Portfolio

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UBLM6X-60-M / DESIGN STUDIO B

THE INEVITABLE EMERGENCE OF DESIGN

1.0

URBAN INTERVENTION

1.1 Urban Manifesto of Malacca
1.2 Understanding Orang Asli
1.3 Regional Context
1.4 Issues & Challenges
1.5 Kampung Jawa - Site Analysis
1.6 Understanding the city climate

2.0

Concept Development

2.1 Design Narrative
2.2 Material + Construction Exploration
2.3 Site Strategies
2.4 Bubble Diagrams

3.0

Design Development

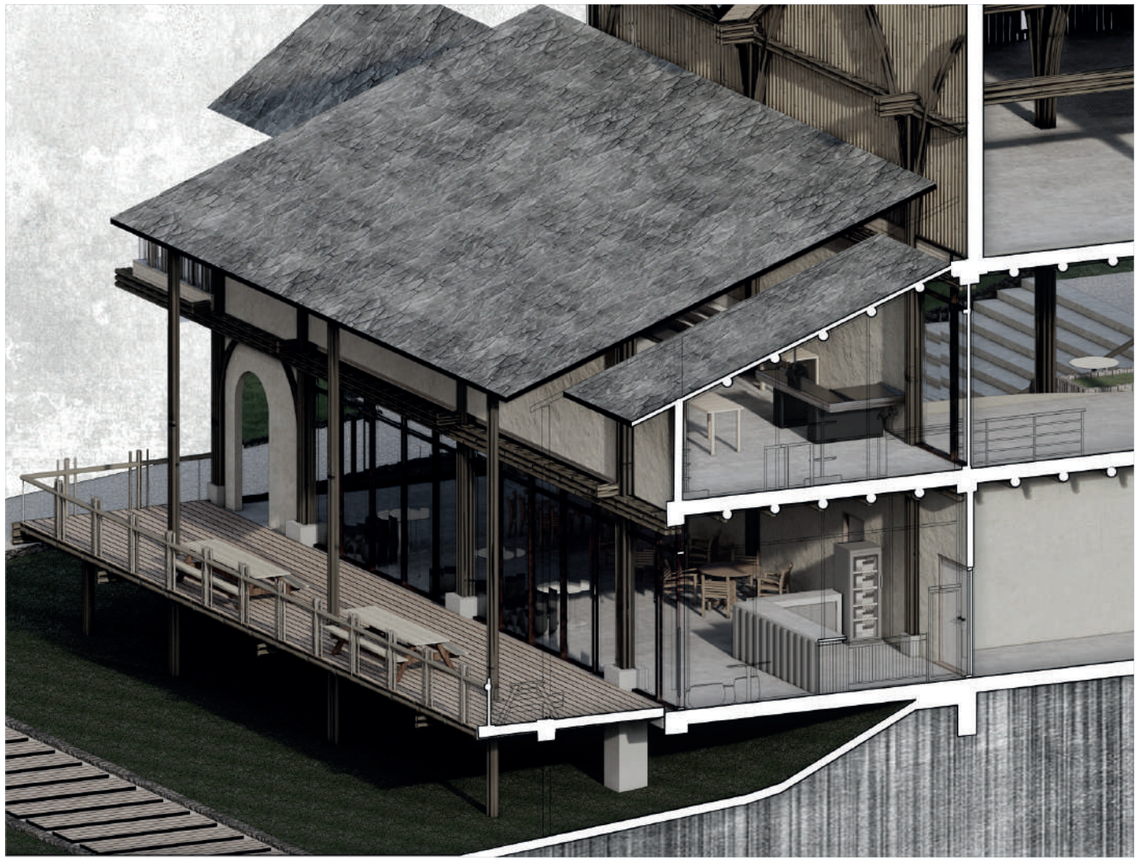
3.1 Massing Studies - Conceptual Model
3.2 Grasshopper Simulation - Massing Exploration

4.0
Environmental Strategies

5.0
Final Proposal Visualisation

6.0
Technical Appendix

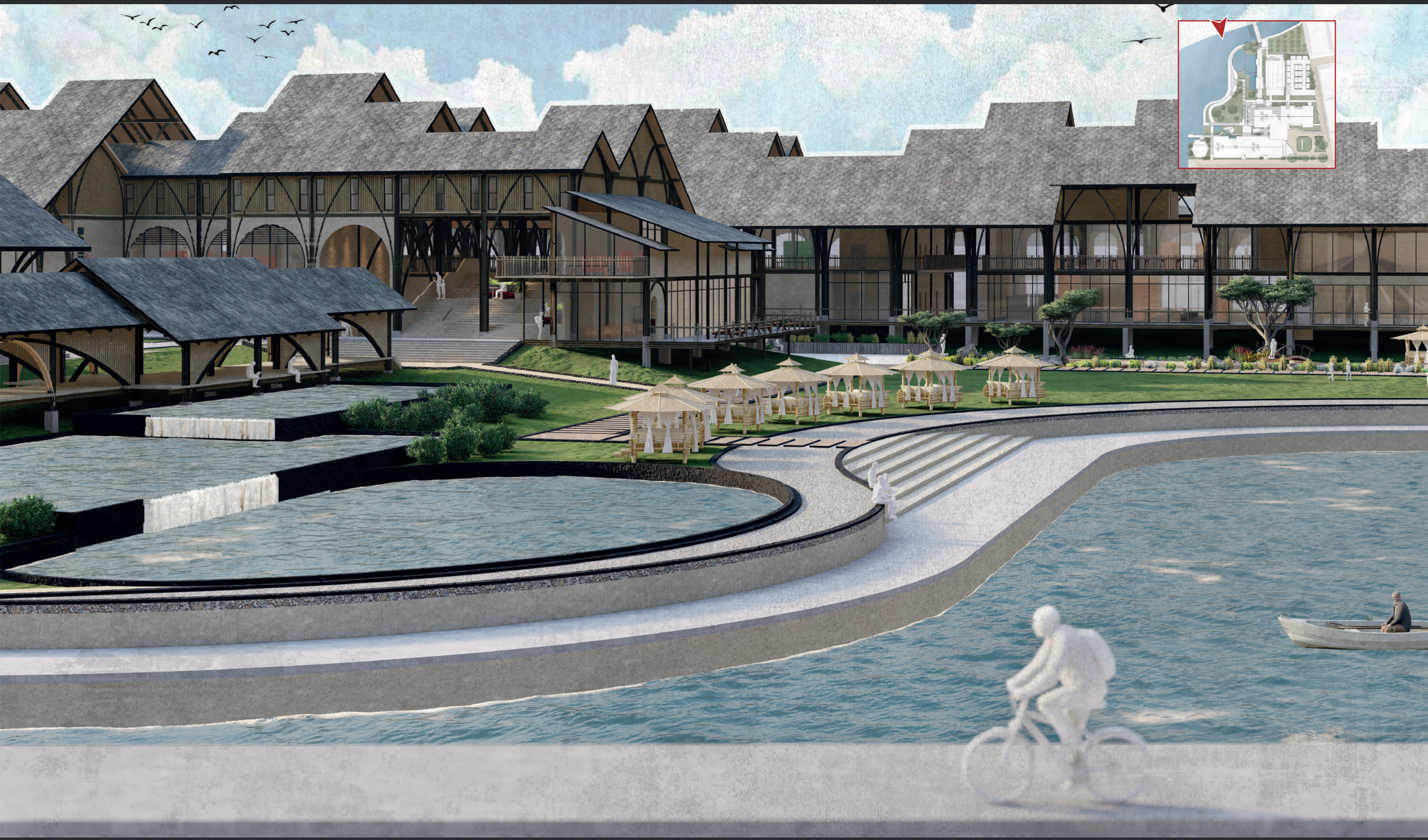
1.1 URBAN MANIFESTO OF MALACCA



At Kampung Jawa, Malacca

Revitalizing Orang Asli Bamboo Traditions in Contemporary Architecture

The project aims to preserve and revitalize the Orang Asli's traditional bamboo craftsmanship by seamlessly integrating these time-honored techniques into contemporary architectural practices. This initiative not only honors the rich cultural heritage of the Orang Asli community but also fosters community engagement and promotes sustainable building solutions. By blending indigenous knowledge with modern design, the project aspires to create spaces that are both culturally resonant and environmentally responsible.


01

1.2 INTRODUCING ORANG ASLI - INDEGENOUS GROUP MALAYSIA

According to (UNDP,2021), there are about 476 million indigenous people across 90 nations, representing 5000 diverse cultures that make up 6.2% of the world's population. The total population of orang asli in Malaysia is approximately 206,777 people (JAKOA,2023). "Orang Asli" in Malaysia refers to people who fulfill certain requirements specified in the Orang Asli Act 1954 (Act 134). This covers people of any race who are adopted and raised by Orang Asli and take up their way of life. Furthermore, people who follow the language, culture, and customs of their Orang Asli mother or father are also regarded as Orang Asli. If there is any doubt, the minister has the power to determine if an individual is truly an Orang Asli. Orang Asli is also a Malay word that refers to 'original people' or 'first people'.

malaysia - orang asli

206,777 ppl

Malacca - orang asli

1,747 ppl

HERITAGE TRAIL IN MALACCA

MALACCA ZONING & TRANSPORTATION

Access from Other Cities to Malacca

The only way to access Malacca from other cities is via the North-South Expressway, which connects northern and southern Malaysia.

By Car / Coach:
If traveling by coach, it will stop at Melaka Sentral Station, which is still quite far from the city centre, also known as the UNESCO Heritage Site.

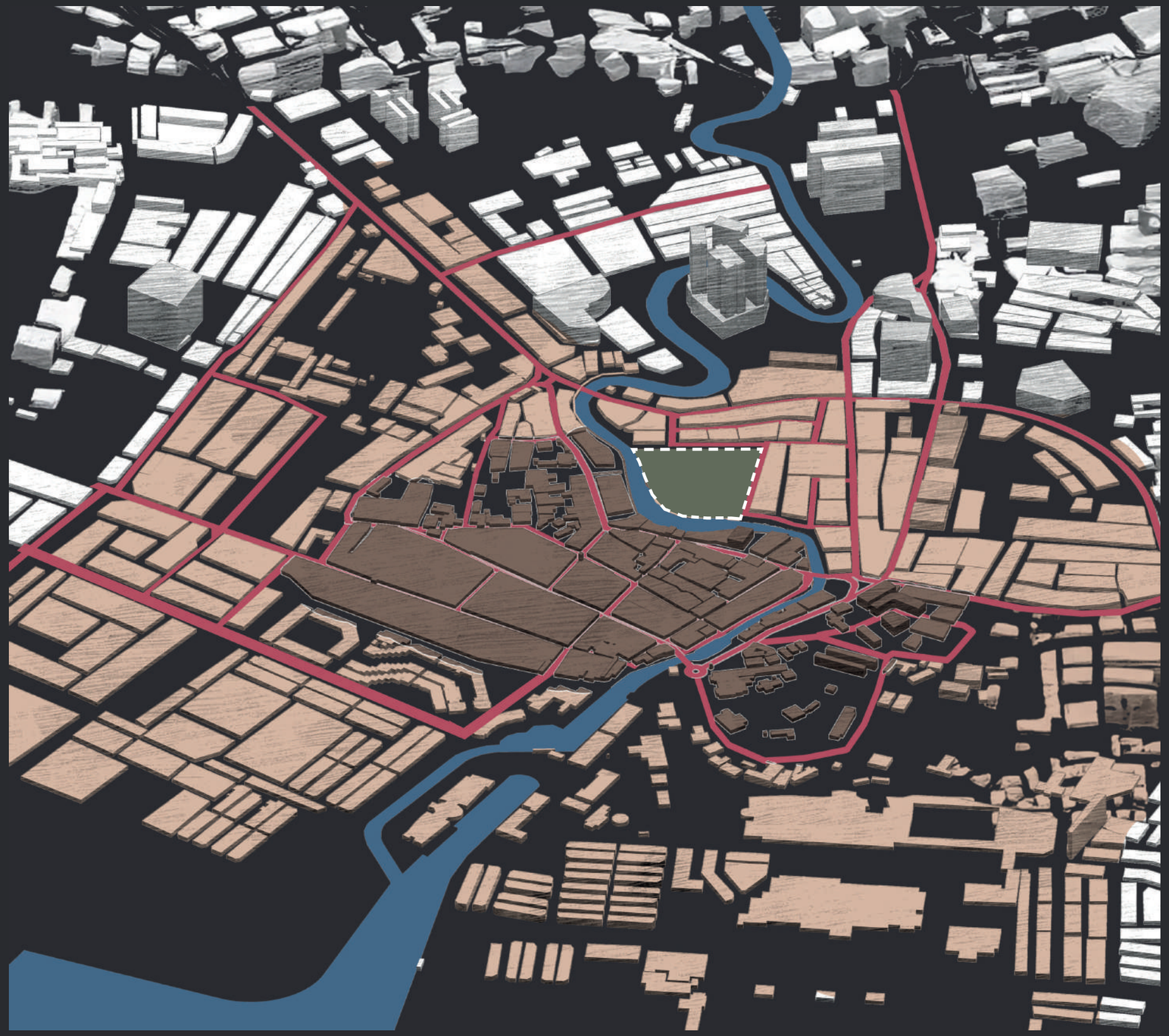
Legends

- North South Expressway Exit
- Green Areas : Malacca Zoo
- Malacca Wonderland Theme Park
- Malacca International Trade Centre
- Factory Zone
- Malacca Sentral Station
- Malacca Hospital
- Historical Centre Buffer Zone
- UNESCO Heritage Site

1.4 ISSUES & CHALLENGES

Legends

- Historical Centre Buffer Zone
- UNESCO Heritage Site
- Car Road
- River



The diagrams show that the number of registered vehicles in Malaysia exceeds the population. This has caused serious traffic congestion issues.

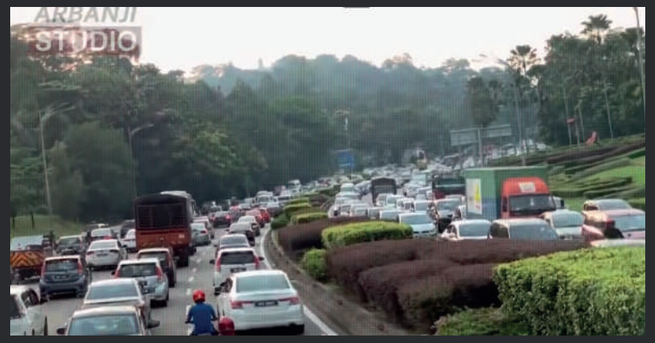
In both the buffer zone and the heritage zone of Malacca, traffic jams are severe from 9 AM to 10 PM, especially on weekends when people travel from other cities for one- to two-day trips.

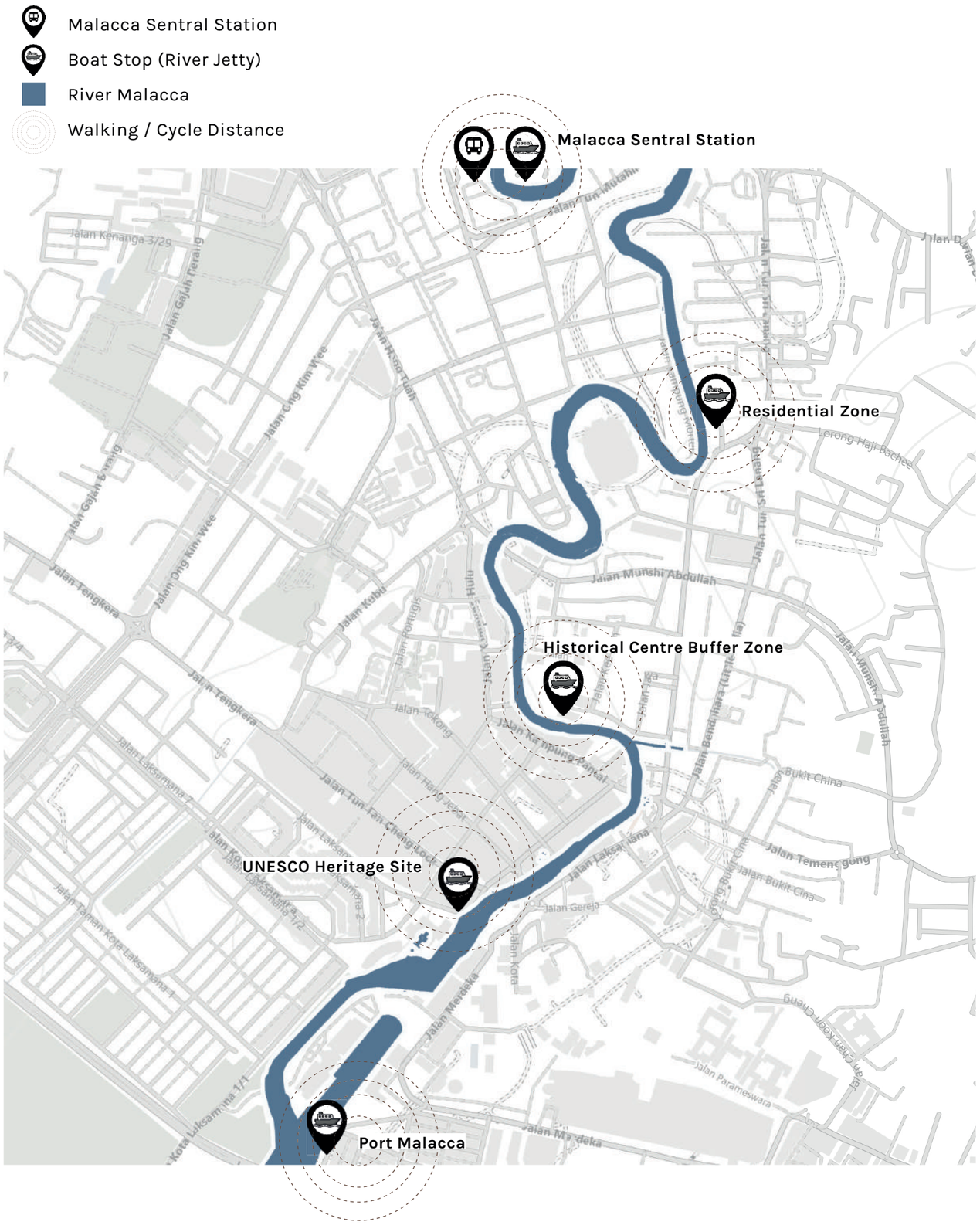
Malaysia Population

34 MILLION ppl

Registered Vechicles

36.3 MILLION Unit





The diagram below shows the high CO_2 emissions from road transportation. To address this, we can apply "Transit-Oriented Development" (TOD) by building key facilities around public transport hubs, ensuring they are connected by shaded, walkable paths.

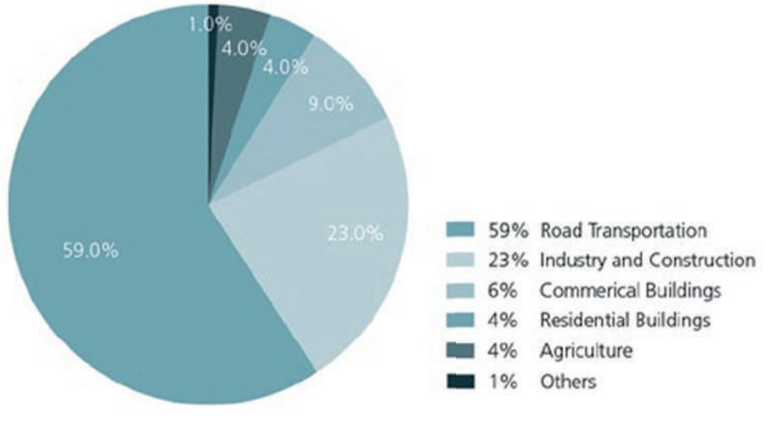
In Malacca, we can also propose to reuse the river as a public transport route, using boats to connect different zones from Malacca Sentral Station. Reduce car usage in the city centre—after all, Malacca is a city that began with its river and port.

Traffic Congestion

Melaka's UNESCO World Heritage area is a key asset for economic growth, but the rising number of tourists has strained its mobility system.

Traffic congestion has reduced Melaka's appeal to visitors and impacted small businesses and shopping areas. Tourist arrivals now overwhelm key access routes and central zones, especially on weekends, holidays, and during peak hours.

For instance, the M29/M31 route—proposed as the Green Transport Corridor—sees over 28,000 vehicles daily, with 3,000 during peak hours.



URBAN GROWTH - MALACCA

How affect on Orang Asli (indigenous group) - Malacca

1. Historical Displacement and Land Alienation

Loss of Ancestral Lands:

Orang Asli have traditionally relied on forests and communal lands for their livelihoods, cultural practices, and spiritual well-being. Over decades, government policies, commercial logging, and land development have resulted in significant displacement. This loss of land not only undermines their economic base but also disrupts the social fabric that has sustained traditional practices for generations.

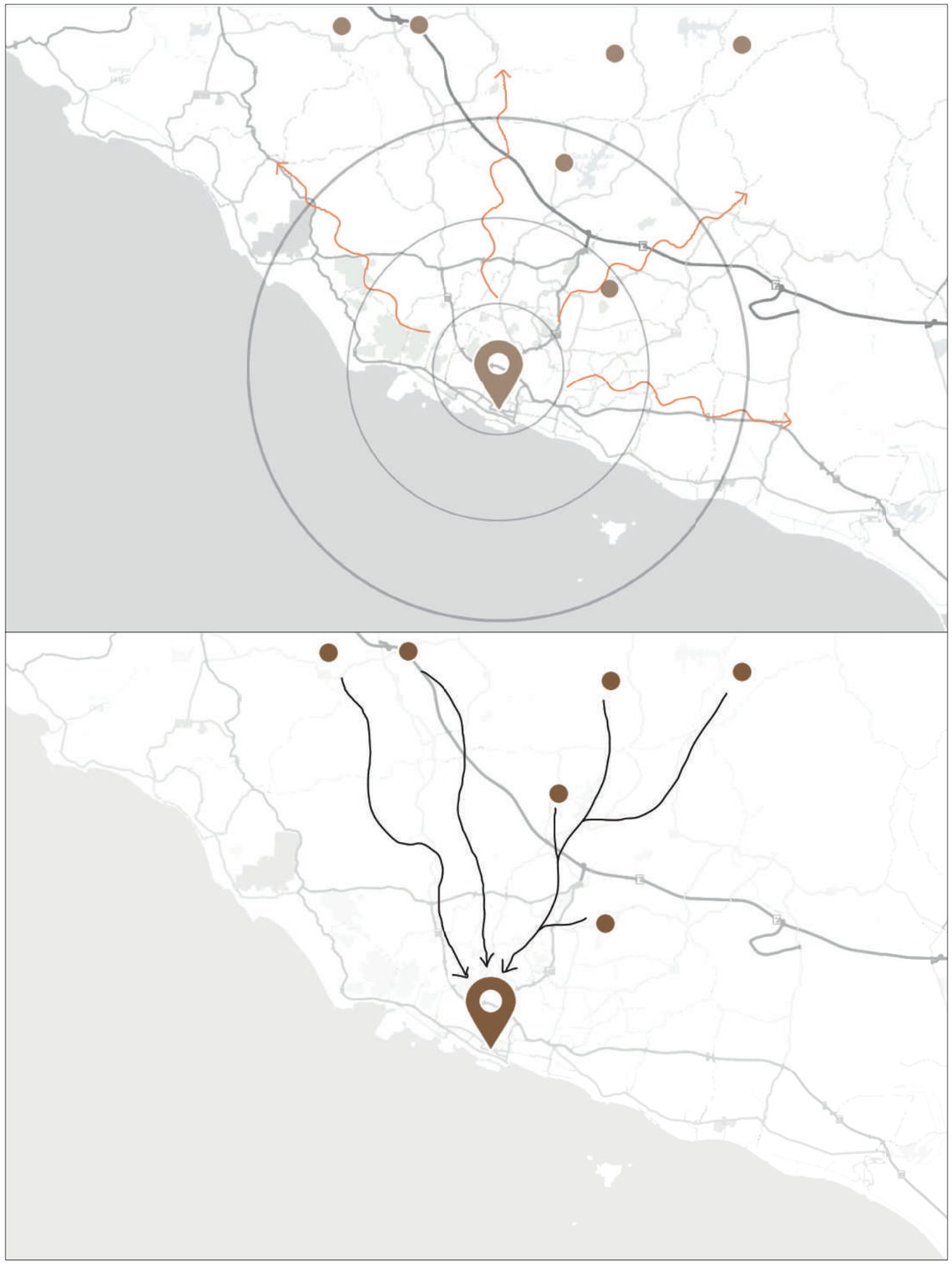
Impact on Traditional Knowledge:

With their traditional territories diminished, opportunities to practice and transmit indigenous knowledge—such as bamboo craftsmanship, medicinal plant usage, and ritual practices—are increasingly reduced.

2. Economic Marginalization

Limited Access to Resources:

The Orang Asli often face barriers to accessing education, healthcare, and employment opportunities compared to the mainstream population. This economic disadvantage forces many to migrate to urban centers in search of work, further distancing them from their cultural roots.

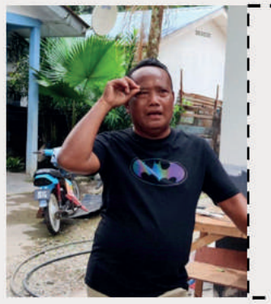


Interiew with Orang Asli Malaysia

"The tradition is no longer practiced except for the celebration of Ancestor Day on January 14th each year."

"We are facing difficulties as it is hard to find jobs."

Tok Batin (head of village)
Hikang Bin Saria



"We hope to attract more visitors and showcase our unique culture of our community."

"Our goal is to preserve and share our cultural heritage, ensuring it is passed down to future generations and appreciated by others."

"We aspire to create and sell our own handcrafted items, promoting our traditional arts and crafts to a wider audience."

The Resident
(Live in Kampung Orang Asli)

Site visit to an indigenous village in Malaysia to understand their living conditions

URBAN GROWTH - MALACCA

How affect on Orang Asli (indigenous group) - Malacca

3. Cultural Assimilation and Erosion of Traditional Practices

Integration into Mainstream Society:

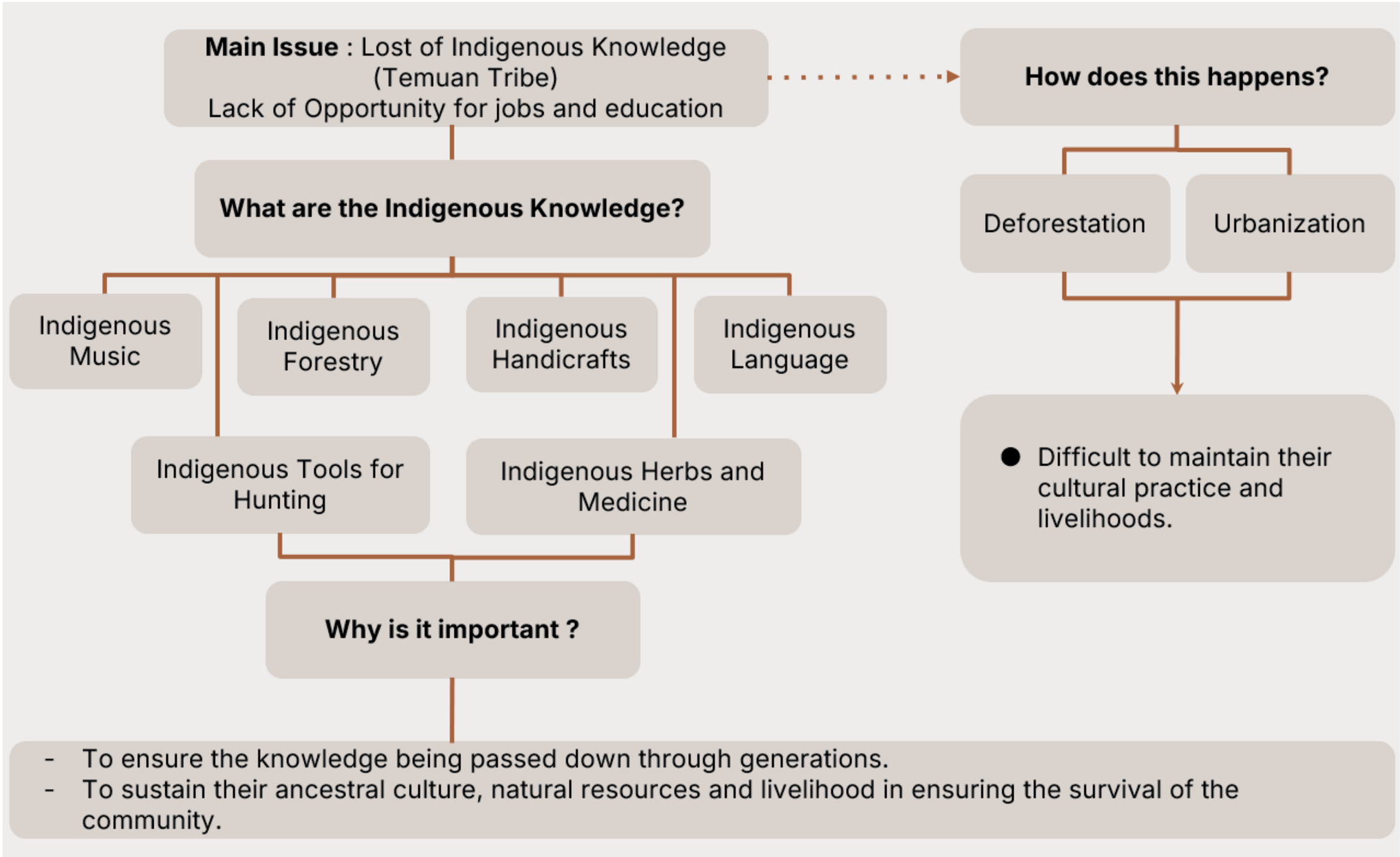
The push for modernization and national development has often prioritized a homogenized cultural identity over the diverse traditions of indigenous communities. This integration can lead to the dilution of traditional customs, languages, and rituals.

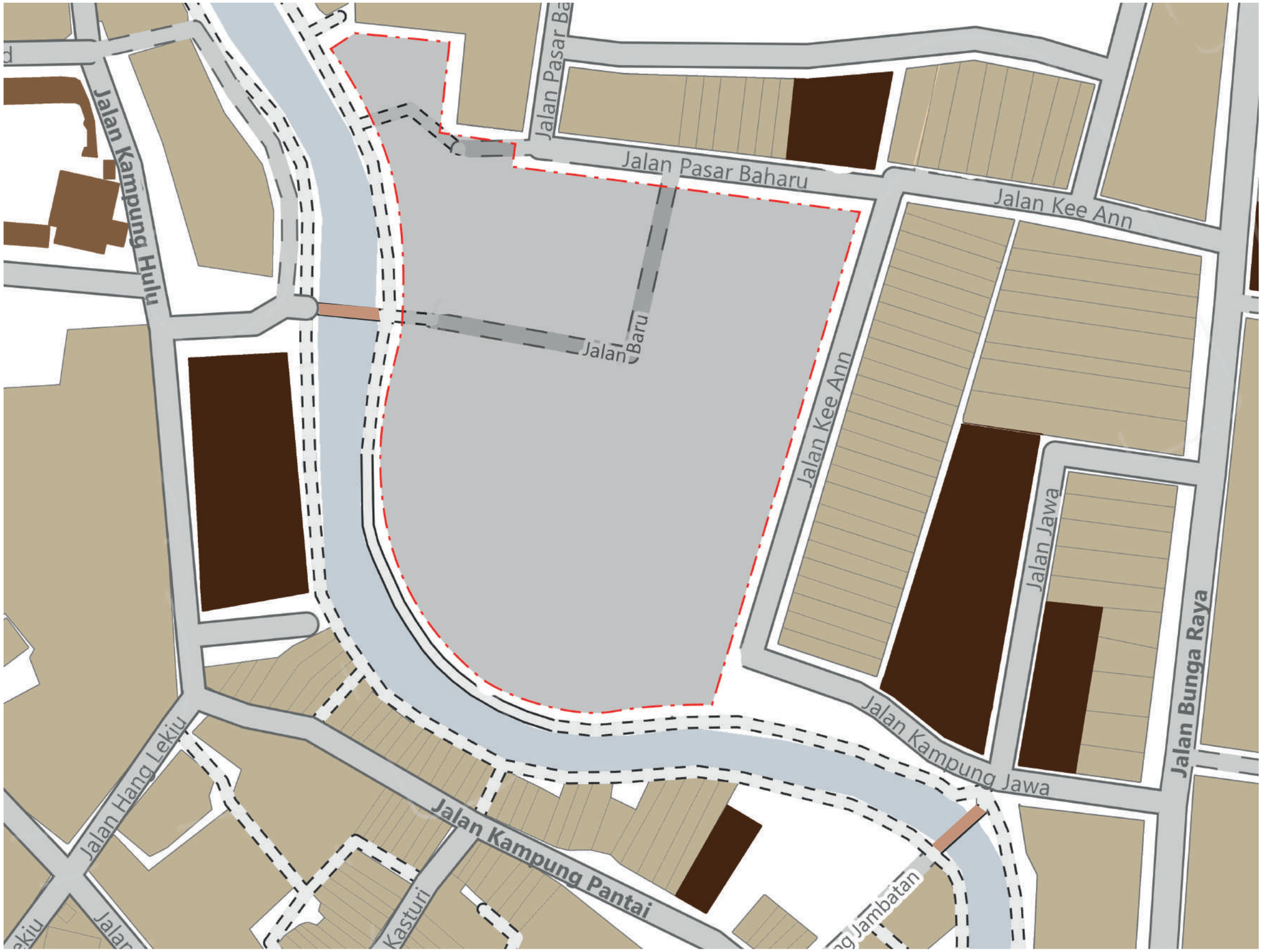
Younger Orang Asli, influenced by mainstream education and urban lifestyles, may see traditional practices as less relevant to modern life. As they adopt new values and economic pursuits, the intergenerational transfer of traditional knowledge and practices diminishes.

Overall Impact on Traditional Practices

These factors together create an environment where the Orang Asli's traditional ways of life are under constant pressure. The erosion of traditional practices not only signifies the loss of unique cultural identities but also diminishes the community's ability to sustainably manage their environment—a knowledge base that has evolved over millennia.

By understanding and addressing these social factors, there is potential to develop strategies that not only safeguard the Orang Asli's cultural heritage but also integrate their valuable traditional knowledge


Main Issue : Lost of Indigenous Knowledge
(Temuan Tribe)
Lack of Opportunity for jobs and education
How does this happens?
Deforestation
Urbanization
What are the Indigenous Knowledge?
Indigenous Music
Indigenous Forestry
Indigenous Handicrafts
Indigenous Language
Indigenous Tools for Hunting
Indigenous Herbs and Medicine
Difficult to maintain their cultural practice and livelihoods.
Why is it important ?
- To ensure the knowledge being passed down through generations.
- To sustain their ancestral culture, natural resources and livelihood in ensuring the survival of the community.


Jalan Pasar Ba
Jalan Pasar Baharu
Jalan Kee Ann
Jalan Kampung Hulu
Jalan Baru
Jalan Kee Ann
Jalan Jawa
Jalan Bunga Raya
Jalan Kampung Jawa
Jalan Hang Lekiu
Jalan Kampung Pantai
Kasturi
Legends
Commercial Area
Residential Area
Religion Building
Bridge
River

2.1 DESIGN NARRATIVE

Revitalizing Orang Asli Bamboo Traditions in Contemporary Architecture

"WEAVING COMMUNITIES THROUGH BAMBOO"

A design concept that interlaces culture, learning, and sustainability—using bamboo as both material and metaphor to physically and socially connect the Orang Asli with the urban community of Malacca.

Bamboo—used for structure and expression—symbolizes identity, sustainability, and connection. The centre becomes more than a building; it's a woven platform of tradition, growth, and belonging in the evolving city landscape.

2.1 MATERIAL EXPLORATION

Using Bamboo As Building Material

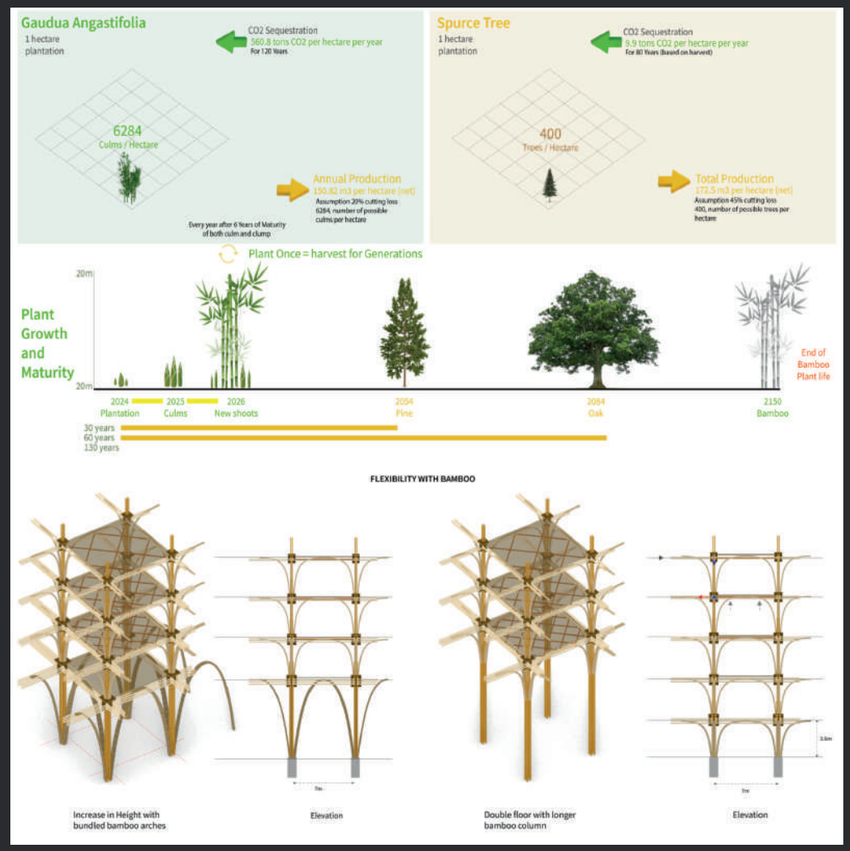
1. Carbon Sequestration:
Bamboo absorbs carbon dioxide from the atmosphere during its growth and stores it within its structure. Unlike traditional building materials that release stored carbon when burned or decomposed, bamboo can store significant amounts of carbon over its lifespan.

2. Renewable and Regenerative:
Bamboo is a fast-growing grass that regrows from the same rootstock after harvesting, eliminating the need for replanting. This natural regeneration reduces the environmental impact of land clearing and harvesting, further decreasing CO2 emissions.

3. Reduced Embodied Carbon:
Bamboo's natural strength and durability allow it to be used in various structural applications, potentially reducing the need for more carbon-intensive materials like steel and concrete. This can lead to a lower embodied carbon footprint for the entire building project.

4. Energy Efficiency:
Bamboo can be used to create energy-efficient buildings by leveraging its thermal properties. Researchers have found that bamboo's cell structure can help regulate heat flow, potentially reducing energy consumption for heating and cooling.

5. Carbon Offsetting Potential:
The carbon stored in bamboo products can potentially offset the carbon emissions from construction activities. By carefully managing the entire lifecycle of bamboo construction, it may be possible to create buildings with a net-positive carbon footprint.



Combining Bamboo with Contemporary Materials

Bamboo represents the Orang Asli culture, while the Malacca community is reflected in traditional shophouse styles and contemporary materials like steel and concrete.

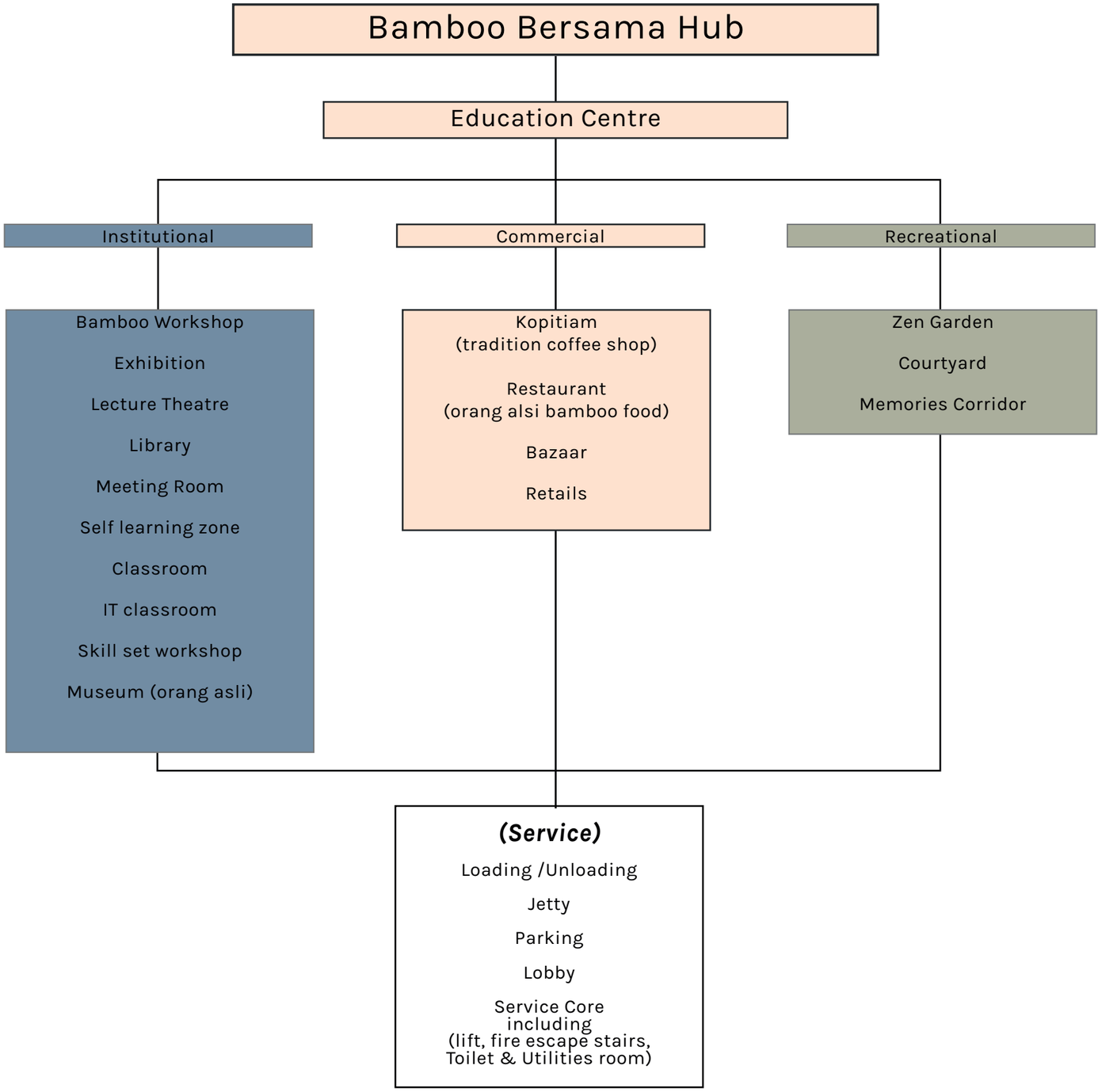
By combining bamboo with modern materials, the design maximizes the strengths of both—leveraging bamboo's sustainability and cultural significance alongside the durability and safety of concrete and steel.

While bamboo offers many environmental benefits, it has limitations, such as lower fire resistance compared to concrete and brick. Treated bamboo improves fire resistance but still cannot match concrete.

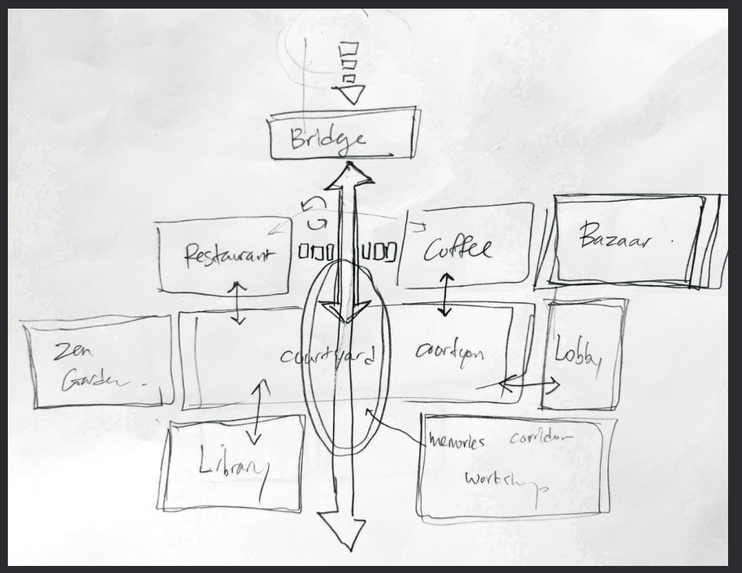
For this reason, fire-critical areas like the kitchen, fire escape staircases, and service cores are constructed with concrete and self-bearing brick walls to ensure occupant safety during emergencies.

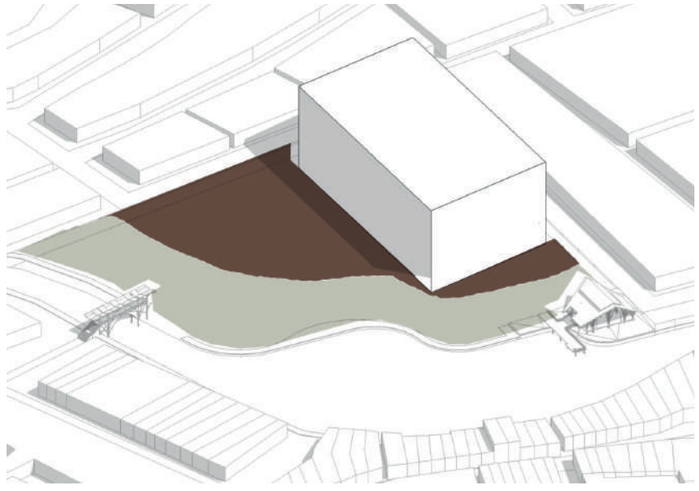
Similarly, for flood resilience, concrete is preferred on the ground floor, as bamboo performs poorly when submerged in water.

This thoughtful combination of materials balances cultural identity, sustainability, and practical safety concerns in the building design.



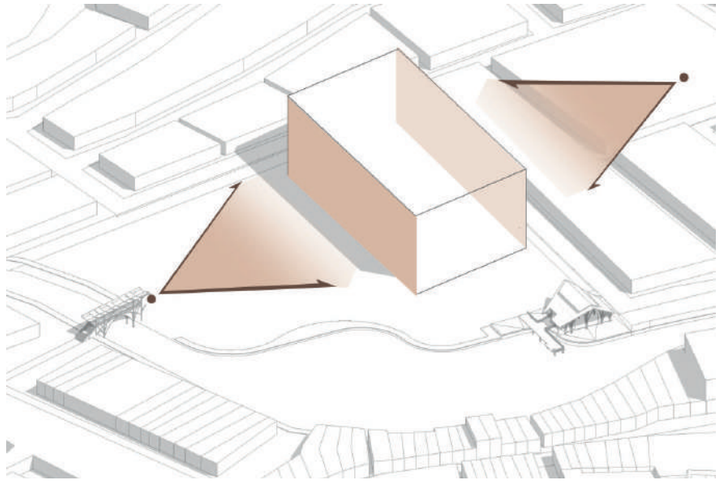
Ground Floor Bubble diagrams brainstorming





20-Meter Setback Strategy

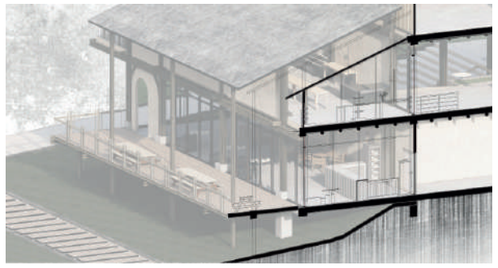
The building is set back 20 meters from the river to mitigate flood risk and create a buffer between the active riverside and the main structure. This setback also serves as a much-needed open green space—providing a public park for Malacca's heritage city centre, which is often densely built and lacking in accessible green areas.

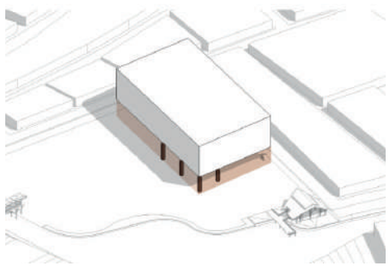


Facade Orientation Strategy

The design features two primary facades:
- One facing the bridge that connects to the UNESCO Heritage Site, creating a strong visual and spatial link to the city's cultural core.
- The other facing the existing active shophouses, maintaining dialogue with the surrounding community and daily urban life.

These facades serve as the building's public front, promoting visibility, accessibility, and interaction from both heritage and local commercial zones.





Elevation & Stilt Strategy

The entire building is elevated to match the level of the adjacent shophouses on higher ground, creating seamless access and urban continuity.

In areas with slopes or lower terrain, the building is raised on stilts. This allows natural airflow beneath the structure for passive cooling and reduces flood risk—especially important in flood-prone zones near the river.

Pedestrian Experience & Walkability Issues

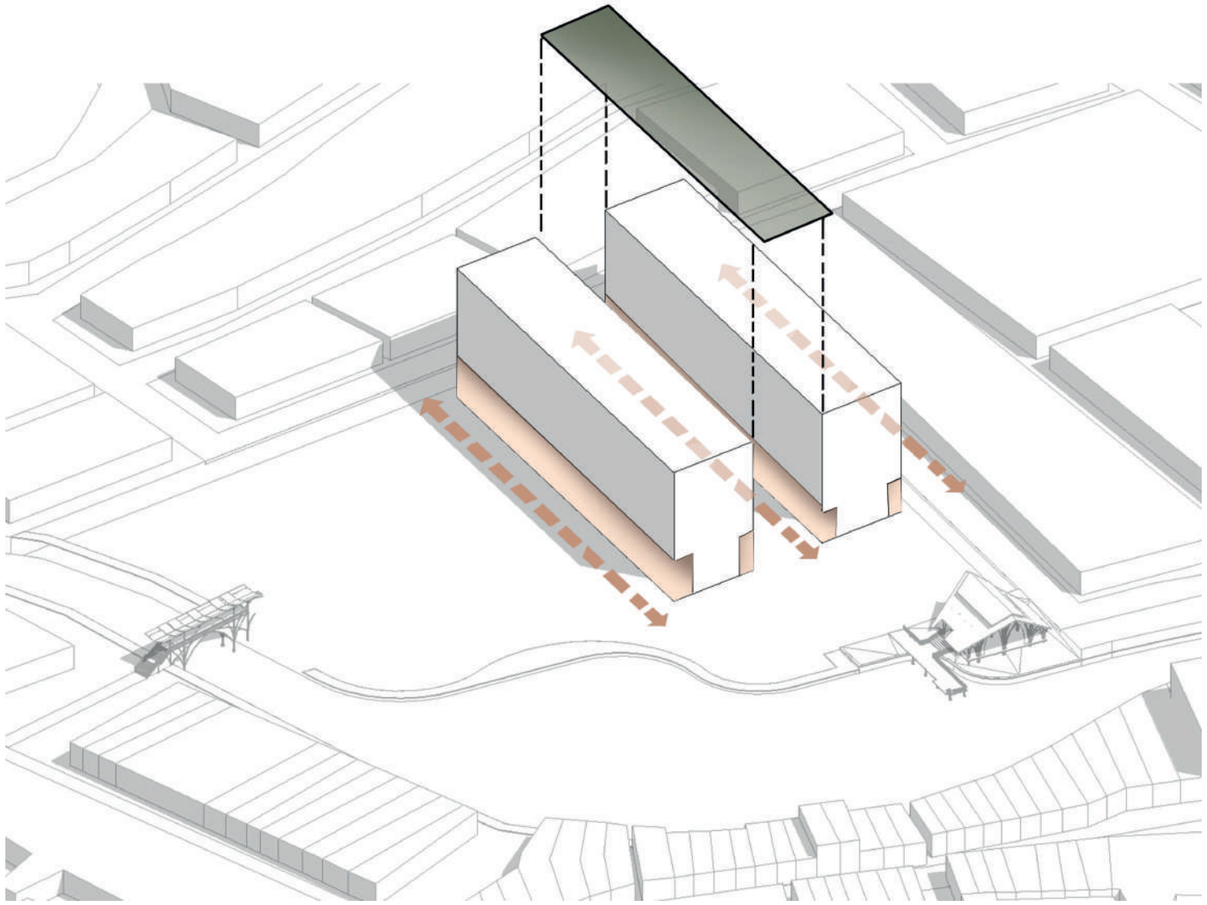
Many existing buildings are designed without considering walkability, forcing pedestrians to walk along vehicle roads—creating unsafe and uncomfortable conditions.

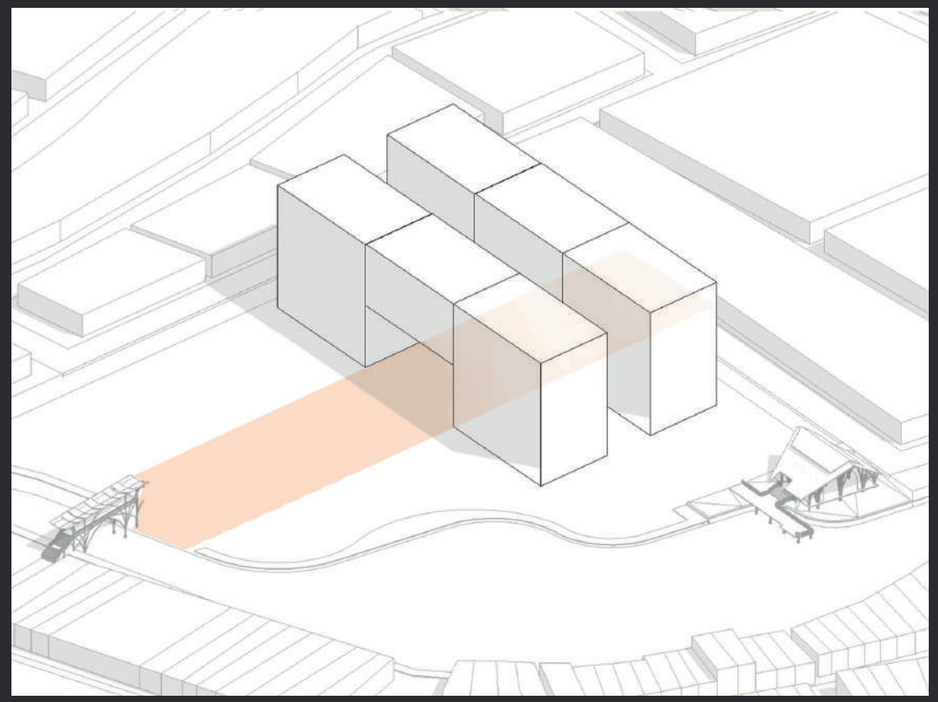
Even when pedestrian walkways are provided, they often lack proper shading or shelter, leaving people exposed to intense sun and heavy rain. This makes walking around the area difficult and unpleasant, especially in Malacca's hot, tropical climate.

Reinterpreting Traditional Social Spaces:
Five-Foot Walkway & Backlane Courtyard

The design draws inspiration from traditional Malaccan shophouses, particularly the five-foot walkway, a covered pedestrian path in front of the ground floor that protects people from the sun and rain. In this project, it serves not just as circulation, but as a shaded transition space that links one program to another—encouraging movement and informal interaction.

Additionally, the concept of the backlane—once a lively, shaded communal space used for gatherings, tea, and children's play—is reimagined in the form of an internal courtyard. By opening up a void between building volumes, the design brings back this lost spatial quality, providing a naturally ventilated, shaded communal space that fosters social interaction—just like in the old days.

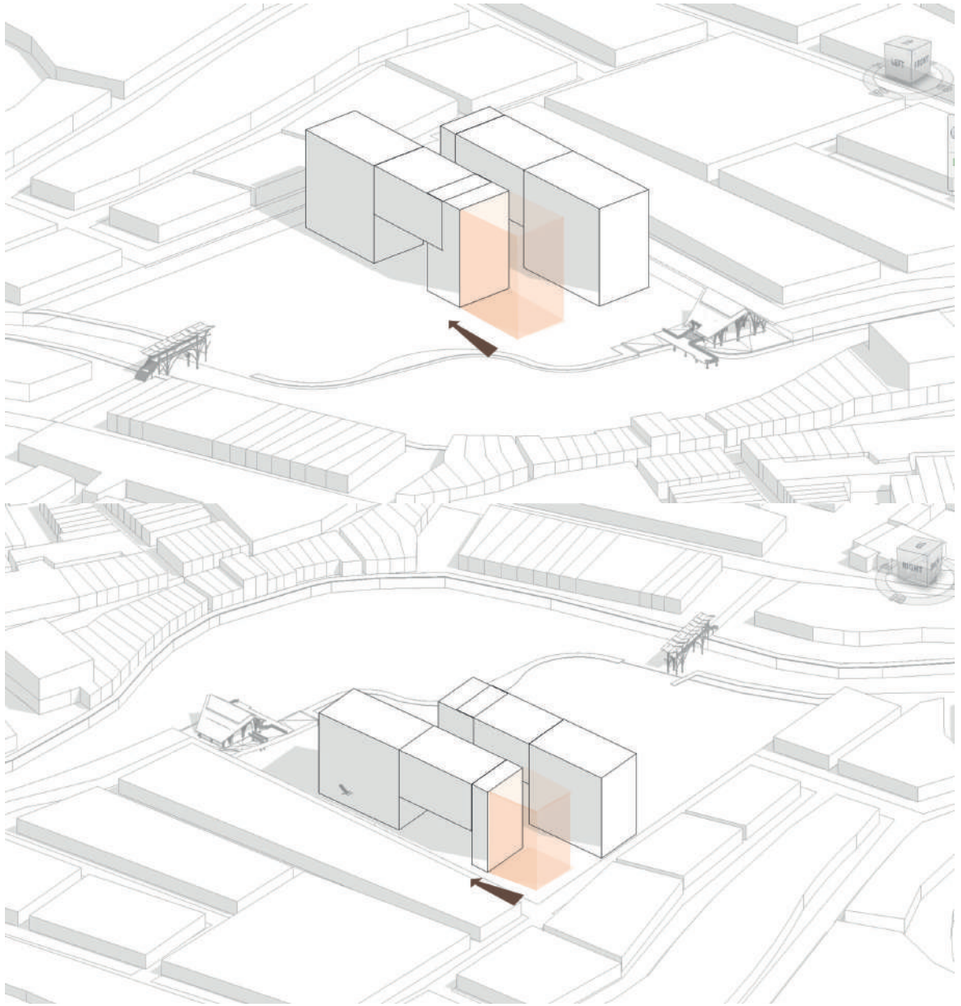




Void for Walkability and Openness

A void is introduced in the middle of the massing to allow natural pedestrian flow through the ground floor—connecting the main site entrance to the shops and restaurants on the opposite side.

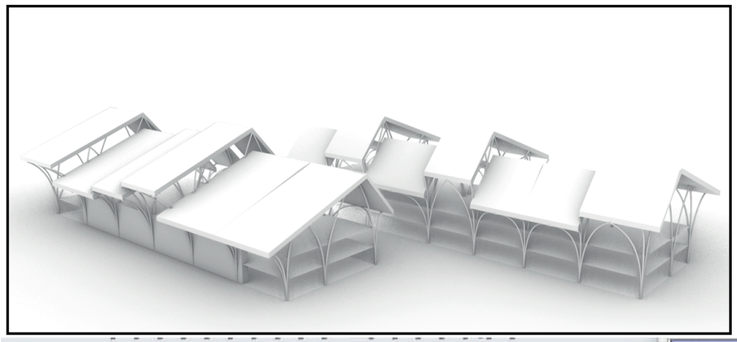
This design enhances walkability and invites people to naturally enter and use the building. The open ground floor creates a space that feels like a public plaza—shaded, comfortable, and seamlessly integrated into the urban fabric, encouraging both circulation and gathering.

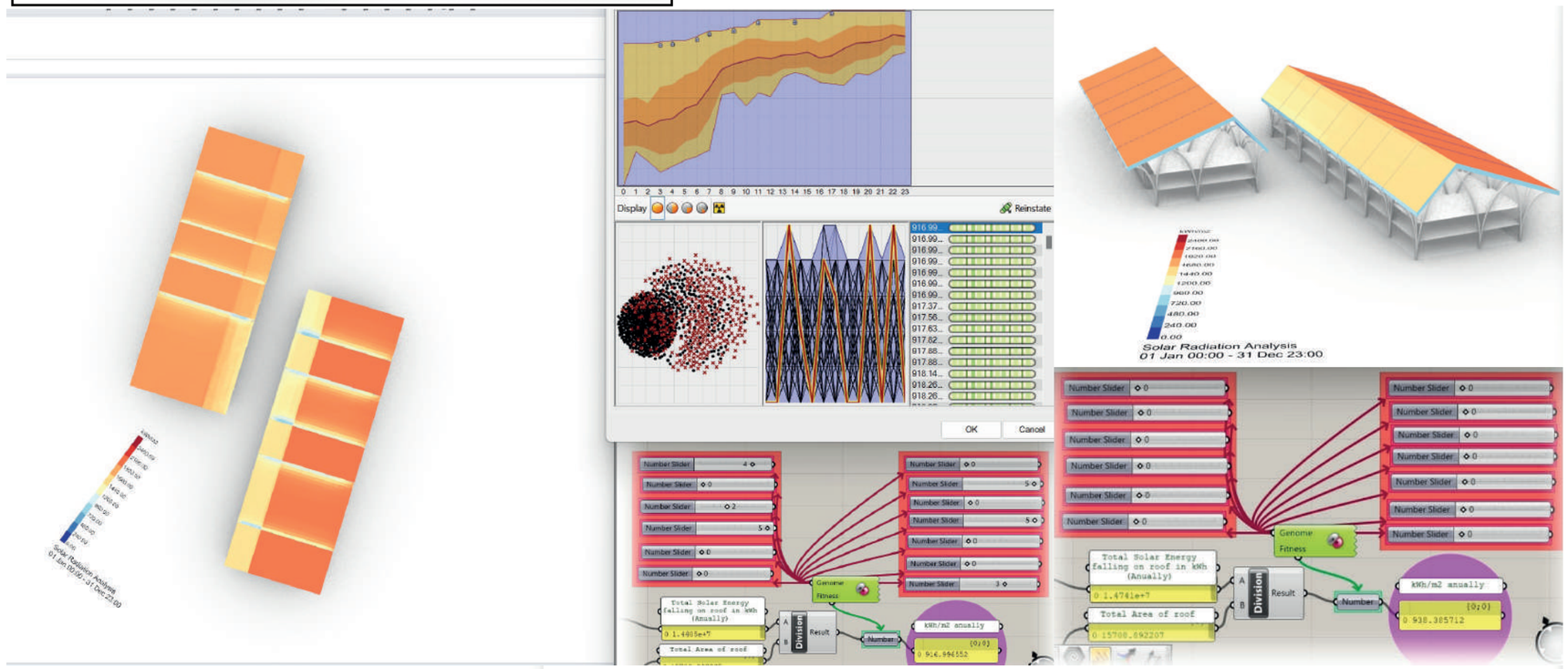


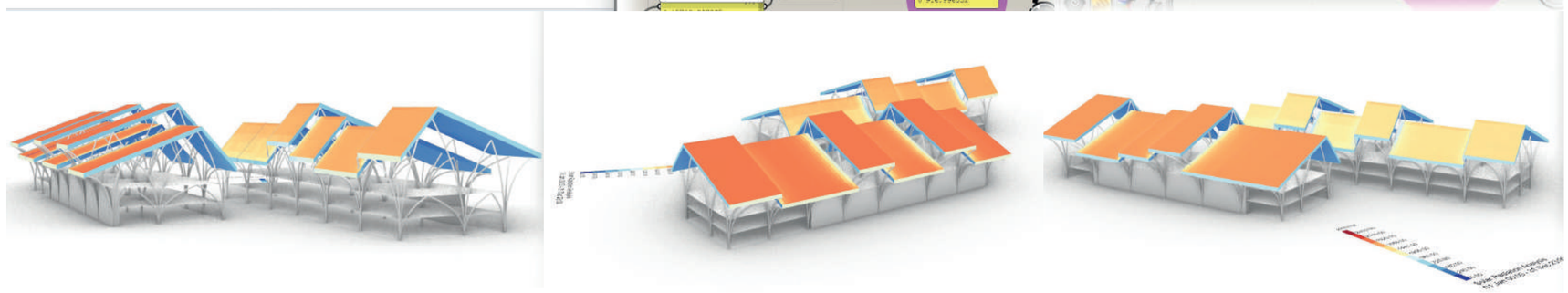
Massing Adjustment for Visual Connectivity & Arrival experience

The block closest to the river and open park is strategically pushed inward, creating a visual corridor that opens up views from the public space into the building. This gesture strengthens the connection between interior functions and the surrounding open space, encouraging interaction and a stronger sense of openness and accessibility.

The block near the shops and main road entrance is pushed inward to create a drop-off zone and a welcoming reception area. This setback improves accessibility and arrival experience, offering a clear entry point while easing vehicular and pedestrian flow at the site entrance.







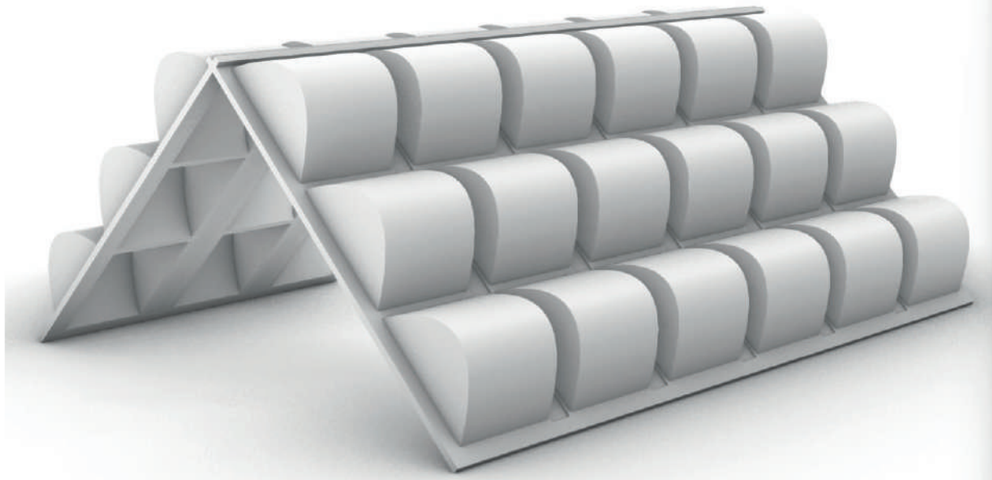
Massing Adjustment for Roof Height Variation for Thermal Comfort

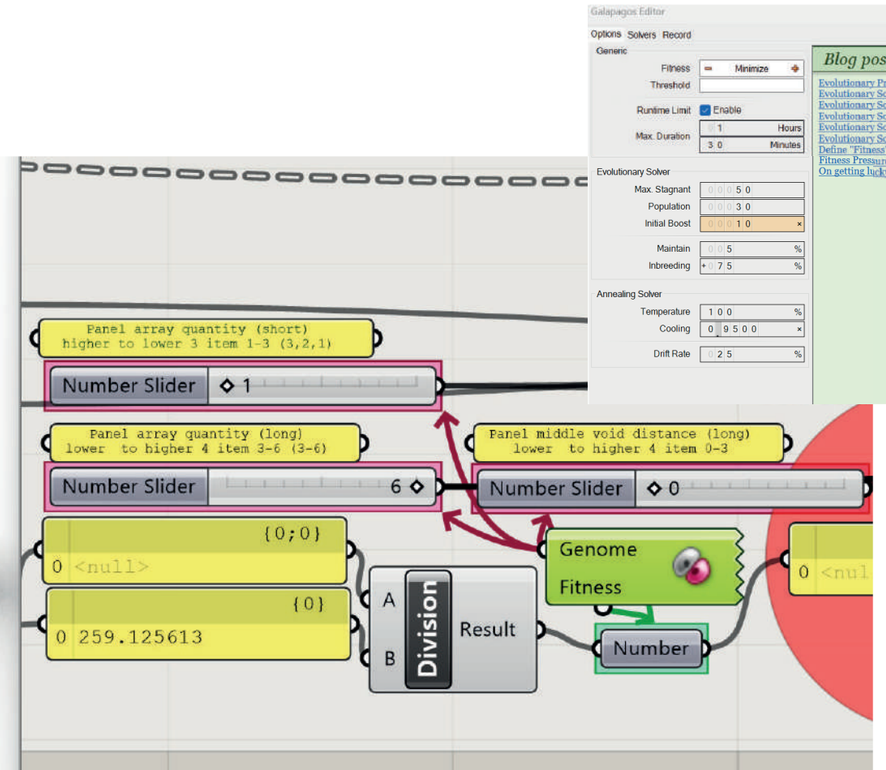
By adjusting building heights to create stepped roof levels, the higher roofs provide natural shading to the lower roofs and facades below.

This strategy significantly reduces solar heat gain, enhancing thermal comfort inside the building and improving energy efficiency in Malacca's tropical climate.

Scan QR code for digital Optimize video

ASSEMBLY ARRANGEMENT *(length, count and distances)*





1

In this iteration, I will work with "Galapagos tools" a plugin in Grasshopper-Rhino, allows me to optimize, analyze, and manipulate parametric designs by leveraging genetic algorithms. It enables users to:

1. Optimize Design Parameters: Adjust multiple variables to achieve the best possible design outcomes based on specific performance criteria.
In this situation/iteration, I will use "total incident solar energy falling on all roof in kWh" divide "Total Area of roof in Meter square" to get my kWh/m2.

2

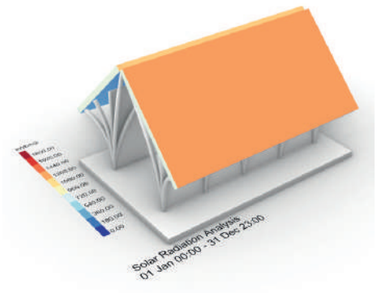
Use GALAPAGOS tools to try out multiple variables on different input parameters:

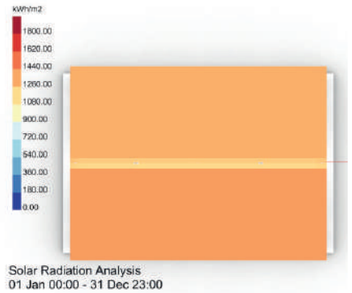
1. Panel array quantity (long axis)
2. Panel array quantity (short axis)
3. Distance between Row of panel and row of panel

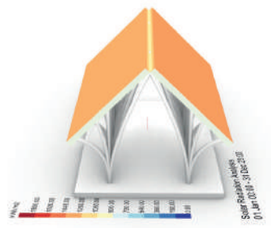
Test out from (50x5)=250 time of testing (digitally in grasshopper), Achieve the best possible design outcomes based one the lower amount of kWh/m2.

Scan QR code for digital Optimize video

Based Pitch Roof Model

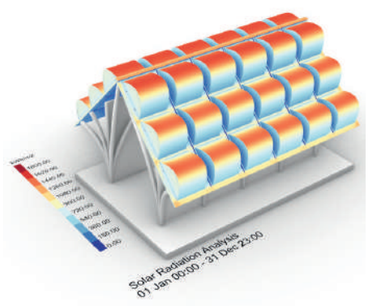


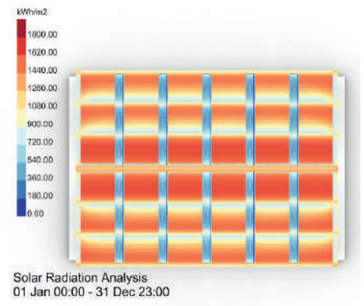


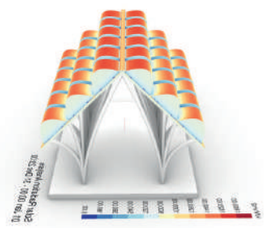


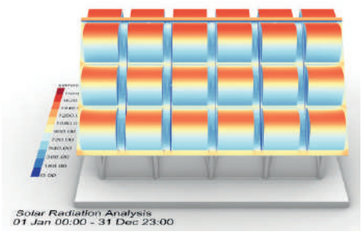
744.25kWh/m²

Final bamboo Roof with system



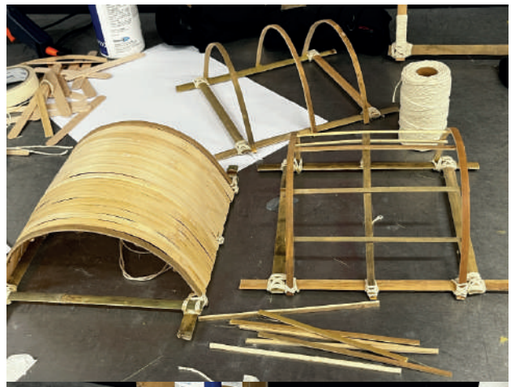


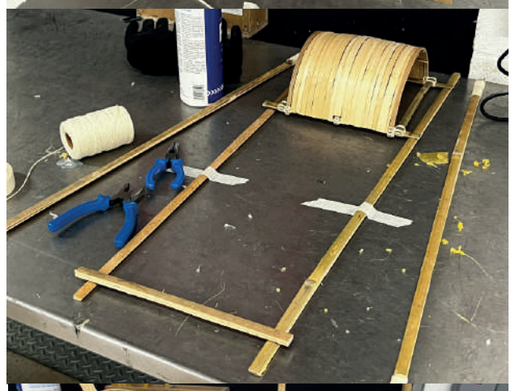


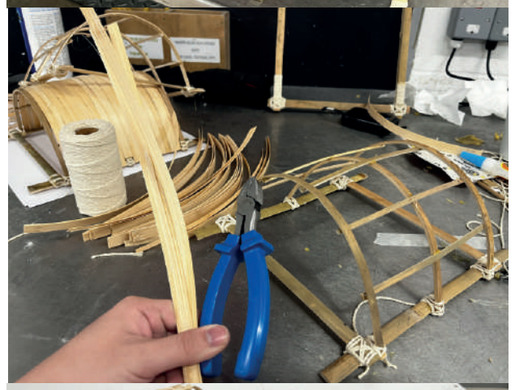


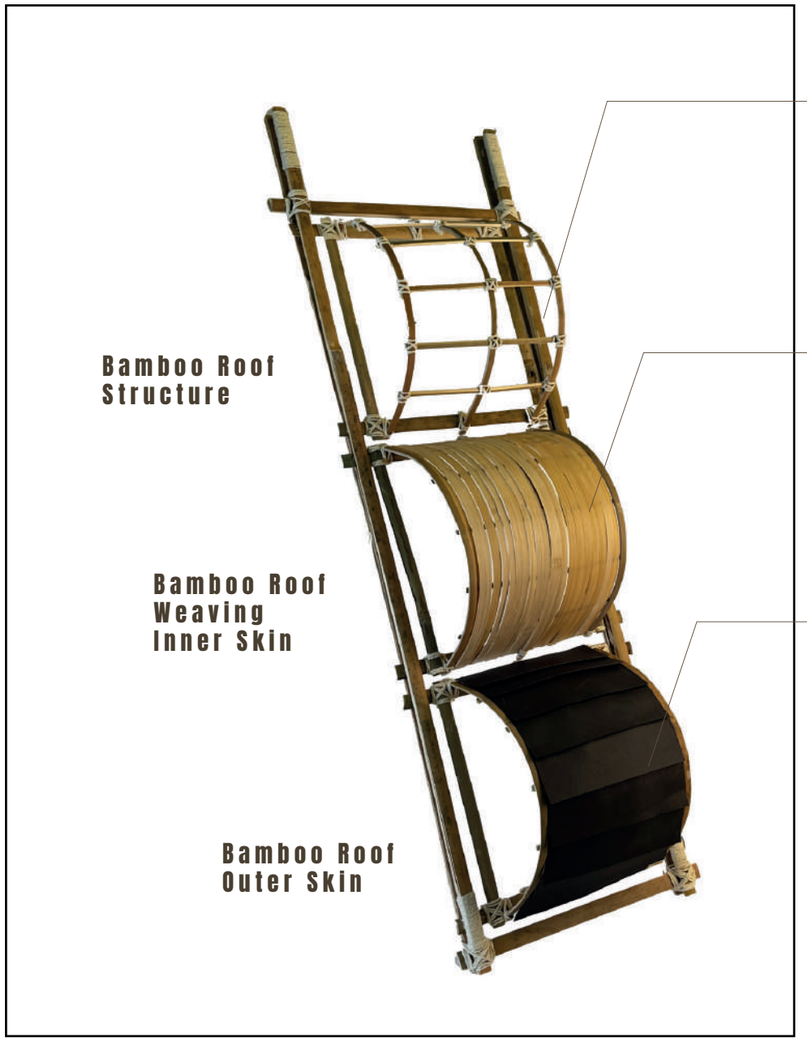
328.41kWh/m²

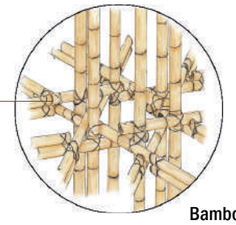
By applying these biomimicry principles onto the roof of education centre, the design reduces the amount of solar energy absorbed by the roof from 744.25 kWh/m to 328.41 kWh/m . This significant drop in heat gain enhances interior thermal comfort and supports passive cooling—making the building more sustainable and user-friendly in Malacca's tropical climate.



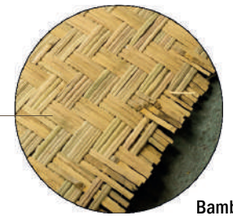




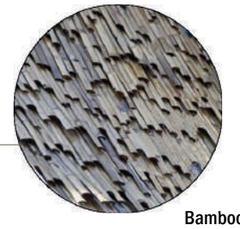




Bamboo Roof Structure



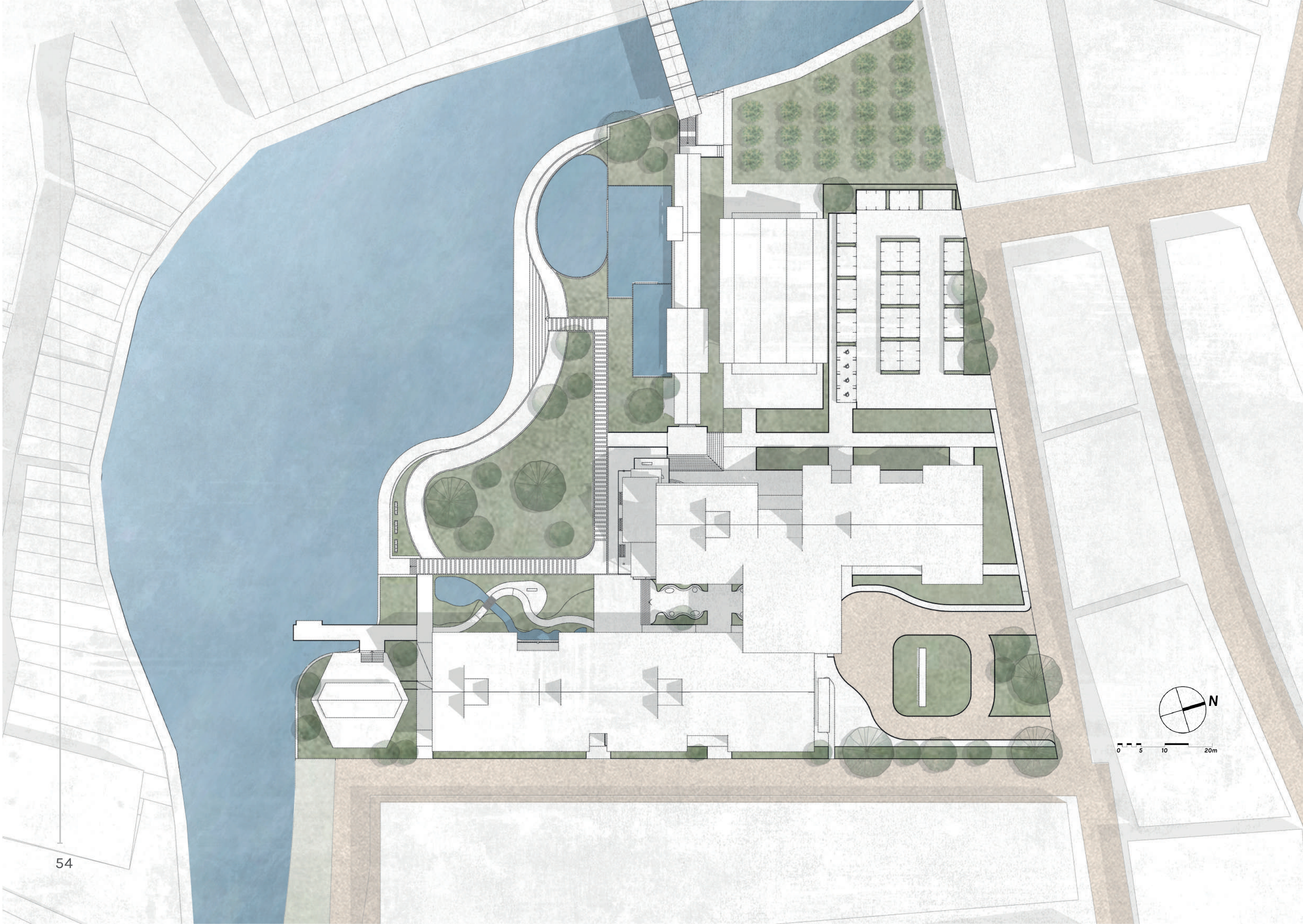
Bamboo Weaving Inner Roof Skin



Bamboo Outer Roof Skin

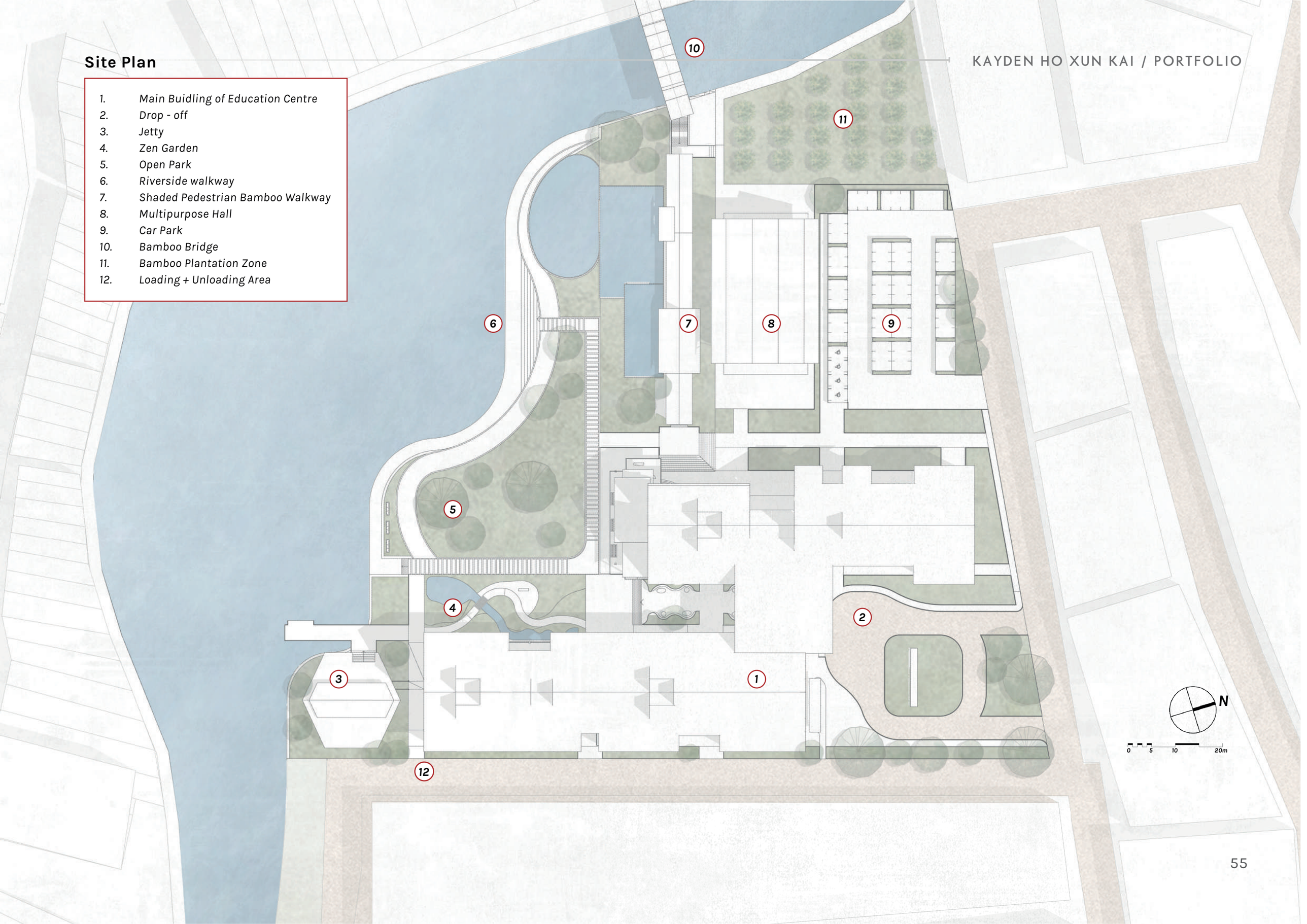
The final prototype combines iterations option B, Height B1and Pattern 1 to maximise the effects of texture and self-shading. The diagrams are showing how it apply into a normal bamboo pitch roof to improve the performance and create more self-shading to reduce kWh per square meter. It demonstrates that bamboo roof panel are able to pre-construct in bamboo factory and apply to different size of bamboo building roof, this make it able to reduce heat absorbing in Malaysia tropical humid climate, at the same time it is more cost and time efficient to able to apply it in bigger scale.


BAMBOO ROOF STRUCTURE
BAMBOO ROOF WEAVING INNER SKIN
BAMBOO ROOF OUTER SKIN
PHYSICAL BAMBOO PROTOTYPE MODEL IN SCALE
WORST PERFORMANCE

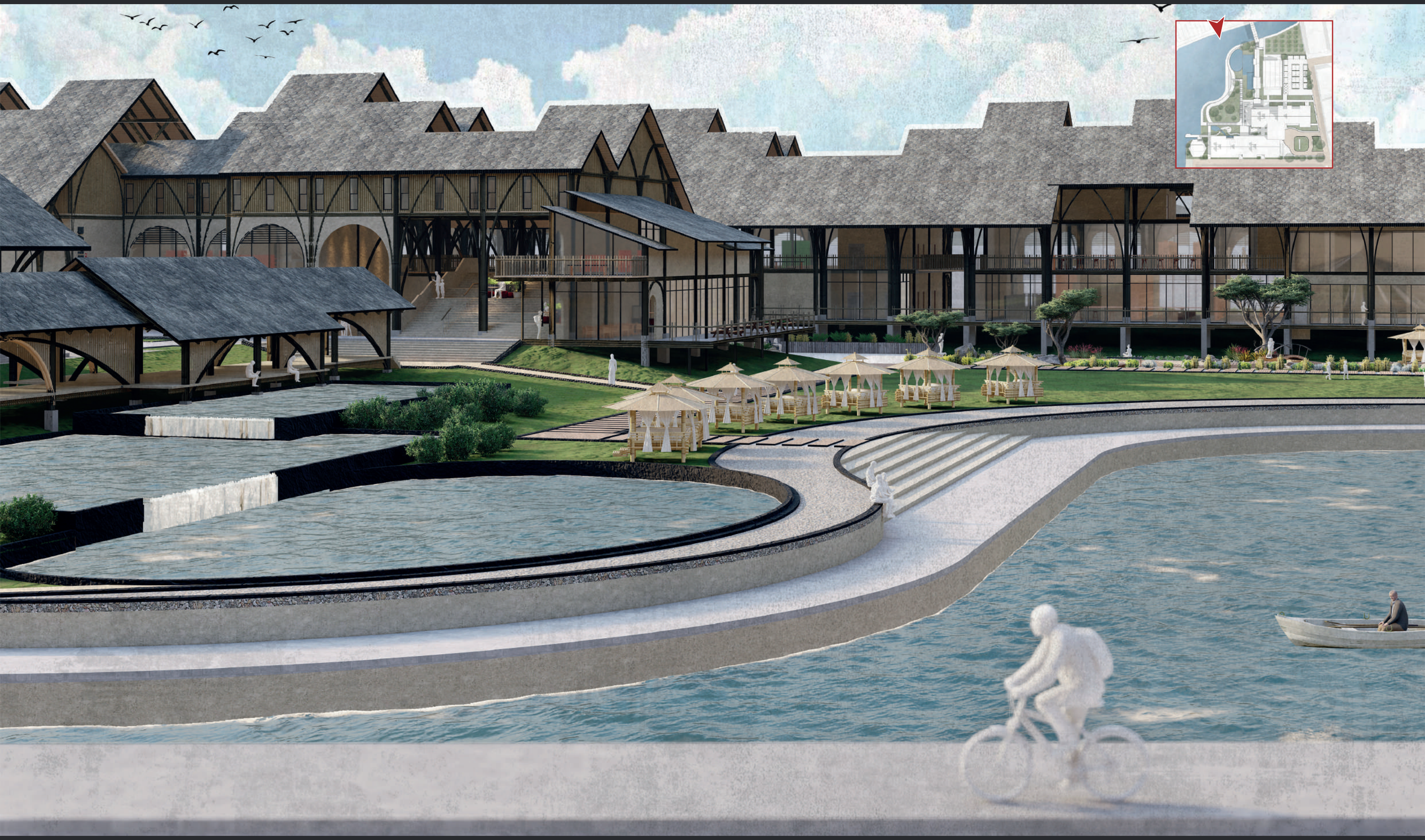

N
0
5
10
20m

Site Plan

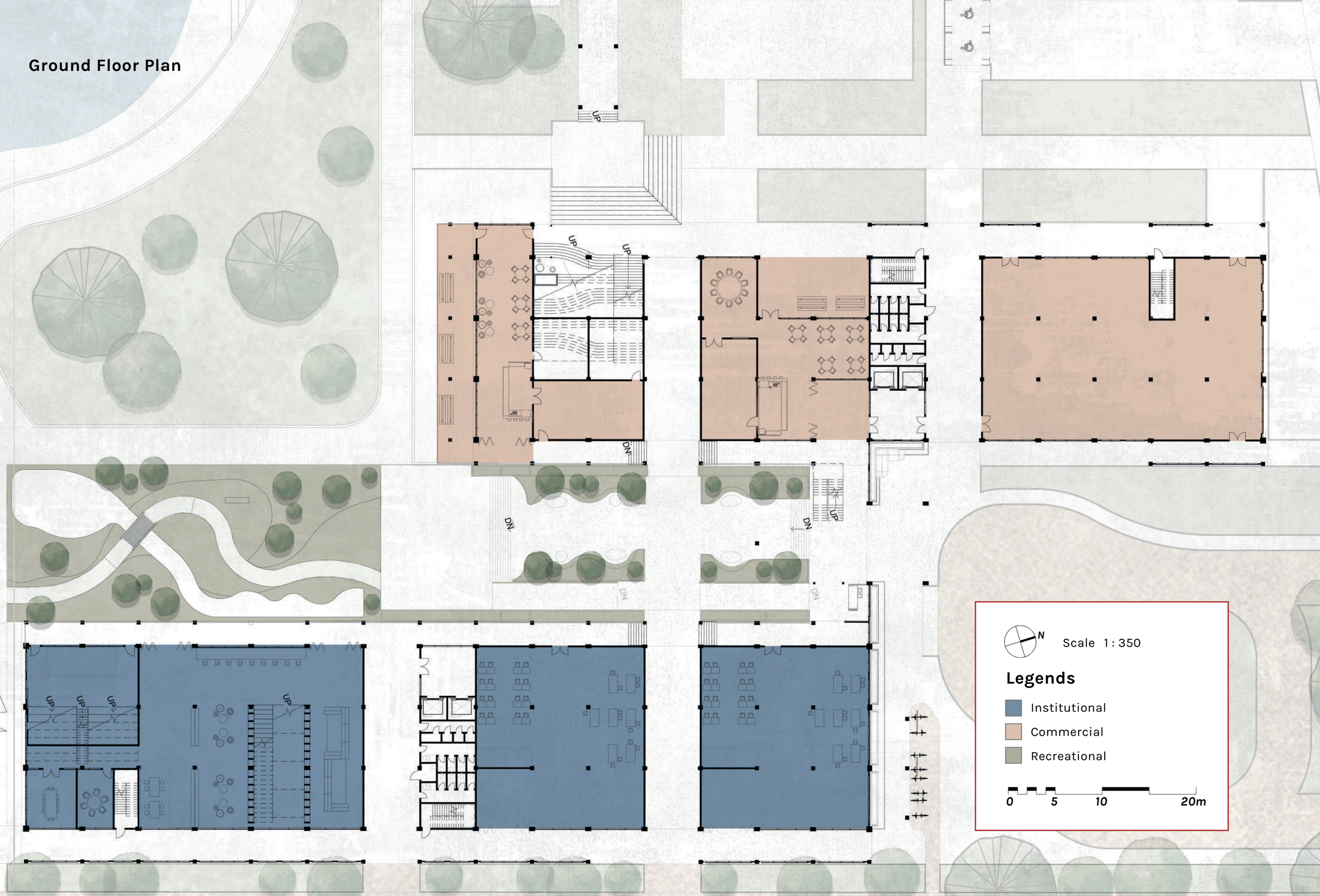
1. *Main Buidling of Education Centre*
2. *Drop - off*
3. *Jetty*
4. *Zen Garden*
5. *Open Park*
6. *Riverside walkway*
7. *Shaded Pedestrian Bamboo Walkway*
8. *Multipurpose Hall*
9. *Car Park*
10. *Bamboo Bridge*
11. *Bamboo Plantation Zone*
12. *Loading + Unloading Area*




BULUH BERSAMA HUB

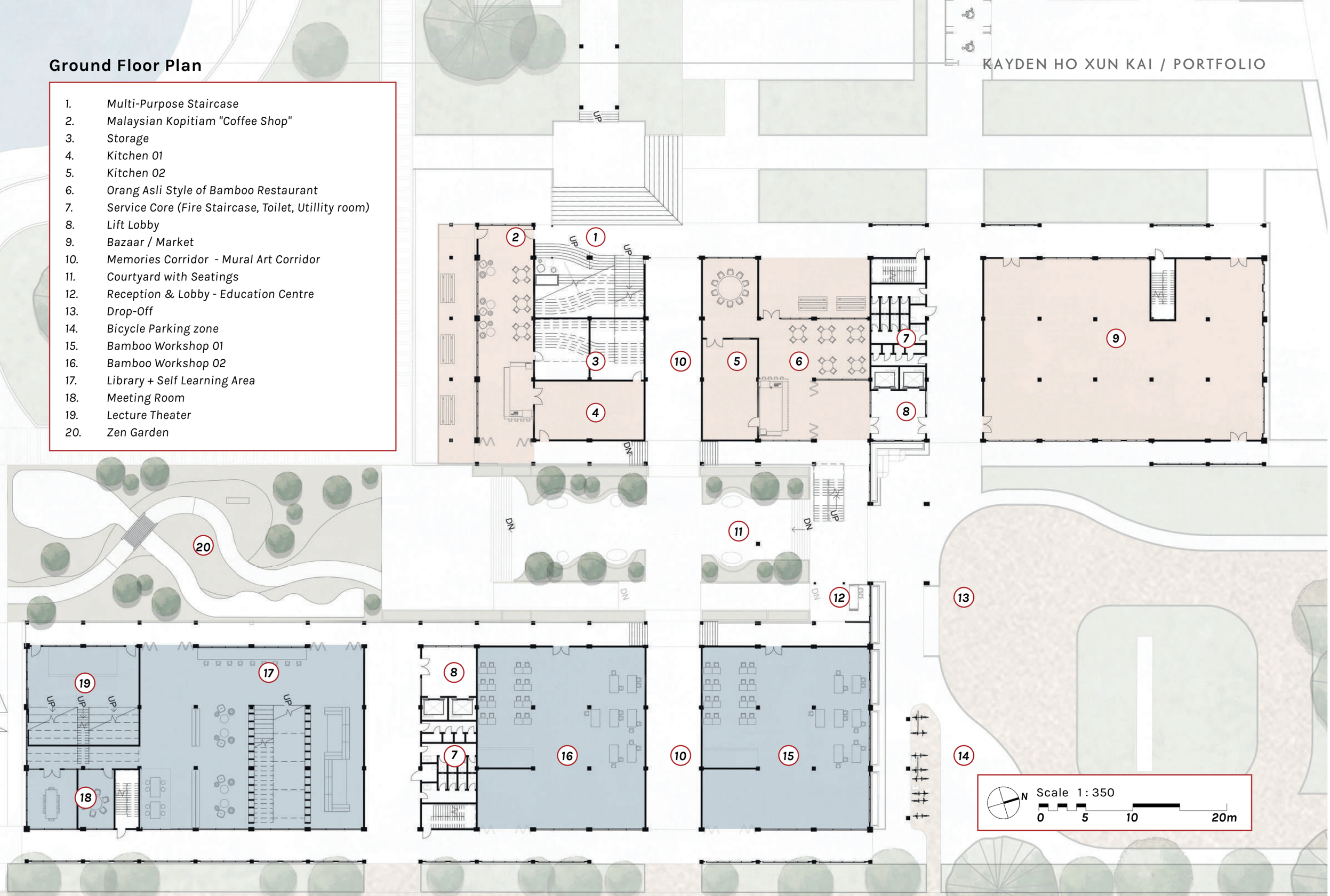

01

Ground Floor Plan



Ground Floor Plan

1. *Multi-Purpose Staircase*
2. *Malaysian Kopitiam "Coffee Shop"*
3. *Storage*
4. *Kitchen 01*
5. *Kitchen 02*
6. *Orang Asli Style of Bamboo Restaurant*
7. *Service Core (Fire Staircase, Toilet, Utillity room)*
8. *Lift Lobby*
9. *Bazaar / Market*
10. *Memories Corridor - Mural Art Corridor*
11. *Courtyard with Seatings*
12. *Reception & Lobby - Education Centre*
13. *Drop-Off*
14. *Bicycle Parking zone*
15. *Bamboo Workshop 01*
16. *Bamboo Workshop 02*
17. *Library + Self Learning Area*
18. *Meeting Room*
19. *Lecture Theater*
20. *Zen Garden*



Multi-Purpose Staircase

Memories Corridor - Mural Art Corridor

Five - Foot Walkway

Bamboo Workshop 01 (GF) + Bamboo Exhibition (1st Floor)

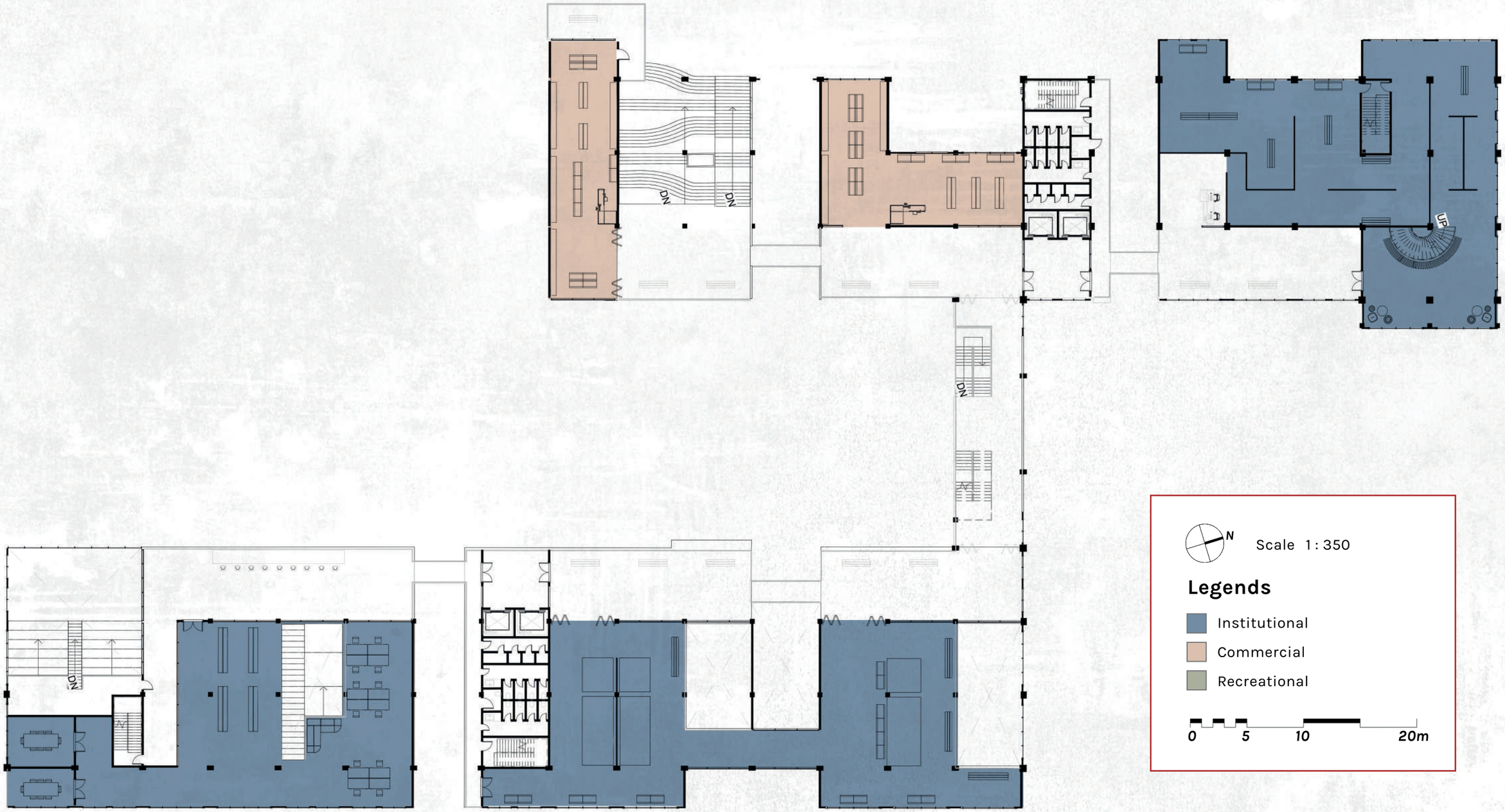
Courtyard with Seatings

Library + Self Learning Area (GF)

Zen Garden

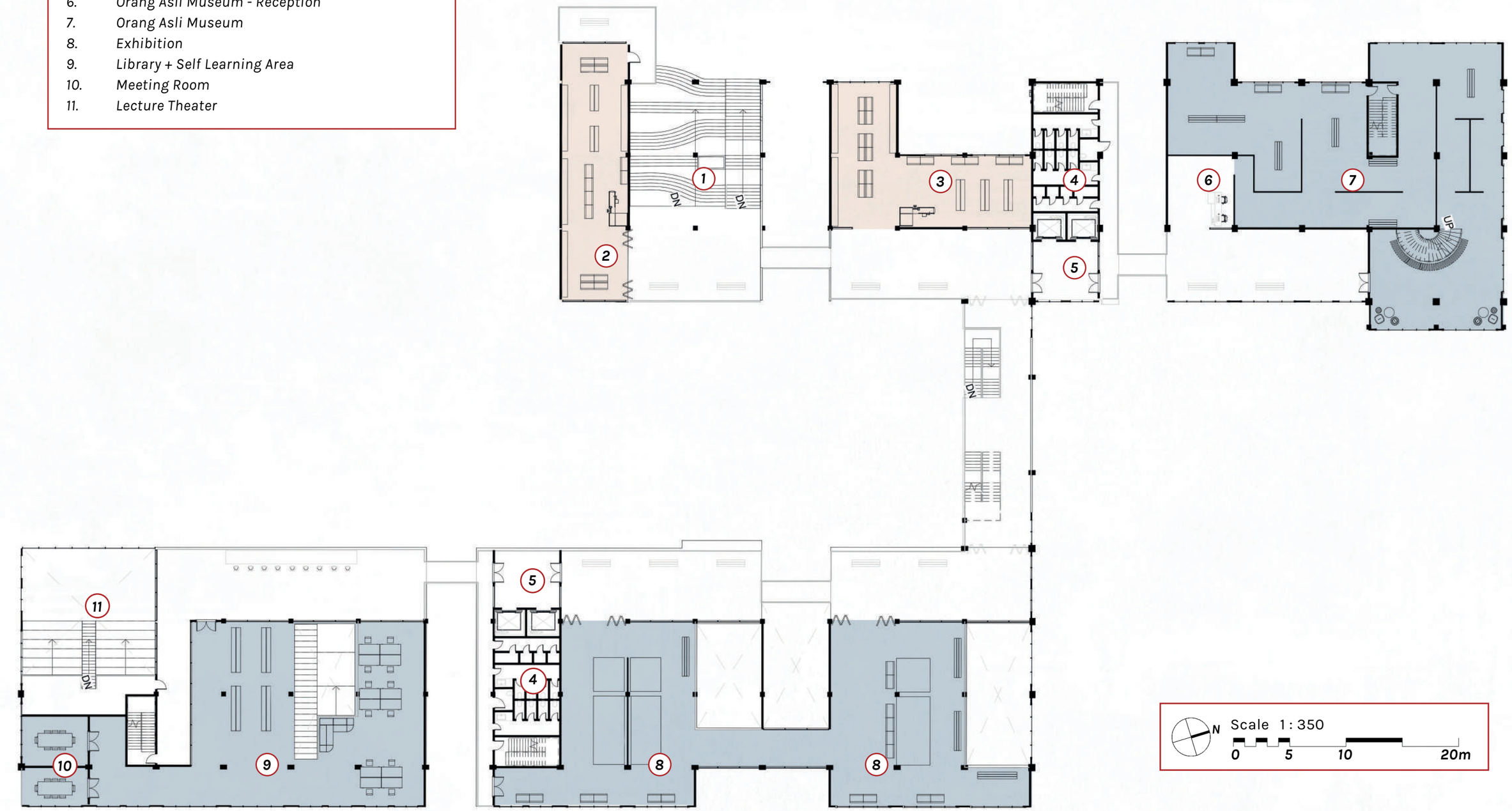
Lecture Theater

1st Floor Plan



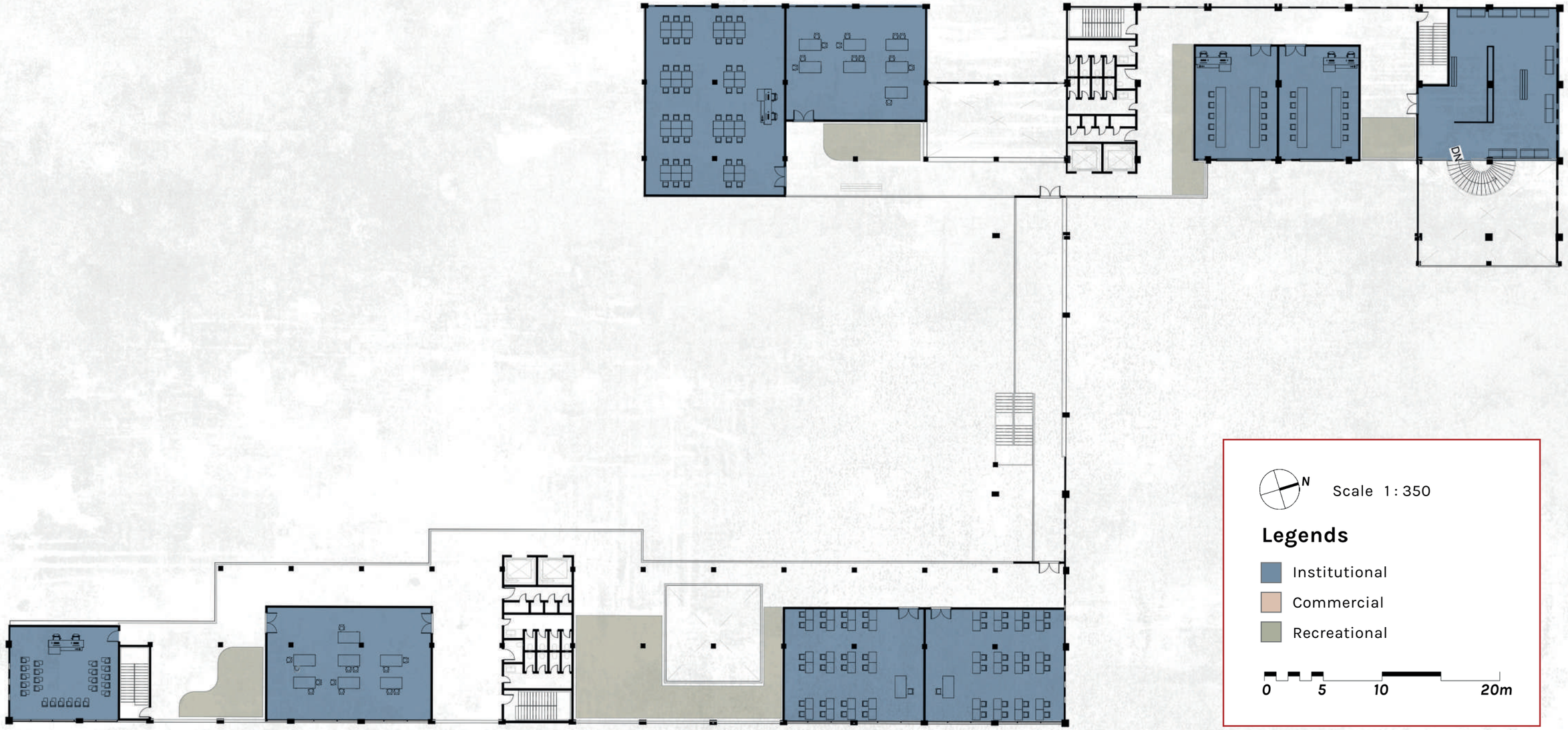
1st Floor Plan

1. *Multi-Purpose Staircase*
2. *Retail 01*
3. *Retail 02*
4. *Service Core (Fire Staircase, Toilet, Utillity room)*
5. *Lift Lobby*
6. *Orang Asli Museum - Reception*
7. *Orang Asli Museum*
8. *Exhibition*
9. *Library + Self Learning Area*
10. *Meeting Room*
11. *Lecture Theater*



Library + Self Learning Area (1st Floor)

Corridor in from of Retail 02

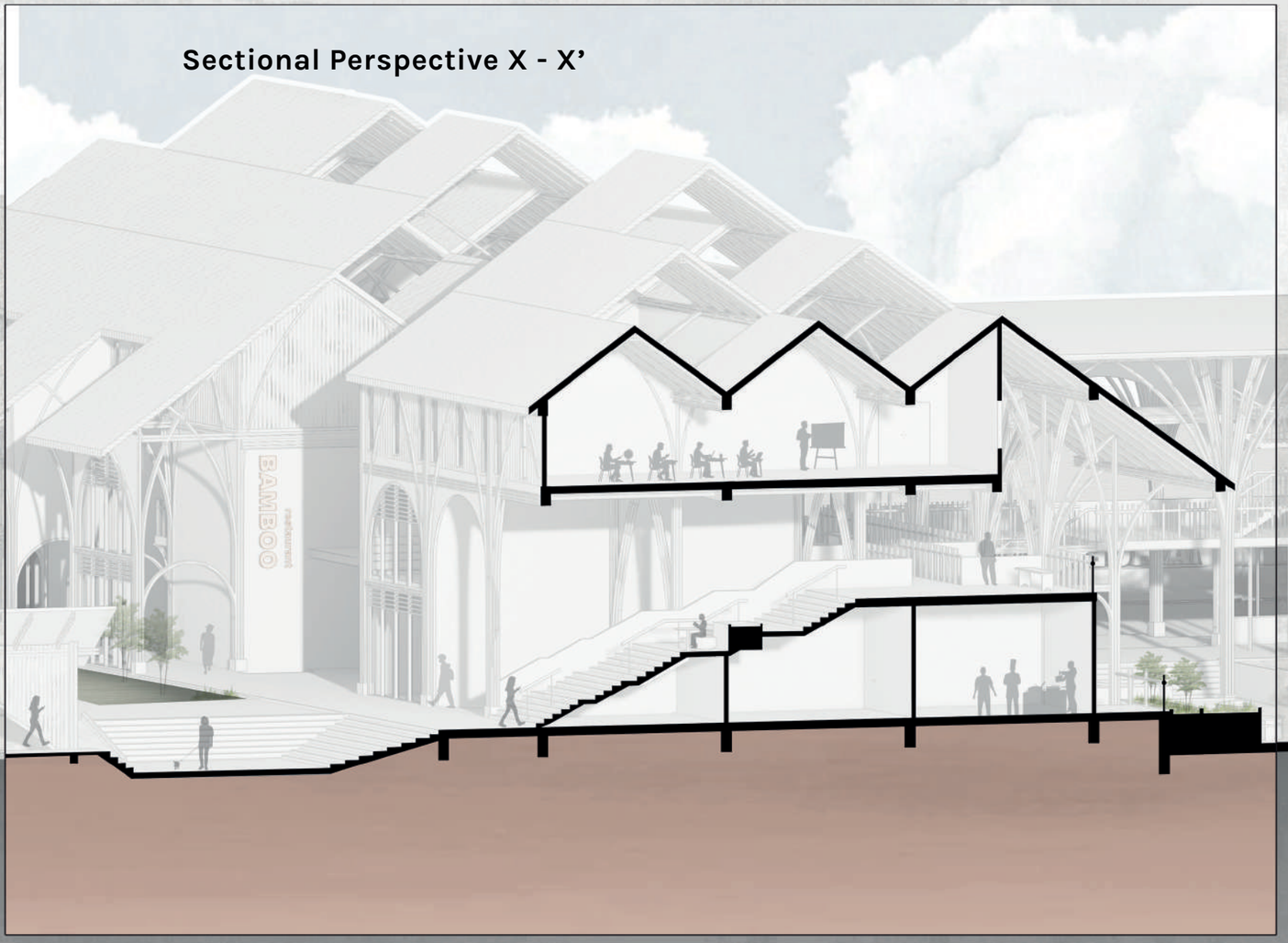

DN
N
Scale 1 : 350
Legends
Institutional
Commercial
Recreational
0
5
10
20m

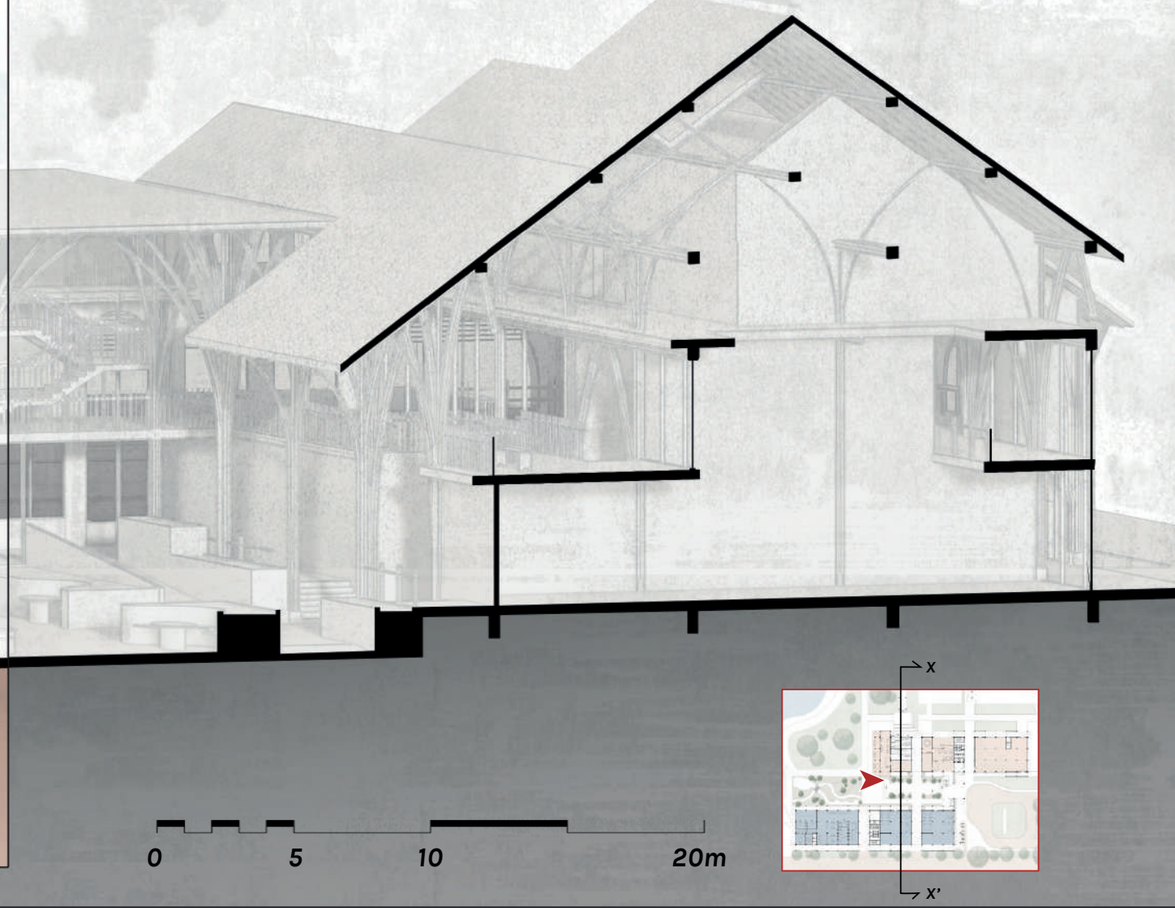
2nd Floor Plan

1. *IT + Computer Learning Classroom*
2. *Classroom 01*
3. *Service Core (Fire Staircase, Toilet, Utillity room)*
4. *Workshop 01 + 02*
5. *Orang Asli Museum - Higher level*
6. *Classroom 02*
7. *Classroom 03*
8. *Workshop 03*
9. *Group Discussion + Meeting Room*

Elevation View 01

Sectional Perspective X - X'

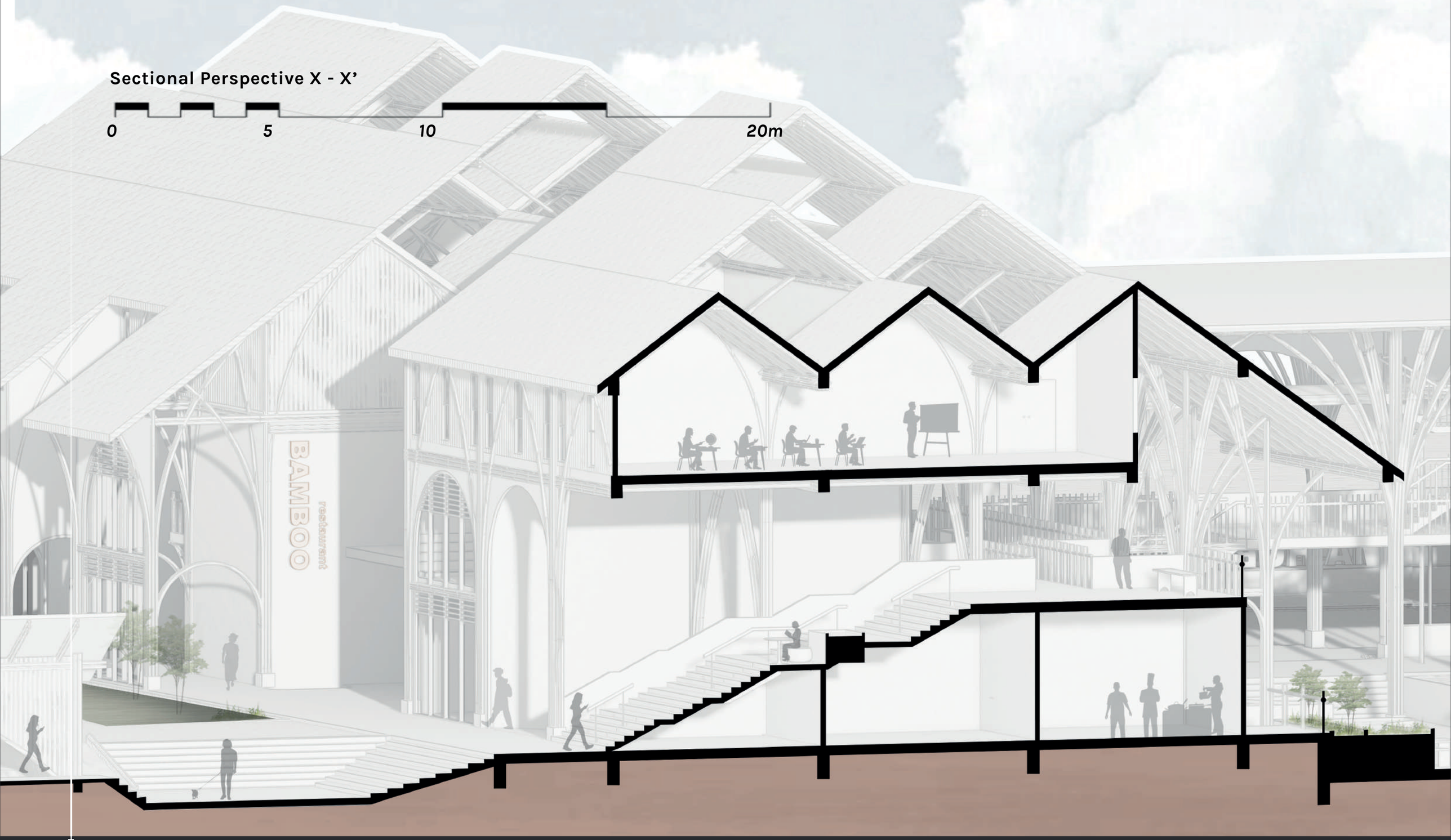


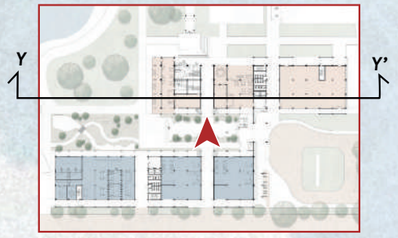


0 5 10 20m

Sectional Perspective X - X’

0 5 10 20m





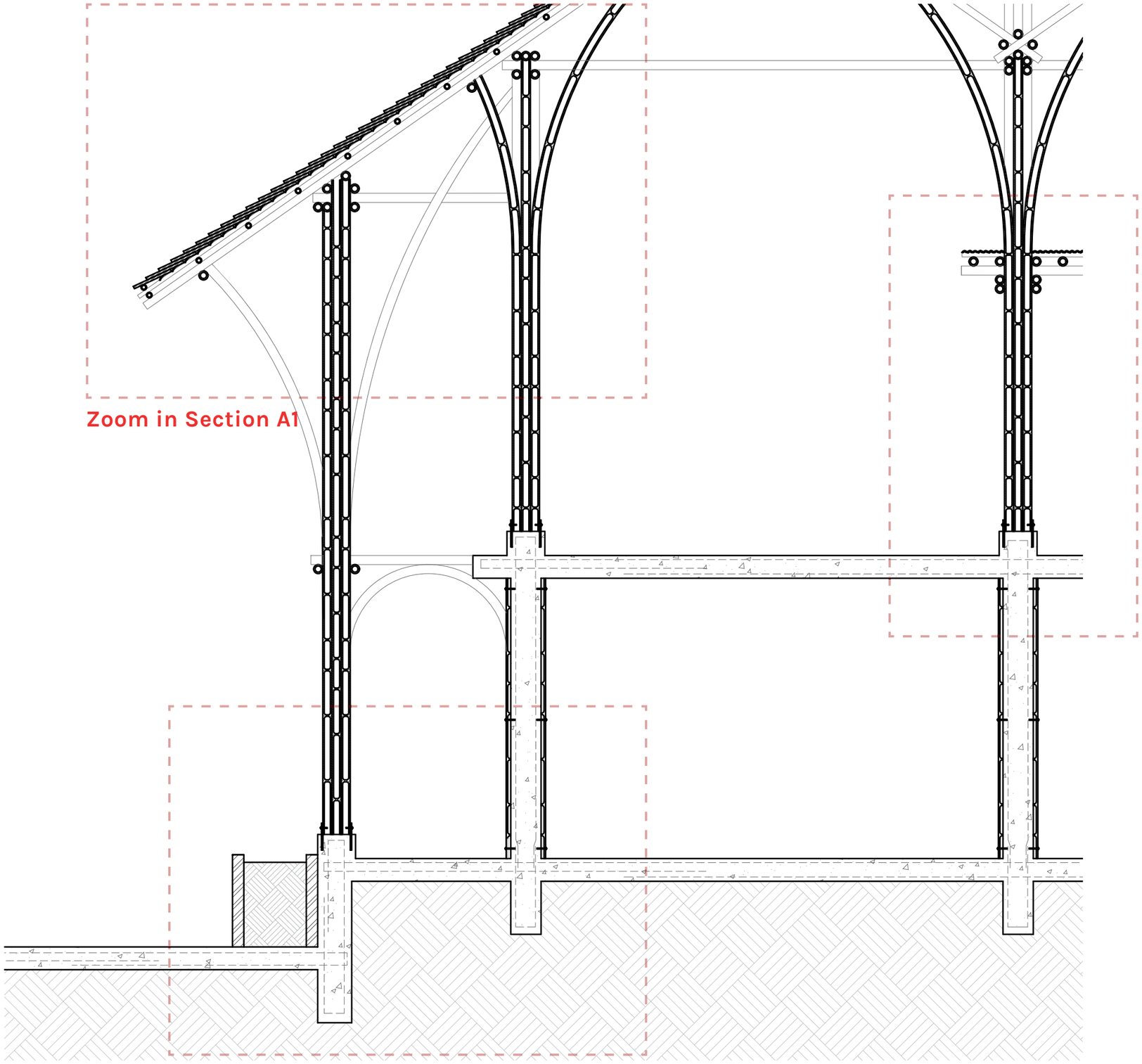
Sectional Perspective Y - Y'

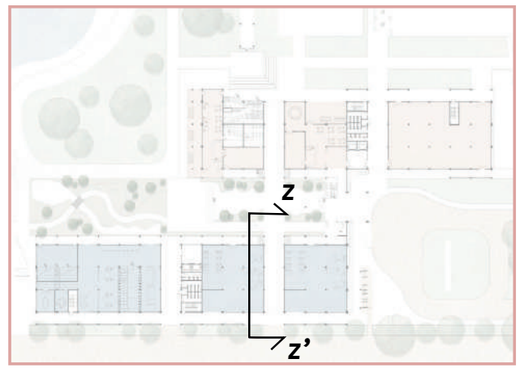
0 5 10 20m

Sectional Perspective Y - Y'

0 5 10 20

Section z - z’ Scale 1:50

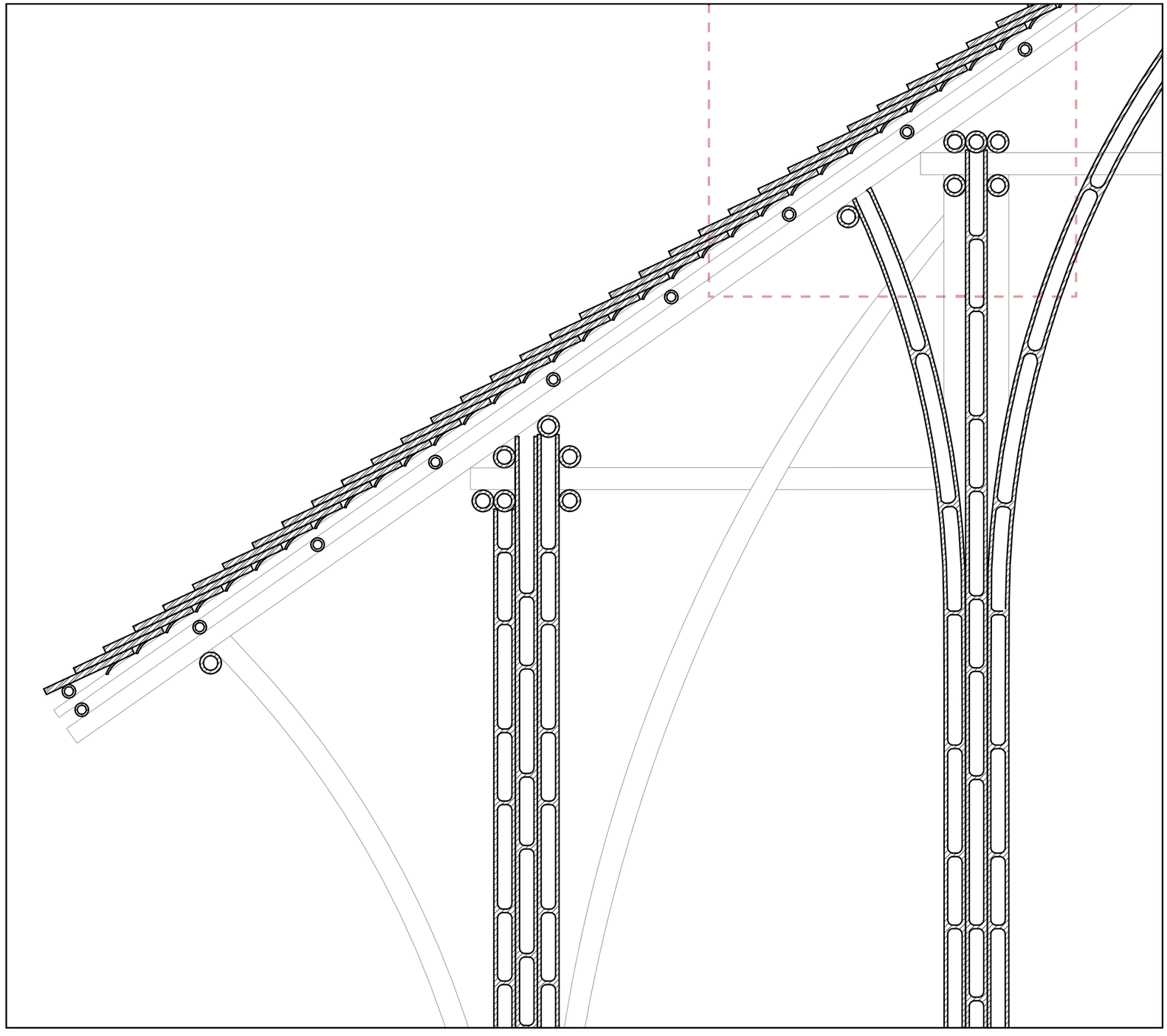




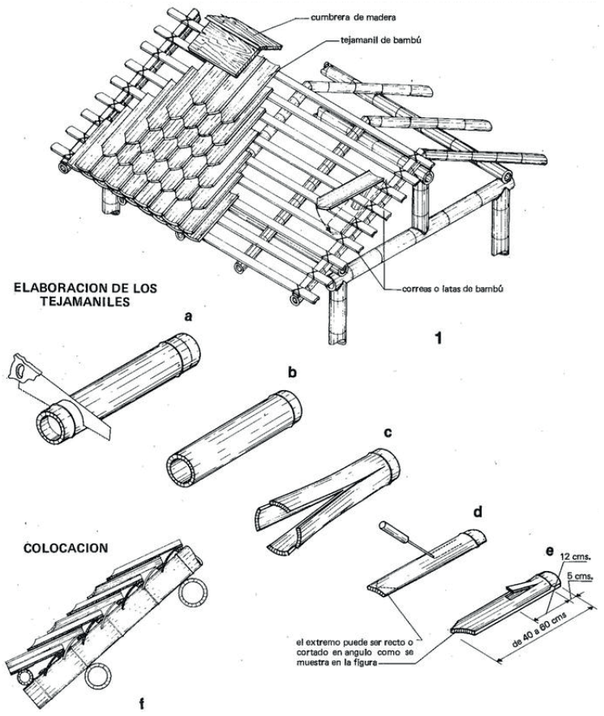
Section z - z’ Scale 1:50

Zoom in Section A1 scale 1:20

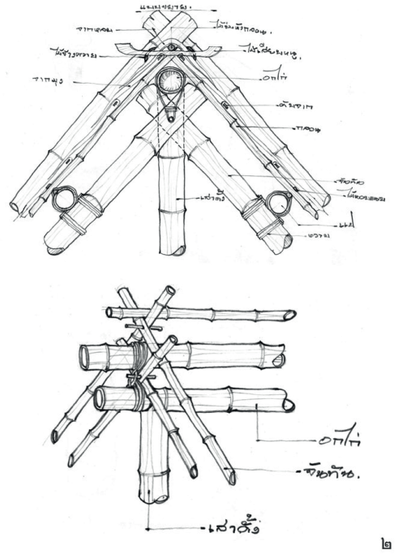
Zoom in Section B1



0 0.5 1.0 1.5 2m



วิชาสถาปัตยกรรมไทย 3108-1004
Drawing By Sompong Bhudbhutthinkul
พ.ศ.2535



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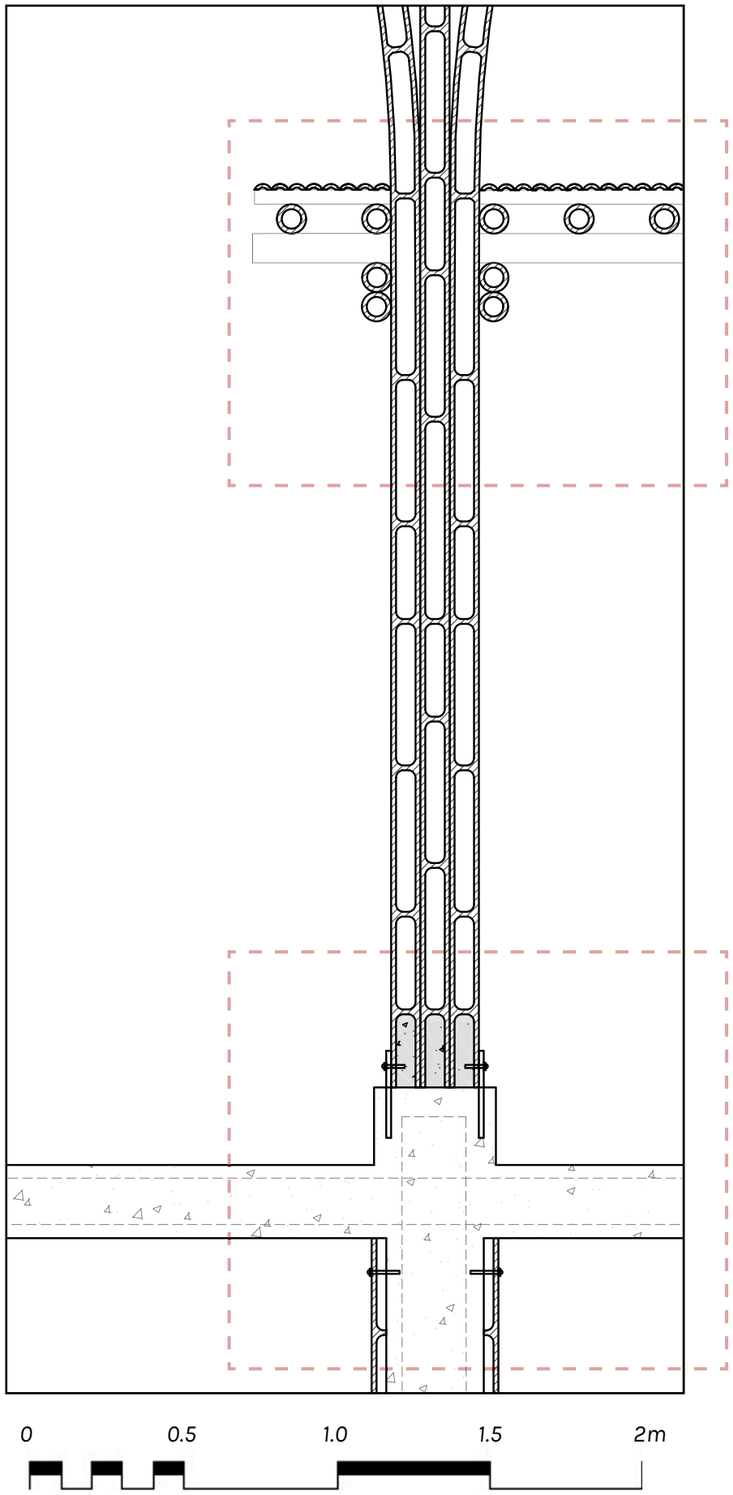
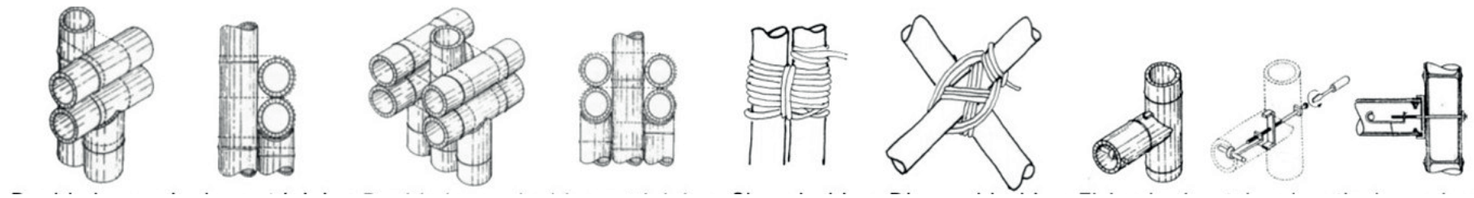
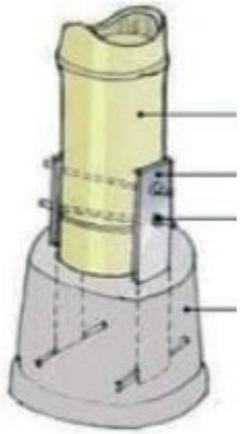
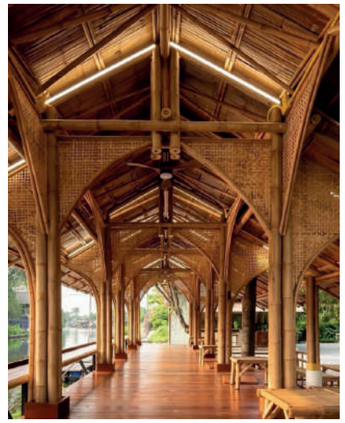
Zoom in Section A2 **Scale 1:20**





Zoom in Section B2



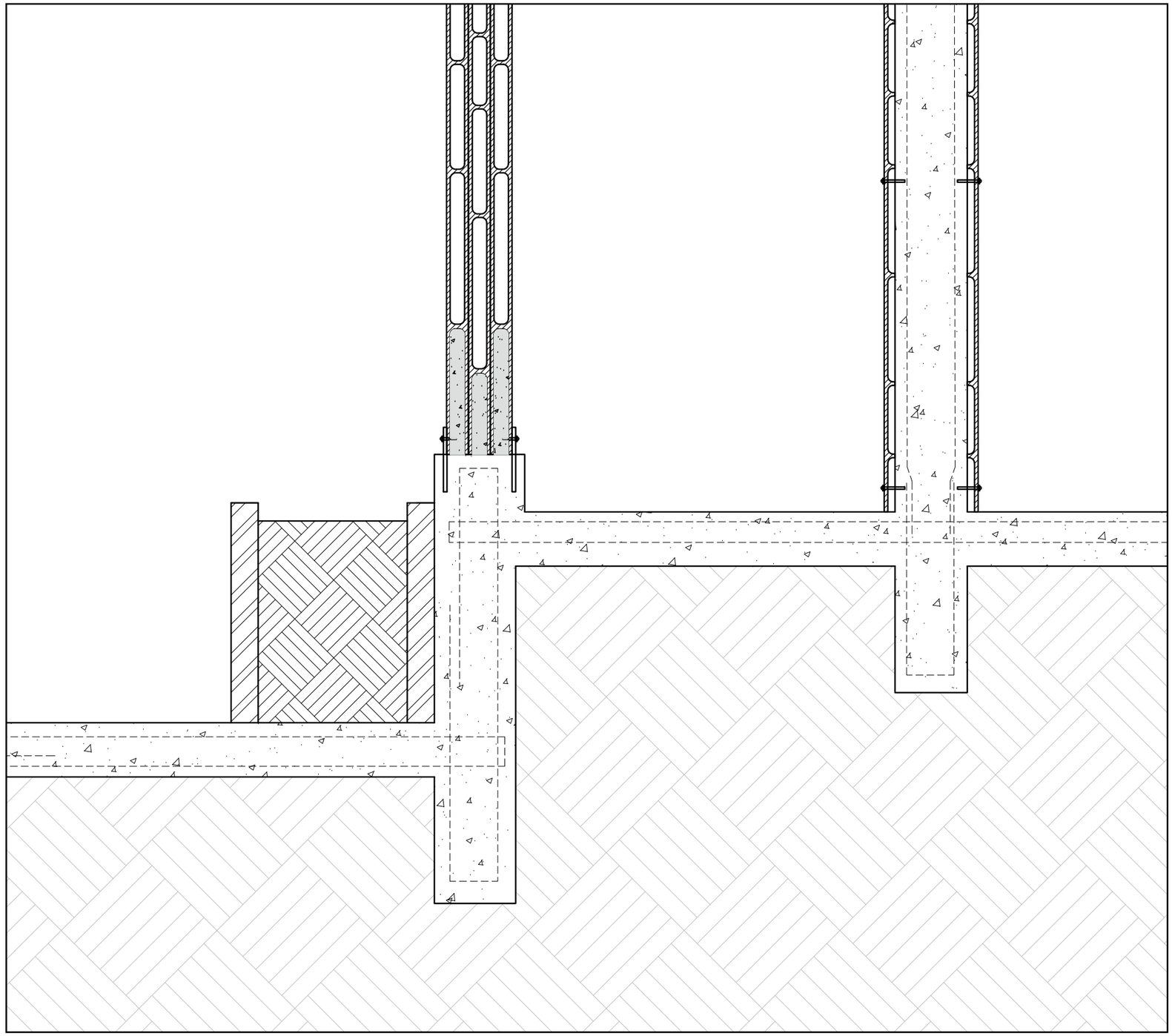


This project explores the integration of traditional and contemporary materials by combining concrete and bamboo structures. The main structural framework from the ground floor to the first floor is constructed with concrete, providing stability and durability. However, the outer skin of this level is clad in split bamboo, continuing the design language and maintaining a strong connection to traditional craftsmanship.

From the first floor upwards, the structure transitions to bamboo as the primary material, emphasizing lightness, sustainability, and cultural identity. This section drawings highlights the architectural and structural dialogue between concrete and bamboo, showcasing thoughtful detailing in the joints and connection methods that harmonize the two contrasting materials.

Zoom in Section B3

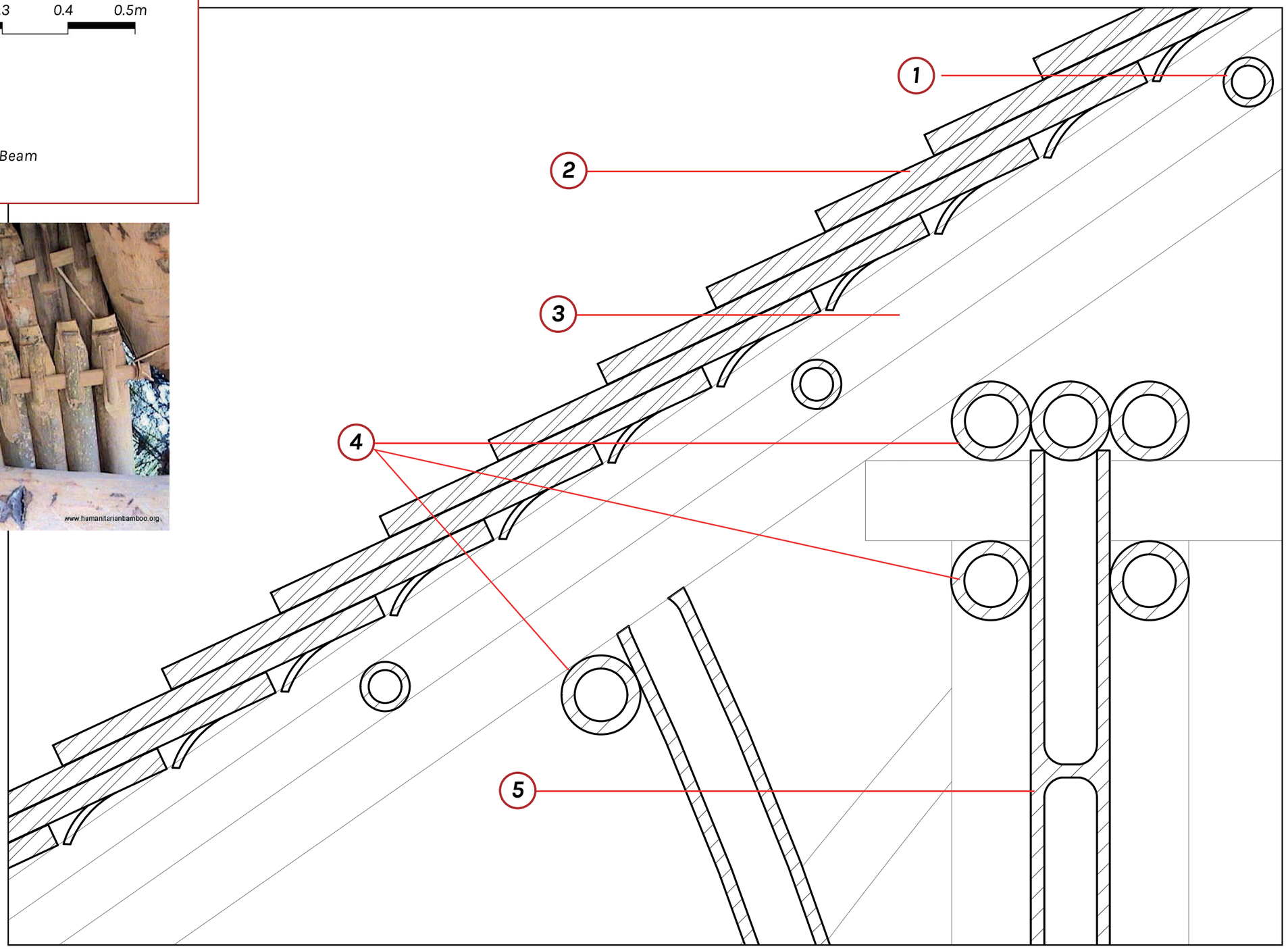
Zoom in Section A3 Scale 1:20



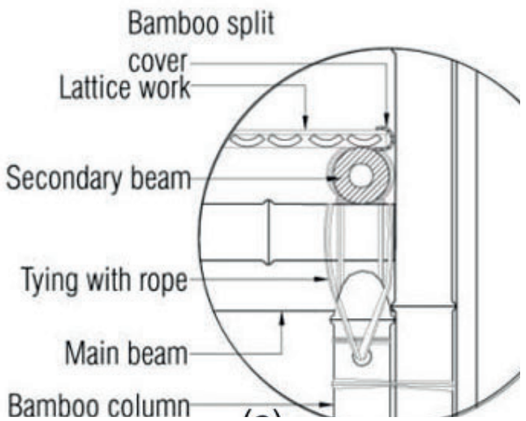
Zoom in Section B1 Scale 1:5

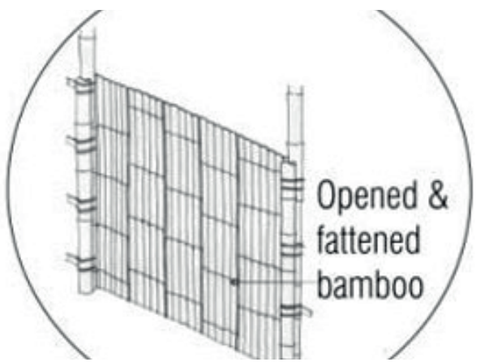
0 0.1 0.2 0.3 0.4 0.5m

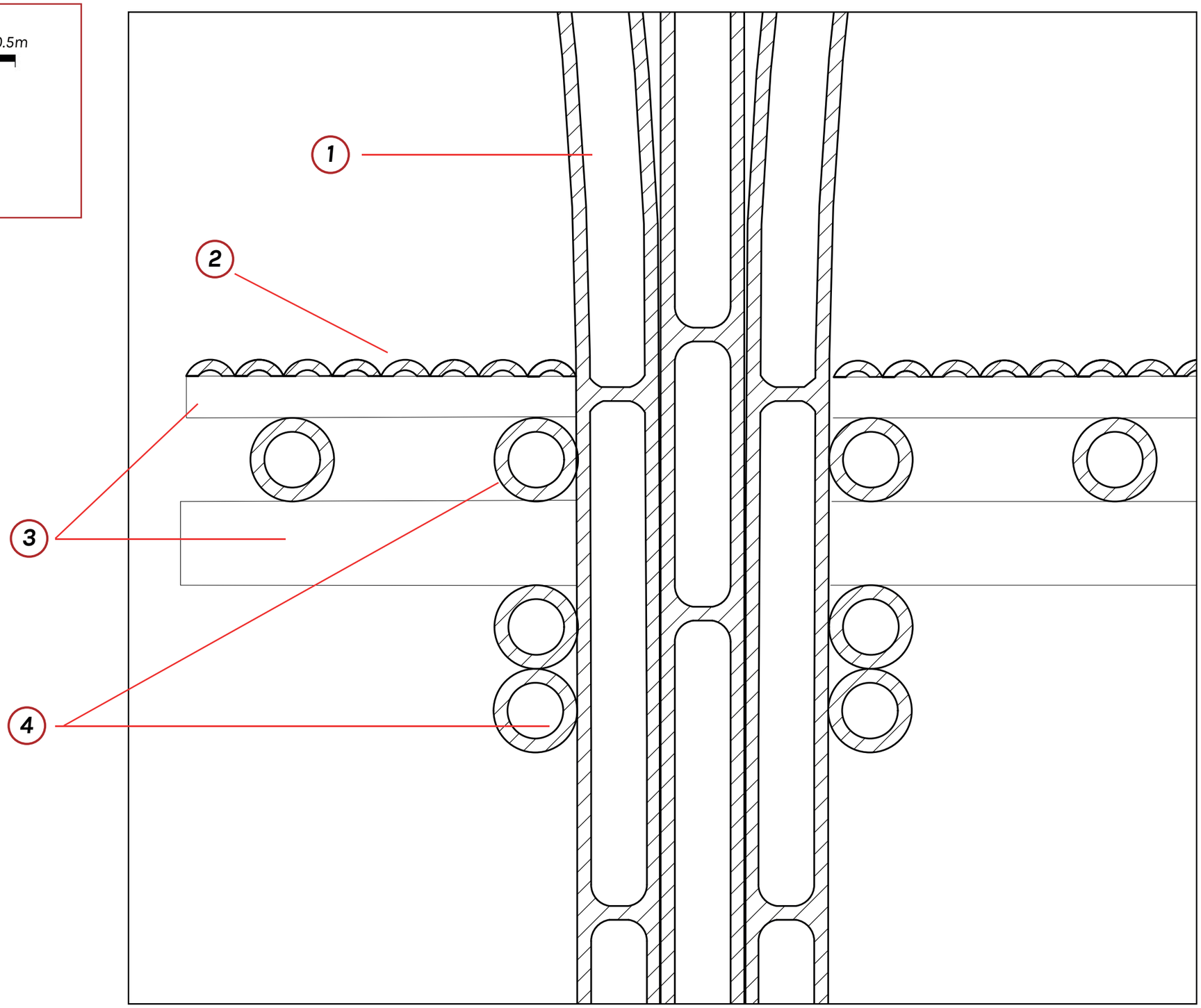
1. *Purlin*
2. *Roof Shade*
3. *Light Roof Truss*
4. *Main & Secondary Roof Beam*
5. *Bamboo Post Structure*



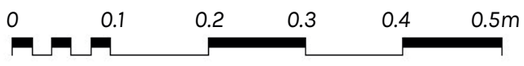
1. *Bamboo Post Structure*
2. *Bamboo Split cover flooring*
3. *Bamboo Secondary Beam*
4. *Bamboo Main Beam*







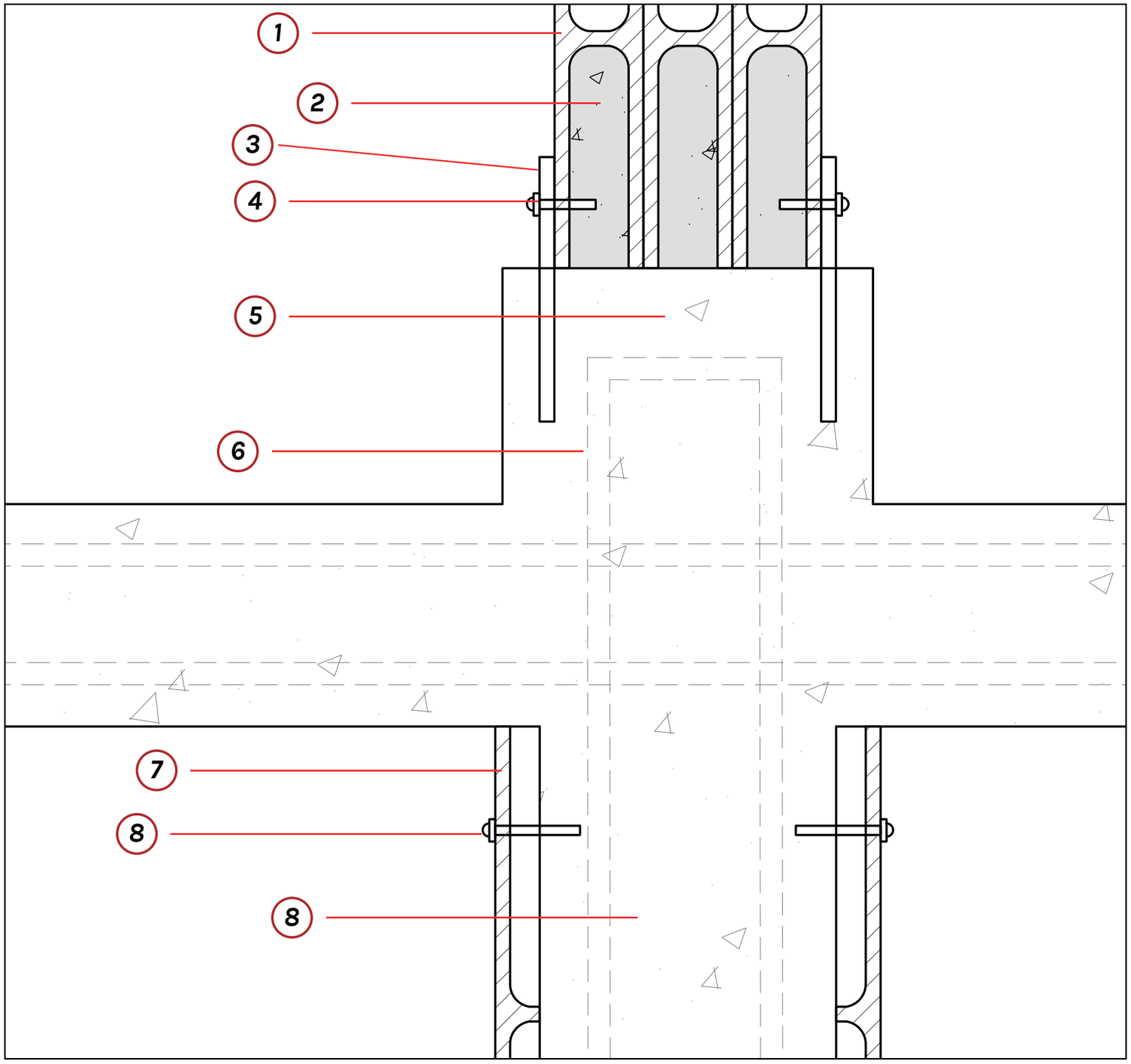
Zoom in Section B3 Scale 1:5



1. *Bamboo Post Structure*
2. *Cement insole to avoid bamboo breaking*
3. *Steel Angle Bracket*
4. *Nails*
5. *Concreate Based structure*
6. *Steel reinforcement bars (Rebar)*
7. *Bamboo Pole Splited into half to cover Concreate Column*
8. *Concreate Column Structure*

A cement insole is applied at the base of each bamboo pole to prevent splitting and decay when inserting nails or fasteners,

This ensuring a more durable connection between the bamboo and the foundation. This detail strengthens the structural integrity while respecting the natural properties of bamboo.



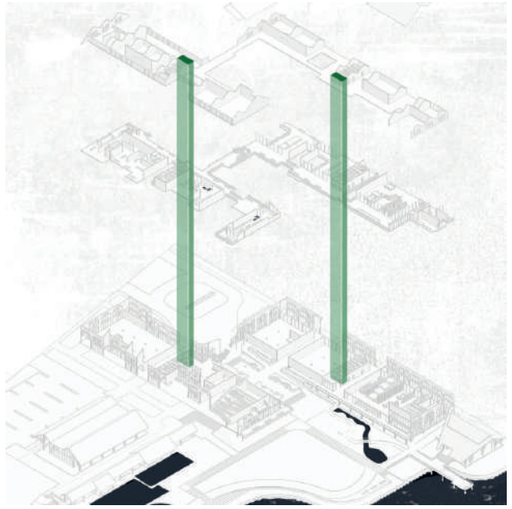
Fire Escape & Service Core Strategy

For fire safety, the building includes two fully protected fire escape staircases located on opposite ends of the structure (shown in red). These connect all floors—from ground to second floor—and are built using self-loading brick walls and reinforced concrete, ensuring high fire resistance and sufficient evacuation time.

The service core, which houses the lift, toilets, utility rooms, and fire stairs, is also constructed with fire-rated materials to meet safety standards.

According to Malaysia's Uniform Building By-Laws (UBBL), the maximum travel distance to a fire escape staircase is 30 meters for unsprinklered buildings.

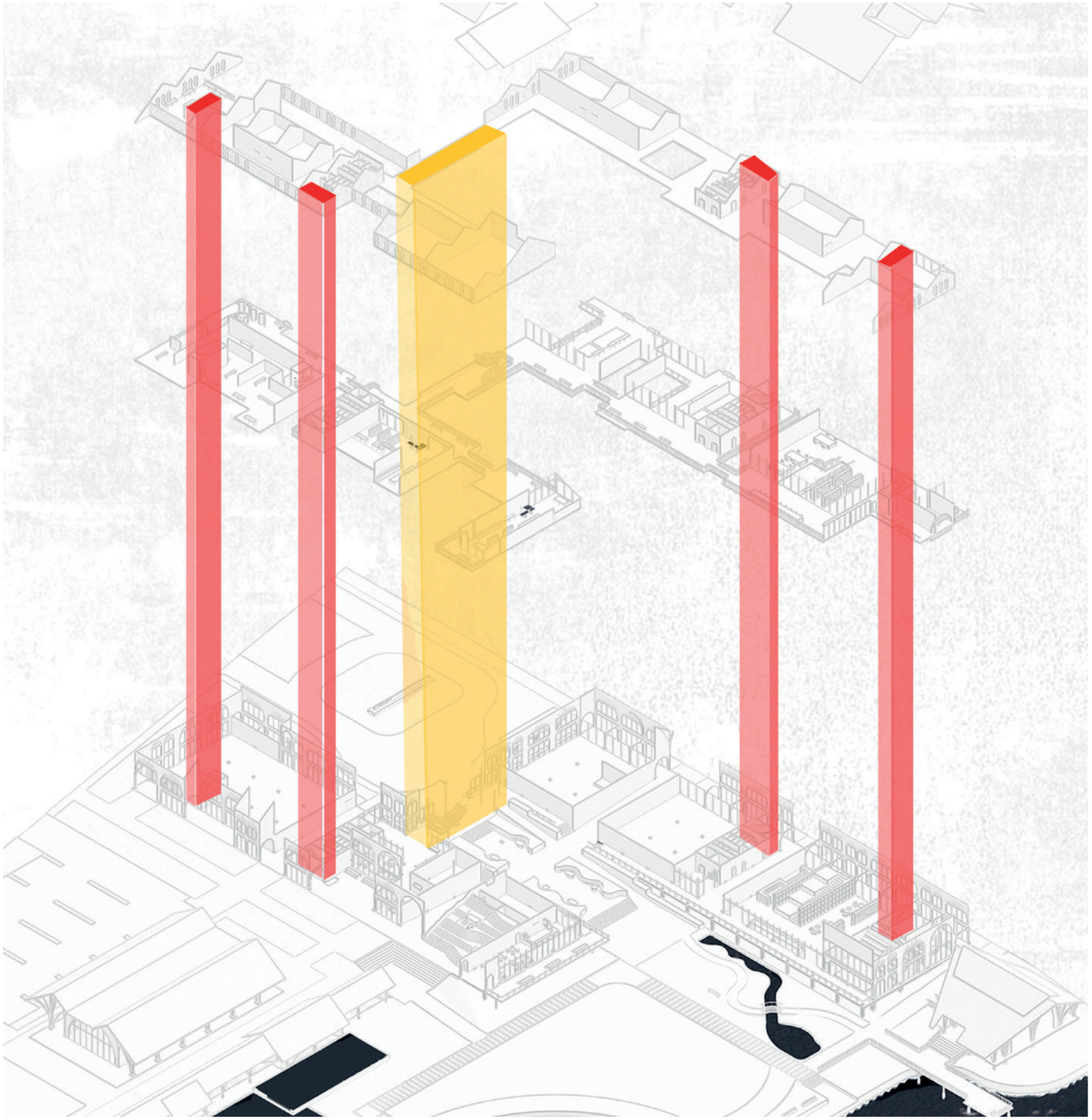
All spaces within the building are designed to ensure that travel distances to the nearest fire staircase remain within this limit, ensuring full compliance with fire safety regulations.



For everyday use, visitors can access the building via a central lift and open staircase near the main lobby and courtyard—designed for convenience, accessibility, and seamless circulation.

Legends

- Fire Escape Staircase
- Daily main Access Staircase
- Lift



KAYDEN HO XUN KAI
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