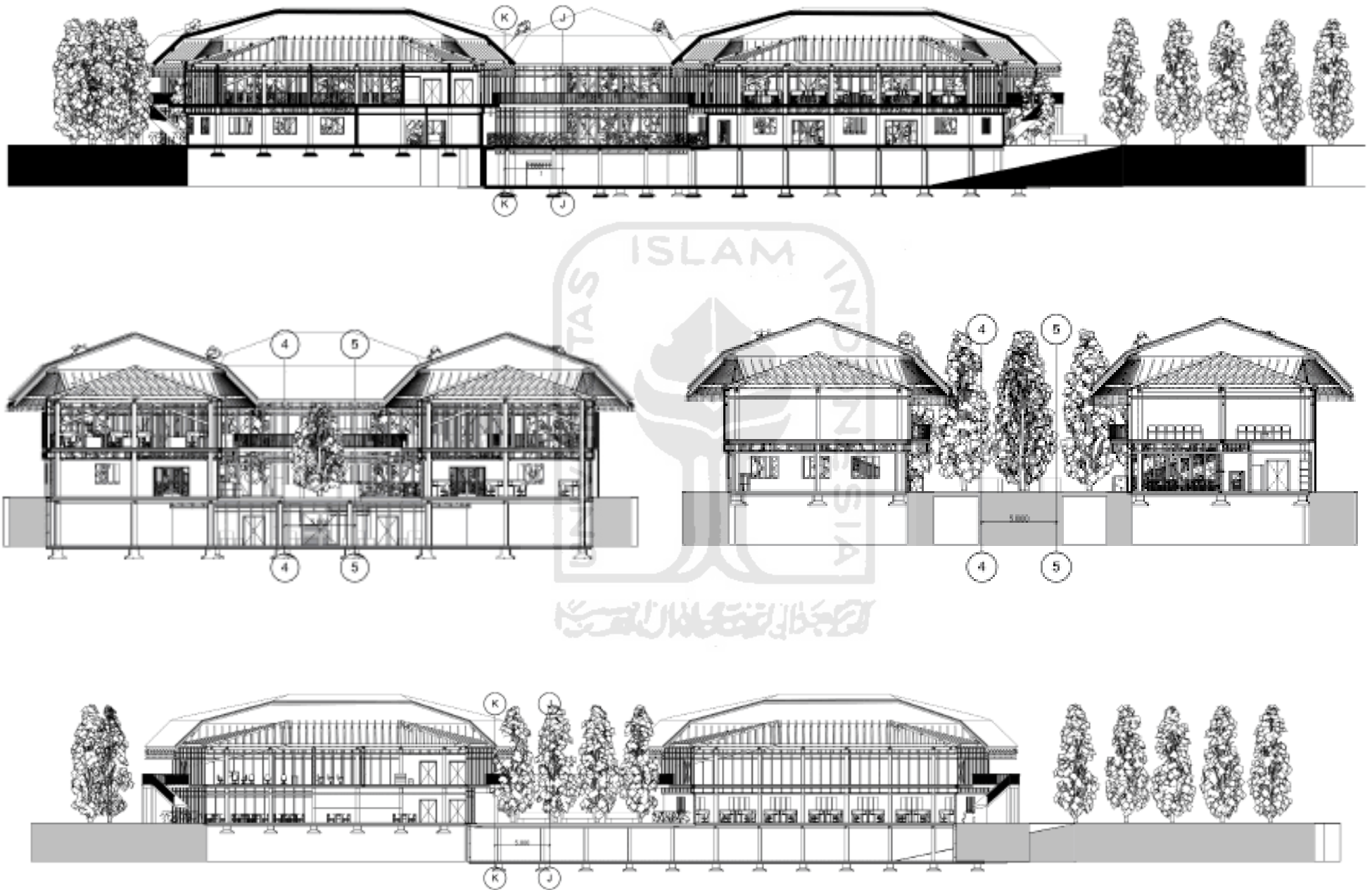
VISUALIZATION



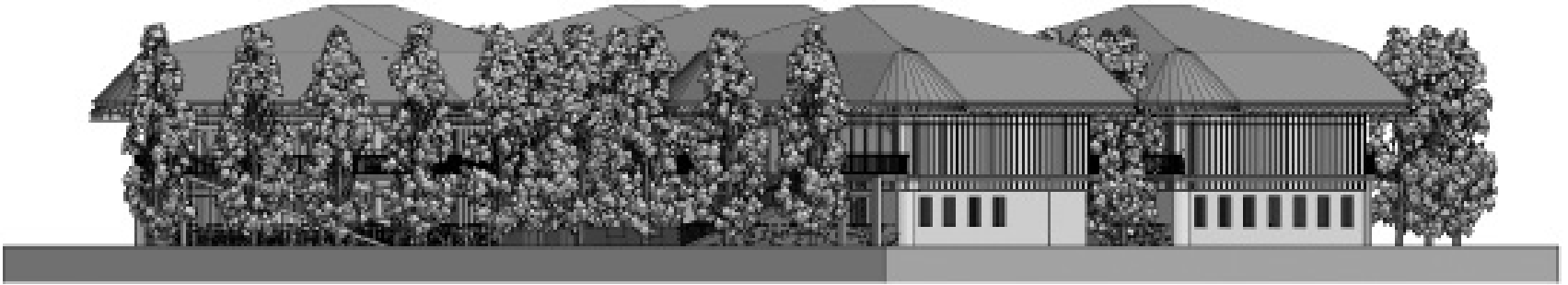
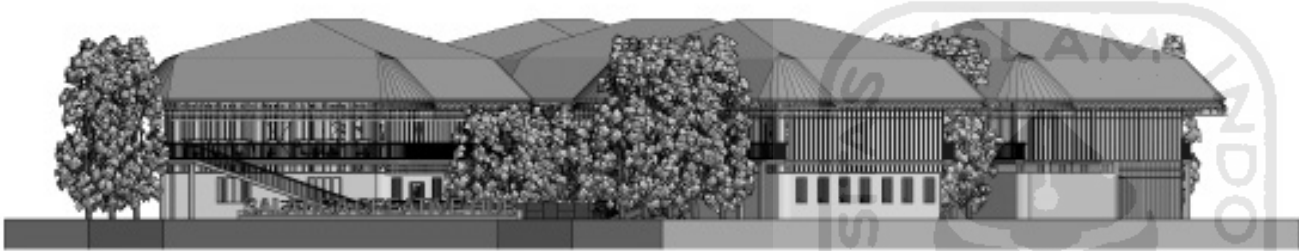
VISUALIZATION



SECTIONS



ELEVATIONS



APREB



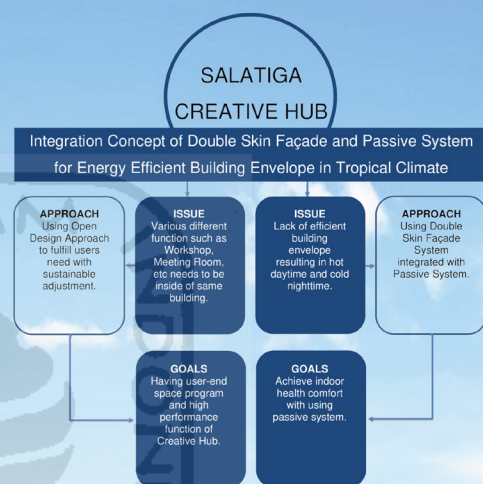
Salatiga Creative Hub

with Integration Concept of Double Skin Façade and Passive System for Energy Efficient Building Envelope in Tropical Climate

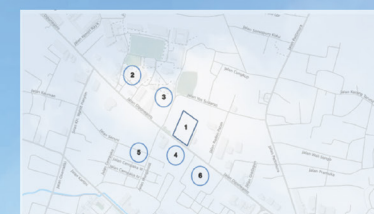
DESIGN PREMISE

Salatiga also known as pension city due to many retired people from 90's bought home for retirement there. Nowadays, Salatiga has grown to diverse populated city with many young people, can be grandchildren of the retired people or newcomer who came to study in highschool or university here. Sadly, freshgraduate tends to work outside of the city rather than staying in Salatiga, due to the chance of working for bigger corporation is small due to little to none of their branch office in the city. "Salatiga Creative Hub, Integration Concept of Double Skin Façade and Passive System for Energy Efficient Building Envelope in Tropical Climate" basically is a public facility with functions such to enable them to work in Salatiga. The approach of Energy Efficient Building Envelope is to make sure the users are comfortable inside of the Creative Hub, with relying mostly in natural windflow and daylighting. This natural atmosphere will hopefully uplift the mood of the users to be more productive on their work.

PROBLEMATIQUE



LOCATION

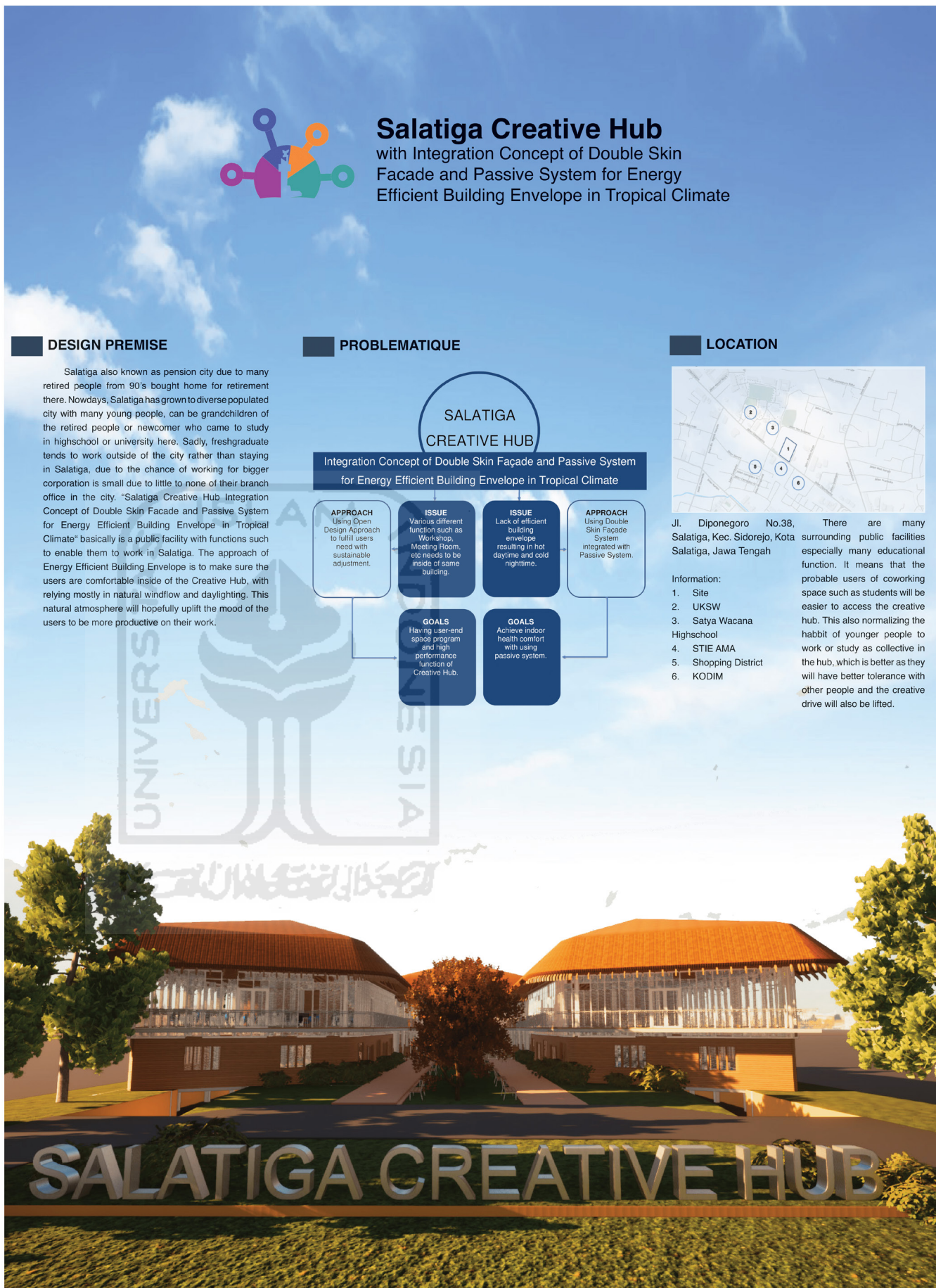


Jl. Diponegoro No.38, Salatiga, Kec. Sidorejo, Kota Salatiga, Jawa Tengah

Information:

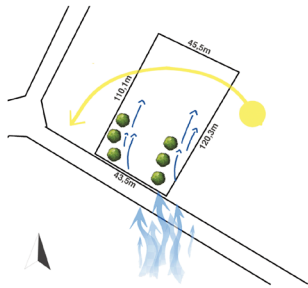
1. Site
2. UKSW
3. Satya Wacana Highschool
4. STIE AMA
5. Shopping District
6. KODIM

There are many surrounding public facilities especially many educational function. It means that the probable users of coworking space such as students will be easier to access the creative hub. This also normalizing the habit of younger people to work or study as collective in the hub, which is better as they will have better tolerance with other people and the creative drive will also be lifted.

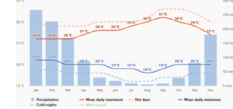


SALATIGA CREATIVE HUB

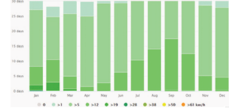
SITE ANALYSIS



Average Temperature



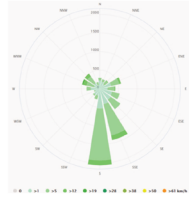
Average Wind Speed



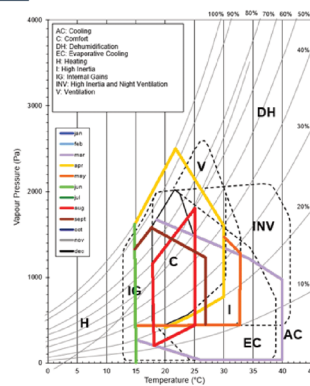
Relative Humidity



Windrose



GIOVANI-MILNE BIOCLIMATIC CHART

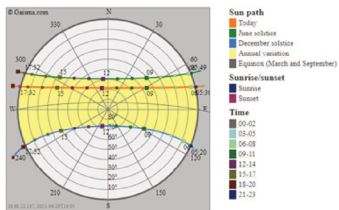


The Giovani-Milne Bioclimatic Chart is used to assess the current circumstances of Average Temperature, Relative Humidity, and Windspeed. The chart shows that the weather in Salatiga can be a little chilly, a little comfortable, or a little hot. Ventilation, shade devices, and evaporative cooling are examples of solutions based on the chart.

Natural ventilation is said to be the simplest and most cost-effective passive technique for every month in hot and humid locations. By shifting the outside and interior air through an aperture, it seeks to achieve a sufficient quantity of fresh air. Furthermore, increased ventilation increases the rate of evaporative and sensible heat loss from the body. Wind direction, penetration area, inlet and outlet sizes, room volume, shading devices, fly screens, and internal barriers are all factors that should be carefully addressed in order to provide a comfortable amount of ventilation. (Santy and colleagues, 2017)

Because the temperature is over 20 degrees Celsius, shading devices are beneficial. The shade device is an option for reducing sun radiation incidences. A smart shading plan can reduce cooling energy demands by up to 10%–20%. (Santy and colleagues, 2017)

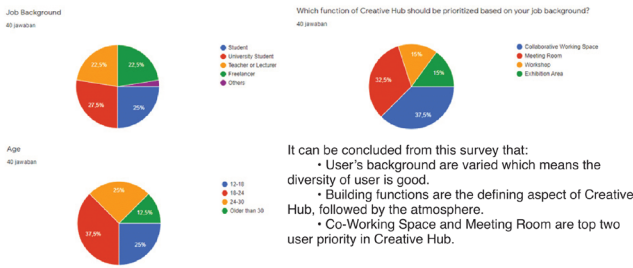
SUN PATH DIAGRAM



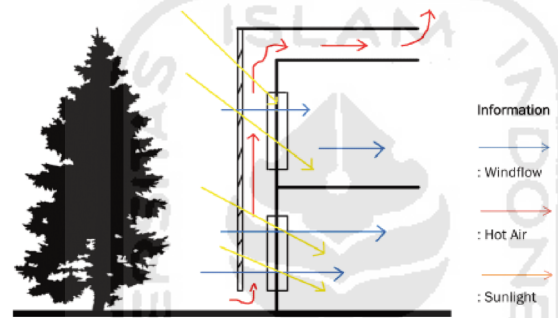
The sun is primarily on the north side of the structure, as can be seen in the chart. Building Orientation, Spacing Angles Between Building Mass, Shading Devices, and Ceiling Height will all be affected.

In the hot, humid tropics, minimizing environmental burdens is a top issue. Build on a hill's summit or windward side, especially on a north or south facing slope. Site away from sources of air pollution, such as industry and motor traffic, if at all feasible; on impacted areas, use plants to limit exposure.

USER-END THROUGH SURVEY



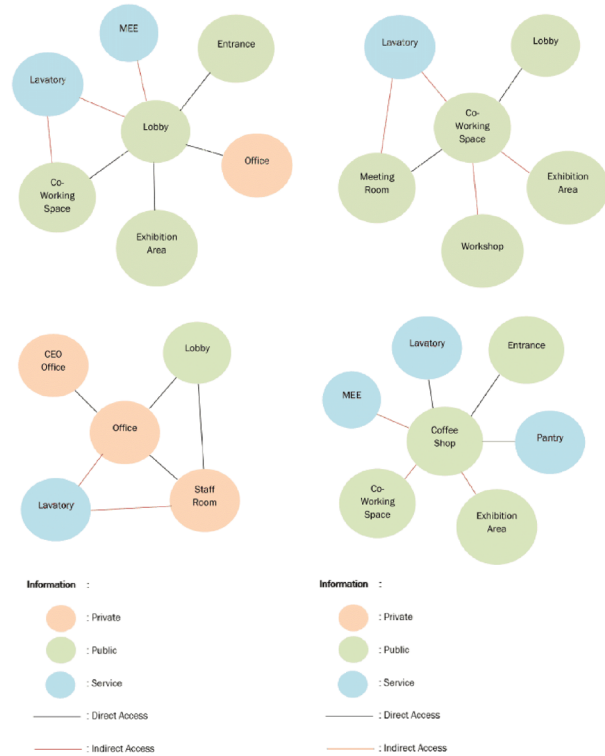
DOUBLE SKIN FACADE CONCEPT



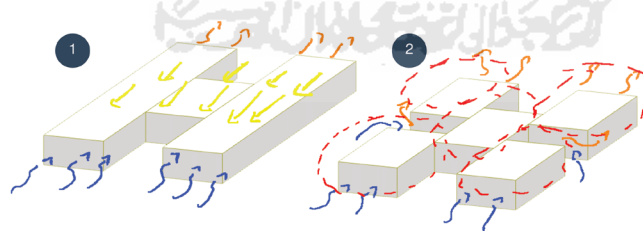
Double skin façade in tropical climate will tend to be open skin rather than closed approach similar to in Europe/Sub-Tropical. With this implementation, passive system will be more prevalent in cooling/lighting the building due to the openings while the skin façade act more of shading of daylighting and hot air circulation. With this alternative, it is needed to dug air canal which will be connected to the envelope itself as cooling mechanism. Not only just at the wall, but the canal is connected to the roof as well, if this system implemented in a comprehensive way, it will have huge impact.

Secondary skin are attached or interconnected with roof structure. This is done to reduce overall structural weight to envelope which maybe consist of glass material.

SPATIAL ORGANIZATION

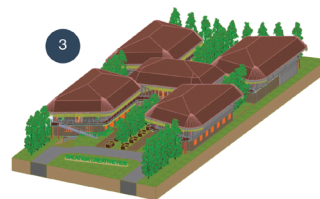


FORM TRANSFORMATION



Long rectangular shape is chosen to minimize direct sunlight while still maximizing natural wind to cool off the building masses.

Longer rectangular are adjusted according to function needs while adding space between masses to reduce noise interfering one function to another.



Synthesize according to concepts and adjust from its variables.

AXONOMETRY EXPLODE



- R Roof**
 - Roof Structure
 - Secondary Skin Structure
 - Roofing
- 2 2nd Floor**
 - Co-Working Space
 - Rentable Office
 - Workshop Areas
 - Meeting Rooms
 - Manager and Staff Office
 - Toilet
- G Ground Floor**
 - Exhibition Hall
 - Co-Working Space
 - Mushola
 - Cafeteria
 - Toilet
 - Indoor Hangout Spaces / Lounge
 - Outdoor Hangout Spaces
- B Basement**
 - Car Parking (30)
 - Motorbike Parking (96)
 - Pump Room
 - Generator Room
 - Panel Room

HIGH-PERFORMING BUILDING CONCEPT IMPLEMENTATION

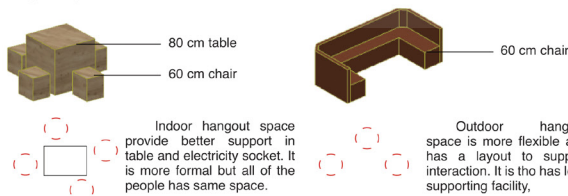
Adaptable Building Functions depends on Local Events
Co-Working Space/Rentable Office Space



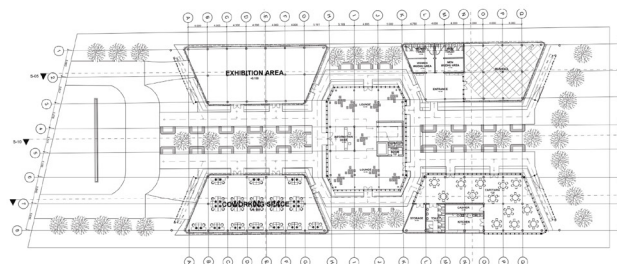
On the second floor, Co-Working Space and Rentable Office Space have the same area of 299,278m². If there is no rent, then the room will be adjusted on Co-Working Space to maximize building usage. If there is a rent then it can be used as Rentable Office Space to promote office growth in Salatiga.

On the first floor, Exhibition Hall and Co-Working Space have the same area of 299,278m². Salatiga is have some emerging batik/display art industry. On occasion the space can be used to promote their product, while if there is no vent, then the room will be adjusted on Co-Working Space to maximize building usage.

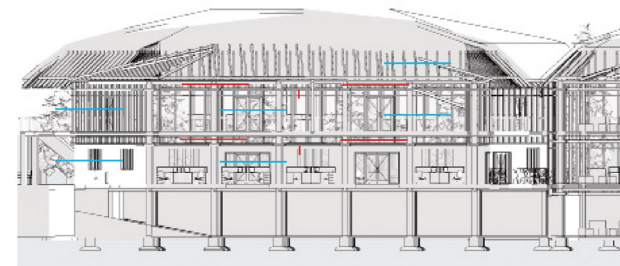
Hangout Spaces to Promote Collaboration Culture



Easily Accessible Barrier Free Circulation



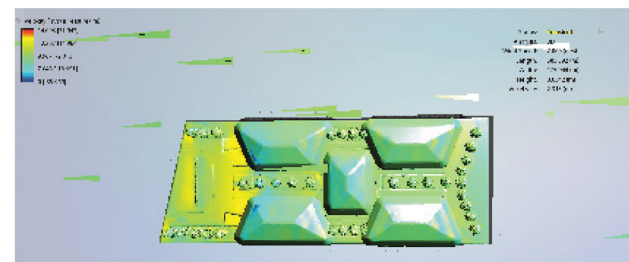
DOUBLE SKIN FACADE CONCEPT IMPLEMENTATION



This implementation of Double Skin Façade integrated with passive system will be more prevalent in cooling/lighting the building due to the openings while the skin façade act more of shading of daylighting and hot air circulation. It is also connected to the envelope itself which has cross openings to work as cooling mechanism.

SIMULATION

Autodesk Flow Design



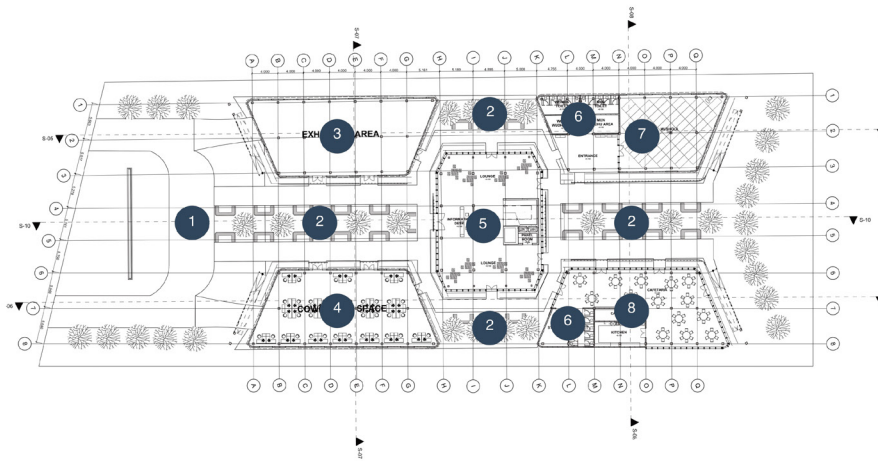
IMPLEMENTATION CONCLUSION

1. Having user-oriented functions to have high-performing Creative Hub is achieved through space adaptability of having 2 functions depending on the needs.
2. Having adaptability of space usage of Creative Hub is achieved through Open Floor Plan Approach.
3. Having Double Skin Façade with adaptation to suit the mountain region in Tropical Climate is achieved with optimum Double Skin usage only focusing on hot area (North) while the building envelope having maximum cross openings.
4. Achieve indoor health comfort with using Passive System and Double Skin Façade System integration is achieved proven with simulation of Windflow and Daylighting in both are comfortable (mostly green-blueish color)



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SITEPLAN

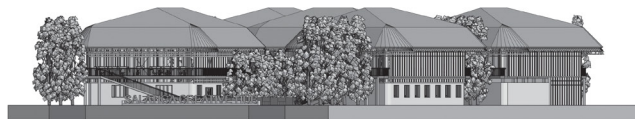


INFORMATION

- 1. DROP-OFF
- 2. OUTDOOR GATHERING SPACES
- 3. EXHIBITION HALL
- 4. CO-WORKING SPACE
- 5. INDOOR GATHERING SPACE / LOUNGE
- 6. TOILET
- 7. MUSHOLA
- 8. CAFETERIA

ELEVATIONS

South Elevation



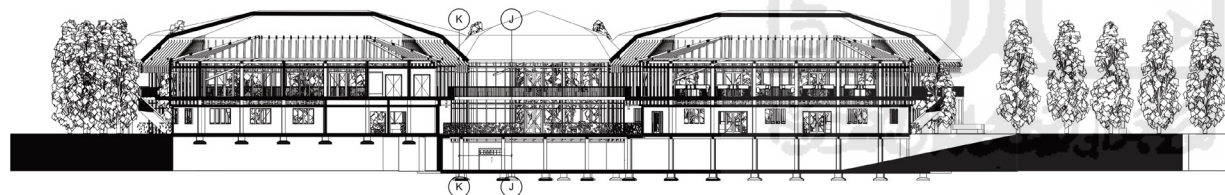
North Elevation



West Elevation



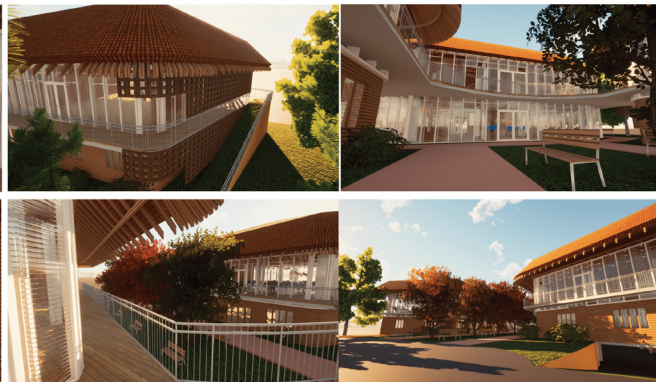
SECTION



INTERIOR PERSPECTIVES



EXTERIOR PERSPECTIVES



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