KARST REBORN

The Living Quarry

INCOUDE COMPANY

Chapter 1

Introduction

Chapter One: Introduction

1.1 Introduction

This project proposes a Limestone Edutourism and Interpretation Centre at Tasik Cermin, Ipoh, Perak. The project focuses on the relationship between limestone landscape, quarrying history, industrial process, and public education.

The centre combines museum, workshop, manufacturing, restaurant, and elevated railway experience. It aims to transform limestone from an industrial material into an architectural journey that teaches visitors about geology, quarrying, craft, and environmental awareness.

1.2 Background and Personal Motivation

The opportunity to design an edutourism centre in Tasik Cermin interested me because the site is strongly connected to limestone hills, caves, quarrying history, and tourism. Ipoh is known for its limestone landscape, but many visitors only experience it as scenery without understanding the process, history, and environmental impact behind it.

For me, this project became a chance to explore how architecture can turn an industrial subject into an educational experience. I wanted to design a place where visitors can learn about limestone formation, quarrying process, and limestone waste reuse through exhibition, workshop, and spatial journey.

Instead of designing only a museum, I aimed to create a hybrid centre that combines interpretation, making, and movement. The project becomes a bridge between the natural mountain, the industrial process, and the public.

1.3 Objectives of the Project

The following are the project's main objectives:

1. To create an edutourism center that highlights limestone as part of Ipoh's geological and industrial identity.
2. To educate visitors about limestone formation, the quarrying process, and limestone products.
3. To combine museum, workshop, and manufacturing spaces into one learning journey.
4. To reuse limestone waste through craft, sculpture, and educational display.
5. To design a safe visitor experience where the public can observe production without entering hazardous factory zones.
6. To respond to the limestone landscape through layering, carving, cave-like spaces, and quarry-inspired form.
7. To control dust, noise, waste, and service movement through proper zoning and separation.
8. To connect the different buildings through an elevated history railway that supports the project narrative.

1.4 Project Location and Its Geological Significance

The project is located at Tasik Cermin, Gunung Rapat, Ipoh, Perak. The area is known for limestone hills, cave formations, former quarry activity, and tourism development. This makes it a suitable location for a project that combines geology, industry, heritage, and education.

Tasik Cermin is commonly known for its mirror-like lake and limestone cave setting. However, the site also represents a deeper story of limestone extraction and landscape transformation. The surrounding karst landscape gives the project a strong geological identity.

The limestone context influenced the design through several ideas: layering, carving, quarry holes, cave journey, and mountain integration. These elements became the architectural language of the project.

1.5 Project Timeline Overview

Week 1: Introduction to the industrial architecture project brief. Initial research on possible industrial topics and site directions. Began exploring limestone as the main project focus because of its strong connection to Ipoh, quarrying, and local landscape identity.

Week 2: Preliminary research on limestone, including its formation, quarrying process, products, and environmental issues. Started identifying the relationship between the limestone industry, tourism, and education.

Week 3–4: Developed the main project direction as a limestone edutourism center. The idea of combining museum, workshop, and manufacturing spaces was introduced. Early zoning and program studies were explored.

Week 5: Focused on the limestone process and how it could be translated into architectural experience. Studied quarrying stages such as extraction, crushing, screening, storage, and transport as possible spatial sequences.

Week 6: Presented early concept ideas and received feedback. The project direction became clearer through the concept of transforming quarrying from an industrial activity into an educational visitor journey.

Week 7–9: Conducted detailed site analysis at Tasik Cermin, Gunung Rapat, Ipoh. Studied site location, access, topography, sun orientation, wind direction, views, surrounding limestone hills, and environmental sensitivity. Completed SWOT analysis and design implications.

Week 10: began master planning and site zoning. Developed the relationship between the museum, factory, restaurant tower, service access, public entrance, and landscape areas.

Week 11–12: Developed the architectural form and massing. Explored limestone layering, quarry-hole concept, cave journey, and mountain integration as the main architectural language. Refined circulation between public, staff, and service zones.

Week 13–14: Continued design development through plans, sections, elevations, and 3D massing. Focused on the central quarry-hole experience, factory-viewing strategy, elevated history railway, and visitor movement sequence.

Week 15: Final review and design refinement. Improved presentation drawings, renderings, technical strategies, material expression, and environmental control systems such as dust, noise, water, and waste management.

Week 16: Completed the final presentation boards, report content, and visual materials. Prepared the project for final submission and presentation.

Chapter 2

Initial Topic Exploration

Chapter Two: Initial Topic Exploration

At the beginning of the project, several industrial directions were explored before finalizing limestone as the main topic. The selected direction needed to have a strong relationship with the site, a clear industrial process, educational value, and architectural potential.
Limestone was chosen because it connects directly to Ipoh's landscape, quarrying history, tourism identity, and construction industry. It also provides a strong opportunity to design a project that combines museum, factory, workshop, and landscape experiences.

2.2 Why Limestone?

The decision to choose limestone (see fig 2.1) as the central topic was guided by the relationship between the site, the material, and the industrial history of Ipoh. Limestone is not only a building material; it is part of the identity of the Kinta Valley landscape.
Through this topic, the project can explain how limestone is formed, extracted, processed, reused, and experienced. It gives the architecture a clear storyline and allows the building to become more than a normal tourism center.

figure 2.1: Limestone

2.2.1 Personal Interest

My interest in limestone comes from its strong relationship between nature and industry. The material begins as a natural geological formation, but through quarrying it becomes part of construction, manufacturing, and daily life.
This contrast interested me architecturally. I wanted to design a project that shows both sides of limestone: the beauty of the karst landscape and the reality of industrial extraction. The project became a chance to translate this contrast into spaces, movement, form, and material.
figure 2.2 illustrates the limestone behavior.

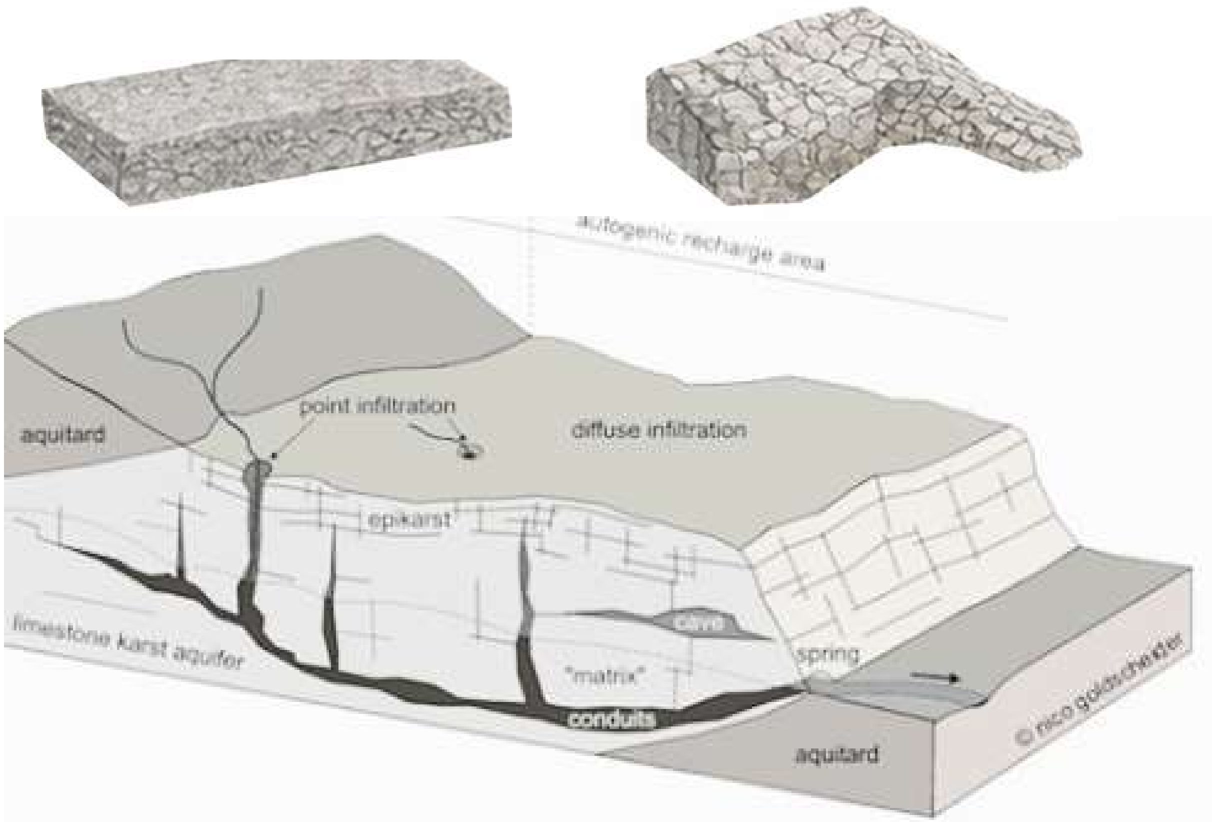


figure 2.2: Limestone Behavior

2.2.2 Relevance to Ipoh's Tourism Identity

Ipoh is strongly known for its limestone hills, caves, temples, and quarry landscapes. Tasik Cermin itself has become a tourism attraction because of its hidden lake, cave passage, and mirror-like water reflection as shown in figure 2.3.

However, the tourism experience often focuses only on scenery. The deeper story of limestone formation, quarrying, waste, and environmental impact is not clearly explained to visitors.

By choosing limestone, the project supports Ipoh's tourism identity while adding an educational layer. The centre becomes a place where visitors can understand the landscape, not only photograph it.

figure 2.3: Ipoh's narrative

2.2.3 Geological and Industrial Richness

Limestone has strong geological value because it forms caves, cliffs, hills, and karst landscapes over long periods of time. In Ipoh, these limestone formations are part of the city's natural identity and tourism image.

At the same time, limestone has industrial value. It is used for aggregates, cement raw material, lime, powder, and construction products. The quarrying process also includes many stages that can be translated into architecture, such as extraction, cutting, crushing, screening, storage, and transportation.

This richness gives the project both educational and spatial potential.

Figure 2.4 shows the geological and industrial richness of the limestone.

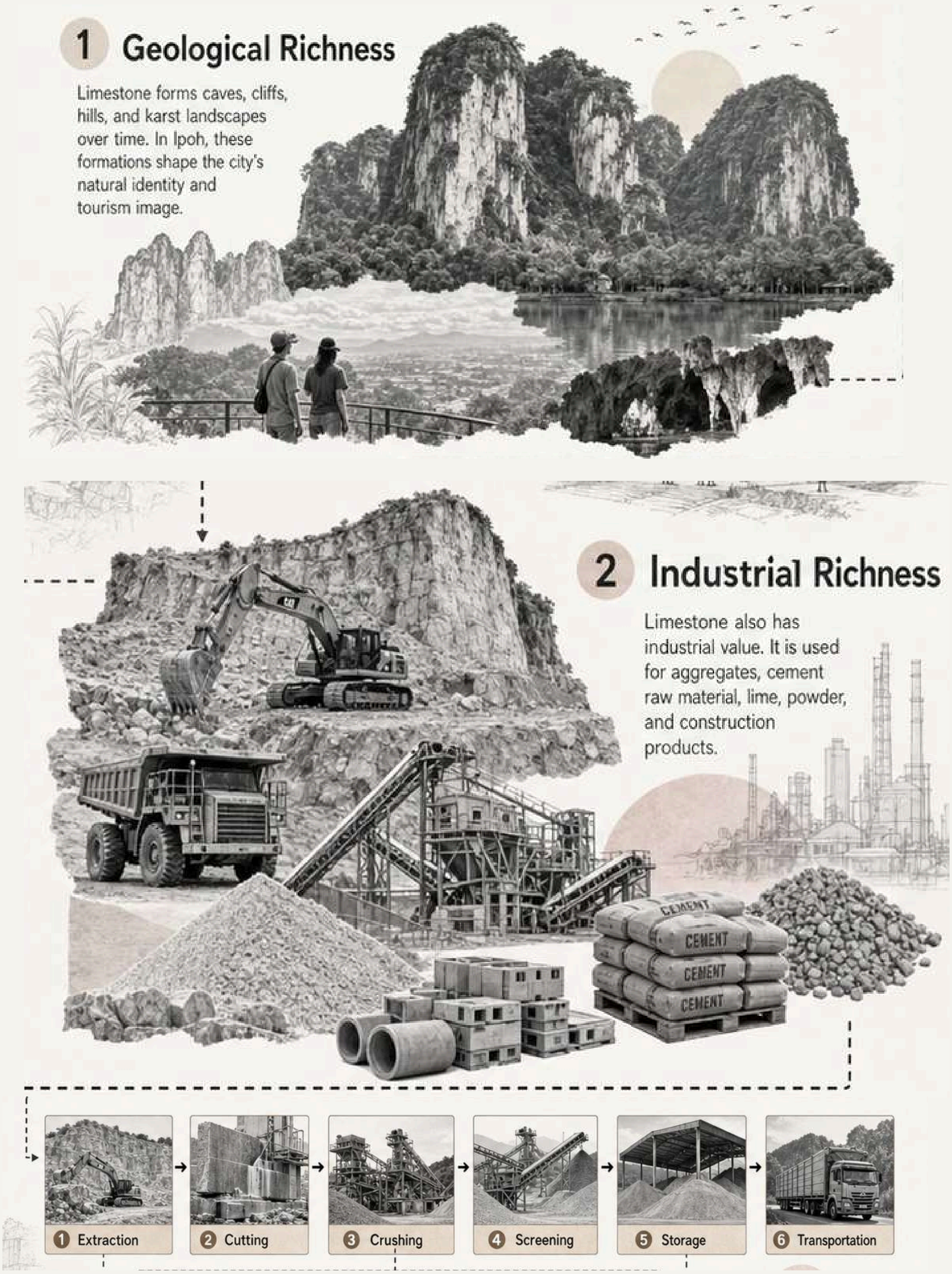


figure 2.4:limestone's Geological and Industrial Richness

2.4 Preliminary Research on Limestone

Before starting the design process, preliminary research was carried out to understand limestone as a material, industry, and landscape system. This research helped shape the concept, programme, and spatial journey of the project.
The research focused on limestone formation, limestone in Malaysia and Perak, quarrying process, limestone products, environmental issues, and potential reuse of limestone waste.

2.4.1 Origin and Formation

Limestone is a sedimentary rock mainly formed from calcium carbonate. It often comes from the remains of marine organisms such as shells, corals, and skeletal fragments that were deposited under ancient seas.
Over time, these deposits were compacted and hardened into rock. Geological movement, uplift, erosion, and water dissolution later shaped limestone into hills, caves, tunnels, cliffs, and karst landscapes.
This formation process influenced the design language of the project through ideas of layering, pressure, carving, voids, and underground experience as shown in figure 2.5.

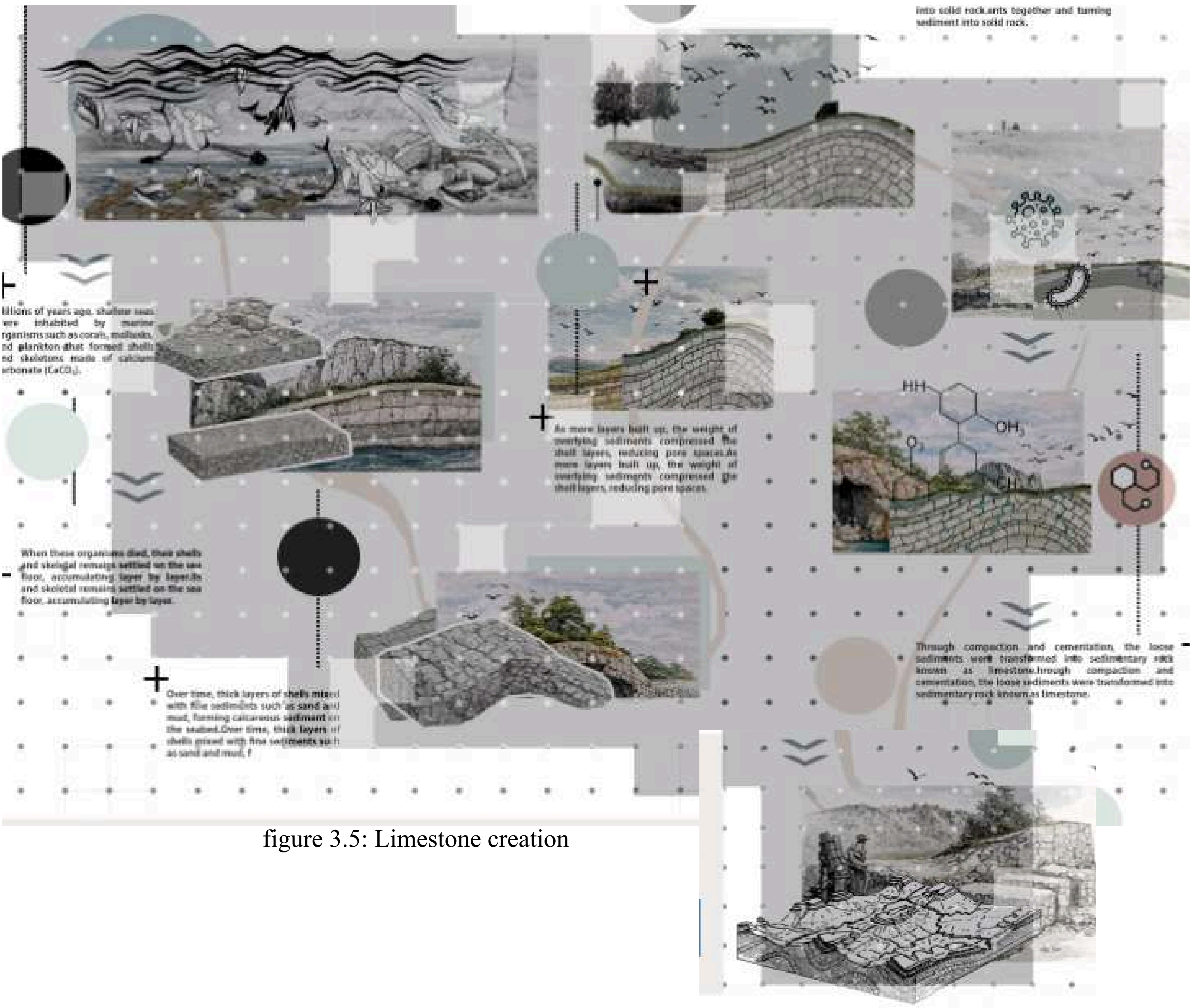
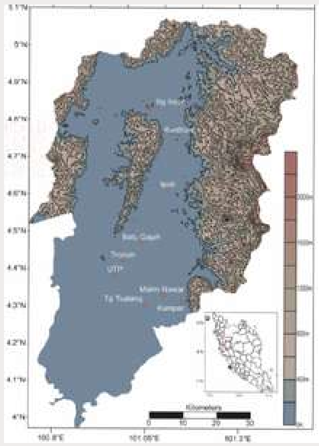


figure 3.5: Limestone creation

2.5 Limestone in Malaysia and Perak



Malaysia has many limestone formations, especially in states such as Perak. Ipoh and the Kinta Valley are well known for limestone hills, cave temples, quarrying activities, and geological heritage.

In Perak, limestone has contributed to construction, cement production, industrial materials, and local economic activity. At the same time, quarrying has created environmental concerns such as dust, noise, vibration, water runoff, and visual damage to the karst landscape.

This makes limestone an important topic for both industry and environmental education.

figure 2.6 provides an overview of the distribution of the limestone in Malaysia.

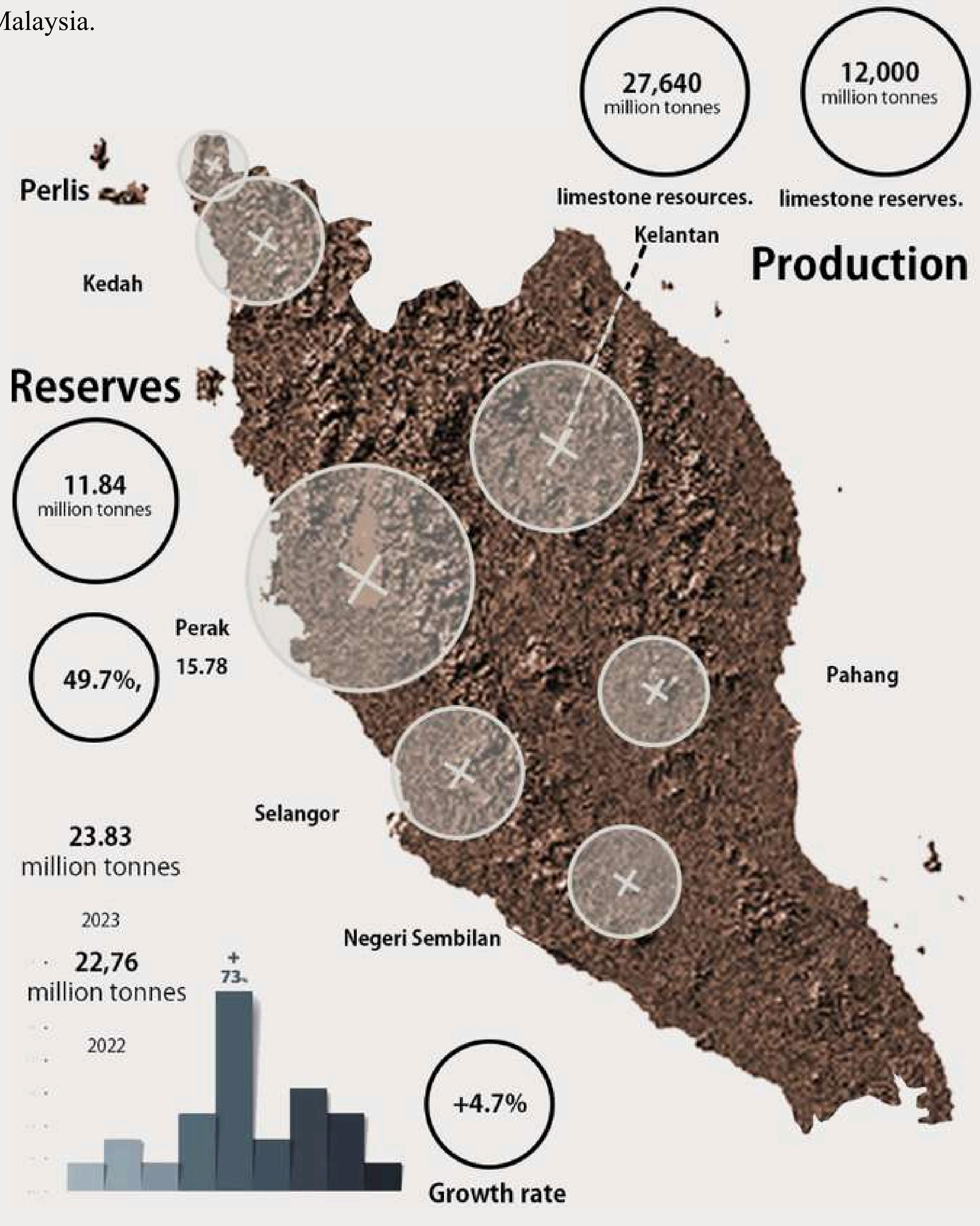
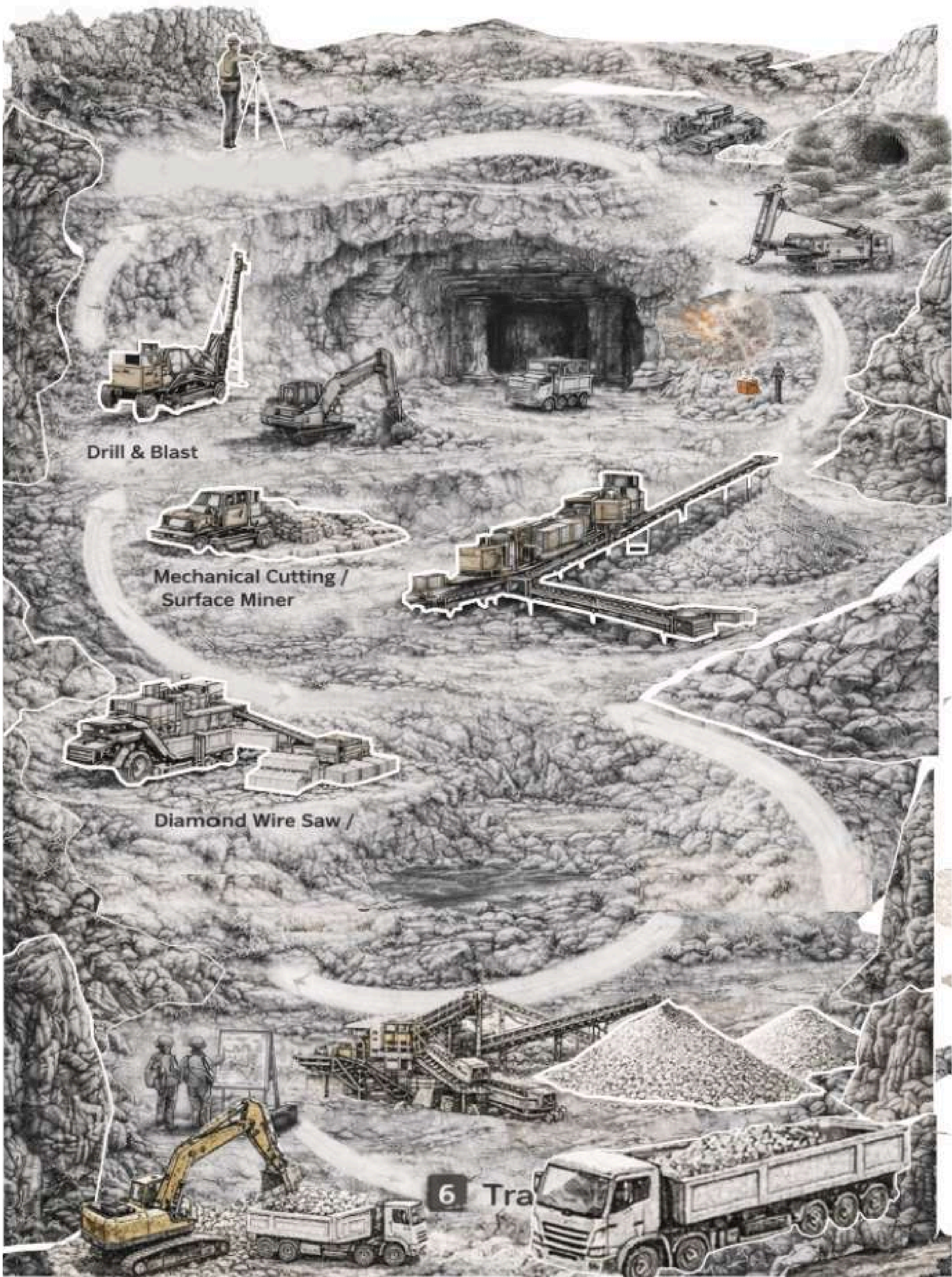


Figure 2.6: The distribution of the limestone in Malaysia.

LIMESTONE QUARRYING PROCESS



EXOLRATION

The process begins with a comprehensive geological and topographical investigation of the site. This stage involves surveying limestone quality, thickness, stratification, fault lines, and karst voids to evaluate both material potential and ground stability. Core samplin

EXTRACTION

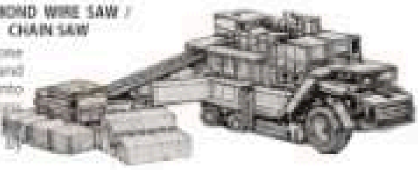
DRILL & BLAST

Extraction is carried out through multiple methods depending on geological conditions and desired output.**Drill & Blast** techniques are used to fragment massive limestone formations through controlled explosions.**Mechanical Cutting / Surface Miner** systems allow continuous extraction with reduced vibration and dust.**Diamond Wire Saw / Chain Saw** methods provide precise

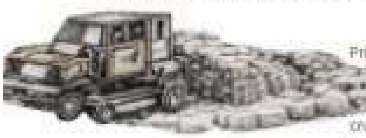
3. SAWING / CUTTING

DIAMOND WIRE SAW / CHAIN SAW

After extraction, large limestone blocks undergo sawing and cutting to reduce them into manageable sizes. This process prepares the material downstream crushing



4. PRIMARY CRUSHING



Primary crushing is the first mechanical [...]uction stage, where large limestone [...]re broken down into smaller [...]ents using jaw or impact crushers. This step transforms raw extracted material into sizes suitable for handling and further processing,

MECHANICAL CUTTING / SURFACE MINER

5. SECONDARY CRUSHING

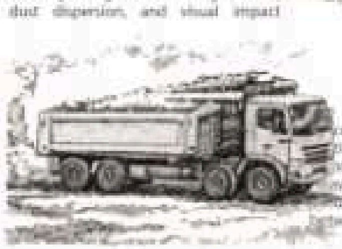
Secondary crushing further refines the material by reducing fragment size and achieving more consistent grading. Cone or impact crushers are typically used at this stage to improve material quality and

6. SCREENING

Screening separates crushed limestone into different size categories using vibrating or inclined screens. Each fraction is sorted according to its intended application, whether for construction aggregates, cement production, or industrial use. This stage ensures quality control and material consistency across

7. STORING

Sorted limestone aggregates are stockpiled on-site in designated storage areas. These piles are organized by size and type to allow efficient handling and distribution. Storage areas must carefully designed to manage runoff, dust dispersion, and visual impact



8. TRANSPORT

[...] final stage involves transporting [...]cessed limestone to external [...]tinations such as cement plants, [...]truction sites, or distribution centers. [...]vy-duty trucks or conveyor systems are [...], forming the primary interface between the quarry and the broader industrial supply network.

ADVANTAGES & DISADVANTAGES OF QUARYING

3. EXPOSURE OF KARST GEOLOGICAL AND HYDROLOGICAL SYSTEMS

Quarrying in limestone landscapes exposes rock stratification, joints, caves, and underground voids that are normally hidden beneath the surface. This direct exposure allows clearer understanding of karst geological structures and hydrological systems, offering valuable insight into the formation, behavior, and vulnerability of limestone environments.

4. POTENTIAL FOR REUSE AS AN EDU-TOURISM AREA

After extraction activities cease, quarry sites can be reused as Edu-Tourism areas by utilizing exposed rock faces, voids, and remaining industrial spaces. These features provide opportunities for educational interpretation related to geology, mining processes, and landscape transformation, allowing the site to gain a new function beyond its industrial life.

1. ECONOMIC CONTRIBUTION

Limestone quarrying plays an important role in supporting local and regional economies by supplying essential raw materials for the construction and cement industries. In addition to material production, quarrying activities create direct employment within the quarry itself and indirect job opportunities across transportation, processing, and supporting industries, contributing to broader economic development.

2. SUPPLY OF MULTI-PURPOSE CONSTRUCTION MATERIAL

Limestone is a highly versatile raw material that can be processed into a wide range of products, including aggregates, crushed stone, powder, lime, and architectural stone. This flexibility allows a single quarry to serve multiple sectors within the construction industry, making limestone a key and reliable resource for both structural and finishing applications.

DISADVANTAGES

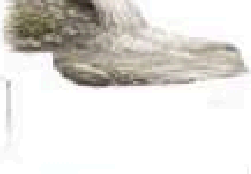
1. LOSS OF BIODIVERSITY

The removal of rock surfaces and vegetation associated with quarrying can destroy natural habitats and ecological niches. This leads to the loss of plant and animal species that depend on limestone cliffs, caves, and surrounding karst e c o s y s t e m s .

2. DUST, NOISE, AND VIBRATION POLLUTION

Extraction, crushing, and transportation activities generate high levels of dust, noise, and vibration. These disturbances can negatively affect surrounding ecosystems, nearby settlements, and overall environmental quality, reducing comfort and safety for both residents and visitors.

3. IMPACT ON WATER SYSTEMS



Quarrying ctivities may disrupt groundwate flow, increase surface runoff, and introduce sediment into nearby wate bodies. This impact is especially critical in limestone regions, where undergound water systems are highly interconnected and sensitive to d i s t u r b a n c e .

4. LANDSCAPE DEGRADATION

Limestone quarrying significantly alters natural landforms, particularly in karst environments where the terrain is highly sensitive. The removal of rock masses creates permanent visual scars and physical changes that can disrupt the natural character and continuity of the landscape.

Chapter 3

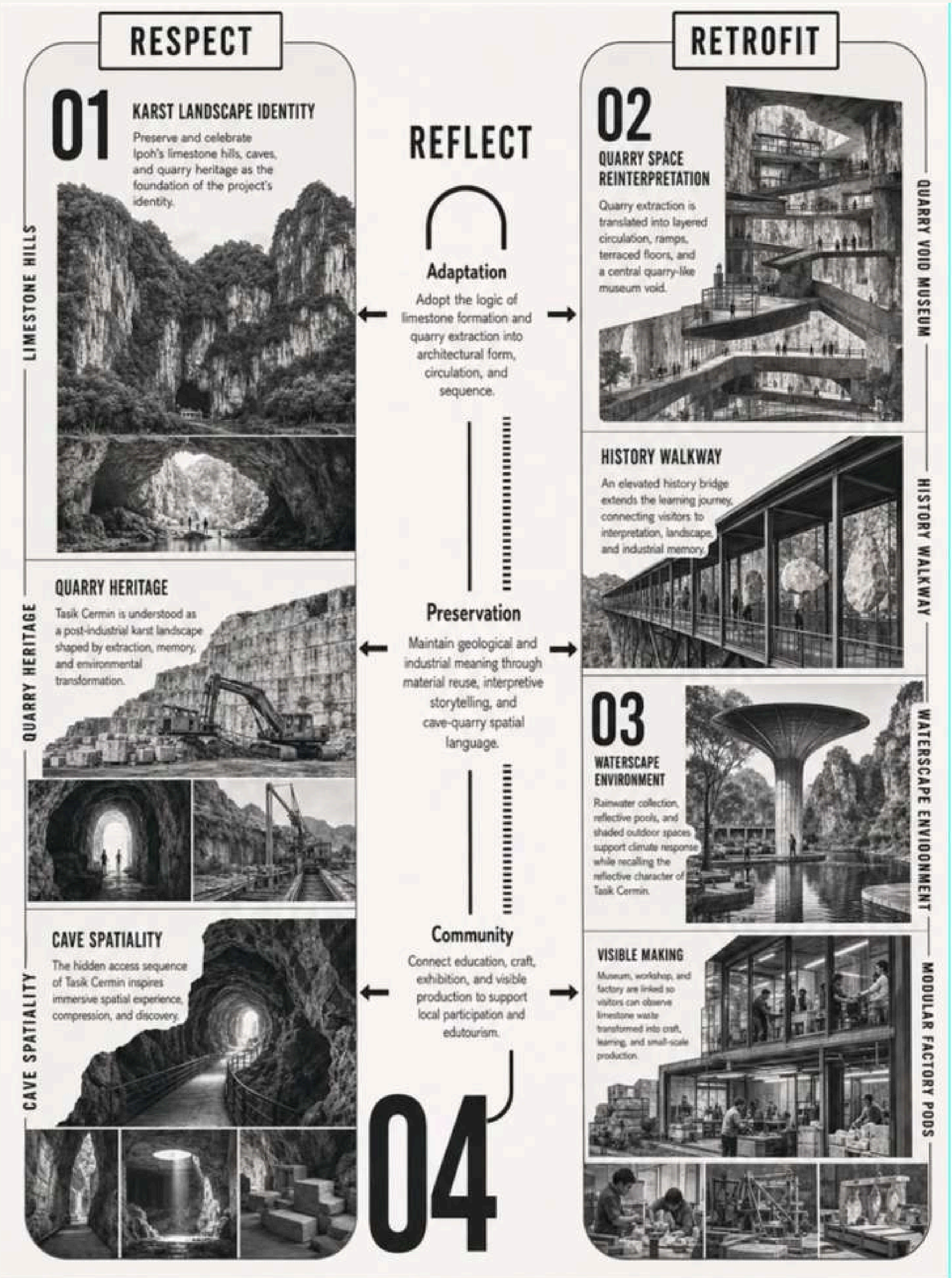
Conceptual Phase: Quarry Interpretation

Chapter Three: Conceptual Phase: Quarry Interpretation

Before developing the full architectural design, the project explored how limestone, quarrying, and industrial process could become spatial experience. This phase helped shape the main design language, programme, and visitor journey of the centre.

The concept was developed from the idea of transforming limestone from an extracted material into an educational story. Instead of showing limestone only as a product, the project uses architecture to explain its formation, quarrying process, waste reuse, and relationship with the landscape.

3.1 Introduction to "Quarry Interpretation" as a Design Approach



3.2 Idea Behind the "From Exploitation to Interpretation" Concept

The main concept of the project is "From Exploitation to Interpretation." It reflects the transformation of limestone quarrying from an extractive industrial activity into a public learning experience.
Quarrying has shaped the landscape of Ipoh and contributed to the economy, but it also creates environmental issues such as dust, noise, waste, and visual scars. The project responds to this by reinterpreting quarrying through architecture instead of ignoring it.

There are many important conceptual components, such as:

1. Layering **of Spaces:**
Inspired by limestone strata and geological formations. The building uses layered floors, walls, roofs, and landscape elements to express the depth of limestone formation.

2. Carving **and Void:**
Inspired by quarry cuts, caves, and holes in the limestone hills. The central quarry hole becomes a major spatial element that organizes circulation and exhibition.

3. Process **as Journey:**
The visitor movement follows the limestone process, from formation and extraction to manufacturing and reuse.

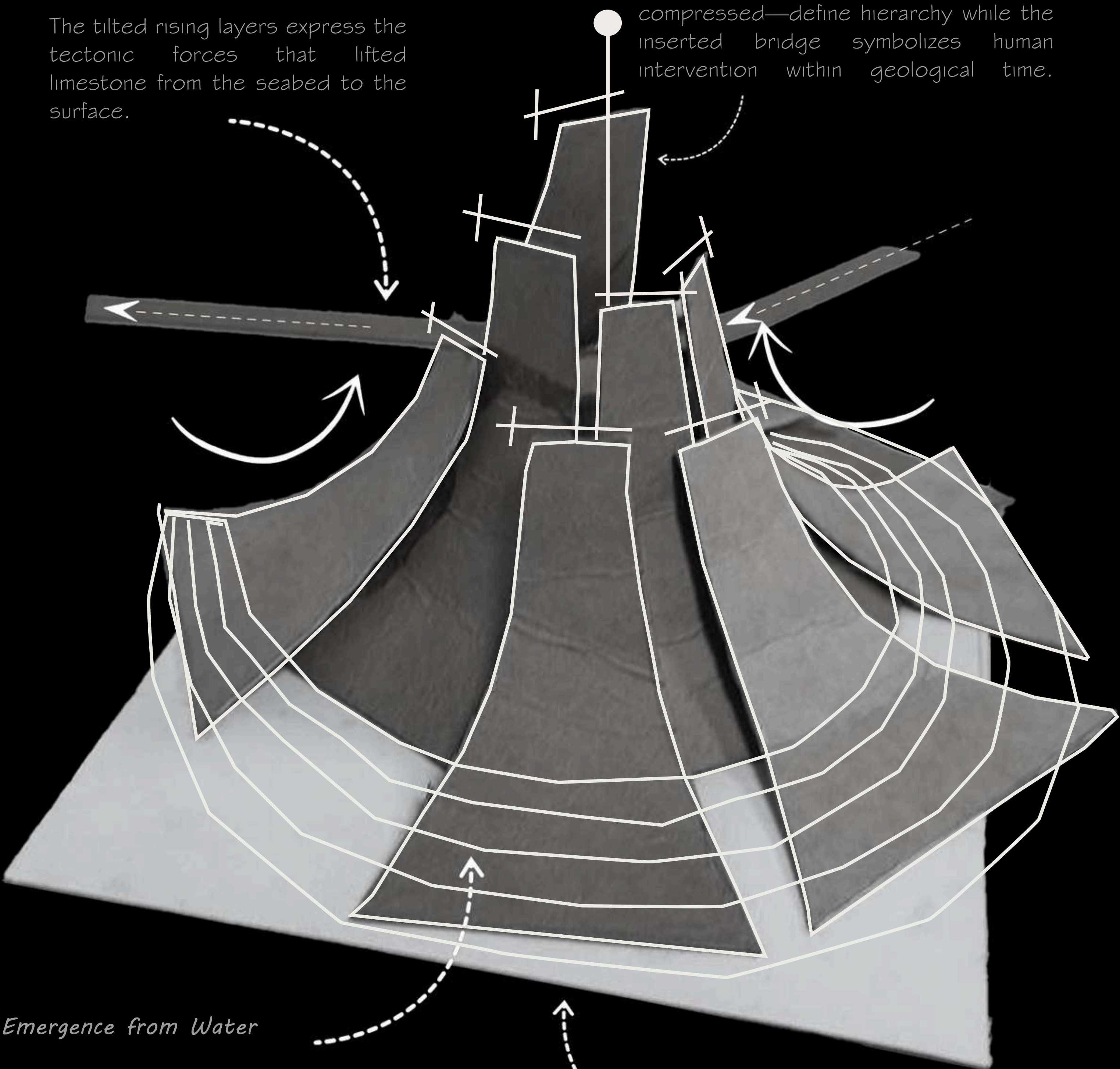
4. Industry **as Education:**
The factory is not hidden completely. Visitors can view selected production activities through safe separation, turning manufacturing into part of the learning experience.

Tectonic Uplift

The tilted rising layers express the tectonic forces that lifted limestone from the seabed to the surface.

The Layer as an Architectural Element

Varying limestone masses—tall and compressed—define hierarchy while the inserted bridge symbolizes human intervention within geological time.



Emergence from Water

The layered forms appear to rise from surrounding water, recalling limestone's submerged marine origin.

Radial Rhythm Without Repetition

Different-scaled elements orbit a central core, creating radial rhythm without literal repetition.

3.3 Key Components of the Edutourism Centre Programme

After developing the concept, the program was arranged to support education, tourism, production, and visitor experience.

The main components of the center are

Reception and Orientation Lobby

A welcoming entrance area for ticketing, information, and introduction to the project.

Limestone Exhibition Gallery

A museum space that explains limestone formation, Ipoh's quarrying history, tools, products, and environmental issues.

Central Quarry Hole

A main spatial void that acts as the heart of the project, representing excavation, depth, and geological layering.

Interactive Workshop Area

A space where visitors can learn and participate in limestone waste craft or sculpture activities.

Manufacturing / Production Zone

A controlled area for processing limestone waste into crafts, educational objects, or small products.

Factory Viewing Area

A safe observation zone where visitors can see production activities without entering hazardous spaces.

Restaurant Tower

A vertical dining experience connected to the mountain and project journey.

History Railway

An elevated movement system that connects buildings and represents the transportation stage of quarrying.

Outdoor Learning Landscape

Landscape areas for rest, interpretation, outdoor display, and environmental buffer.

Service and Administration Areas

Back-of-house spaces for staff, storage, loading, technical support, and maintenance.

The program supports three main goals: education, experience, and production.

3.4 Workshop and Manufacturing Spaces

The workshop and manufacturing areas are important because they connect learning with making. These spaces allow the project to go beyond a normal museum by showing how limestone waste can be reused.

Several factors were considered in designing these spaces:

- **Zoning by Process:**

The manufacturing spaces follow the limestone waste reuse process, including receiving, sorting, cutting, crushing, mixing, forming, drying, storage, and display.

- **Visitor Safety:**

The public is separated from the production area through glass partitions, controlled circulation, and viewing points. This allows visitors to observe the process safely without entering noisy or dusty zones.

- **Dust and Noise Control:**

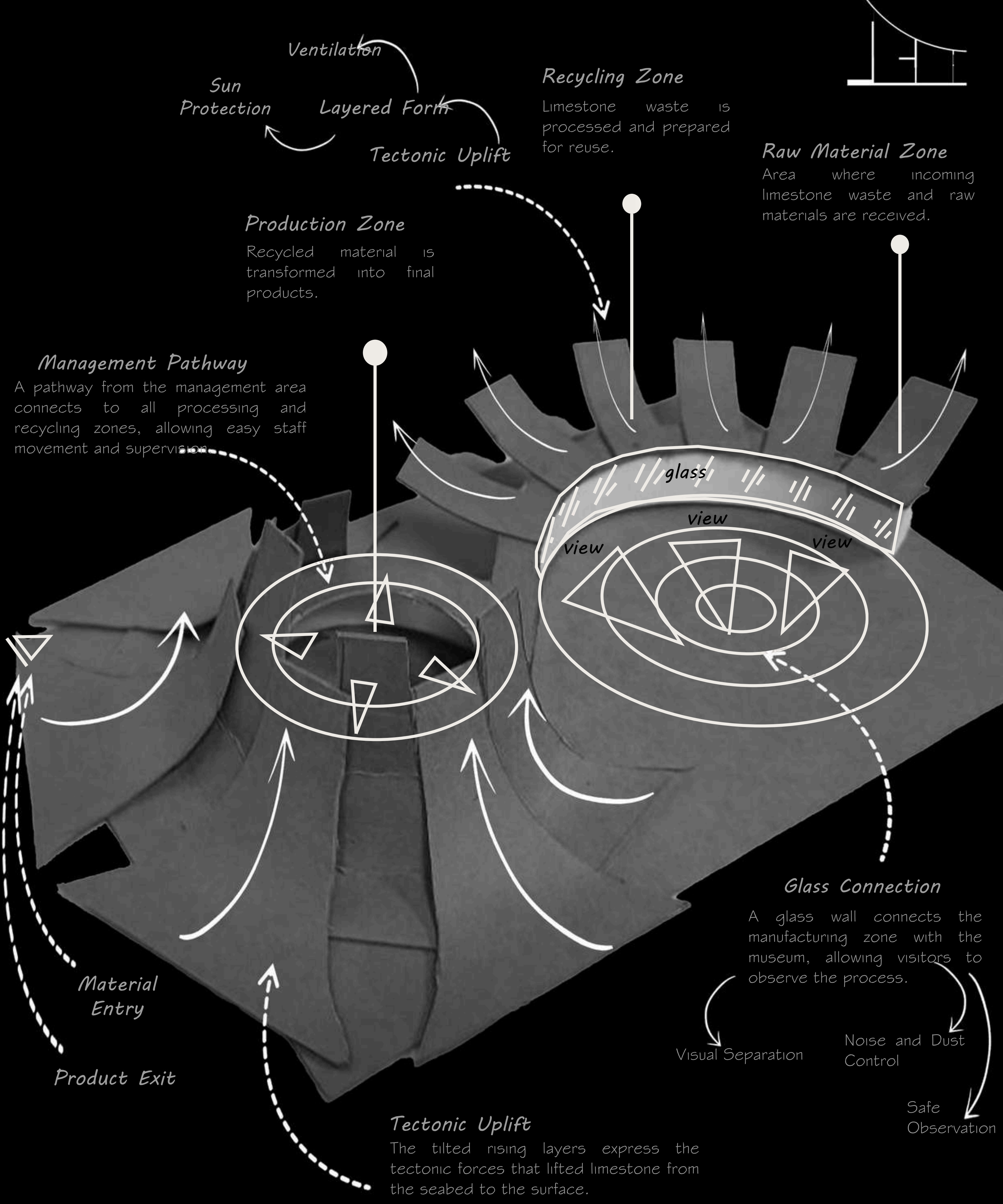
The production area is enclosed and supported by ventilation, filtration, and buffer zones to reduce the impact of dust and noise on public spaces.

- **Educational Output:**

The products from the workshop, such as limestone crafts and sculptures, can be displayed in the museum. This creates a direct relationship between making, learning, and exhibition.

The workshop is not just a production space. It becomes an educational tool that explains the value of limestone waste and shows how industrial leftovers can become meaningful objects.

Manufacturing Zone



3.5 Activity Flow and Spatial Zoning Ideas

The spatial flow was designed as a narrative journey that follows the life cycle of limestone. Visitors move through different zones that represent discovery, extraction, processing, reuse, and reflection.

The visitor journey includes:

Arrival Zone

Reception, orientation, and introduction to limestone and Tasik Cermin.

Geological Introduction Zone

An exhibition about limestone formation, karst landscape, caves, and Ipoh’s geological identity.

Quarry Process Zone

Spaces explaining extraction, cutting, crushing, screening, storage, and transportation.

Observation Zone

Viewing areas where visitors can observe the manufacturing process safely.

Participation Zone

Workshop spaces where visitors can engage with limestone waste craft and educational activities.

Cave / Descent Experience

A spatial sequence inspired by quarry holes, underground voids, and limestone caves.

History Railway Zone

Elevated circulation that connects the buildings and represents industrial transport.

Reflection and Commercial Zone

Restaurant, retail, display, and rest areas where visitors complete the journey.

Zoning was also divided into:

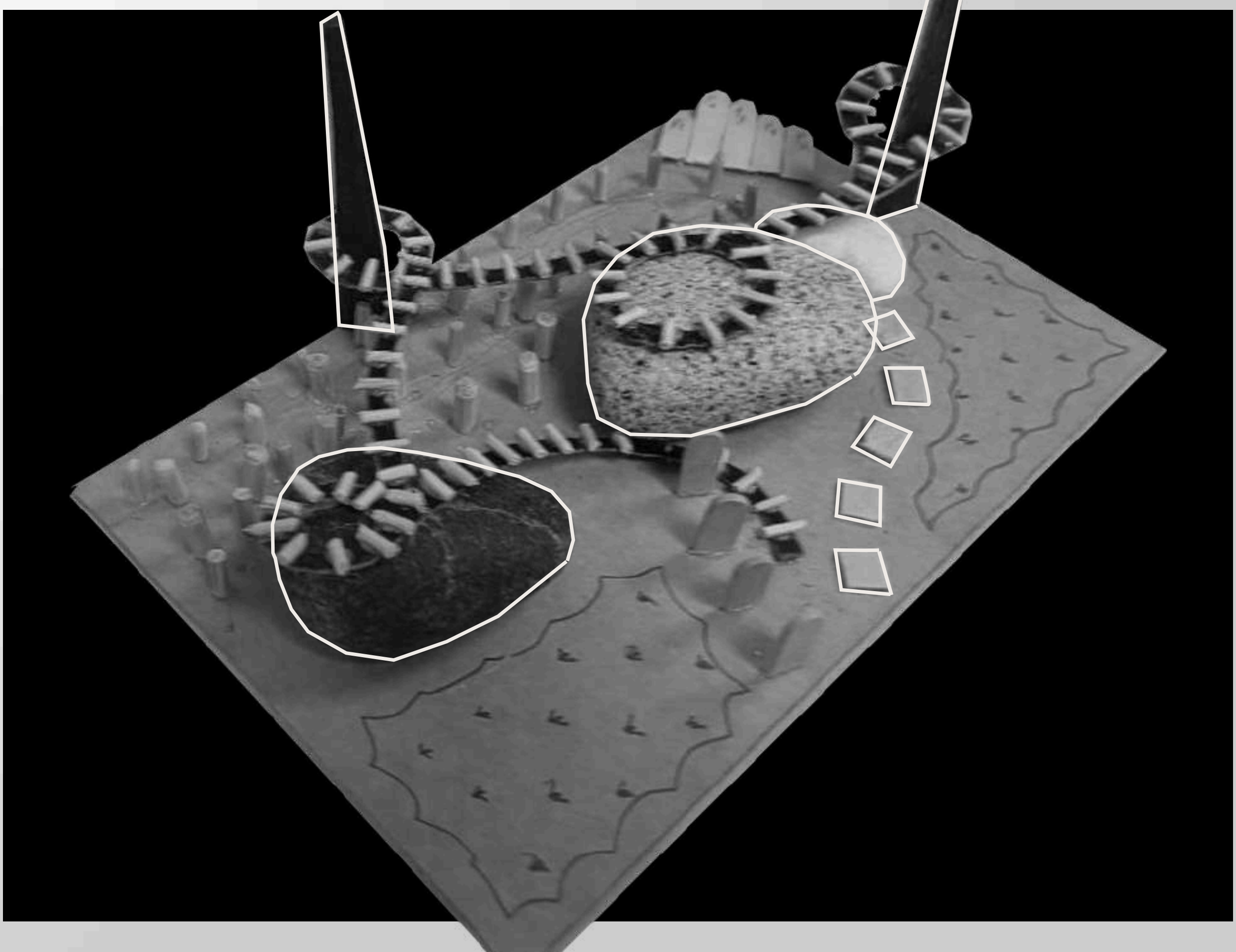
Public zone: lobby, museum, exhibition, restaurant, railway, outdoor learning areas.

Semi-public zone: workshop and guided activity spaces.

Private zone: administration, staff areas, storage, and production control rooms.

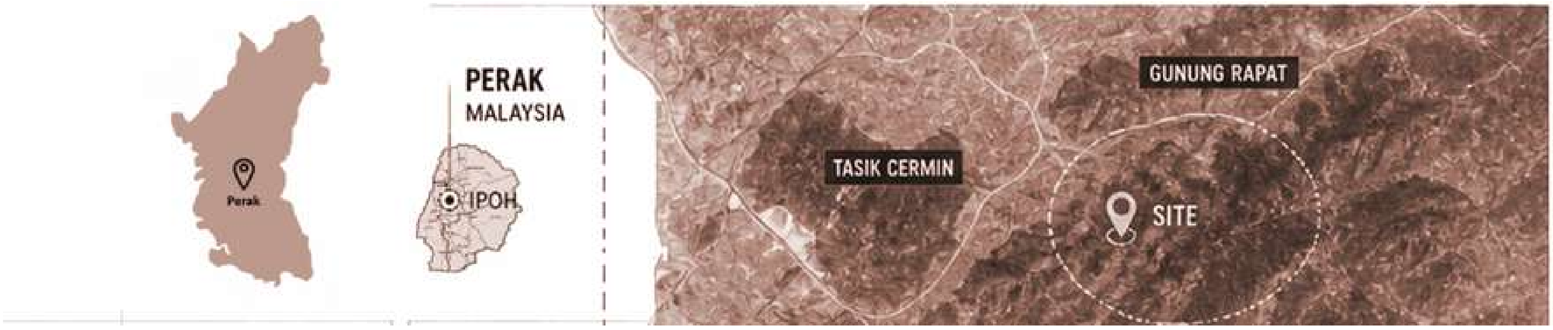
Service zone: loading, waste handling, factory supply, and maintenance access.

This zoning strategy supports a clear visitor experience while keeping the industrial functions safe and controlled.



Chapter 4

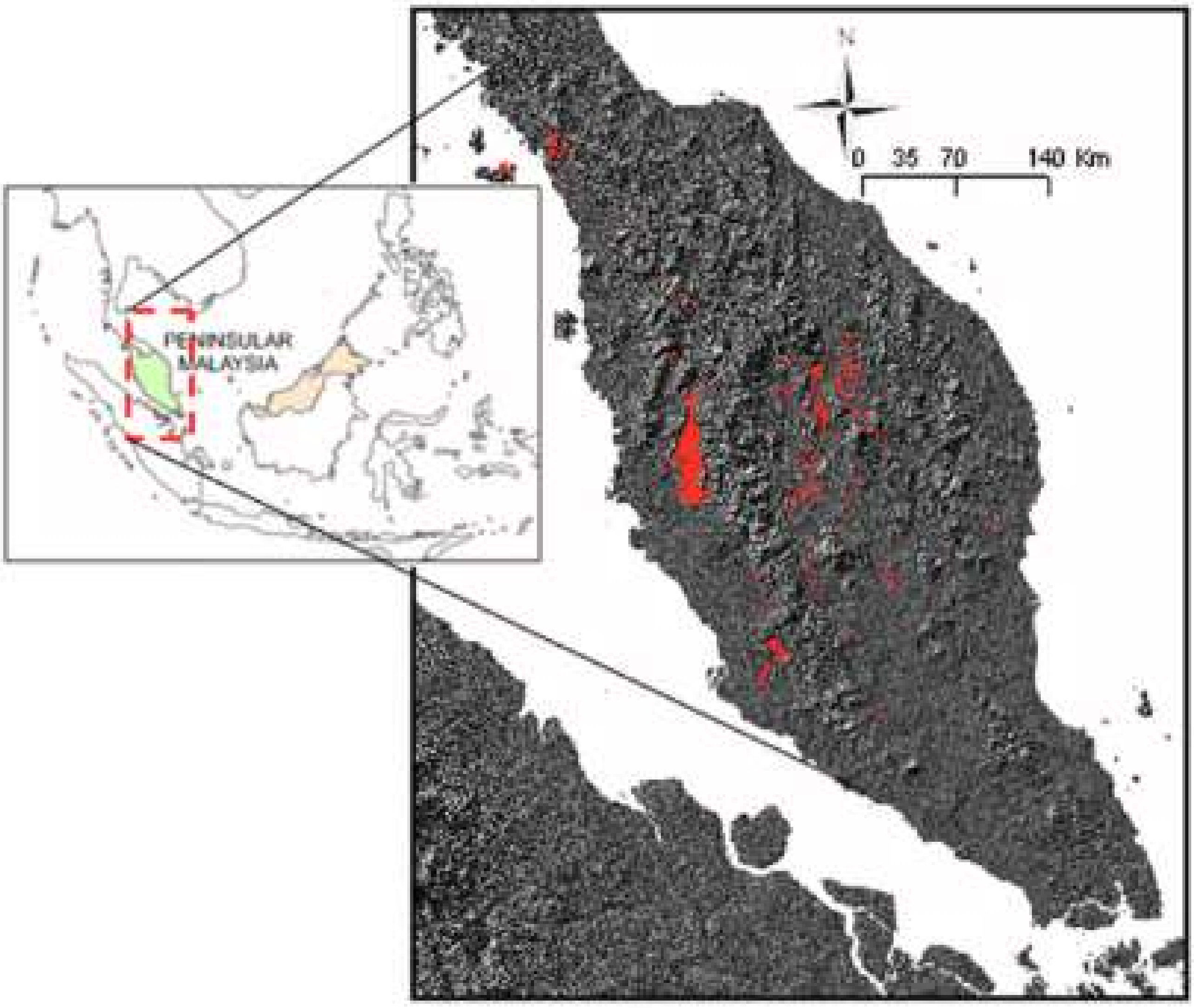
Site Analysis



Chapter four: Site Analysis

A detailed site analysis is important to ensure the design responds to the existing landscape, access, climate, and environmental sensitivity. The selected site is located near Tasik Cermin, Gunung Rapat, Ipoh, Perak, an area strongly connected to limestone hills, cave systems, tourism, and quarrying history.

The site provides a strong opportunity to design an edutourism centre that connects architecture with geology, industrial memory, and landscape experience. The analysis focuses on site location, accessibility, topography, climate, wind, views, SWOT, and design implications, following the same structure as the reference report's Chapter 4 site analysis.



4.1 Site Location: Tasik Cermin, Gunung Rapat, Ipoh, Perak

The project site is located near Tasik Cermin and Gunung Rapat in Ipoh, Perak. This area is known for its limestone hills, cave formations, hidden lake experience, and quarry-related landscape.
Important contextual features of the site include:

- **Limestone Landscape**

The site is surrounded by limestone hills and karst formations, giving the project a strong geological identity.

- **Tourism Context**

Tasik Cermin is already known as a tourism attraction because of its cave access, lake, and mirror-like water reflection.

- **Industrial Memory**

The surrounding area has a strong relationship with quarrying and limestone extraction, making it suitable for an interpretation center.

- **Natural and Environmental Sensitivity**

The karst landscape requires careful design because limestone areas may contain caves, underground voids, water movement, and fragile ecosystems.
By selecting this site, the project can become a bridge between limestone heritage, industrial process, tourism, and public education.

figure 4.1 shows Important contextual features of the site.

figure 4.1: The contextual features of the site

4.2 Accessibility and Transportation

Accessibility is important because the project is designed as a public edutourism center. The site can be accessed by local road networks connected to Ipoh and the surrounding tourism areas.

The site can be accessed in several ways:

- **By Car**

Visitors can access the site through existing local roads from Ipoh city and nearby attractions around Gunung Rapat.

- **By Tourist Van / Bus**

The project should provide a clear drop-off and parking area for tourist groups, especially because the center may receive visitors, students, and guided tour groups.

- **Pedestrian Movement**

Pedestrian paths should be clearly separated from vehicle and service movement to provide a safe visitor experience.

- **Service Access**

Service vehicles need a separate entrance for loading, waste collection, factory supply, and maintenance **without disturbing the public route.**

On-site circulation must be planned clearly, with a main public entrance, service entrance, drop-off area, parking, and emergency access.

figure 4.2 indicates of a diagram that showing the site's access routes.

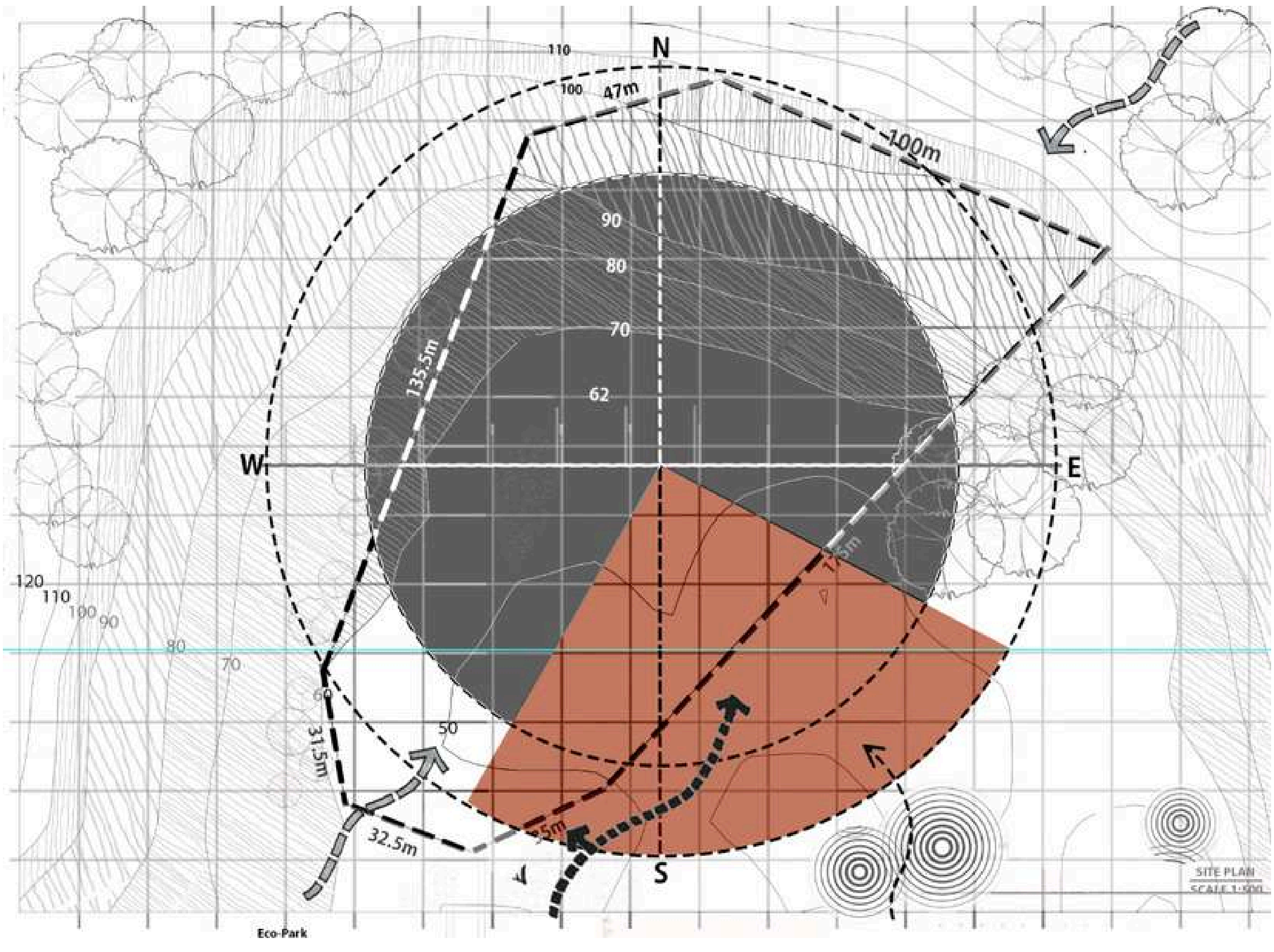


Figure 4.2: Diagram showing the site’s access routes.

4.3 Topography and Terrain Analysis
The site is influenced by the limestone hill setting and surrounding landform. The terrain condition gives the project an opportunity to create level changes, stepped spaces, and a stronger relationship with the mountain edge.
Important topographical observations:

- **Mountain Edge Condition**

The site is located near limestone hills, creating a strong background and physical boundary for the project.

- **Potential Level Changes**

The terrain allows the design to explore descending and ascending movement, which supports the quarry-hole and cave-journey concept.

- **Karst Ground Sensitivity**

Limestone areas may contain underground voids, cracks, and groundwater movement. Heavy structural intervention should be carefully controlled.

- **Drainage Consideration**

Surface water must be managed properly because runoff can affect low areas and factory-related waste zones.

Instead of flattening the site completely, the design should work with the terrain through stepping, carving, controlled excavation, and landscape integration.
Figure 4.3 shows an aerial view of the site and its surrounding terrain.

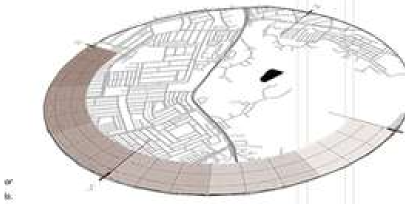
Figure 4.3: An overview of the site

4.4 Climate and Sun Orientation

Ipoh has a hot and humid tropical climate. This affects the design in terms of shading, ventilation, material selection, and user comfort. These important climate factors are:

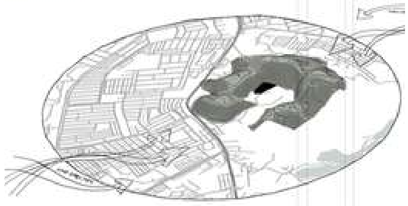
- **Heat and Humidity**

The building needs shaded circulation, breathable spaces, and natural ventilation where possible.



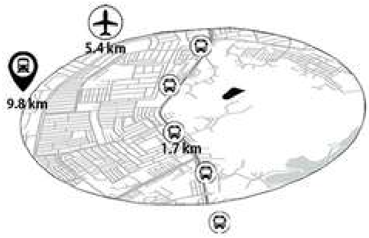
- **Rainfall**

Roof overhangs, covered walkways, proper drainage, and water management systems are needed to protect visitors and building spaces.



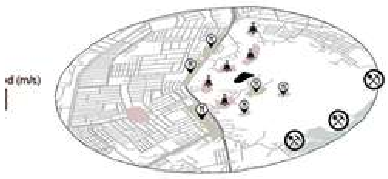
- **Sun Exposure**

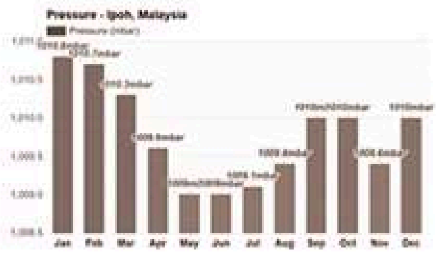
The east and south-east sides receive strong morning sun, while other sides may be partly shaded by the surrounding hills.

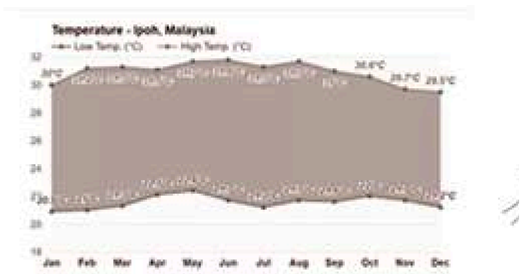


- **Shading Strategy**

Louvers, deep overhangs, vertical fins, landscape buffers, and roof layering can reduce heat gain and glare.
The building orientation should reduce direct solar heat while still allowing controlled daylight into museum and circulation spaces.







4.5 Wind Direction and Ventilation

Wind movement on the site is influenced by the surrounding limestone hills. The mountains can block or redirect wind, making ventilation strategy an important part of the design.
Important wind observations:

- **Prevailing Wind**

The main wind is considered to come from the south-west to south directions.

- **Mountain Blockage**

Limestone hills to the north and west may reduce airflow from certain directions.

- **Open South Side**

The southern opening can be used to bring air into the site and support passive cooling.

Factory Ventilation Control
Manufacturing areas require controlled ventilation because of dust, noise, and possible airborne particles.

- **Ventilation strategy:**

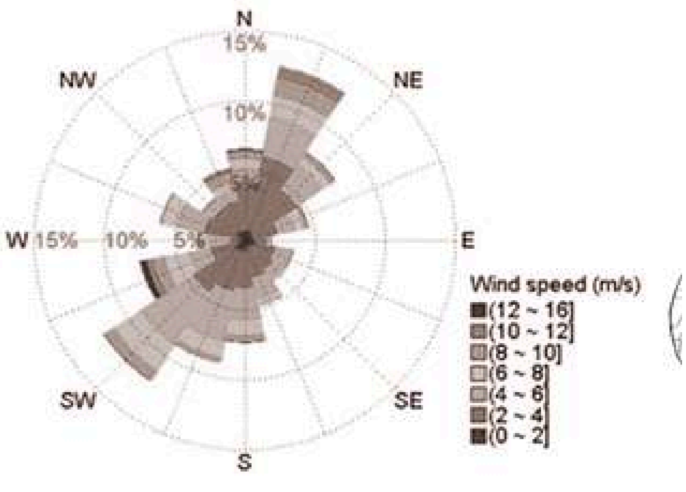
Use open and shaded public circulation where possible.

- **Use high-level openings to release hot air.**

Place dusty production areas in enclosed and filtered zones.

- **Use landscape buffers to cool and filter incoming air.**

Separate natural ventilation zones from mechanically controlled factory spaces.
This strategy helps improve comfort while keeping the industrial areas safe and controlled.



4.6 Views and Context

The visual context of the site is strongly connected to limestone hills, vegetation, and industrial memory. However, the design should not depend only on lake views because the lake is not directly visible from the main project site.
Important view and context points:

- **Limestone Hills**

The mountain edge becomes the strongest visual and conceptual background.

- **Limited Lake Visibility**

Tasik Cermin is accessed through caves and is not directly visible from the project site, so the design should focus on spatial experience rather than panoramic lake views.

- **Karst and Cave Identity**

The surrounding caves and limestone formations influence the architectural language of voids, layering, and carving.

- **Industrial Context**

Nearby quarry-related history creates a strong narrative for the museum and factory program.

The design should frame the mountain, create internal quarry-like spaces, and use controlled openings instead of relying on unrealistic open views.

4.7 SWOT Analysis of the Site

This summary outlines the site's core qualities and concerns to guide future planning.

- **Strengths**

Strong limestone and karst landscape identity.
Located near Tasik Cermin, an existing tourism attraction.
Strong connection to Ipoh's quarrying and geological history.
Suitable for edutourism, museums, and industrial interpretation.

- **Weaknesses**

A lake view is not directly visible from the project site.
Karst ground may create structural and foundation challenges.
Industrial processes may create dust, noise, and service conflicts.
Site circulation needs careful planning due to public and service separation.

- **Opportunities**

Opportunity to transform limestone quarrying into education.
Potential to support tourism, local craft, and environmental awareness.
Ability to reuse limestone waste for workshops and display.
Chance to create a unique museum-factory hybrid in Ipoh.

- **Threats**

Environmental sensitivity of limestone karst landscapes.
Possible water runoff, erosion, or groundwater issues.
Noise and dust impact if factory areas are not controlled.
Over-tourism may disturb the natural and cultural context if not managed.

4.8 Design Implications from Site Findings

Based on the site analysis, several design decisions were influenced by the limestone context, terrain, climate, and circulation requirements:

- **Terrain and Mountain Response**

The design uses layering, stepping, carving, and quarry-hole spaces to respond to the limestone hill setting.

- **Climate and Shading**

Roof overhangs, vertical fins, shaded walkways, and landscape buffers are used to reduce heat and improve comfort.

- **Wind and Ventilation**

Public zones use natural ventilation where possible, while factory zones use controlled ventilation and filtration.

- **Access and Circulation**

Public, staff, service, and emergency routes are separated to avoid conflict and improve safety.

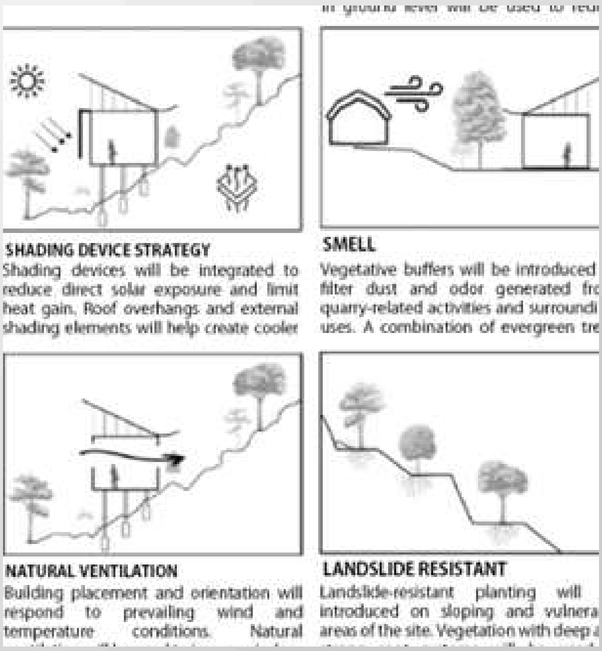
- **View Strategy**

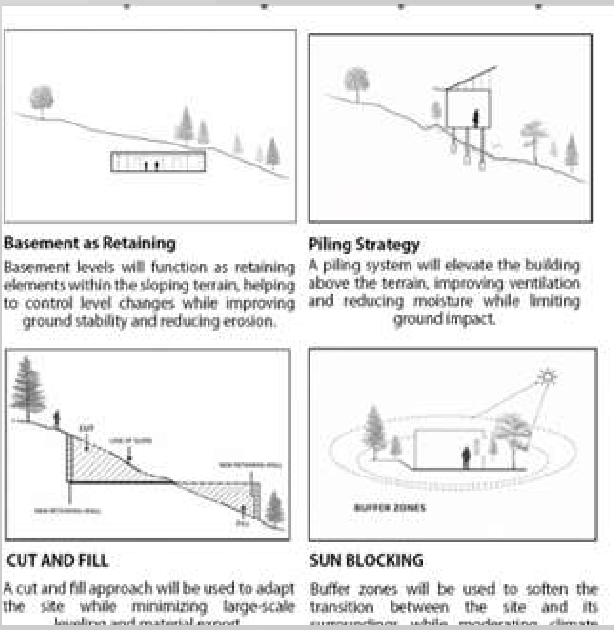
Since the lake is not directly visible, the project focuses on internal spatial drama, mountain framing, cave-like spaces, and process-based experience.

- **Environmental Protection**

Water runoff, dust, noise, and limestone waste must be managed through technical and landscape strategies.

These implications ensure that the design is not just placed on the site but directly shaped by the site conditions.





Chapter 5

Design Development of the Centre

Chapter five: Design Development of the Centre

This chapter explains how the project developed from site analysis and concept into a complete architectural proposal. The design development focuses on master planning, zoning, circulation, massing, terrain integration, architectural language, reference projects, and local influence, following the same structure used in the reference report's Chapter 5.
The main aim was to create a centre that connects limestone interpretation, museum experience, manufacturing, workshop activity, landscape, and the history railway into one clear journey.

5.1 Master Planning Process

The master planning stage began by arranging the main zones according to the site condition, visitor experience, and industrial workflow. The design needed to balance public tourism spaces with controlled manufacturing areas.

- **Initial considerations:**

Place the public entrance on the east / south-east side for clear visitor arrival.
Keep service access separated from the public route.
Position the museum and interpretation spaces as the main visitor experience.
Locate the manufacturing zone where service access and dust control can be managed.
Use the mountain and limestone context as the main design background.

- **Primary zoning approach:**

1. Entry and Reception Zone

Located near the public entrance to welcome visitors and introduce the limestone journey.
Museum and Interpretation Zone
Placed as the main educational core, explaining limestone formation, quarrying history, and industrial processes.

2. Workshop and Manufacturing Zone

Located in a more controlled area, allowing visitors to observe production safely without disturbing operations.

3. Restaurant and Viewing Tower

Designed as a vertical experience connected to the mountain and the elevated journey.

4. History Railway and Bridge Connection

Used to connect the main buildings and create a narrative route inspired by quarry transport.
The master plan is organized as a journey from arrival, learning, observation, participation, and reflection.

5.2 Zoning Layout on the Site

The zoning layout was developed to separate public, semi-public, private, and service functions clearly. This is important because the project includes both tourism and industrial activities. The zoning strategy is:

- **Public Zone**

Reception, museum, exhibition galleries, restaurant, outdoor learning areas, and history railway.

- **Semi-Public Zone**

Limestone craft workshops and guided activity spaces where visitors can participate under supervision.

- **Private / Staff Zone**

administration, staff rooms, storage, control rooms, and back-of-house areas.

- **Manufacturing Zone**

Limestone waste processing, cutting, crushing, mixing, forming, drying, and product storage.

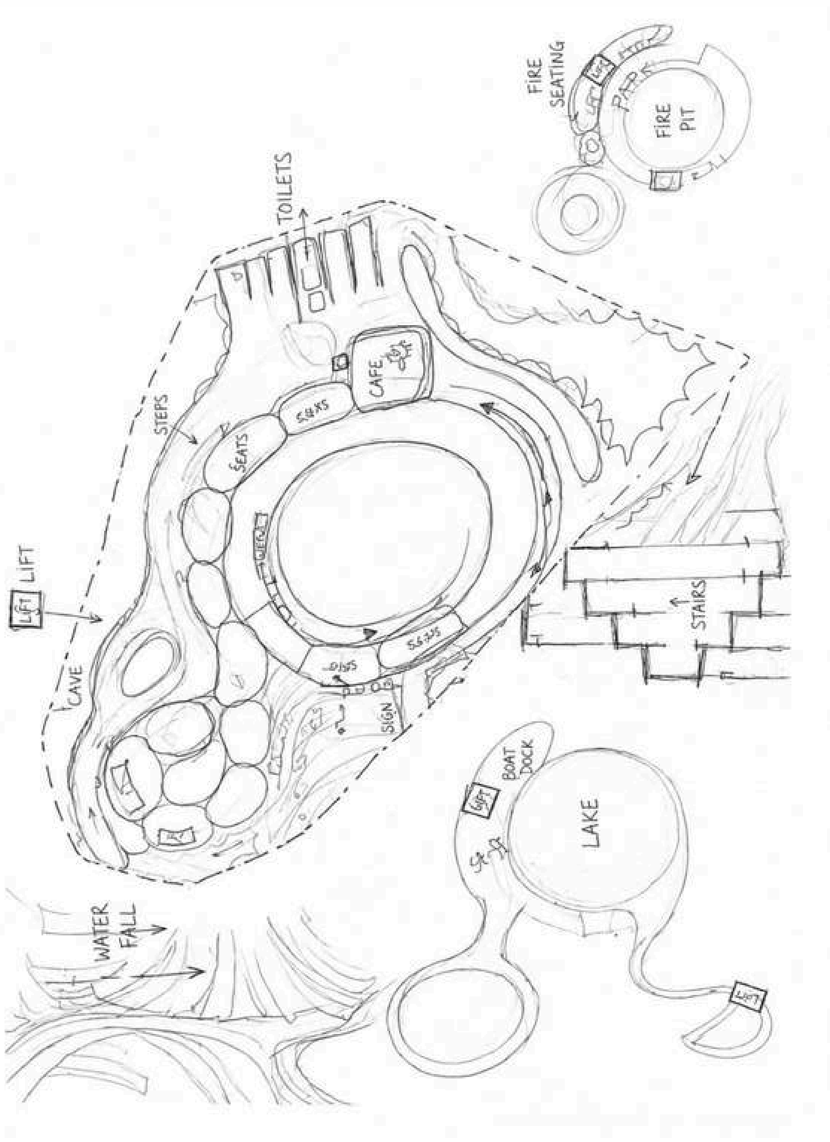
- **Service Zone**

Loading area, service parking, waste handling, maintenance, and factory supply route.

- **Landscape Buffer Zone**

Green areas are used to soften the industrial edge, reduce dust/noise impact, and connect the project to the limestone landscape.

This zoning supports both visitor experience and operational safety.



5.3 Circulation: Public vs Private, Tourist Flow

The circulation strategy was designed to guide visitors through the project while keeping industrial and service movement separate.

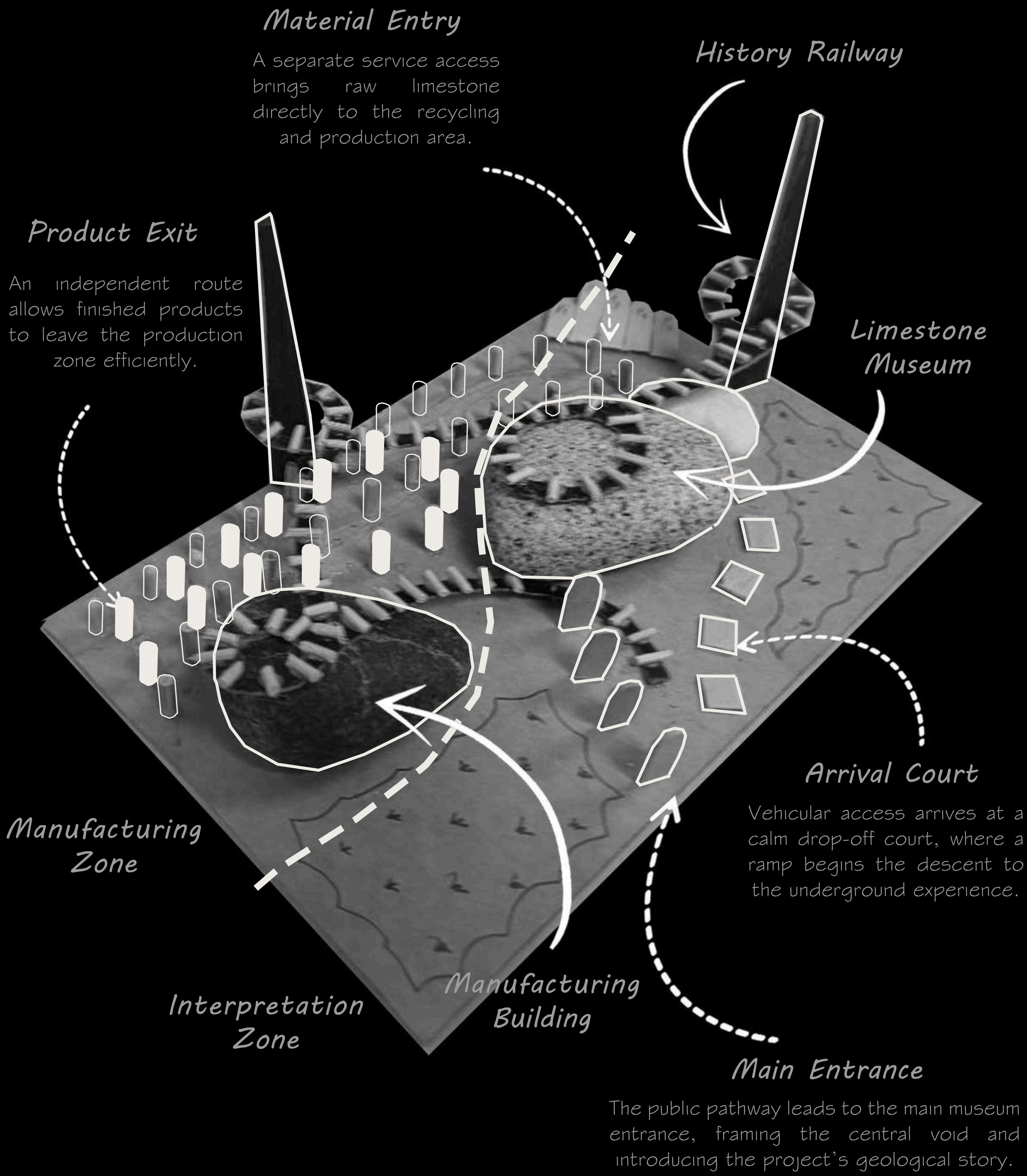
The tourist journey is organized through the following sequence of spaces and experiences:

- **Arrival and reception**

1. Limestone introduction gallery
2. Quarrying and geological exhibition
3. Central quarry-hole experience
4. Factory viewing area
5. Limestone waste workshop
6. Cave-like / descent experience
7. History railway connection
8. Restaurant / reflection zone
9. Exit through retail or outdoor landscaping.

The circulation strategy is divided into public and private/service movement as follows:
Lobby, museum, exhibition, viewing gallery, workshop, restaurant, railway, outdoor trail, factory operation, staff rooms, storage, loading, waste handling, maintenance, and service parking.

The public route is designed as a controlled educational journey. The service route is kept separate to avoid conflict with visitors and to support safe factory operation.


Material Entry
A separate service access brings raw limestone directly to the recycling and production area.
History Railway
Product Exit
An independent route allows finished products to leave the production zone efficiently.
Limestone Museum
Arrival Court
Vehicular access arrives at a calm drop-off court, where a ramp begins the descent to the underground experience.
Manufacturing Zone
Interpretation Zone
Manufacturing Building
Main Entrance
The public pathway leads to the main museum entrance, framing the central void and introducing the project's geological story.

5.4 Massing Development

The massing development was driven by the idea of limestone layering, quarry cuts, and mountain integration. The building form was not treated as a single block but as a group of connected volumes responding to process and site.

- **Initial stage:**

The first idea started with separating the project into major program blocks: museum, factory, restaurant tower, and support spaces. This helped clarify the functional relationship between public and industrial zones.

- **Development stage:**

The masses were adjusted to create a stronger visitor journey. The central quarry hole became the main organizing space, while other buildings were arranged around it or connected through elevated circulation.

- **Final refinement:**

The massing became more layered and carved, reflecting the limestone landscape. Some spaces feel embedded, some rise vertically, and some are connected through the history railway. This creates a stronger relationship between building, mountain, and industrial narratives.

The final massing expresses the project concept: from limestone formation to extraction to processing to interpretation.

5.5 Integration with Terrain, Mountain, and Quarry-Inspired Cutting

The project responds to the terrain by using the idea of cutting, stepping, and descending rather than placing a flat building on the site.

- **Design rationale:**

The limestone landscape is naturally shaped by caves, holes, cliffs, and quarry cuts. These features inspired the architecture to behave like a carved landscape instead of a normal building object.

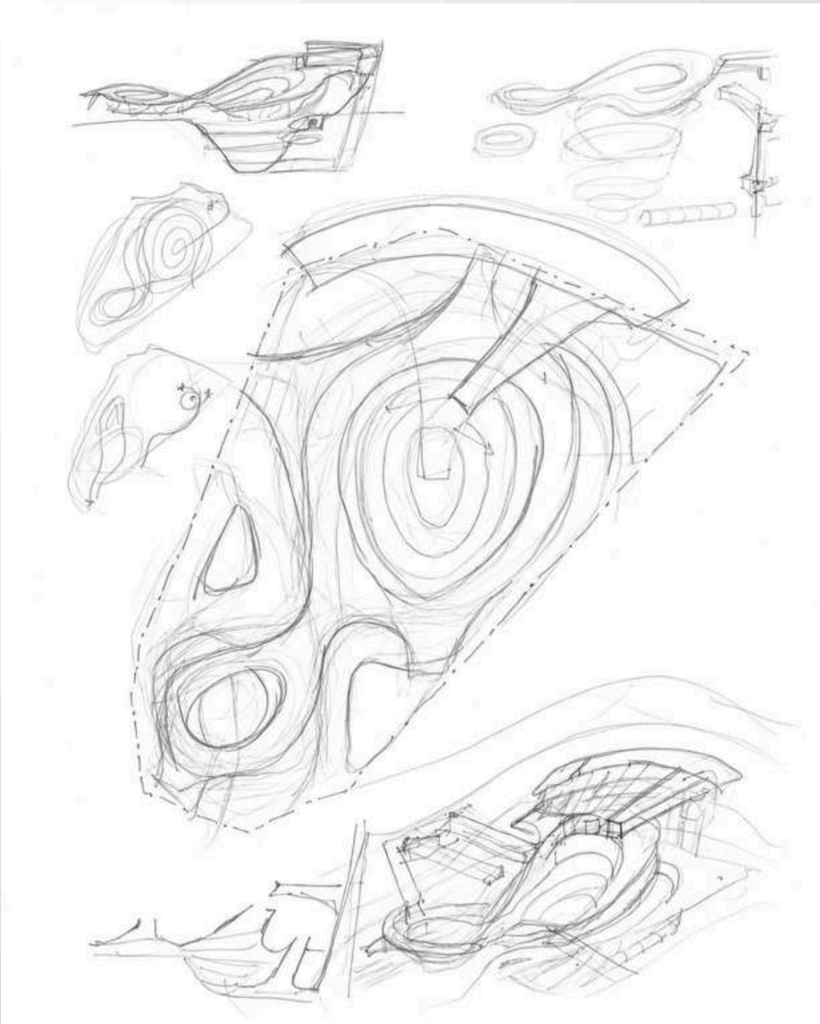
- **Implementation on site:**

The central quarry hole creates a strong void and spatial focus.
Level changes support the idea of descent and ascent.
Cave-like spaces create an immersive learning experience.
The restaurant tower attaches visually and conceptually to the mountain.
The elevated railway follows the idea of industrial transport across the site.

- **Spatial experience:**

Visitors move through the project as if they are moving through limestone layers. They descend into darker, enclosed spaces, pass through exhibition and factory viewing areas, then rise again through the railway and tower experience.

This terrain integration strengthens the project narrative and makes the site condition part of the architecture.

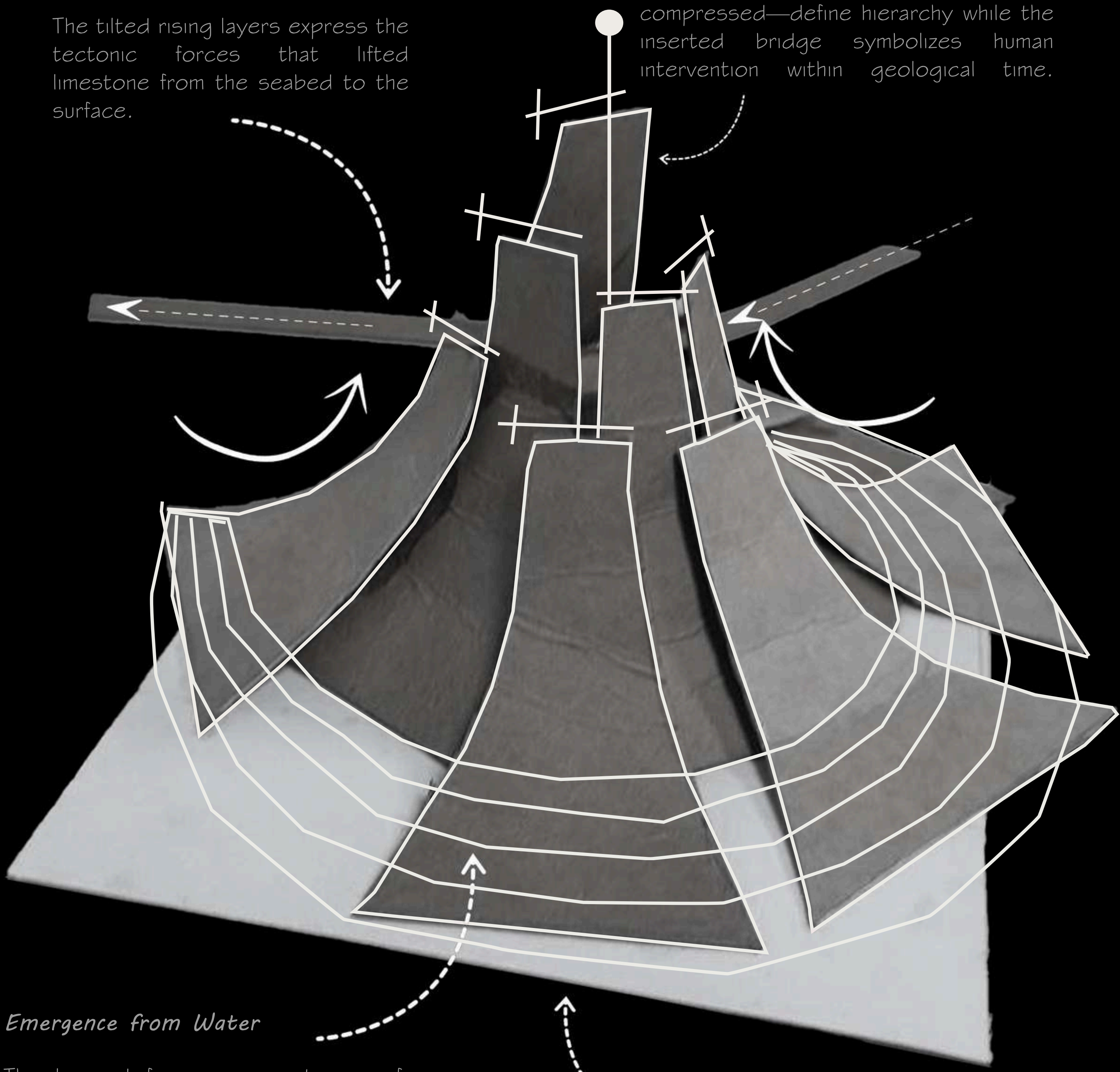


The Layer as an Architectural Element

Varying limestone masses—tall and compressed—define hierarchy while the inserted bridge symbolizes human intervention within geological time.

Tectonic Uplift

The tilted rising layers express the tectonic forces that lifted limestone from the seabed to the surface.



Emergence from Water

The layered forms appear to rise from surrounding water, recalling limestone's submerged marine origin.

Radial Rhythm Without Repetition

Different-scaled elements orbit a central core, creating radial rhythm without literal repetition.

5.6 Inspiration and Architectural Language

The architectural language is inspired by limestone geology, quarrying processes, mountain layers, and industrial structure. The design inspiration is developed through the following key references:

- **Limestone Layering**

The building uses layered walls, roofs, floors, and façade elements to reflect geological strata.

- **Quarry Holes and Caves**

Voids, dark spaces, skylights, and carved circulation represent the experience of quarrying and underground limestone formations.

- **Industrial Process**

Structural frames, bridges, viewing galleries, and railway elements express the industrial side of the project.

- **Mountain Integration**

The form responds to the limestone hill by using vertical elements, rough textures, and stepped massing.

Architectural language key elements:

- Layered roof and façade treatment.
- Heavy and grounded forms mixed with light bridges.
- Vertical openings inspired by quarry cuts and limestone cracks.
- Glass viewing partitions between museum and factory.
- Raw material expression such as limestone, concrete, steel, glass, and textured surfaces.
- Cave-like spatial transitions from dark to light.
- The architecture aims to feel geological, industrial, and educational at the same time.

5.7 Reference Projects

Several reference projects were studied to support the design direction and architectural language:

- **Jinyun Quarries, China**

Relevance: Adaptive reuse of quarry spaces into cultural and performance spaces.
Takeaway: Quarry scars can become meaningful public experiences instead of abandoned industrial damage.

- **Zayed National Museum, Abu Dhabi**

Relevance: Uses vertical towers for symbolic form, natural ventilation, and strong museum identity.
Takeaway: Tall architectural elements can work as both environmental devices and narrative landmarks.

- **Carrara Marble Quarries, Italy**

Relevance: Famous quarry landscape connected to stone extraction and material heritage.
Takeaway: Industrial landscapes can carry strong cultural and educational value.

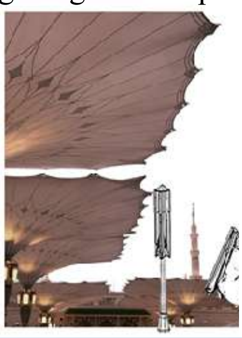
- **Industrial Museums / Factory Visitor Centres**

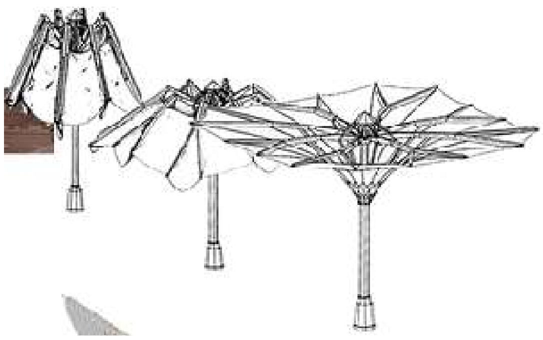
Relevance: Combine production, exhibition, and public observation.
Takeaway: Manufacturing can become part of the visitor experience if circulation and safety are controlled.

- **Kinta Valley Limestone and Cave Context**

Relevance: Local limestone caves, temples, and quarry landscapes around Ipoh.
Takeaway: The design should respond to local geological identity instead of copying foreign forms.

These references helped define the project as a hybrid between museum, factory, landscape, and geological interpretation.





5.8 Local Architecture, Geological, and Industrial Influence

The design is influenced more by the local limestone landscape than by traditional decorative architecture. The strongest local identity of the project comes from Ipoh's karst hills, caves, quarry history, and industrial memory.

Key influences adapted:

- **Limestone Hills**

The massing and façade language respond to the verticality, roughness, and layering of the hills.

- Cave Experience

Darker transitional spaces, controlled light, and enclosed paths are used to create a sense of discovery.

- **Quarry Cutting**

Sharp openings, carved voids, and stepped spaces reflect quarry extraction and cutting.

- Industrial Structure

Steel bridges, viewing platforms, factory zones, and the history railway express the production side of limestone.

- **Tropical Response**

Shaded walkways, roof overhangs, vertical screens, and landscape buffers respond to the hot and humid climate.

By combining geological and industrial influences, the project develops an architectural identity that belongs to Tasik Cermin and Ipoh rather than becoming a generic tourism building.

Chapter 6

Design Process of Main Component Stages

Chapter six: Design Process of Main Component Stages

This chapter explains the design development of the main architectural component: the Central Quarry Hole. This element became the heart of the project because it connects the museum, limestone process, visitor journey, cave experience, and vertical circulation.
The Central Quarry Hole was developed through several design stages. Each stage improved the relationship between concept, function, structure, site response, and visitor experience, similar to the step-by-step sketch process used in the reference report.

6.1 Sketch 1: Initial Rough Idea and Inspiration

- **The objective of this stage is to:**

To explore a central space that represents limestone extraction, quarry depth, and geological layering.

- **The design inspiration is taken from:**

Limestone quarry holes.
Cave openings.
Layered rock formation.
The feeling of descending into the earth.

- **The design is characterized by:**

The first idea focused on creating a large central void inside the project. This void was imagined as a quarry-inspired space where visitors could feel the scale, depth, and heaviness of limestone.
At this stage, the design was still rough. The main focus was on the emotional experience of entering a carved space, not yet on detailed zoning or structure.

- **The reflection from this stage shows that:**

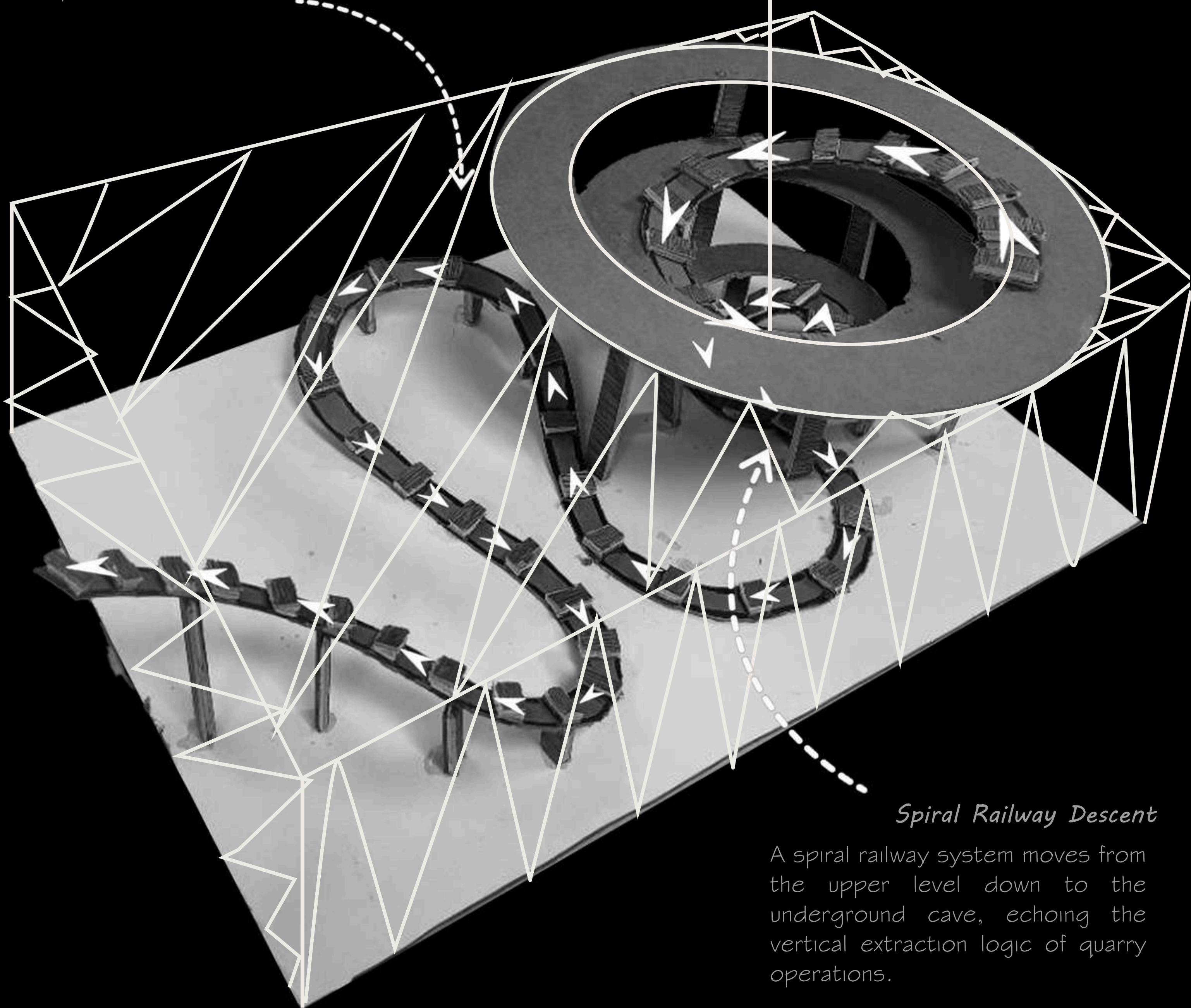
This sketch captured the main concept clearly, but it still needed stronger functional organization and better connection to the museum and factory spaces.

The Central Void

The large central void is inspired by the real quarry pit, transforming the act of extraction into a spatial core of interpretation.

Underground Caves

The descending cave spaces recreate the physical and atmospheric experience of mining deep beneath the earth.



Spiral Railway Descent

A spiral railway system moves from the upper level down to the underground cave, echoing the vertical extraction logic of quarry operations.

Railway as Experiential Circulation

Due to the monumental scale of the space, the railway becomes the primary circulation device, allowing visitors to traverse and observe the entire process as an immersive industrial journey.

6.2 Sketch 2: First Spatial Layout Attempt

- **The objective of this stage is to:**

To organize the spaces around the central quarry hole and begin connecting the visitor journey with the limestone process.

- **The design inspiration was taken from:**

Placing exhibition spaces around the central void.
Connecting different levels through ramps, stairs, and viewing points.
Introducing the idea of descending and ascending.
Creating a visual connection between the museum and the factory.

- **The design is characterized by:**

The quarry hole became the main orientation space. Visitors could move around it while learning about limestone formation, quarrying, crushing, screening, and reuse.
The layout began to create a clear sequence: arrival, introduction, exhibition, observation, workshop, and continuation to the historic railway.

- **The reflection from this stage shows that:**

This stage improved the spatial logic, but the circulation still needed refinement to avoid confusion between public, staff, and service movement.

6.3 Sketch 3: Improvements Based on Feedback or Functionality

- **The objective of this stage is to:**

To improve zoning, safety, and visitor circulation based on project requirements and feedback.
Feedback Highlights:
Separate public and service circulation more clearly.
Make the quarry hole more meaningful, not only decorative.
Strengthen the connection between museums and manufacturing.
Control dust and noise from the factory area.
Make the visitor journey easier to understand.

- **Key Design Changes:**

The spaces were divided into three main zones:

1. Public Interpretation Zone
2. Museum, exhibition, quarry-hole viewing, and visitor circulation.
3. Semi-Public Learning Zone
4. Guided workshop and craft areas using limestone waste.
5. Controlled Industrial Zone
6. Manufacturing, storage, service, and waste handling areas.
7. Glass partitions and viewing points were introduced to allow visitors to observe production safely without entering the factory zone.

- **Reflection:**

This stage made the project more realistic. The design became clearer because the quarry hole started to work as both a spatial experience and an organizing element.

6.4 Sketch 4: Developing Structure and Form Details

- **Objective:**

To refine the physical form, roof system, structure, and material expression of the central quarry hole.

Focus Areas:

1. Layered roof structure.
2. Curved ribs and ring beams.
3. Vertical openings for light.
4. Structural support around the central void.
5. Material expression inspired by limestone layers.

- **Structural Language:**

The quarry hole was supported by a system of main rings, curved ribs, columns, and roof layers. The roof was imagined as a lightweight layered limestone form, supported by a steel structure underneath. Skylight openings were introduced around the roof to bring controlled daylight into the central space. These openings are not perfectly regular, because the design aims to reflect natural quarry cuts and limestone cracks.

- **Reflection**:

This stage connected the concept with buildable structure. The central space became stronger because the form, roof, and structure started to support the same limestone narrative.

6.5 Sketch 5: Finalized Design Reflecting All Considerations

- **The objective of the final stage is to:**

To present the final design of the central quarry hole as the main spatial and narrative component of the project.

The final design is summarized as:

The final quarry hole acts as the heart of the edutourism center. It organizes the visitor journey and creates a strong relationship between geology, quarrying, exhibition, and movement.

- **The final design includes:**

A large central void inspired by quarry excavation.
Layered circulation around the void.
Exhibition zones explaining limestone formation and the quarrying process.
Controlled viewing toward manufacturing spaces.
Cave-like lower levels for immersive experience.
Connection to the elevated history railway.
Skylight and vertical openings for dramatic natural light.

- **The design features are expressed through:**

The visitor journey starts from the entrance and gradually moves into the limestone story. The quarry hole creates a sense of depth, while the surrounding spaces explain the industrial process. The journey then continues toward the workshop, factory viewing area, restaurant tower, and history railway.

- **The reflection from the final stage shows that:**

The final version combines concept, function, and experience. It does not treat limestone only as a material, but as a spatial story that visitors can move through and understand.

6.6 Description of How Feedback, Site, and Program Influenced Changes

Throughout the design process, three main factors shaped the development of the central quarry hole:

1. Feedback from Lecturers and Reviews

Early feedback helped strengthen the project concept and pushed the design to become more than a simple museum. The quarry hole needed to work as a real spatial organizer, not just a symbolic shape.

Later feedback focused on circulation, safety, and the relationship between public and production spaces. This helped improve the separation between visitors, staff, and service movement.

2. Site Conditions

The limestone hill context influenced the form, material language, and spatial atmosphere. Since the lake is not directly visible from the project site, the design focuses on internal experience, mountain framing, and cave-like spaces instead of relying on external views.

The terrain and karst setting also encouraged the use of layering, carving, descent, and controlled structural intervention.

3. Program Requirements

The program required a clear relationship between the museum, workshop, manufacturing, restaurant, and railway. Because of this, the quarry hole became the main connector between learning, observing, making, and moving.

Factory-related functions also influenced the design. Dust, noise, waste, and service access required controlled zoning and safe viewing areas. This made the project more functional and realistic.

Overall, the design process transformed the central quarry hole from a rough concept into the main architectural element that holds the whole project together.

Chapter 7

Final Design

Chapter seven: Final Design

This chapter presents the final architectural proposal of the Limestone Edutourism and Interpretation Centre. It explains the final site plan, floor plans, elevations, sections, perspective views, material palette, sustainability strategies, and storytelling approach.

The final design combines limestone interpretation, museum experience, manufacturing, workshop learning, restaurant tower, outdoor landscape, and history railway into one connected architectural journey. This follows the same final design structure used in the reference report, where the project is explained through drawings, views, materials, sustainability, and storytelling.

7.1 Site Plan

The site plan shows the overall arrangement of the project within the Tasik Cermin and Gunung Rapat limestone context.

- **Design Highlights:**

The main public entrance is placed on the east / south-east side for clear visitor arrival.
The service entrance is separated toward the south-west side to avoid conflict with public movement.
The museum and interpretation spaces form the main visitor core.
The manufacturing zone is placed in a controlled area with access for service vehicles.
The restaurant tower is positioned as a vertical experience connected to the mountain.
The history railway links the buildings and supports the project's industrial narrative.
Landscape buffers are used to reduce dust, noise, and visual impact.

- **Key Zones Shown:**

Main arrival and reception
Limestone museum and interpretation centre
Central quarry hole
Workshop and craft spaces
Manufacturing / factory zone
Restaurant tower
History railway
Outdoor learning landscape
Parking and service access

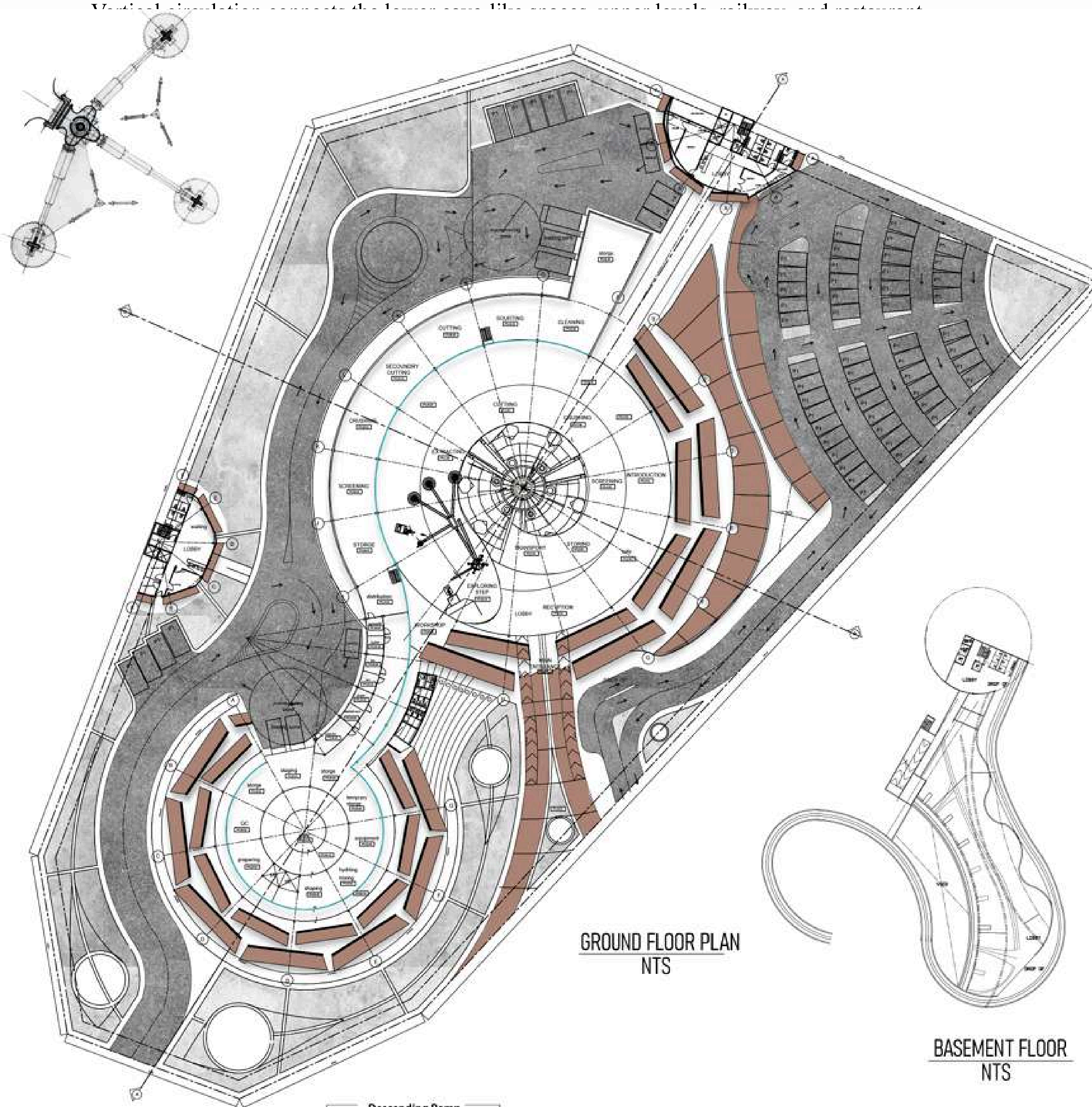

SITE PLAN
NTS

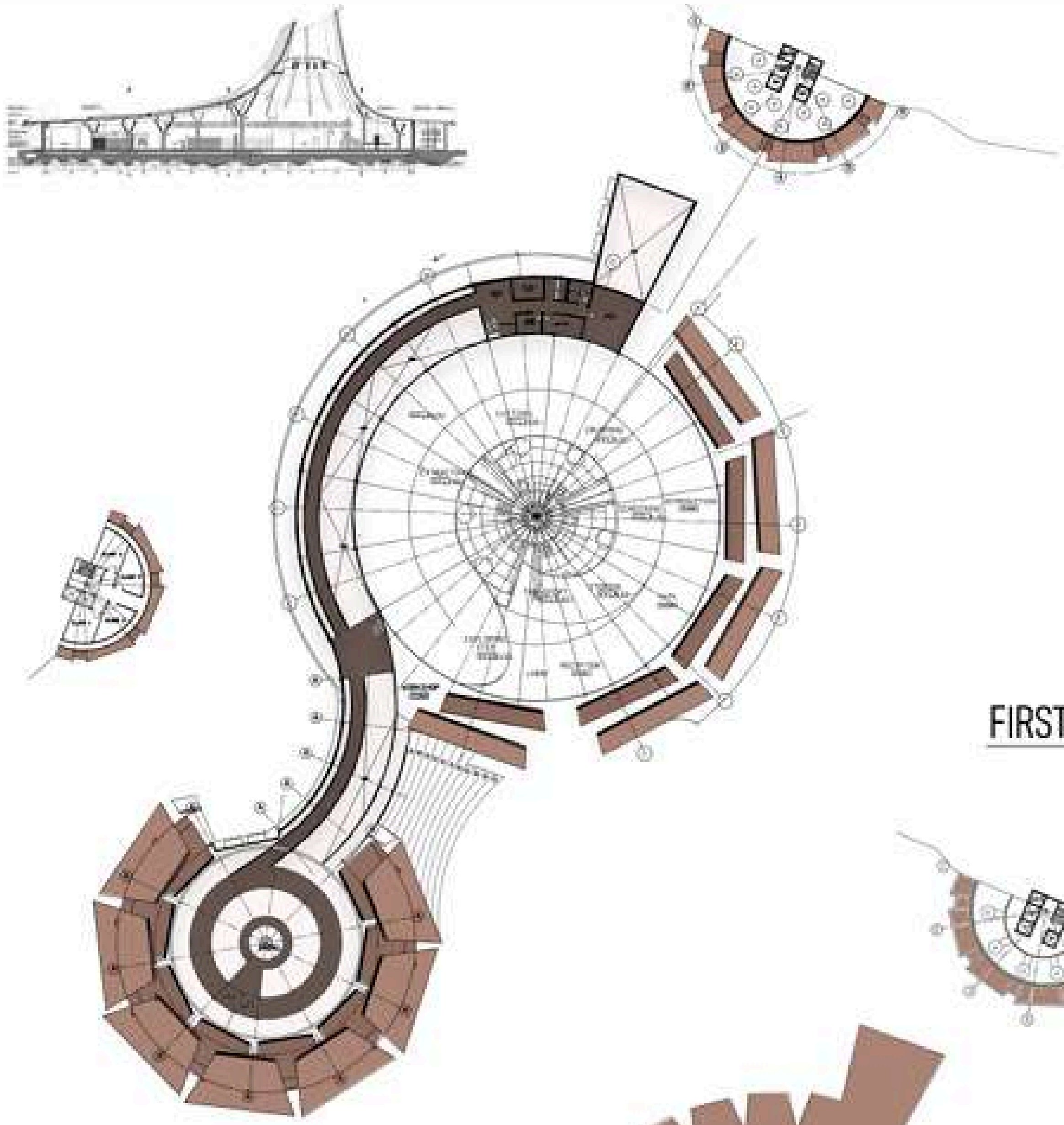
7.2 Floor Plans

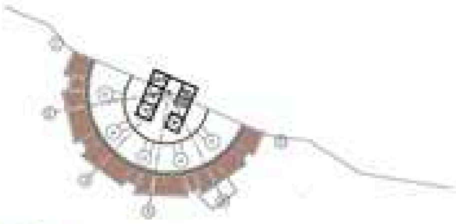
The floor plans show the internal organization, spatial sequence, and relationship between public, semi-public, private, and service zones.

- **Plan Features:**

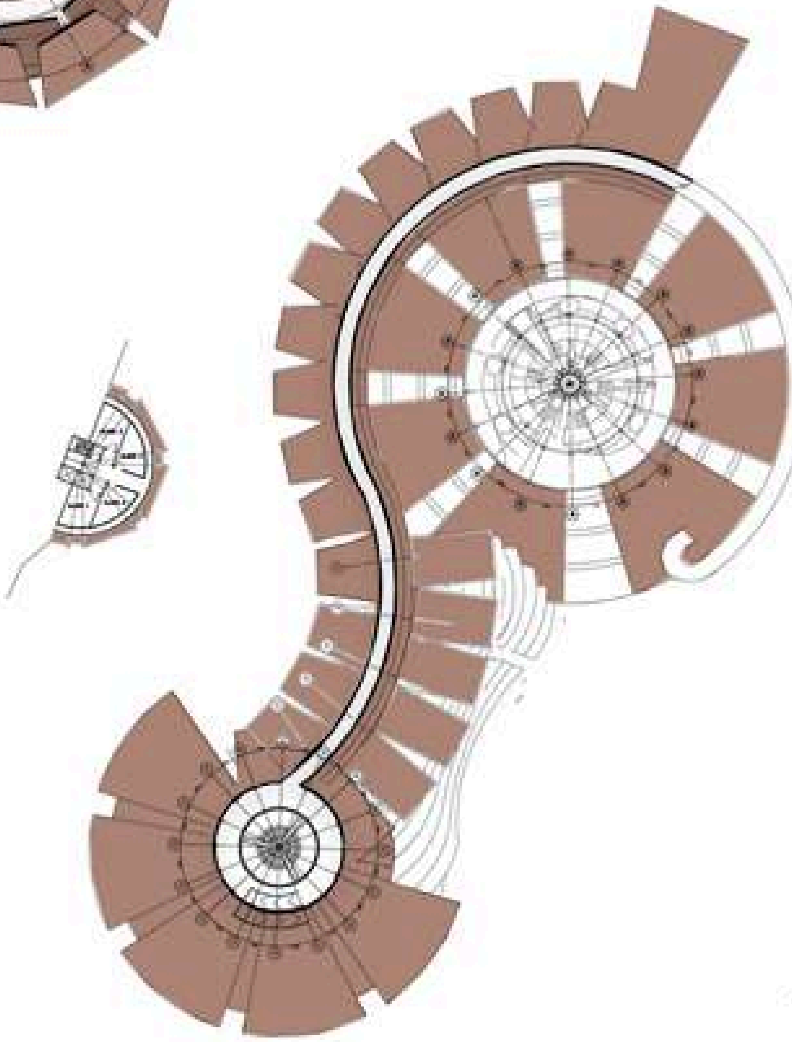
Public areas begin with reception, orientation, and museum galleries.
The central quarry hole organizes the main circulation and visual experience.
Exhibition spaces follow the limestone story from formation to quarrying and reuse.
Workshop areas allow visitors to participate in limestone waste craft activities.
The manufacturing zone is separated but visually connected through safe viewing areas.
Staff, storage, service, and loading areas are kept away from the public route.
Vertical circulation connects the lower cave like spaces, upper levels, railway, and restaurant







FIRST FLOOR PLAN
NTS



FIRST FLOOR PLAN
NTS

7.3 Elevations

The elevations show the exterior expression of the project and how the building responds to the limestone landscape.

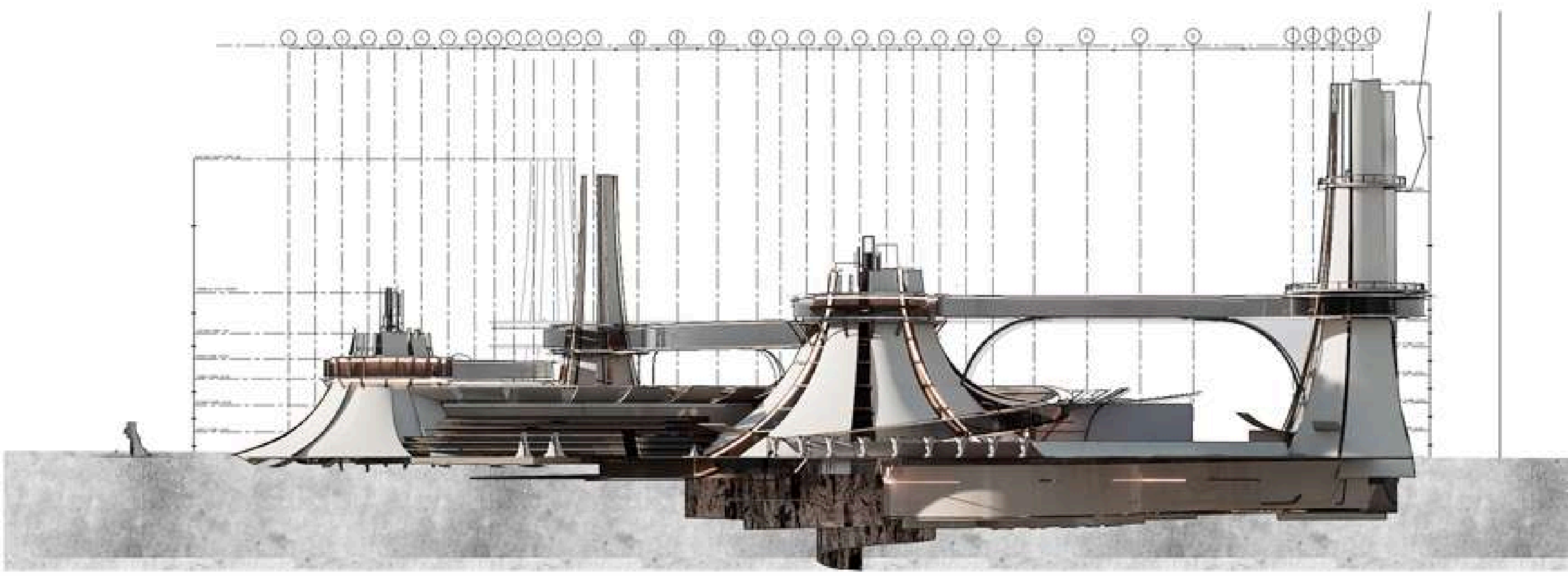
- **Key Elements Shown:**

Layered façade treatment inspired by limestone strata.
Vertical openings that reflect quarry cuts, cracks, and cave entrances.
A combination of heavy grounded forms and lighter elevated bridge elements.
Shading devices such as fins, overhangs, and façade screens to reduce heat gain.
Strong contrast between solid limestone-inspired surfaces and transparent viewing areas.
The restaurant tower form attached visually to the mountain edge.

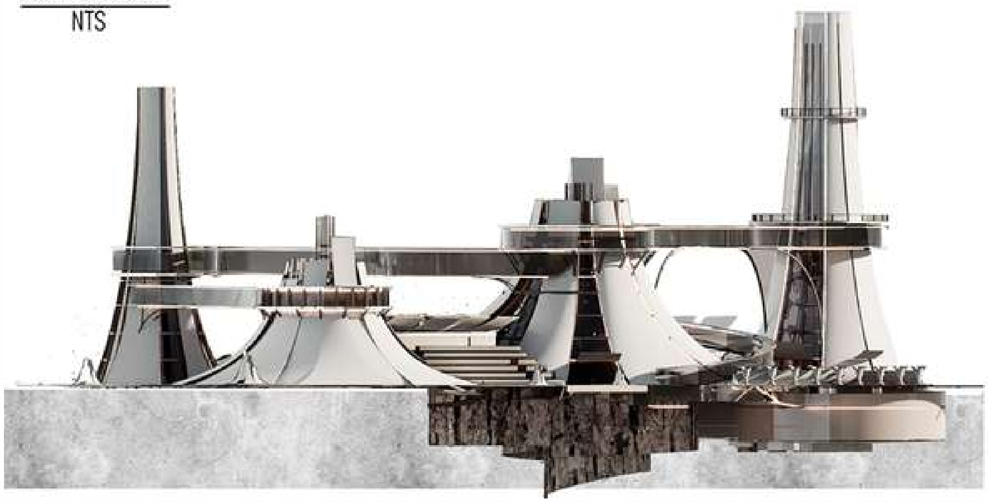
- **Reflection**:

The elevation is not designed to look decorative only. It expresses the main concepts of limestone layering, industrial processes, and mountain integration. The building should feel connected to the karst landscape instead of appearing as a random object on the site.

SOUTH ELEVATION
NTS



SOUTH ELEVATION
NTS

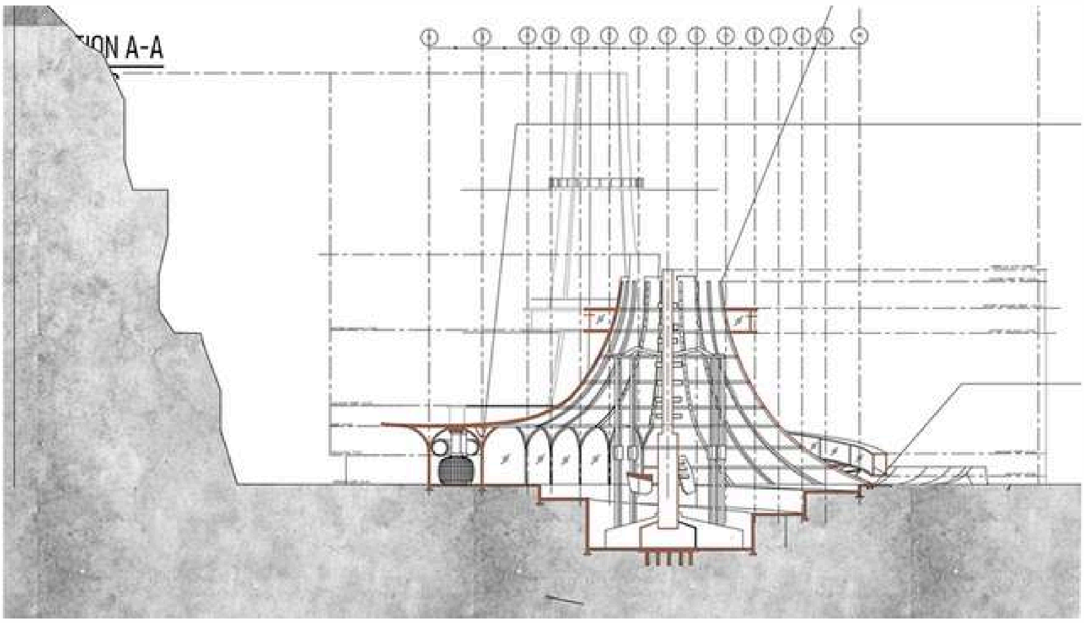


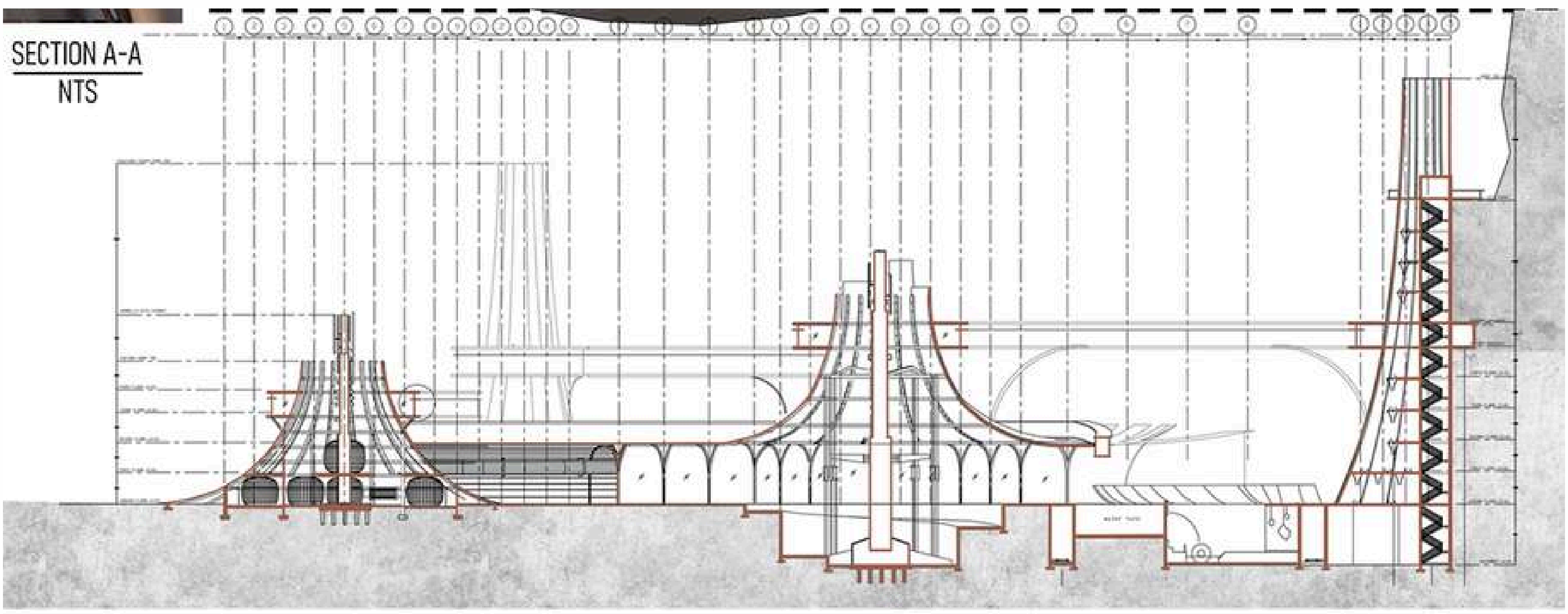
7.4 Sections

The sections are important because they show the vertical experience of the project, especially the quarry hole, cave journey, and railway connection.

- **Design Aspects Shown in Sections:**

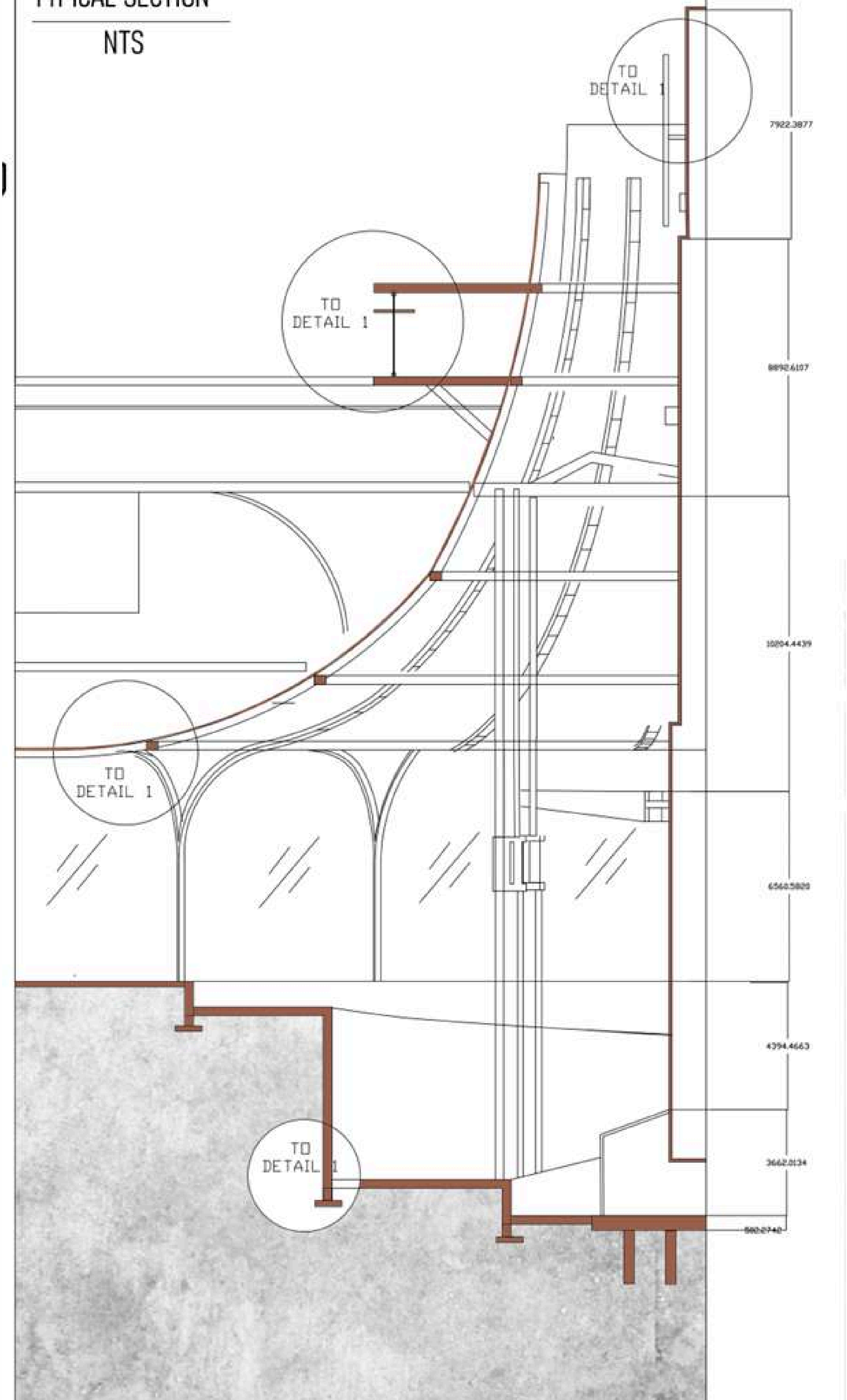
1. The central quarry hole as the main vertical void.
2. Level changes that create descent and ascent through the building.
3. Cave-like lower spaces that create an immersive limestone experience.
4. Double-height or open spaces for exhibition and orientation.
5. Controlled daylight entering through skylights and vertical openings.
6. Relationship between the museum, factory viewing, workshop, and railway.
7. Restaurant tower as a vertical element connected to the mountain.
8. The sections show how visitors experience the project in layers, moving from open public areas into deeper, enclosed spaces, then rising again through the railway and tower.



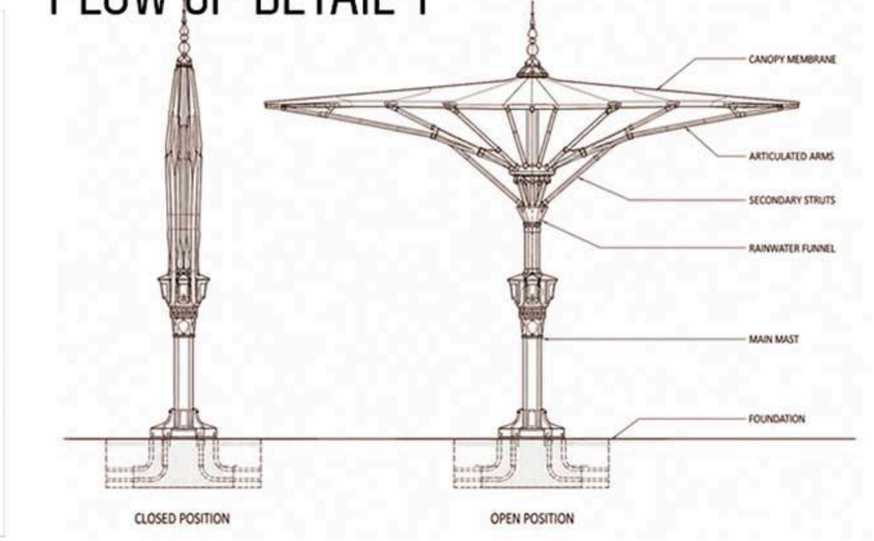


TYPICAL SECTION

NTS

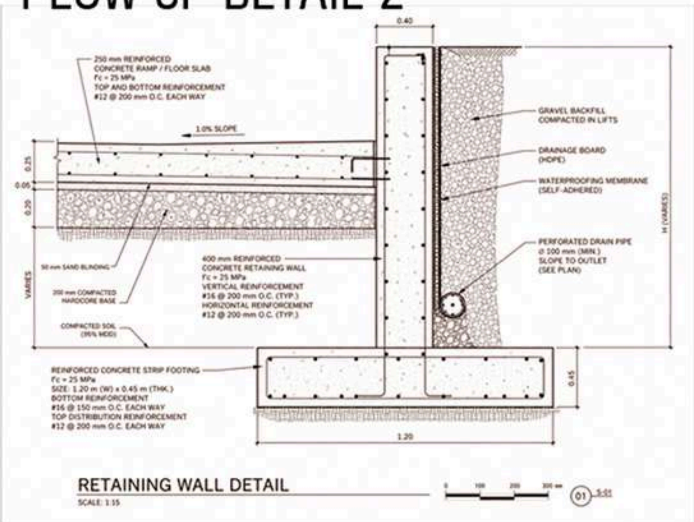


PLOW UP DETAIL 1

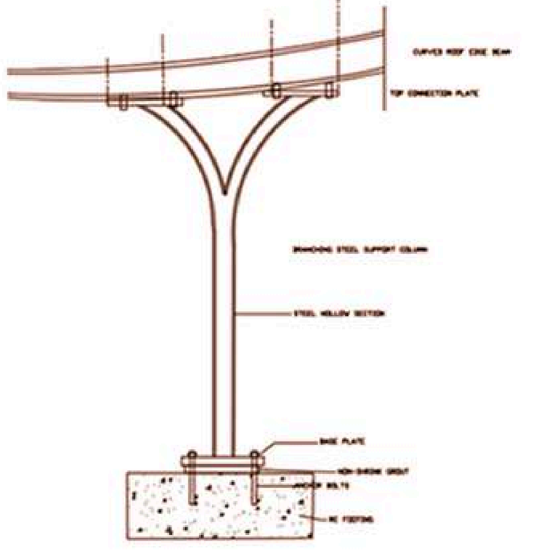


PLOW UP DETAIL 2

P



PLOW UP DETAIL 3



BRANCHING STEEL SUPPORT COLUMN DETAIL

7.5 Perspective Views

This section presents the final atmosphere and user experience of the design through 3D views and renderings.

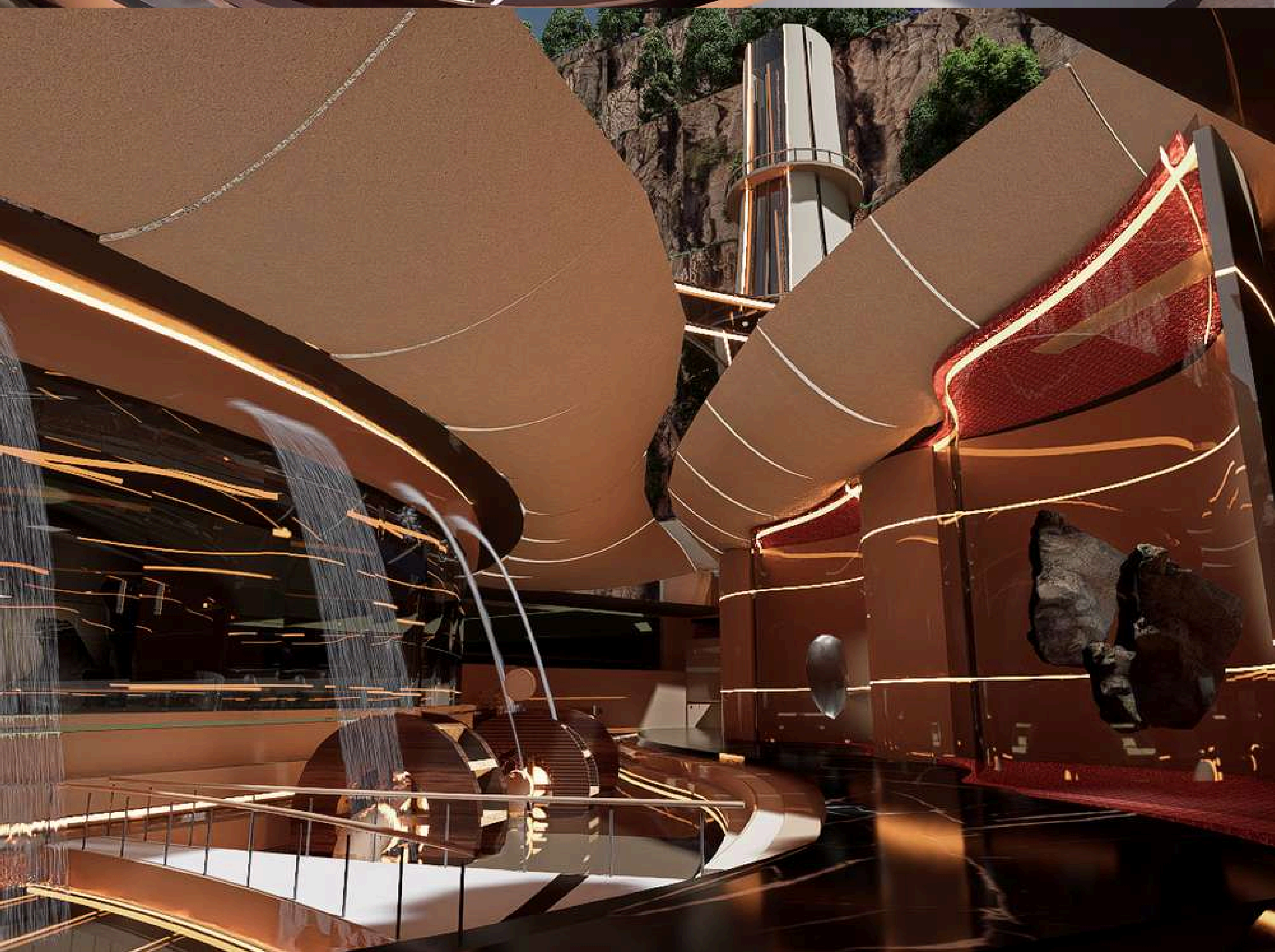
- **Key Perspectives Included:**

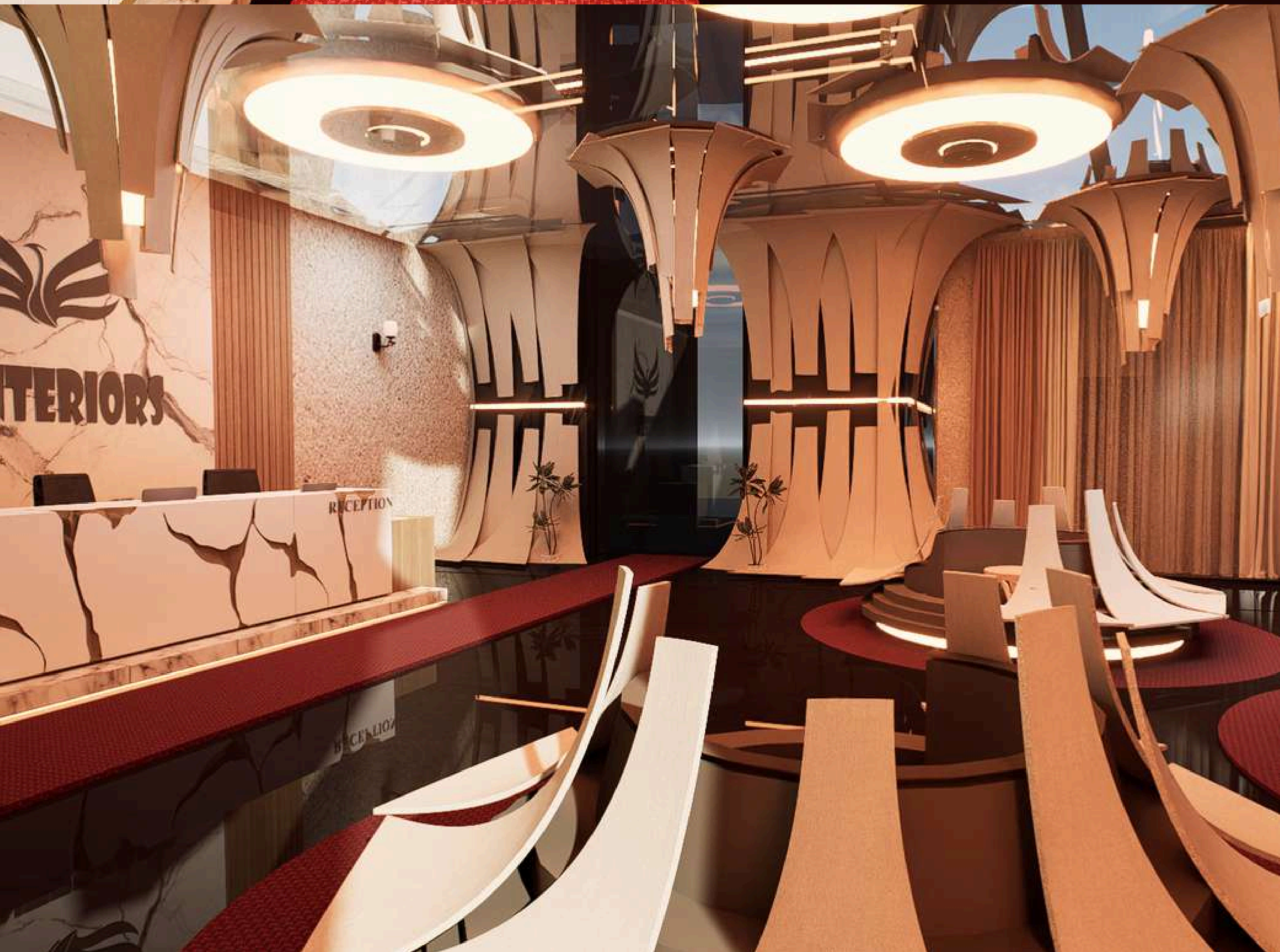
Main entrance view: Shows the arrival experience, limestone-inspired façade, and public approach.
Central quarry hole view: Highlights the main void, layered circulation, skylight, and exhibition atmosphere.
Museum interior view: Shows how visitors learn about limestone formation, quarrying, and products.
Factory viewing area: Shows the separation between public observation and controlled manufacturing.
Workshop view: Displays limestone waste craft and educational making activities.
History railway view: Shows the elevated connection between buildings and the industrial transport narrative.
Restaurant tower view: Shows the vertical dining experience connected to the mountain.
Outdoor landscape view: Shows buffers, learning paths, seating, and limestone landscape integration.

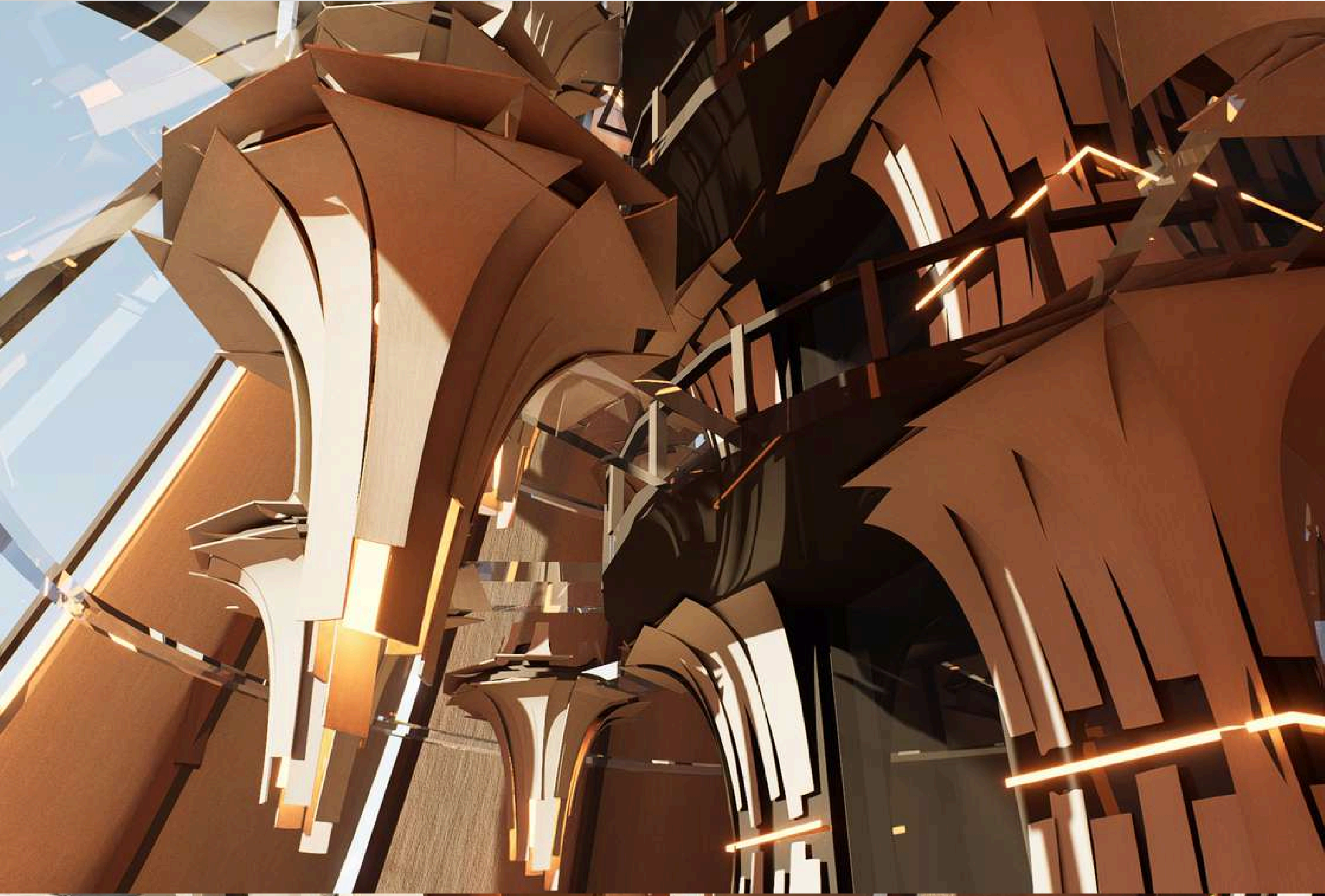
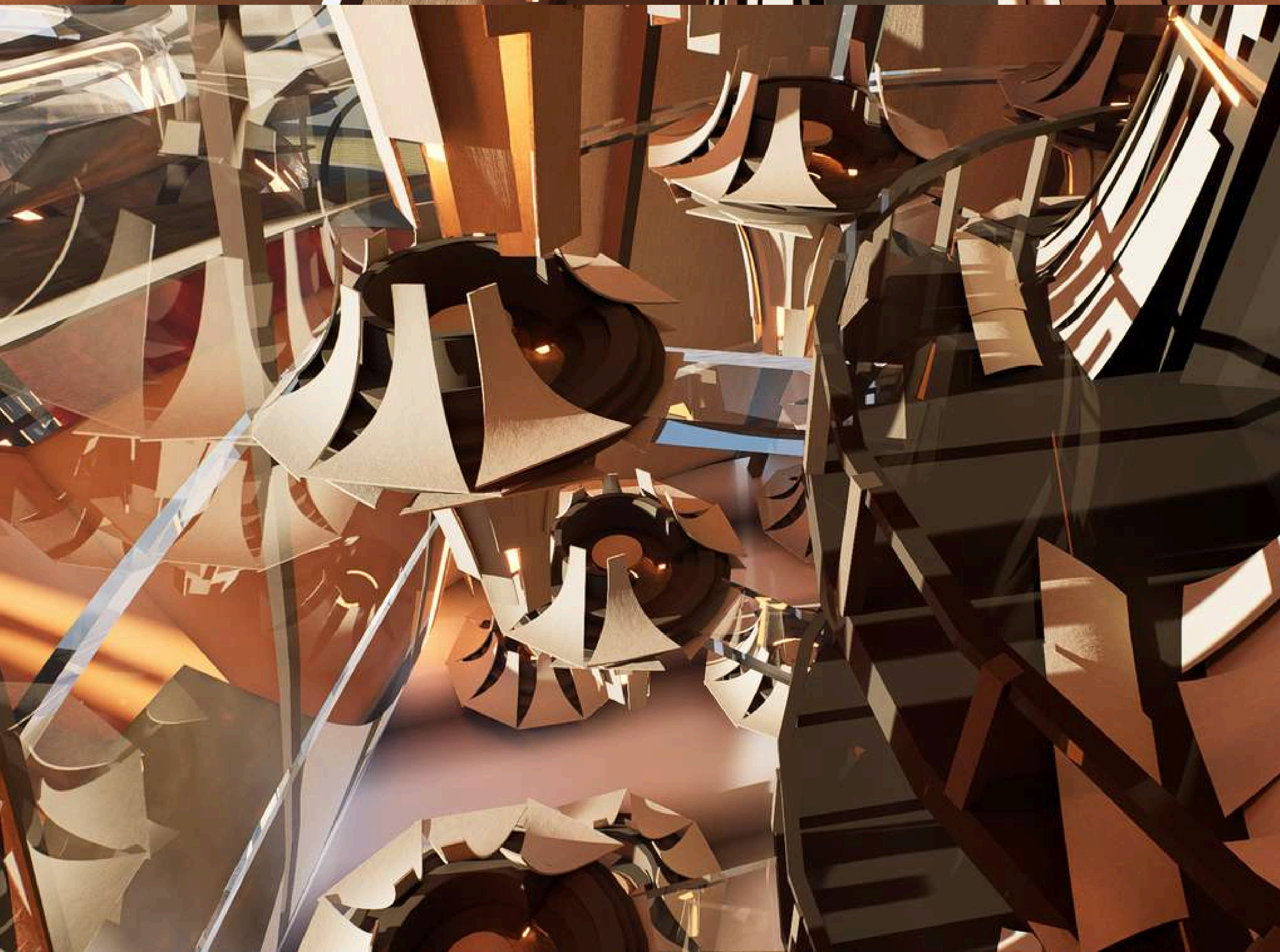
These perspectives help communicate the project not only as a building but also as a complete visitor journey.








RECEPTION

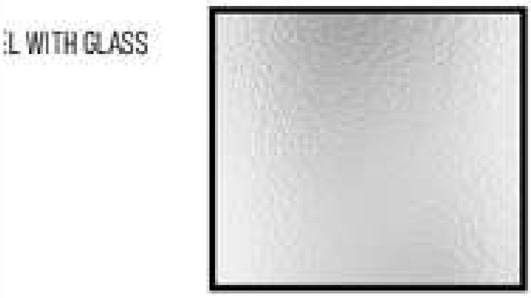



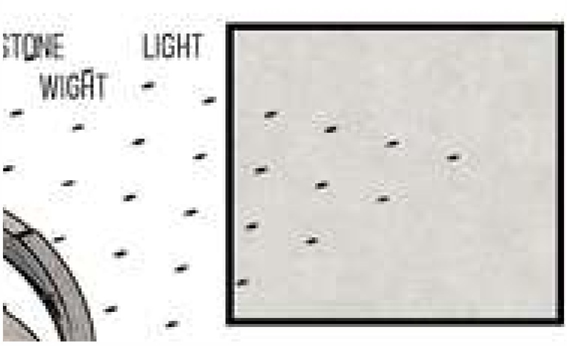
7.6 Material Palette and Local Relevance

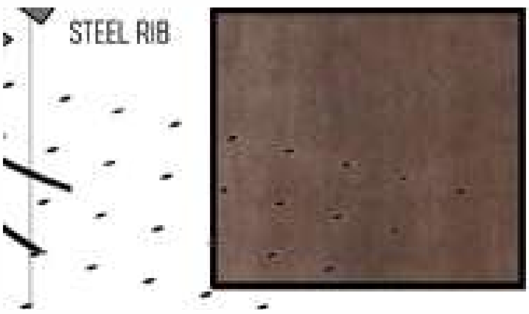
The material selection is based on limestone identity, industrial character, durability, and environmental response.

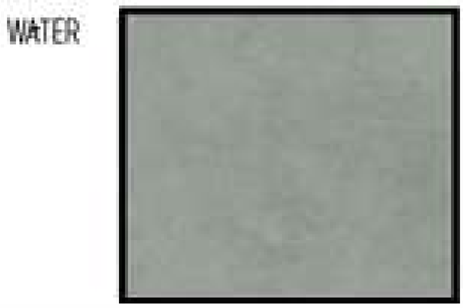
- **Material Selections:**

1. Limestone / limestone-textured finish: Used to connect the building directly to the site identity and geological narrative.
2. Concrete: Used for grounded forms, retaining elements, and cave-like spaces.
3. Steel: Used for structural ribs, ring beams, railway elements, bridge connections, and industrial expression.
4. Glass: Used for controlled transparency between museum and factory viewing areas.
5. Timber or warm interior finishes: Used in public and restaurant areas to soften the industrial feeling.
6. Perforated panels / vertical fins: Used for shading, filtered light, and façade rhythm.
7. Landscape stone and gravel: Used to extend the limestone language into the outdoor areas.
8. Local Relevance: The materials reflect the character of Ipoh’s limestone landscape and quarrying history. The design uses rough, layered, and textured surfaces to express geological formation, while steel and glass represent the industrial and educational side of the project.









7.7 Sustainability and Passive Design Features

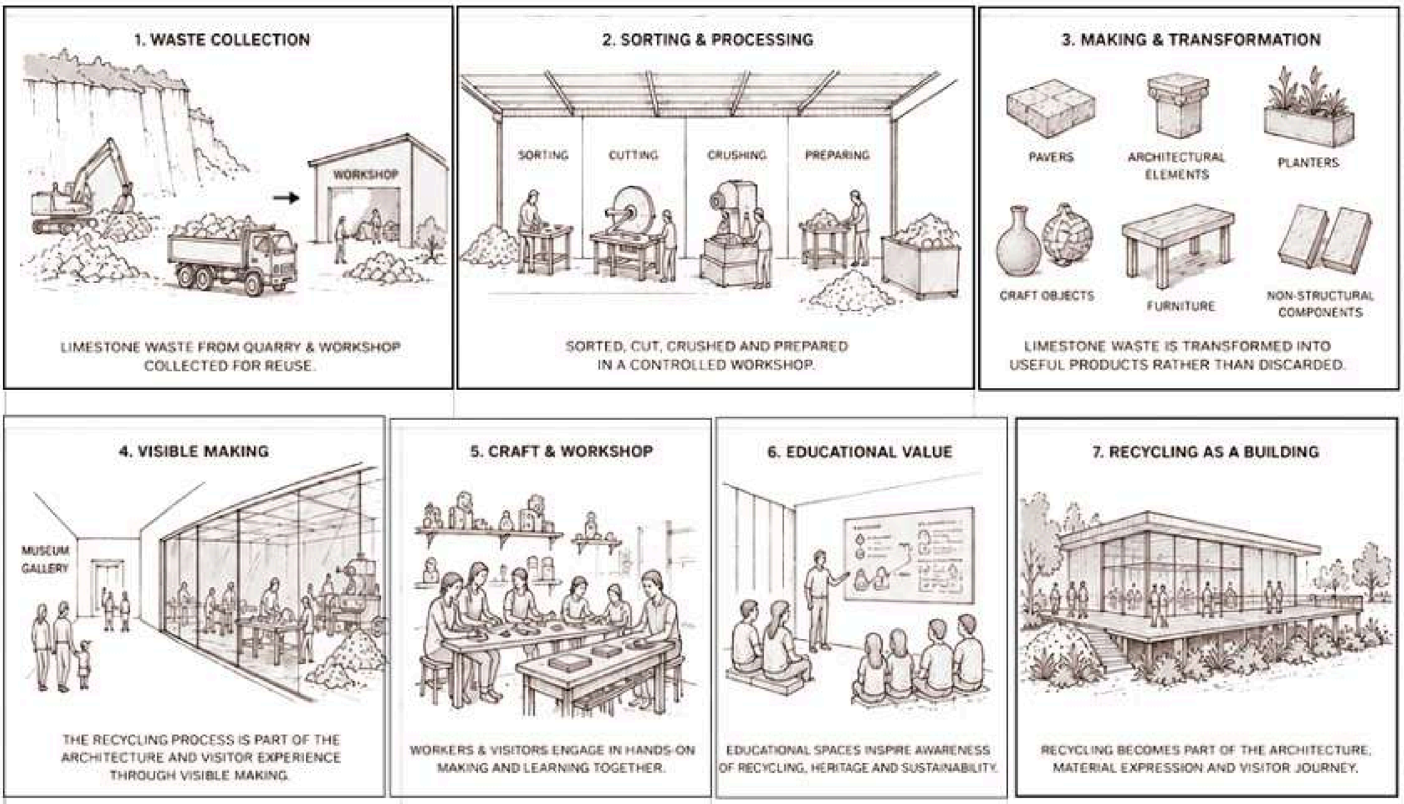
The project uses sustainability strategies that respond to the climate, site sensitivity, and industrial programme.

- **Passive Design Features:**

Shaded walkways to reduce heat and improve visitor comfort.
Vertical fins and deep openings to control glare and direct sunlight.
Skylights and controlled roof openings to bring natural light into the central quarry hole.
Natural ventilation for public circulation and selected semi-open spaces.
High-level openings to release hot air.
Landscape buffers to cool the site and reduce dust movement.
Roof overhangs to protect visitors from rain and sun.

- **Environmental Strategies:**

Reuse of limestone waste for craft, sculpture, and educational display.
Controlled factory ventilation to manage dust.
Noise separation between manufacturing and public areas.
Water runoff and slurry management through drainage and settling areas.
Clear service route to reduce conflict and operational disturbance.
Reduced site disturbance by responding to the existing terrain and mountain edge.
These strategies make the project more suitable for the karst context and reduce the negative impact of industrial activities.



7.8 Geological and Industrial Storytelling Through Architecture

The architecture is designed as a storytelling tool. Instead of presenting limestone only through display panels, the building itself becomes part of the learning experience.

- **Key Storytelling Elements:**

Central Quarry Hole: Represents extraction, depth, and the transformation of the landscape.
Layered Forms: Express the geological formation of limestone over time.
Cave-like Spaces: Create an immersive experience inspired by karst caves and underground voids.
Factory Viewing: Allows visitors to understand limestone processing and waste reuse safely.
Workshop Spaces: Turn industrial waste into craft, sculpture, and educational objects.
History Railway: Represents the transport stage of quarrying and connects the visitor journey across the site.
Restaurant Tower: Creates a final elevated experience that reconnects visitors with the mountain context.
Through form, circulation, material, and programme, the project tells the story of limestone from natural formation to industrial extraction, then finally to interpretation, education, and reuse.

Chapter 8

History Railway

Chapter eight: History Railway

The history railway is one of the main architectural features of this project. It acts as a connector between the main buildings and also becomes part of the visitor experience. Instead of being only a bridge or circulation path, it is designed as a storytelling element that represents the transportation stage of the limestone quarrying process.

In the reference report, Chapter 8 focuses on the bridge as both a functional connector and symbolic architectural element. For this project, the same structure is adapted into the History Railway, which connects the museum, factory, restaurant tower, and outdoor interpretation spaces.

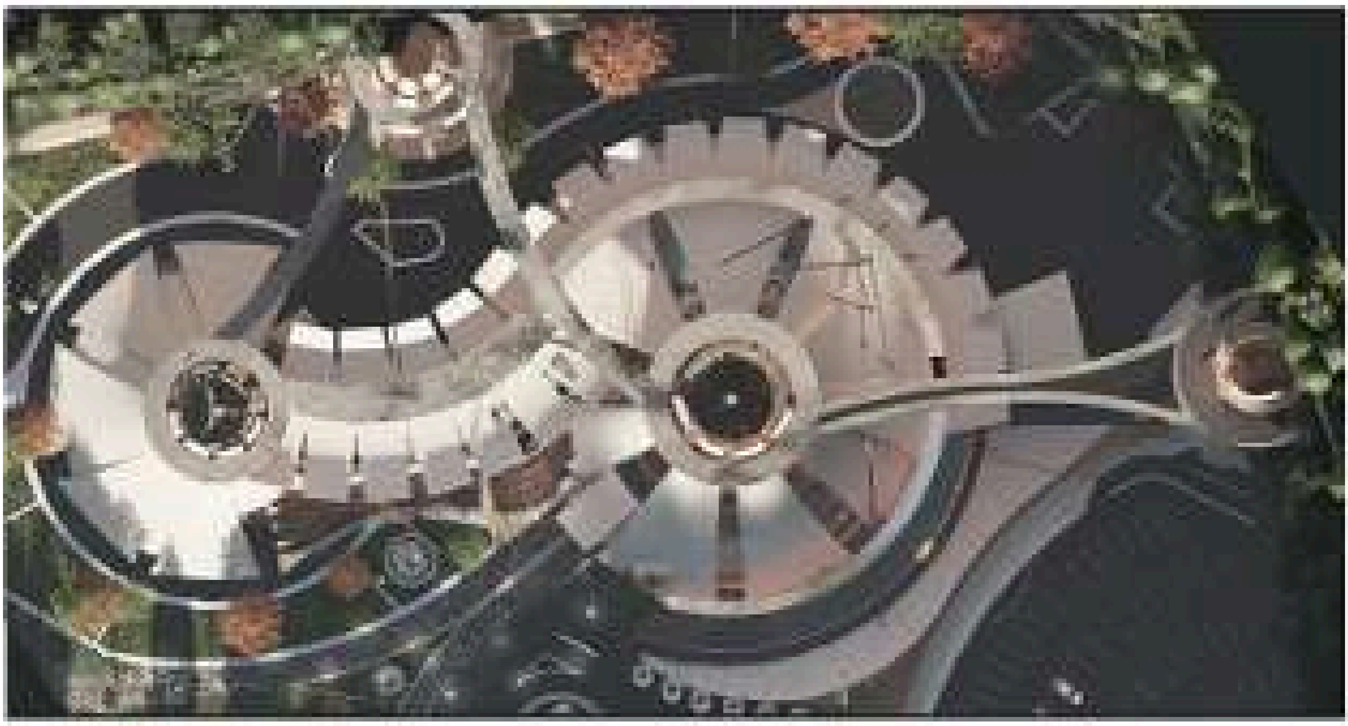
8.1 Introduction to the History Railway

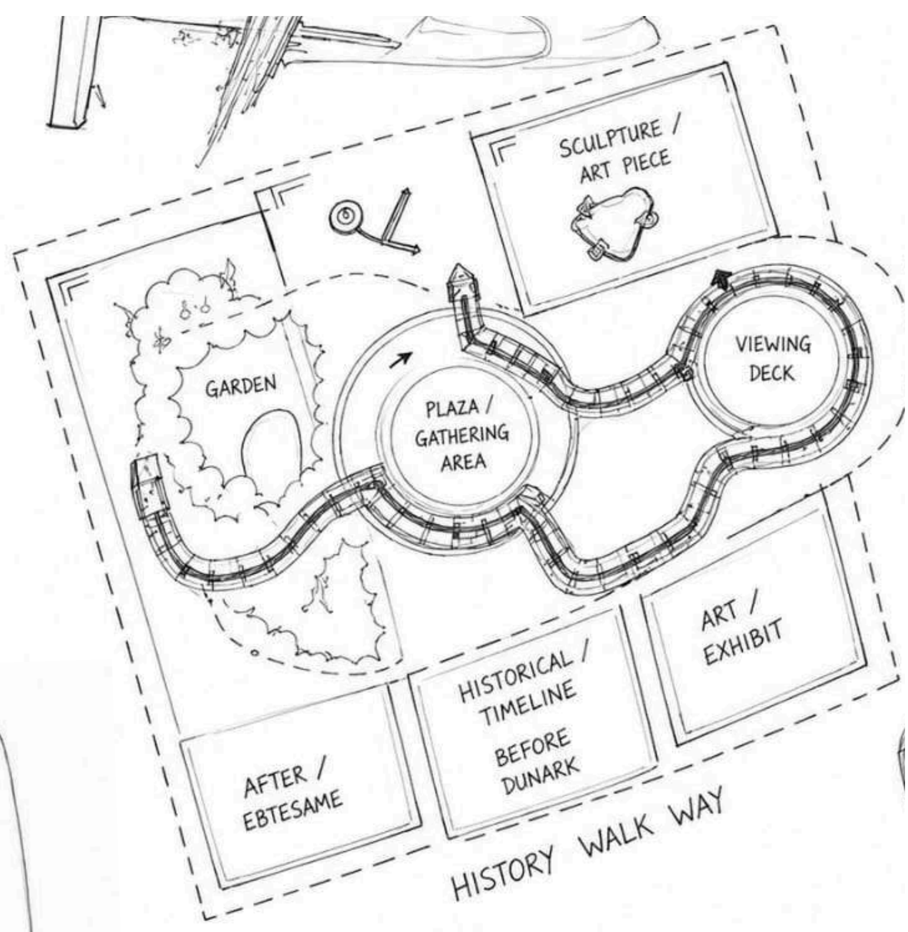
The history railway is designed to connect the main components of the Limestone Edutourism and Interpretation Centre. It allows visitors to move between buildings while experiencing the project from an elevated level.

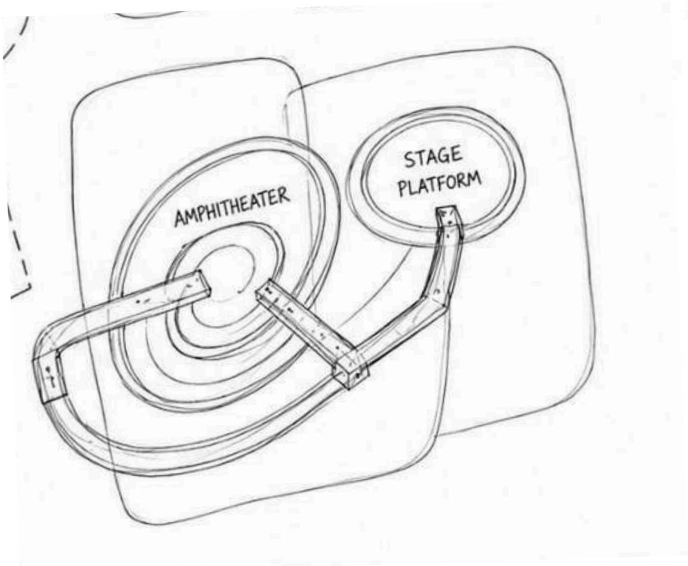
Its main function is to improve circulation across the site, especially because the project consists of several different buildings and zones. The railway helps reduce walking distance and creates a continuous journey between the museum, workshop, manufacturing viewing area, restaurant tower, and outdoor landscape.

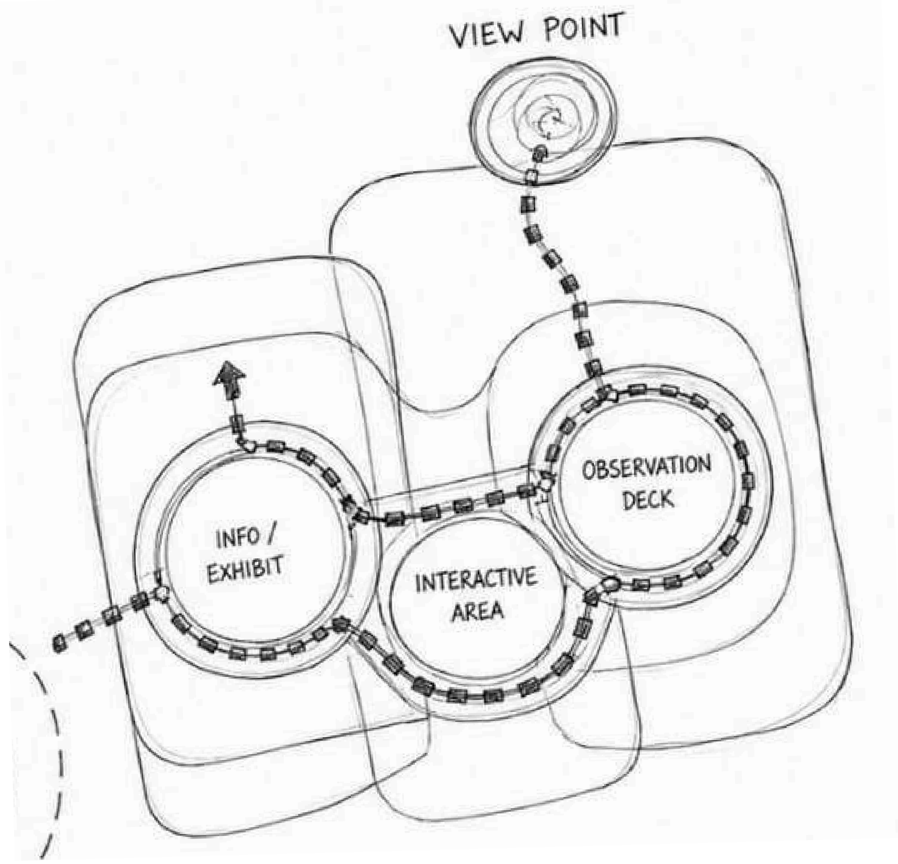
Beyond function, the railway also carries a narrative meaning. It refers to the movement of limestone from quarry to processing area, storage, and distribution. In this project, the railway transforms that industrial transport idea into an educational visitor experience.

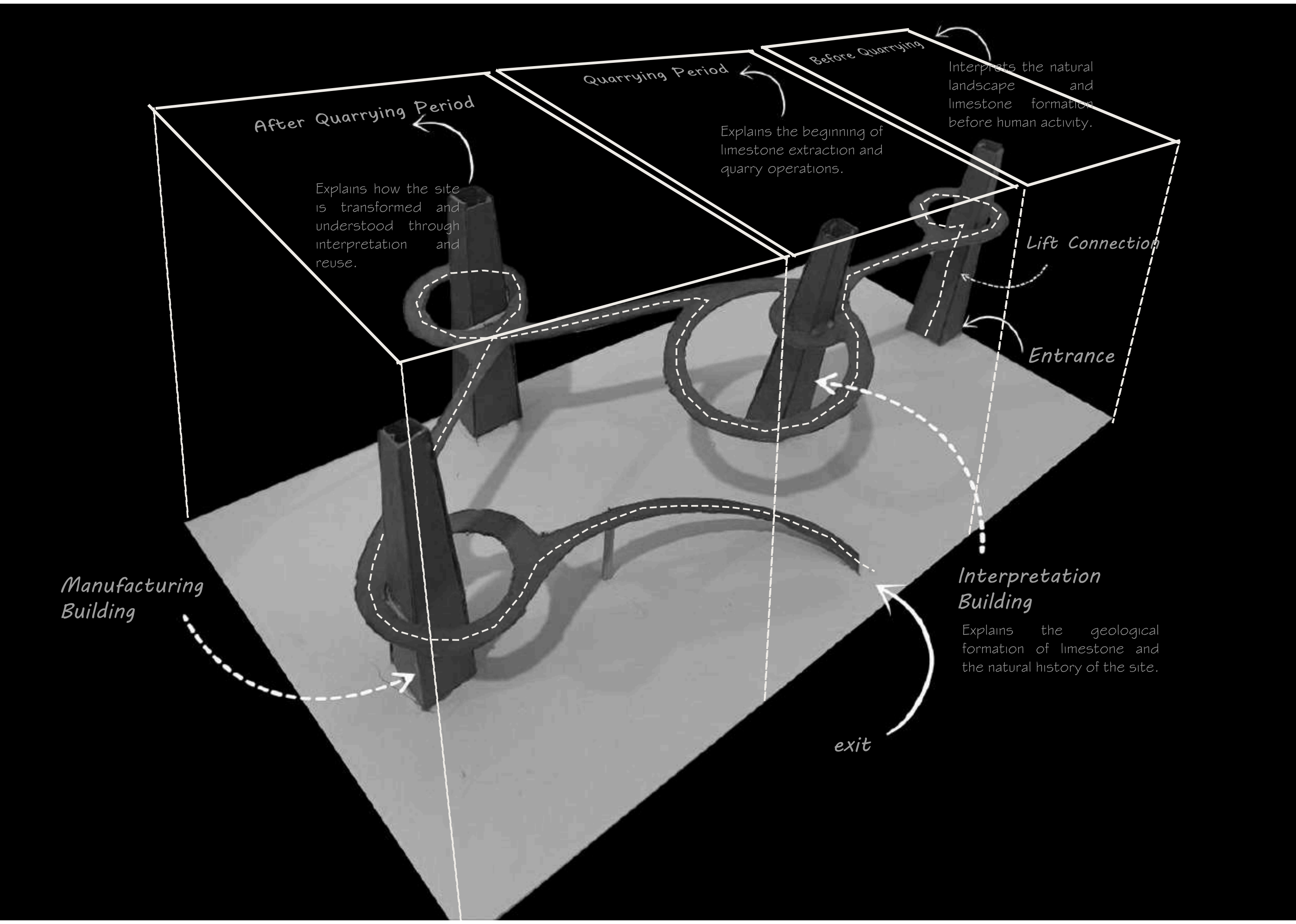
The elevated position also allows visitors to understand the site from a different perspective. They can see the relationship between the buildings, landscape, mountain edge, and industrial process below.




SCULPTURE / ART PIECE
GARDEN
PLAZA / GATHERING AREA
VIEWING DECK
HISTORICAL / TIMELINE
BEFORE DUNARK
ART / EXHIBIT
AFTER / EBTESAME
HISTORY WALK WAY


STAGE PLATFORM
AMPHITHEATER


VIEW POINT
OBSERVATION DECK
INFO / EXHIBIT
INTERACTIVE AREA



After Quarrying Period
Explains how the site is transformed and understood through interpretation and reuse.
Quarrying Period
Explains the beginning of limestone extraction and quarry operations.
Before Quarrying
Interprets the natural landscape and limestone formation before human activity.
Lift Connection
Entrance
Manufacturing Building
Interpretation Building
Explains the geological formation of limestone and the natural history of the site.
exit

8.2 Design Inspiration

The design inspiration of the history railway comes from quarry transportation systems, mining tracks, and industrial movement. In quarrying, materials are transported from one stage to another, from extraction to crushing, screening, storage, and dispatch.

This idea is translated into the project as a visitor journey. Instead of carrying only stone, the railway carries people through the story of limestone.

The railway also represents the connection between the past and present. It reminds visitors of industrial movement and quarry history, while being used in a contemporary edutourism project.

Symbolically, the railway shows that the limestone process is not one fixed moment. It is a continuous cycle: formation, extraction, processing, reuse, learning, and memory.

8.3 Structural Design and Materials

The structural design of the history railway combines industrial strength with lightweight visitor experience. The structure should feel connected to quarry machinery, bridges, and mining infrastructure.

The main materials that used:

- **Steel Structure**

Steel is used for the main frame, columns, beams, and rail support. It gives the railway an industrial character and provides strong structural stability.

- **Concrete Supports**

Concrete is used for foundations, vertical supports, and connection points. It gives the structure a grounded feeling and relates to the heavy nature of limestone and quarrying.

- **Glass or Open Guardrails**

Transparent or semi-open guardrails allow visitors to view the site, museum spaces, factory areas, and landscape while moving along the railway.

- **Metal Decking / Floor Panels**

The walking or track base can use metal decking or durable floor panels to express an industrial atmosphere.

- **Limestone-Textured Elements**

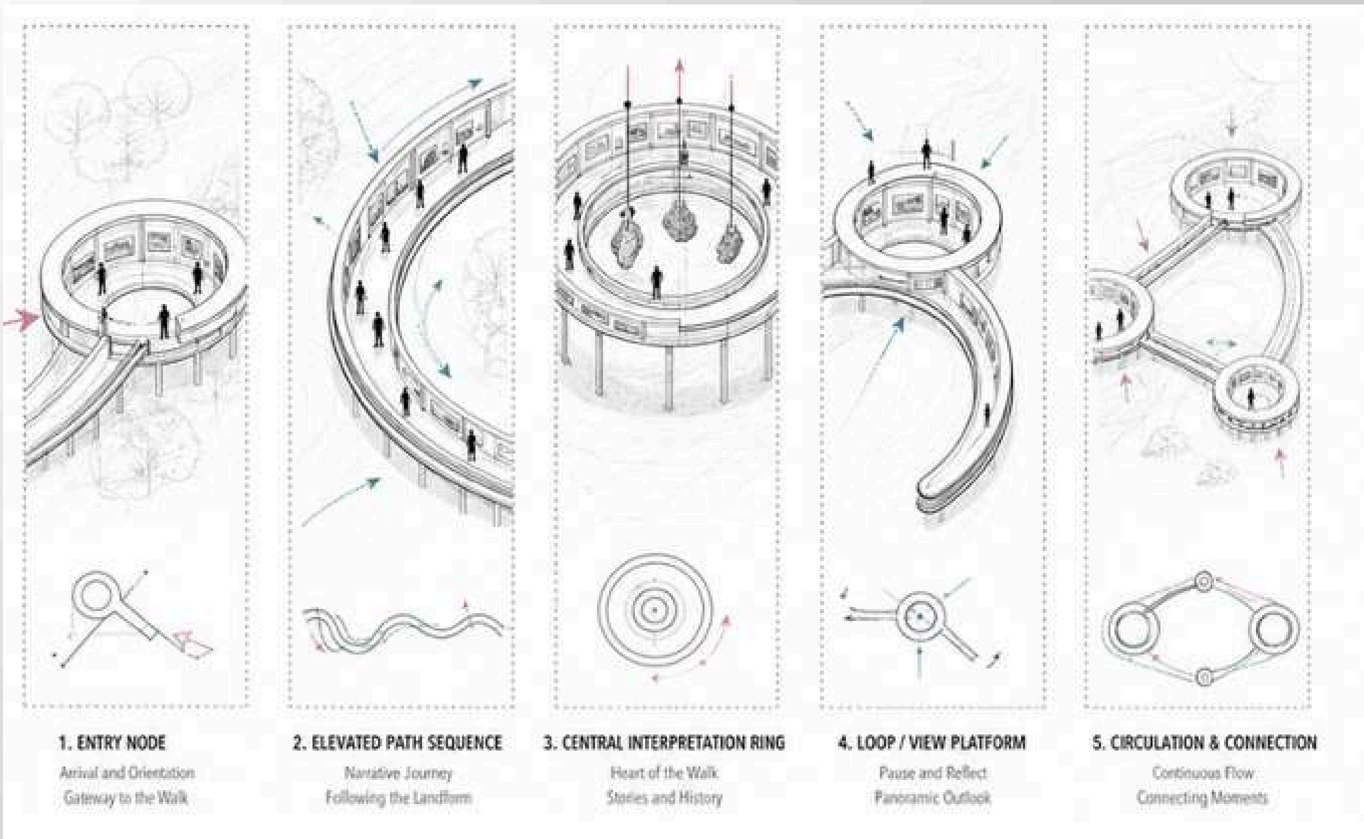
Selected walls, station points, or platform edges can use limestone texture to connect the railway back to the project’s geological identity.

This material combination supports the concept of the project: industrial memory, geological identity, and public learning.

8.3.1 Why These Materials?

- The materials were chosen based on strength, safety, meaning, and relationship to the project concept.
- Steel was chosen because it reflects industrial architecture and quarry machinery. It is suitable for long-span connections and elevated structures.
- Concrete was selected for its durability and heavy character. It also relates to construction and limestone-based material culture.
- Glass or open guardrails allow visual connection between visitors and the surrounding spaces. This is important because the railway is not only for movement, but also for observation.
- Metal decking strengthens the industrial feeling of the railway and supports the idea of transport, machinery, and process.
- Limestone-textured surfaces connect the railway to the local site identity and prevent it from feeling like a generic bridge.

Together, these materials make the railway functional, safe, and conceptually connected to the limestone narrative.



8.4 Exploded Axonometric or Detail

The exploded axonometric of the history railway can be explained in layers:

1. Foundation and Support Layer

This is the lowest layer, consisting of concrete foundations, base plates, and vertical support columns. It carries the full railway structure and transfers loads safely to the ground.

2. Main Steel Frame Layer

This layer includes the primary beams and structural frame. It forms the main spine of the railway and supports the movement path.

3. Track / Floor Deck Layer

This is the surface where visitors move. It can include railway track expression, metal decking, or a safe walking platform depending on the final design.

4. Guardrail and Safety Layer

This layer includes glass panels, metal railings, or mesh screens. It protects users while keeping visual connection to the site.

5. Canopy / Shading Layer

A lightweight roof or partial canopy provides shade and rain protection. Its form can follow the language of limestone layering or industrial track covers.

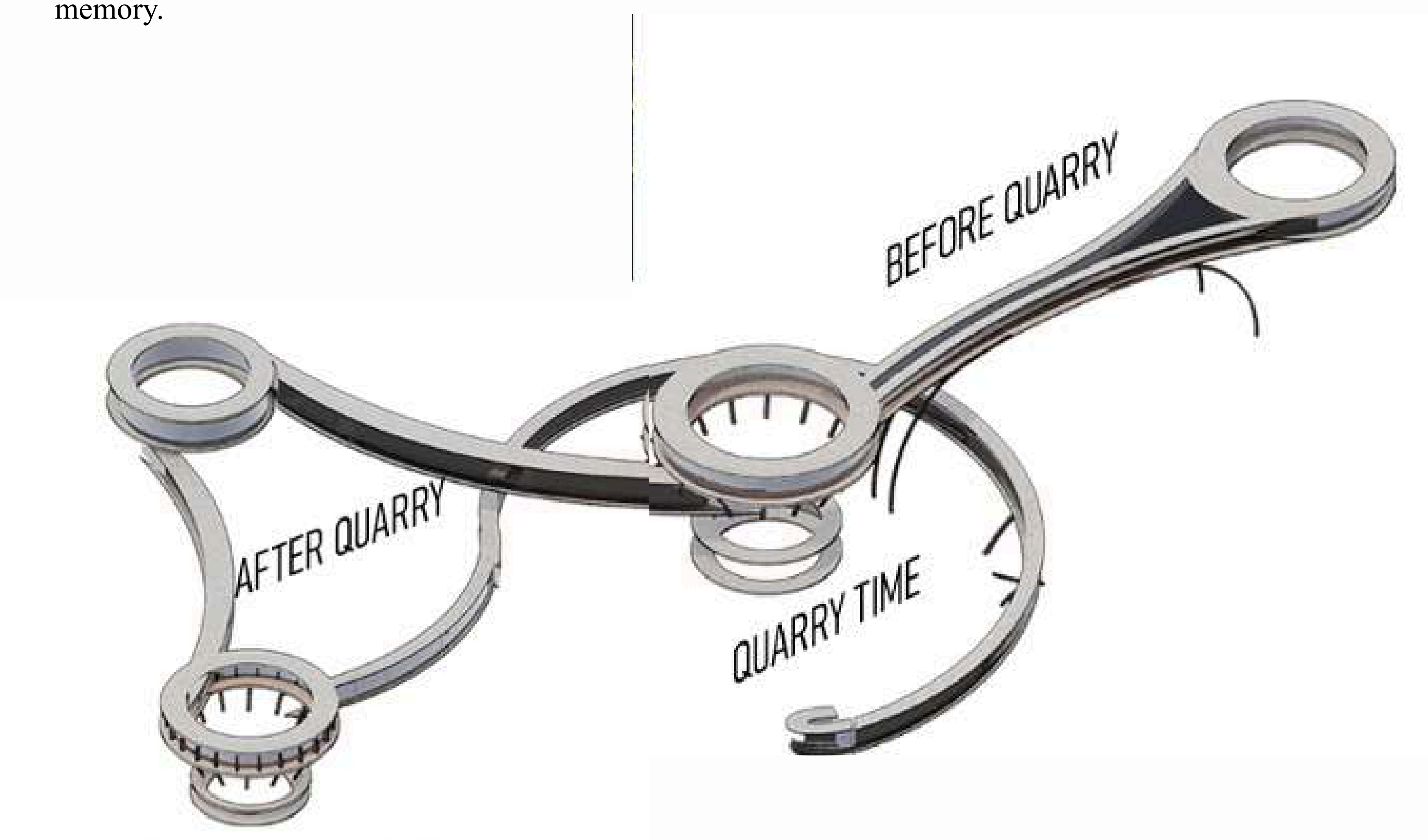
6. Station / Pitstop Layer

Small stopping points are placed along the railway. These can function as interpretation stations, viewing decks, or rest points where visitors learn about quarrying stages.

7. Lighting and Signage Layer

The top or side layer includes lighting, wayfinding, and educational panels. These help guide visitors and explain the limestone process during the journey.

The exploded view should show that the railway is not only a transport system. It is a layered architectural element that combines structure, movement, safety, interpretation, and industrial memory.



Chapter 9

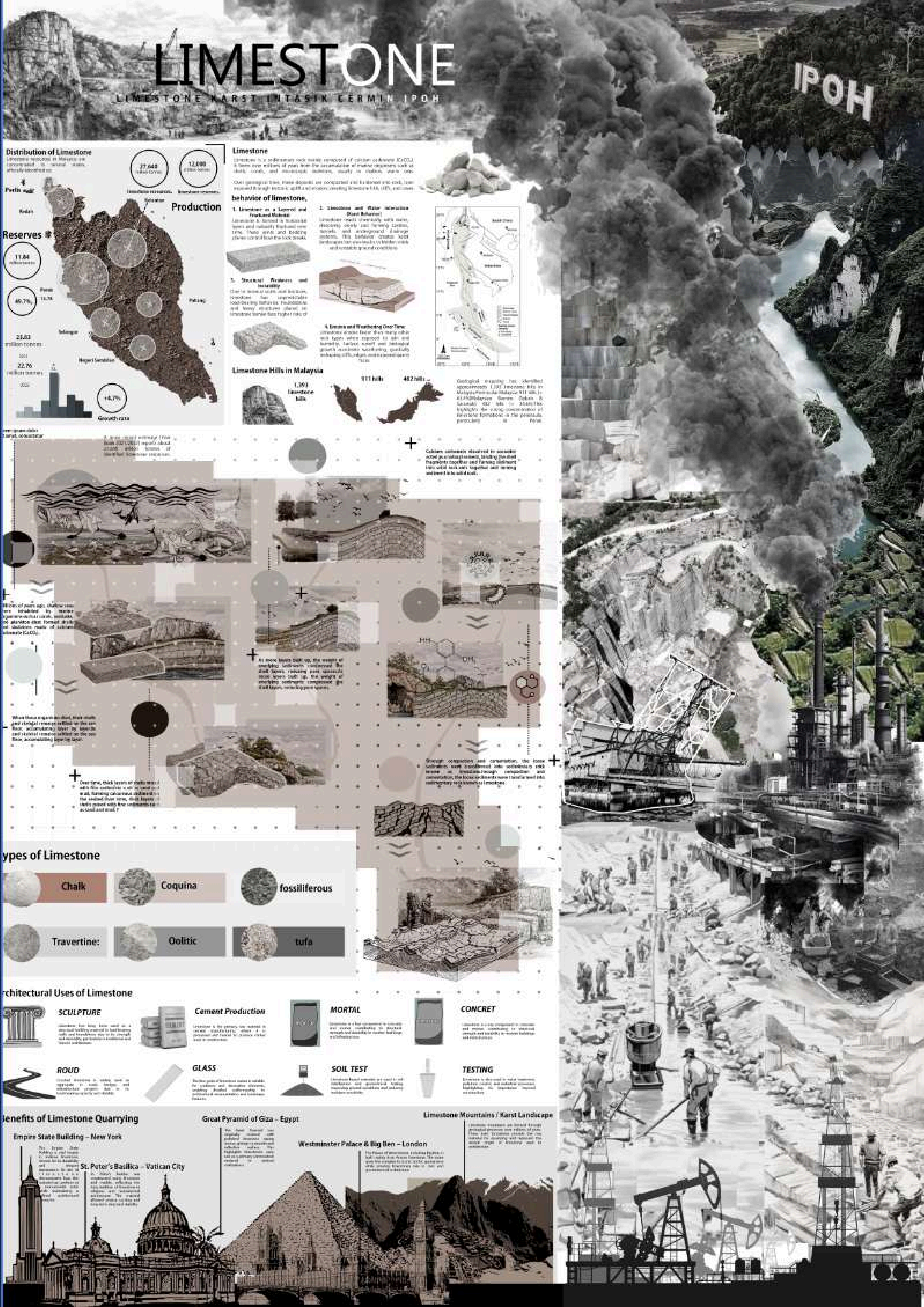
Additional Information

Chapter nine: Additional Information

This chapter compiles key information from the presentation boards to support the written design journey. It explains the main project issue, target users, planning framework, circulation, fire safety, exploded axonometric, façade design, and the overall design narrative.
Similar to the reference report, this chapter is arranged into presentation strips that summarize the important visual and technical information of the project.

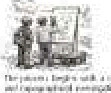
9.1 Strip 1: Limestone Interpretation

The first presentation strip introduces limestone as the main foundation of the project. The project does not treat limestone only as a construction material but as a complete architectural subject that connects geology, industry, heritage, tourism, and education. Since the project is located near Tasik Cermin and Gunung Rapat in Ipoh, limestone becomes a very relevant topic because it forms the physical identity of the surrounding landscape. The limestone hills, caves, cliffs, hidden lake, and karst formations give the site a strong natural character and make limestone the most suitable material and narrative driver for the project.
This strip explains the importance of limestone through several layers. First, limestone has geological value because it forms over long periods of time through natural sedimentation, compression, and chemical processes. Over time, water erosion and dissolution create caves, voids, tunnels, and irregular rock formations. These geological characteristics inspire the architectural language of the project, especially the ideas of layering, carving, cutting, excavation, and void-making. The central quarry hole, basement spaces, cave-like circulation, and layered exhibition zones are all derived from this geological understanding.
Second, the strip presents limestone as an industrial resource. Limestone is widely used in construction, cement production, lime, aggregate, powder, and other building-related products. This industrial role is important because quarrying has shaped many parts of Ipoh and Perak. However, quarrying also produces environmental issues such as dust, noise, waste, vibration, and visual scars on the landscape. Because of this, the project does not celebrate quarrying blindly. Instead, it uses quarrying as a subject for interpretation, allowing visitors to understand both its value and its impact.
The strip also explains the limestone process as a design generator. The process begins with geological formation and continues through exploration, extraction, crushing, screening, storage, manufacturing, and reuse. These stages are translated into the visitor journey. Instead of showing the process only through text panels, the project turns it into a spatial experience. Visitors move through exhibitions, ramps, voids, workshops, and viewing areas that explain how limestone is formed, extracted, processed, and reused. This makes the museum more active and immersive.
Finally, this strip establishes the main conceptual direction of the project: from exploitation to interpretation. The project transforms limestone from something extracted from the land into something explained, experienced, and understood by the public. This creates a stronger educational purpose for the architecture. Limestone becomes the core story of the building, and the building becomes a tool to reveal the hidden relationship between natural formation, industrial activity, environmental responsibility, and cultural identity.



LIMESTONE
LIMESTONE KARST INTASIK CERMIN IPOH
IPOH
Distribution of Limestone
Production
Reserves
Growth rate
Limestone
behavior of limestone,
Limestone Hills in Malaysia
911 hills
1,393 limestone hills
Types of Limestone
Chalk
Coquina
fossiliferous
Travertine:
Oolitic
tufa
Architectural Uses of Limestone
SCULPTURE
Cement Production
MORTAL
CONCRET
ROUD
GLASS
SOIL TEST
TESTING
Benefits of Limestone Quarrying
Empire State Building – New York
Great Pyramid of Giza – Egypt
St. Peter's Basilica – Vatican City
Westminster Palace & Big Ben – London
Limestone Mountains / Karst Landscape

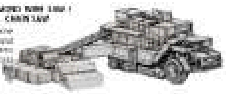
LIMESTONE QUARRYING PROCESS



EXOLRATION

EXTRACTION

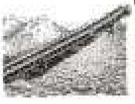
3. SAWING / CUTTING



4. PRIMARY CRUSHING

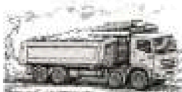
5. SECONDARY CRUSHING

6. SCREENING



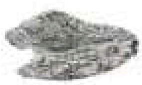
7. STORING

8. TRANSPORT

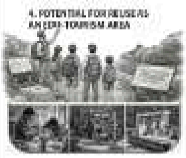


ADVANTAGES

01

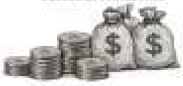


02



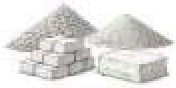
03

1. ECONOMIC CONTRIBUTION



2. SUPPLY OF MULTI-PURPOSE CONSTRUCTION MATERIAL

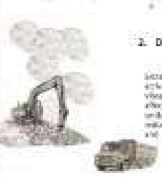
04



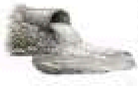
DISADVANTAGES

1. LOSS OF BIODIVERSITY

2. DUST, NOISE, AND VIBRATION POLLUTION



3. IMPACT ON WATER SYSTEMS



4. LANDSCAPE DEGRADATION

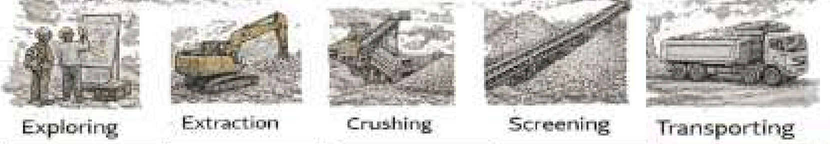
where and how many

60% Malaysia's limestone quarries

42 limestone quarries

Perak

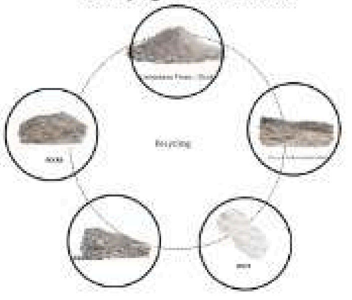
48.1% national limestone production



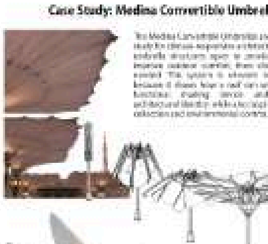
Gunung Rapat	Gunung Terundum (Terendum)	Gunung Lanno (Batu Gajah)	Kanthan Quarry (Chemor)	Gunung Lanno (Batu Gajah)
	– active limestone extraction	– major limestone hill with quarry activity	– large-scale limestone quarry linked to cement production	– major limestone hill with quarry activity

Limestone Quarry Areas near Ipo

Quarrying Waste Generation

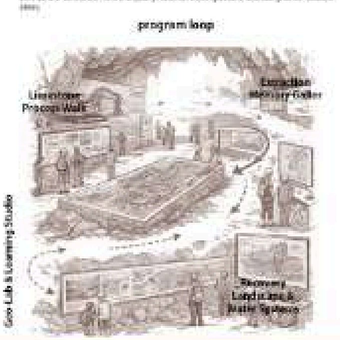


Case Study: Medina Convertible Umbrellas

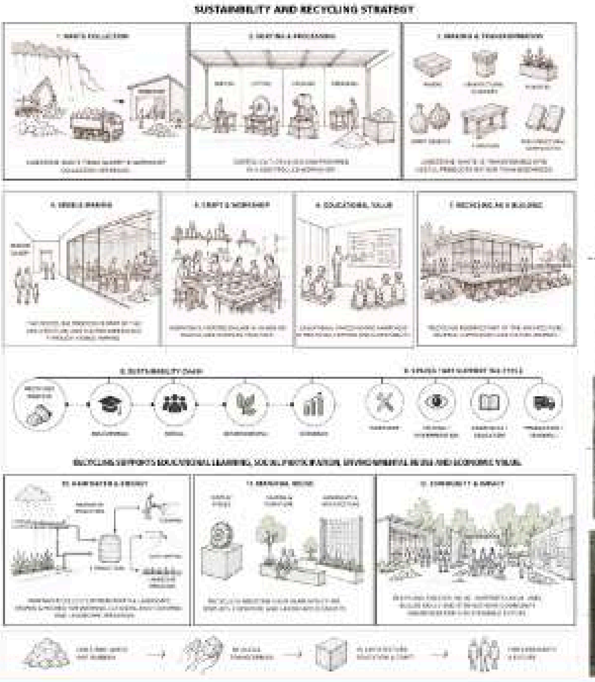


Zayed National Museum / Foster + Partners

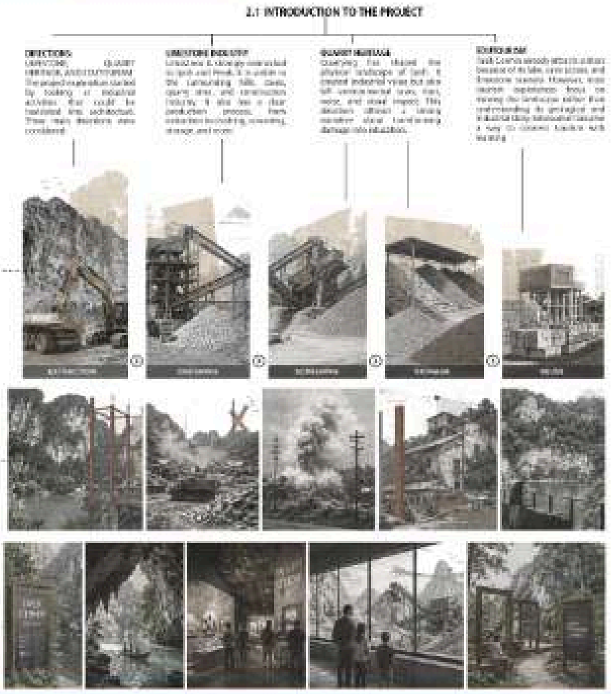
program loop



SUSTAINABILITY AND RECYCLING STRATEGY

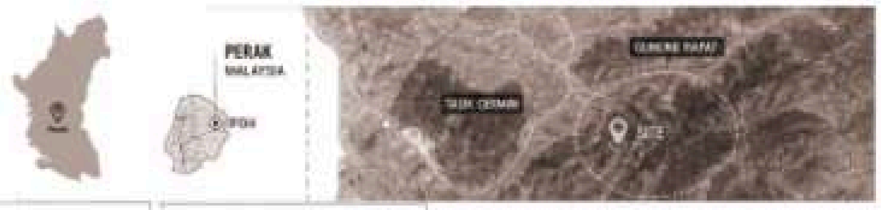


2.1 INTRODUCTION TO THE PROJECT



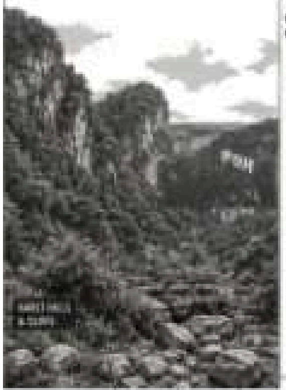
SITE ANALYSIS

TASIK CERMIN, GUNUNG RAPAT, IPOH, PERAK



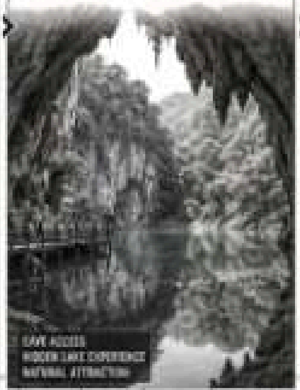
LIMESTONE LANDSCAPE

Surrounded by limestone hills and karst formations, giving the site a strong geological identity.



02 TOURISM CONTEXT

Tasik Cermin is known for its cave access, hidden lake experience, and mirror-like water reflection.

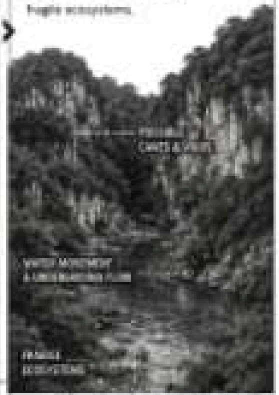


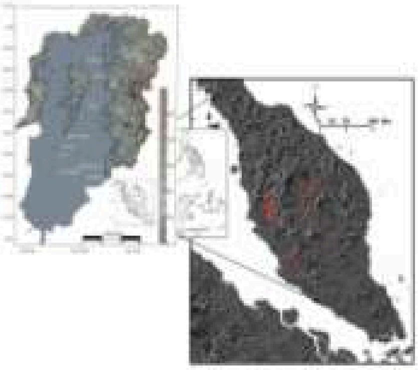
03 INDUSTRIAL MEMORY

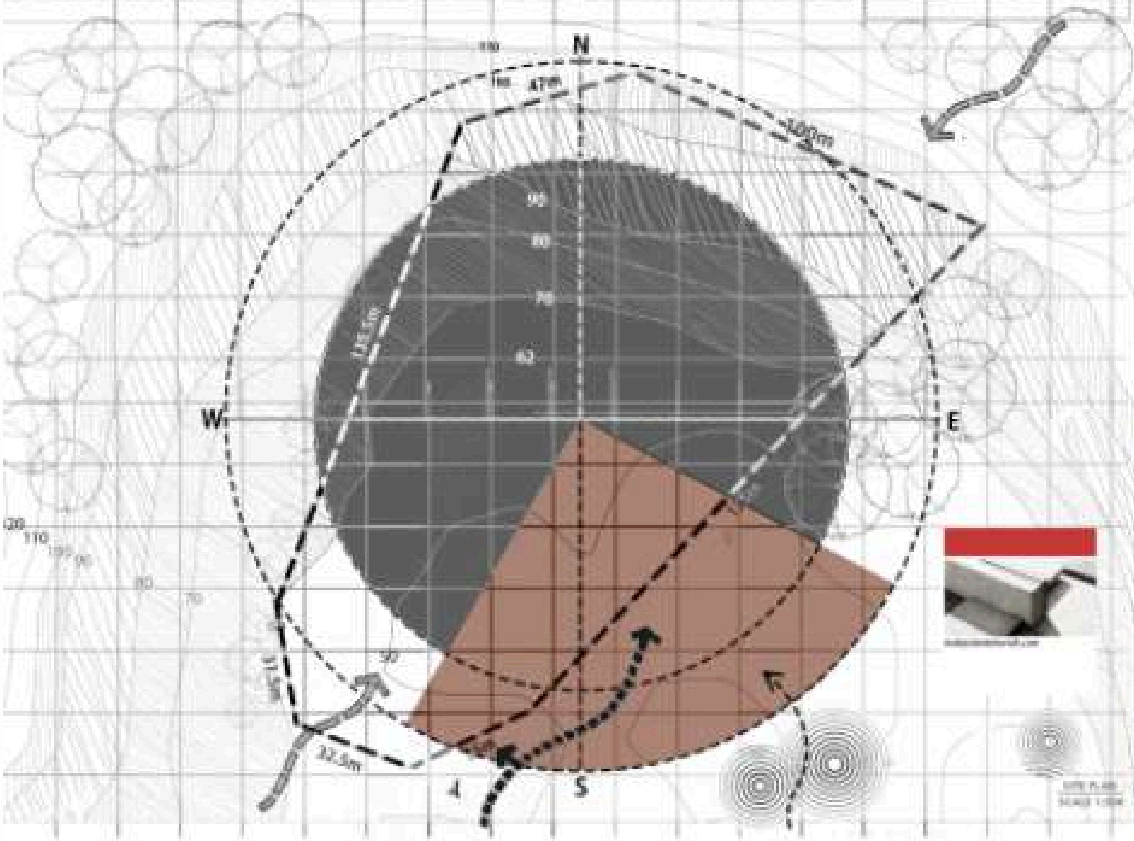
The surrounding area has a strong relationship with quarrying and limestone extraction.

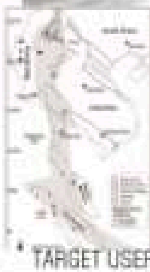
04 ENVIRONMENTAL SENSITIVITY

The karst landscape requires careful design due to caves, underground voids, water movement, and fragile ecosystems.

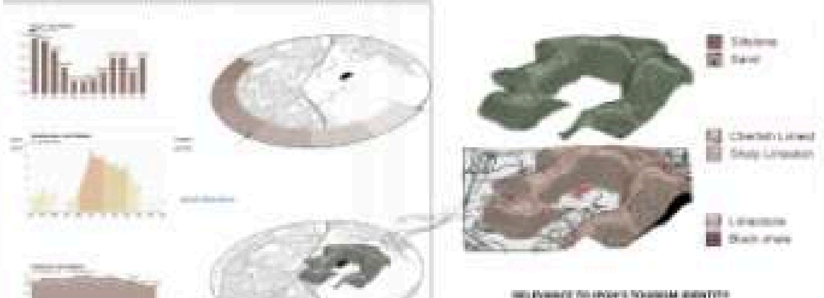




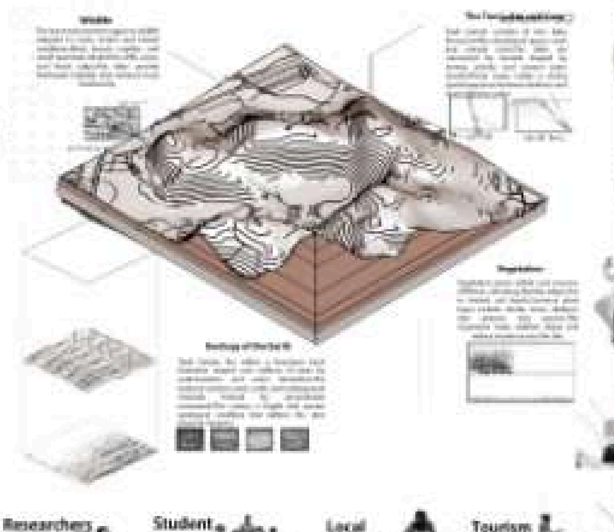


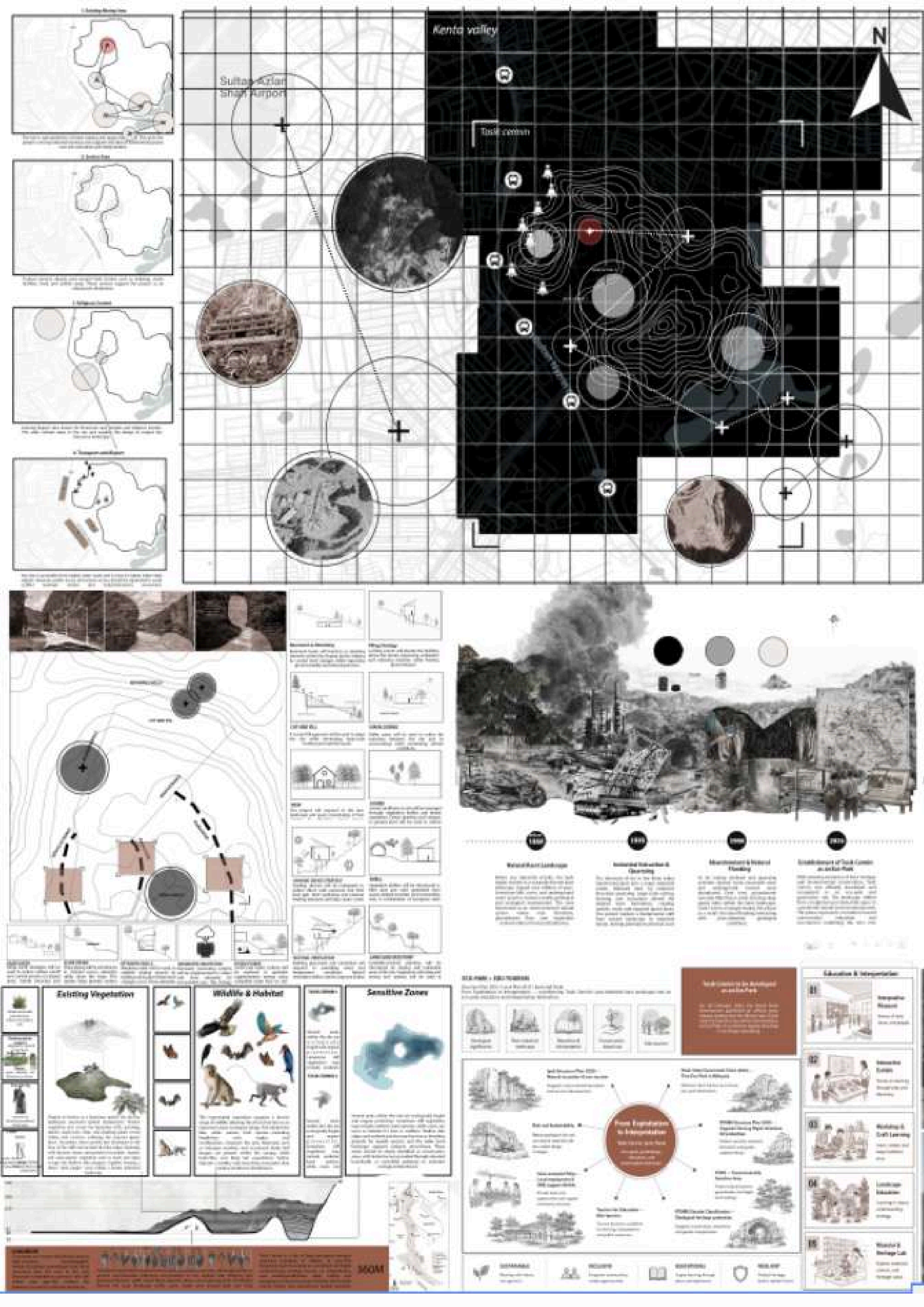


TARGET USER



RELEVANCE TO IPOH'S TOURISM IDENTITY

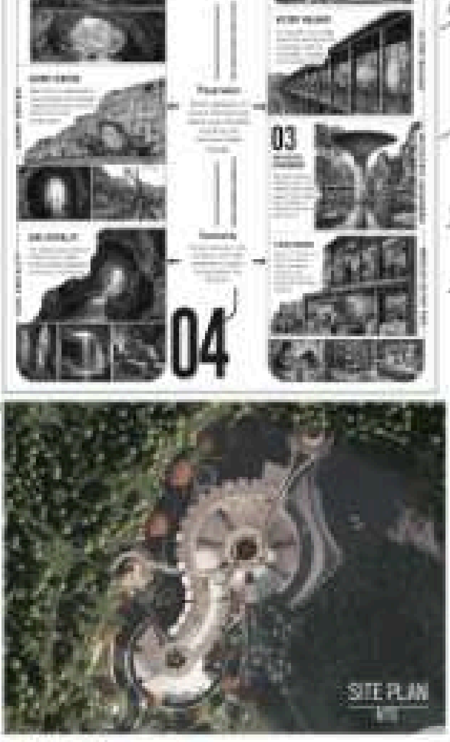




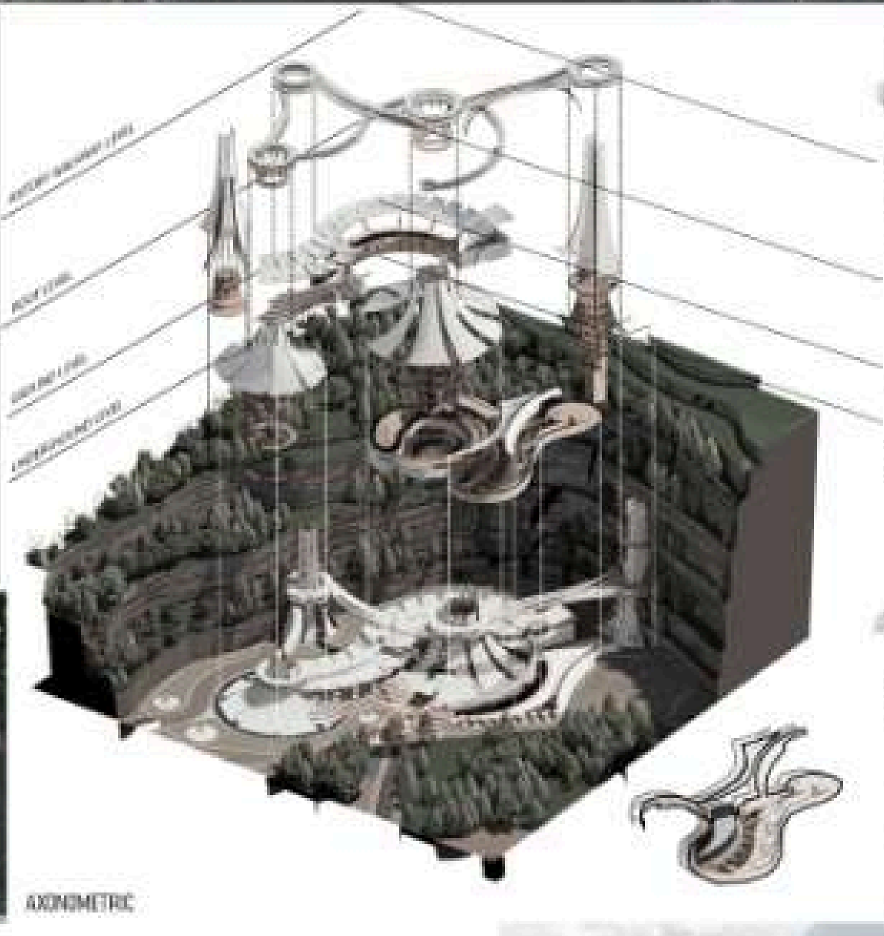
Kenta valley
N
Sultan Azlan Shah Airport
Existing Vegetation
Wildlife & Habitat
Sensitive Zones
Natural Karst Landscape
Industrial Extraction & Quarrying
Abandonment & Natural Flooding
Establishment of Tasik Cermin as an Eco-Park
From Exploitation to Interpretation
Education & Interpretation
Interpretive Museum
Interactive Exhibits
Workshop & Craft Learning
Landscape Education
Material & Heritage Lab
560M

KARST REBORN
BETWEEN KARST, QUARRY HERITAGE & EDUTOURISM

RESPECT
RETROFIT
REFLECT
01
02
03
04

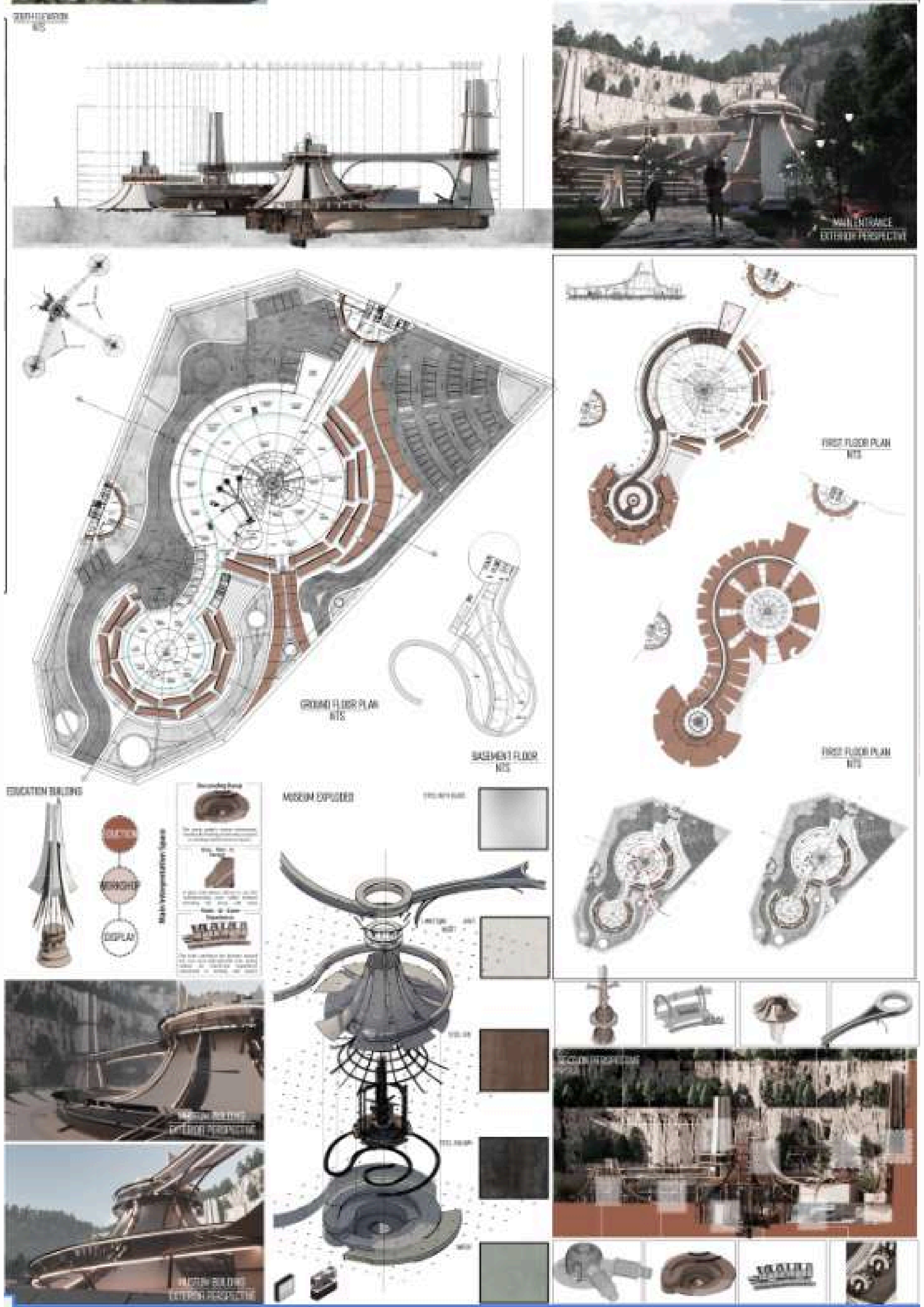


SITE PLAN



AXONOMETRIC

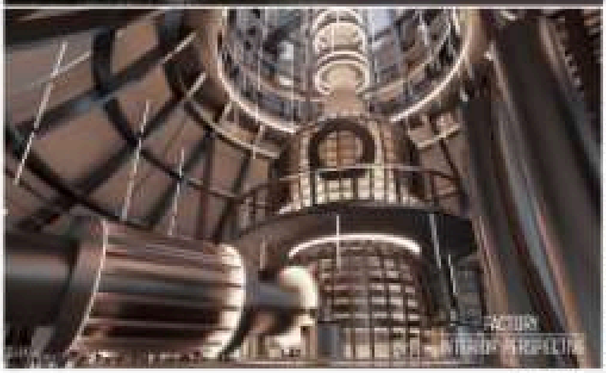
HISTORY WALKWAY
RECYCLING BUILDING
RESTAURANT BUILDING
FACTORY BUILDING


SOUTH ELEVATION
NTS
MAIN ENTRANCE
EXTERIOR PERSPECTIVE
FIRST FLOOR PLAN
NTS
GROUND FLOOR PLAN
NTS
BASEMENT FLOOR
NTS
FIRST FLOOR PLAN
NTS
EDUCATION BUILDING
WORKSHOP
DISPLAY
MUSEUM EXPLODED
EXTERIOR PERSPECTIVE
EXTERIOR PERSPECTIVE

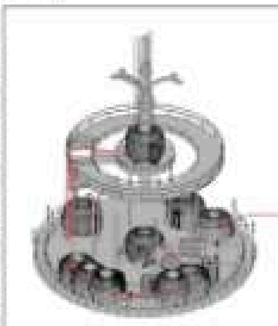

HISTORY WALKWAY
EXTERIOR PERSPECTIVE

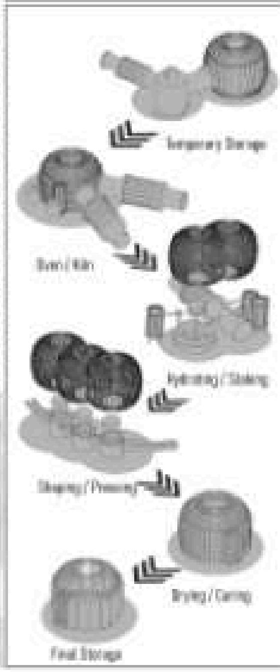

MANUFACTURING ZONE
FACTORY AREA
RECYCLING AREA


SERVICE ROAD
EXTERIOR PERSPECTIVE

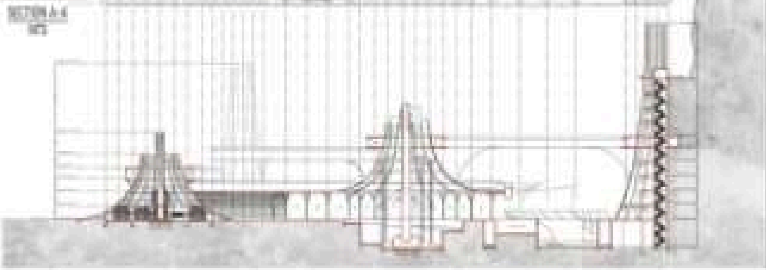

FACTORY
INTERIOR PERSPECTIVE

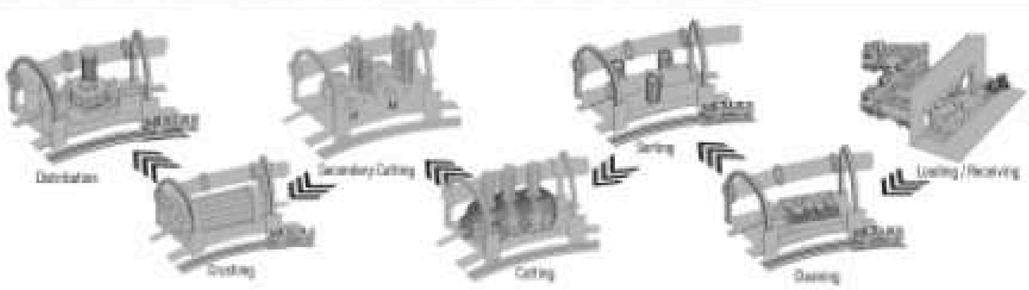

FACTORY AREA
STRUCTURE INSIDE THE FACTORY



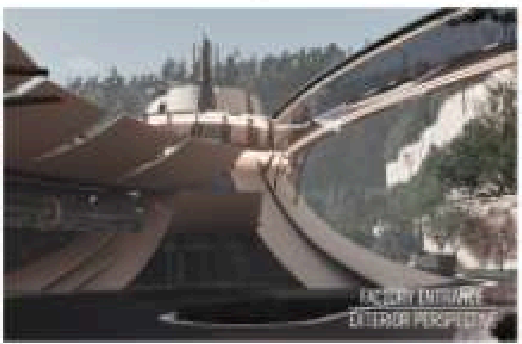

Temporary Storage
Oven / Kiln
Hydrating / Slaking
Shaping / Pressing
Drying / Curing
Final Storage

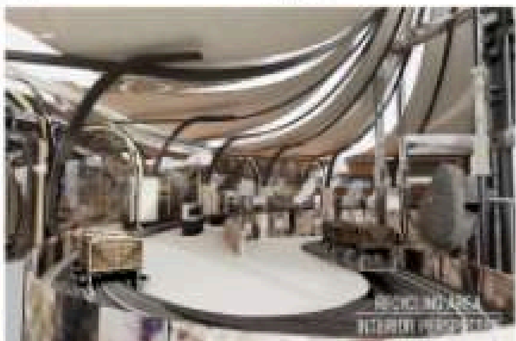

RECYCLING AREA


SECTION A-A

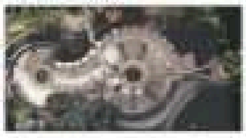

Distribution
Secondary Cutting
Sorting
Loading / Receiving
Crushing
Cutting
Cleaning

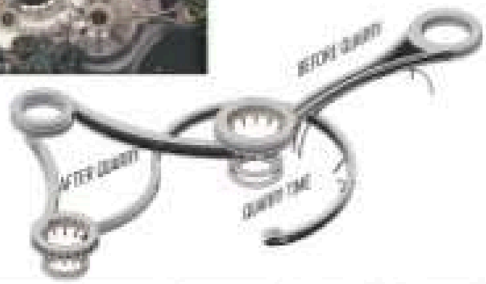

MAIN ENTRANCE
EXTERIOR PERSPECTIVE

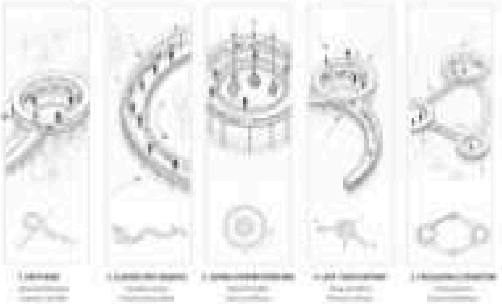

FACTORY ENTRANCE
EXTERIOR PERSPECTIVE

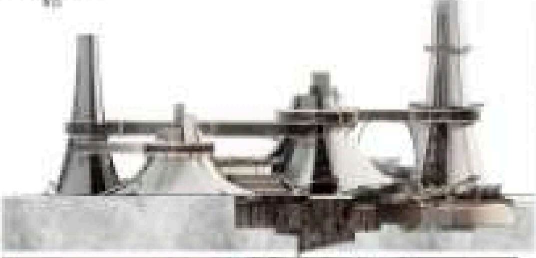

RECYCLING AREA
INTERIOR PERSPECTIVE

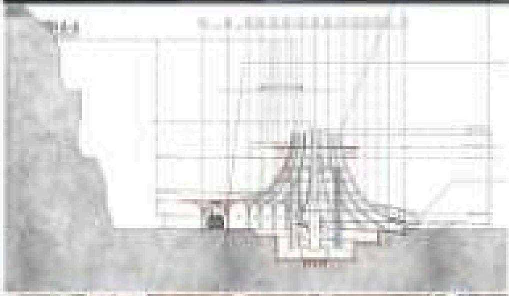
HISTORY WALKWAY



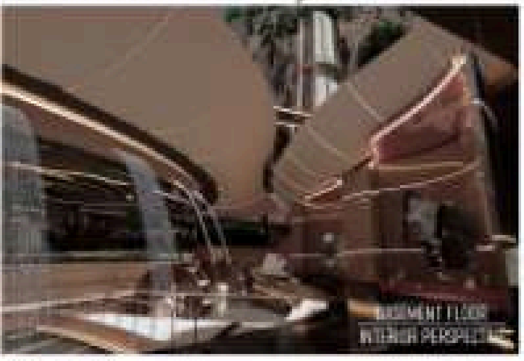


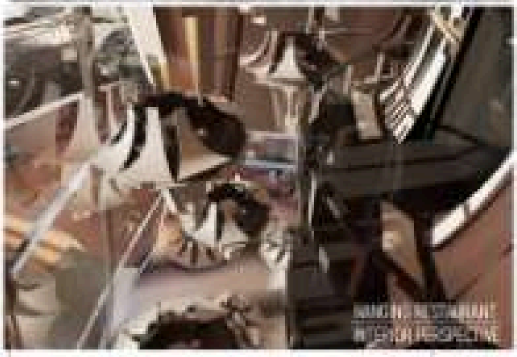






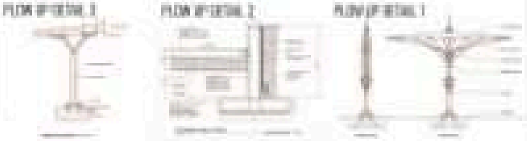
HANGING RESTAURANT

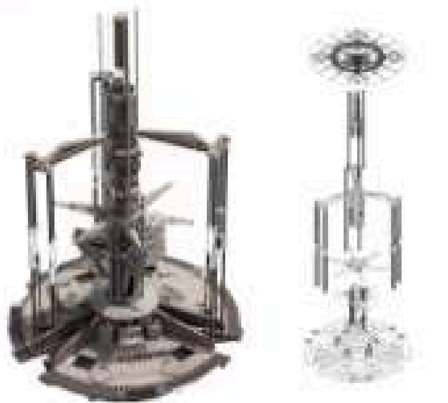




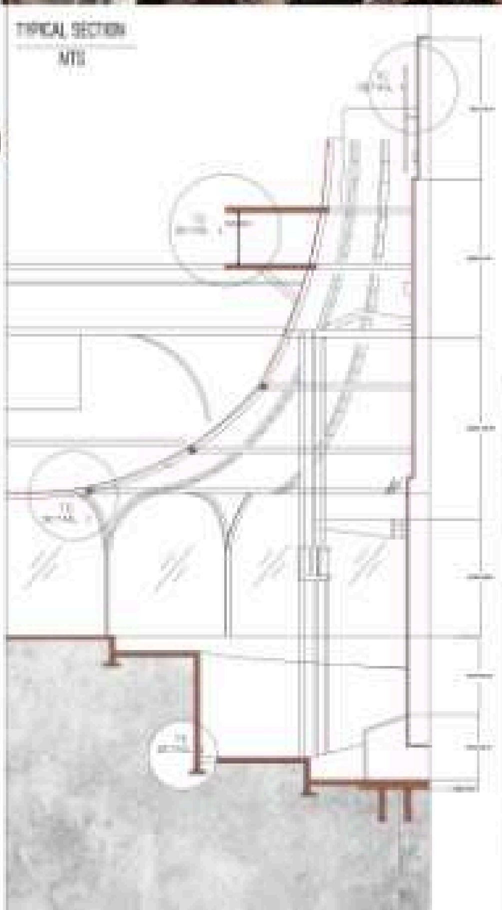
BASEMENT FLOOR

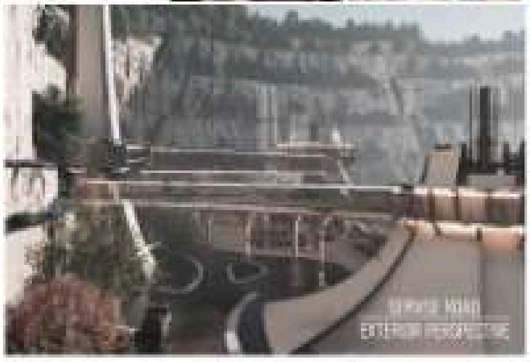
water wheel generator

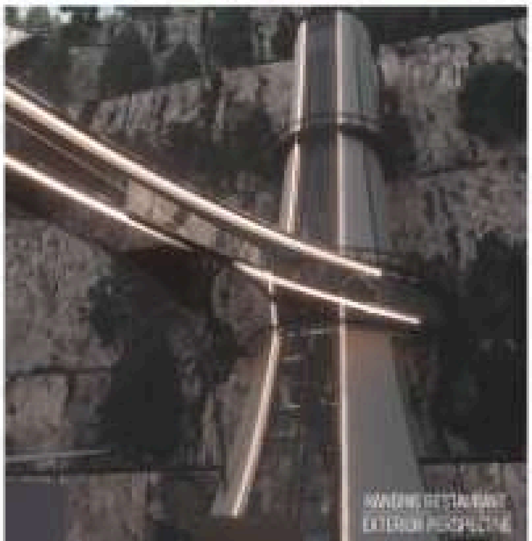




TYPICAL SECTION
NTS







Chapter 10

Reflection

Chapter ten: Reflection

This project was a valuable learning experience because it challenged me to connect industrial architecture with geology, tourism, environmental issues, and public education. The design process helped me understand that an industrial project should not only focus on machines and production, but also on how people experience, learn from, and safely interact with the process.

Through this project, I learned how limestone can become more than a construction material. It can become a source of architectural concept, spatial narrative, material strategy, and environmental awareness.

10.1 Challenges Faced

a) Difficulty in Combining Museum and Factory

One of the main challenges was combining public museum spaces with manufacturing areas. The project needed to allow visitors to observe the production process, but also keep them safe from dust, noise, machines, and service movement.

b) Circulation and Zoning Confusion

It was challenging to separate public, staff, service, and emergency circulation clearly. Since the project includes museum, factory, restaurant, railway, and outdoor spaces, the movement system needed to be carefully organized.

c) Translating Limestone into Architecture

Another challenge was translating limestone, quarrying, and mountain character into architectural form without making the design look forced or only decorative.

10.2 How I Overcame Them

a) Clear Separation Between Public and Factory Zones

I solved the museum and factory relationship by using controlled viewing areas, glass separation, and clear zoning. This allowed visitors to understand the manufacturing process without entering dangerous production spaces.

b) Improving Circulation Strategy

The circulation was improved by separating the public entrance from the service entrance. Public users follow the museum and railway journey, while service vehicles use a different route for loading, waste handling, and maintenance.

c) Strengthening the Concept

The design became clearer when the concept of “From Exploitation to Interpretation” was used as the main guide. This helped connect the quarry hole, cave journey, limestone layering, factory viewing, and history railway into one architectural story.

10.3 What I Learned About Limestone, Ipoh, and Architecture

- **Limestone**

Through this project, I learned that limestone is not only a material used in construction. It is connected to geological formation, caves, mountains, quarrying, products, waste, and environmental impact. I also learned that limestone waste can be reused in more meaningful ways, such as craft, sculpture, and educational display.

- **Ipoh**

I gained a deeper understanding of Ipoh as a city shaped by mining, limestone hills, caves, tourism, and industrial history. The site at Tasik Cermin and Gunung Rapat showed me how natural beauty and industrial memory can exist together in one landscape.

- **Architecture**

In terms of architecture, I learned how a building can become a storytelling tool. Architecture can explain process, guide movement, control safety, and create awareness. This project taught me that strong design is not only about form, but about how concept, site, programme, structure, and experience work together.

10.4 Personal Growth as a Designer

As a designer, this project helped me become more confident in handling complex programmes. I learned how to work with a project that includes different functions such as museum, factory, workshop, restaurant, railway, service areas, and landscape.

I also learned the importance of making design decisions based on concept and site response. Instead of creating random forms, every part of the project needed to relate back to limestone, quarrying, or the visitor journey.

This project also improved my understanding of technical issues such as circulation, dust control, service access, structure, ventilation, and fire safety. These issues made the design more realistic and complete.

10.5 What I Would Do Differently or Improve

If I had more time, I would improve the technical development of the factory and environmental systems in more detail. The dust control, water recycling, slurry management, and mechanical ventilation could be studied further to make the industrial part stronger.

I would also develop the structural details of the central quarry hole and history railway more deeply, especially the connection between ring beams, ribs, columns, roof layers, and the mountain edge.

In terms of presentation, I would improve the diagrams to explain the visitor journey more clearly. The project has a strong story, but it needs clear drawings and graphics so the jury can understand it quickly.

Chapter 11

Conclusion

Chapter eleven: Conclusion

This project shows how architecture can transform an industrial subject into an educational and meaningful visitor experience. The Limestone Edutourism and Interpretation Centre is not designed only as a museum, but as a place where geology, quarrying, manufacturing, landscape, and tourism are connected together.

The main idea of the project is “From Exploitation to Interpretation.” It responds to the limestone landscape of Tasik Cermin and Gunung Rapat by changing the story of quarrying from extraction and damage into learning, awareness, craft, and reuse. Through this approach, the project gives new value to limestone as both a natural formation and an industrial material.

11.1 Summary of the Project’s Purpose and Design Journey

The purpose of this project is to create an edutourism centre that explains the limestone identity of Ipoh. The design introduces visitors to limestone formation, quarrying history, production process, environmental issues, and the potential reuse of limestone waste.

The design journey started with research on limestone and quarrying, then developed into a concept based on layering, carving, quarry holes, caves, and industrial transport. These ideas were translated into the main architectural components such as the central quarry hole, museum galleries, workshop spaces, manufacturing viewing area, restaurant tower, and history railway.

The project also responds to the site by respecting the limestone hill context, separating public and service circulation, controlling dust and noise, and using landscape buffers. The final design aims to create a clear journey where visitors can learn, observe, participate, and reflect.

11.2 Final Thoughts on Geological Heritage, Industrial Memory, and Architecture

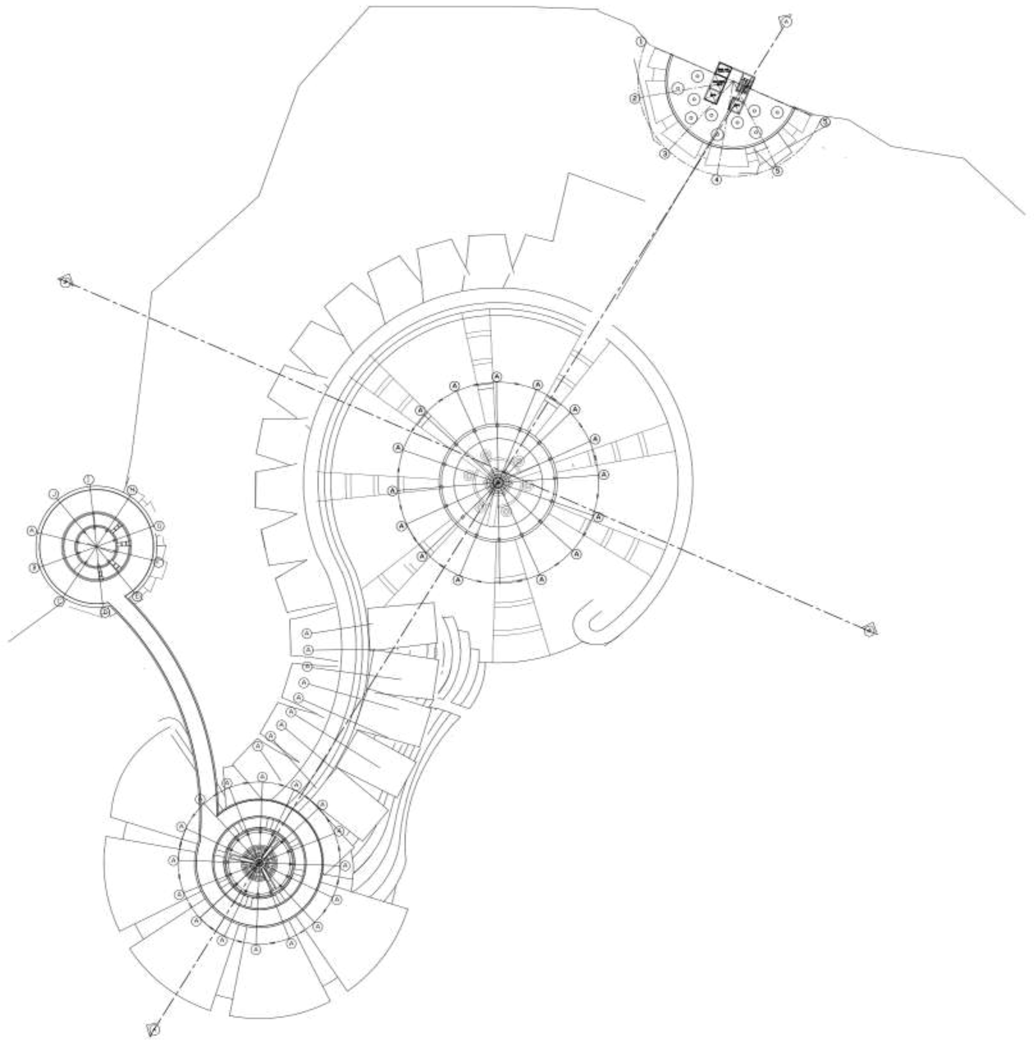
Architecture can play an important role in protecting and explaining geological heritage. Limestone landscapes are often appreciated for their beauty, but their deeper history, formation, industrial use, and environmental impact are not always understood by the public.

This project uses architecture as a tool to make those hidden stories visible. The central quarry hole represents extraction and depth. The cave-like spaces express geological formation and discovery. The factory viewing area shows the reality of production. The workshop spaces turn limestone waste into educational and creative outputs. The history railway connects the whole journey and represents industrial movement.

By combining education, tourism, production, and environmental awareness, the project creates a new way to experience limestone. It does not ignore the damage caused by quarrying, but it also does not reject the industry completely. Instead, it transforms the industrial memory into a learning platform.

In conclusion, the Limestone Edutourism and Interpretation Centre shows how architecture can reconnect people with landscape, material, and process. It becomes a place where visitors can understand the value of limestone, the history of quarrying, and the possibility of reuse and interpretation for the future.

Chapter 12



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

202601

DRAWING TITLE:

THIRD FLOOR

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHAHUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16

NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

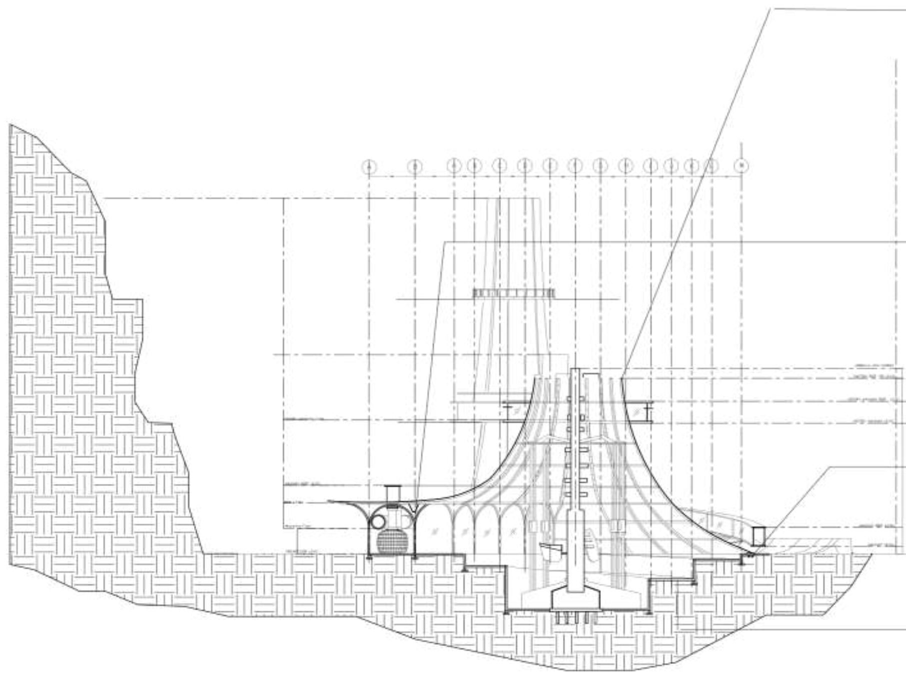
202601

DRAWING TITLE:

SITE PLAN

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:500
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



SECTION B-B

SCALE 1:300

NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS) (ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY HERITAGE
INTERPRETATION AND EDUTOURISM CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

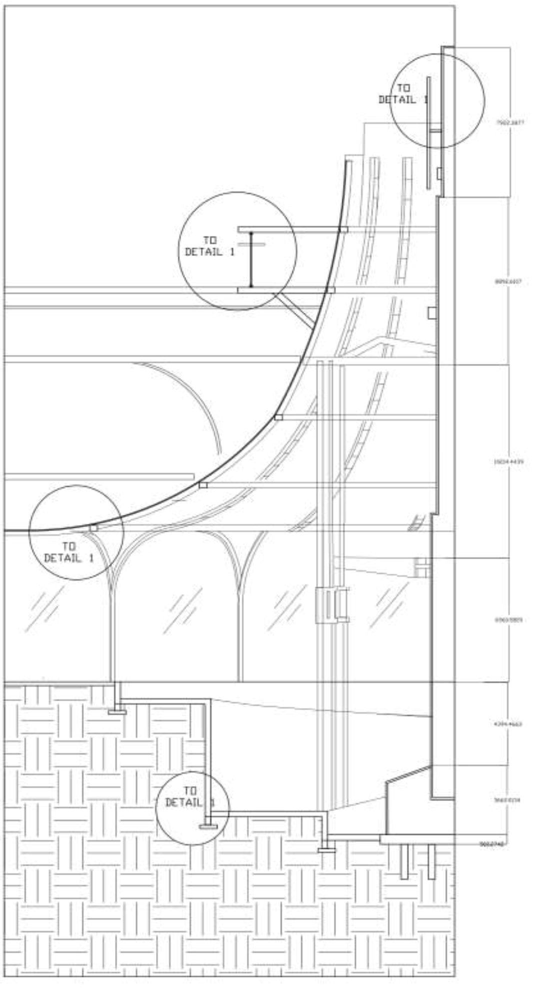
202601

DRAWING TITLE:

SECTION B-B

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202405010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	AS SHOWN
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984
DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

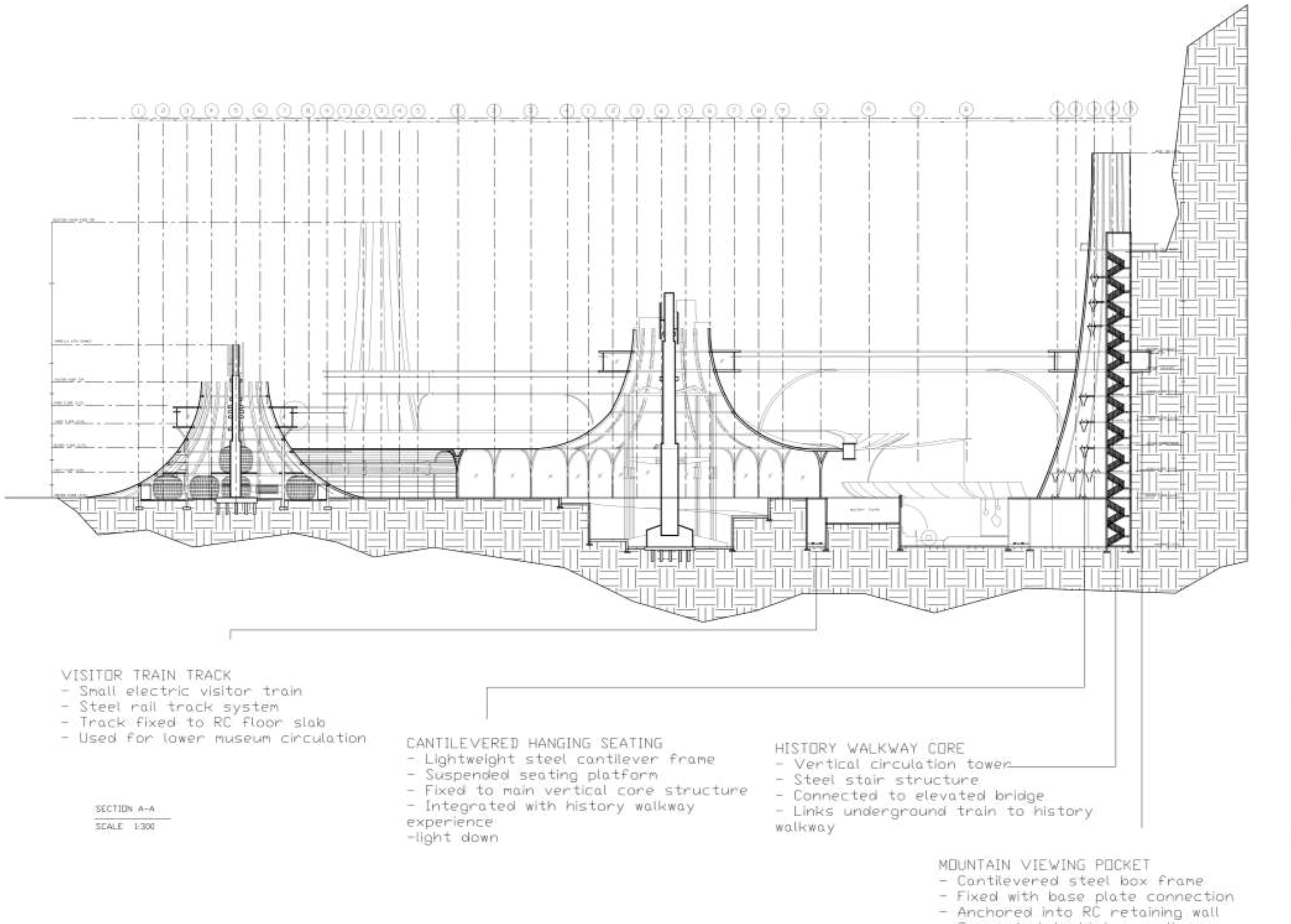
202601

DRAWING TITLE:

typecal section

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202405010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:100
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



VISITOR TRAIN TRACK
- Small electric visitor train
- Steel rail track system
- Track fixed to RC floor slab
- Used for lower museum circulation

CANTILEVERED HANGING SEATING
- Lightweight steel cantilever frame
- Suspended seating platform
- Fixed to main vertical core structure
- Integrated with history walkway experience
-light down

HISTORY WALKWAY CORE
- Vertical circulation tower
- Steel stair structure
- Connected to elevated bridge
- Links underground train to history walkway

MOUNTAIN VIEWING POCKET
- Cantilevered steel box frame
- Fixed with base plate connection
- Anchored into RC retaining wall
- Connected to history walkway core

SECTION A-A
SCALE 1:300

NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND BUILT ENVIRONMENT

COURSE:
STUDIO 5

PROGRAM:
BACHELOR OF SCIENCE IN (HONS) (ARCHITECTURAL DESIGN)

PROJECT:
PROPOSED LIMESTONE QUARRY HERITAGE
INTERPRETATION AND EDUTOURISM CENTRE
AT TASIK CERMIN, IPOH, PERAK

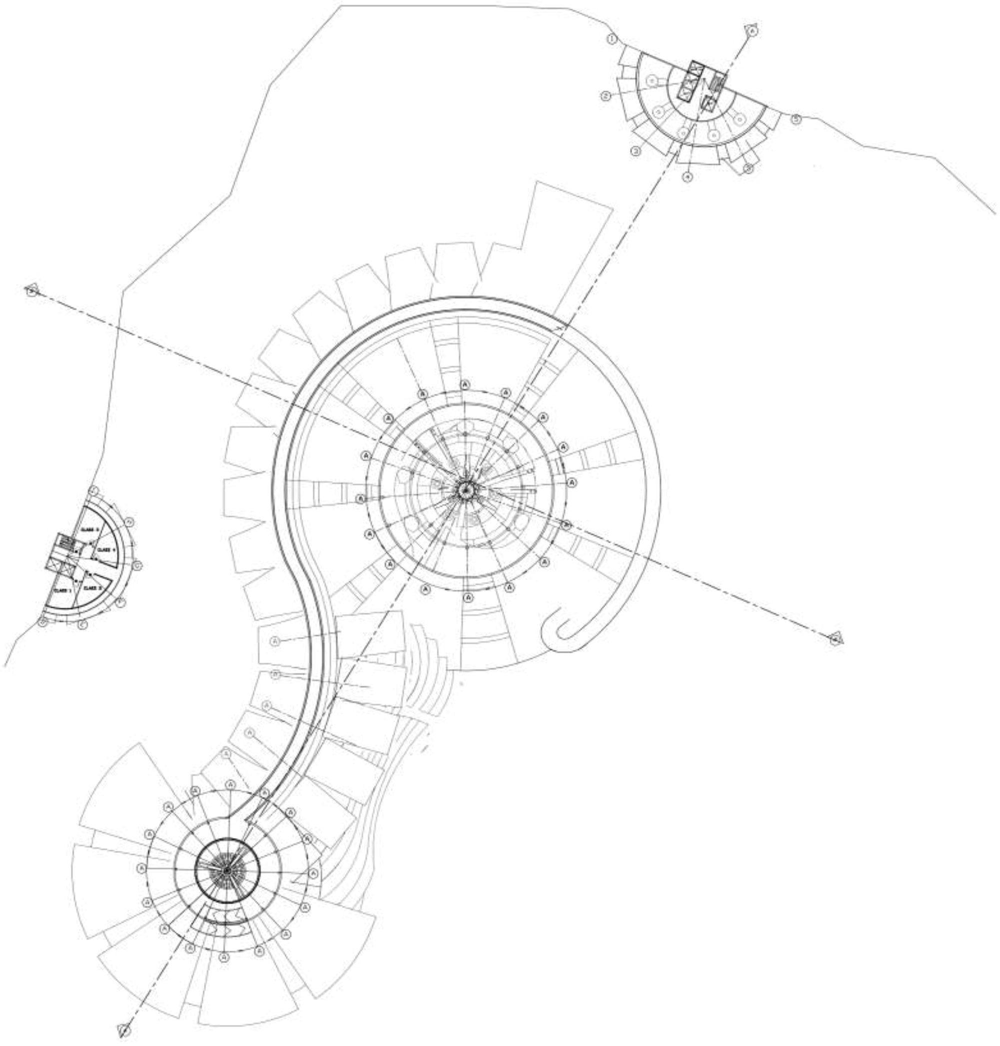
FOR
TASIK CERMIN ECO-PARK

SEMESTER:
202601

DRAWING TITLE:
SECTION B-B

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202405010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	AS SHOWN
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

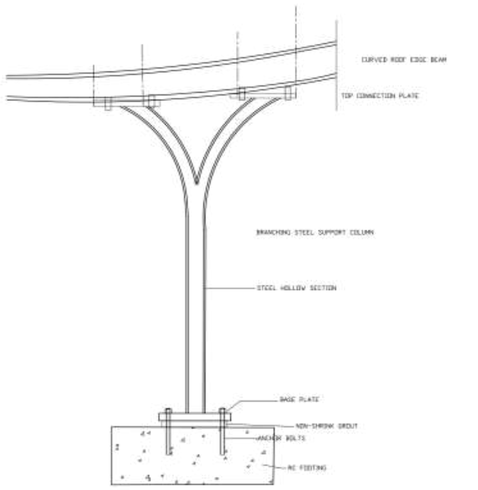
202601

DRAWING TITLE:

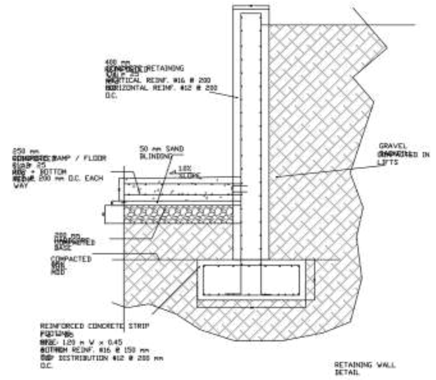
SECOND FLOOR

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHAHUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



BRANCHING STEEL SUPPORT COLUMN DETAIL



RETAINING WALL DETAIL

NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

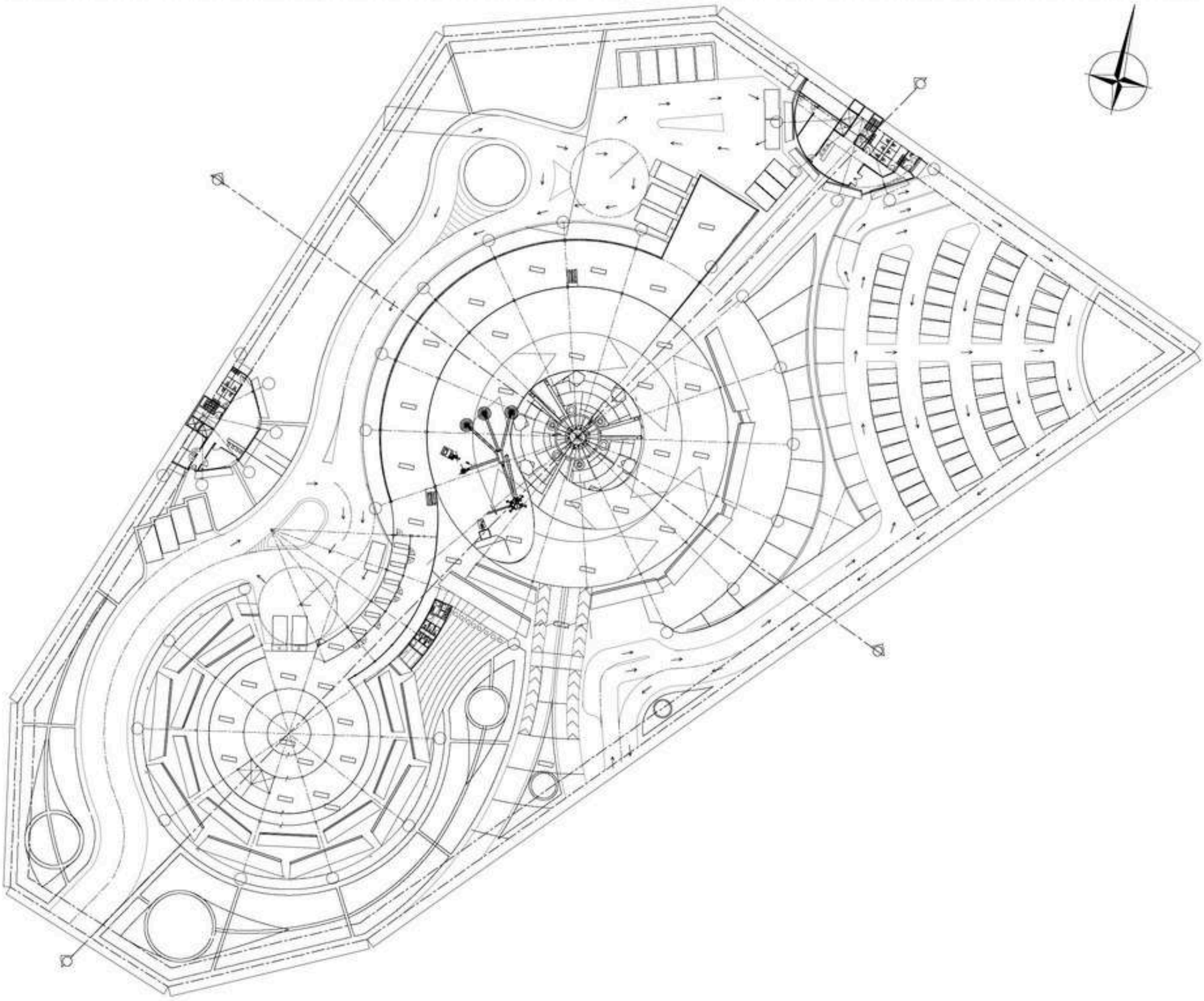
202601

DRAWING TITLE:

plow up detail

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202405010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	150
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

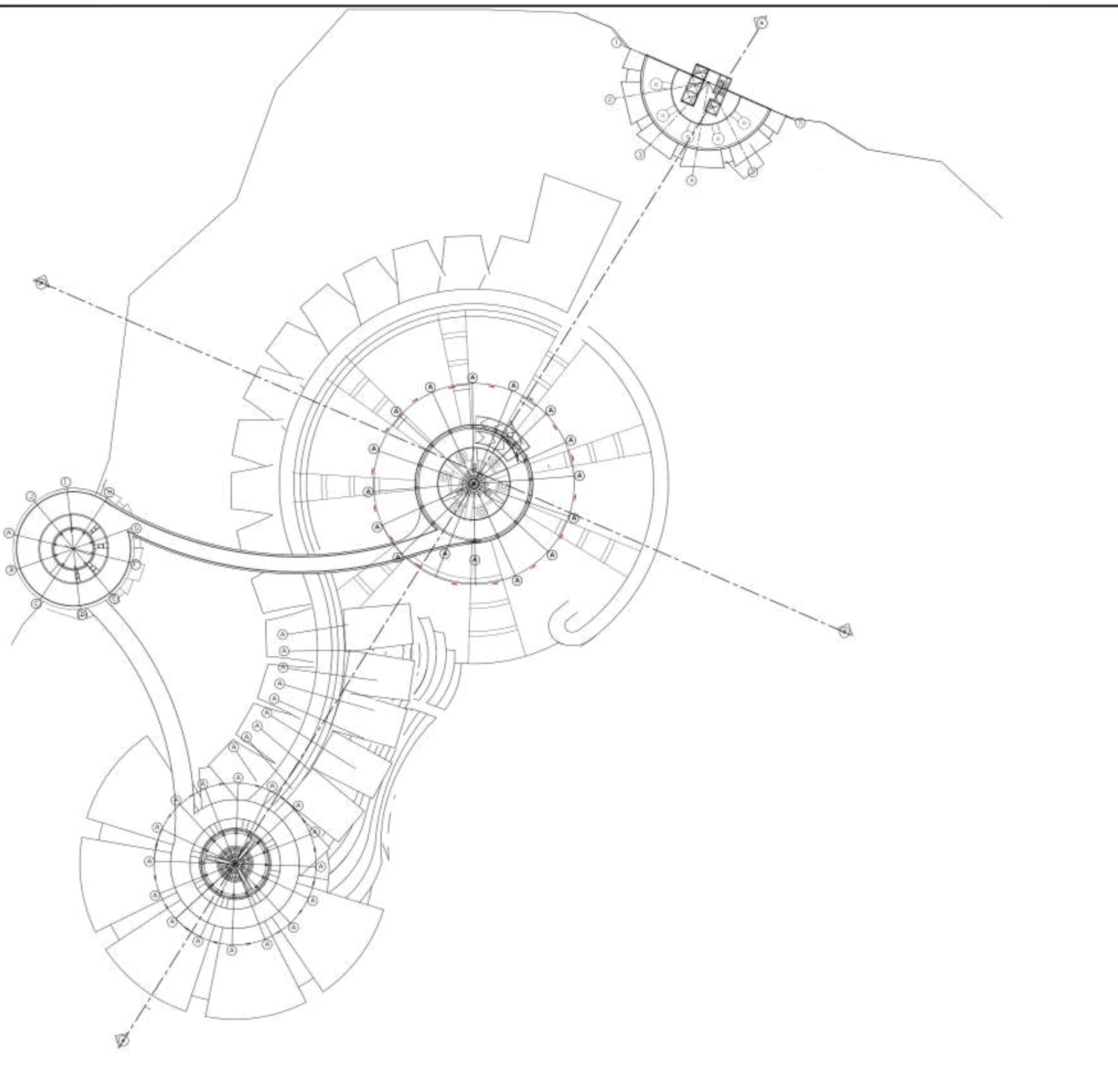
202601

DRAWING TITLE:

FIRST FLOOR

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

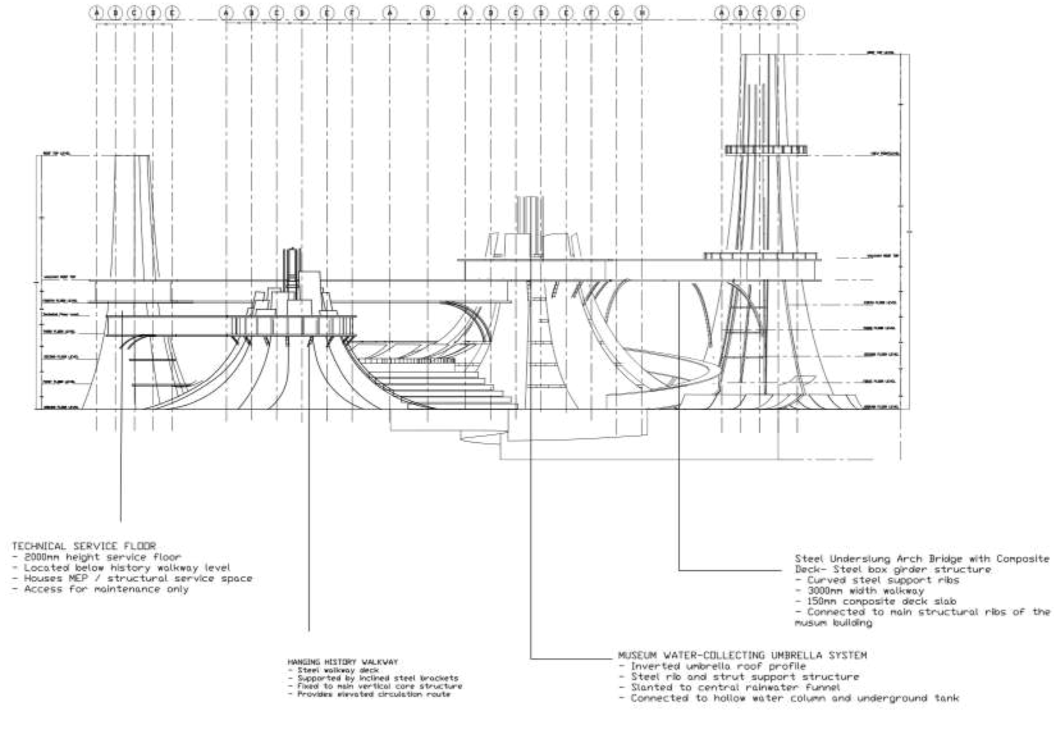
202601

DRAWING TITLE:

FOURTH FLOOR

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202405010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND BUILT ENVIRONMENT

COURSE:
STUDIO 5

PROGRAM:
BACHELOR OF SCIENCE IN (HONS) (ARCHITECTURAL DESIGN)

PROJECT:
PROPOSED LIMESTONE QUARRY HERITAGE INTERPRETATION AND EDUTOURISM CENTRE
AT TASIK CERMIN, IPOH, PERAK

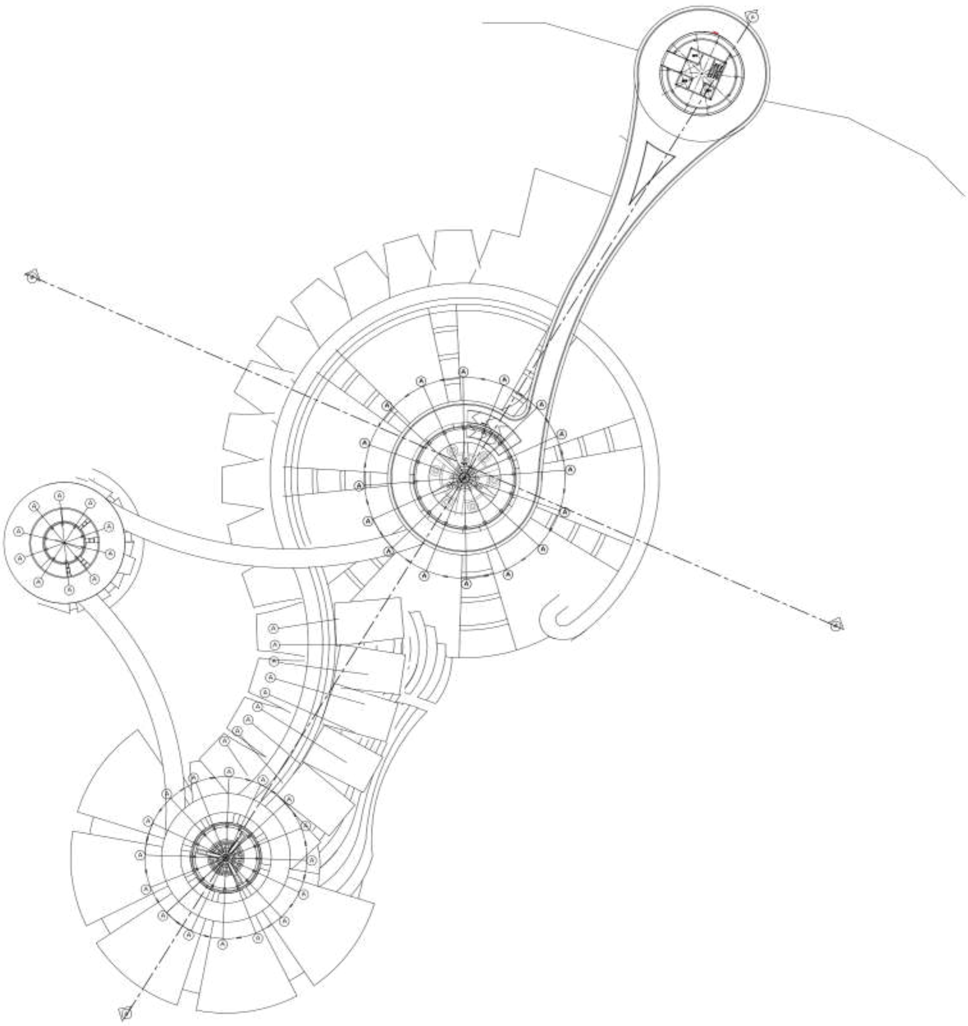
FOR
TASIK CERMIN ECO-PARK

SEMESTER:
202601

DRAWING TITLE:
SOUTH ELEVATION

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	AS SHOWN
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

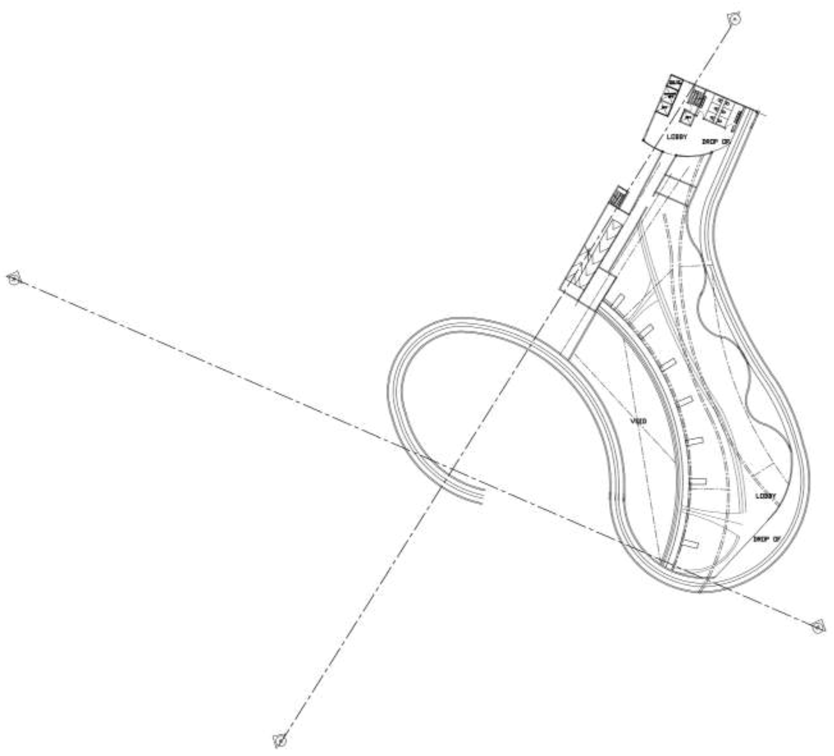
202601

DRAWING TITLE:

FIFTH FLOOR PLAN

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND
BUILT ENVIRONMENT

COURSE:

STUDIO 5

PROGRAM:

BACHELOR OF SCIENCE IN (HONS)
(ARCHITECTURAL DESIGN)

PROJECT:

PROPOSED LIMESTONE QUARRY
HERITAGE
INTERPRETATION AND EDUTOURISM
CENTRE
AT TASIK CERMIN, IPOH, PERAK

FOR
TASIK CERMIN ECO-PARK

SEMESTER:

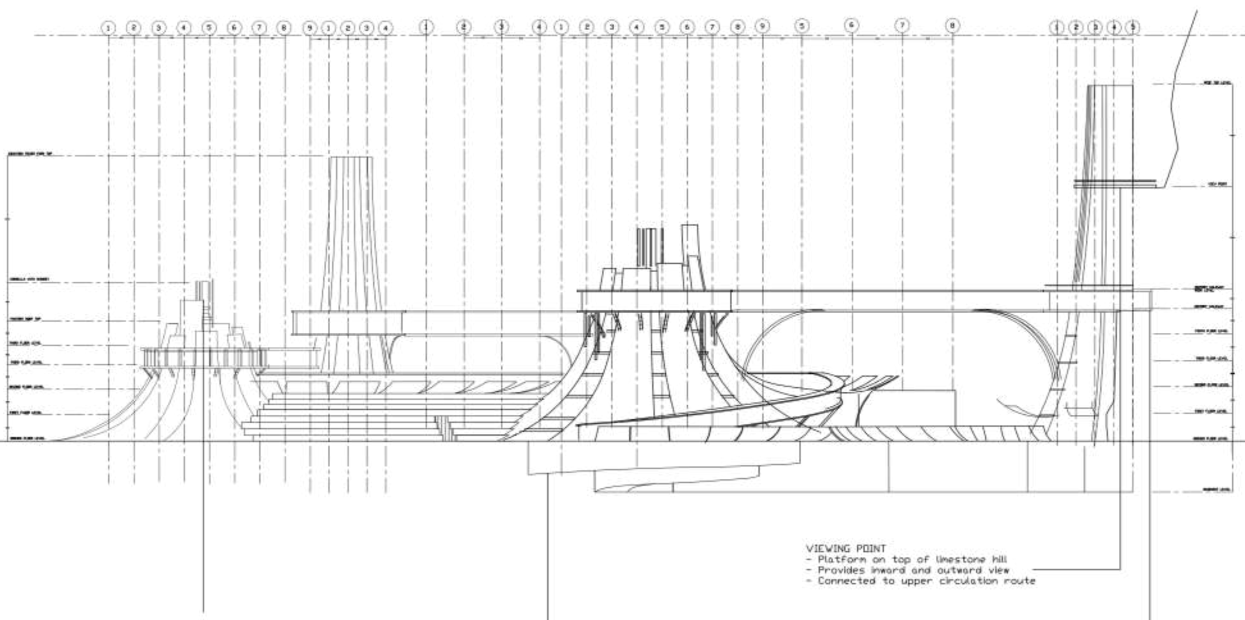
202601

DRAWING TITLE:

Basement floor

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16



VIEWING POINT
- Platform on top of limestone hill
- Provides inward and outward view
- Connected to upper circulation route

FACTORY UMBRELLA / CHIMNEY SYSTEM
- Inverted umbrella roof profile
- Steel rib and strut support structure
- Central steel framed chimney
- Connected to factory exhaust / dust outlet

UNDERGROUND LEVEL
- Reinforced concrete basement structure
- Contains cave route and service spaces
- Connected to lower visitor circulation
- Located below natural ground level

HANGING HISTORY WALKWAY
- Elevated history walkway
- Partially inserted into limestone hill
- Connected to viewing and stair route

NOTES:

DEPARTMENT:

CITYUNIVERSITY
MALAYSIA
Est 1984

DEPARTMENT OF ARCHITECTURE
FACULTY OF ARCHITECTURE AND BUILT ENVIRONMENT

COURSE: STUDIO 5

PROGRAM: BACHELOR OF SCIENCE IN (HONS) (ARCHITECTURAL DESIGN)

PROJECT: PROPOSED LIMESTONE QUARRY HERITAGE INTERPRETATION AND EDUTOURISM CENTRE AT TASIK CERMIN, IPOH, PERAK

FOR TASIK CERMIN ECO-PARK

SEMESTER: 202601

DRAWING TITLE: FRONT ELEVATION

DRAWN BY	SALAH ABDELWAHAB IBRAHIM MOHAMED
STUDENT ID	202485010048
CHECKED BY	MOHAMMAD AMIRSHAH BIN SHARUDDIN
SCALE	1:300
DATE	4 MAY 2026

DRAWING NO	SHEET NO
202509/WDAS-WD01	01/16

つづく