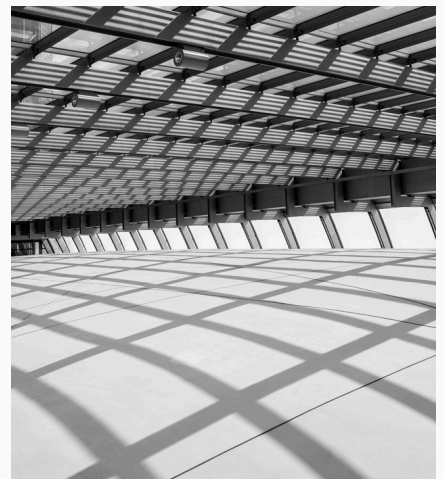


SITI KHAIRUL AQILAH  
BINTI AYOB

STUDIO 5

# JELAGA

COAL HERITAGE CENTRE & MAKER SPACE



MAY 2026

# NOTE OF APPRECIATION

*KHAIRUL AQILAH:*

Architecture is never a solitary journey, it is a collective narrative of mentorship, resilience, and shared dreams. As I stand at the threshold of completing my final year at City University Malaysia, this report (JELAGA) serves as more than just a design proposal, it is a tribute to the people who fueled my creative fire.

I am profoundly grateful to my Studio Master, Sir Amirshah Sharuddin. Thank you for not only critiquing my drawings but for challenging my perspective. Your guidance taught me that architecture is not just about building structures, but about excavating the soul of a site, especially one as rich and forgotten as the coal mines of Batu Arang.

To the faculty of Architectural Design, thank you for the rigorous discourse and for holding us to the highest standards. To my lecturers, Miss Bridget, your technical insights were the anchors that kept my concepts grounded in reality.

A special piece of my heart goes to the town of Batu Arang. To the shadows of the old mines and the whispers of its history, thank you for being my silent collaborator. This project is my way of honoring your legacy, ensuring that the "jelaga" of the past becomes the light for the future.

To my studio mates, we survived the long nights, the endless coffee, and the final deliverables together. Thank you for being the family I chose within these studio walls. Your energy made the impossible feel reachable.

Finally, to my parents and family. You provided the foundation long before I knew how to design one. Your sacrifices are the invisible pillars holding up every floor of my ambition. Everything I build, I build to make you proud.

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# Chapter 1

INTRODUCTION

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## 1.0 INTRODUCTION:



### **1.1 Background and Personal Motivation**

Batu Arang is not merely a geographic location on the outskirts of Selangor; it is a landscape deeply etched with the toil and "black gold" that once fueled the nation's industrial awakening. This report originates from an architectural fascination with Jelaga, the soot and residue that remains long after the flame has been extinguished. To me, Jelaga represents the tangible residue of memory, a dark but vital layer that still clings to the crumbling industrial walls of this town.

My personal motivation stems from the urgent need to transition the narrative of Batu Arang from a "forgotten relic" to a "living laboratory of innovation." As a designer, I feel a profound responsibility to prevent this heritage from fading into obscurity. I am driven to demonstrate that industrial waste specifically coal ash can be reclaimed as a high-performance, sustainable structural element. This report seeks to prove that architecture can act as a vessel for healing, turning the remnants of an extractive past into the foundations of a resilient future.

### **1.2 Objectives of the Project**

The primary goal of this report is to propose an integrated complex comprising an Exhibition Gallery and Industrial Workshops, centered on three core objectives:

- **Reclamation of Collective Memory:** To design a spatial experience that evokes the nostalgic grit of the coal mining era, ensuring that the historical significance of the site is felt through immersive, industrial-tectonic volumes.
- **Materiality and Innovation:** To establish the complex as a local hub for research, exploring the untapped potential of coal by-products (such as coal-ash concrete and raw steel) as the primary architectural language.
- **Socio-Economic Resilience:** To provide a dedicated platform for the local community to share industrial skills and showcase artisanal craftsmanship, ensuring the town's legacy evolves into a sustainable modern economy.

### 1.3 Project Location (Batu Arang) and its Cultural Significance

The Historical Fabric of Batu Arang Located within the district of Selayang, Batu Arang stands as a unique anomaly in Malaysia’s urban history. Established in the early 20th century, it was once a bustling industrial powerhouse, often referred to as the "Mini London" of Malaya. The town’s identity is inextricably linked to the coal mining industry, which shaped not only its economy but its very topography. The presence of subterranean tunnels, iconic brick chimneys, and a distinct colonial-industrial layout creates a site context that is rich with "genius loci" a spirit of place that demands a sensitive yet bold architectural response.

**Cultural Significance: From Industry to Identity** The significance of Batu Arang transcends its physical ruins. It represents a pivotal chapter in Malaysia’s modernization. Culturally, the town is a repository of industrial heritage, where the lives of the local community were once dictated by the rhythm of the mines. However, as the fires of the industry died out, the town’s significance began to erode, leaving behind a "cultural void."

This report recognizes Batu Arang not just as a site for construction, but as a site for architectural excavation. The cultural importance lies in the tension between its glorious past and its silent present. By situating the Jelaga project here, we are acknowledging that the town’s heritage is not a static museum piece, but a catalyst for a new cultural identity, one that bridges the gap between the shadows of the old mines and the light of modern industrial craftsmanship.



### 1.4 Project Timeline Overview

The development of the JELAGA project was executed over a rigorous 16-week duration. The timeline was strategically structured to transition from macro-historical research into micro-technical architectural resolution, ensuring the industrial heritage of Batu Arang was authentically captured through an industrial-tectonic lens.

PHASE	TIMELINE	PROGRESS & MILESTONES
I: PRELIMINARY RESEARCH	Week 1	Project Inception & Heritage Selection: Introduction to the industrial hub brief. Comparative research between various industrial typologies. Final selection of Coal Mining Heritage as the core theme due to its untapped tectonic potential and historical depth.
	Week 2	Conceptual Programming: Initial ideation on spatial programming centered on the "Jelaga" narrative, translating coal extraction processes and the "soot" metaphor into initial spatial volumes.
II: CONCEPTUAL REFINEMENT	Week 3 – 4	Form Iteration: Refinement of the design massing based on initial critiques. Focused on the transition between subterranean-inspired spaces and above-ground industrial volumes to reflect the mining journey.
	Week 5	Visual Archetype & Materiality: Development of the conceptual design board. Commencement of digital modeling, focusing on the textures of raw coal, oxidized steel, and heavy industrial forms.
	Week 6	Conceptual Presentation: Formal presentation of the "Jelaga" architectural narrative. Secured feedback on the integration of the exhibition-workshop hybrid program and its circulation.
III: SITE & CONTEXTUAL DATA	Week 7 – 9	Desktop Site Analysis: Comprehensive remote study of the Batu Arang site. Utilization of GIS data and historical mapping to analyze topography, sun orientation, and subterranean constraints. Completion of the SWOT Analysis focusing on industrial ruins and land rehabilitation.

PHASE	TIMELINE	PROGRESS & MILESTONES
IV: DESIGN DEVELOPMENT	Week 10	Master Planning & Zoning: Translating the "Jelaga" concept into a site-specific master plan. Focused on site layout, vehicular/pedestrian circulation, and the integration of the coal mining exhibition journey.
	Week 11 – 12	Tectonic Development: Detailed architectural forming of the Coal Mining Workshop and Gallery. Refinement of massing in relation to the site's contours and the implementation of coal-ash materiality.
V: TECHNICAL RESOLUTION	Week 13 – 14	Documentation & Visualisation: Production of technical drawings including floor plans, sections, and elevations. Generation of high-fidelity 3D renderings showcasing the "Jelaga" atmosphere and the final user journey experience.
	Week 15	Pre-Final Review: Internal critique and feedback sessions. Final refinement of presentation boards, focusing on technical clarity, materiality call-outs, and narrative consistency.
VI: SUBMISSION	Week 16	Final Portfolio & Report Submission: Compilation of the 113 pages comprehensive report and final presentation boards. Submission for final academic assessment and jury review.

# Chapter 2

INITIAL TOPIC EXPLORATION

## 2.0 INITIAL TOPIC EXPLORATION

### **2.1 Introduction to Coal Mining Heritage: An Industrial Odyssey**

Coal mining is far more than a mere extractive industry, it represents a profound, visceral, and almost primal interaction between human endeavor and the subterranean depths of the earth. It is an industry that encapsulates not only physical labor and mechanical innovation, but also the emotional and environmental weight of penetrating the hidden layers of the planet. In the Malaysian context, coal mining stands as a silent, soot-stained pillar of early industrialization, a narrative that remains largely overlooked and underrepresented when compared to the more dominant and celebrated histories of tin mining and rubber plantations. Despite its relative obscurity, coal mining has played a crucial role in shaping the infrastructural and economic foundations of early Malaya.

The heritage of coal is deeply embedded in what can be described as the raw and evocative aesthetic of "JELAGA" a term that symbolizes soot, residue, and the lingering memory of combustion. This aesthetic is not merely visual, but experiential, consisting of a complex symphony of grit, intense thermal processes, material transformation, and the overwhelming presence of monumental industrial machinery. It is an atmosphere defined by darkness, density, and material honesty, where every surface tells a story of heat, pressure, and time.

This exploration seeks to go beyond surface-level observation by dissecting the anatomical remnants of this industry and translating them into a contemporary architectural language that is both expressive and meaningful. Rather than perceiving these remnants as abandoned or obsolete structures, this study interprets them as carriers of spatial intelligence and tectonic expression. We are not merely looking at old buildings, instead, we are investigating what can be termed as the "Industrial Tectonic" a condition where heavy materials, structural clarity, and functional efficiency converge to produce spaces of immense physical and symbolic power.

Through this lens, the report positions itself as a conceptual and temporal bridge between the "Black Gold" era of the early 1900s and a future where architecture evolves into a tool for cultural preservation, reinterpretation, and environmental reclamation. It argues that architecture has the capacity not only to remember the past, but also to transform industrial legacies into regenerative systems that contribute to contemporary society.

## 2.2 Why Coal Mining? The Rationale of "Jelaga" and the Tectonic of Memory

The decision to adopt Coal Mining Heritage as the central theme for the Jelaga project is guided by a series of architectural considerations that highlight its relevance within a final year design exploration. This theme allows the project to operate across multiple layers, including historical interpretation, material experimentation, and spatial storytelling.

One of the key motivations lies in the preservation of industrial archaeology. Batu Arang presents a rare condition within Malaysia, where the landscape contains a complex network of underground shafts, surface ruins, and remnants of industrial infrastructure. These elements together form an open and immersive industrial museum that exists within its original setting. This report emphasizes the importance of preserving these industrial traces as valuable cultural assets. Instead of erasing them, the project proposes to engage with them through a process of architectural excavation. In this approach, new interventions are carefully inserted to coexist with the existing remains, allowing both past and present to be experienced simultaneously. The new architecture does not dominate the old, but instead frames and enhances its presence.

Another important aspect of this project is the exploration of material residue. Coal ash, which is typically regarded as waste, is reinterpreted as a useful and high performance construction material. This shift challenges the conventional perception of coal as a purely negative resource and opens up new possibilities for sustainable design. By incorporating coal ash into building elements, the project introduces the idea of circular tectonics, where waste is transformed into a meaningful architectural component. In this way, the building becomes directly connected to the history of the industry, not only in concept but also in material form.

The mining process itself also provides a strong foundation for spatial design. The journey from the bright surface into the dark and compressed underground environment offers a powerful metaphor that can be translated into architecture. This allows the design to create a sequence of spaces that guide users through varying conditions of light, scale, and atmosphere. By controlling these elements, the architecture is able to recreate the emotional experience of descending into a mine. This transforms the building into more than just a physical structure. It becomes a narrative environment that allows users to feel and understand the history of coal mining in a more immersive way.

## 2.3 Preliminary Research on Coal and the Legacy of Malayan Collieries

### 2.3.1 Origin and the Mini London Legacy

The development of Batu Arang as an industrial town began in 1915 with the establishment of Malayan Collieries Limited. This marked the beginning of a highly organized mining operation that would shape the identity of the area for decades. At its peak, Batu Arang functioned as a self-sufficient industrial settlement equipped with its own power supply, brick production facilities, residential quarters, and a dedicated railway network for transporting coal. This level of development earned the town the nickname Mini London, reflecting its advanced infrastructure and modern planning during that period.

During this golden phase, the visual character of Batu Arang was defined by prominent industrial structures such as tall brick chimneys and mechanical headframes. These elements dominated the skyline and served as symbols of industrial strength and progress. In this research, these vertical structures are understood as architectural references that inform the design direction of the Jelaga project. Their form and presence influence the vertical expression and structural rhythm of the proposed workshop and gallery, ensuring that the new design maintains a strong connection to the historical identity of the site.

### 2.3.2 The Anatomy of Coal Extraction and its Spatial Implications

Understanding the technical process of coal extraction is essential in shaping a design that is both functional and meaningful. The process can be interpreted through a series of stages that directly influence the spatial organization of the project.

The first stage involves exploration and excavation, where the earth is opened to access coal deposits. This moment can be translated into architectural elements that are embedded within the ground, such as sunken spaces and recessed courtyards. These elements create a strong sense of connection between the building and the landscape.

The second stage focuses on extraction and transportation. Coal is moved from underground to the surface through mechanical systems. This process inspires the design of circulation within the building, where movement is guided through linear paths and gradual transitions. Ramps and directional flows help to create a clear spatial narrative that reflects the movement of material within a mine.

The third stage involves processing, where coal is sorted and prepared for use. This requires large open spaces that can accommodate industrial activities. In the project, this is reflected in the design of the workshop areas, which are characterized by high ceilings, exposed structures, and flexible layouts. These spaces are designed to support a range of activities while maintaining a strong industrial character.

The final stage is combustion, where coal is transformed into energy and leaves behind residue in the form of ash and soot. This stage becomes a key influence on the material expression of the project. The use of charred timber, dark concrete, and weathered steel helps to evoke the visual and tactile qualities associated with heat and transformation. These materials serve as a reminder of the industrial processes that once defined the site.

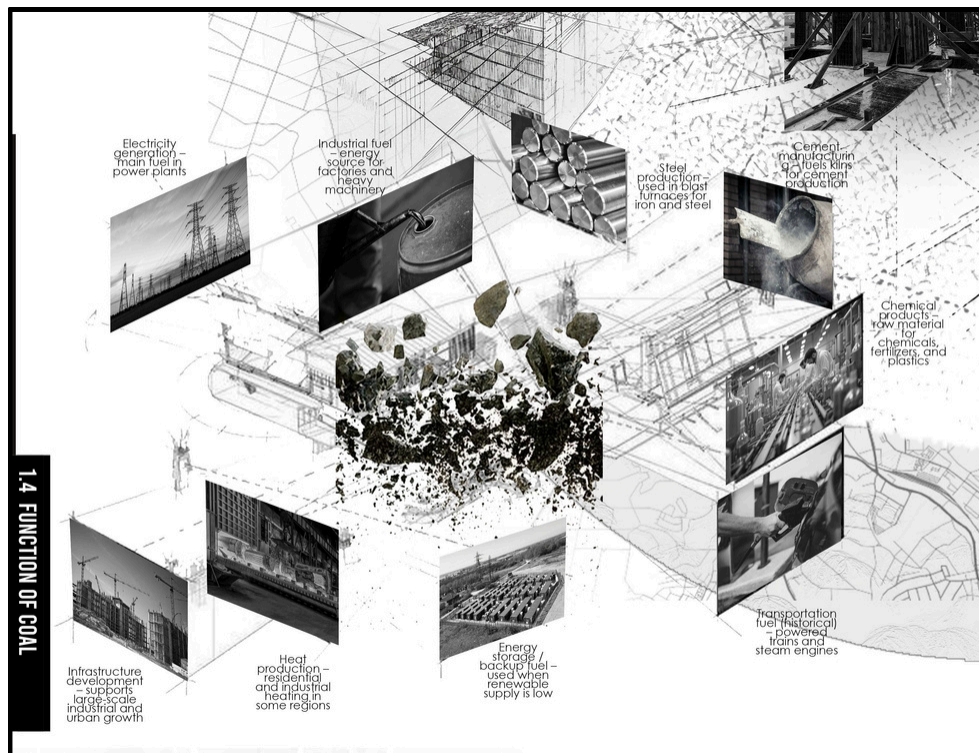
### 2.3.3 Socio Economic Impact and the Cultural Void

The closure of the coal mines in the 1960s brought significant changes to Batu Arang. What was once a thriving industrial community began to decline as economic activities came to a halt. The absence of the mining industry created a gap not only in employment but also in cultural identity. This condition can be described as a cultural void, where both the physical environment and the social structure were left without a clear direction.

The remaining industrial structures became silent markers of a past that was no longer active. While they hold historical value, they also reflect a sense of abandonment and disconnection. This highlights the need for an architectural response that can reintroduce purpose and meaning to the site.

The Jelaga project responds to this condition by proposing a combination of exhibition and workshop spaces. The exhibition component focuses on storytelling and education, allowing visitors to learn about the history and significance of coal mining. At the same time, the workshop component introduces new forms of activity that can support community engagement and skill development.

By combining these two functions, the project aims to reconnect the past with the present while creating opportunities for the future. It transforms the site from a place of decline into a space of learning, creativity, and regeneration, allowing the community to rediscover its identity through both memory and innovation.



# Chapter 3

CONCEPTUAL PHASE: THE TECTONIC OF RESIDUE

### **3.0 CONCEPTUAL PHASE: THE TECTONIC OF RESIDUE**

#### **3.1 Introduction to "JELAGA" as a Design Narrative**

The conceptual core of this project is encapsulated in the term Jelaga, the carbonaceous residue or soot that remains after the combustion of coal. In this report, Jelaga is not merely viewed as a byproduct, but as a metaphor for the "persistence of memory". Architecturally, the concept translates into a design that explores the transition from the ethereal (smoke/memory) to the solid (residue/structure). This approach dictates a building that feels as though it has been "exhumed" from the site, utilizing heavy, dark materials and rhythmic structural skeletons to mirror the industrial heritage of Batu Arang.

#### **3.2 The Philosophy of Subterranean Extraction**

The idea behind the design is rooted in the physical act of mining: the "digging" and "tunneling" into the earth. This concept manifests through the manipulation of ground planes and sectional density. The workshop and exhibition spaces are conceived as "Inhabited Voids," mimicking the hollowed-out shafts of the old collieries. By utilizing a "digging" architectural language, the project minimizes its visual footprint on the surface while creating a dramatic, immersive experience below the datum line, allowing visitors to feel the atmospheric pressure and raw materiality of the subterranean world.

#### **3.3 Key Components of the Hybrid Program**

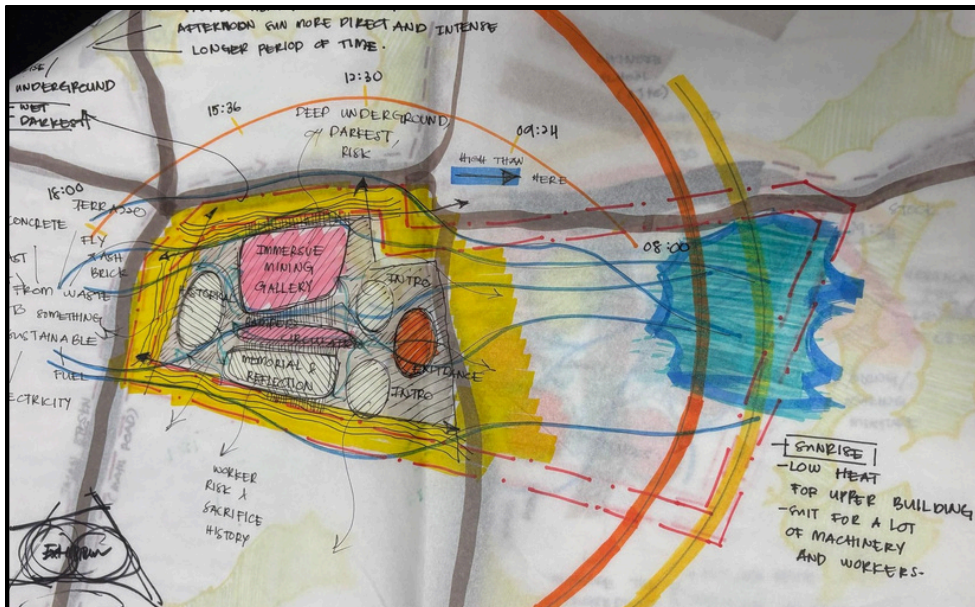
To fulfill the project's objectives, the program is divided into three symbiotic zones that reflect the coal-making cycle:

- The Archive (Gallery): A space for the "Light of Memory," where the history of Batu Arang is curated through immersive media and industrial artifacts.
- The Laboratory (Workshop): A functional zone for "Material Innovation," focusing on the research and production of coal-ash-based construction materials.
- The Forum (Public Space): A communal area designed for "Social Re-ignition," acting as a bridge between the local residents and the visitors.

### 3.4 Spatial Zoning and Activity Flow

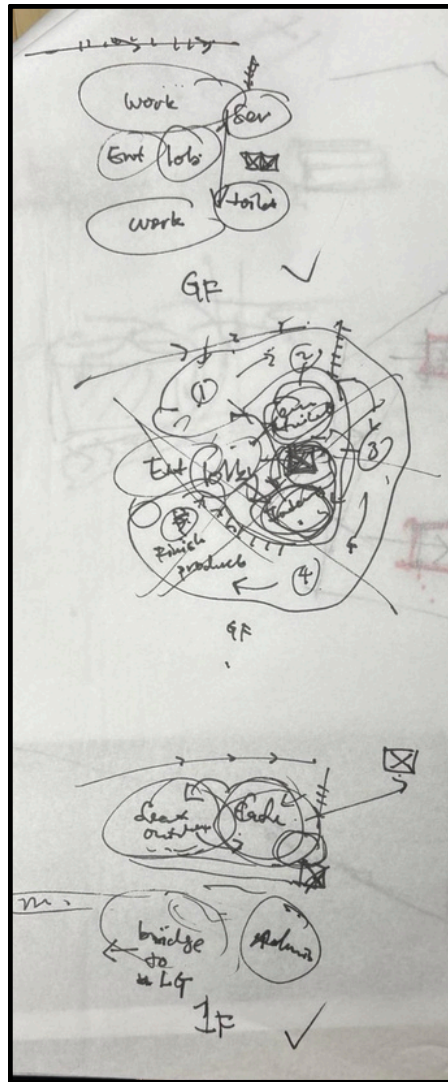
The activity flow within the JELAGA complex is designed as a linear narrative of "Excavation and Enlightenment". Visitors begin their journey at the highest point of the site, gradually descending into the "Dark Heart" of the exhibition before emerging into the naturally lit, high-volume workshops. This spatial sequence ensures a clear separation between public-private zones while maintaining a visual connection through internal voids and industrial atriums, allowing the "process of making" in the workshops to be witnessed by gallery visitors.

First Bubble Diagram Planning



CONCEPTUAL PHASE: THE TECTONIC OF RESIDUE





### Spatial Zoning and Adjacencies

The diagram establishes a clear hierarchy of spaces and how they interact with one other:

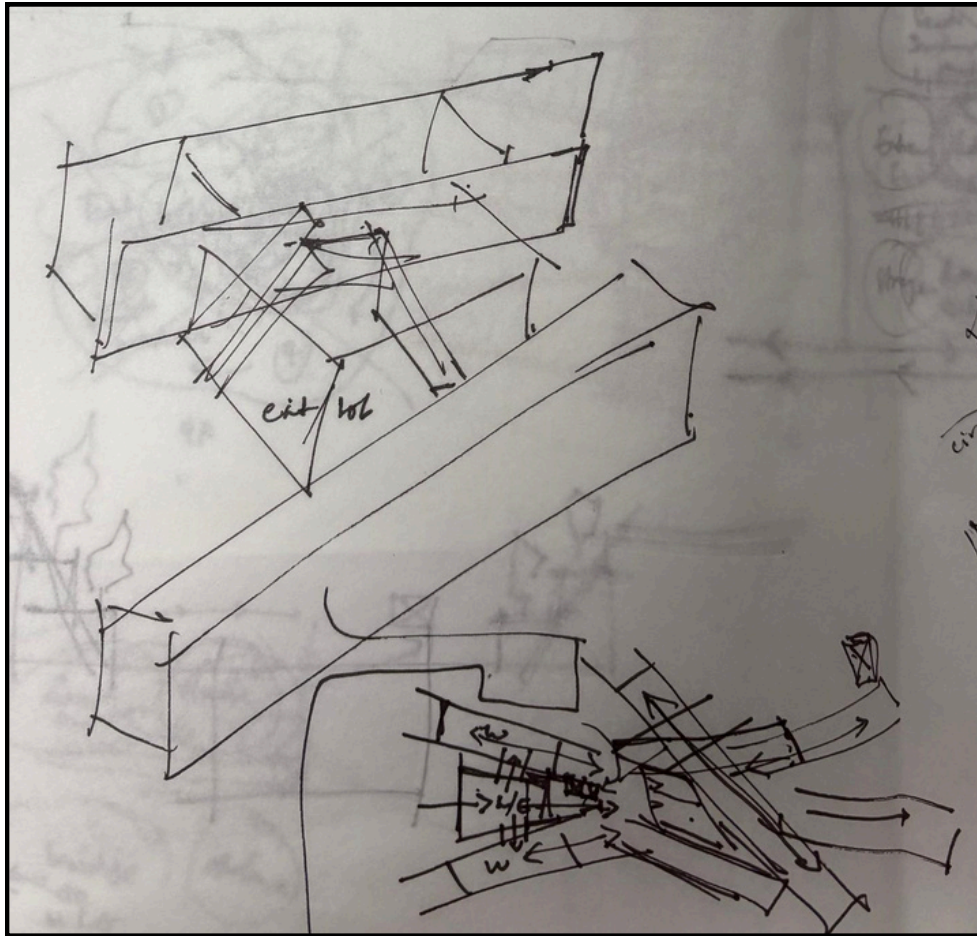
- **Public Core:** The Entrance and Lobby act as the central distribution point, managing the primary arrival flow.
- **Operational Cluster:** Admin, Services, and Storage/Loading are clustered together in the upper section, indicating a private functional zone that is tucked away from the main public eye but easily accessible for staff.
- **Social & Leisure Zone:** The Cafe and Seating (Outdoor/Indoor) are positioned toward the bottom and right, suggesting a more relaxed atmosphere away from the administrative and service noise.

### Circulation and Access

The sketch identifies two distinct types of vehicular and pedestrian movement:

- **Visitor Access:** The "Visitor Road" leads directly toward the Entrance, ensuring a clear and intuitive path for the public.
- **Service Logistics:** The "Service Road" is strategically placed at the top, allowing for discrete "Storage/Loading" and "Services" access without crossing paths with visitors.

## Form Articulation



## Linear Massing and Spatial Interstices

The shift from circular bubbles to long, rectangular volumes represents a move toward linear massing.

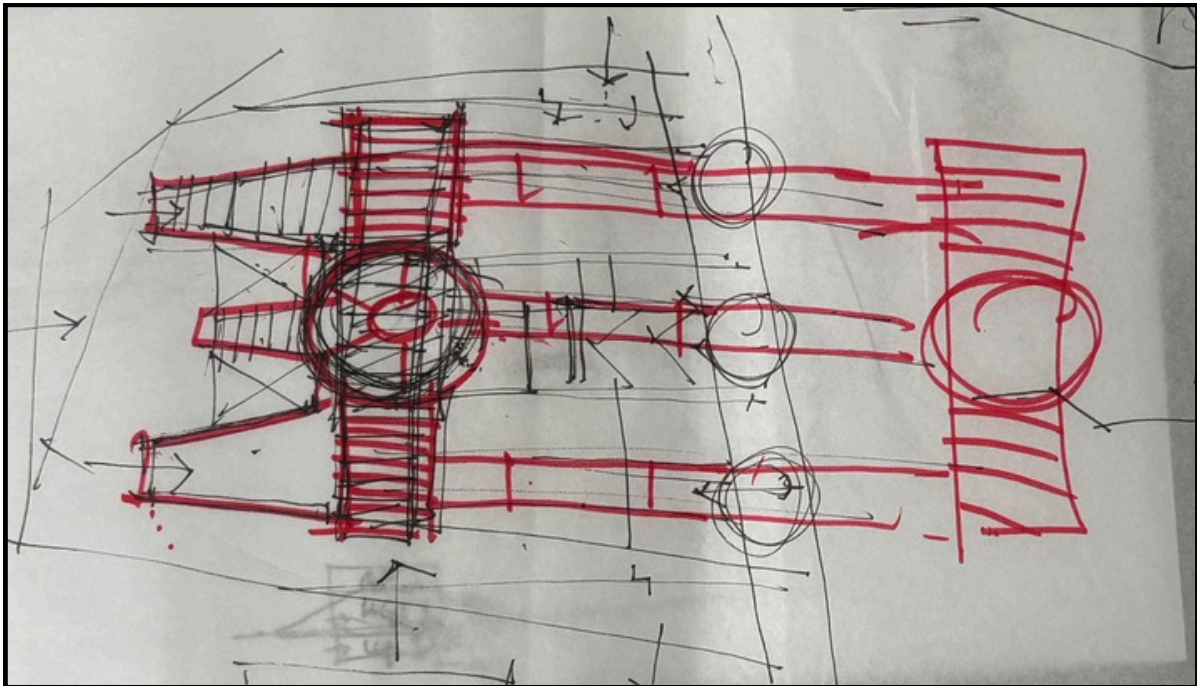
- The Interstitial Void: By pulling the primary masses apart, you have created a "void" or "interstitial space" between them. This echoes the "Interstitial Bridge" concept, where the space between buildings becomes as important as the buildings themselves.
- Parallel Alignment: The two main bars create a strong longitudinal axis, likely separating the "Public" zones (like the Cafe) from the "Private/Operational" zones (Admin and Services) identified in your bubble diagram.

## The Central Nexus (Entrance/Lobby)

In your 3D sketch, the "Ent/Lob" (Entrance/Lobby) is no longer just a circle; it is a connecting knuckle or central nexus.

- Tectonic Connection: The diagonal lines overlapping the central volume suggest a tectonic structure, possibly a glass atrium or a bridge that physically and visually anchors the two main masses.
- Compression and Expansion: Moving from the open exterior into this central, potentially tighter volume creates a "spatial compression" before visitors expand out into the larger wings of the building.





### The "Stitching" Concept

In architecture, this approach is often referred to as stitching the site. The three red linear paths act as primary axes that bind two separate site zones together.

- **Linear Connectivity:** These axes ensure physical and visual continuity, turning isolated site fragments into a single, coherent entity.
- **The Interstitial Bridge:** These elongated elements reinforce your "Interstitial Bridge" concept, where the act of moving between two points becomes the core architectural experience.

### Central Hub & Satellite Nodes

You have established a Central Nexus (the large circle on the left) that serves as the heart of the building.

- **Anchor Point:** This section acts as a focal point where all circulation from the left side of the site converges before being distributed through the "fingers" (linear tracks).
- **Nodal Points:** The smaller circles along the axes act as nodes—points of interest or transition, such as vertical circulation (stairs/lifts) or viewing decks, before reaching the final destination on the right.

### Industrial-Tectonic Alignment

The repetitive, parallel arrangement aligns perfectly with your specialization in industrial-tectonic design.

- **Structural Repetition:** These parallel lines mirror industrial structures like coal conveyor systems or railway tracks, which is highly appropriate for your project's heritage context.
- **Rhythm and Pattern:** This repetition creates a powerful visual identity that will translate well into the monochrome and realistic material textures (steel and concrete) you prefer for your renders.

### Spatial Programming: Head vs. Tail

This sketch strategically divides the building's program:

- The Head (Left): A dense, complex zone likely housing the Lobby, Admin, and primary exhibition spaces for "Project Jelaga".
- The Spines (Center): Linear circulation or gallery "spines" that connect various activities.
- The Tail (Right): A terminal zone that might be more open, such as the Cafe or community spaces overlooking the site's views.

# Chapter 4

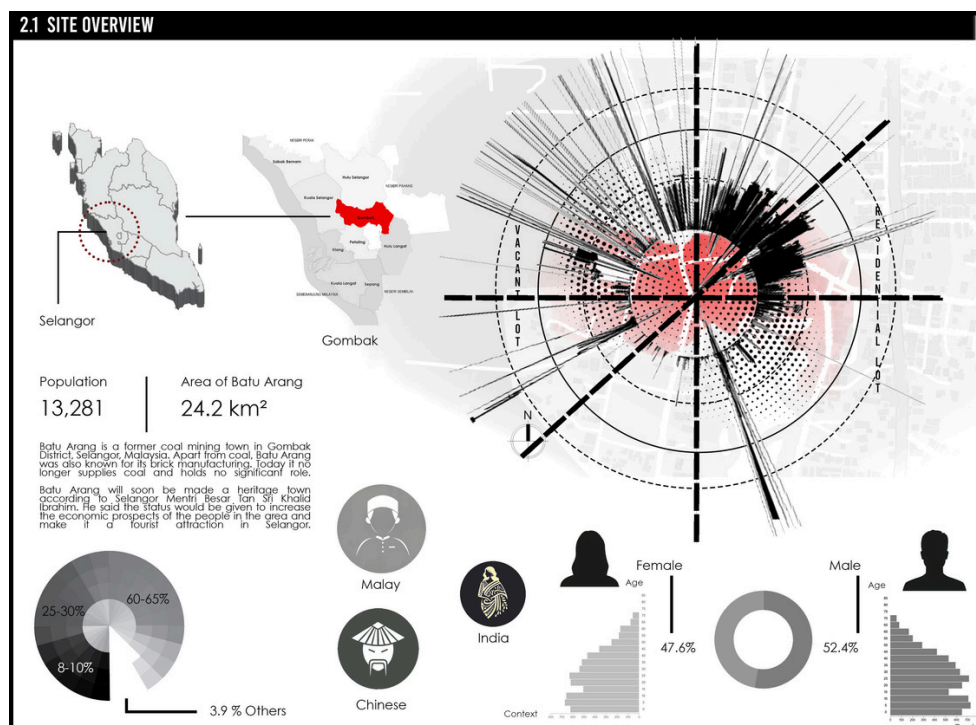
SITE ANALYSIS

## 4.0 SITE ANALYSIS: CONTEXTUAL INTELLIGENCE

### 4.1 Site Location and Geographic Context: The Industrial Heartland

The chosen site is situated within the historic enclave of Batu Arang, Selangor, a town whose urban morphology has been deeply shaped by early twentieth century industrial planning and resource extraction activities. The spatial organization of the town reflects a clear hierarchy between industrial zones and residential settlements, forming a layered urban condition that continues to define its identity today. Positioned strategically near the remnants of the old mining shafts, the site operates as a critical threshold that mediates between two contrasting environments. On one side lies the surviving colonial residential fabric, characterized by a more domestic and human scaled environment, while on the other side exists the raw and overgrown ruins of the former collieries, which embody the memory of industrial intensity and abandonment.

This condition allows the site to function as a transitional node that connects the everyday life of the town with its deeper industrial past. Through the use of GIS mapping and historical satellite data, the analysis reveals how the site has evolved over time and how its spatial role has shifted from an active industrial zone into a fragmented landscape of memory. This transformation highlights the potential of the site to act as a bridge that reinterprets and reconnects these two contrasting narratives. Rather than treating the boundary as a separation, the project reimagines it as a zone of interaction where architecture can mediate between history, landscape, and contemporary use.



2.2 SITE CONTEXT



COAL MINING TUNNEL (HISTORICAL LANDMARK) | 100 m from project site



The historical coal mining tunnel is a remnant of Batu Arang's industrial past. It defines the post-mining landscape and provides a tangible connection to the site's heritage, informing the design narrative of adaptive reuse and memory in architecture.

Represents industrial heritage links past energy production to waste-to-energy education.



150 m from project site | SJK (C) CHAP KHUAN

This school establishes educational infrastructure within the context. Its formal, organized layout and community-focused design influence surrounding circulation patterns and highlight the social role of architecture in post-industrial towns.

Educational presence nearby encourages collaboration and hands-on learning.



Site Context



PUSAT JAGAAN SEJAHTERA (WELFARE CENTRE) | 50 m from project site



This community care centre contributes to the social infrastructure of the site, reflecting the interaction between built form and local daily life. Its low-rise scale complements the post-mining open landscape surrounding the project site.

Supports community engagement low-rise scale complements post-mining landscape.



120 m from project site | DEWA WONG (TAOIST TEMPLE)

The temple introduces cultural and religious significance to the site context. Its traditional architectural language contrasts with the post-mining landscape, enriching the narrative of community heritage and identity.

Cultural and religious landmark informs local identity and design integration.



## 4.2 Accessibility and Connectivity: The Industrial Artery

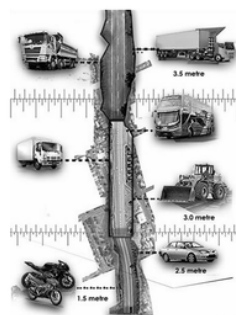
Despite its current perception as a relatively quiet and isolated area, the site remains connected through a network of heritage roads that were originally designed to support the transportation of coal and industrial materials. These routes once served as the primary infrastructure that sustained the mining economy, linking extraction points to processing facilities and distribution networks. Today, although their function has diminished, these pathways continue to define the movement pattern within the area.

The surrounding context of the site is predominantly rural in character, consisting largely of kampung settlements where daily mobility is highly dependent on private vehicles. The absence of a comprehensive public transportation system further reinforces this condition, with only limited services such as school buses and vans operating within the area. As a result, accessibility to the site is largely reliant on individual modes of transport, which influences both the entry experience and the planning of circulation within the project.

The analysis focuses on what can be understood as the Industrial Artery, which refers to the main access route that historically facilitated the movement of locomotives, heavy machinery, and raw materials. This route is not only significant in terms of physical connectivity, but also as a spatial memory of industrial circulation. The project responds to this condition by proposing a clear hierarchy of access that distinguishes between different types of users and activities. Heavy duty access is allocated to the workshop component, allowing for efficient movement of materials and equipment without interfering with other functions. At the same time, a more controlled and welcoming entrance is designed for pedestrians, particularly those accessing the gallery and exhibition spaces.

In response to the reliance on private transportation, the design also considers the provision of adequate parking areas and clear vehicular circulation to ensure smooth access without creating congestion within the site. Drop off zones are carefully positioned to accommodate occasional group arrivals, including educational visits that may utilize school buses. These strategies aim to enhance accessibility while maintaining the calm and reflective quality of the post industrial environment.

This separation ensures that the intervention remains functional while also maintaining a comfortable and safe environment for visitors. More importantly, it allows the site to be reintegrated into the broader circulation system of Batu Arang, reconnecting it to the town without compromising its calm and reflective post industrial character.



### 4.3 Topography and Terrain Analysis: The Sculpted Landscape

The terrain of Batu Arang presents a unique condition that differs significantly from natural landscapes. It can be understood as a man made topography, shaped by decades of mining activities that involved excavation, soil displacement, and land modification. As a result, the ground condition is highly irregular, with significant variations in contour that reflect the history of extraction.

Through detailed analysis of the site's topography, it becomes evident that these contour changes are not limitations, but opportunities for architectural exploration. The presence of slopes and depressions allows for the possibility of integrating the building into the ground, creating a form of subterranean design that is both sensitive and performative. By identifying specific datum levels within the terrain, the building can be carefully inserted into the landscape, reducing its visual dominance while enhancing its connection to the site.

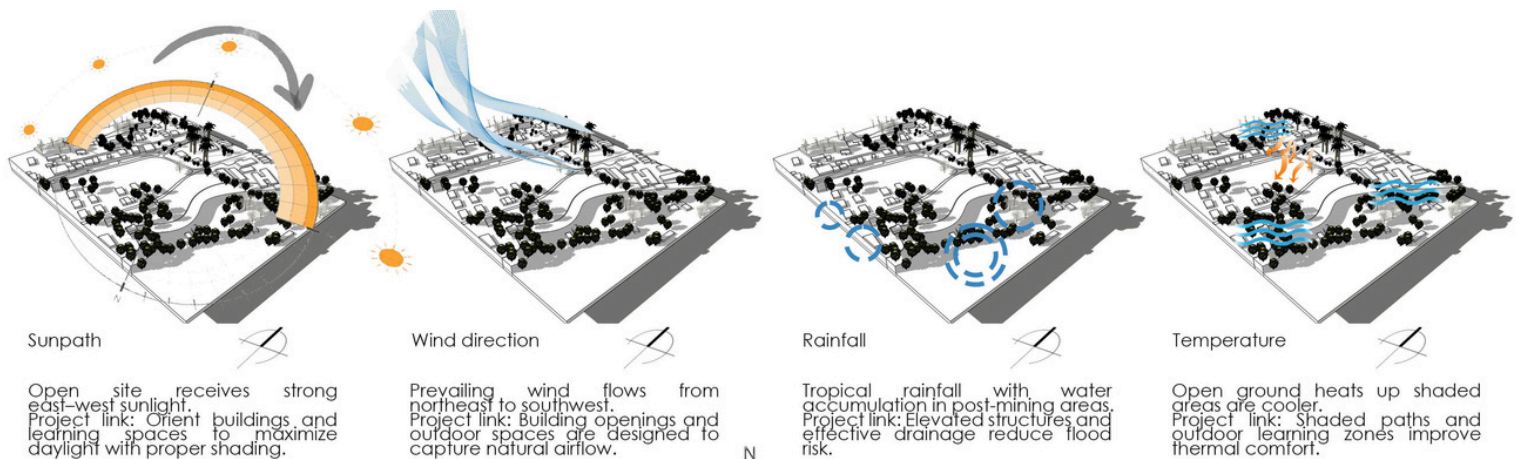
This approach not only minimizes the impact on the skyline, but also takes advantage of the thermal properties of the earth. By embedding parts of the building within the ground, the design is able to utilize the natural cooling effect of soil mass, creating a more stable internal environment. This strategy echoes the atmospheric conditions of the original mine shafts, where temperature and light were naturally controlled by depth and enclosure. In this way, the terrain becomes an active component in shaping both the spatial and environmental performance of the project.

#### 4.4 Macro and Micro Climatic Studies

The climatic analysis plays a crucial role in informing the orientation, form, and environmental strategies of the building. By studying both macro and micro conditions, the design is able to respond more precisely to the local climate while enhancing user comfort and energy efficiency.

In terms of sun orientation and thermal radiation, digital sun path studies indicate that a north south alignment offers the most effective configuration for controlling solar exposure. This orientation reduces direct heat gain from the east and west, which are typically more intense in tropical climates. Based on this finding, the project adopts a saw tooth roof form, a typology commonly associated with industrial architecture. This roof configuration allows soft and diffused northern light to enter the interior spaces, particularly within the exhibition areas, while minimizing glare and excessive heat. At the same time, it provides a controlled environment that enhances visual quality without relying heavily on artificial lighting.

Wind direction and passive ventilation are equally important considerations. Due to its elevated position, the site is able to capture prevailing winds that move through the surrounding valley. The design takes advantage of this condition by shaping the building mass to guide and accelerate airflow. This creates a natural ventilation system that improves indoor air quality and reduces heat accumulation. Internal courtyards and vertical voids are strategically placed to support this movement, allowing air to circulate effectively throughout the building. The use of these elements reflects an understanding of how form and space can work together to enhance environmental performance without mechanical dependency.



#### **4.5 Views and Contextual Vistas: The Visual Anchors**

One of the most significant qualities of the site lies in its visual connection to the remaining industrial structures that define the identity of Batu Arang. These include the surviving brick chimneys and the skeletal headframes of former mining operations, which stand as powerful reminders of the town's industrial past.

The analysis identifies these elements as key visual anchors that should be preserved and highlighted within the design. Rather than concealing or ignoring them, the project intentionally orients its spatial layout to frame and emphasize these views. Openings, corridors, and gathering spaces are aligned in such a way that they direct attention towards these historical structures, transforming them into integral components of the architectural experience.

This strategy creates a series of framed vistas that establish a continuous visual dialogue between the new intervention and the existing ruins. As visitors move through the building, they are constantly reminded of the historical context, allowing them to maintain a strong sense of place. This relationship between architecture and context reinforces the narrative of memory, ensuring that the past remains present within the spatial experience.

#### 4.6 SWOT Analysis and Design Implications

The SWOT analysis provides a structured evaluation of the site's potential and challenges, offering a clear foundation for design decision making.

The strengths of the site lie in its rich historical narrative and the presence of a strong industrial identity that can be described as its *genius loci*. This unique character provides a powerful conceptual base for the project, allowing it to draw directly from the memory and atmosphere of the place.

However, the site also presents certain weaknesses, particularly in terms of ground stability. The existence of underground voids resulting from previous mining activities raises concerns regarding structural safety and requires careful consideration during the design and construction process. Additionally, the relatively remote location of the site may limit accessibility and reduce immediate public engagement if not properly addressed.

At the same time, there are significant opportunities that can be explored. The integration of coal ash as a construction material opens up possibilities for innovation in sustainable design. Furthermore, the revival of the site as an architectural destination has the potential to contribute to eco tourism and cultural regeneration within Batu Arang.

Nevertheless, there are also threats that must be acknowledged. The continued deterioration of existing industrial ruins poses a risk to the preservation of the site's historical value. Without proper intervention, these elements may be lost over time, weakening the overall narrative of the place.

Based on these findings, the design adopts a light footprint and heavy material approach. This strategy ensures that the building is carefully positioned on stable ground while minimizing disruption to the existing landscape. At the same time, the use of dense and expressive materials reflects the industrial character of the site, allowing the architecture to resonate with its historical context. Through this balance, the project is able to respond both technically and conceptually, creating a design that is grounded, sensitive, and meaningful.

# Chapter 5

DESIGN DEVELOPMENT: FROM CONCEPT TO  
TECTONIC

## 5.0 DESIGN DEVELOPMENT: FROM CONCEPT TO TECTONIC

### 5.1 Design Synthesis: The Jelaga Logic

The design development phase represents a critical shift from conceptual exploration into a resolved architectural proposition. At this stage, the abstract narratives and theoretical frameworks established earlier are translated into tangible spatial and tectonic strategies. The JELAGA project adopts a bottom up design methodology, where the design does not begin with an imposed form, but instead emerges from the intrinsic conditions of the site and the logic of the coal mining process itself.

The subterranean nature of Batu Arang, combined with its layered industrial history, becomes the primary generator of form. Rather than designing against the site, the architecture is shaped by it, responding to both its physical constraints and its historical memory. This approach ensures that the final outcome is not arbitrary, but deeply rooted in context and meaning.

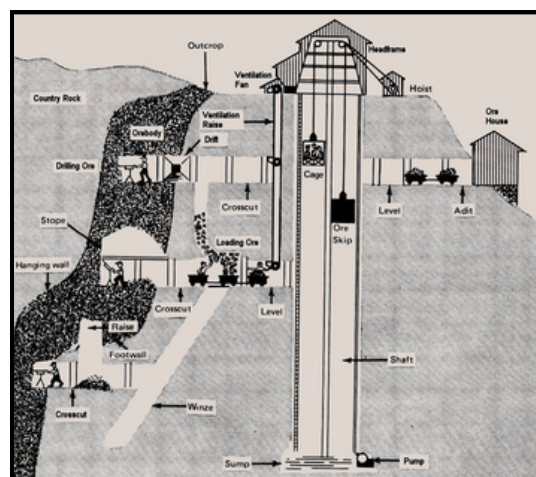
The synthesis of the design is guided by three primary drivers that collectively define its architectural language.

Verticality is derived from the dominant presence of brick chimneys and industrial towers that once defined the skyline of Batu Arang. These elements are reinterpreted as vertical markers within the project, giving the building a sense of direction, hierarchy, and symbolic presence.

Subterranean depth reflects the hidden world of the mine shafts. This driver informs the sectional quality of the building, encouraging a design that moves below ground level and engages with the earth as a spatial medium. It introduces a layered experience where users transition between light and darkness, compression and release.

Material weight is inspired by the physical and symbolic properties of coal and soot. The architecture expresses a sense of heaviness and permanence through the use of dense materials and solid forms. This creates a strong tactile identity that resonates with the industrial past of the site.

Together, these drivers form the Jelaga logic, a design framework that integrates narrative, material, and spatial strategies into a cohesive architectural expression.



## 5.2 Evolution of Form: The Excavation Strategy

The evolution of the building form is not conceived as a singular gesture, but as a gradual and iterative process that mirrors the act of mining itself. The massing strategy begins with the idea of a solid volume embedded within the earth, representing the coal seams that lie beneath the surface. This initial form is intentionally simple and monolithic, establishing a strong relationship with the ground.

From this starting point, the design undergoes a series of controlled subtractions, where portions of the mass are carefully removed to create internal spaces. This process can be understood as architectural excavation, where space is not added, but revealed. The resulting form is therefore a balance between solid and void, reflecting the duality of mass and emptiness that characterizes underground mining environments.

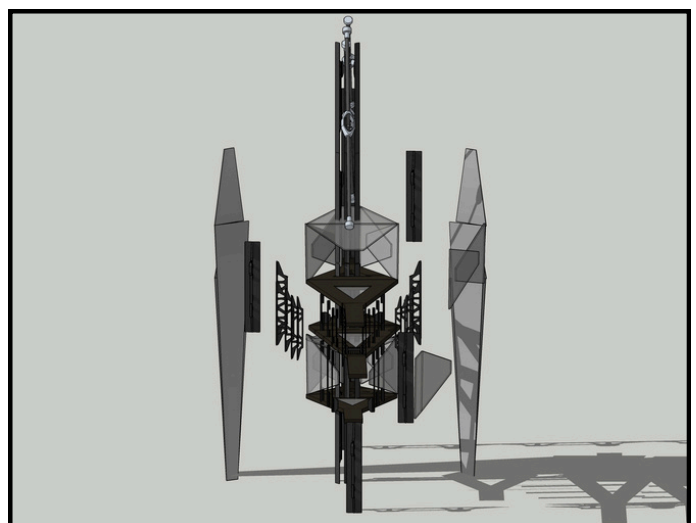
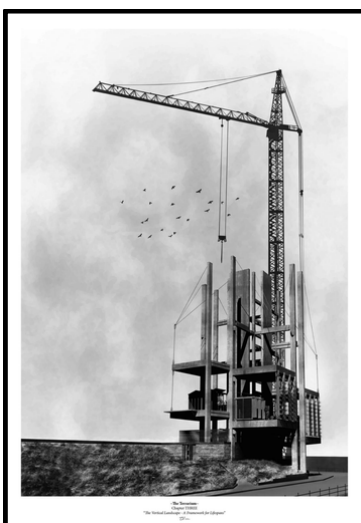
The introduction of voids plays a crucial role in shaping both spatial quality and environmental performance.

### I. Subtractive Logic

Voids are strategically carved into the mass to allow natural light to penetrate deep into the building. These openings are positioned based on functional requirements and solar orientation, ensuring that interior spaces receive sufficient daylight without excessive heat gain. This approach reflects the logic of ventilation shafts in traditional collieries, where vertical openings were essential for bringing light and air into enclosed underground environments.

### II. Fractured Geometry

The external expression of the building is intentionally fragmented, with edges that appear jagged and irregular. This fractured geometry is a direct reference to the raw condition of coal when it is first extracted from the earth. It avoids a polished or overly refined appearance, instead embracing imperfection as a form of authenticity that strengthens the overall architectural narrative.



### 5.3 Spatial Organization and The Linear Narrative

The spatial organization of the project is structured around a linear narrative that reflects the life cycle of coal. This arrangement allows users to experience the building as a continuous journey rather than a collection of separate spaces.

#### I. The Descent

The entrance sequence is designed as a transitional moment that prepares visitors for the journey ahead. The space is compressed and dimly lit, with a lower ceiling height that creates a sense of enclosure. This condition marks the beginning of the spatial narrative and introduces the atmosphere of the underground environment.

#### II. The Chamber

As visitors progress further, the space expands into large gallery volumes. These areas are defined by their monumental scale and controlled lighting conditions. Natural light enters from above, creating a soft and diffused illumination that enhances the display of heritage artifacts. The spatial quality evokes a sense of stillness and reflection, similar to that found in sacred or monumental spaces.

#### III. The Forge

The final stage of the sequence leads to the workshop area, where the focus shifts from observation to production. This space is open, flexible, and defined by its industrial character. High ceilings and exposed structural elements create a sense of scale and functionality, while visual transparency allows visitors to observe the process of transforming coal ash into new materials.

## 5.4 Technical Resolution: Industrial Tectonics and Structure

The technical resolution of the project is guided by the principle of honest tectonics, where structural and material systems are clearly expressed and form an integral part of the architectural language.

### I. Primary Structure

The main structural system consists of a steel portal frame, chosen for its efficiency and ability to span large distances. This system supports the creation of open and flexible spaces, particularly within the workshop area, while reinforcing the industrial identity of the project.

### II. The Soot Envelope

- The facade is designed as a material expression of the Jelaga concept, combining texture, depth, and durability.
- Charred timber is used to create a dark and tactile surface that reflects the visual qualities of soot while providing long term resilience.
- Pre cast coal ash concrete panels are introduced as an innovative material strategy, transforming industrial waste into a functional building component while supporting the concept of circular design.

### III. Subterranean Plinth

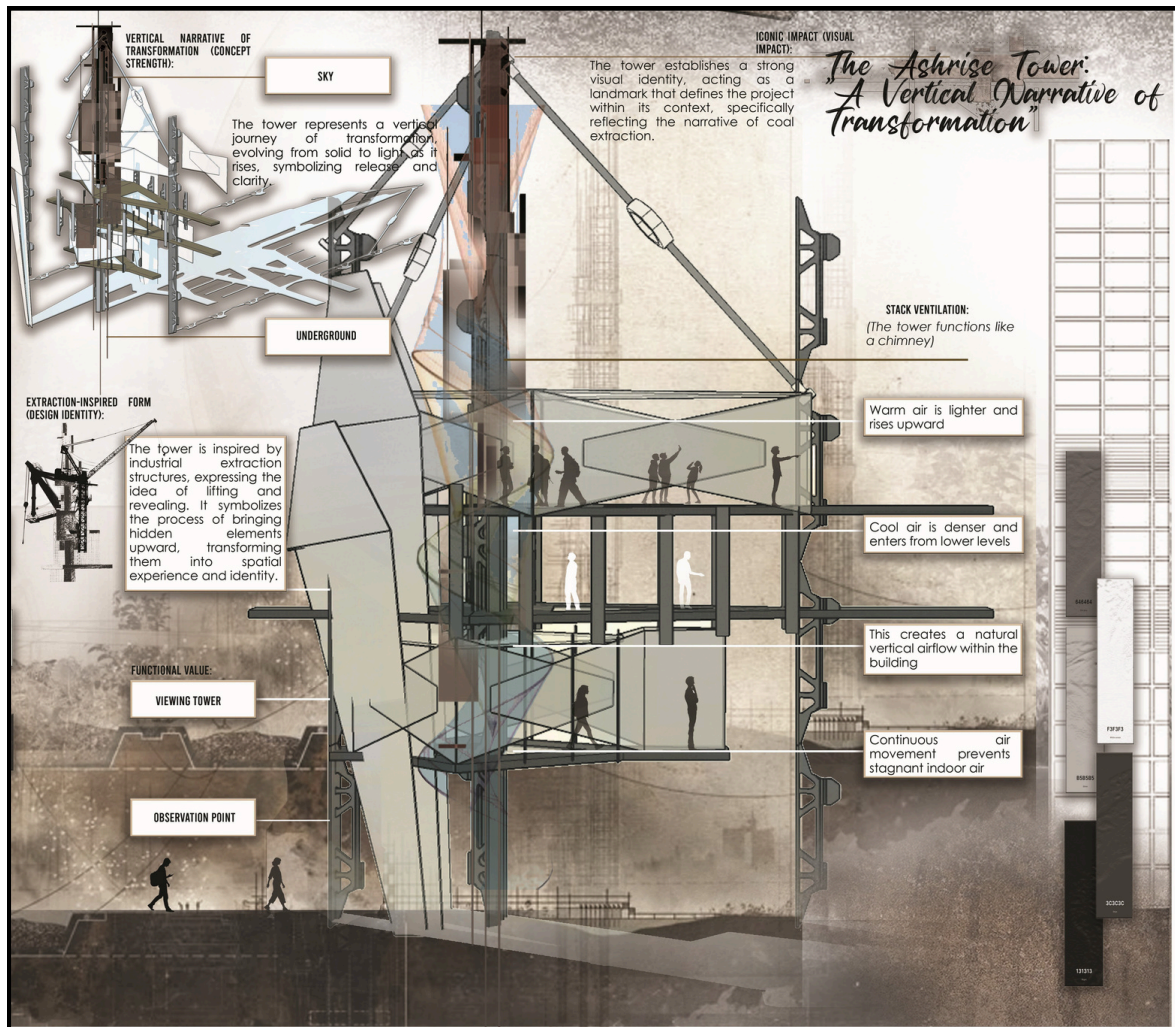
The base of the building is constructed using board marked concrete, providing structural strength and stability, particularly in areas where the building interacts directly with the ground. This plinth anchors the building to the site and reinforces the idea of a structure emerging from within the earth.

## 5.5 Sustainable Integration and Passive Systems

The project integrates passive environmental strategies into its overall design to enhance performance and reduce reliance on mechanical systems.

### I. The Stack Effect

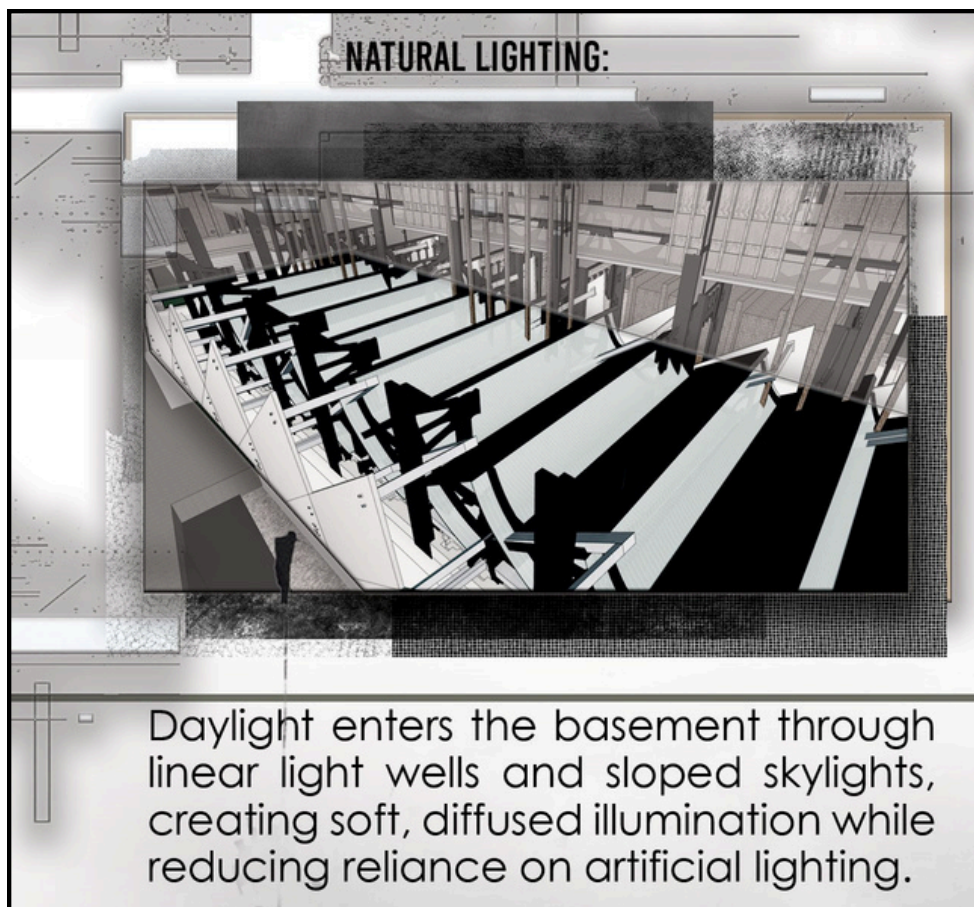
Vertical voids within the building function as natural ventilation shafts, allowing warm air to rise and escape through higher openings. This creates a continuous airflow that helps regulate internal temperature.



## II. Daylighting Strategy

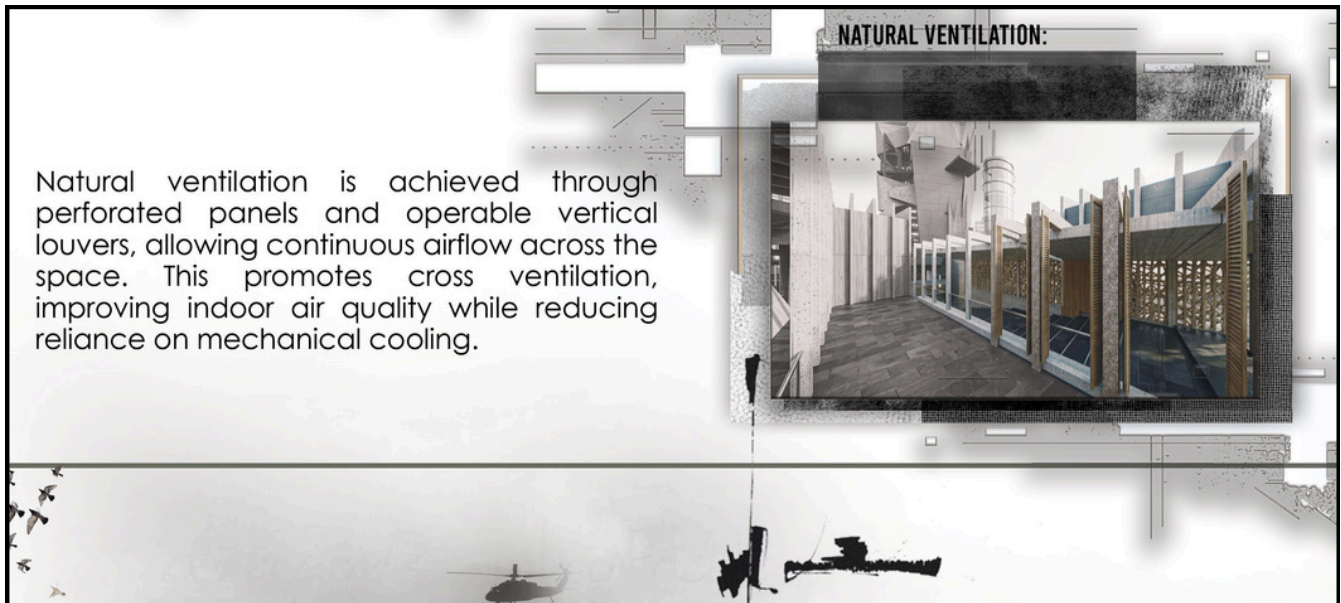
Openings and roof forms are carefully designed to allow natural light to enter the building in a controlled manner. This reduces the need for artificial lighting while improving the quality of interior spaces.

Natural lighting within the building is carefully orchestrated through the integration of linear light wells and sloped skylights, allowing daylight to penetrate deep into the basement spaces. This strategy ensures that even the lower levels, which are typically deprived of natural light, receive adequate illumination. The design promotes soft, diffused daylight, reducing glare while enhancing visual comfort for users. By maximizing the use of natural light, the building significantly reduces dependence on artificial lighting, contributing to energy efficiency and a more sustainable indoor environment.



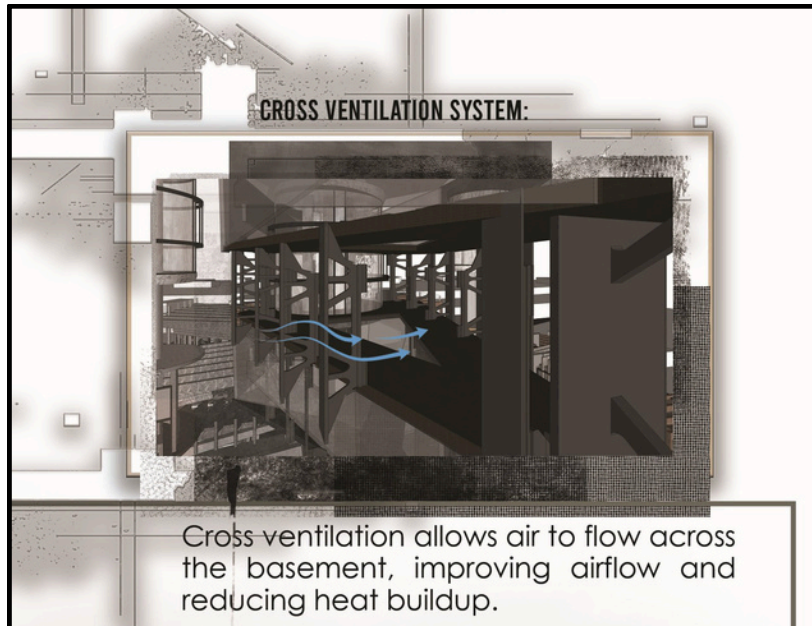
### III. Natural Ventilation

The building layout is aligned with prevailing wind directions, allowing air to move naturally through the spaces. This improves comfort levels and supports a healthier indoor environment.

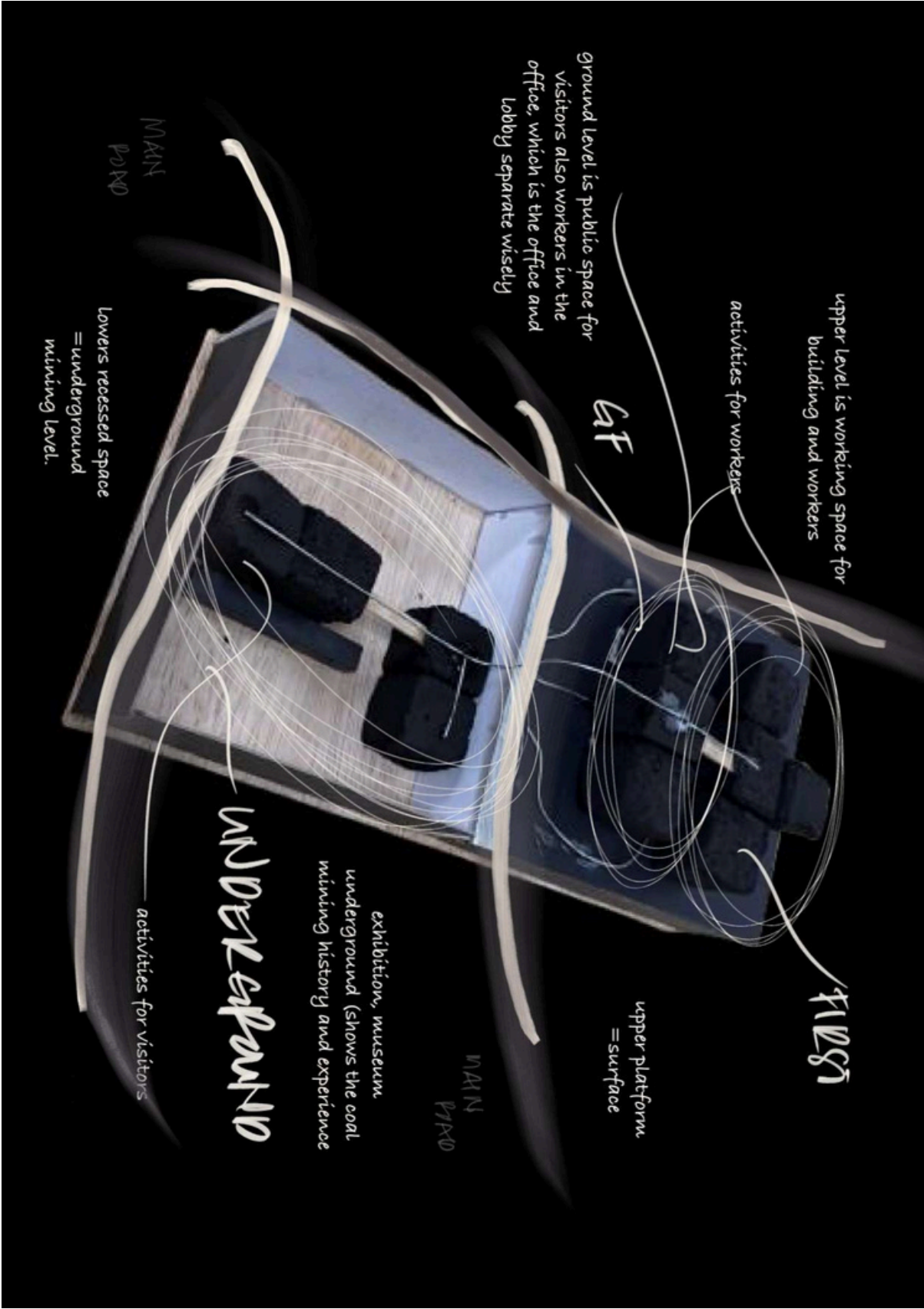


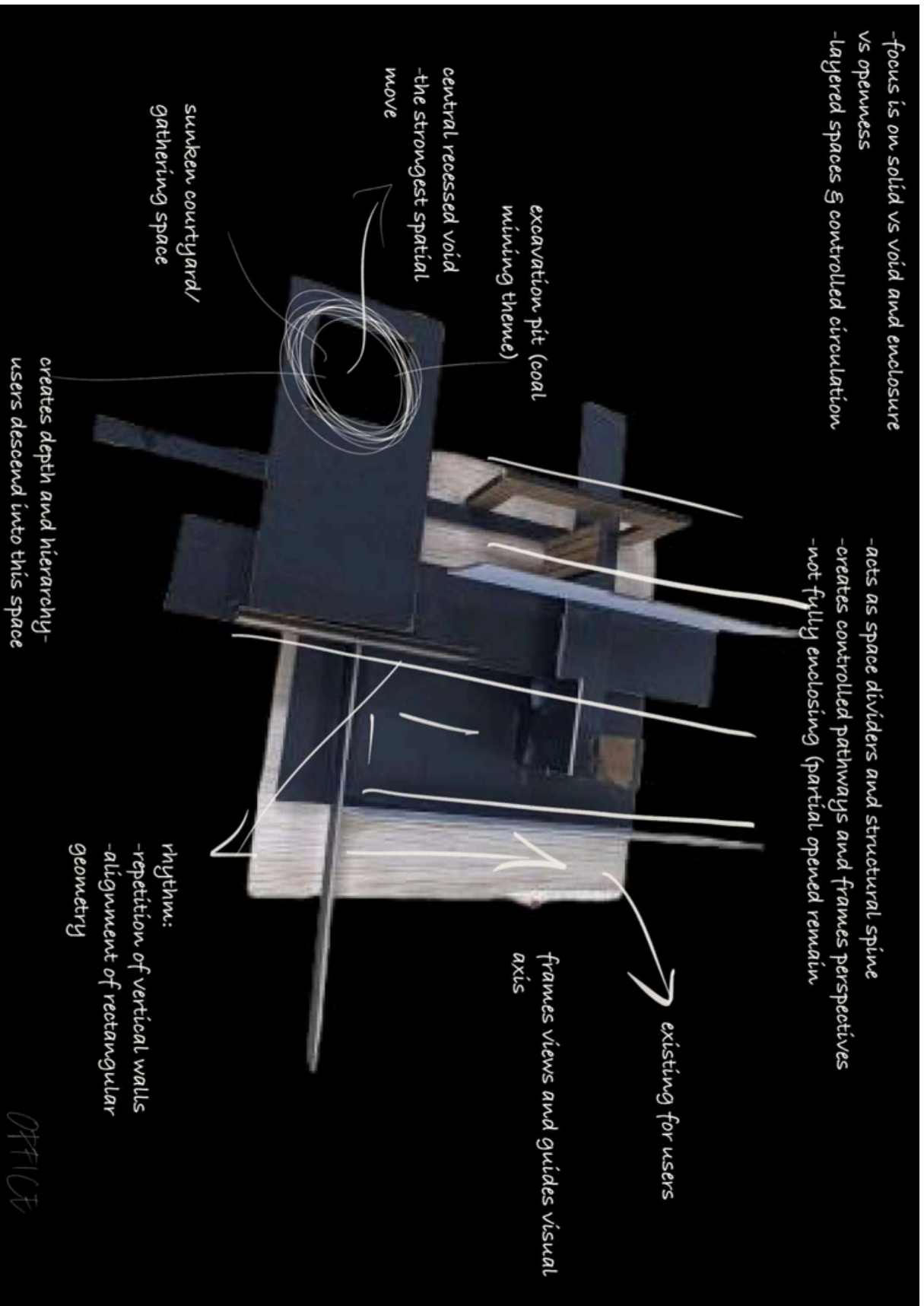
IV. Cross Ventilation

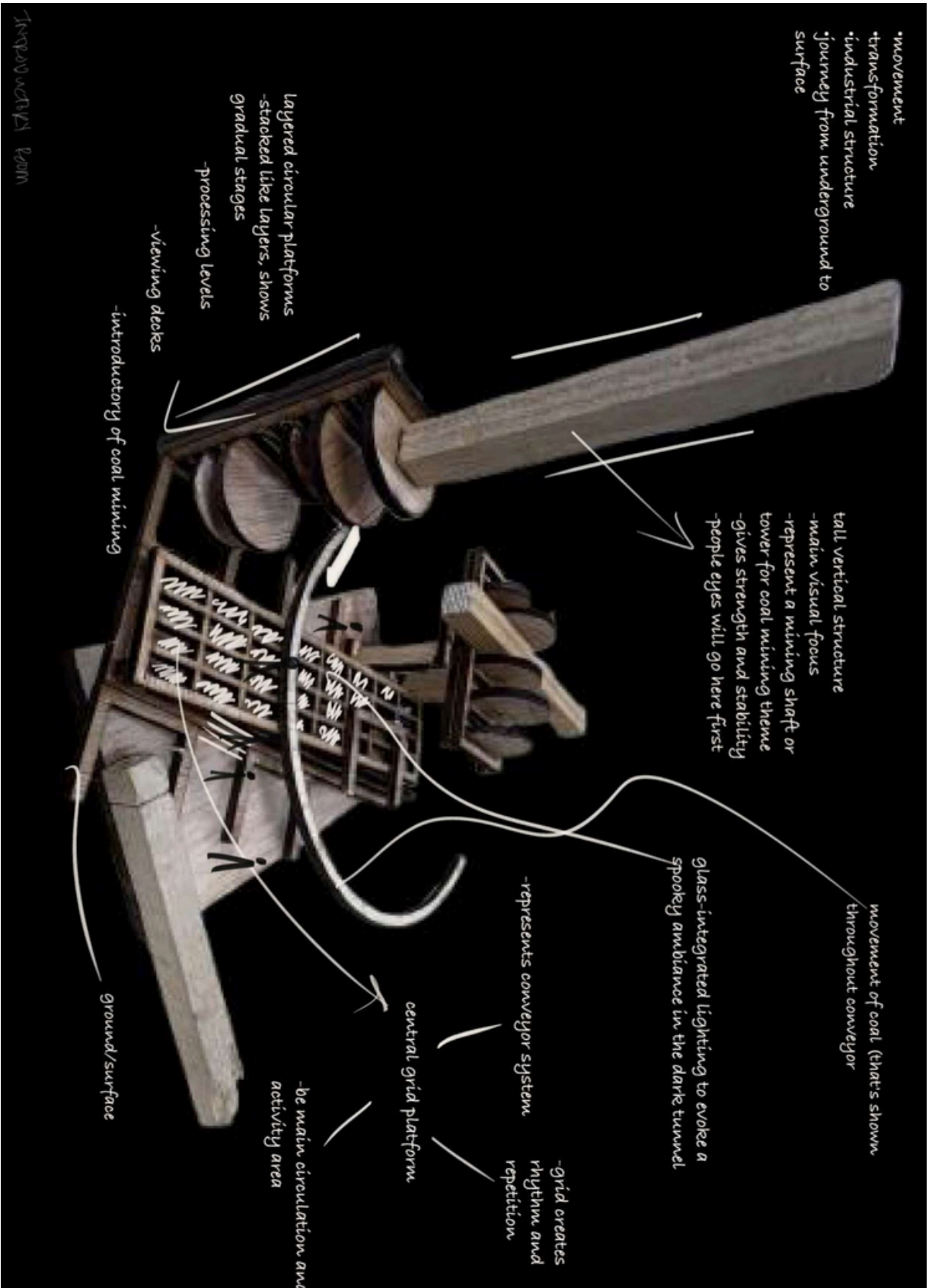
The building integrates a cross ventilation system to enhance natural airflow within the basement spaces, which are typically enclosed and prone to heat accumulation. Openings positioned on opposite sides of the structure allow air to move continuously across the interior, creating a pressure difference that drives natural ventilation. This strategy improves indoor air quality while effectively reducing heat buildup, resulting in a more comfortable and breathable environment. By minimizing reliance on mechanical ventilation, the design contributes to lower energy consumption and supports a more sustainable approach to environmental control.



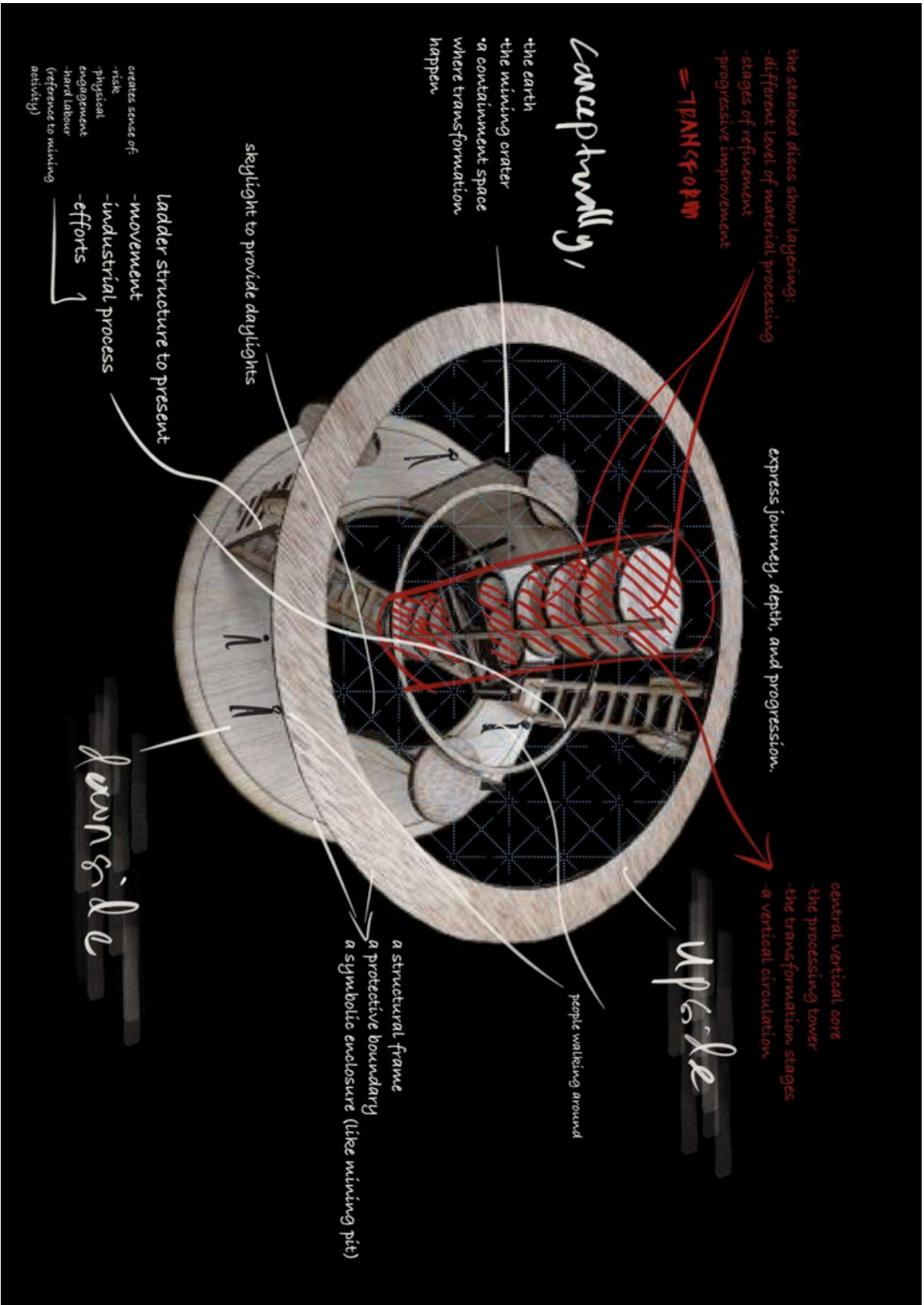
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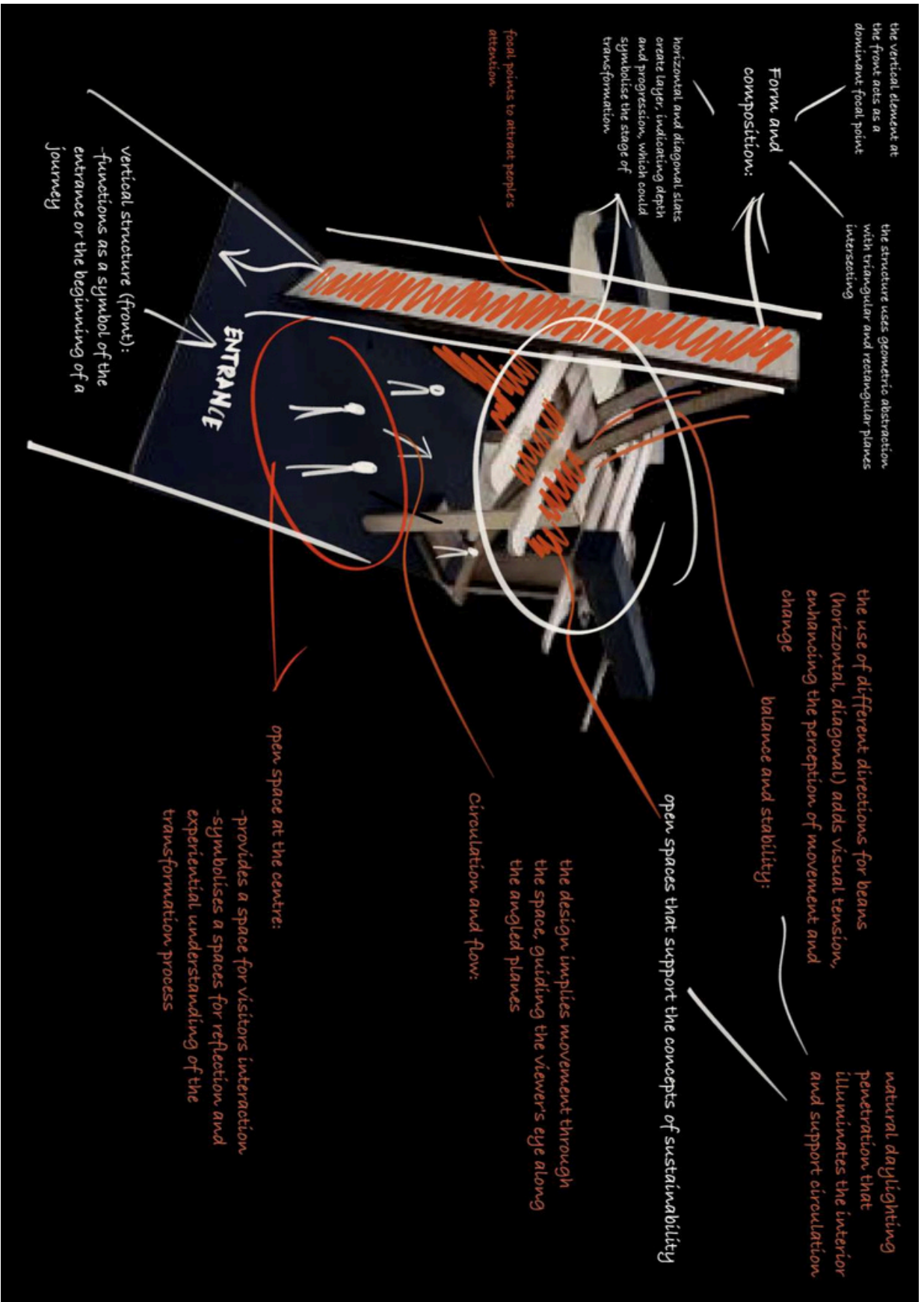


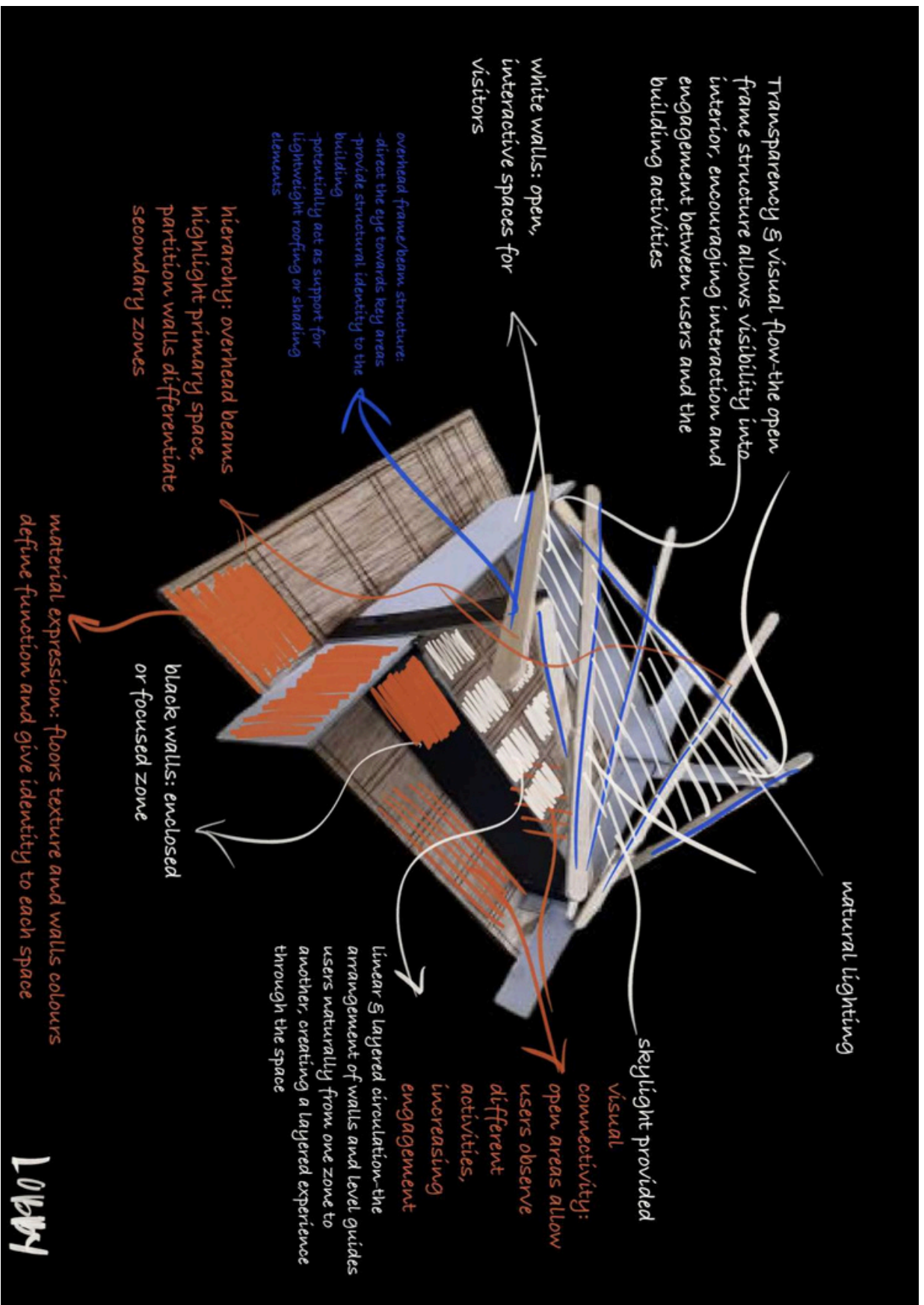


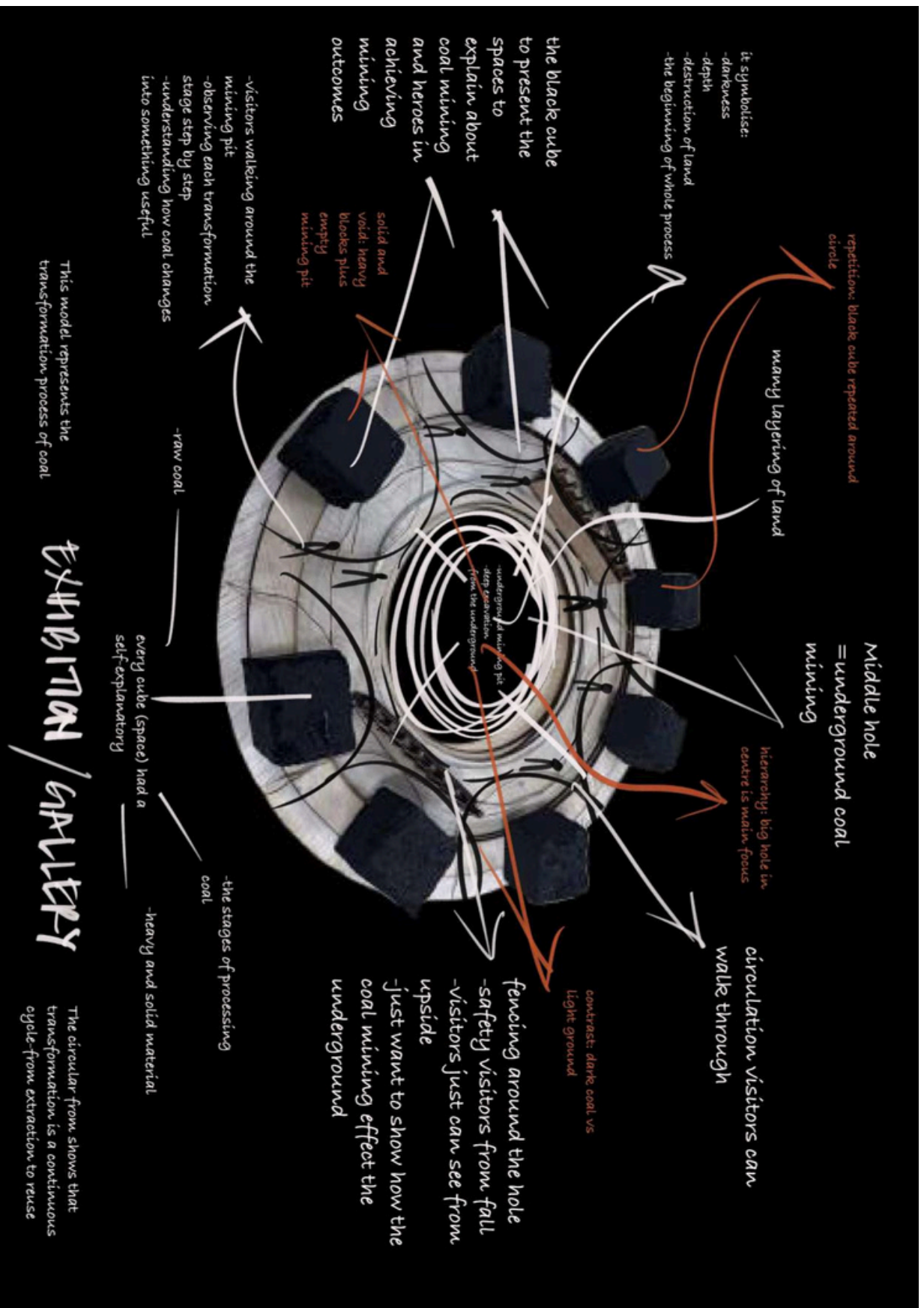


DESIGN DEVELOPMENT: FROM CONCEPT TO TECTONIC

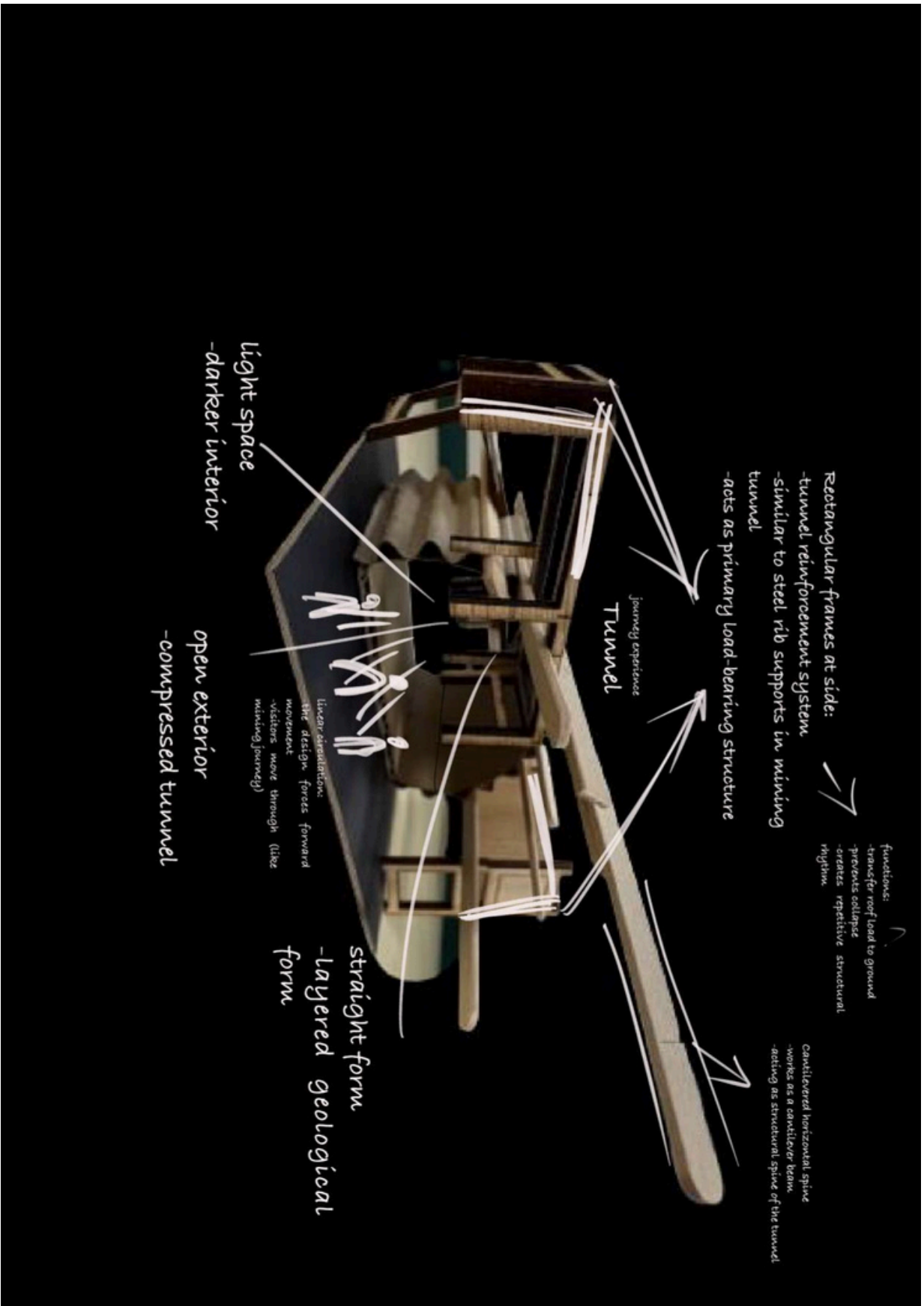




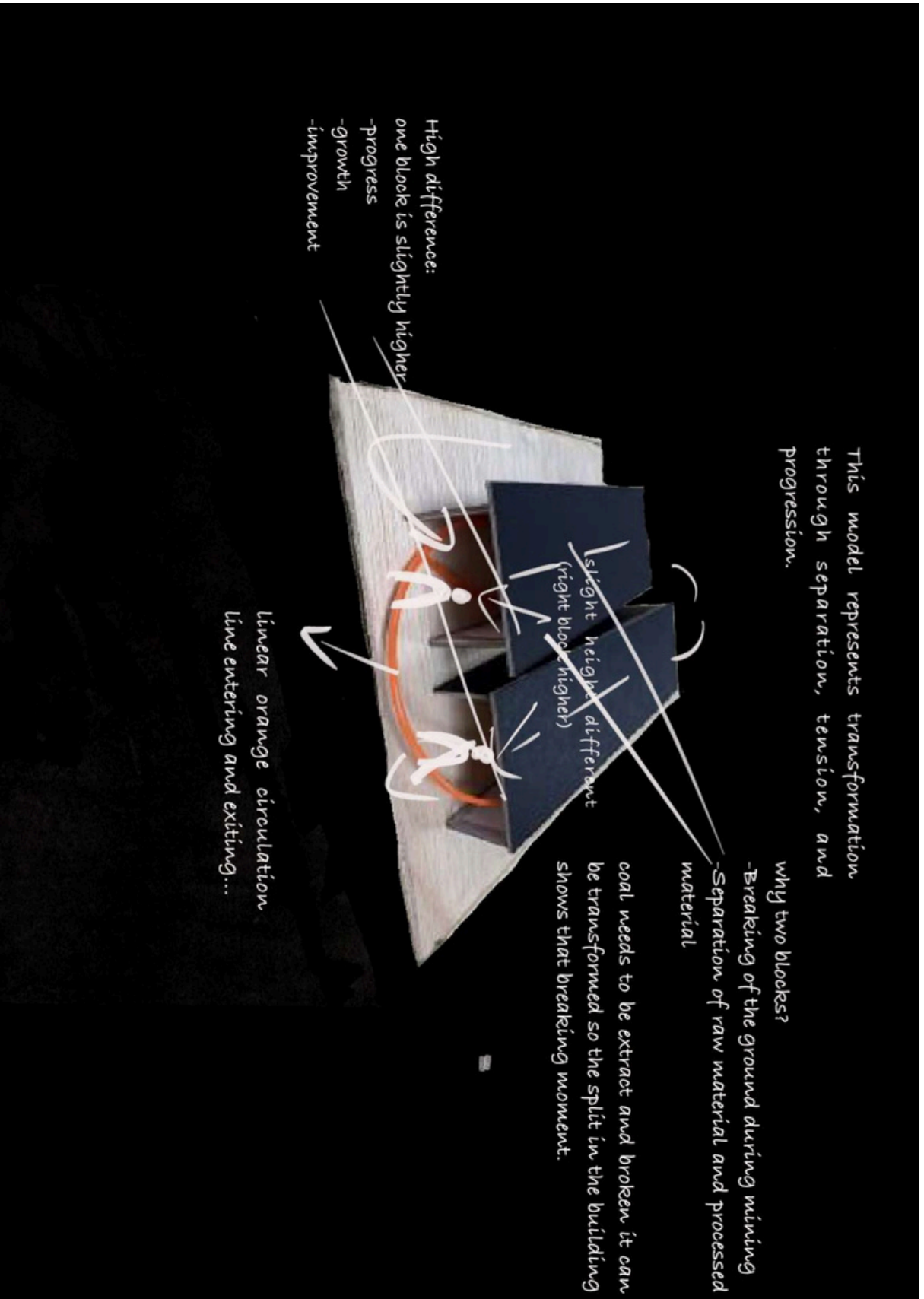


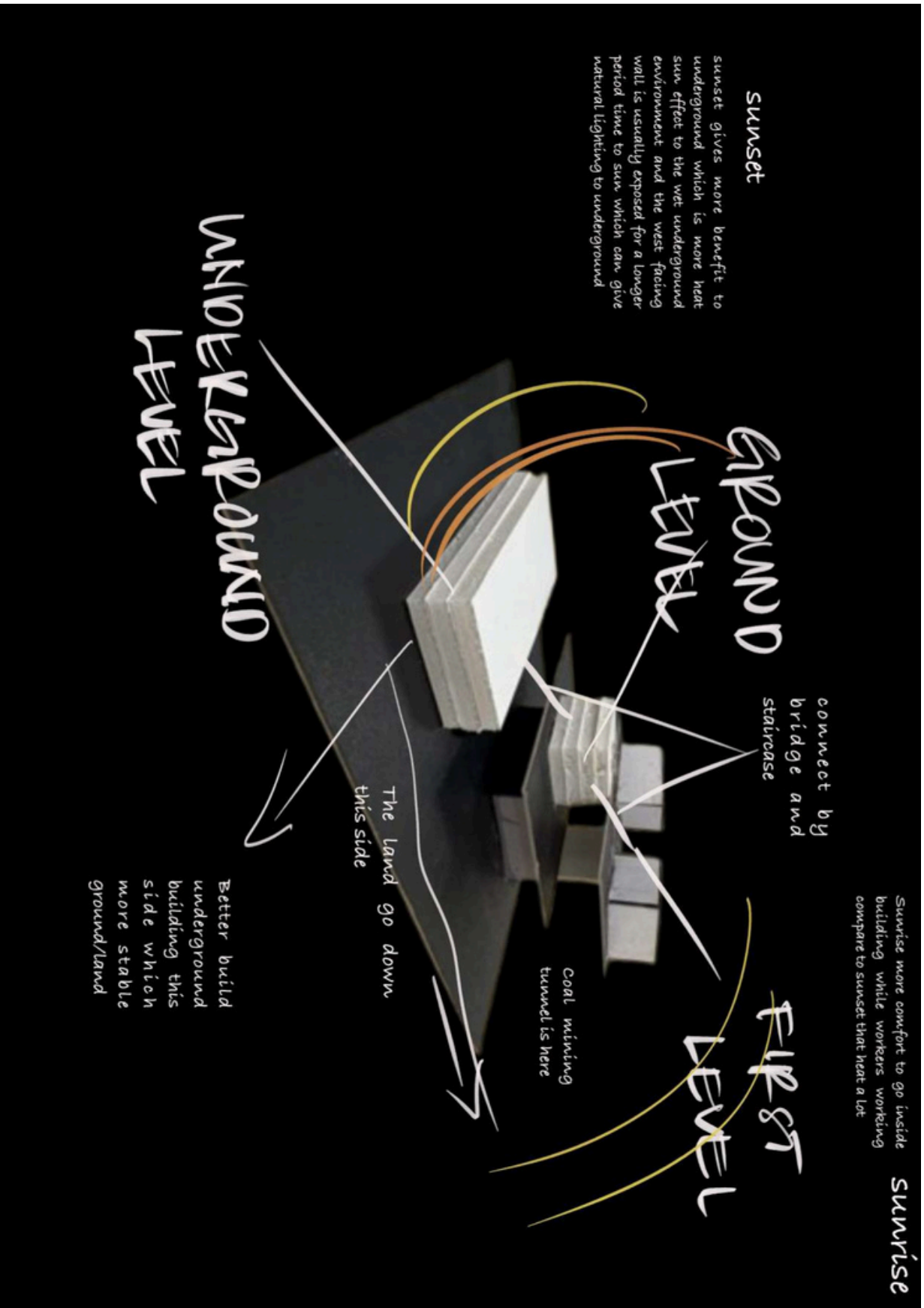


DESIGN DEVELOPMENT: FROM CONCEPT TO TECTONIC



DESIGN DEVELOPMENT: FROM CONCEPT TO TECTONIC





# Chapter 6

TECHNICAL DOCUMENTATION AND  
ARCHITECTURAL VISUALISATION

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## **6.0 TECHNICAL DOCUMENTATION & ARCHITECTURAL VISUALISATION**

### **6.1 The Technical Manifesto: Constructing Jelaga**

The technical resolution of the JELAGA project is conceived as a rigorous exploration of industrial tectonics, where construction is not merely a functional requirement, but a fundamental expression of the architectural narrative. At this stage, the project translates its conceptual foundation into a buildable system that is both structurally efficient and materially expressive. The building is envisioned as a robust and high performance envelope that responds directly to the harsh and raw character of Batu Arang's mining landscape.

Rather than concealing its construction, the project embraces a language of material honesty, where each component is clearly articulated and contributes to the overall identity of the architecture. The structural system is deliberately exposed, allowing users to understand how the building stands, spans, and performs. This approach reinforces the industrial heritage of the site, where structure and function were always visibly intertwined.

The structural logic prioritizes modularity and adaptability, ensuring that the building can accommodate large scale industrial activities while maintaining spatial flexibility. A primary steel exoskeleton is introduced as the main structural framework, allowing for wide, uninterrupted spans that are essential for both the workshop and gallery spaces. This system not only supports functional requirements, but also creates a strong visual rhythm that reflects the repetitive and mechanical nature of industrial construction.

### **6.2 Architectural Drawings: Spatial Breakdown**

The architectural drawings serve as a critical tool in communicating the spatial logic and experiential qualities of the project. Each drawing is developed not only as a technical document, but also as a narrative device that illustrates how users move through and interact with the building.

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### 6.2.1 Subterranean Floor Plan: The Excavated Archive

Designed at a level below the primary ground datum, the subterranean floor represents the most introspective layer of the project. This level houses the core heritage archives, where historical artifacts, records, and narratives are preserved within a controlled environment.

The spatial organization of this floor is guided by a carved logic, where circulation paths are intentionally narrow, enclosed, and directional. This creates a sense of compression that reflects the physical and psychological experience of moving through underground mine shafts. As users navigate through these spaces, moments of expansion are introduced in the form of larger chambers, providing contrast and relief.

#### I. Spatial Character

The atmosphere is intentionally subdued, with limited natural light and a focus on controlled illumination. This enhances the sense of depth and introspection, encouraging visitors to engage more closely with the exhibited materials.

#### II. Circulation Strategy

Movement is linear yet immersive, guiding users through a sequence of spaces that unfold gradually. This reinforces the narrative of descent and discovery, aligning with the overall concept of excavation.

### 6.2.2 Ground Floor Plan: The Forge of Innovation

The ground floor acts as the central hub of activity within the JELAGA complex, where the energy of production and experimentation is most visible. This level accommodates the coal ash workshops, which serve as spaces for research, fabrication, and material development.

The layout is designed around the concept of active transparency, where the boundaries between public and private zones are intentionally blurred. Visitors are able to observe the processes taking place within the workshops, creating a direct connection between knowledge and making.

#### I. Programmatic Zoning

The workshop areas are arranged in an open plan configuration, allowing for flexibility and adaptability. Supporting spaces such as storage, preparation areas, and service zones are integrated seamlessly into the layout.

#### II. Public Interface

A central concourse acts as the main circulation spine, connecting different parts of the building while providing clear visual access to the workshop activities. This creates an engaging environment where visitors can witness the transformation of coal ash into new architectural materials.

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### 6.2.3 Sectional Narrative: The Vertical Dialogue

The sectional drawings serve as one of the most critical representational tools in the JELAGA project, as they reveal the complexity of vertical relationships that cannot be fully understood through plans alone. Through these sections, the building is interpreted not just as a series of horizontal layers, but as a continuous spatial dialogue between ground, sub ground, and elevated volumes. This vertical articulation becomes essential in expressing the core narrative of descent and emergence that defines the coal mining experience.

The sections illustrate how the building negotiates between its embedded condition within the earth and its emergence into the open industrial landscape. At the lower levels, the architecture is dense, enclosed, and grounded, reflecting the weight and pressure of the subterranean environment. As the section rises, the spaces gradually open up, allowing more light and air to penetrate, creating a clear transition from compression to release. This sectional progression is carefully designed to evoke both physical and emotional responses from users as they move through different levels of the building.

#### I. Void Chimneys

The presence of vertical voids is a defining feature within the sectional composition. These voids function as environmental devices that facilitate natural ventilation through the stack effect. Warm air generated within the building rises through these vertical shafts and is expelled at higher openings, creating a continuous movement of air that helps regulate internal temperature.

Beyond their environmental function, these void chimneys also serve as spatial connectors that visually link different levels of the building. They introduce moments of vertical continuity, allowing users to perceive the full height of the space and understand their position within the overall structure. The interplay of light entering through these voids further enhances their presence, creating shafts of illumination that penetrate deep into the interior.

#### II. Spatial Contrast

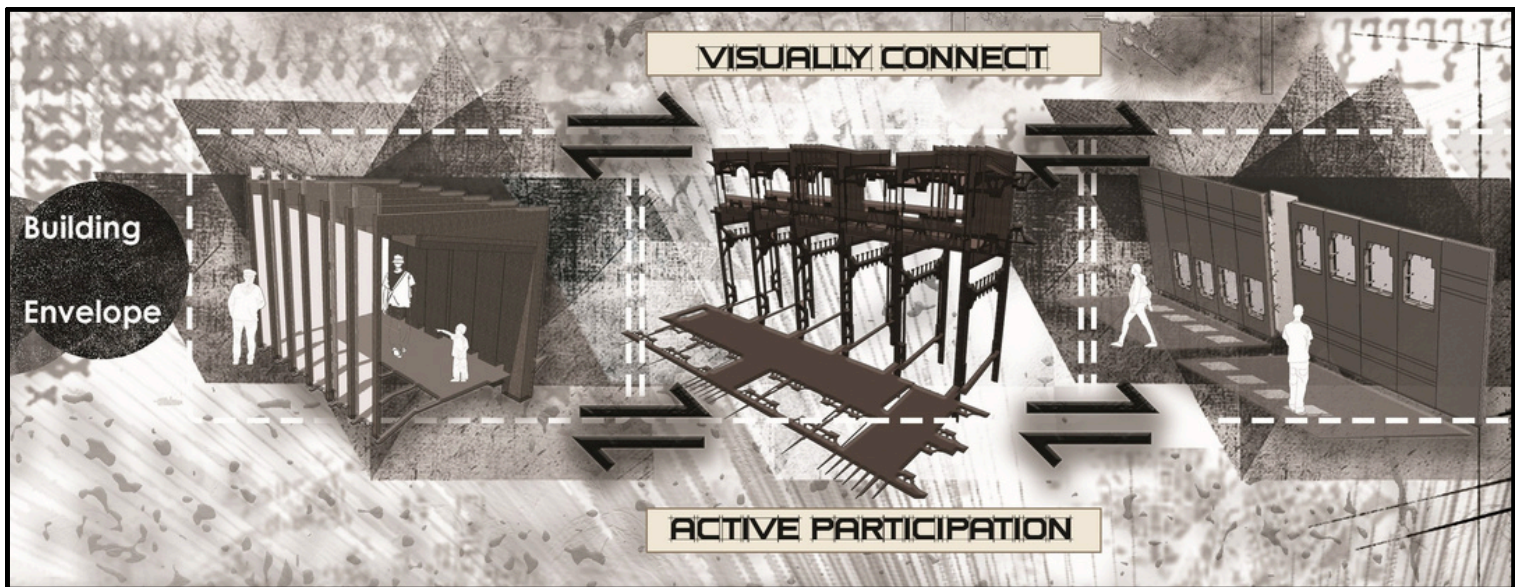
A strong contrast is established between the heavy, earth sheltered base and the lighter, more open upper levels of the building. This contrast is not only structural, but also experiential. The lower levels are characterized by thick walls, reduced openings, and a more controlled environment, reinforcing the sense of being within the earth. In contrast, the upper levels are more porous and visually connected to the surroundings, allowing for greater interaction with light, air, and external views.

This deliberate juxtaposition enhances the overall narrative of the project, where movement through the building reflects a transition from darkness to light, from confinement to openness. It also emphasizes the dual identity of the architecture as both a grounded and elevated structure.

### III. Structural Hierarchy

The sectional drawings clearly demonstrate the hierarchy of structural systems that support the building. The lower portion of the structure relies on reinforced concrete elements that provide stability and resistance against lateral earth pressure. These elements form a solid base that anchors the building securely within the terrain.

Above this base, the structure transitions into a steel framework that allows for larger spans and more flexible spatial configurations. This shift in structural system is expressed visually, reinforcing the idea of a building that evolves as it rises. The clarity of this structural hierarchy aligns with the principle of honest tectonics, where the method of construction is openly revealed rather than concealed.



### 6.3 Materiality and Envelope Specification

The material strategy of the JELAGA project is developed as an extension of its conceptual foundation, where each material is selected not only for its performance, but also for its ability to communicate meaning. The building envelope acts as a physical interface between the architecture and its environment, mediating factors such as light, heat, and weather while also expressing the identity of the project.

The Jelaga skin is conceived as a dynamic and evolving surface that responds to time and environmental exposure. Rather than maintaining a static appearance, the materials are chosen for their ability to age and weather, allowing the building to gradually integrate with the surrounding industrial ruins. This approach reinforces the idea that architecture is not fixed, but continuously shaped by its context.

#### I. Facade System

The facade is composed of pre cast concrete panels that incorporate approximately thirty percent recycled coal ash. This integration of industrial byproduct into the building fabric represents a direct translation of the project's concept into material form. The panels are treated with a dark carbonized finish, creating a surface that absorbs light rather than reflecting it. This results in a muted and textured appearance that closely resembles the visual quality of soot.

In addition to its symbolic value, this facade system provides durability and resistance to environmental conditions, ensuring long term performance. The modular nature of the panels also supports efficient construction and maintenance.

#### II. Structural Skeleton

The structural framework of the building is formed by oxidized steel elements that are intentionally left exposed. This decision reflects a commitment to material honesty, where the structural system is not hidden behind decorative finishes, but is presented as an integral part of the architectural expression.

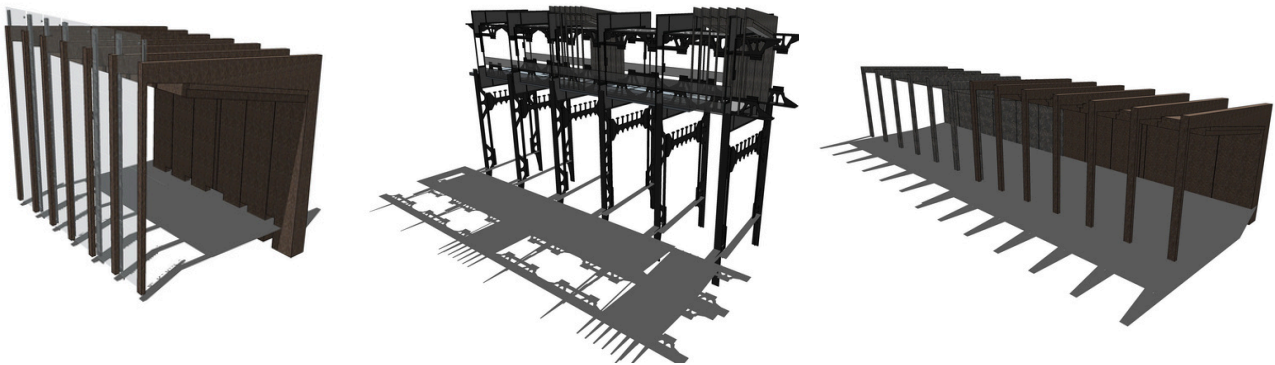
The natural oxidation process of the steel creates a protective layer that enhances its durability while contributing to its visual character. Over time, the material develops a rich patina that reinforces the industrial identity of the building. This evolving surface quality allows the structure to age alongside the surrounding ruins, creating a cohesive relationship between old and new.

#### III. Glazing System

The glazing strategy is carefully designed to balance transparency and performance. High performance low emissivity glass is used to minimize heat gain while maintaining visual clarity. These glazed elements are framed by slender steel mullions, which provide structural support while maintaining a minimal visual profile.

The placement of glazing is highly intentional, with openings positioned to capture and frame key views of the surrounding landscape. In particular, the remaining brick chimneys of Batu Arang are highlighted through these framed views, allowing the historical context to remain visually present within the interior spaces.

## 6.4 Visualisation: The Atmospheric Experience



The visualisations produced for the JELAGA project are developed as analytical tools that explore the atmospheric qualities of the architecture. Rather than focusing solely on representation, these images aim to capture the sensory experience of the building, including its light conditions, material textures, and spatial depth.

A key concept explored within these visualisations is the relationship between light and shadow, often described as the *chiaroscuro* of coal. This approach emphasizes contrast, where areas of brightness and darkness interact to create a sense of drama and intensity. This is particularly relevant to the project, as it reflects the environmental conditions of mining spaces, where light is scarce and carefully controlled.

### I. Interior Perspectives

The interior visualisations focus on the gallery spaces, where light is introduced from above through controlled openings. As light filters down into the space, it interacts with structural elements and material surfaces, creating layered patterns of illumination. This produces a dynamic environment where light is constantly shifting throughout the day.

The quality of this light is intentionally soft and diffused, enhancing the atmosphere of contemplation and reflection. The scale of the space, combined with the controlled lighting, creates a sense of monumentality that elevates the experience of viewing the exhibits.

### II. Exterior Perspectives

The exterior visualisations capture the building within its broader environmental context, emphasizing its relationship with the landscape and the existing industrial remnants. Particular attention is given to moments of transition, such as dusk, where the contrast between the building and the sky becomes most pronounced.

At this time, the dark mass of the JELAGA complex appears as a strong silhouette against the fading light, reinforcing its identity as a contemporary industrial landmark. Despite its bold presence, the building remains respectful of the surrounding context, aligning with the scale and character of the historical skyline.

Through these visualisations, the project communicates not only its physical form, but also the atmosphere and emotion that define the overall architectural experience.

# Chapter 7

FINAL DESIGN

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## 7.0 FINAL DESIGN: JELAGA ARCHITECTURAL RESOLUTION

This chapter presents the finalized architectural resolution of the JELAGA Coal Mining Heritage and Innovation Centre. It represents the culmination of a comprehensive design process where conceptual narratives, site analysis, and technical strategies are translated into a cohesive architectural proposal. The design reinterprets the raw and subterranean narrative of coal extraction into a contemporary industrial tectonic facility that functions both as a centre for material innovation and as a platform for historical preservation.

The project is conceived not only as a building, but as an experiential environment that allows users to engage with the legacy of coal mining through spatial, material, and atmospheric qualities. By integrating workshop functions with exhibition spaces, the architecture bridges the past and future of Batu Arang, transforming industrial residue into a catalyst for regeneration.

### 7.1 Site Plan: Industrial Scape

The site plan illustrates how the JELAGA complex is carefully integrated into the existing man made topography of Batu Arang. The design responds directly to the industrial scars left by former mining activities, treating them not as constraints but as opportunities for architectural intervention. The terrain, shaped by years of excavation and soil displacement, becomes an active element that informs the placement and form of the building.

The overall planning strategy ensures that the architecture sits harmoniously within the landscape, minimizing visual disruption while reinforcing the historical identity of the site. The relationship between built form and ground is carefully articulated to reflect the logic of mining, where architecture appears to emerge from within the earth.

#### Design Highlights

##### I. Subterranean Integration

The building footprints are partially embedded into the natural slope, creating a condition where the architecture is both visible and concealed. This approach mimics the entrance of a mine shaft, reinforcing the conceptual narrative of descent while also benefiting from the thermal properties of the ground.

##### II. Zonal Hierarchy

A clear spatial hierarchy is established between industrial and public functions. Heavy duty workshop zones are positioned in areas that allow for efficient logistical access, while the exhibition galleries are located in more controlled and accessible zones for visitors. This separation ensures operational efficiency without compromising the visitor experience.



## 7.2 Floor Plan: The Mining Journey

The floor plans are developed as a spatial narrative that reflects the life cycle of coal, guiding visitors through a structured journey from extraction to innovation. Rather than organizing spaces purely based on function, the design emphasizes experiential sequencing, allowing movement through the building to become an integral part of the storytelling process.

### Plan Features

#### I. Public to Private Transition

The spatial sequence begins at the entrance foyer, which acts as a transitional threshold between the external environment and the internal narrative. Visitors are then led into the subterranean gallery, referred to as the dark heart, where the focus is on historical interpretation. Beyond this, the journey continues into semi public areas such as laboratories and innovation workshops, where knowledge and production intersect.

#### II. Operational Workflow

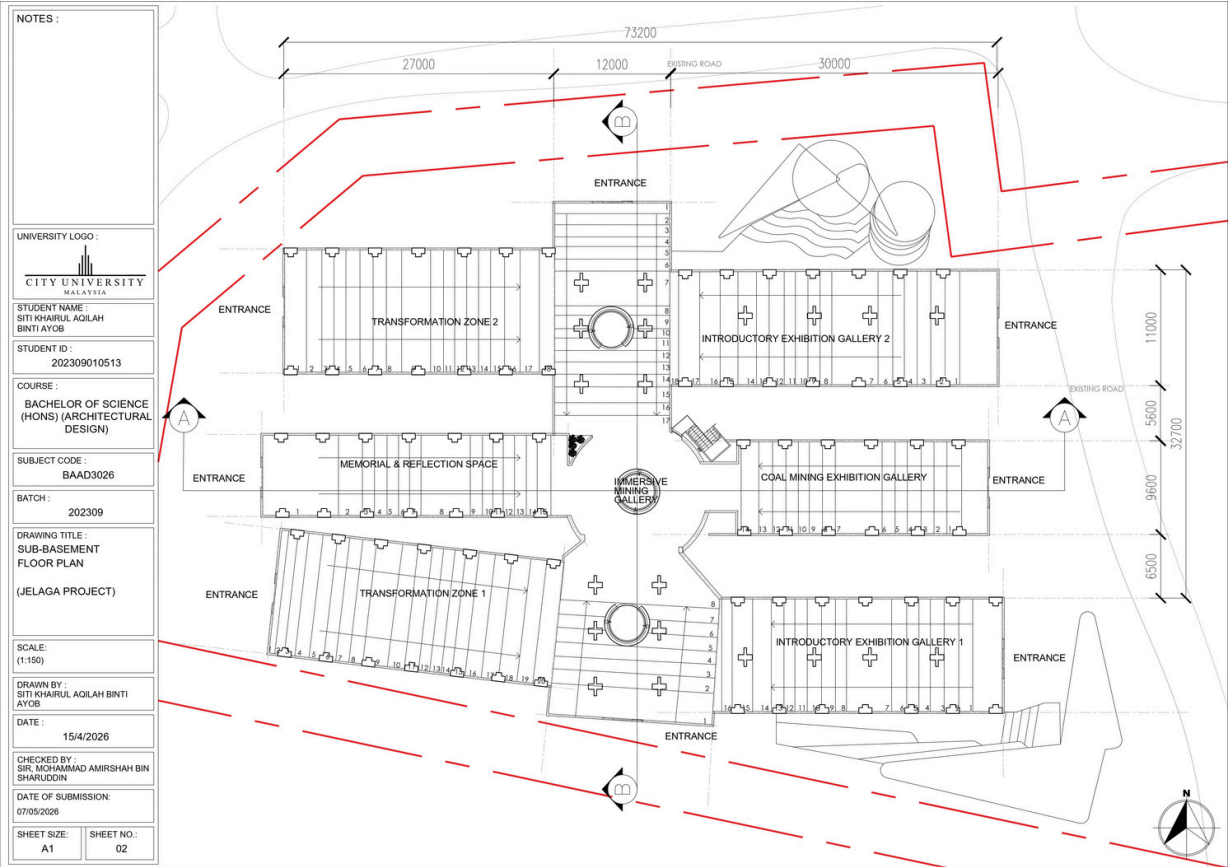
The layout supports a logical progression of activities, beginning with material research in the laboratory, followed by prototype development in the workshop, and culminating in the display of outcomes within the gallery. This workflow ensures that the building functions as both a research facility and an educational environment.

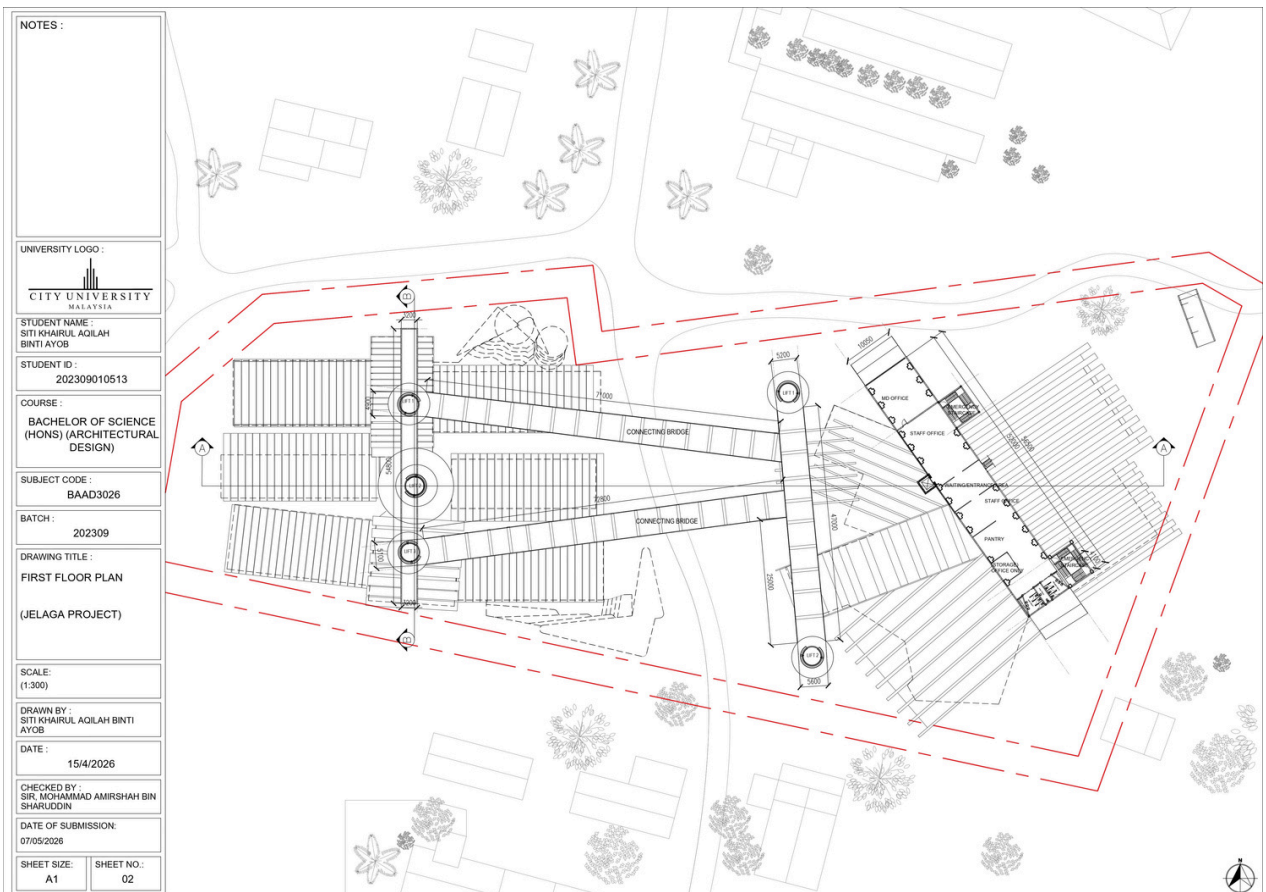
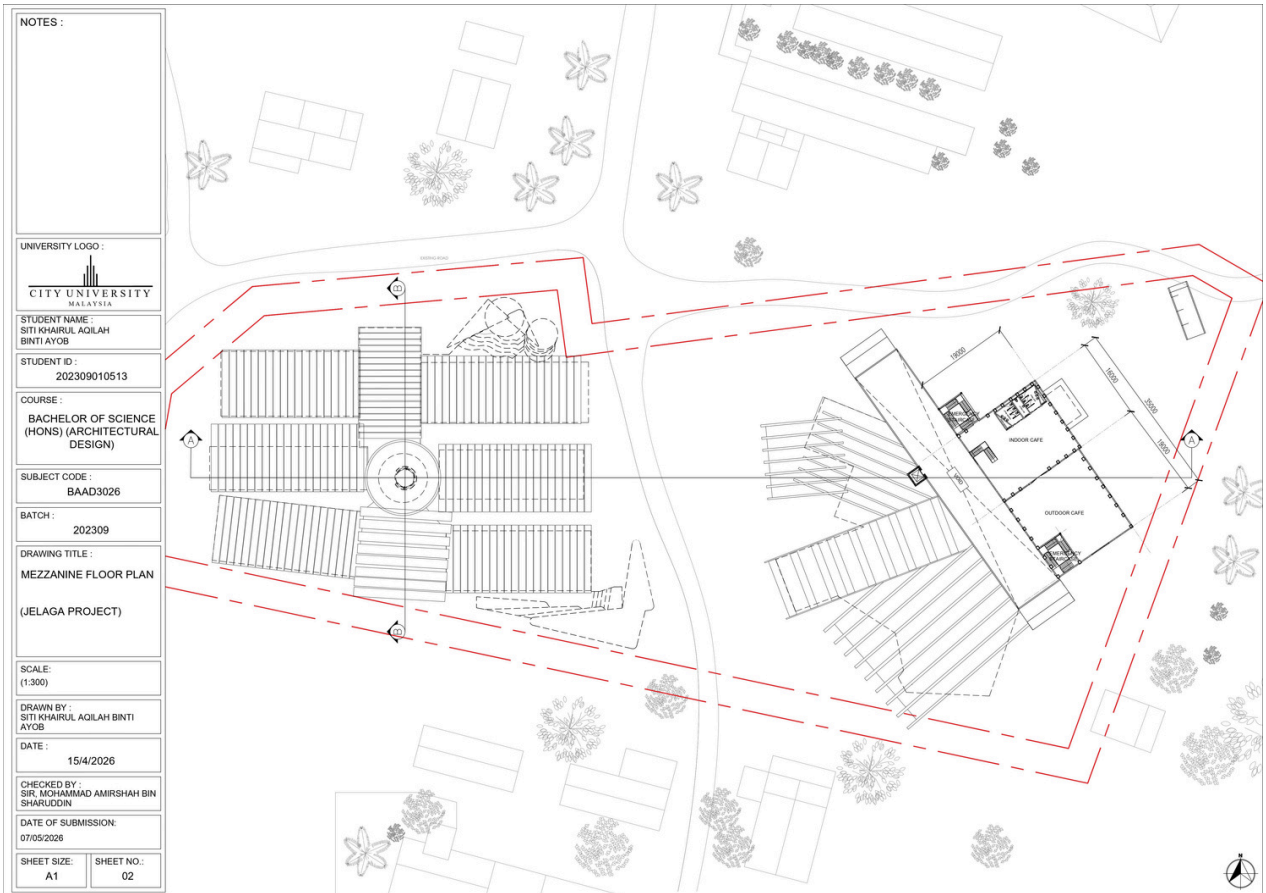
#### III. Atmospheric Voids

Central light wells and vertical void chimneys are integrated into the plan to bring natural light into deeper parts of the building. These elements not only enhance environmental performance, but also contribute to the spatial experience by creating moments of vertical connection and visual interest.

#### IV. Modular Workshop Units

The workshop spaces are designed with flexibility in mind, featuring modular layouts that can accommodate heavy machinery and various forms of material testing. This adaptability allows the building to respond to changing technological needs over time.





### 7.3 Elevations: The Silhouette Of Soot

The elevation drawings express the external identity of the building, emphasizing its scale, materiality, and relationship with the industrial landscape. The design avoids excessive ornamentation, instead relying on form, proportion, and material expression to convey its architectural intent.

#### Key Elements Shown

##### I. Fractured Volumes

The overall massing is articulated through a series of jagged and irregular forms that reflect the raw condition of coal when it is extracted. This fractured geometry creates a dynamic and expressive silhouette that reinforces the concept of industrial fragmentation.

##### II. Material Contrast


The façade combines charred timber and pre cast coal ash concrete panels, creating a dark and textured surface that embodies the visual quality of soot. This contrast between materials adds depth and variation to the building envelope while maintaining a cohesive Jelaga identity.

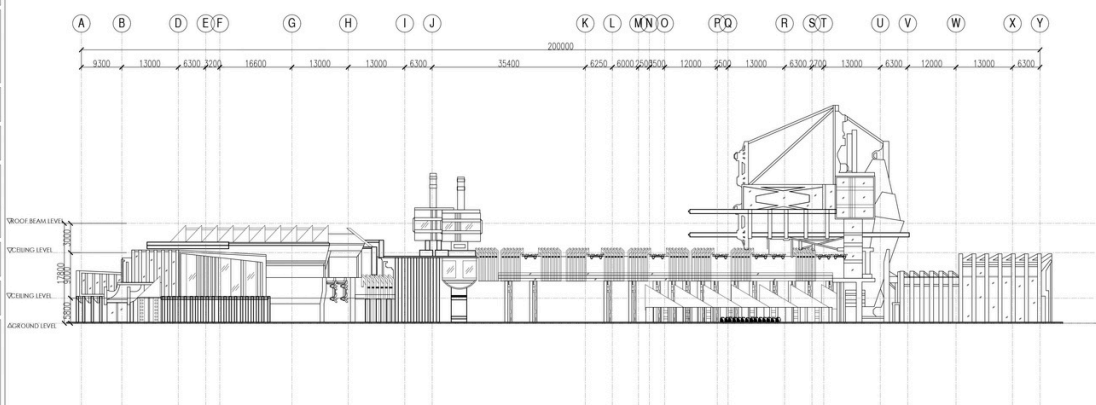
##### III. Industrial Rhythm


The exposed steel portal frames establish a clear structural rhythm across the elevations. This repetitive pattern echoes the architectural language of early twentieth century colliery structures, reinforcing the connection between past and present.

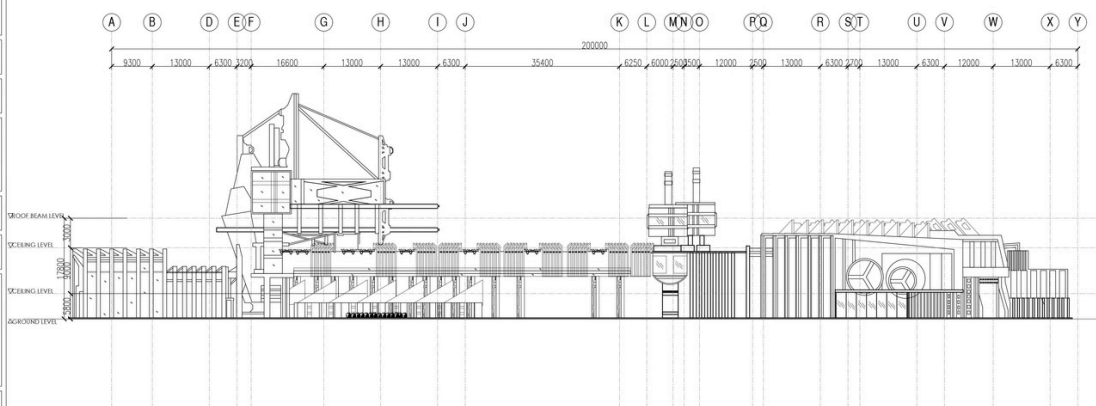
##### IV. Controlled Fenestration


Openings are carefully designed to limit excessive heat gain while framing specific views of the surrounding industrial context. Narrow vertical windows create a sense of enclosure while directing attention towards key visual elements within the site.

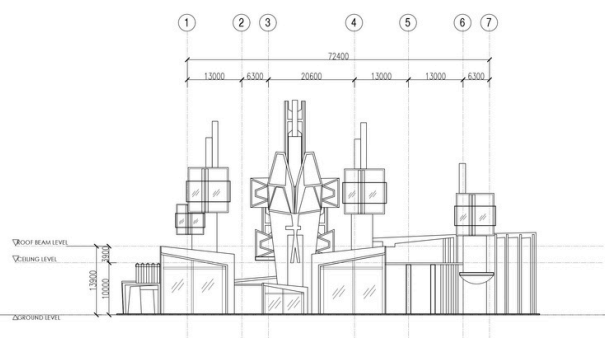
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STUDENT ID: 202309010513	
COURSE: BACHELOR OF SCIENCE (HONS) (ARCHITECTURAL DESIGN)	
SUBJECT CODE: BAAD3026	
BATCH: 202309	
DRAWING TITLE: FRONT ELEVATION (JELAGA PROJECT)	
SCALE: (1:350)	
DRAWN BY: SITI KHAIRUL AQILAH BINTI AYOB	
DATE: 15/4/2026	
CHECKED BY: SIR. MOHAMMAD AMIRSHAH BIN SHARUDDIN	
DATE OF SUBMISSION: 07/05/2026	
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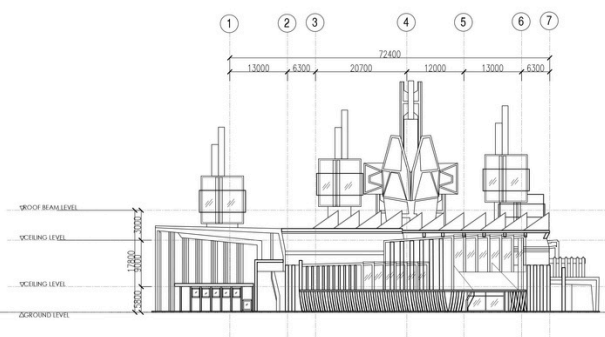
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STUDENT ID: 202309010513	
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SUBJECT CODE: BAAD3026	
BATCH: 202309	
DRAWING TITLE: REAR ELEVATION (JELAGA PROJECT)	
SCALE: (1:350)	
DRAWN BY: SITI KHAIRUL AQILAH BINTI AYOB	
DATE: 15/4/2026	
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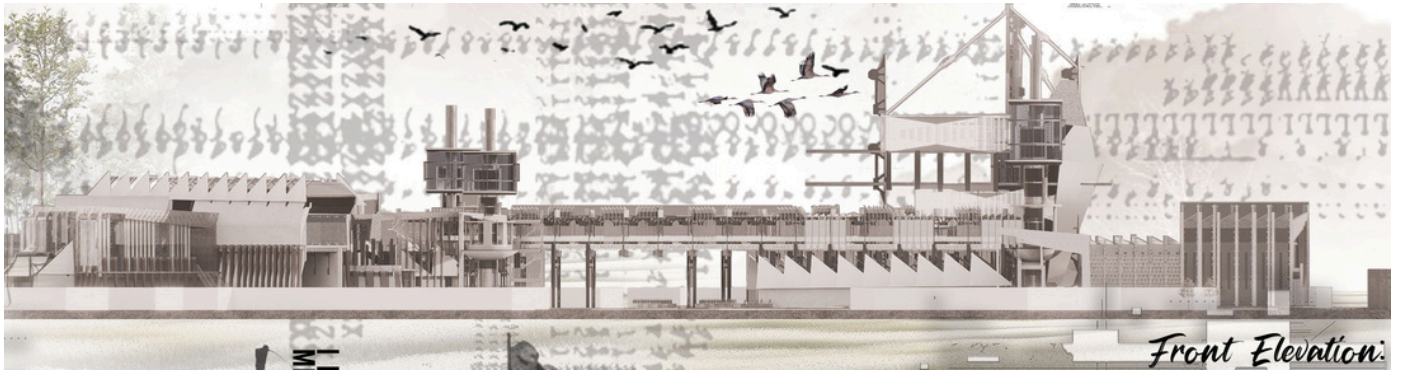


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STUDENT ID : 202309010513	
COURSE : BACHELOR OF SCIENCE (HONS) (ARCHITECTURAL DESIGN)	
SUBJECT CODE : BAAD3026	
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DRAWING TITLE : RIGHT ELEVATION (JELAGA PROJECT)	
SCALE : (1:350)	
DRAWN BY : SITI KHAIRUL AQILAH BINTI AYOB	
DATE : 15/4/2026	
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COURSE : BACHELOR OF SCIENCE (HONS) (ARCHITECTURAL DESIGN)	
SUBJECT CODE : BAAD3026	
BATCH : 202309	
DRAWING TITLE : LEFT ELEVATION (JELAGA PROJECT)	
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### 7.4 Sections: The Tectonic Of Depth

The sectional drawings provide insight into the vertical complexity of the building and its relationship with the terrain. They reveal how the architecture engages with depth, both physically and conceptually, to create a layered spatial experience.

#### Design Aspects Shown

##### I. The Sectional Excavation

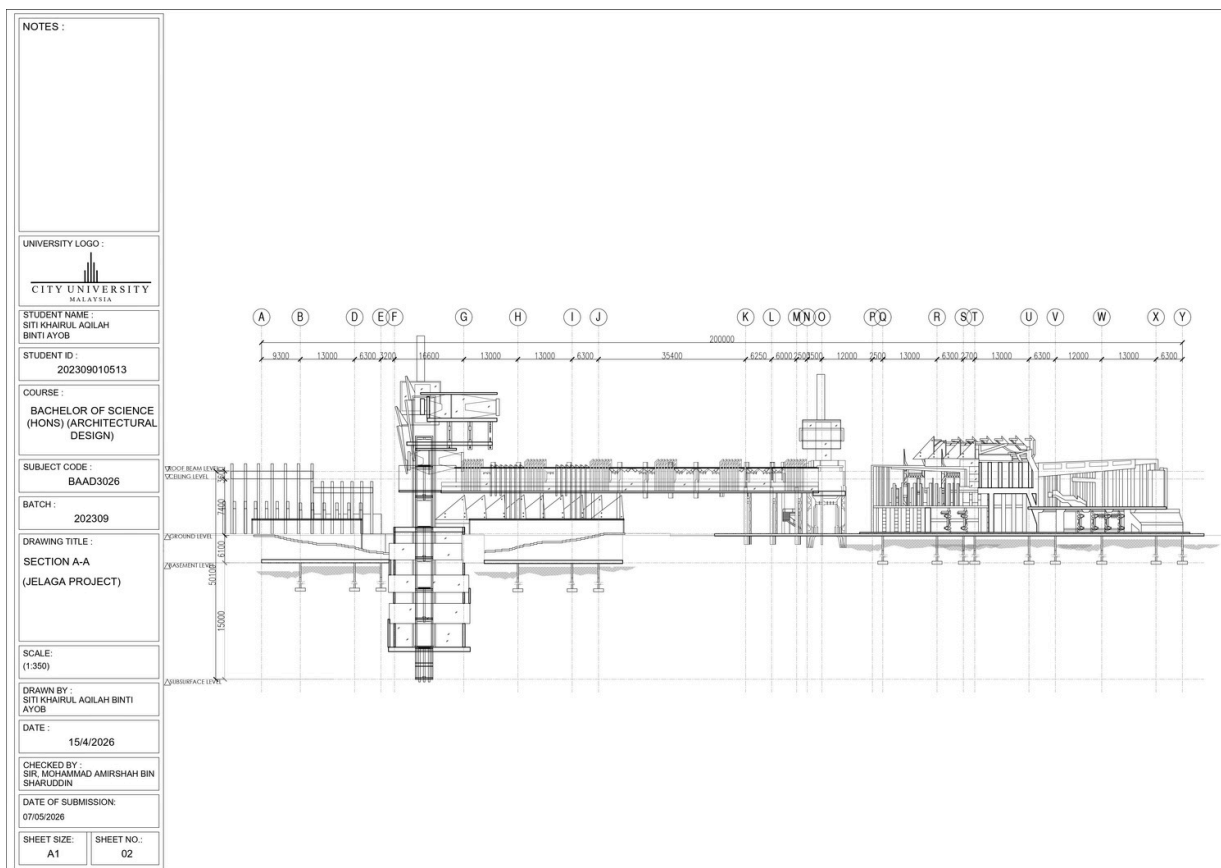
The building is shown cutting into the slope, creating subterranean gallery spaces that are embedded within the earth. This approach reinforces the narrative of excavation and establishes a strong connection between architecture and ground.

##### II. Thermal Flues

The workshop volumes are designed with double height spaces that support natural ventilation through the stack effect. Warm air rises and is released through roof openings, improving thermal comfort without reliance on mechanical systems.

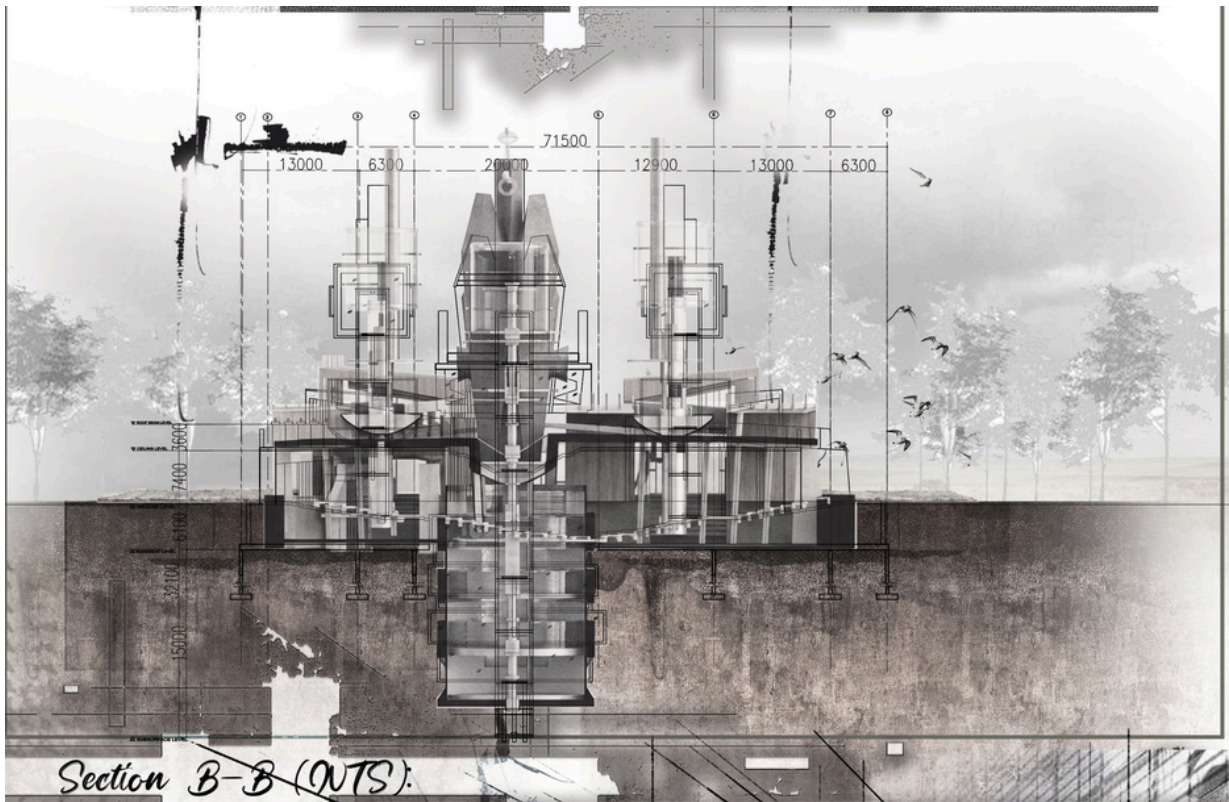
##### III. Light Wells

Deep vertical shafts introduce natural light into the underground spaces, creating dramatic lighting conditions that enhance the display of artifacts. These light wells contribute to the atmospheric quality of the interior, transforming the gallery into a space of reflection and reverence.



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SUBJECT CODE : BAAD3026	
BATCH : 202309	
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CHECKED BY : SIR MOHAMMAD AMIRSHAH BIN SHARUDDIN	
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Section B-B (NTS).

## 7.5 Perspective Views

The perspective views are developed to communicate the sensory and emotional qualities of the JELAGA project. They focus on the interplay of light and shadow, creating a strong visual narrative that reflects the conditions of mining environments.

### Key Perspectives Included

#### I. The Descent

This view captures the transition from the external environment into the interior, highlighting the heavy concrete surfaces and the gradual movement into darkness. It establishes the beginning of the experiential journey.

#### II. The Forge

The workshop interior is presented as a dynamic and active space, where steel structures, material processes, and filtered natural light come together to create a productive environment.

#### III. The Gallery of Shadows

The subterranean gallery is depicted as an immersive space where focused lighting highlights the displayed artifacts. The controlled use of light creates a sense of depth and intensity, reinforcing the concept of black gold.

#### IV. Evening Glow

The exterior perspective at dusk shows the building illuminated from within, with light filtering through perforated surfaces. This creates a warm and inviting presence that contrasts with the dark mass of the building.



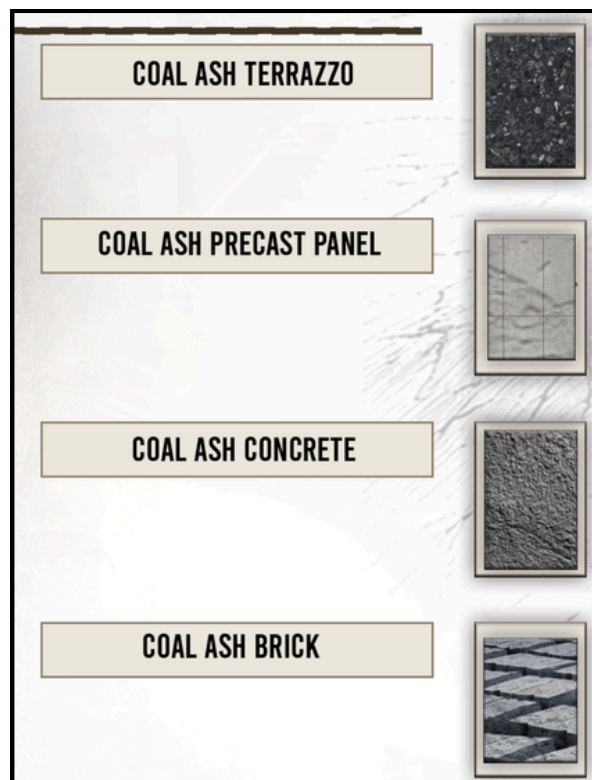


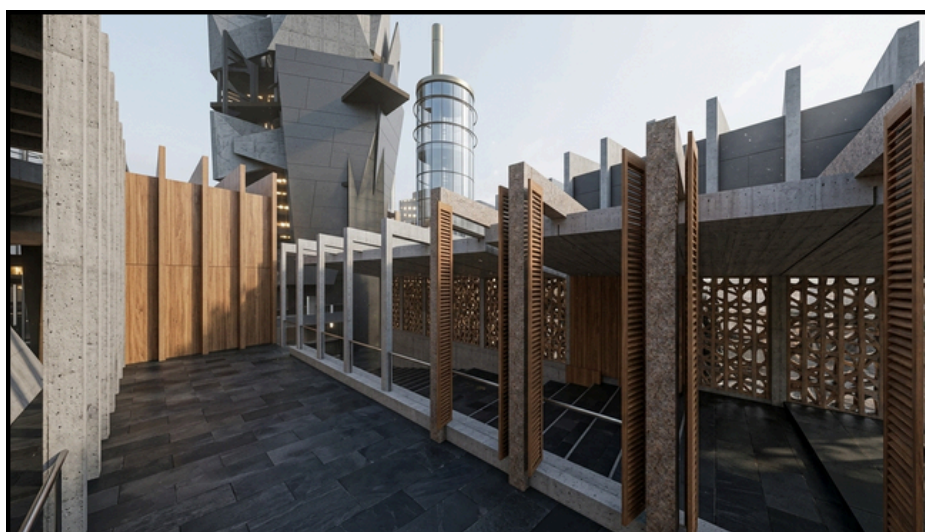
## 7.6 Material Palette and Industrial Relevance

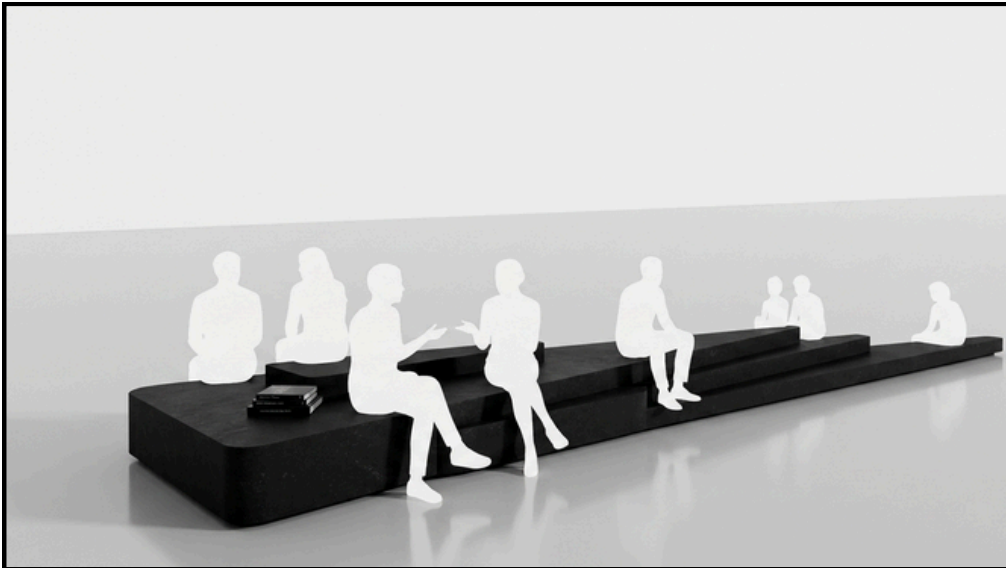
The material palette of the project is carefully selected to reflect both the industrial heritage of the site and the concept of Jelaga, while fulfilling functional and environmental requirements.

Coal ash concrete is used as a primary material, transforming industrial waste into durable building components. It is applied in the form of pre cast panels for the façade, ensuring consistency, efficiency, and a strong industrial expression. Coal ash is also developed into bricks for selected areas, adding a more tactile and human scale quality, as well as terrazzo finishes for interior flooring, allowing users to experience the material more closely.

Oxidized steel is left exposed to express the structural system and reinforce the concept of honest tectonics. Charred timber introduces a carbonized surface that represents soot while enhancing acoustic performance. Perforated metal grilles are used for ventilation and security, echoing the visual language of industrial machinery.







### **7.7 Sustainability and Passive Design**

Sustainability is integrated into the design through passive strategies that respond to the tropical climate and reduce reliance on mechanical systems. The project uses earth sheltering to stabilise internal temperatures, especially within the subterranean gallery spaces, by taking advantage of the natural thermal mass of the ground.

Natural ventilation is achieved through void chimneys that support the stack effect, allowing hot air to rise and exit the building while drawing cooler air into lower spaces. This ensures continuous airflow and improves indoor comfort throughout the day.

The incorporation of recycled materials, particularly coal ash, further strengthens the sustainability approach by reducing construction waste and reusing industrial byproducts within structural and architectural elements.

### **7.8 Cultural Storytelling Through Architecture**

The JELAGA project functions as a spatial narrative that communicates the history and transformation of Batu Arang's coal mining heritage. The architecture is designed as a dual experience where the subterranean gallery represents the past, focusing on extraction, memory, and industrial history, while the workshop represents the future, focusing on innovation and material experimentation.

This relationship creates a continuous dialogue between history and progress, allowing visitors to understand how industrial heritage can be reinterpreted into contemporary value. Rather than preserving history as static memory, the project activates it through spatial experience and material transformation.

In this way, JELAGA bridges the cultural gap left by the decline of the mining industry and repositions the site as a place of learning, creativity, and regeneration.

# Chapter 8

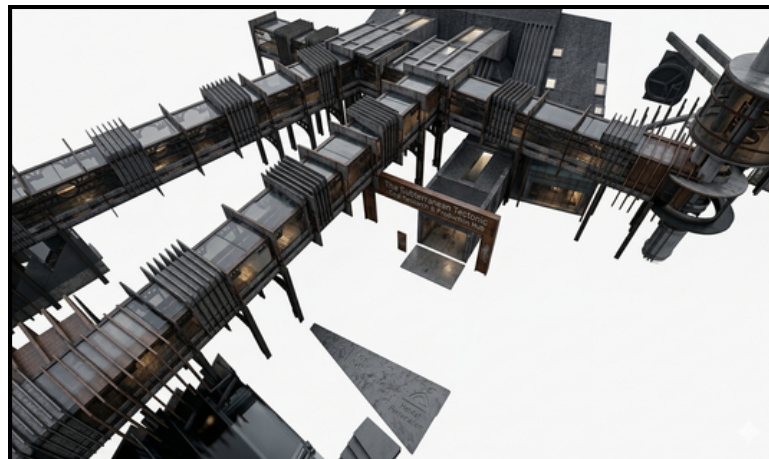
BRIDGE

## 8.0 THE INTERSTITIAL BRIDGE: A SPATIAL THRESHOLD

### 8.1 Conceptual Narrative: The “In-Between” Space

The Interstitial Bridge functions as the primary circulatory spine and conceptual anchor of the JELAGA complex. In architectural discourse, the term interstitial refers to a space that exists in-between two defined conditions, acting as a transitional zone rather than a fixed destination. In this project, the bridge embodies this idea by operating as both a physical connector and a metaphorical threshold between two contrasting worlds, namely the World of Extraction represented by the subterranean exhibition spaces, and the World of Innovation represented by the workshop zones.

By elevating itself above the existing scarred terrain of Batu Arang, the bridge creates a suspended condition where visitors are temporarily detached from the ground. This elevated perspective allows users to observe the industrial landscape from a continuous linear datum, encouraging a moment of reflection before transitioning into the deeper narrative of the exhibition or the more active environment of the workshop. In this way, the bridge becomes not just a circulation element, but an experiential device that frames the relationship between memory and future potential.

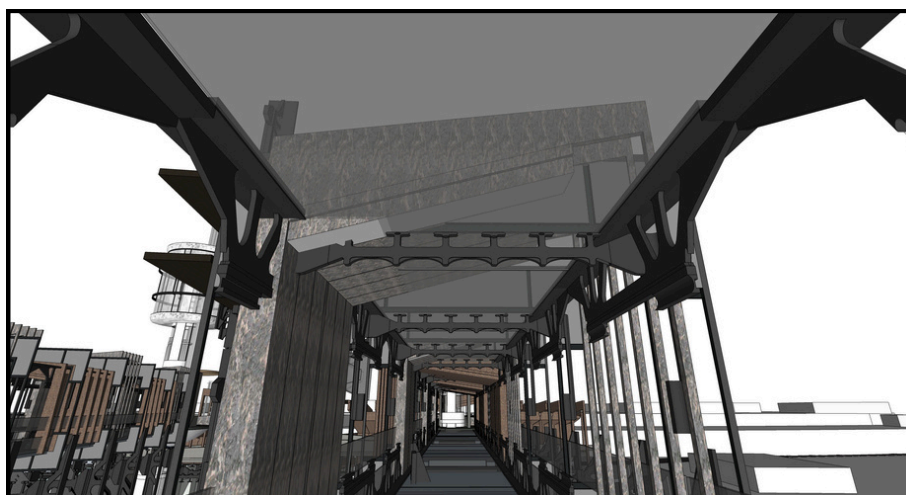


## 8.2 Structural Tectonics: The Exoskeleton Grid

The structural language of the Interstitial Bridge is directly inspired by the abandoned mining headframes of the former Malayan Collieries, translating historical industrial typologies into a contemporary architectural expression. The design retains the rawness of industrial construction while reinterpreting it through modern structural efficiency.

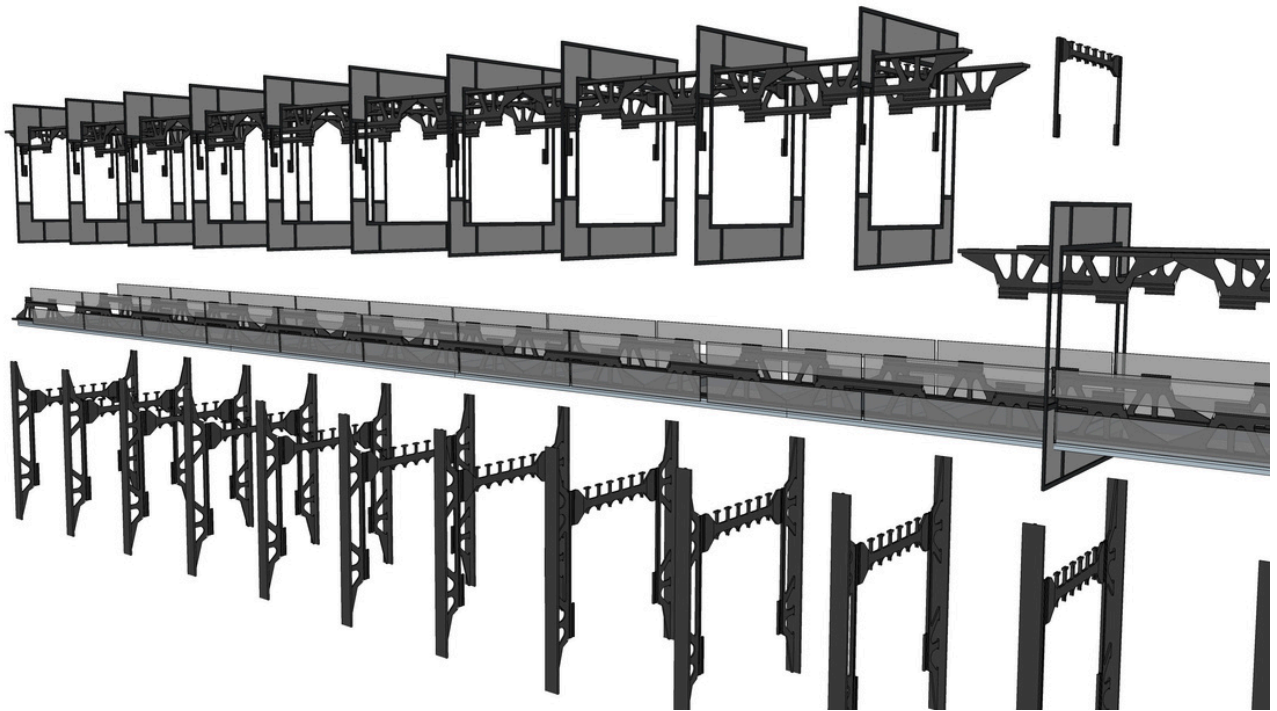
### I. Steel Truss System

The bridge is constructed using a weathered steel truss system, commonly known as Corten steel. This material provides high structural strength for long span conditions while naturally developing an oxidized surface that aligns with the Jelaga aesthetic. The rusted finish allows the structure to visually integrate with the industrial remnants of Batu Arang, reinforcing continuity between past and present.



## II. Rhythmic Repetition

The arrangement of vertical and diagonal truss members creates a repetitive structural rhythm that echoes the timber support systems used in historical underground mine tunnels. This repetition not only strengthens the structural logic but also introduces a sense of movement and continuity along the length of the bridge.



### III. Lightweight Transparency

Despite its heavy industrial expression, the bridge maintains a degree of visual permeability. Expanded metal mesh and glass balustrades are integrated into the structure to preserve openness and ensure continuous visual engagement with the surrounding landscape. This balance between solidity and transparency reinforces the concept of a transitional space.



A steel-based structural system is adopted to reduce ground load due to its lightweight nature, while recycled concrete and brick are integrated to promote sustainable material reuse.



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### 8.3 Spatial Experience and Viewing Anchors

The Interstitial Bridge is designed as a spatial lens that actively controls and frames the visitor's visual experience as they move between different zones of the site. Rather than acting as a passive connector, it becomes a curated sequence of viewpoints that enhance the narrative of the project.

#### I. Framed Vistas

Certain segments of the bridge are intentionally compressed or opened up to create framed views of key industrial remnants, particularly the brick chimneys of Batu Arang. These framing devices transform the ruins into visual anchors, allowing them to become part of the ongoing architectural dialogue.

#### II. Atmospheric Variation

The spatial experience along the bridge alternates between enclosed shaded sections and open viewing platforms. The enclosed areas generate a sense of compression and introspection, while the open zones introduce expansion, light, and visual release. This contrast mirrors the conceptual transition between extraction and innovation.

#### III. Material Walkway

The flooring of the bridge is constructed using pre cast coal ash concrete tiles, allowing visitors to physically engage with the material research developed within the project. This creates a direct tactile connection between circulation and construction materiality.

### 8.4 Programmatic Connectivity and Logistics

Beyond its experiential role, the Interstitial Bridge also functions as a critical infrastructural component that ensures the operational integration of the entire JELAGA complex. It acts as a functional link that supports both public movement and technical coordination.

#### I. Programmatic Stitching

The bridge resolves the spatial separation created by the sloped site, effectively stitching together the subterranean exhibition spaces and the innovation workshop. This ensures that both programmatic zones operate as a unified system rather than isolated entities.

#### II. Technical Artery

Integrated within the structural depth of the bridge are concealed service routes that facilitate the movement of materials, samples, and technical systems between different parts of the site. This allows logistical operations to occur without interfering with the public experience.

#### III. Climatic Funnel

Due to its elevated position, the bridge captures prevailing winds and channels them towards the internal voids of the building. This enhances natural ventilation performance and supports the passive cooling strategy of the entire development.

# Chapter 9

ASHRISE TOWER

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## **9.0 THE ASHRISE TOWER: A VERTICAL NARRATIVE OF TRANSFORMATION**

### **9.1 The Concept of Vertical Transformation**

The Ashrise Tower functions as the monumental anchor of the JELAGA project, representing a vertical narrative of transformation that symbolically and spatially connects the underground condition of extraction with the elevated condition of knowledge and innovation. The tower is conceived as a continuous journey that moves from the weight and density of the earth towards the openness and clarity of the sky, reflecting the full lifecycle of coal from hidden resource to visible energy and meaning.

Architecturally, it acts as a vertical totem that carries the memory of Batu Arang's industrial past while reinterpreting it into a forward looking structure. Rather than existing as an isolated object, the tower becomes a critical reference point within the site, marking the presence of the JELAGA complex and reinforcing the narrative of transformation that defines the entire project.

### **9.2 Design Identity: Extraction Inspired Form**

The morphology of the Ashrise Tower is directly inspired by industrial extraction structures such as mining headframes, cranes, and lifting mechanisms that once defined the visual identity of coal mining landscapes. These references are abstracted and reinterpreted into a contemporary architectural expression that retains their structural honesty and mechanical logic.

#### **I. The Act of Lifting**

The design expresses the idea of lifting and revealing, where the tower is understood as a vertical mechanism that metaphorically raises material from the depths of the earth. This is articulated through a skeletal steel framework and suspended volumetric elements that suggest movement, tension, and upward progression. The form reflects a continuous process of extraction and transformation, reinforcing the conceptual foundation of the project.

#### **II. Material Layering**

The material composition of the tower is arranged in a vertical gradient that reflects its conceptual journey. At the base, heavy board marked concrete establishes a sense of grounding and permanence, anchoring the structure firmly into the landscape. As the tower rises, the material transitions into lighter steel and glass elements, creating a fractured and more transparent tectonic expression. This gradual shift represents the transformation from raw industrial residue to refined knowledge and innovation.

### 9.3 Passive Performance: The Stack Ventilation Chimney

In addition to its symbolic role, the Ashrise Tower functions as a critical environmental system within the JELAGA complex. It operates as a living chimney that supports passive ventilation strategies across the entire development.

#### I. Thermal Buoyancy

The tower is designed to utilize the stack effect, where cooler air is drawn into the lower levels and gradually rises as it is heated within the vertical core. This natural movement of air creates a continuous cycle of ventilation that enhances thermal comfort throughout the building.

#### II. Natural Airflow

The constant upward movement of air within the tower helps to prevent stagnation and improves overall air quality. This passive system reduces the dependence on mechanical cooling systems, particularly for the surrounding workshop and exhibition spaces, making the building more energy efficient and environmentally responsive.

### 9.4 Functional Value: The Observation and Viewing Totem

Beyond its environmental and symbolic functions, the Ashrise Tower also serves as a key experiential and functional element within the project. It operates as a viewing tower that offers visitors a unique opportunity to engage with the broader landscape of Batu Arang.

#### I. Elevated Perspective

From its upper levels, the tower provides panoramic views of the surrounding industrial terrain, allowing visitors to visually connect the new architectural intervention with the remnants of the historical mining infrastructure, including chimneys and shaft locations. This elevated perspective reinforces the relationship between past and present conditions of the site.

#### II. Experiential Ascent

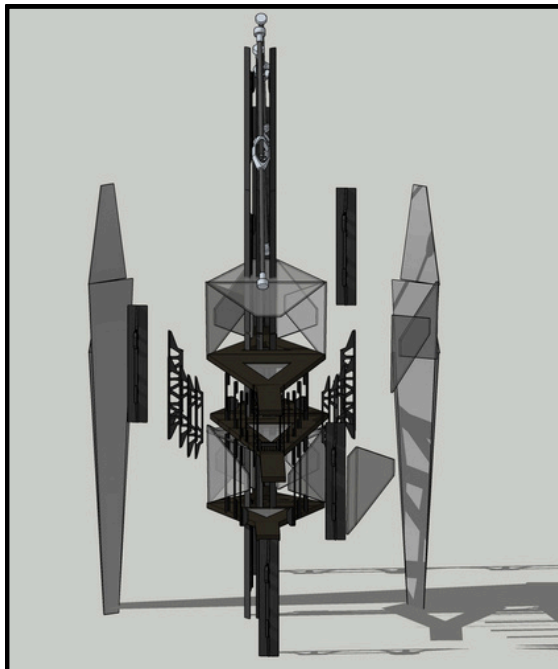
The vertical circulation within the tower is designed as a curated sequence of spatial experiences. As users ascend, each level reveals different framed views of the landscape, gradually unfolding the site's layered industrial history. This progression transforms the act of movement into a narrative journey that deepens the visitor's understanding of the man made topography of Batu Arang.

### 9.5 Iconic Impact: The Visual Landmark

The Ashrise Tower establishes a strong and recognisable visual identity for the JELAGA project, functioning as a landmark that defines both the immediate site and its wider context. By extending vertically into the skyline, the tower creates a clear point of reference within the landscape.

It serves as a contemporary reinterpretation of the historical chimneys of Malayan Collieries, shifting their meaning from symbols of industrial pollution and extraction into markers of cultural memory and regeneration. Instead of emitting smoke, the tower represents a new form of presence that communicates research, material innovation, and cultural reactivation.

Through this transformation, the Ashrise Tower becomes more than a structural element. It becomes a symbolic beacon that repositions Batu Arang's industrial identity within a contemporary architectural discourse.



# Chapter 10

CONCLUSION

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## **10.0 CONCLUSION**

### **10.1 The Legacy of Jelaga**

The JELAGA Coal Mining Heritage and Innovation Centre is more than a structural intervention. It is positioned as an architectural manifesto that embodies the resilience, memory, and transformation of industrial identity within Batu Arang. Throughout this sixteen week design journey, the project has gradually evolved from an initial historical reading of the site into a more critical and refined tectonic response that bridges the gap between a forgotten industrial past and a sustainable, forward looking future. In this sense, the project is not only concerned with form and function, but also with how architecture can actively participate in the reconstruction of cultural meaning.

At a deeper level, JELAGA operates as an exploration of how architecture can respond to absence. The absence left by the decline of coal mining is not treated as a void to be filled superficially, but as a condition to be understood, interpreted, and transformed. This approach allows the project to move beyond conventional preservation strategies and instead engage with industrial heritage as a living framework that can be reactivated through design.

The project therefore becomes both a physical and conceptual bridge between eras, connecting the material legacy of extraction with contemporary ideas of sustainability, innovation, and cultural continuity.

### **10.2 Synthesis of Design Intent**

The project directly addresses the cultural void that emerged following the cessation of coal mining activities in 1960. This void is not only expressed in the form of abandoned structures and altered landscapes, but also in the gradual loss of identity experienced by the local context over time. Batu Arang, once defined by its industrial intensity, is now left with fragmented memories embedded within its terrain and ruins.

Through the conceptual framework of Jelaga, or soot, the architecture repositions this residue as a central design driver rather than a byproduct to be ignored. Soot becomes a metaphor for memory, transformation, and continuity. It represents both what remains and what can be reimagined. In this way, the project reframes industrial remnants as active materials of design thinking that influence spatial organization, material expression, and atmospheric experience.

The spatial narrative of the design is structured as a continuous experiential journey that reflects the lifecycle of coal. It begins within the subterranean exhibition spaces, where the environment is intentionally heavy, compressed, and introspective. This condition reflects the reality of extraction, where material is hidden beneath layers of earth and effort. The atmosphere in this zone is quiet and reflective, allowing visitors to engage with the history of mining in a direct and immersive manner.

As the journey progresses, the spatial conditions gradually shift. The architecture becomes lighter, more open, and more expressive, eventually culminating in the Ashrise Tower. This vertical element represents the final stage of transformation, where material, energy, and meaning are elevated from the ground towards light and openness. The transition from subterranean depth to vertical ascent becomes a physical interpretation of change, growth, and renewal.

### 10.3 Technical and Environmental Achievement

The technical resolution of the project demonstrates that industrial heritage is not a limitation in sustainable design, but rather a strong foundation for innovation. By integrating environmental strategies with material experimentation, the project establishes a clear link between past industrial systems and future ecological approaches.

Material Innovation is a key achievement within the design. Coal ash, once considered waste from industrial processes, is reinterpreted as a valuable construction material. It is incorporated into concrete mixes, pre cast façade systems, bricks, and terrazzo finishes. This transformation of waste into architectural components reflects a circular approach to material usage, where nothing is discarded and everything is given renewed purpose within the built environment.

This strategy not only reduces environmental impact, but also strengthens the conceptual identity of the project. The building literally embodies the material history of coal, allowing the architecture to become a physical extension of the site's industrial legacy.

Passive Performance strategies are integrated as essential components of the design rather than secondary considerations. The Interstitial Bridge and the Ashrise Tower both function as environmental systems in addition to their spatial and symbolic roles. Through carefully designed voids and vertical shafts, these elements support natural ventilation using the stack effect, allowing warm air to rise and escape while drawing cooler air into lower levels.

This continuous airflow improves thermal comfort across the building while significantly reducing reliance on mechanical cooling systems. In addition, the partial earth integration of the subterranean exhibition spaces further enhances thermal stability by utilising the natural insulating properties of the ground.

At a broader scale, the project aligns with key Sustainable Development Goals, particularly SDG 9 which focuses on industry, innovation, and infrastructure, and SDG 11 which promotes sustainable cities and communities. Through this alignment, JELAGA proposes a model for the regeneration of post industrial landscapes in Malaysia, especially brownfield sites that carry strong historical but underutilised potential.

#### 10.4 Final Reflection: A Beacon for Batu Arang

Ultimately, JELAGA is conceived as a living monument rather than a static object of remembrance. It does not freeze history, but instead activates it through spatial experience, material transformation, and environmental interaction. In doing so, it ensures that the story of Batu Arang is no longer confined to forgotten ruins, abandoned shafts, or silent relics of the Malayan Collieries era. Instead, it is reintroduced into a contemporary architectural dialogue that allows it to evolve and remain relevant.

The project positions architecture as a medium that can hold memory while simultaneously generating new possibilities. It suggests that the act of designing is also an act of cultural restoration, where landscapes that have lost their original function can be reinterpreted into spaces of learning, creativity, and collective identity.

Within this framework, the Ashrise Tower becomes the most visible expression of the project's intention. It stands not only as a physical landmark but also as a symbolic gesture of continuity. Rising above the site, it redefines the industrial chimney as something no longer associated with smoke and extraction, but with knowledge, reflection, and renewal.

In a broader sense, the tower acts as a beacon for Batu Arang, signalling a shift in identity from extraction to innovation. It transforms the memory of Black Gold into a renewed Golden Era, where the value of the site is no longer measured only in resources taken from the ground, but in ideas, culture, and experiences generated above it.

Through this transformation, JELAGA demonstrates that architecture has the capacity to operate beyond physical construction. It can heal fragmented landscapes, reconstruct lost identities, and reawaken the cultural spirit of a place. Most importantly, it proves that industrial heritage is not an ending point, but a starting point for new narratives of resilience, sustainability, and imagination.

# Chapter 11

CASE STUDY

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## 11.0 CASE STUDY: THE JEWISH MUSEUM BERLIN

### 11.1 Introduction to the Case Study

The Jewish Museum Berlin, designed by Daniel Libeskind, is selected as the main case study for the JELAGA project because of its strong emphasis on experiential architecture and its ability to communicate meaning through space itself. The Jewish Museum Berlin is widely known for how it transforms architecture into a narrative experience, where visitors do not simply observe history, but move through it physically and emotionally.

Unlike conventional museums that rely heavily on exhibits and written information, this building allows the architecture to take on the role of storytelling. Through its fragmented form, controlled circulation, and the use of empty spaces, it creates an environment that feels intense, reflective, and sometimes even uncomfortable. These qualities are important because they allow visitors to connect with the deeper meaning of the space rather than just understanding it intellectually.

For the JELAGA project, this case study is highly relevant as it shows how architecture can move beyond being just a container for functions. It demonstrates how space, form, and material can be carefully designed to evoke emotions and create a memorable experience. This approach is particularly useful when translating the story of coal mining, where the experience is not only about history but also about physical labour, depth, and transformation.

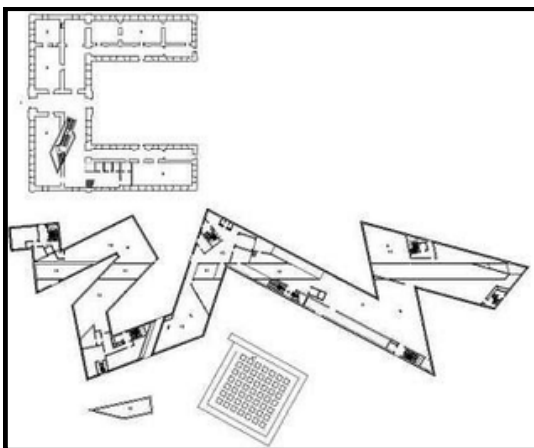


## 11.2 The “Void” and the “Axes”

One of the most important design strategies in the Jewish Museum Berlin is the use of axes and voids to organize both movement and meaning within the building. The museum is structured around three underground axes that represent different narratives, guiding visitors through a sequence of experiences rather than allowing random circulation. These axes create a clear path that shapes how the space is understood, making movement itself part of the storytelling process.

At the same time, the concept of voids plays a very strong role in expressing absence and memory. These voids are empty spaces that cut through the building and are intentionally left unused. They are not meant to be occupied, but rather to be felt. Their emptiness creates a powerful sense of loss and silence, allowing visitors to reflect on what is missing rather than what is present.

In JELAGA, these ideas are translated into a different context through the use of a linear mining path and void chimneys. The mining path guides visitors through a controlled journey that reflects the process of coal extraction, ensuring that the experience unfolds in a meaningful sequence. The void chimneys, on the other hand, act both as environmental elements and symbolic spaces. Their darkness and raw material quality represent the hollowed condition of the earth after mining, creating moments where visitors can pause and reflect within the journey.



### 11.3 Sensory Experience: Beyond Visuals

The Jewish Museum Berlin shows that architecture can engage more than just the visual sense. It creates an experience that affects how the body feels within space. Through the use of narrow corridors, slanted floors, and irregular forms, the building creates a sense of discomfort and instability. This is not accidental, but intentionally designed to reflect emotional tension and uncertainty.

Material also plays a significant role in shaping this experience. The exposed concrete surfaces feel cold and hard, while the acoustics create echoes that make the space feel empty and quiet at the same time. This combination produces an atmosphere that is heavy and introspective, where even silence becomes part of the experience.

In JELAGA, these ideas are adapted through the manipulation of light, space, and material. The transition from bright exterior areas into darker subterranean spaces creates a strong contrast that reflects the experience of entering a mine. This gradual shift allows visitors to feel the change in atmosphere rather than just see it. Materials such as board marked concrete and charred timber are used to control sound and create a more muted environment, simulating the quiet and pressurized conditions underground. This approach strengthens the immersive quality of the design and allows the space to communicate beyond visual appearance.

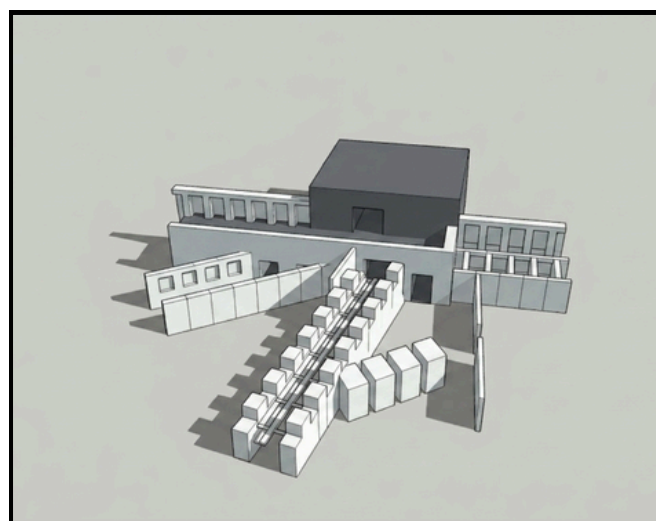
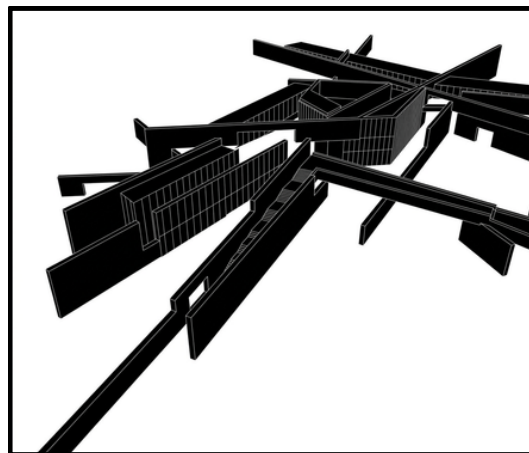
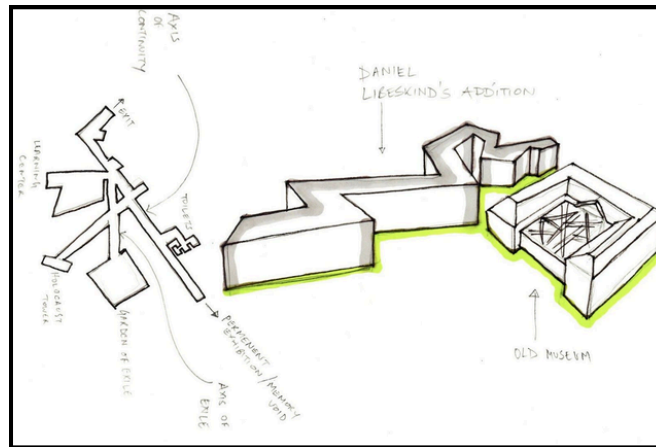
### 11.4 Application to JELAGA: The Coal Mining Experience

The most important lesson taken from the Jewish Museum Berlin is the idea of architecture as a tool for empathy. Instead of simply presenting information, the design creates an environment where visitors can feel and understand the experience on a deeper level.

In JELAGA, this idea is applied by transforming the coal mining narrative into a spatial journey. Visitors are not only learning about mining, but are placed within conditions that reflect its physical and emotional reality. The use of narrower pathways in certain areas creates a sense of compression, similar to the confined spaces of underground tunnels. This makes the experience more personal and relatable.

At the same time, the introduction of vertical movement through the Ashrise Tower creates a contrasting moment of release. As visitors move upward, the space becomes more open and lighter, symbolizing the transition from extraction to transformation. This shift reinforces the overall narrative of the project, where the past is not only remembered, but reinterpreted into a new future.

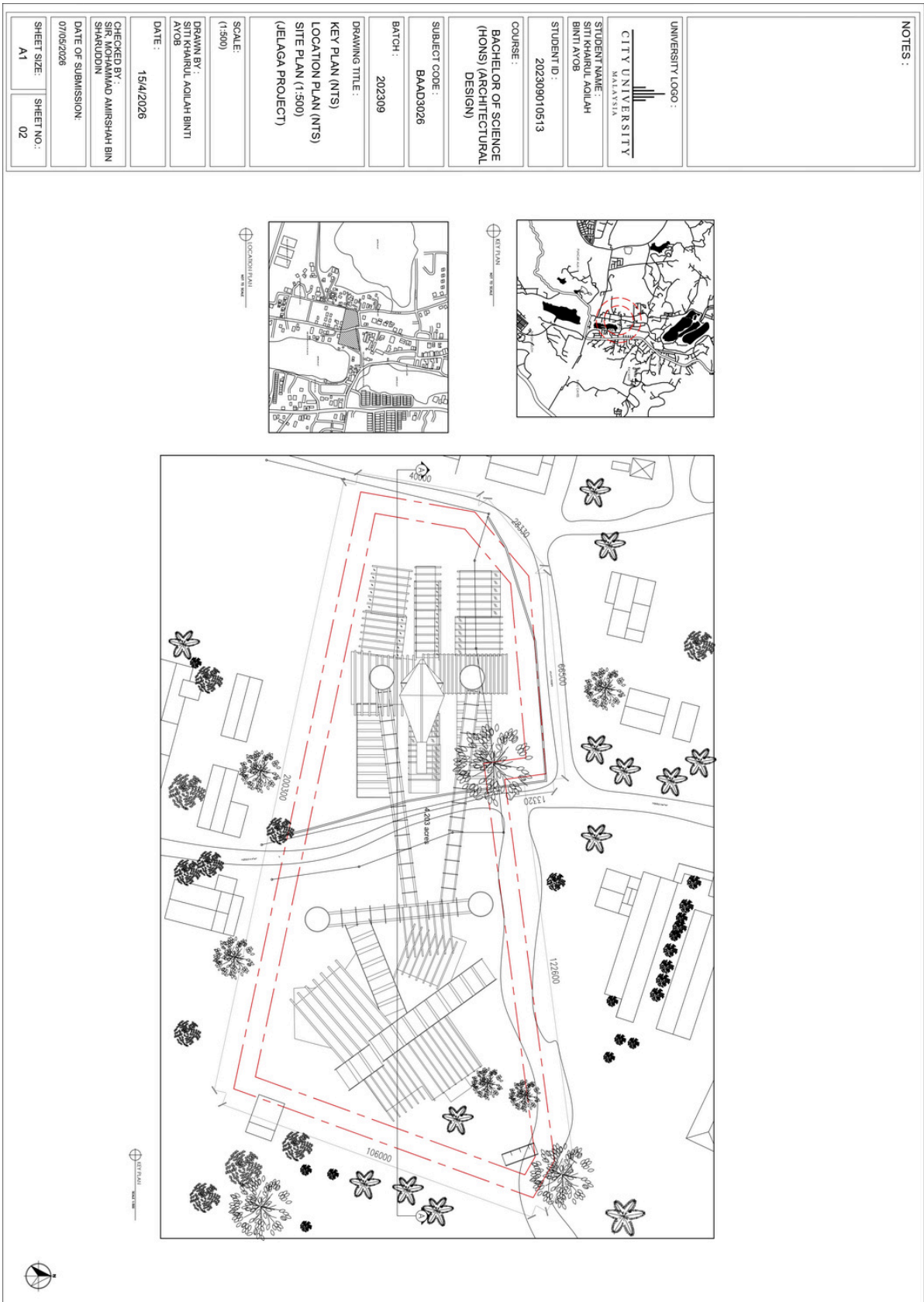
Through this approach, JELAGA adopts the principles of experiential architecture and applies them within the context of coal mining heritage. The result is a design that is not only informative, but also emotional and immersive, allowing visitors to connect with the story of the site in a more meaningful way.

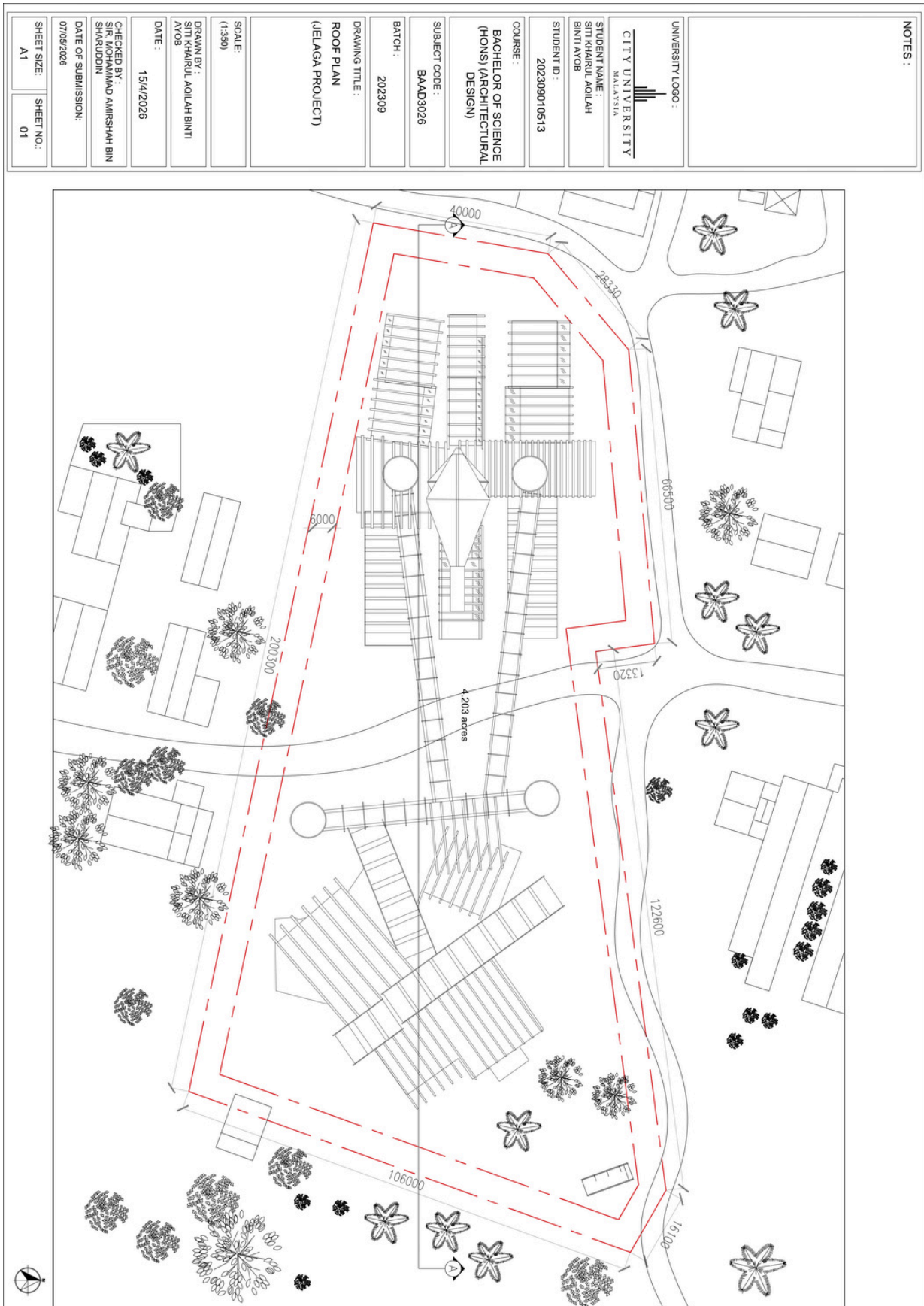


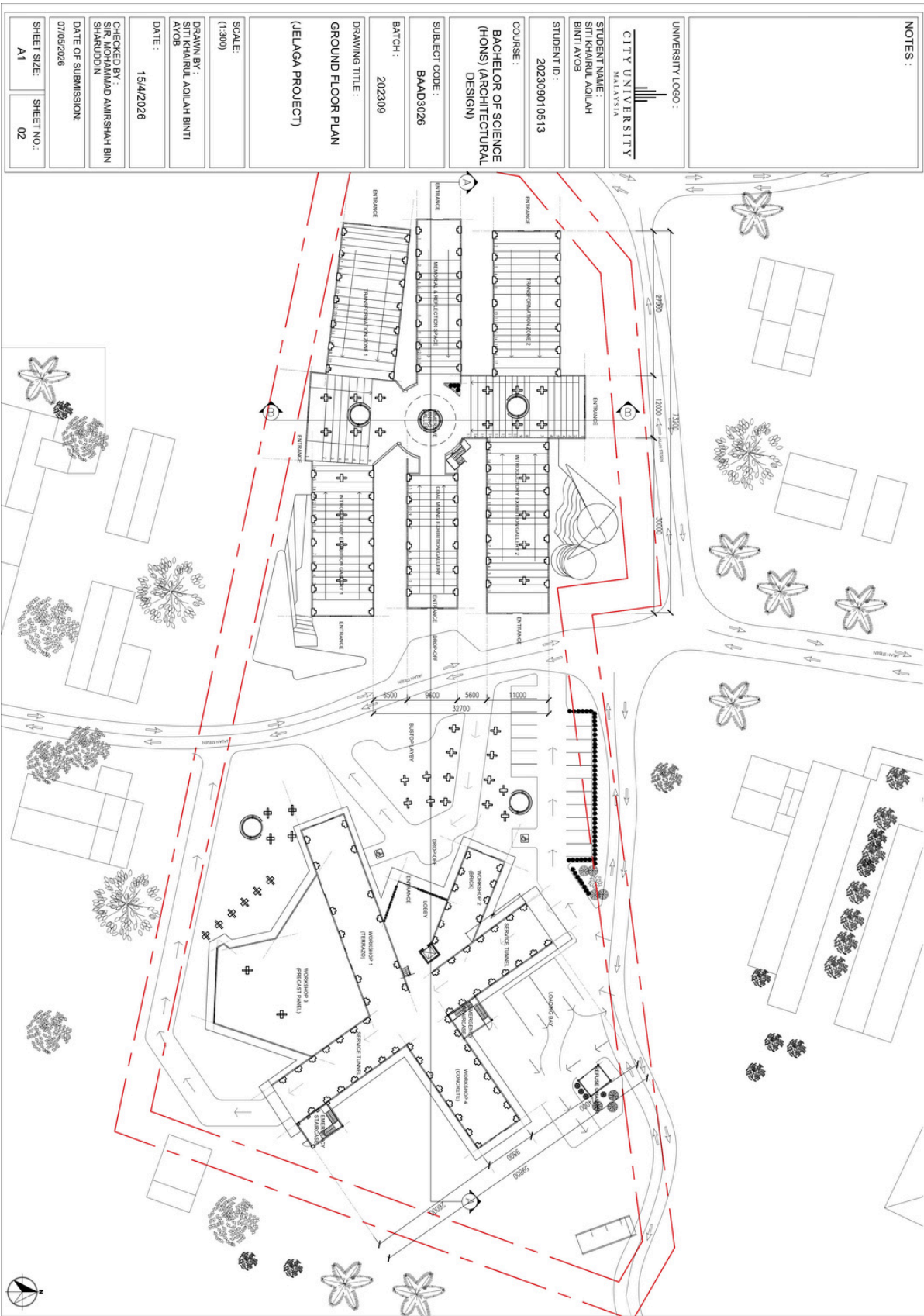
# Chapter 12

12.0 APPENDIX

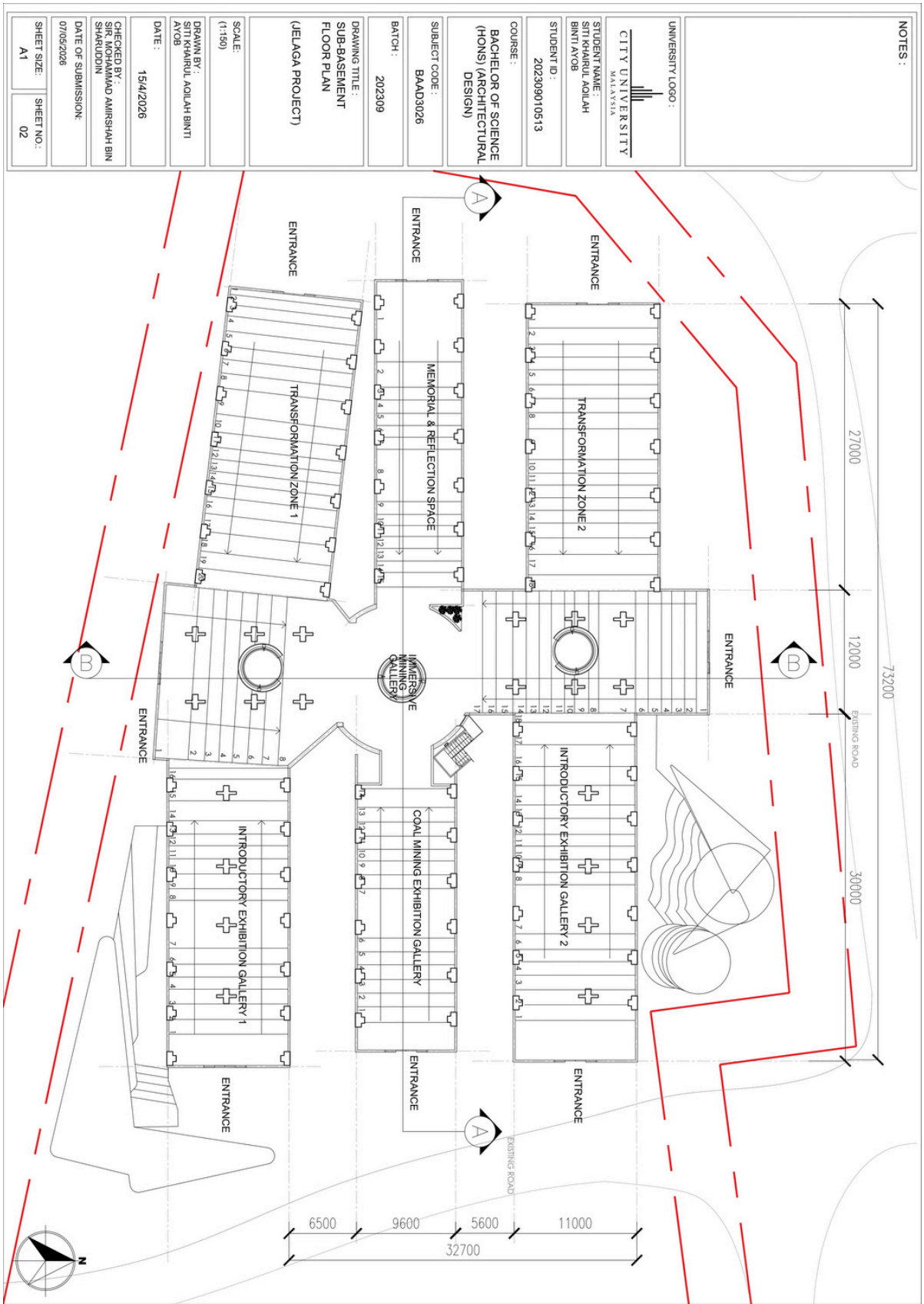
12.1 Working Drawing







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STUDENT ID : 202309010513	
COURSE : BACHELOR OF SCIENCE (HONS) (ARCHITECTURAL DESIGN)	
SUBJECT CODE : BAAD3026	
BATCH : 202309	
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DATE : 15/4/2026	
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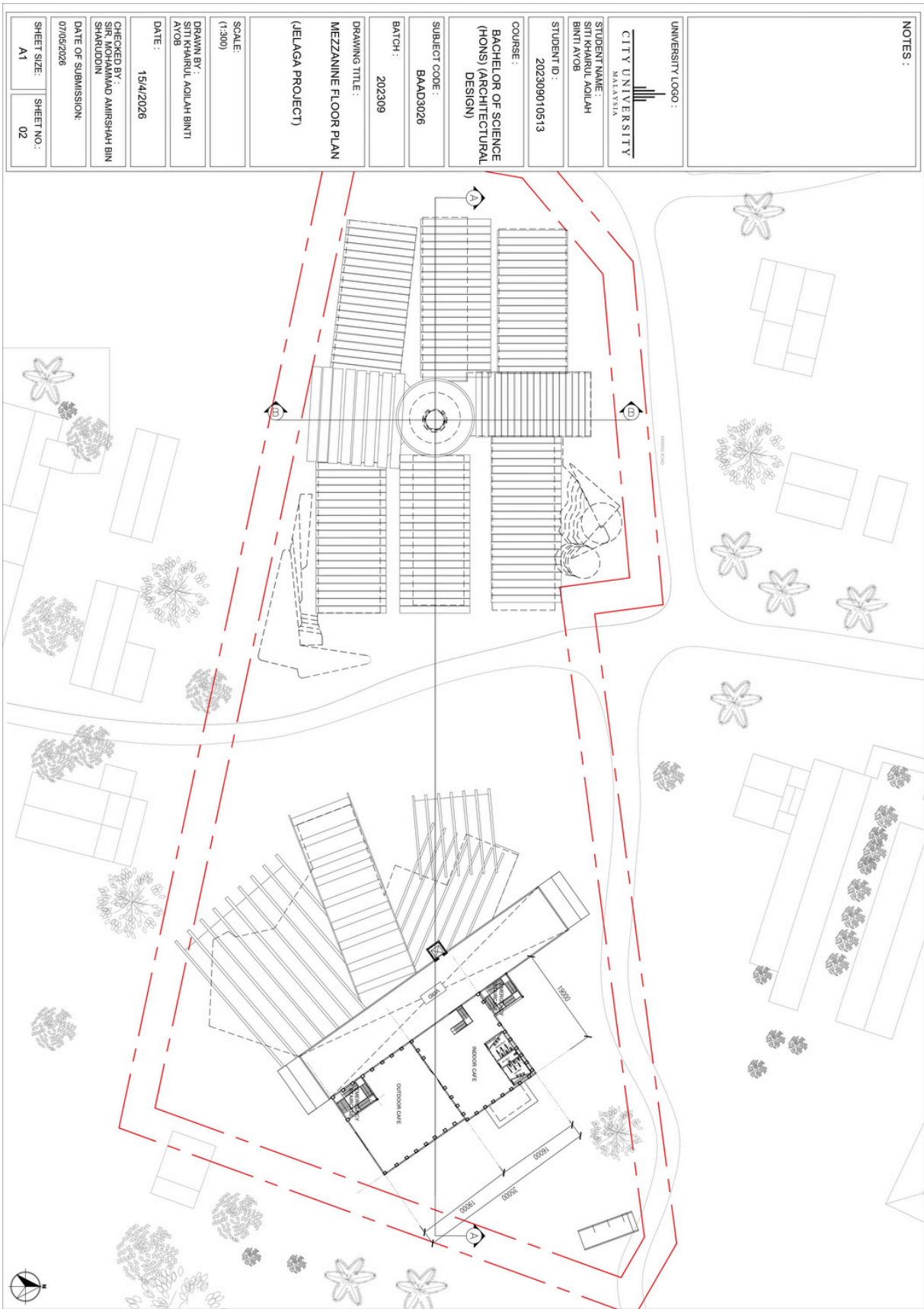


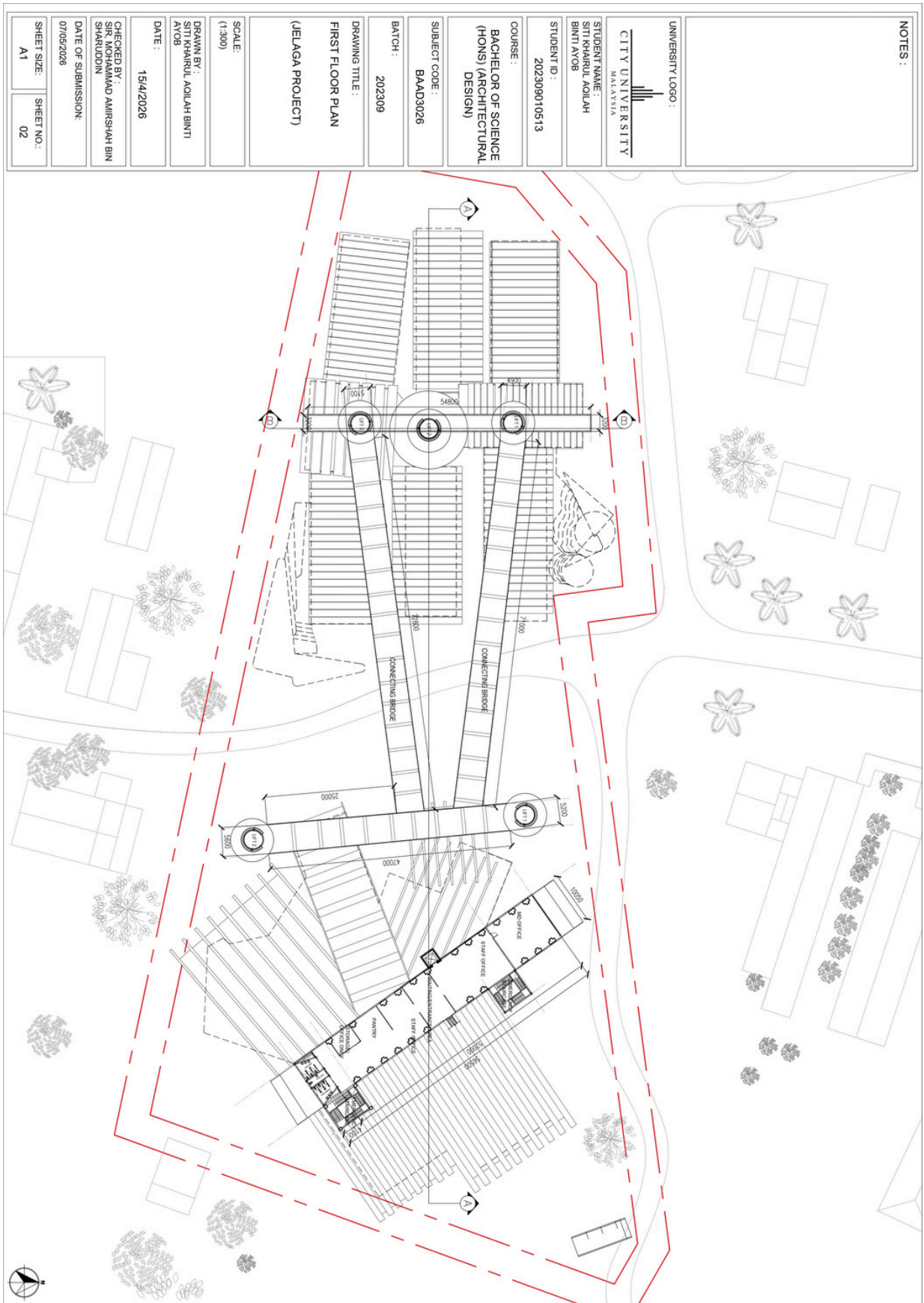
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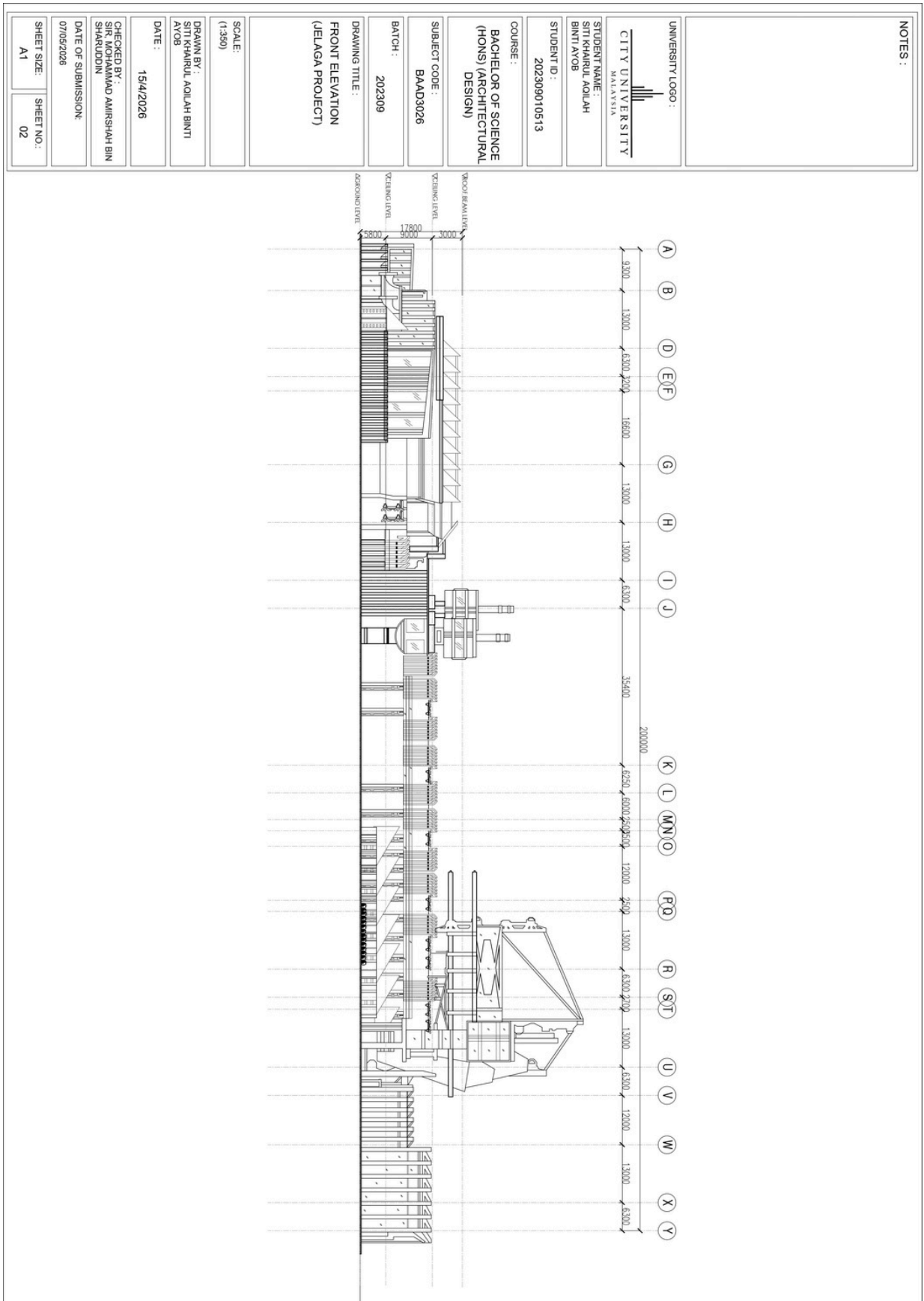
  

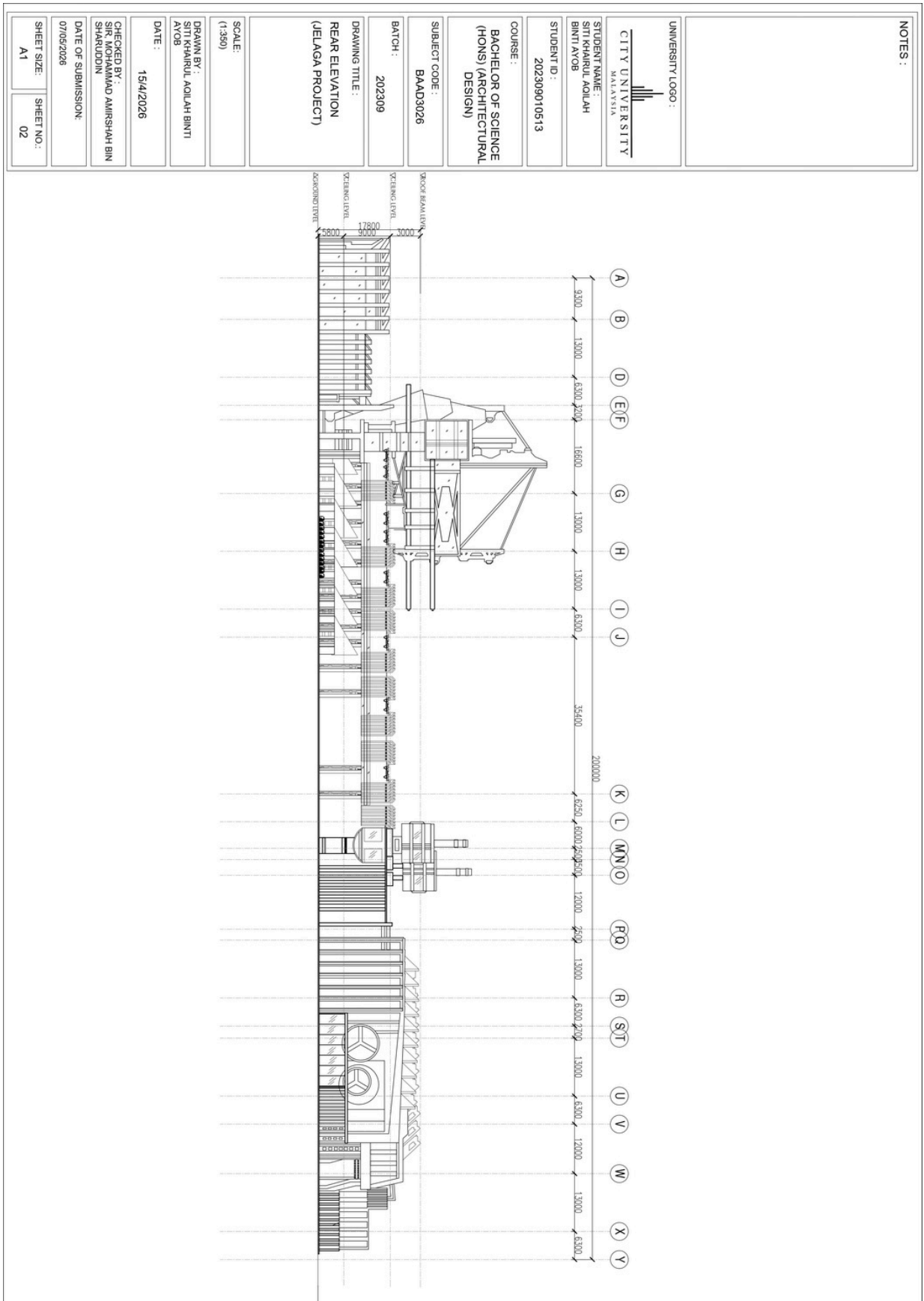
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TOWER SECOND FLOOR  
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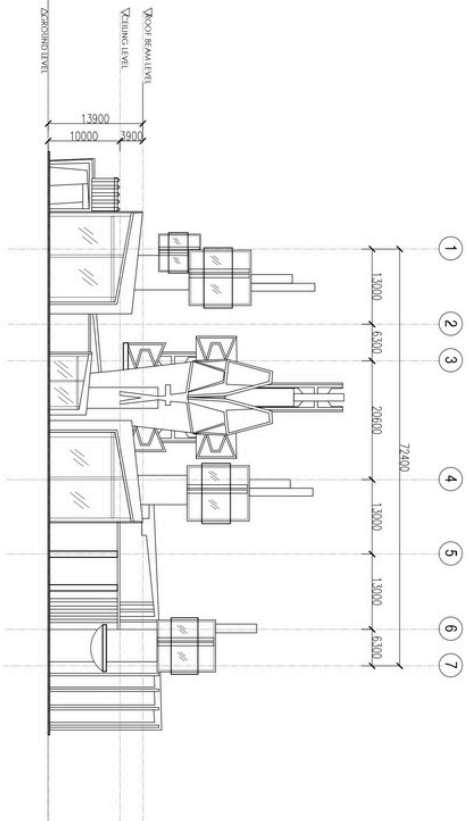





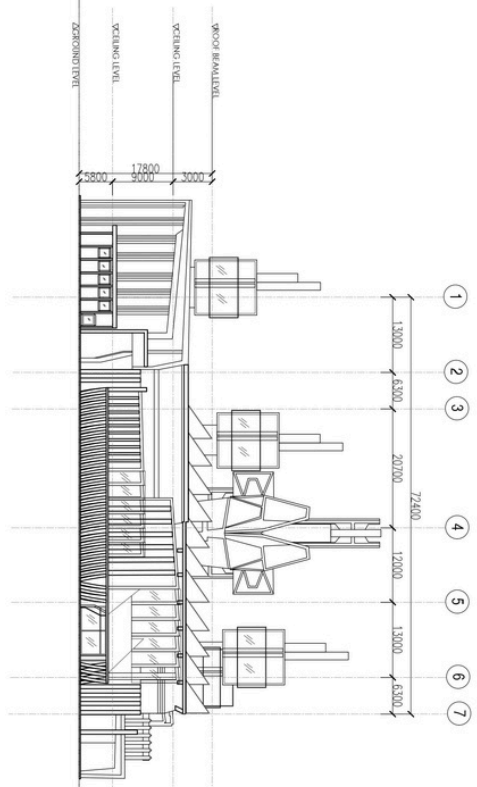


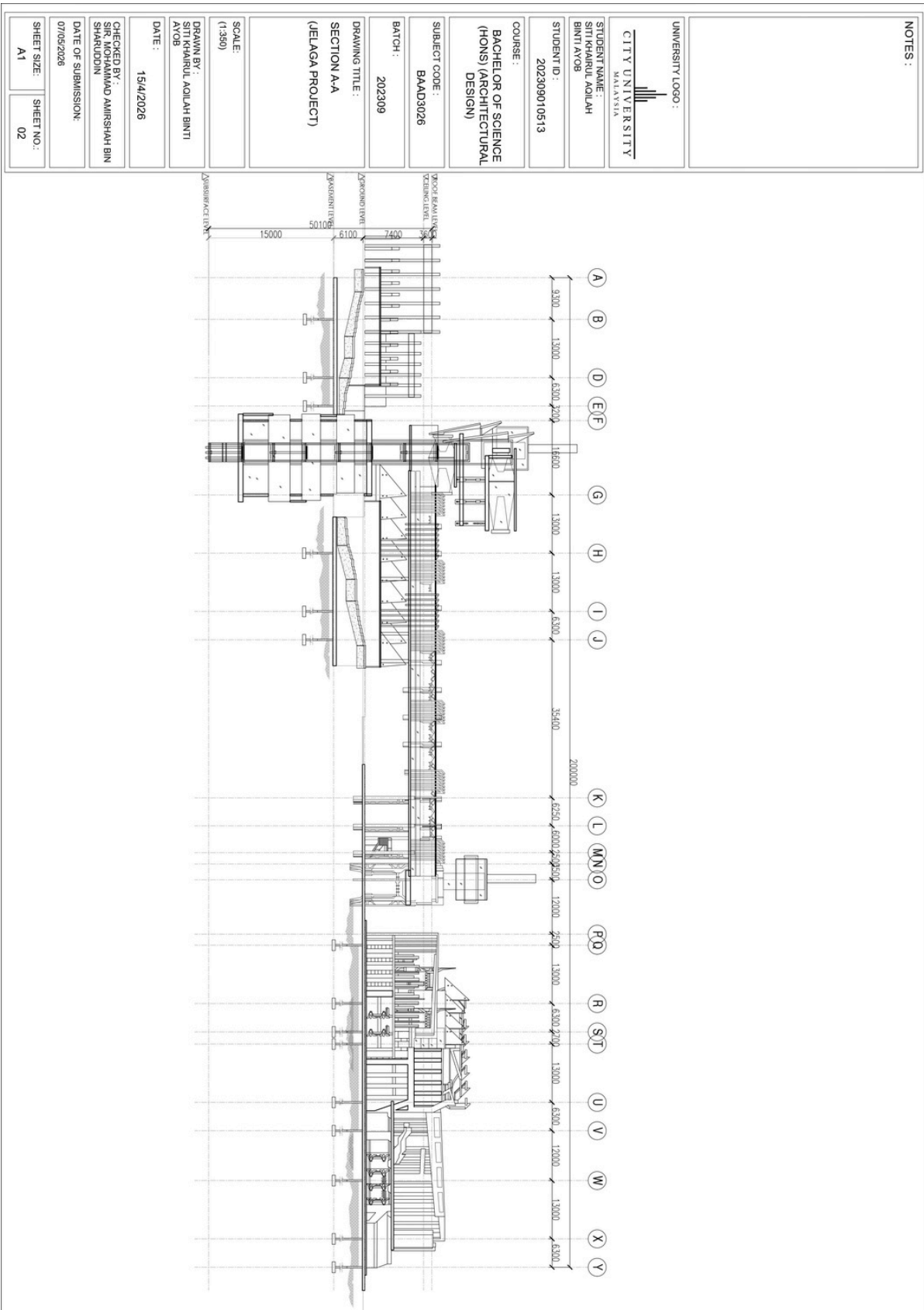



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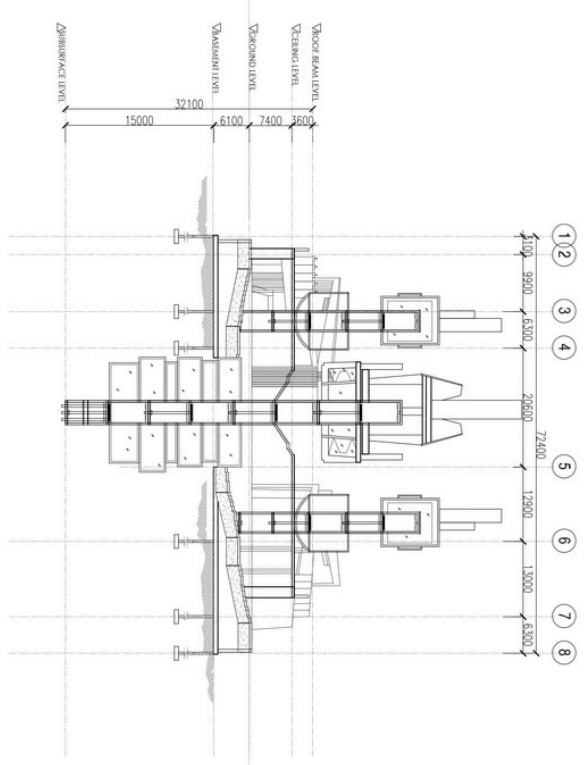
  



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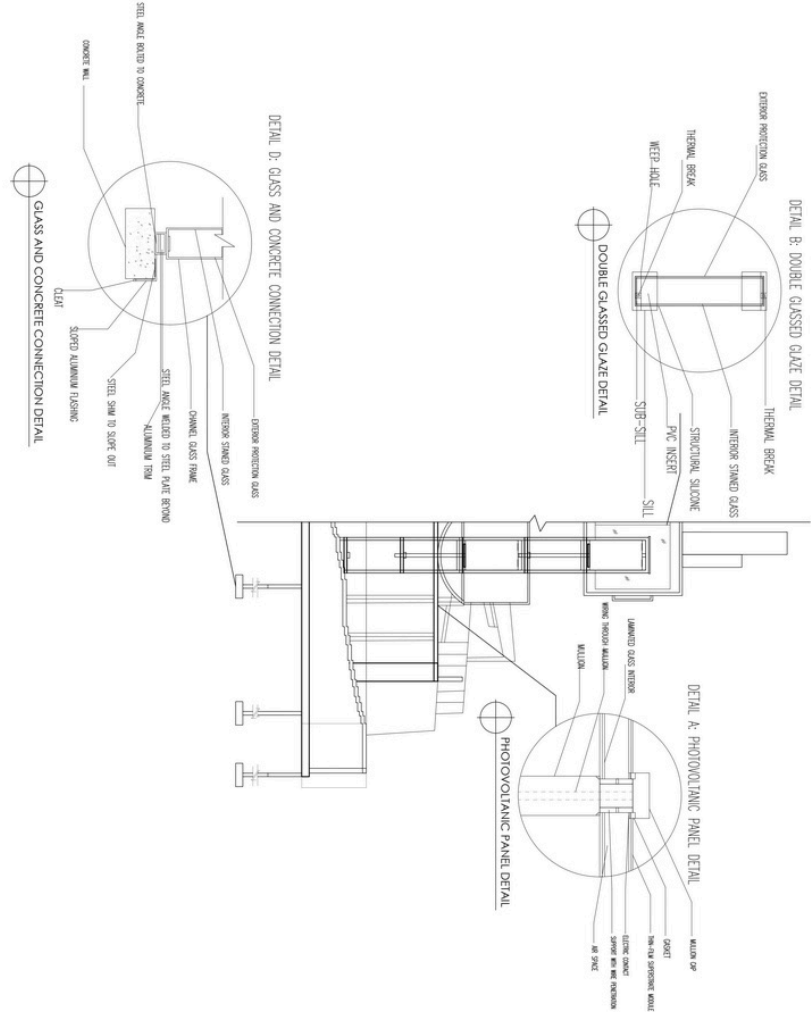
  





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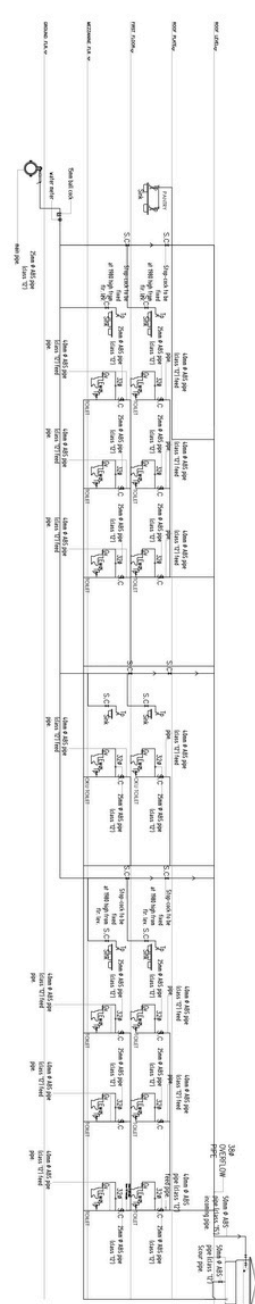
  


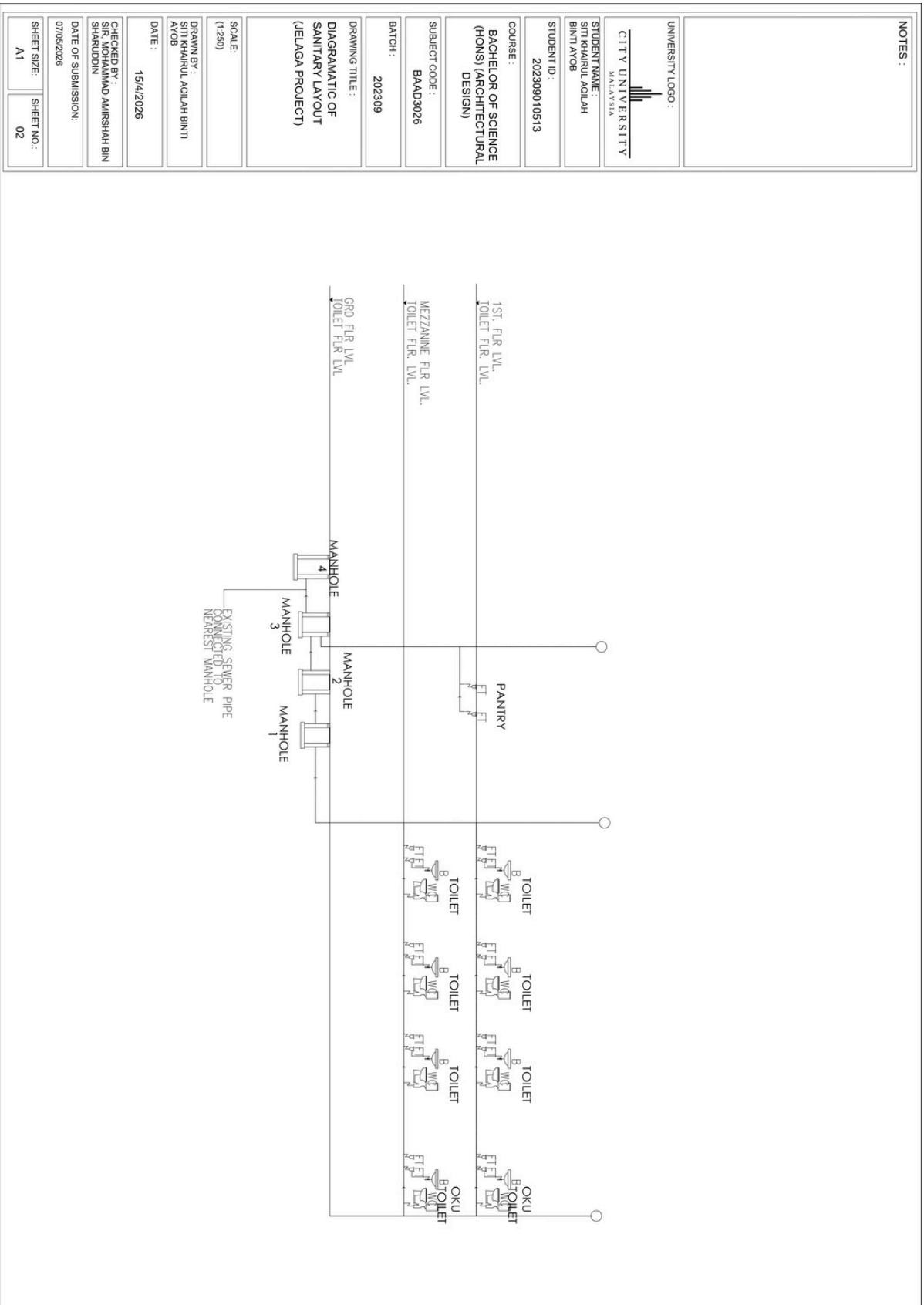
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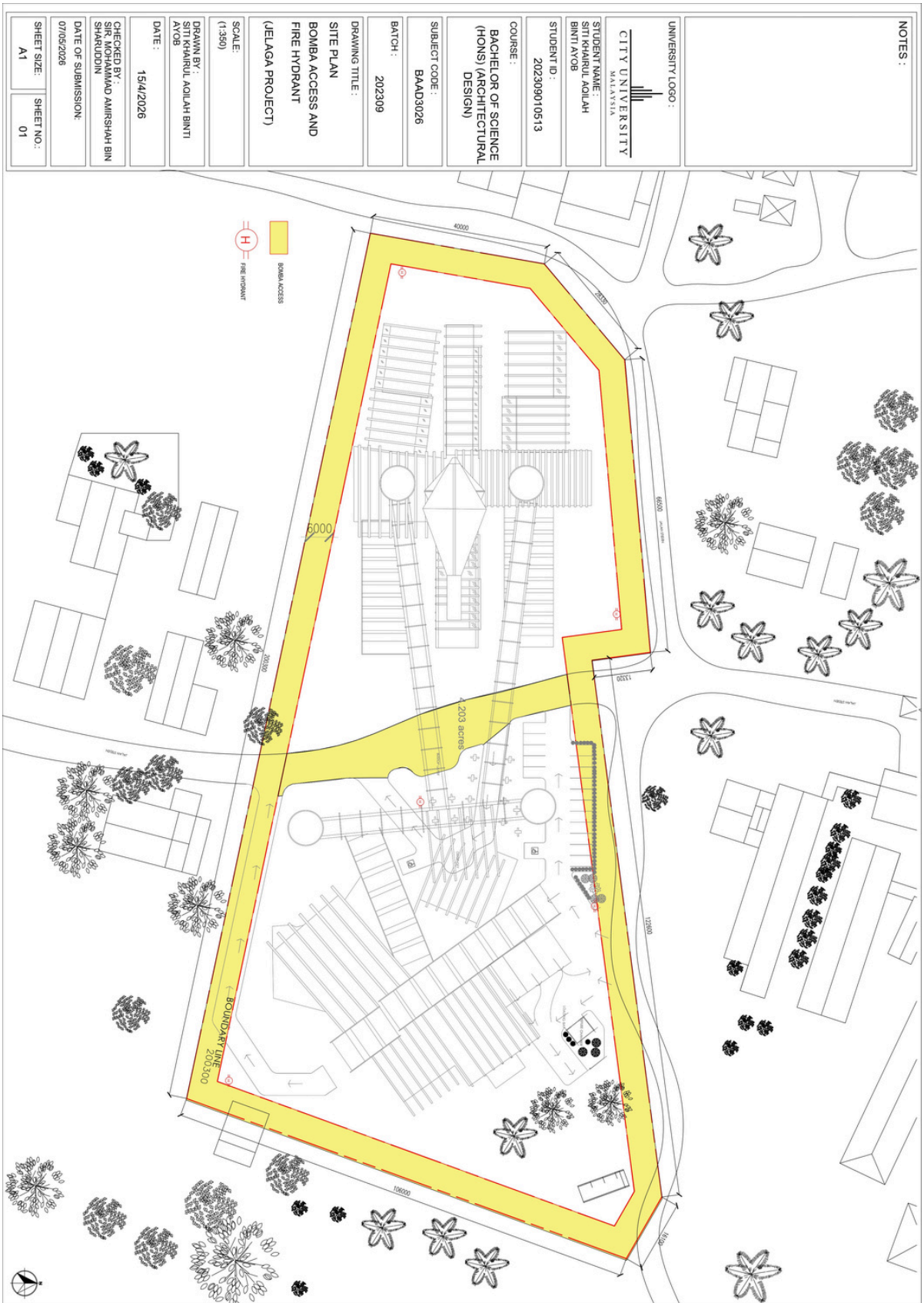
  


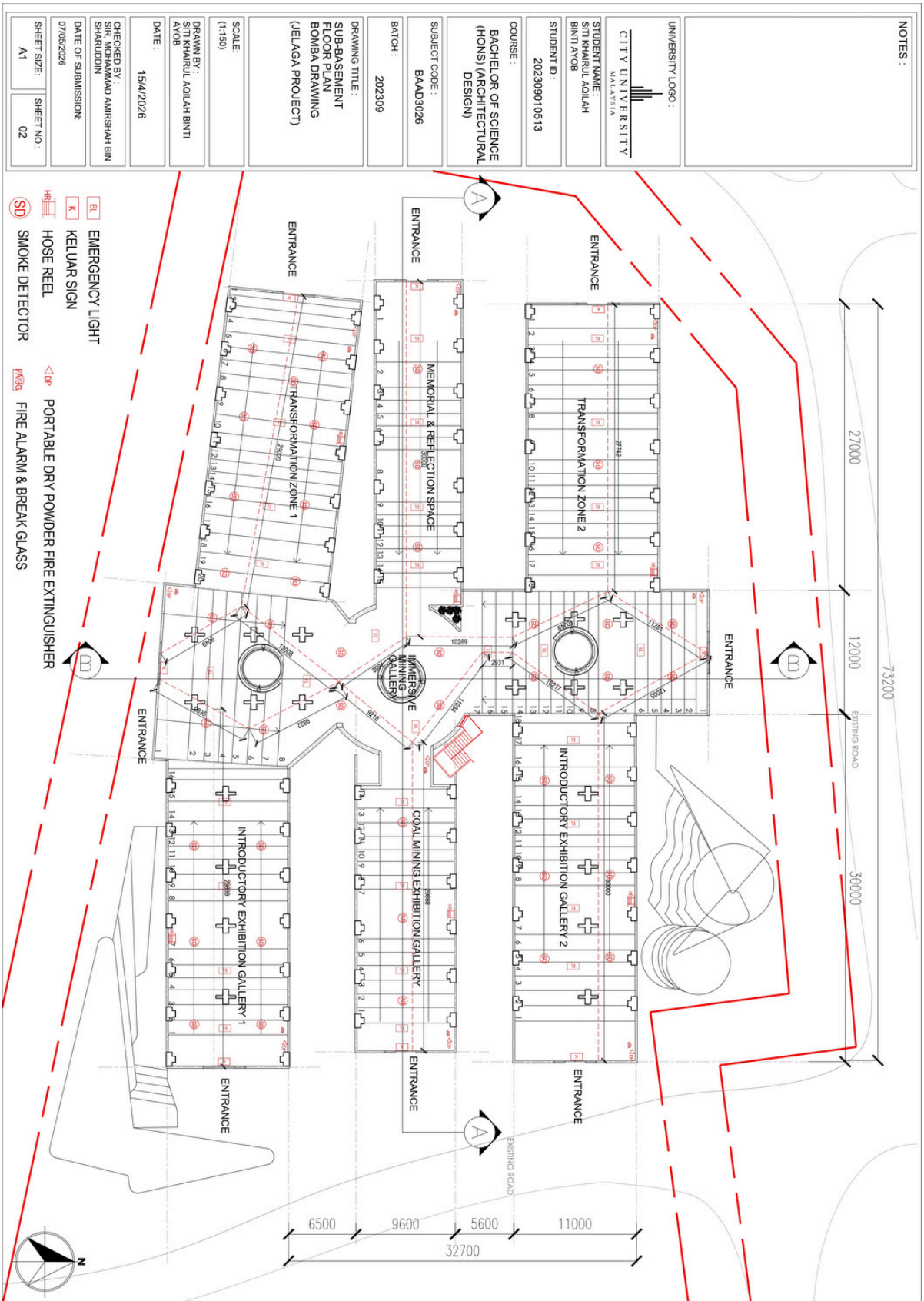
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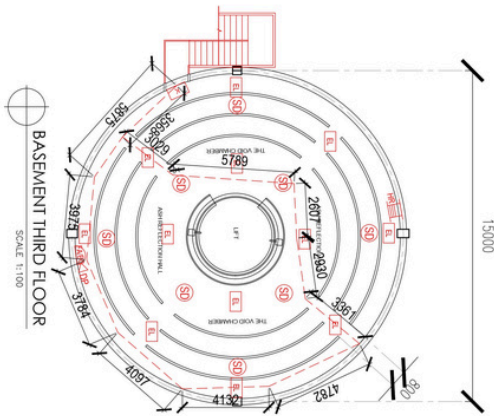
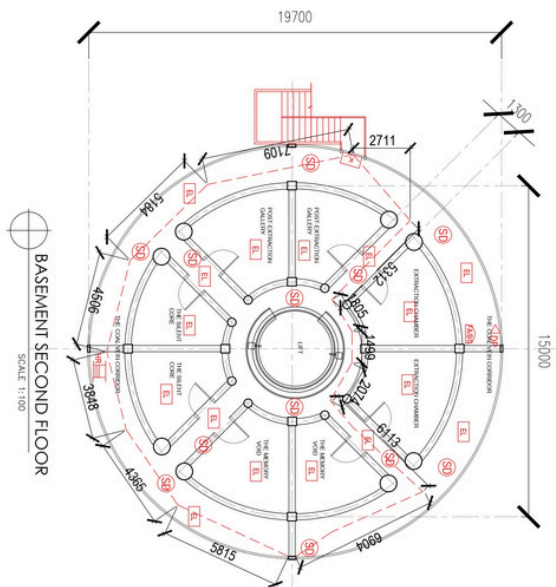
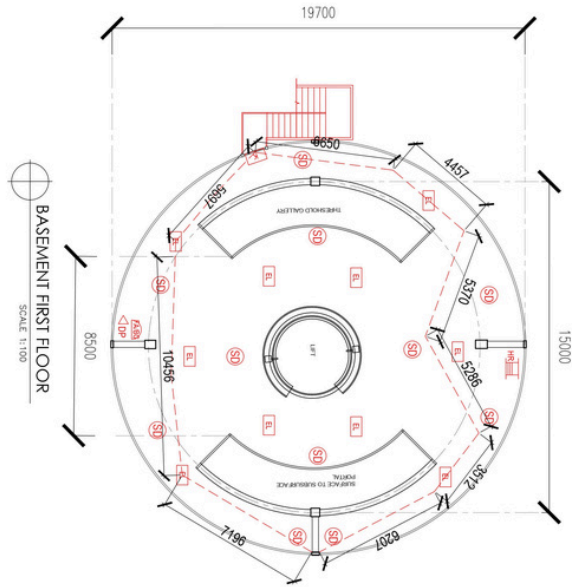













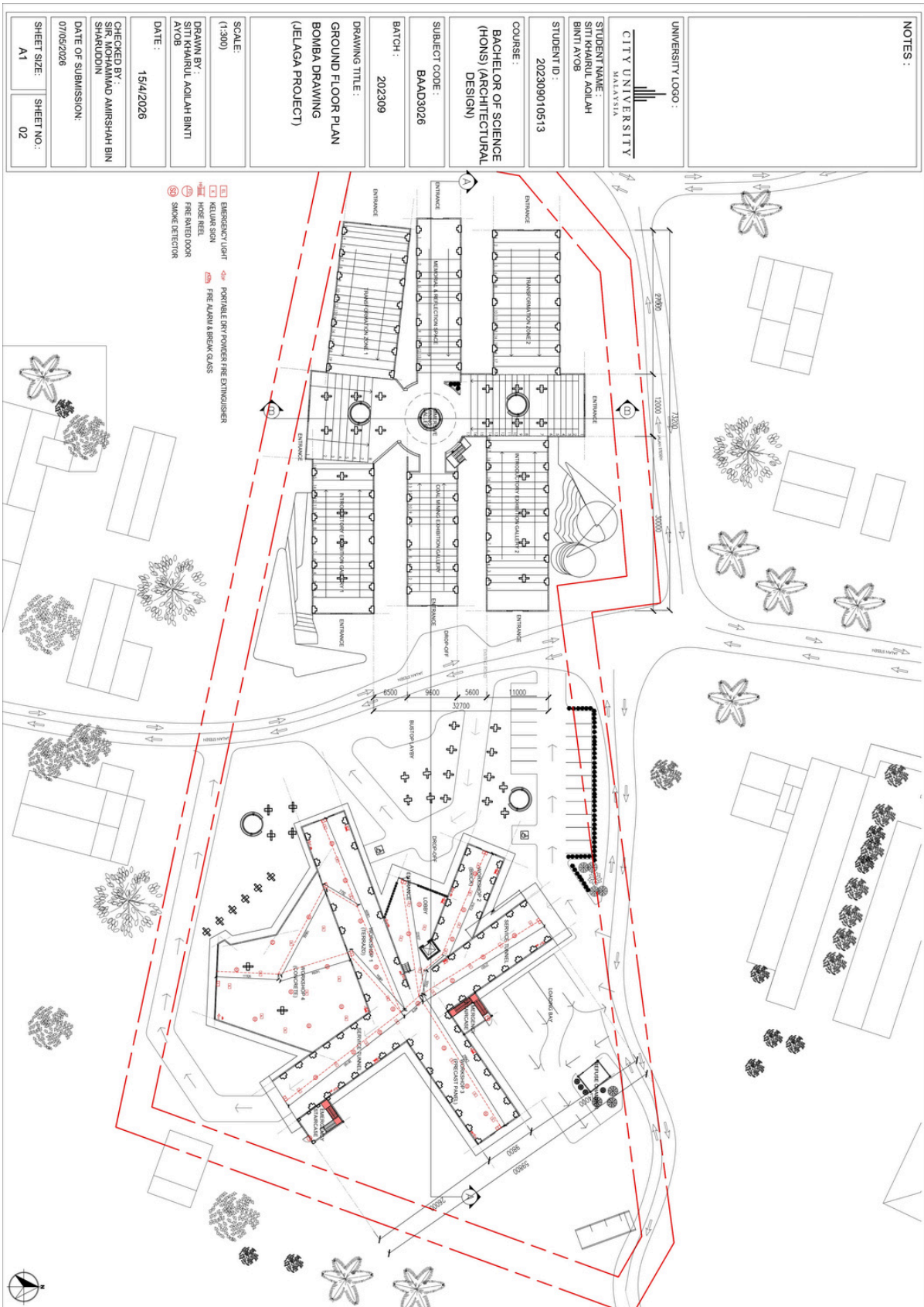
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NOTES :



-  EMERGENCY LIGHT
-  KELUAR SIGN
-  HOSE REEL
-  FIRE RATED DOOR
-  SMOKE DETECTOR
-  PORTABLE DRY POWDER FIRE EXTINGUISHER
-  FIRE ALARM & BREAK GLASS









12.2 Final Board Presentation

### 01 RESEARCH BOARD MINING AND QUARRYING: POST-INDUSTRIAL LANDSCAPE AND COMMUNITY REGENERATION

## COAL AS A RESOURCE

**1.5 HISTORICAL OF COAL (MALAYSIA)**

**1.6 HISTORICAL OF COAL (WORLDWIDE)**

**1.7 ADVANTAGES**

**1.8 DISADVANTAGES**

**1.9 MINING AND QUARRYING**

**2.1 COAL TO ENERGY PROCESS (ELECTRICITY)**

**2.2 COAL TO ENERGY PROCESS (ELECTRICITY)**

**2.3 GROUND CONDITION & LAND STABILITY**

**2.4 CASE STUDY**

This infographic board explores the role of coal as a resource. It includes a world map showing coal distribution, a detailed diagram of the coal-to-energy process (from coal to electricity), and a case study section. The board is densely packed with text, images, and diagrams, all presented in a clean, modern layout.

### 02 SITE ANALYSIS MINING AND QUARRYING: POST-INDUSTRIAL LANDSCAPE AND COMMUNITY REGENERATION IN BATU ARANG

## BATU ARANG, GOMBAK, SELANGOR

**2.1 SITE OVERVIEW**

**2.2 SITE CONTEXT**

**2.3 SITE HISTORICAL TIMELINE**

**2.4 LANDUSE**

**2.5 CULTURAL AND ECONOMIC SIGNIFICANCE**

**2.6 GEOLOGICAL CONTEXT**

**2.7 UNDERGROUND SPACE IN FORMER MINING AREA CONSTRUCTION METHOD**

**2.8 ENVIRONMENTAL CONTEXT**

**2.9 SITE PLAN DEVELOPMENT**

**2.10 SECTION & ELEVATION**

This site analysis board provides a comprehensive overview of the Batu Arang area. It features a site overview map, a historical timeline, and detailed land use and geological context. The board also includes a section on underground space construction methods and a final site plan development. The design uses a mix of maps, photographs, and architectural drawings to convey information.

