RE[DE]FINED

An Electronic Waste Recycling Plant and Jewellery Design School

Maboneng Precinct, Johannesburg

Lize-Marie du Toit

RE[DE]FINED

Extracting from the electronic waste hierachy in Maboneng, Johannesburg.

DECLARATION

This dissertation is submitted in partial fulfilment of the requirements for M.Arch. (Prof) degree at the University of the Free State. All work in this document is my own, except where otherwise acknowledged.

I declare that **"Re[de]fined"** is my work.

Department of Architecture, Faculty of Natural Agricultural Sciences, University of the Free State.

The work contained in this thesis has been submitted for proofreading and editing by Natania du Plessis.

Supervisors: Prof. J.D. Smit, Mrs. P. Smit, Prof. G. Bosman, and Prof. J. Noble.

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Declaration of Original Authorship:



This dissertation and its work have not been submitted to meet the requirements for any reward, nor has it been submitted to any other institution of higher education. This dissertation contains no material previously published or written by another individual, except where references are made.

Lize-Marie du Toit | 2018115986

Email: lmdutoit1@gmail.com

Cell No: (+27) 71 350 9514

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Finally, my fellow M.Arch Prof. students, for the tears and laughter we have shared, you have been my rock.

RIGHT TO REPAIR

"**At the far end of the world where nobody knows**

The sweet smell of burning gets right up your nose

It comes from wires, TV's, computers and other such stuff

That's been thrown away like pieces of fluff.

They end up in piles – and that's what's burning

We don't give a damn – and we're not learning

That this is madness. It doesn't make sense.

How could our society be so dense?"

(Hailes, 2021: Online.)

Julia Hailes (Hailes, 2021: Online) writes of our designed obsolescence and its relevance to e-waste. In her work, "Right to Repair", she encourages the extended possibilities of the life of our electrical goods. She formulates a framework of giving consumers options other than "discarding and buying something new". She speaks of "scars on the landscape" caused by the piles of rubble and accuses our fuelled and wasteful society of the greed we must now challenge.



Figure 01: Death's Dealer (Sharma, A. 2023: Online).

ABSTRACT

The reality of electronic device use, consumption, and production have increased dramatically over the past few decades, leading to an increase in the disposal of outdated technology. The aim is to explore an appropriate inner-city development that encourages e-waste recycling and material recovery to present an opportunity for economic benefit and community engagement. This begs the question of how architecture can act as a mediator to expand the sustainable processing of electronic waste (e-waste) by exposing the jewellery industry and addressing the rapid evolution of technology; able to express and take on an embodied entrepreneurial venture within the urban fabric of Maboneng in Johannesburg. Designers seldom address the challenge of creating a potential hub that provides entrepreneurs with an urban platform by approaching the city resources as a waste mine rather than sensitive ecological mining areas. The proposed design's aim relies not only on the educational outcome of the jewellery design students but also on providing a prosperous and vibrant workforce through waste production methods to celebrate the secondary properties of the material. This is done by investigating waste control analysis to address the complex system of extraction methods, including the study of precedents contributing to the function, context, and building type. The urban renewal programme acts as an instrument to support other waste management investigations, offering education and active instruction in the city and redefining our response to the rampant concern of e-waste.

Keywords: e-waste recycling, jewellery design, urban mining, extraction operations, sustainability, expression, and exposure.

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INTRODUCTION



Figure 02: Overdose (Dombries, C. 2017: Online).

Once presented with the daunting task of determining a dissertation topic, I questioned how architecture could be used as a tool to address contemporary problems. Not only is this project developed within a framework of managing a non-architectural problem in South Africa, it also challenges how architecture can address a global crisis that goes beyond the interests of architects.

The development of information technologies, the international economy, and the digital age all mark society today. This fleeting network has grown so much that it influences and captivates our daily lives. Not only does the digital age hold a firm grip on our thoughts and emotions, it also results in materials that take up our physical space.

The systematic burial of waste leaves much evidence of humanity's unsustainable damage to environmental systems; it also leads to a significant proportion of valuable sources destined to be extracted from large tech companies to everyday household appliances.

This is an exploration of architectural intervention and a course of discovery to provide a place for the city and its people to develop solutions to compete in the circuits of advancing space and maintain control thereof. When local labour and resources collide, the architecture holds further potential for expanding its reach across a global sphere. However, the proposed design's primary concern is extracting from downtown Johannesburg's waste hierarchy and celebrating urban mining in the context of the "City of Gold".

RESEARCH METHODOLOGY

The structure of the dissertation presents an argument exposing the threat of e-waste and introducing the process of urban mining and how jewellery design allows the reader to engage with numerous possibilities when manifesting oneself into the problem-solving opportunities of such e-waste.

This research seeks to explore the following primary sources of knowledge that govern the significance of typology (type), topology (topos), morphology (form), and tectonics (structure). The who, what, where, and how of architecture serve as the foundation for the research methodologies.

The format of these questions is as follows: The project's challenges and boundaries will be identified in the dissertation through objectives on the problem statements and aims, followed by the research question and leading themes. Topology acquires quantitative and qualitative information about the environment and the site, indicating its defining qualities and challenges, by compiling geographical data and information on the site's past and experiential elements. The investigation of the client, programme, and building type addresses the overall objective of typology. Further observations within the theoretical studies approach the building through morphology and tectonics, using research and analysis from the extracted readings to explore and establish the conceptual framework related to the problem statement.

The design and technical synthesis are produced and supported by the ideas and theories forming the design methodologies. Regarding the final design synthesis, this dissertation attempts to review and evaluate the investigation process through conceptual exploration and research aiding its development.

PART 01 | Project

Rationale

The project rationale is intended to assist the reader in understanding the project's foundation and to present an argument as to why the dissertation is appropriate in its attempt to address the underlying problem. The understanding of the project implementation is supported by relevant background regarding the problem statement that demonstrates the decision-making process supported by innovative ideas to inform and inspire the development process.

1.1 PROBLEM STATEMENT

A disengaged relationship exists between architects and the demands of the city, especially the factors concerning industrial processes and, more importantly, waste management. When it comes to the realities of the digital age, where people are eager to embrace technology evolving at an increasing rate, we intend to disregard the toxic wastelands it leaves behind.

By understanding the industrial traces, the critical components of our society, and the weight minerals and money carry, this document aims to challenge the preconceived notions about e-waste and how to give back to the city. This is done by maintaining a clear understanding of the relationship between industrial fragments, labouring individuals and waste by raising an academic education in jewellery design to expose truths, evoke responses and redefine time in architectural form.

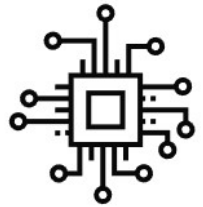
1.1.1 The Digital Age and Its Toxic Legacy

We often take electronics for granted because they advance at such an incredible rate – and now even faster than ever. The widely accepted international definition of e-waste is the discarded components of "anything that runs on electricity" (De Froeberville, 2019: Online), and it is currently the fastest growing and most valuable domestic waste stream in South Africa.

However, because of the substances that make up the components of the device, e-waste is both toxic and a valuable source of secondary raw material. It includes anything that contains circuitry or electrical components that use small amounts of metals, such as gold and silver, among other materials, due to the metal's remarkable electrical conductivity.

Unfortunately, some of these discarded appliances contain poisonous materials and will remain so if not handled properly and appropriately discarded. This has an extreme effect on our economy and environment. In recent years, we have seen rapid technological innovation but not the necessary change to address this transformation.





THE DIGITAL AGE

THE WORLD'S LARGEST WASTE DUMP



Figure 03: Burning Dreams (Rapezzo, C. 2022: Online).

1.1.2 Agbogbloshie

The extraction of raw materials frequently causes dislocation, unrest, and even war amongst different groups or countries. With over a third of electronic devices wounding up in developing countries, it is essential to raise awareness against this injustice. The dynamism of urban regions stems from a network's ability to sprawl and integrate the complexity of its components in certain portions of the world while deteriorating in other spaces.

Agbogbloshie, a commercial district on the Korle Lagoon and former wetland of the Odaw river near the centre of Accra, Ghana, is one of the world's most prominent examples of e-waste dumping sites where gold, amongst other materials, is now mined for with unthinkable methods. Yet, its jewellery industry accounts for only a tiny percentage of the world's total production (Fening, 2015: Online).

Since many electronic devices are not designed to be recycled, the appropriate disassembly of e-waste is exceedingly tricky and labour-intensive, especially without the necessary machinery to facilitate it. This manual labour causes injuries, such as burns, untreated wounds, eye damage, and lung and back problems, that go hand in hand with chronic nausea, anorexia, debilitating headaches, and respiratory problems, resulting in the death of many workers (McElvany, 2014: Online).

The reasoning for this insight is to communicate the intense influence our global culture has on the extraction of metals and the lack of technological advancement and use of modern equipment affecting the lifestyle of people.

1.2 AIM

The experience of such a dynamic, charismatic, and turbulent city as Johannesburg, which is just as complex in its wastelands, allows us to perceive an alternative perspective, with thoughts on new prospective futures, enthusiastic outlooks, and supporting remedies. The aim is to shift the perception of urban mining from its current undesirable role and redefine the rudimentary methods currently used in the industry.

Typically grounded in public educational institutions, hybrid architecture is functional and valuable when combining the two distinct sections of industrial and social architecture. This allows for the most significant benefit involving the communities' best interest and quality of life.

By repairing our mental and physical separation from urban mining, we can observe the related practices and stray away from the isolated settlements of poisoned environments and lost minerals. This operation is based on reactions, ethical principles, and values, imposing a new, informed path, which includes educational and recreational functions.



Figure 04: Urban Mining (Independant, 2021: Online).

Mining

[GEOLOGICAL DEPOSITS]



Figure 05: Mine dump, Jhb (Lewis, M. 2021: Online).

Urban Mining

[ANTRHOPOGENIC STOCKS]

1.2.1 Urban Mining

Reclaiming raw materials from waste products sent to landfills is known as urban mining and is currently more valuable than traditional mining. REDISA, a South African NPC working with governments to implement circular economies, suggests that "South Africa's growth path, which has previously been skills-biased with deficient levels of employment growth, can be altered to be less skills-intensive and more employment-intensive if we focus on a growth strategy that beneficiates all waste streams" (Van der Merwe, 2017: Online).

The benefits of urban mining allow the increasing demand for raw materials to become an essential part of the circular economy by bringing geographically-scarce resources closer to where they are needed (Copper Alliance, 2020: Online) and therefore enhancing the safety of resources.

To fully realise an urban mine's potential, adequate local infrastructure, skills, and market conditions are required to increase the processing capacity of secondary materials. Hence, the number of resources in urban mining rises continuously as products and infrastructure surge. By celebrating the concept of people working as a network system through education and training, the proposal presents an opportunity for economic benefit, most notably based on environmental health concerns.

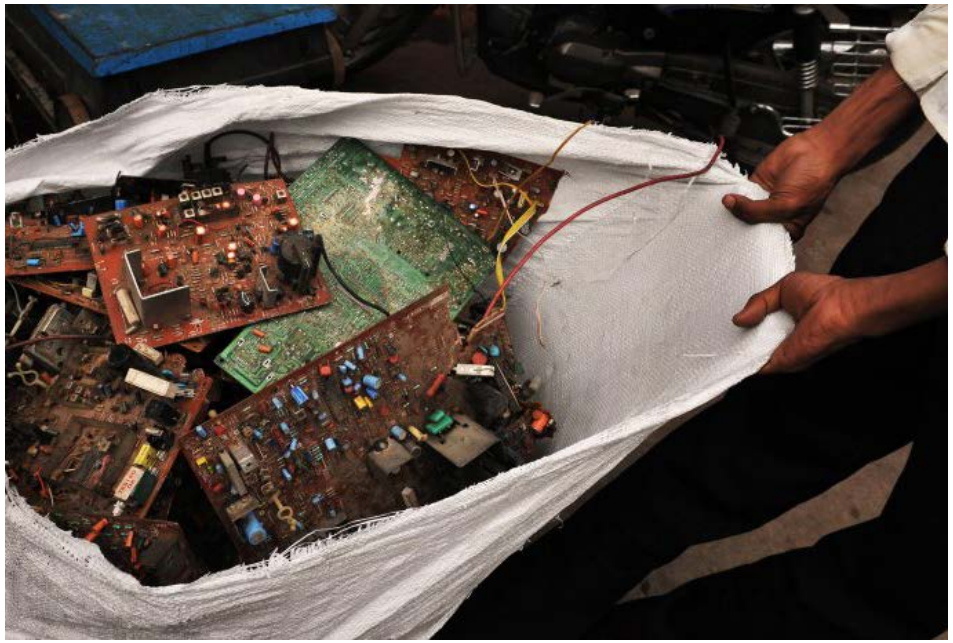


Figure 06: Urban Mining (CSIS, 2021: Online).

URBAN MINING: MINING REALITY

1.3 TOPOLOGY

Investigating where the building should be located to address the issues of topology. These considerations are further explored in Part 3, where research is conducted to establish design tools concerning the site by managing the urban fabric and its pragmatics.

1.3.1 Site Justification

The proposed site is located between the eastern side of Johannesburg's Central Business District (CBD) and the industrial area bordering the Golden Reef in the outer skirts of Maboneng's Precinct. The site connects the railway station at Jeppestown, where the development of a prosperous neighbourhood is absent, and the area is left to degradation. In effect, this has contributed to the site's immediate surroundings being in dire need of a catalytic approach that explores alternative paths to the one lacking innovation and growth. It will serve as a catalyst project to encourage even greater social vitality and will act as an enticing attraction point, drawing outsiders to a communal node where Maboneng can be experienced to a greater level, expanding the precinct within its specific purpose.

"PLACE OF LIGHT"



1.3.2 Problem Statement

The issue of addressing Maboneng's typology relates to the need to expand the possibilities of the precinct and the social norms, cultures, and values even further through public intervention. To develop the urban environment into an even more attractive and robust space within the larger city of Johannesburg, it is crucial to determine which aspects helped shape its development and whether those factors (the atmosphere, art, culture, buildings, and urban design) contribute to adopting and utilising these homogenous views.

1.3.3 Aims

This part of Johannesburg's urban narrative is layered with a complex urban and social culture unique to its location, allowing the project to arise from and build upon this perspective. The proposed building aims to integrate itself into Maboneng's urban narrative and spatial structure by adding a new layer of contemporary design and contributing to the iconic urban tourism destination This will lure those hailing from the suburbs and signify the profound transformation, using immediate resources whilst introducing cultural, economic, and environmental value in the waste infrastructure.



Figure 07: Maboneng Precinct (Author, 2023).

1.4 MORPHOLOGY

The morphological aim is to create an innovative architectural stance to encourage the intriguing and fruitful fusion between the keen entrepreneurial sense and a well-focussed inventiveness, asking how entrepreneurs have moulded the urban setting into a more appealing and vibrant area within the larger city of Johannesburg?

1.4.1 Research Question

EXPOSURE

How can architecture act as a mediator to expand the sustainable processing of electronic waste by exposing the jewellery industry and addressing the rapid evolution of technology; able to express and take on an embodied entrepreneurial venture within the urban fabric of Maboneng?

EXPRESSION

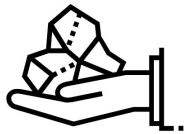
The process of upskilling and reskilling urban dwellers to start them on establishment in a city of socio-economic deprivation.

A proposal for how upcycling refers to how the art of jewellery design and the science of repurposing materials can be translated into an architectural design approach.

'Upcycling' = Discipline + Art

a composition of = 'preparations and techniques' + 'expression and





1.5 TYPOLOGY

Investigates what the building should be in terms of programme and function, regarding urbanism and the urgent need for intervention.

1.5.1 Issues Relating to the Unemployment Rate

The systematic burial of e-waste now concerns thousands, including children, who make a living scavenging for electronics and other devices disassembled in small workshops or junk warehouses.

In most illegal cases, the uncontrolled burning and disposal of e-waste cause environmental problems due to incorrect processing methods, which releases significant toxic substances into the air, soil, and groundwater. This impacts the informal workers' health because of the hazardous working environments, and because they do not have any access to proper tools and protective equipment.

Yet, the value chain created through urban mining provides the city with the desperately required employment opportunities among low and medium-skilled workers, envisioning specialist tasks within a network of skilled artists honouring modern techniques.

1.5.2 Client and User

The client and user are chosen in alignment with the proposed building as they dictate the programme of the building, creating job opportunities, retaining value in the industry, and repairing electronics through e-cycling.

Client Profile:

Auterra & eWASA EPR Waste Association of South Africa

User Outline:

- Permanent staff and service members
- Urban miners and public engagement
- Prospective students.



1.5.3 Prospective Views

With unemployment being a driving factor, as well as the need for public intervention, the provision of employment opportunities and economic incentives for the locals can be enhanced through architectural intervention and help uplift the socio-economic profile of Maboneng.

The e-waste management system will also help stimulate young people's creativity by teaching them how to recycle and make something valuable from old technology. This will help to further boost the economy by supporting and creating jobs. The goal is to achieve a blended learning approach to address the mounting e-waste and Gauteng unemployment crisis.

PART 02 | Exploration and Grounding

This chapter addresses the knowledge discovered through research and investigations of the project's justification. Architectural concepts generate the overall conceptual framework, whereas precedents and theoretical underpinnings concern the fundamental understanding of contextual studies. The translation of information gained is required to create a foundation for the design process, ultimately transforming into a strategy, and resolving issues taken into consideration in the problem-solving of the physical architectural intervention.

2.1 TOUCHSTONE

The touchstone explores the main idea or guiding principle of the design. It is a constant reference point throughout the design process and is constructed abstractly, forming an essential part of the initial design concept. By exploring the link between jewellery and architecture through the poeisis of manipulating materials into new elements, the purpose of the touchstone is to develop the potential to foster the transformation of our discarded culture, the detritus of our modern life, and the sustainability of materials, which symbolises the ongoing conflict between the past and present.

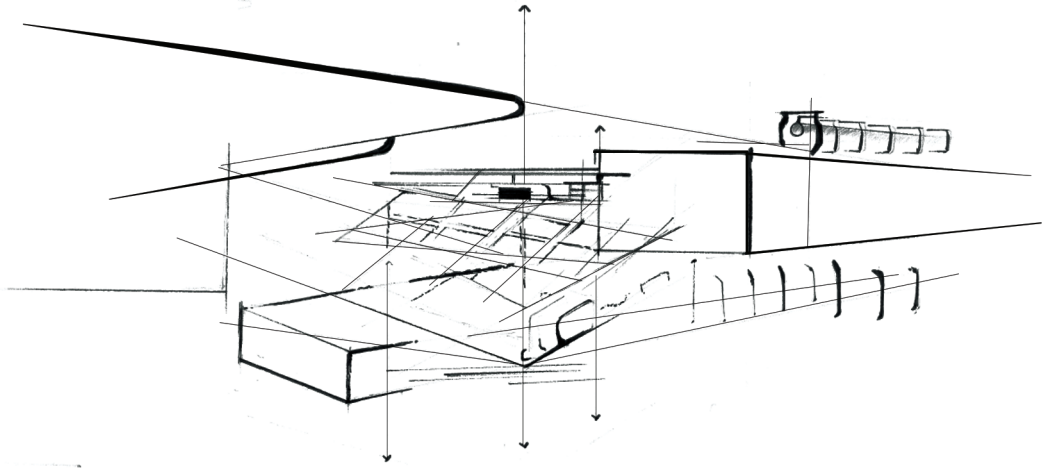


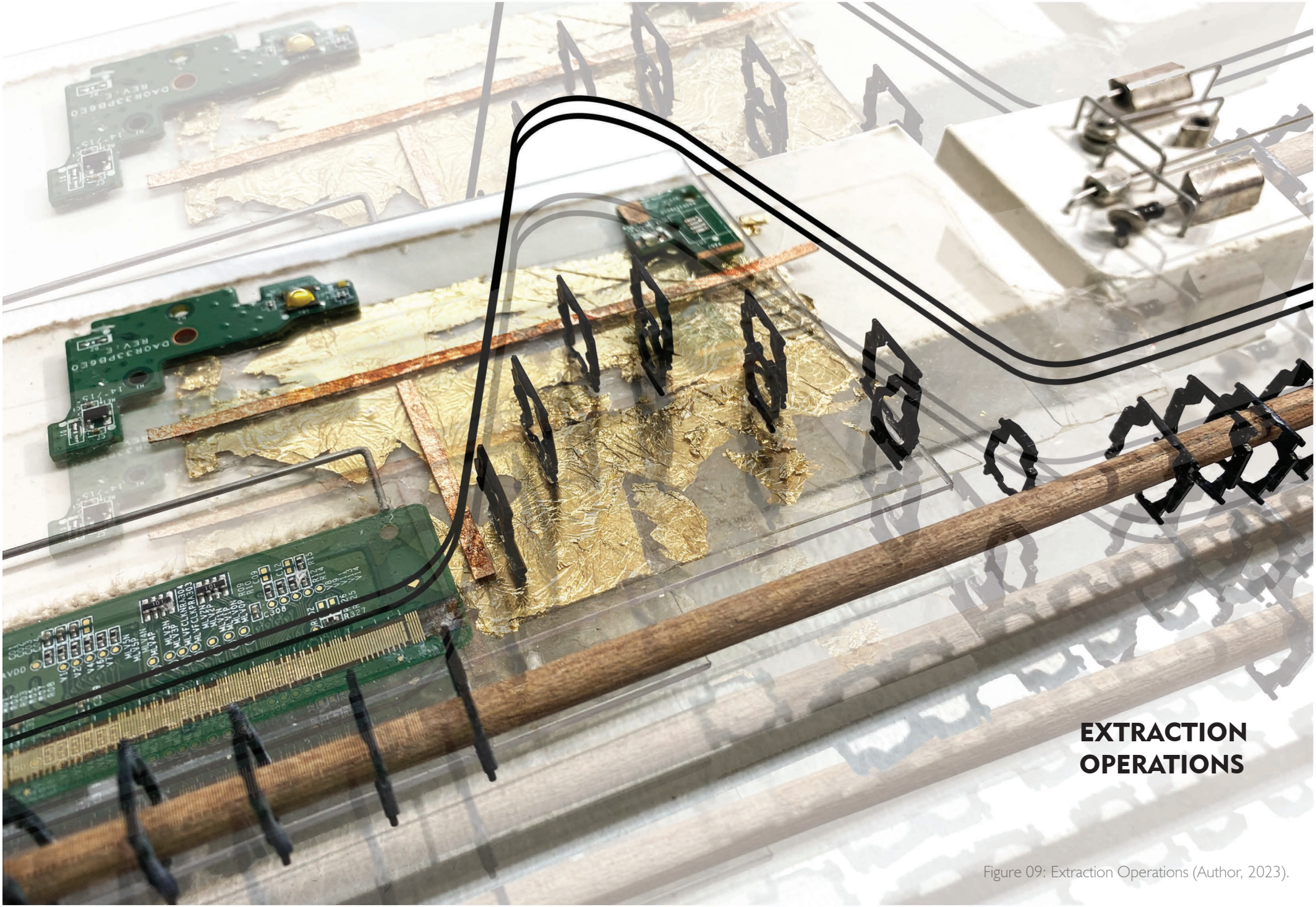
Figure 08: Conflicting Possibilties (Author, 2023).

2.1.1 The Poeisis of Manipulation

Despite its conservation during physical and chemical changes, it is well-known that matter can neither be created nor destroyed (National Geographic Society, 2022:Online). Therefore, the touchstone is interpreted and displayed to bring awareness to how we address our waste consumption, acknowledging how our commodities impact our planet and our lives.

The touchstone emphasises coalescing art and instrumentality by exploring the potential to foster transformation. By using the jeweller's bench and pin, extraction operations, and the final exhibition of the jeweller's podium, we unveil the layered debris of our modern life, ultimately expanding the lifespan of the devices.

The project exposes the discarded materials and evidence of our unprecedented destruction by revealing their secondary properties rather than purely nominating when material becomes waste. The goal is to reach equilibrium, arranging and balancing a set of materials into a composition. Most importantly, the touchstone describes the transformation of the once functional, always hidden, and now discarded matter towards the now exposed, poetic, and embellished piece of jewellery.



EXTRACTION OPERATIONS

Figure 09: Extraction Operations (Author, 2023).

THE JEWELLERS' BENCH & PIN

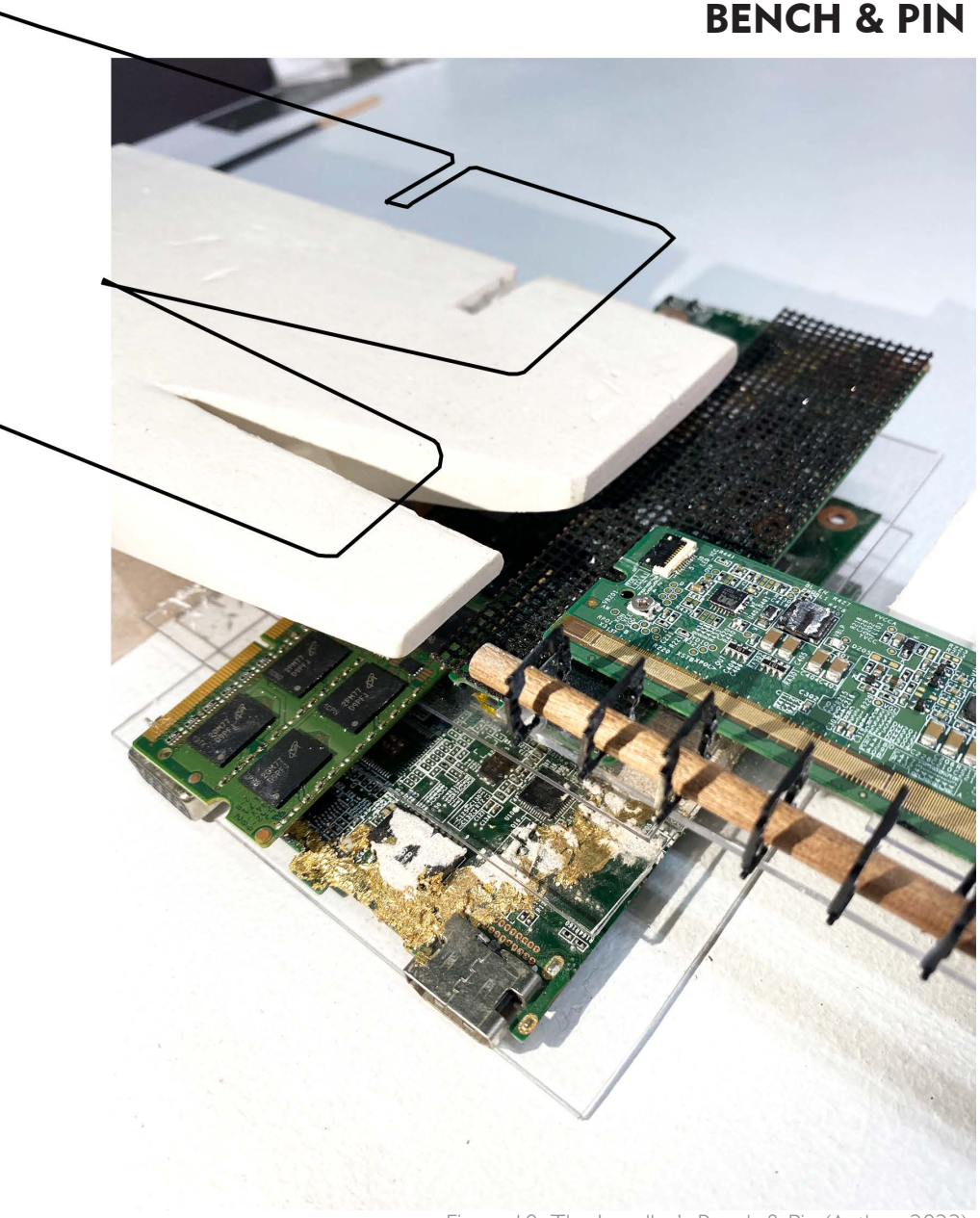
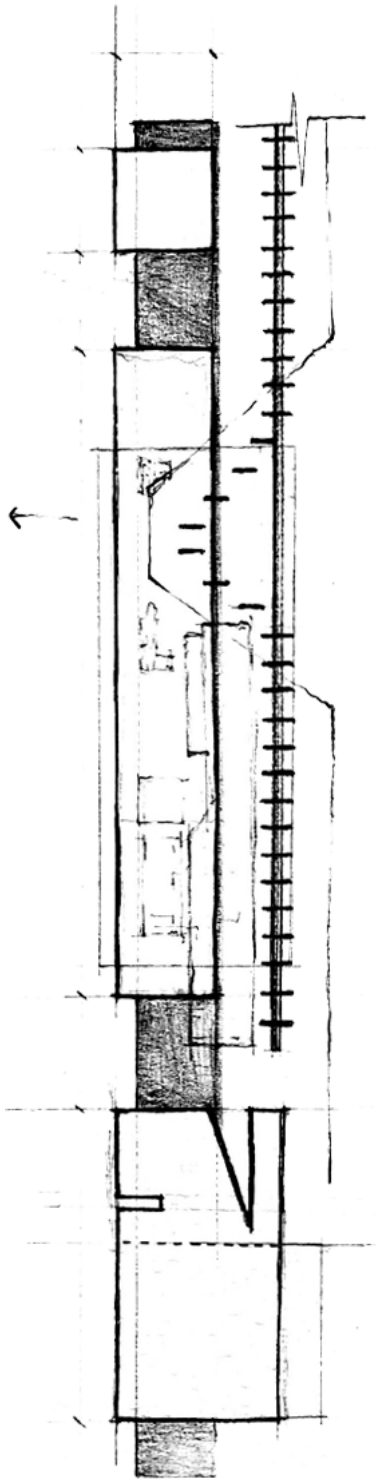


Figure 10: The Jeweller's Bench & Pin (Author, 2023).



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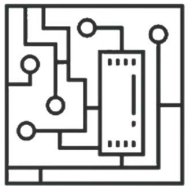

Figure 11: Art & Instrumentality (Author, 2023).

EXHIBITION & EXPOSURE

Figure 12: Exhibition & Exposure (Author, 2023).



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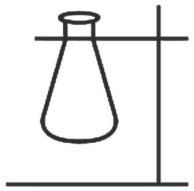

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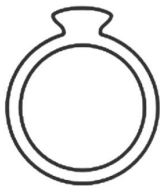


2.2 CONCEPTUAL FRAMEWORK

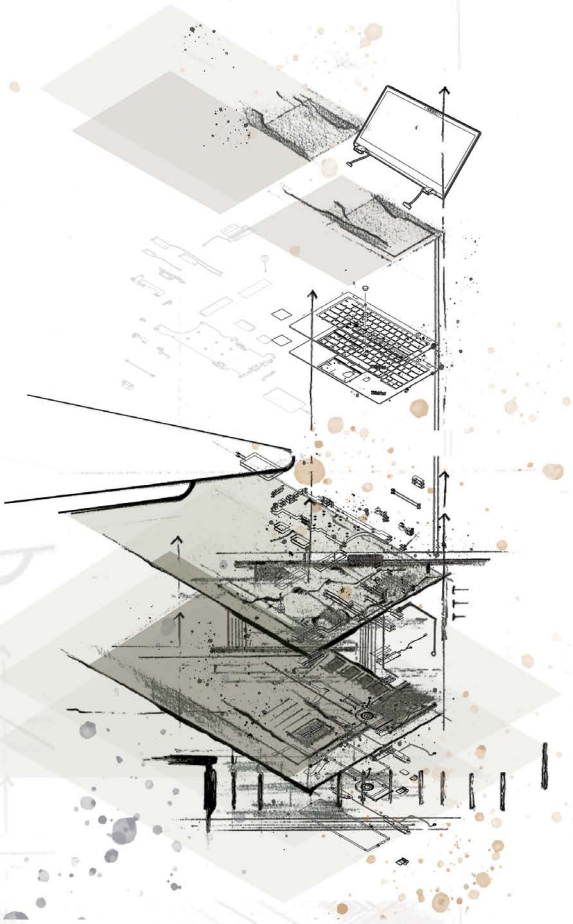
By investigating three approaches to the site and simultaneously addressing the theoretical underpinning and problem statement, the concepts transform the realisation and transformation of architectural forms to be further explored in the design explorations.

The world's technological and production processes continually change and develop at an immense rate; therefore, continual change and adaption are essential to sustain the material used, especially when it resorts to a functional change that could provide for an extended life. The grounding behind the waste –the source and consequence of the produced and abused urban nature, is the foundation for my decision-making and questions our awareness, ability, and expectation to offer an innovative potential.

Lewis Mumford, an American historian, sociologist, and philosopher of technology, particularly noted for his study of cities and urban architecture, described the foundation that developed into the three conceptual approaches, creating new typologies of waste management infrastructure.

> **"The chief function of the city is to convert power into form, energy into culture, dead matter into the living symbols of art, and biological reproduction into social creativity."**
>
> - Lewis Mumford, Cities in Evolution.

Evanescing Distortions



"The Origin"

Figure 13: Elevating and redirecting the compacted and concentrated (Author, 2023).

Articulating the Subliminal

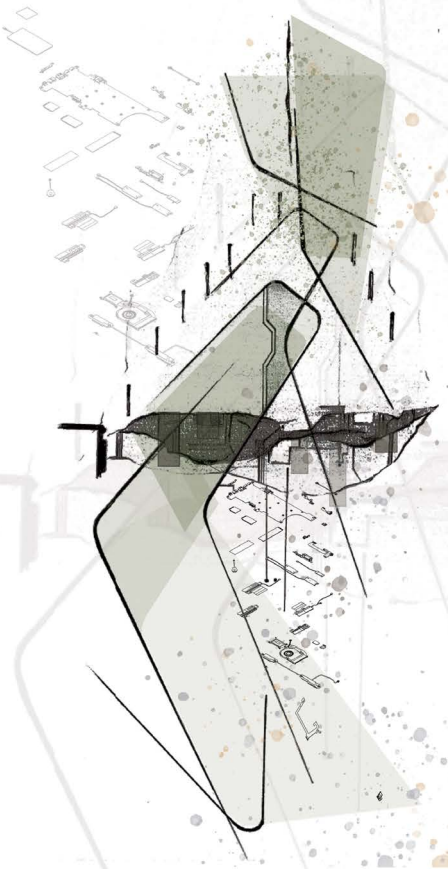
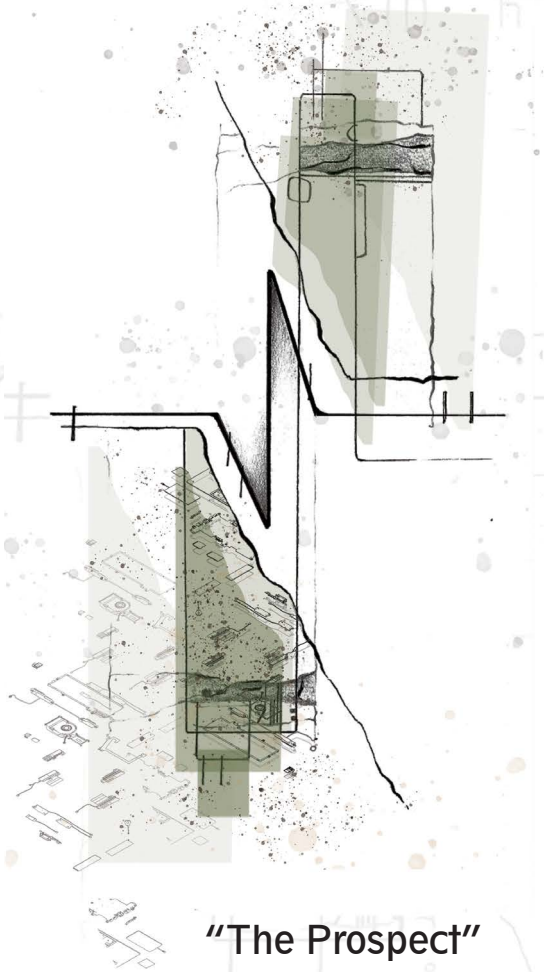


Figure 14: Extracting from the deep recesses of our past (Author, 2023).

"The Transformation"

Poetic Equilibrium



"The Prospect"

Figure 15: The constant rearrangement of the fragments of evolution (Author, 2023).

2.2.1 Evanescing Distortions

Identify, decompose, and recompose elements.

"The Origin"

This conceptual approach addresses the obstacles we experience due to a lack of understanding of the richness and complexities of our internal, local discourses and the possibilities they hold within. This is "The Origin" of the process, where avenues are encouraged to be explored to elevate and redirect our compacted and concentrated impression of the current weight of the city's resources. This multi-layered story of the systematic burial of e-waste portrays distortions as a compression of time and space in modernity. This concept aims to carve out and expose all the intersecting layers of the environment, which structure how we live and access our resources, ultimately creating awareness of the current misrepresentation of e-waste.

Figure 16: 'The Origin' (Author, 2023).

2.2.2 Articulating the Subliminal

Extracting the deep recesses of our past and memories.

"The Transformation"

This concept is informed by transforming the so-called "dead matter into the living symbols of art" (Wadlow, 2016: 36), defined by Lewis Mumford, as the primary function of a city's evolution. After the initial encounter with understanding the origin of e-waste, I now refer to the incomprehensible complexity of materials existing beneath the surface, the layer beneath the visible edifice. By using deconstruction as the antidote to 'uncover' the unconsciousness of the material, this concept defines how to ultimately transform the primal pursuit of converting used materials from their structures to something new. This provides a particular interpretation of 'The Transformation' and conveys the seemingly magical creation process involving the conversion towards sustainability.

Figure 17: 'The Transformation' (Author, 2023)

2.2.3 Poetic Equilibrium

Rearranging fragments of evolution into a composition.

"The Prospect"

After exploring the potential of fostering transformation, this conceptual approach strives to compose a place where nature and urban infrastructure are in complete harmony. At this destination, a balance is found between external and internal forces, a portal between two worlds, where the urban life of "ecological appropriation" and "social production" moves simultaneously to ensure the future evolution of urban systems. "The Prospect" shares dialogues on different points of view about storytelling, but more specifically, the way we dwell, as these materials themselves have always been and will always be a part of the Earth's structure.

Figure 18: 'The Prospect' (Author, 2023).

Refining the **MORPHOLOGY**

Each particle of dust carries with it a unique vision of matter, movement, collectivity, interaction, affect, differentiation, composition and infinite darkness.

- Reza Negarestani
Cyclonopedia
2008.

2.3 MORPHOLOGY

This chapter provides insight into the theoretical stance, a framework followed by the previous chapters, illustrating principles through, conceptual sketches, and the overall grounding of the design proposal.

2.3.1 The Inexorable Waste Revelation

An infinity of waste revealing conflicted possibilities

Cities are collapsing under the weight of their distortions of universal tendencies rather than understanding the richness of its complexities. We live in a time when the prevailing concern of trash has displaced the landscape. The human concept of defining a given material with no use, value, or potential is what is left behind when imagination fails and is otherwise known as 'waste' (Ekberg, 2009).

Therefore, the topic of 'Unveiling refined possibilities' referring back to the conceptual framework translates the discourse derived from the three concepts, translating the 'Evanescing Distortions, to 'Articulating the Subliminal' and finally reaching a 'Poetic Equilibrium' to create an architectural image that relates to the aspirations of a community or individual to form part of the embodied experience of the proposed design.

The theoretical discourse explores the wildest possible frontier of ideas and tools that can be combined and recombined in unpredictable ways to process the intrinsic value left to be recovered, emphasising the social stream of urban dwellers and their discards.



Figure 19: 'The Prospect' (Author, 2023).

THE INEXORABLE WASTE REVELATION.

Unveilling the refined possibilities

Evanescing Distortions

"The origin"

Palimpsest

Identifying, decomposing, & recomposing of elements

→

Articulating the Subliminal

"The Transformation"

Alchemy

Extracting from the deep recesses of our past & memories

→

Poetic Equilibrium

"The Prospect"

Embodiment

Rearranging the fragments of evolution into a composition

Narration

The discourse of the object

Framing a portal between two worlds, where the urban life of ecological appropriation and social production move at the same rate, to ensure the future evolution of urban systems.

2.3.2 The Scar

The concept of "evanescing distortions" addresses the theoretical aspect of the damage caused by the digital age and the affective scars left upon the landscape. Palimpsest can be understood as the practical interpretation of an accumulation of layers. However, the information and connotation could be distorted and blurred by erasing and covering the unpleasant layers, which causes two adverse effects: permanently destroying accurate information or distorting how people perceive things.

The hypothesis of our dissociation from waste, sometimes referred to as our persistent effort to deny the existence thereof, is the foundation of our material rejects. The concept of urban palimpsest addresses the product of landscape transformations and its history, which contributes to the current morphology of the urban tissue and is essential to grasp as it is a valuable tool to address the planning of the current and future evolution of urban systems. Today, this global crisis has made it immensely difficult to extract the significance and social influence of metal mining because the authenticity and value of e-waste have been obscured.

When we work with heterarchy, we ensure the best opportunity to realise human potential. This enables the scars left behind after occupancy ceases in the urban fragment to operate at their full potential, resulting in a story unfolding.

"The scar is a deeper level of reconstruction that fuses the new and the old, reconciling, merging them, without compromising either one in the name of some contextual form of unity. The scar is a mark of pride and honour, both for what has been lost and what has been gained. It cannot be erased except by the most cosmetic means. It cannot be elevated beyond what is a mutant tissue, the precursor of unpredictable regenerations. To accept the scar is to accept existence. Healing is not an imaginary, cosmetic process, but something that -by articulating differences – both deeply divides and joins together."

- Lebbeus Woods.

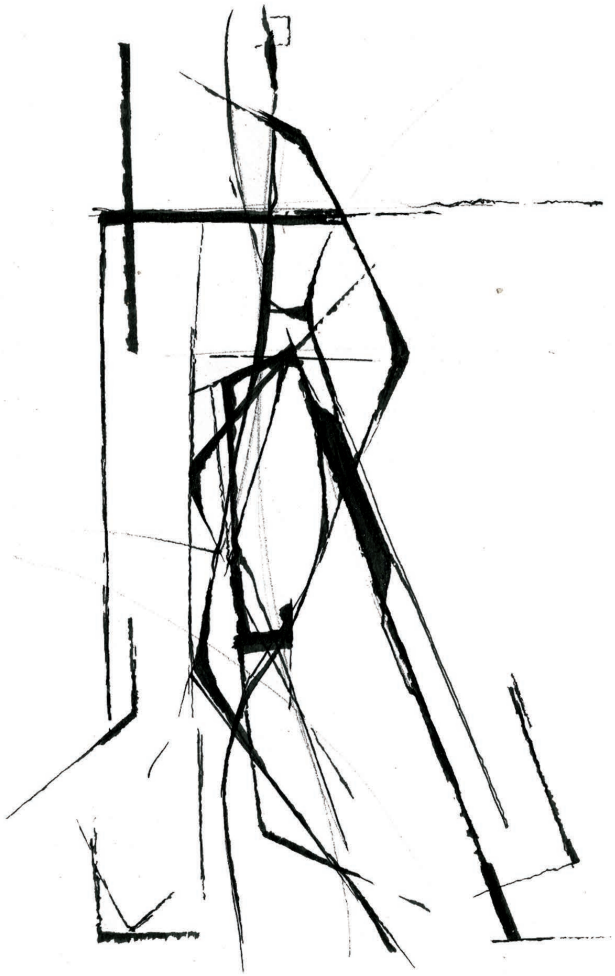


Figure 20: Fusing the old and the new together (Author, 2023).

The scar, according to Woods, "is a mark of pride and honour." Since it is the most direct and long-lasting reflection of the experiences, reminding us of what has been lost. On the other hand, it is crucial to for the "acceptance of existence" of the scar to realise what has been gained regarding the value and credibility of materials and for" architecture to confront abuse and chaos by turning them into a "new form of knowledge" rather than a distant memory (Woods,1993: 31).

2.3.3 Embodied Making

Woods elaborates on these "in-between"- spaces, where architecture is, first and foremost, a process of creating and not only an expression of knowledge (Woods, 1997: 36). This concerns society as a complex stream made up of an intertwined system of coalescing activities, including terms such as public/ private, art/science, and capital/ labour and allows us to engage with innovative methods of moving and resting in space, as well as provoking new and ever-changing interactions among people and things.

We must investigate new types of urban space and architecture because of the fluidity, speed, and advancements in the exchange of information across infinitely large and complex areas. One can immerse oneself in a world of concurrent activities within the walls, where informal meets formal, low-tech, high-tech, and emerging marketplace meets the global economic market.

Nigel Hamilton writes on the alchemical process of transformation. He elaborates on the origins of alchemy, stating, "Alchemy traces its roots back to the Egyptian civilisation where it emerged as practising art and science and expression of the Egyptian religion." He then introduces transmutation as the basis of alchemy, best known for believing lead can be transmuted into gold. This metaphor is created for us to realise that the transformation of non-precious metals into gold is compared to a soul being freed from its 'dead, leaden state of mind'. (Hamilton, 1985: 16)

The touchstone, *The Poeisis of Manipulation,* addresses the activity in which something that did not exist before by fusing art and instrumentality is brought into being. Merleau-Ponty stated that it is through art that we draw upon the fabric of brute meaning. Autopoiesis then again describes the realm of existence, where the body slides between the interchange of structure and information – it provides a platform for one to evolve and become a fundamental communication medium to introduce the notion and interaction of extraction, exposure, and expression.

An embodiment could embrace the core exchange system when the body is present. Finding the balance between the "local physical & cultural characteristics" and the "modern practices, technologies, and economic material conditions" allows for reinterpreting the journey of the economic transaction by analysing the relationship between humans and their discards.

EMBODIED MAKING BETWEEN PALIMPSEST & NARRATIVE

The urban miners we encounter around each corner in almost every corridor manifest their cultural manifestations of services and entrepreneurial values. Through observations and interviews, Byron Brown studied a variety of street vendors. He discovered that their distinctive cultures and services are demonstrated in the cherished interactions and encounters between their customers and themselves and in the orchestration of the physical environment (Brown, 2014: 244).



STREET VENDORS

Figure 21: Street Vendors (Author, 2023).

URBAN MINERS



Figure 22: Urban Miners (Author, 2023).

The comparison is made between street vendors and urban miners, as these factors provide the possibilities for improvement of the informal sector as urban miners play a central role in the possibilities technology can bring. In addressing the social deprivation of the CBD, specific tools are needed to release and express emotion, improve the insiders' well-being, build their identity and community identity, bring order to chaos, and orient themselves in time and space to affect fundamental transformations, ultimately.

This theoretical aspect addresses the problem statement of users that dwell in the disembodied setting of the city, causing the mind and body to feel immersed in systems that have suffered inexorable damage due to waste piles; it is necessary to return to critique and allow vulnerability to influence and shape the potential of the society to become part of the greater narrative of a place.

2.3.4 The Narrative of Evolution

Harmony can be found in the most uncommon, complex, and disorderly places. Nature underpins our very existence, making us question whether we have not left ourselves a city that is only hindering our existence. A cityscape could be defined as an artistic representation of the urban environment; it consists of the dense buzz of people and their activities and the non-humans (e-waste) that persistently concern humans.

THE COMPLEXITIES OF CITY LIFE AND HUMAN WASTE

"Each particle of dust carries with it a unique vision of matter, movement, collectivity, interaction, affect, differentiation, composition and infinite darkness."

- Reza Negarestani
Cyclonopedia
2008.

To illustrate the reciprocal relationship between city life and the complexity of human waste, it is crucial to notice what is circulating through the city: the dust of the pixelated material history and the complexity of the human experience erodes its way to the present time, containing layered experiences and events captured in the built environment.

The inhabitants become part of the city's identity within a moment of encounter. A dialogue informs the complexities of their experience, as opposed to the natural environment, which evokes and overcomes change, becoming one with itself and dissolving within a balanced intention to unfold naturally amongst the various exposures of the surrounding context.

Cities can be considered ecosystems, with complex networks of organisms and autonomous systems. A thriving ecosystem refers to one that can sustain itself by using an output from one system as an input for another in a cyclical fashion (Muller, 2018), resulting in these dialogues frequently having plot twists where previously disjointed and unclear threads are suddenly brought together in a coherent whole.

"We could classify the luxuriant growth of objects as we do a flora or fauna, complete with tropical and glacial species, sudden mutations, and varieties threatened by extinction?"

- Baudrillard, 2008: 05.

Jean Baudrillard questions the lost balance between the ever-accelerating precession of objects compared to humankind.

It is impossible to immediately restore the disrupted ways of life after destruction when far too much has been suffered and lost at too great a price to be forgotten. Therefore, the sense of creation allows for the survival of elements under extreme destruction conditions. This provides a new way of life within a paradoxical state of deconstruction and construction by creating voids in a world that is becoming more cluttered.

The paradox between construction and deconstruction raises a high level of complexity in conveying spaces for exchange and dialogue. Tracing the histories of our materialistic values on the basis that they determine our relationship with the world helps convey a more robust understanding of place.

The narratives within delve into the minds of city dwellers, whose day-to-day activities, places of employment, and myriad layers of movement through their built environment point out not only the spatial tensions brought on by the networks of globalisation but also their effects on urban life and city form.

This theoretical aspect evolves from an introspective exploration of plotting a dynamic identity through the evolution of the object to provide a distinct possibility for construing a refined approach.

In conclusion, the discourse evolves from an introspective exploration of the challenges and aims of the affective scars. Reconstructing the simple theme re[de]fined in all its complexities to expand over the possibilities of an enriching experience. The dedicated mission of the building is to unite the people to build a community and transform the urban space through extraction, exposure, and expression, ultimately fulfilling the improvements and raising awareness.

The proposed design is challenged to show the innovation of the balancing act between social-ecological appropriation and social production, which are not contrary to the future evolution of urban systems, allowing the project not to diminish the significance of the waste. It ensures that the urban insiders become acutely aware of the journey through jewellery design and display the possibilities of how transaction and knowledge play a vital role in our urban systems.

This chapter provides insight into the exploration of e-waste, finally shaping the theoretical stance summarised as a framework followed by the previous chapters, illustrating principles through precedent studies, conceptual sketches, and overall grounding of the design proposal. The leading theme of narration, from exposure transformation to expression, informs the outcome of the design by unravelling the composition between the pieces, palimpsest, embodiment, and narration, discussing the influence of the concepts becoming a vital theme in the reasoning, decision making and underpinning of the development of the design which will be addressed in the following chapter, where materiality, structure, form, and detail become the acting design tools to the written script.



Figure 23: Designing for e-waste (DANIELS, 2017: Online).

Refining the **TOPOLOGY**

Dull, inert cities, do contain the seeds of their own destruction and little else. But lively, diverse, intense cities contain the seeds of their own regeneration, with the energy to carry over for problems and needs outside themselves.

-Jane Jacobs. The Death and Life of Great American Cities



Figure 24: Current topology of Maboneng (Van der Walt, 2015).

2.4 TOPOLOGY

The mapping of the site includes numerous site investigations that conduct a quantitative and qualitative analysis of the proposed site's macro, meso, and micro analyses within the broader context of Johannesburg and the Maboneng Precinct. The topology aids in finding a solution to the translation of the environment's needs and the users of the proposed building.

2.4.1 Macro Context

The term macro context refers to the broader setting influencing the proposed site and Maboneng. This study considers the areas surrounding the proposed site's focus point and ties it to the rest of Johannesburg and its influences.



Figure 25: Mapping South Africa (Unknown)



Figure 27: Mapping Gauteng (Unknown)

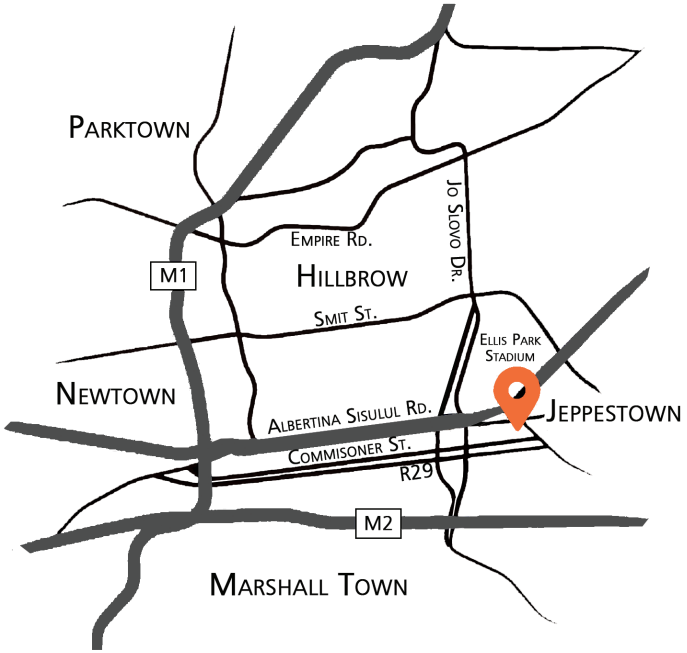


Figure 26: Jeppestown Urban Setting (de Beer, 2023: Online).

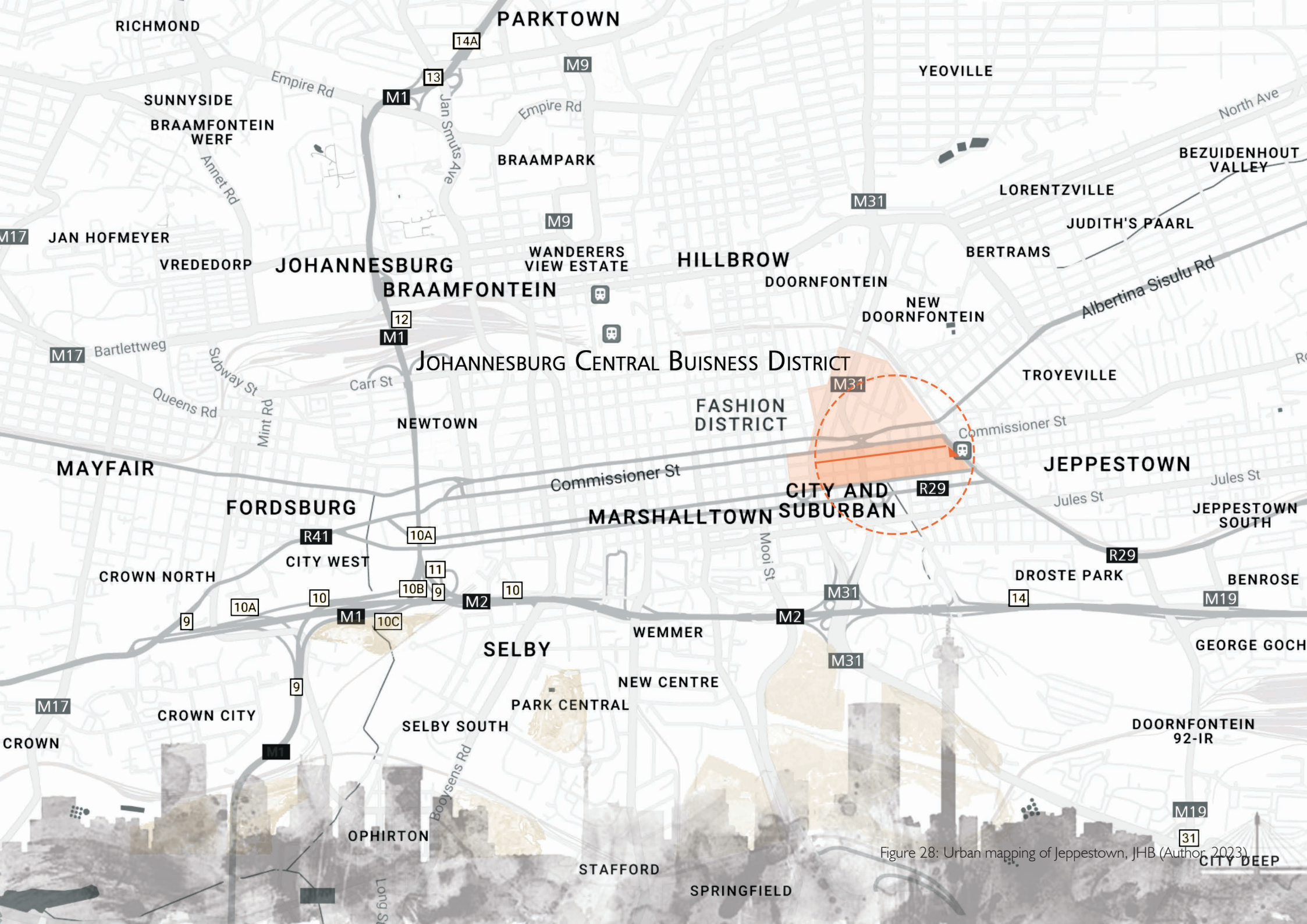


Figure 28: Urban mapping of Jeppestown, JHB (Author, 2023)

JOHANNESBURG, AKA JO'BURG/ JOZI

Owning its birth to the gold rush, Johannesburg was founded in 1886, with the discovery of gold on the Main Reef, a rocky outcrop of the Witwatersrand area. Gold mines had left their mark in sand-tips and slime dames, so firm in their stepped tabular shape, only waiting on Johannesburg to become a world-class city, the provincial capital of Gauteng, and the financial centre, attracting thousands of prospectors (Aymard, 2013: Online). People have long associated the city's existence with the rich golden veins beneath its rolling Highveld plains. Despite its unappealing landscape, Johannesburg emerged as a concrete formation between rocky ridges, dusty fields, and golden grasslands.

A dual city arose concerning the mining industry and development of a robust financial sector, soon to become the Central Business District. Because of this fast-paced city and rapid attempt at urbanisation over the years, congestion and pollution resulted in a characterised state of a crippling inner city (CBD), caused by degradation and deterioration. As a result, the negative long-term consequences of an undersized city plan were not nearly conducive enough for modern city development, which led to metropolitan activities subsequently moving to more modern and developed areas.

Yet, the CBD's population is still growing at an immense rate and has become a refuge for the poor, with expanding informal trade and an increasing level of crime placing enormous demands on the city's economic and social infrastructure. Therefore, pockets of regeneration play a vital role in uplifting and transforming what was once known as "the jewel of Africa" and shifting our current perception of the city (Murtagh, 2015: 8).



Figure 29: Johannesburg Gold Mine 1956 (Hilton, 2023: Online)



Figure 30: Urban Mapping of Mabonent Precinct (Author, 2023).

2.4.2 Meso Context

The meso context is an in-depth investigation of the site's immediate vicinity, including its location within the urban fabric of Maboneng and its significance. The objective is to determine how the proposed intervention will fit into its surrounding environment by analysing the influencing neighbourhood with its due prospects, how the activity near and around the site will impact Maboneng and how Maboneng itself would influence the periphery of the proposed site.



CONNECTED URBAN NEIGHBOURHOOD

Figure 31: Mabonent Precinct (Author, 2023).

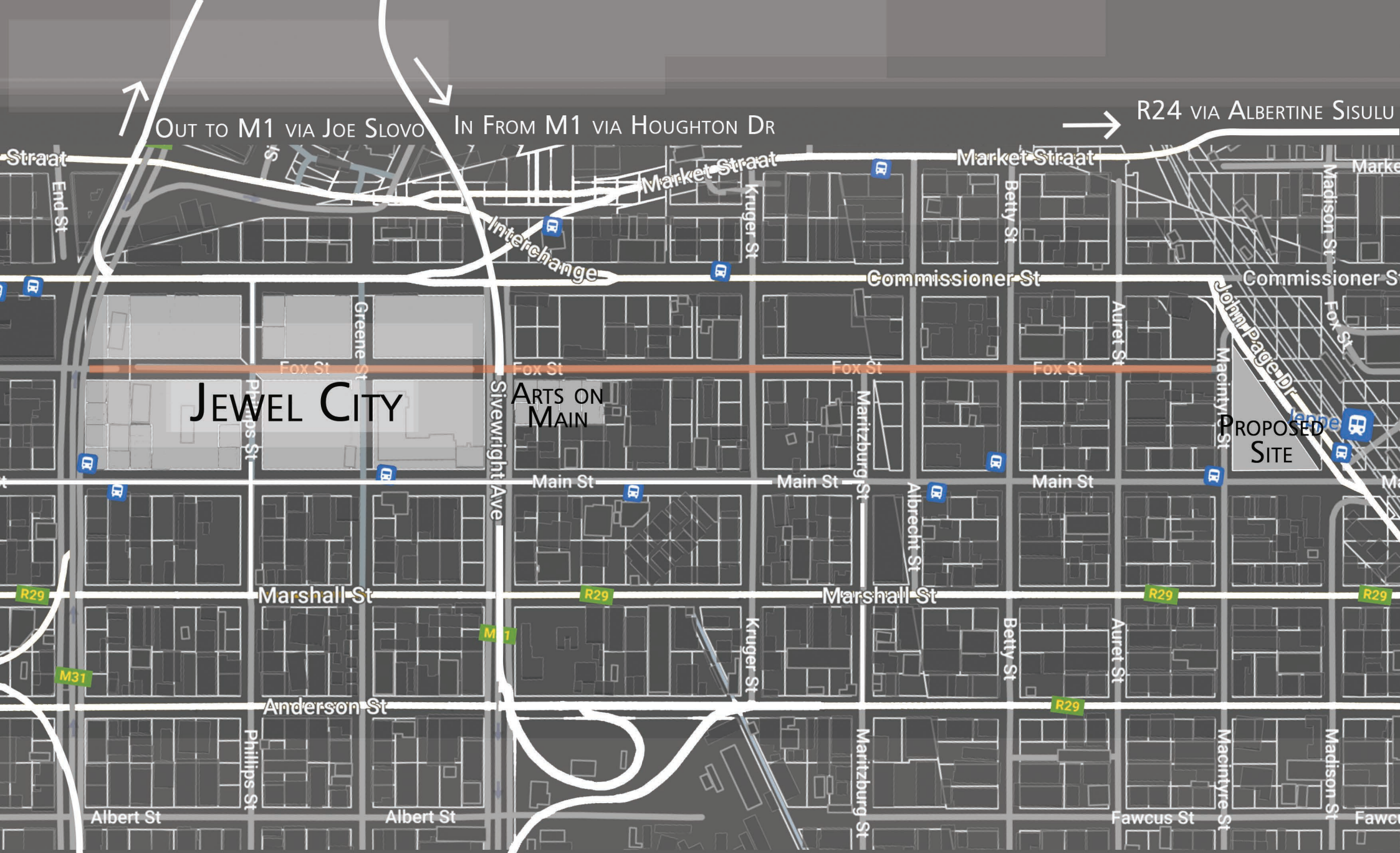


Figure 32: Influencing roads (Author, 2023).

PROPERTUITY

Entrepreneurship + Inventiveness = Creativity
CITY IMPROVEMENT DISTRICT (CID)

In 2009, Jonathan Liebmann, CEO of the property development company Propertuity, started the project putting Maboneng, meaning "place of light" on the map, offering people a place to communicate past experiences of the city through artistic expression (The Maboneng Precinct: Dynamizing Urban Renovation in Johannesburg, 2013).

Maboneng consists of easily accessible city blocks, once home to an industrial micro district of grimy abandoned warehouses (Kelly, 2020: Online). Most buildings in and around the Maboneng Precinct, even those of historical value, have deteriorated. This is due to social deprivation, a term that implies a "standard of living or a quality of life below that of the majority in a particular society, to the extent that it involves hardship, inadequate access to resources, and underprivileged" (Herbert, 1975).

SOCIAL DEPRIVATION

The inherited dysfunctional urban environment of Maboneng remains a place where many people seek their fortunes and offer their labour inside the economic and social infrastructure to take on the initiative of urban decay. Whilst most Central Business Districts are traditionally known and interpreted as multifunctional areas which include commercial, retail, cultural and residential components, they must adapt to new realities and users. (Hoogendoorn, 2008).

Yet, new activity appears to be taking over, carrying on a custom that is deeply ingrained with mining heritage and continues to provide humanity with a landscape from which one can make a living.

Maboneng caters for numerous gathering points, attracting people to the hipster bourgeois characteristics of the place, a cultural hub of creative entrepreneurs, artists, and designers. Arts on Main and Jewel City are two well-known developments in the area and give insights into its cultural significance, dedicated to redeveloping and renovating buildings, and aiding in explaining why Maboneng is of value for expansion.



Figure 33: Arts on Main Building (Author, 2023).

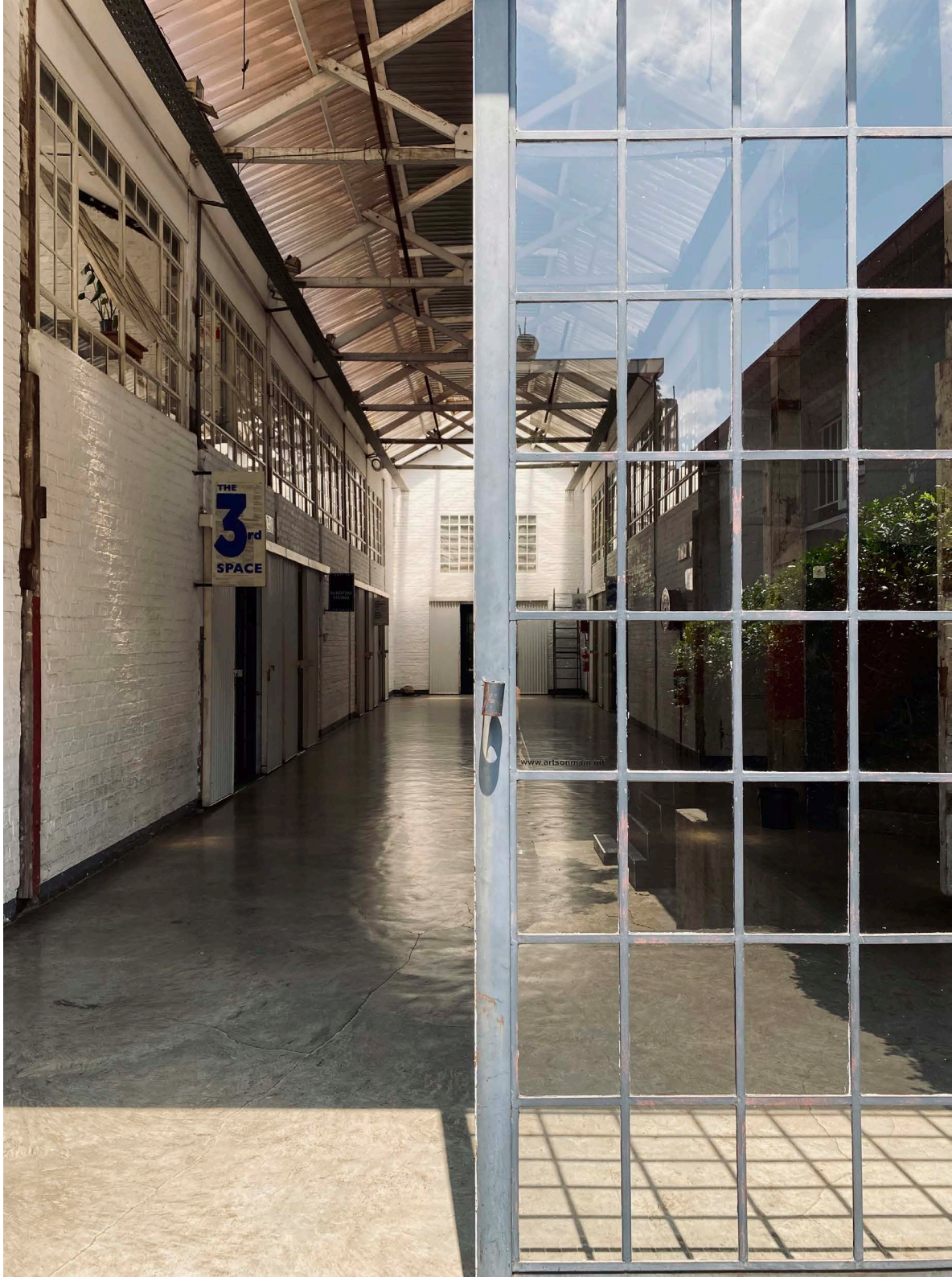


Figure 34: Arts on Main Interior (Author, 2023).

ARTS ON MAIN



Figure 35: The Centre For The Less Good Idea (Author, 2023).

The renovated and transformed century-old, abandoned warehouse, Arts on Main, is currently the mixed-use cultural hub of the neighbourhood and probably holds the most significance in its symbolic representation of the area. Located on the western end of Maboneng's Main Street, and inviting visitors into its exquisite courtyard, it consists of artists' studios, galleries, workshops, eateries, and various office and retail spaces and offers visitors a range of events, arts, and merchandise.

Its re-opening in 2010 inevitably inspired the general aesthetic of the precinct, triggering the necessary development for future generations with their market every Saturday and Sunday hosting a leading design and food complex and housing Johannesburg's top galleries and art studios.
This unique environment offers innovative experiences for urban users to engage with their community, sharing and developing ideas.

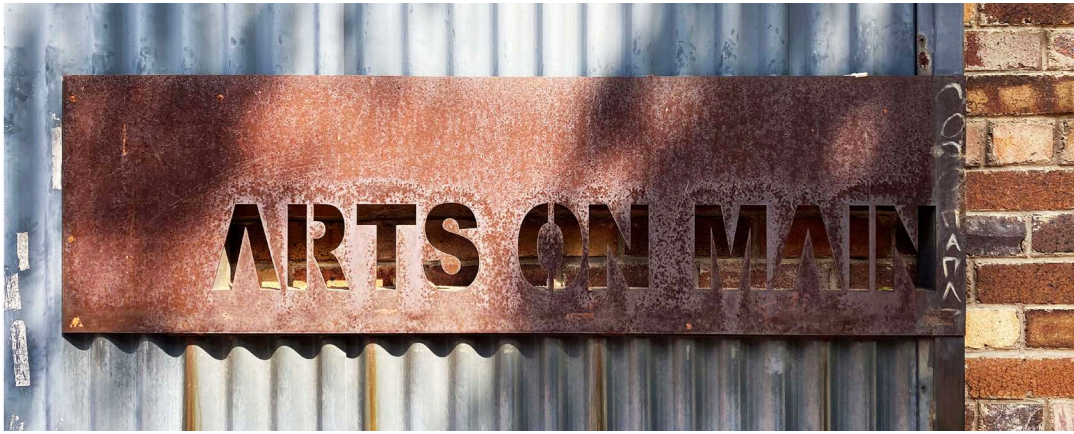


Figure 36: Arts on Main (Author, 2023).



I WAS SHOT IN JOBURG

A community upliftment project arose in 2009, giving young and disadvantaged street kids in Johannesburg the opportunity to generate an income by uplifting their skills through photography. This organisation was initiated by the South African architect and photographer Bernard Viljoen, who gave a newfound hope through the lens of a disposable camera by searching for beauty, composition, and numerous other interesting subject matters where none was thought to be.

The words "Write the Future" are written on a crumbling wall and with the click of a disposable camera, a photograph is sent around the world, printed onto notebooks, canvasses, keychains, and postcards – and ferried to all corners of the world (Morton, 2017: Online).

Figure 37: "Write the future" notebook (Morton, 2017: Online).

> What I would like to propose for the project is using my photographic skills and talent and giving of my time and resources to positively contribute to and enrich the lives of children who might otherwise not have had the exposure nor the opportunity to develop their photographic skills and talent. Teaching and enabling kids to see the world through different eyes. Teaching them to look, to see, to compose, to capture what it is they see in such a way that they can be proud of it. – Bernard Viljoen

(Morton, 2017: Online)



Figure 38: Former street kids of Maboneng (Morton, 2017: Online).



Figure 39: Central pedestrian axis (van Zyl, 2023: Online).

GASS Architects
Maboneng, Johannesburg
2020

INNER CITY GEM

Jewel City hosts the massive, mixed-use redevelopment project on the outskirts of the Maboneng Precinct and breathes new life into the previously walled-off former diamond and precious metal trade centre. Initially, the entire area was closed off to the public in the mid-90s and remained isolated for many years; the six city blocks of industrial buildings were forgotten but now consist of apartment blocks, commercial and retail buildings, and a large public square and urban park.

The public realm of the precinct was carefully considered. The perimeter has critical points for vehicle access, but the area's central axis is primarily pedestrianised. Maintaining a belief in the transformative potential of urban design and architecture to promote economic and social energy, dignity, and prosperity, the architecture of this industrial complex has been re-envisioned as a series of insightful interventions that breathe new life into Johannesburg's CBD while remaining respectful of its heritage.

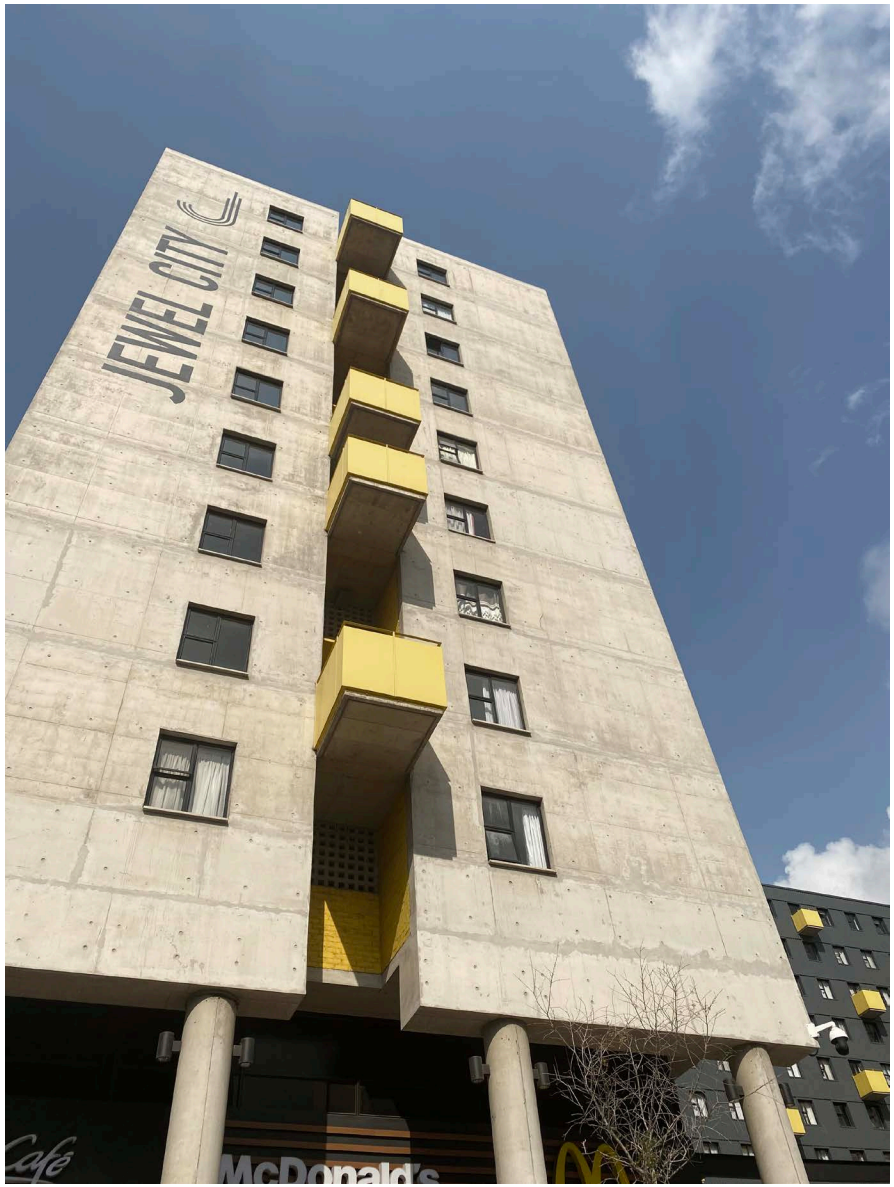
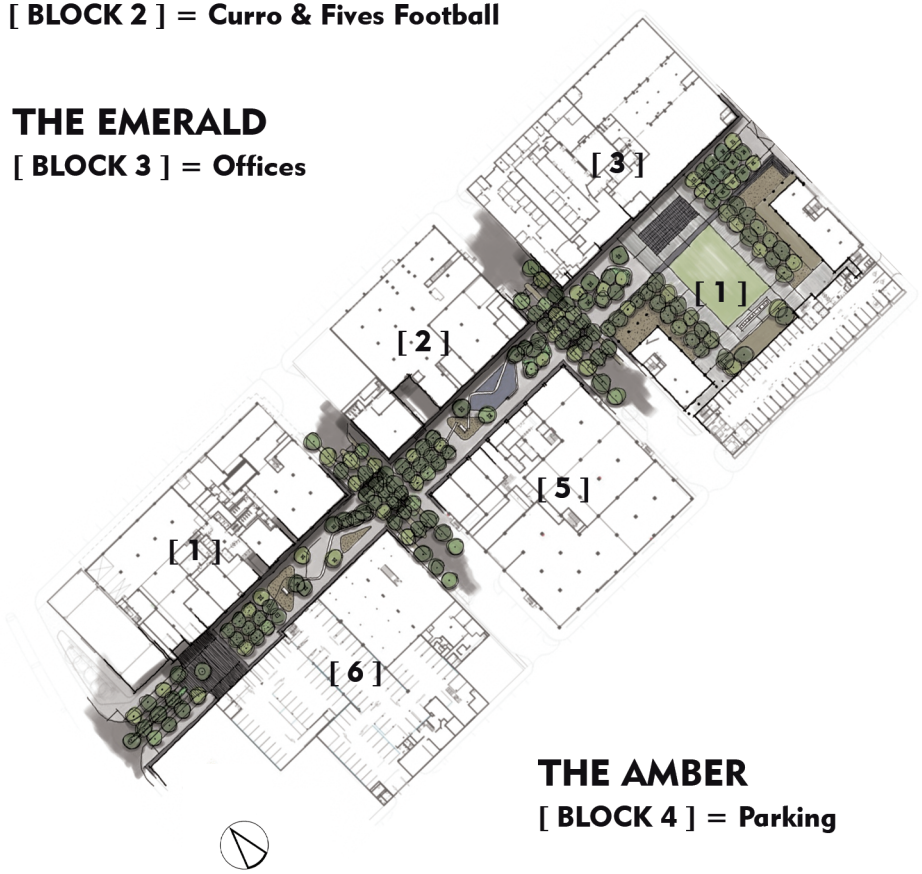


Figure 41: Jewel City, The ONYX (Author, 2023).

THE DIAMOND
[BLOCK 1] = Residential

THE RUBY
[BLOCK 2] = Curro & Fives Football

THE EMERALD
[BLOCK 3] = Offices



THE AMBER
[BLOCK 4] = Parking

THE SAPHIRE
[BLOCK 5] = Commercial

THE ONYX
[BLOCK 6] = Residential

Figure 40: Floor plan (GASS Architects, 2023: Online).

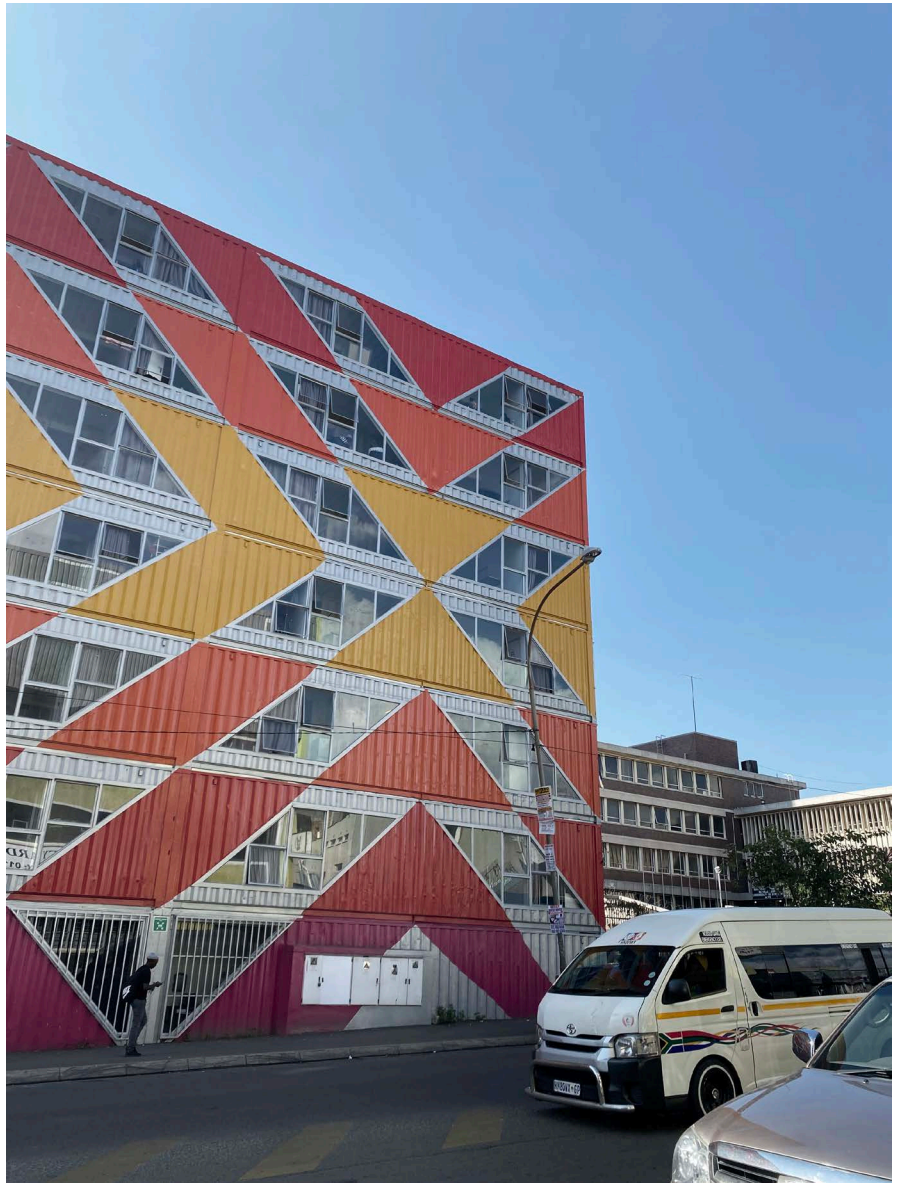


Figure 42: Stacked Up Housing Containers (Author, 2023).

STACKED UP

The striking "Stacked Up" housing containers are well-known for drawing attention, made entirely of recycled ISO shipping containers, and rearranged into the shape of a V to create an open yard. This seven-storey apartment building brings affordable housing to an area that already houses a unique neighbourhood life, allowing residents to reconnect with the city once more.

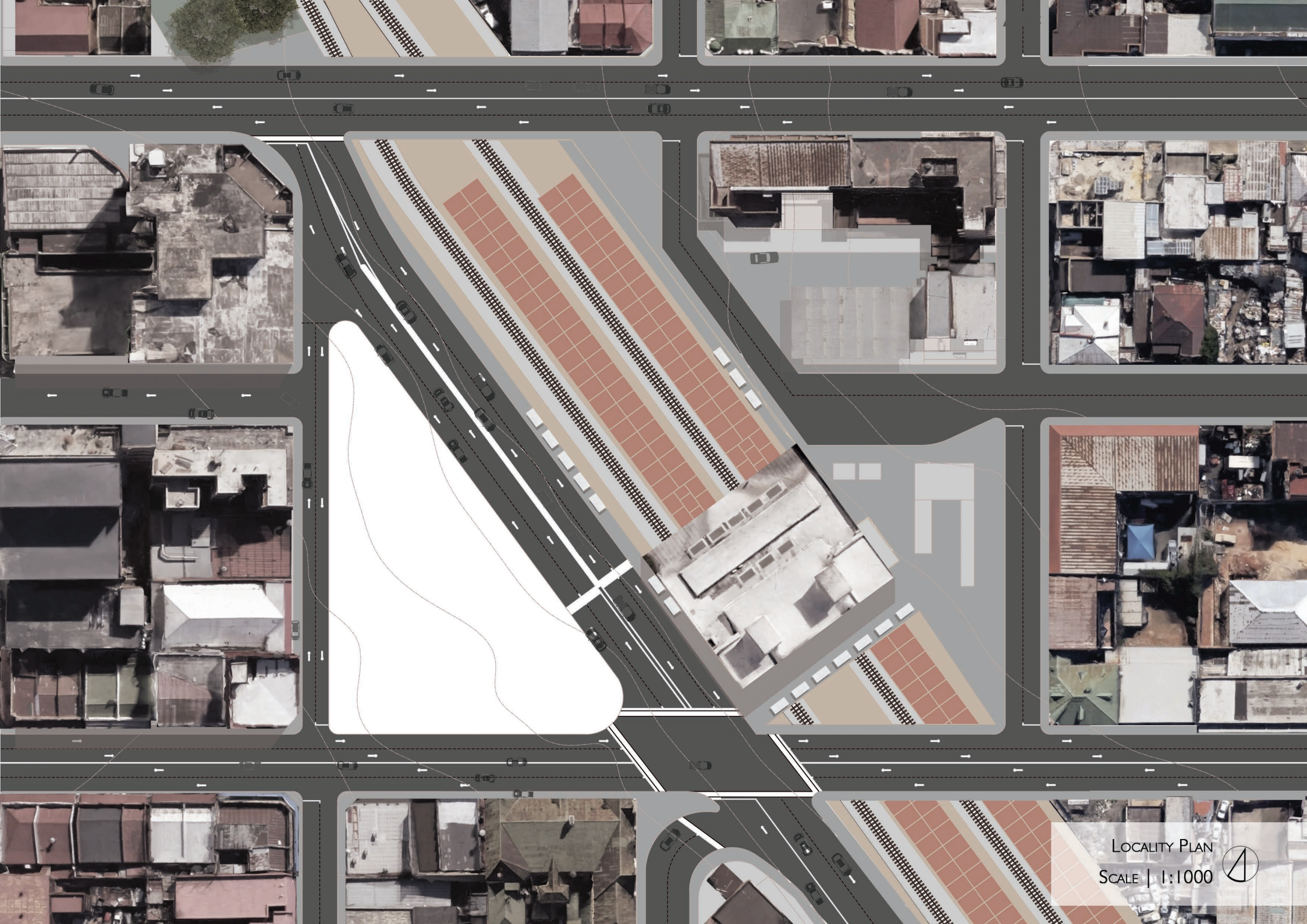
LOT-EK Architects
Maboneng, Johannesburg
2017

COSMOPOLITAN

The Cosmopolitan Hotel completed around the turn of the 20th century and located at the intersection of Commissioner and Albrecht Street, is one of Maboneng's most legendary buildings (Edwardes, 2016: Online). The building, formerly a well-known club and hotel owned by several wealthy businessmen, has been transformed into a dining, shopping, and gallery space while retaining its striking Victorian façade.



Figure 43: Cosmopolitan Building (Schlor, B; 2017).


LOCALITY PLAN
SCALE | 1:1000

2.4.3 Micro Context

An investigation into the physical influences and restrictions concluded through an environmental analysis of the site within its broader context. A crucial approach acts as a cognitive and qualitative guideline to aid the design process regarding the proposal's impact.



Figure 44: S (Author, 2023).



Figure 45: Current state of railway tracks (Author, 2023).



Figure 46: Abandoned Jeppestown Trainstation (Author, 2023).


Fox Street
Site Boundary
Building Line
John Page Dr
1717m
1716m
Proposed Site
erf no. 1/2749
Existing Structures to be
demolished
Macintyre Street
1714m
1715m
Main Street
Site Plan
Scale | 1:500

Current Site Conditions



Figure 48: Macintyre Street (Author, 2023).



Figure 49: Existing ablutions on site (Author, 2023).



Figure 47: Existing structures around edge of site (Author, 2023).

Refining the **TYPOLOGY**

We were given the theme of recycling, which is interesting because it sounds like a very functional, utilitarian thematic, but there are people, labour, and architectural possibilities within recycling.

-Mason White, 2017, Designing for e-waste



2.5 TYPOLOGY

The typological characteristics are mainly explored through the design methodology of the proposed programme, addressing the concerns relating to waste management infrastructure. A diverse blend between spaces is envisioned to include social/commercial market spaces, industrial factory volumes for manufacturing plants, and jewellery design institutions/stores.

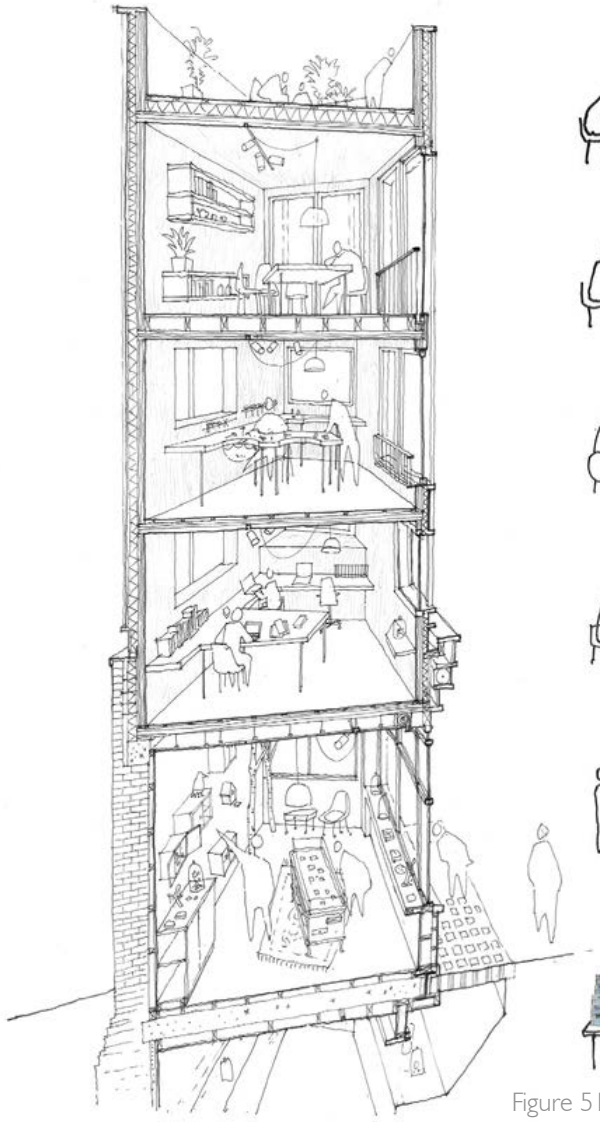
2.5.1 Precedent Study: Alex Monroe Studio

The more refined building programme, completed on (pg. add final page no.), is a proposal that aims to reconcile the numerous challenges that prevent e-waste recycling from intensifying its potential. It is inspired by the simplistic approach of DSDHA's new jewellery studio in London. Alex Monroe Studio promotes the importance of connections with the outside world, providing critical working conditions and opportunities to connect with society and celebrate the art of making.

The project addresses issues of appropriate urban form relevant for inner-city inhabitation in a heterogeneous condition of continuously changing cities. As with the proposed intervention, the jewellery studio's primary responsibility is to provide a showcase for the growing industry of refined e-waste.

Figure 50: Alex Monroe Studio (Gilbert, 2012: Online).

DSDHA Architects London's Southpark 2012





- Roof Terrace



- Meeting Space



- Jewellery-making Workshop



- Administrative Floor

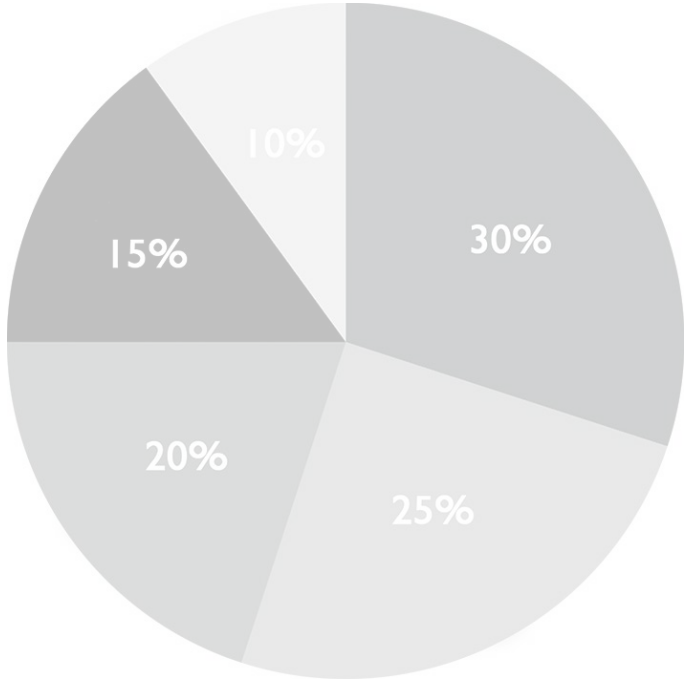


- Jewellery Shop



- Basment Studio for Heavy Machinery

Figure 51: 'Container for Craft' (DSDHA, 2012: Online).



Prinicples Extracted:

- Sociable character within workshops
- Relationship between internal spaces and their urban fronts
- Showcasing the industry

Recycling E-Waste Facility | 30%

Jewellery Design School | 25%

Recreation & Landscape | 20%

Re-selling Units | 15%

Services | 10%

'CONTAINER FOR CRAFT'

2.5.2 Clients

The clients chosen include the EPR Waste Association of South Africa, and Auterra. The clients are partnered to provide a multi-faceted communication and representation tool to provoke a broad range of approaches, exposing the jewellery industry to the interlinking aspects of urban mining and the e-waste recycling facility.

2.5.2.1 EPR Waste Association of South Africa

eWASA is a registered producer responsibility organisation (PRO) with the Department of Forestry, Fisheries, and the Environment (DFFE) for the Electrical and Electronic Equipment (EEE), Lighting, and Paper and Packaging Sectors (eWASA: Online).



Figure 52: EWASA EPR Waste Association of South Africa (EWASA, 2023: Online).

2.5.2.2 AuTerra

AuTerra is a refinery currently consisting of a small team of jewellery designers and manufacturers, bringing together a community who share a passion for ethical, eco-friendly handcrafting of precious metals into minimalist jewellery reclaimed from circuit boards.

In the summer of 2015, Auterra made their first ring out of gold recycled from e-waste, which would also be the first in the world. With their contemporary designs, they strive to simplicity and quality as revealed in the timeless elements of their materials

With founders who are passionate advocates for sustainability, working towards social and environmental justice, and with first-hand experience in what unchecked mining does to their surrounding communities and landscapes, they still decided to embark on a career in one of the most fraught industries in the world (Heather, 2023: Online).

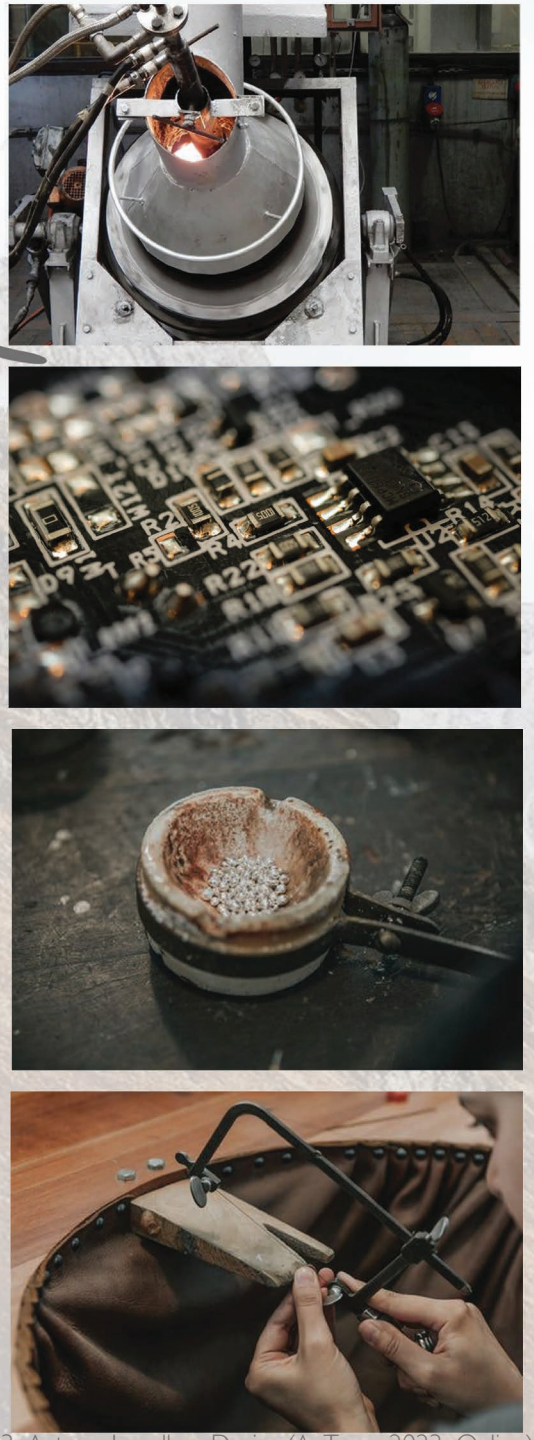


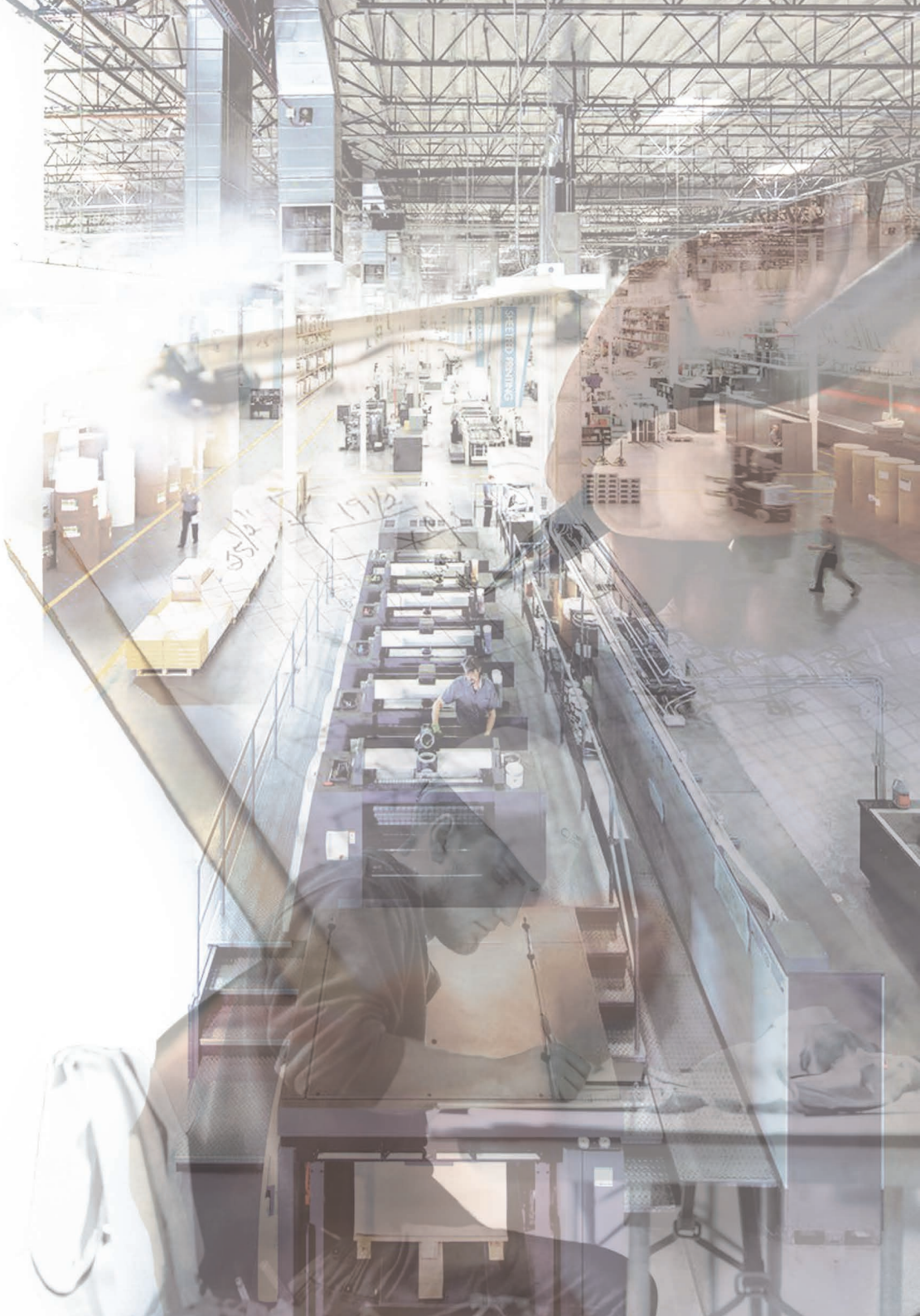
Figure 53: Auterra Jewellery Design (AuTerra, 2023: Online).

"I fell in love with jewellery design because of its intimacy with the body, jewellery becomes a way to carry our stories with us"

-Ashley Heather
(AuTerra, 2023: Online).

2.5.2.3 Jewellery School

The Jewellery School programme is an extension of AuTerra and partnered with the University of Johannesburg (UJ), it is one of the vibrant jewellery hubs of South Africa and offers dynamic and progressive training in jewellery and metal design, art education, visual communication design and fine arts. With excellent practical, theoretical, and design knowledge to expose the students to business administration and marketing techniques, the goal is to develop a broad range of entrepreneurial skills to realise their creative potential fully.



2.5.3 Users

2.5.3.1 The Public

The building provides insightful exposure concerning the issue by engaging with the public. The visitor passing through this unique experience creates an opportunity for expression to increase public awareness of the threat of e-waste. The building accommodates open exhibition areas, a forum for the public to exchange ideas and opinions, and a series of invitations to unique events.



2.5.3.2 Permanent Staff Members

The E-Waste Recycling Plant consists of experienced scientific minds specialising in chemical processing, engineering and metallurgy and includes the following:

- Laboratory technicians
- Trained local/community members
- Urban miners
- Plant managers
- Service(s)

The Jewellery School is structured around the development of a dynamic team of experienced educators in their respective fields, such as:

- Board of Directors
- Management
- Jewellers
- Academic
- Service(s)

2.5.3.3 Students

The part-time and full-time students are enrolled and registered in their specific subject courses. The public is also invited to the occasional workshops or for short periods to assist in the basic jewellery design principles.

2.5.4 The Building Programme

To quantify and accurately define the building programme the type, concentration, and specification of the metals that are directly influenced by the choice of recovery are taken into consideration to lessen the hazardous working conditions related to informal techniques.

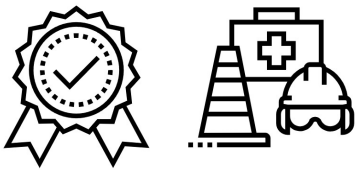
The building strives to enhance the objective and purpose of the development by investigating the components of a suitable programme that will best align with the project's rationale and the user's and client's needs. It will require some preliminary start-up plans to act as an urban catalyst for the area's social and community development and economic growth.

First, we will explore the methods currently used by the industry for extracting materials, their impact, and whether they suit the project concerning the environment, its users, and health risks. The choice of process is crucial as the physical and chemical processes used to extract these materials lead to many toxic materials being released into the atmosphere, infiltrating the water bodies and soil of the urban setting, and should be carefully considered in the accommodation of an e-waste processing plant.

Most urban slums in the city perform dangerous procedures where untrained workers with no protective equipment treat and process hazardous e-waste using the crudest techniques (Annamalai, 2015: Online), such as:

- Physical dismantling of materials using tools such as hammers, chisels, and screwdrivers with their bare hands.
- Removal of components through heated-over coal-fired grills/open pit burning.
- Using open-pit acid baths to strip and recover metals from materials.
- Chipping and melting of materials without proper ventilation.
- Improper disposing of unsalvageable materials.

The project aims to discard the use of the informal recycling and pyrometallurgical industries and direct all industrial sludge to a hydrometallurgical approach, emphasising modern scientific discoveries which ought to be conducted for future metal recovery programmes developing more efficient, safer, and more sustainable techniques for metal dissolution from industrial sludges.



INDUSTRIAL SLUDGE

Technological approaches to the metal recovery

Pyrometallurgical Industry

- **Incineration**
- **Plasma arc furnace smelting**
- **Blast furnace & smelting**

or

Hydrometallurgical Industry

- **Chemical Leaching**

  Metal dissolution in leachates combined with water-based chemical reagents.

- **Concentration & Purification**

  Techniques such as solvent extraction ion-exchange, and absorption.

- **Recovery**

  The selective recovery of metals through electrodeposition ad precipitation.

Figure 54: Industrial Sludge Diagram (Author, 2023).

The e-waste recycling plant includes a facility where all activity regarding the proposed programme occurs indoors, a preferred and more appropriate operation. The diagram (fig. _) presents the key ideas supported by montages illustrating the typical use of the spaces of the high-tech environment.

The programme is divided into components to convey the hydrometallurgical approach and link the theories and conceptual approach to the contextual studies of the building programme and its potential undertaking.

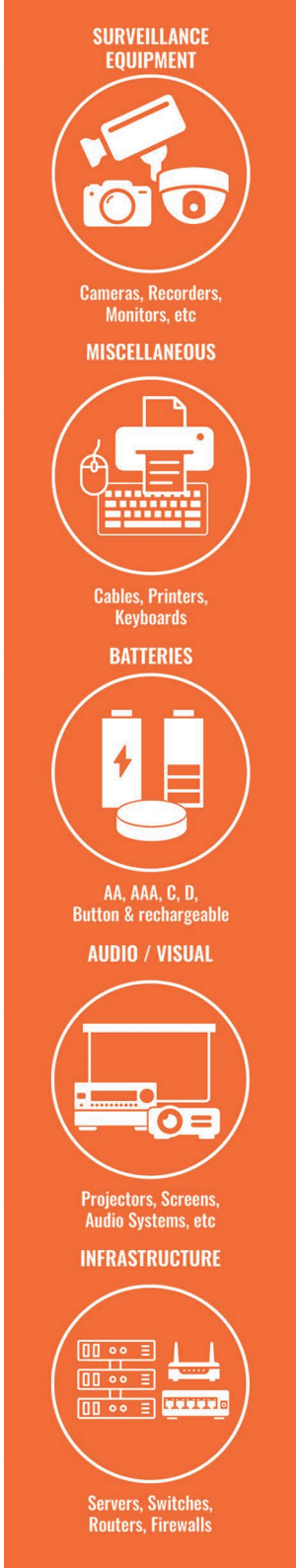


Figure 56: Types of e-Waste (AI Generated, 2023: Online).

01 Holding Depot

The technical cycle starts after vast quantities of e-waste are fed into the holding depot by urban miners and large-scale commercial waste collection depots. Manual sorting and examination of the destruction are done within the holding depot by trained members in preparation for processing. The waste is separated into reactive and non-reactive groups. The unused waste is sent to redirected streams/barter shops.

02 Processing Floor

The non-reactive materials will be sent to the Mechanical Processing Facility, where technicians feed the waste into the shredding machine to extract the metals.

The reactive materials are sent to the Chemical Separation Facility, where trained professional technicians use chemical agents to extract the metals by dissolving the non-metal elements.

03 Preparation Area

Packaging of purified metals will be sent to the Jewellery Design School or sold to external industries.

04 Mixed-Metals e-Refinery

The recovered metal commodities are refined in the baking pots of the Jewellery Design School.

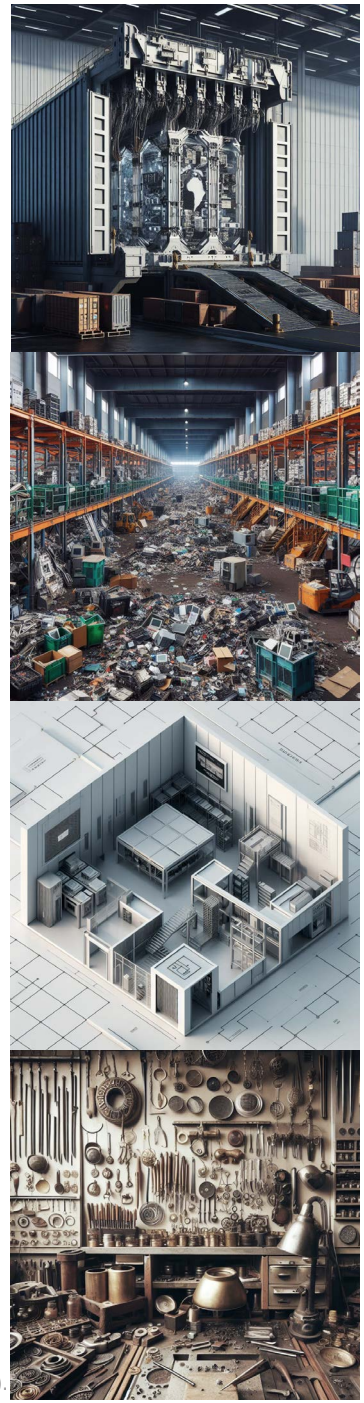


Figure 55: Typical Indoors Activity (AI Generated, 2023: Online).

"We believe that while some metal mining may always be necessary, ultimately our most important extraction operations should be taking place in scrap yards and recycling centres rather than sensitive ecological areas and ancestral lands."

-Ashley Heather
(AuTerra, 2023: Online)



Figure 57: Metal Mining from Scrap Yards (AI Generated, 2023: Online).

The building programme presents the dismantling process exhibited through public display, trading in barter shops influenced by redirected streams rather than behind corrupted streams, and processing under strict provision and controlled systems to convey the new face of recycling.

In essence, the chapter includes involving potential areas inside the informal trade, collaborating with individuals and community-based projects shaping public opinion on e-waste recycling and jewellery design. This inspires people to help translate these concepts through social behaviour and linking with the diverse cultural aspects of the city. Users are given instructions to create their dialogue, forming part of the programme, for the building to become a transparent place of social reciprocity and to re-invent the education of the residing society.

Electronic Waste Recycling Facility

Loading Platform

1. Examination
2. Manual Sorting
3. Storage

Mechanical Seperation Facility

Non-reactive Materials

1. Magnetic
2. Induced Electric Current
3. Water

or

Chemical Seperation Facility

Reactive Materials

1. Chemical Leaching
2. Concentration & Purification
3. Recovery

Packaging

Decontamination Area

00.

Holding Depot

Multi Market/ Trading Zone

01.

1. Redirected Waste Streams
2. Barter Shops

or

02.

Processing Floor

03.

Preparation Area

Exclusion Zone

The Mixed-Metals E-Refinery (Jewellery School)

04.

or

- **Other External Industries**

- **Workshops [3]**
- **Laboratories [3]**
  1. Gemmology
  2. Horology
  3. Silversmithing
- **Studio [x]**
- **Classrooms [3]**
- **Computer Suites [1]**

Public & Student Use

06.

- **Exhibition Walkway**
- **Cafeteria**
- **Internet Cafe**
- **Jewellery Store**

Public & Student Use

Figure 58: Building Programme (Author, 2023).

PART 03 | Design Methodology

Design methodology is the development of structured methods or techniques used in the design activities of a specific discipline. It incorporates the theories, principles, regulations, and approaches to fulfil the intended design objectives.



THE INITIAL DESIGN DRAWINGS AND IDEAS EXPLORE THE BASIC CONCEPTUAL APPROACH AND LEAD TO THE DEVELOPMENT OF BOTH SECTION AND PLAN.

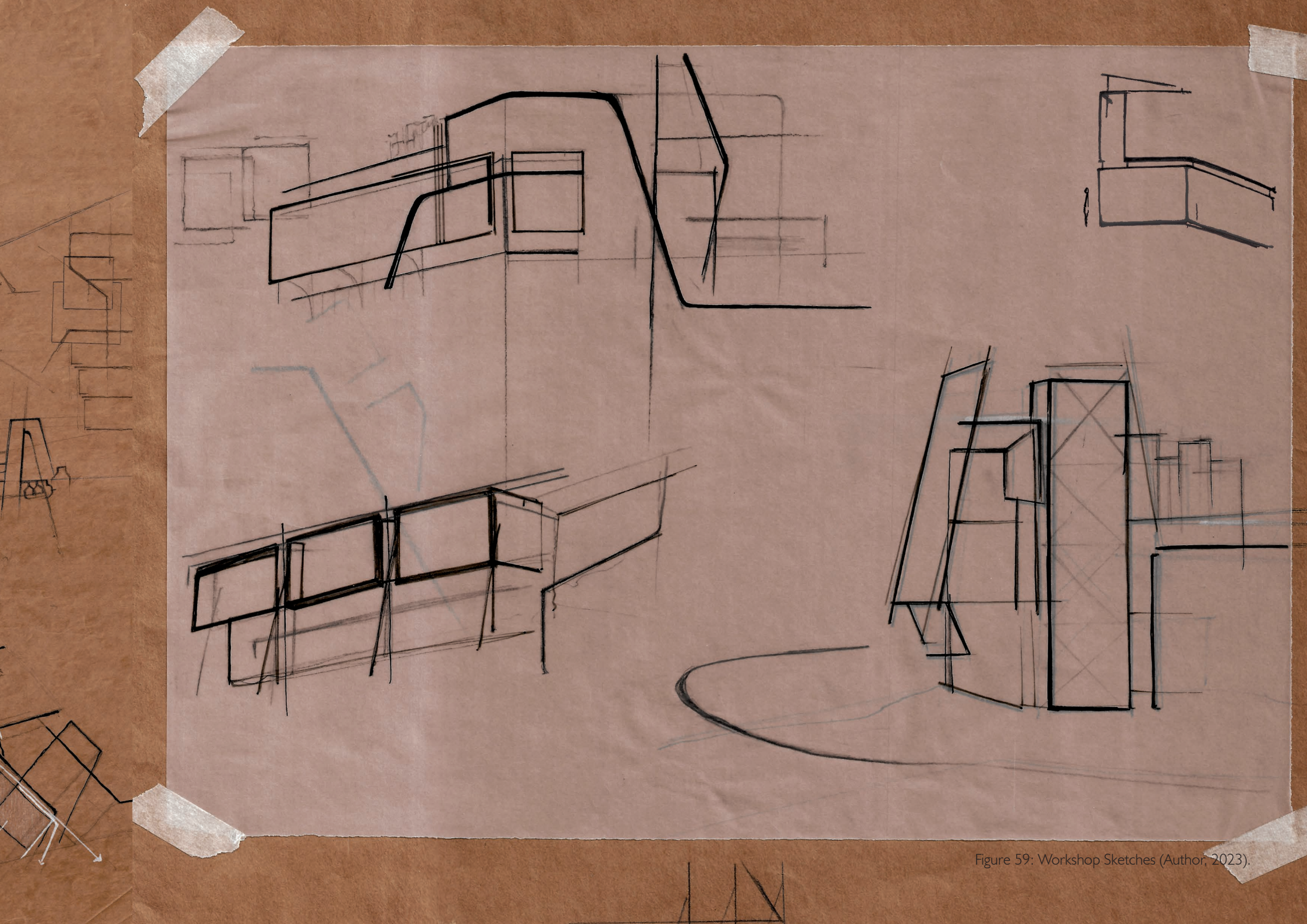


Figure 59: Workshop Sketches (Author, 2023).

3.1 Investigation & Analysis

3.1.1 Precedent Study: Deerfield Academy – Koch Centre for Science, Math & Technology

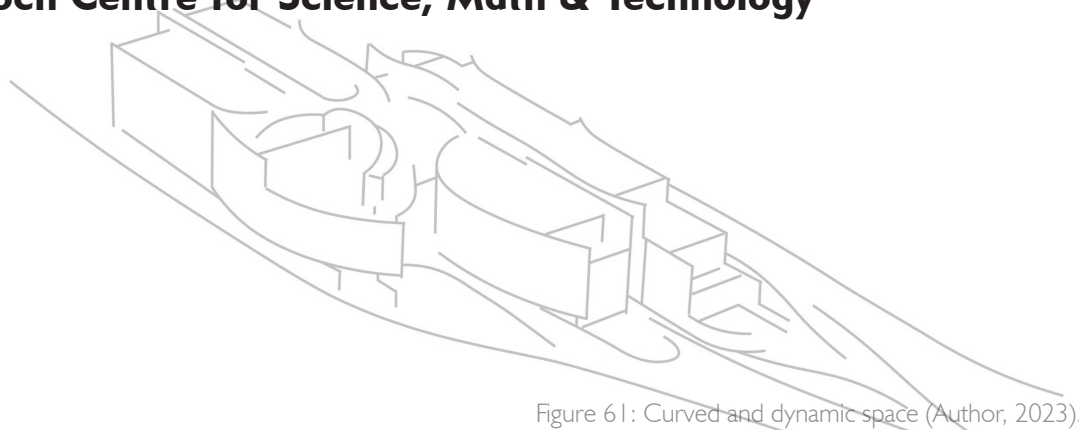


Figure 61: Curved and dynamic space (Author, 2023).

Skidmore, Owings & Merril Architects

Deerfield Academy, United States

2007

Prinicples Extracted:

- Exploration of light
- Expression of the wonders of its subject

The Deerfield Academy successfully managed the simultaneous arrangement of three academic disciplines – science, mathematics, and technology – to maximise educational opportunity when the science building was constructed for a renowned private boarding school. Today, it serves as both a versatile framework for scientific inquiry and a scientific tool in and of itself (ArchitypeReview, 2007: Online), including faculty members, architects, educators, and professionals in related fields to form part of the visionary symposium.

The building houses three-storey science commons, classrooms, labs, a planetarium, and a 225-seat Socratic lecture hall. This versatile, dynamic space symbolises the motion of celestial bodies and is motivated by the study of light, which has become a recurring theme. It uses a language that connects interior functional requirements with exterior architectural expressions.



Figure 60: Metal Recycling Plant (SOM Architects, 2011: Online).

As the building extends into the surrounding environment, the walls become retaining walls with the bricks appearing to fold into the existing contours of the site. A terraced green landscape with garden roofs is created by filling the spaces between the walls that step down towards their ends, mediating a significant grade change (SOM Architects, 2011: Online).

Making the programme of the building the core of its architecture was the key to the project's success. At some point, the focus of the establishment shifted from designing a building to creating a programme from which an architectural concept would emerge.

3.1.2 Precedent Study: Waste Disposal Station

The layout of the Waste Disposal Station is informed by the movements conceived by the mechanical machine. The complete recycling and breakdown of household waste is determined by the transportation of goods, with the main entrance of the building marked by an overhanging conveyor belt.

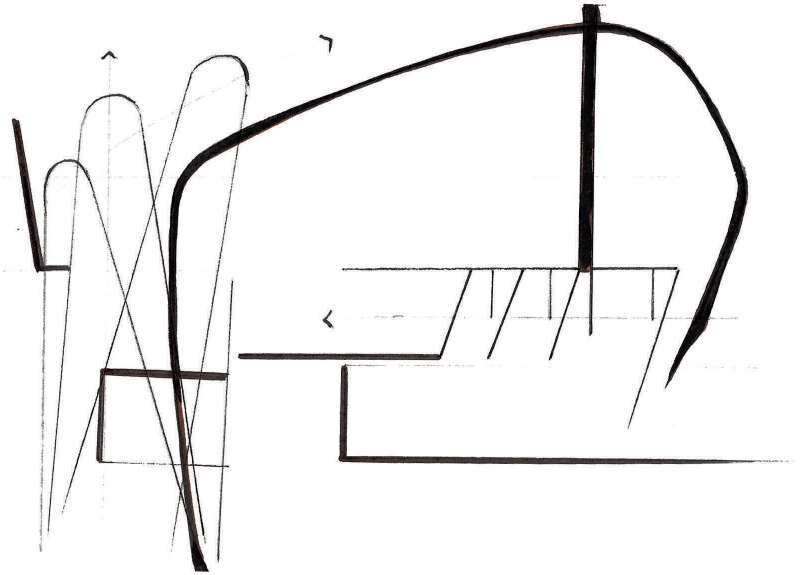


Figure 63: Movement and Transition (Author, 2023).

Prinicples Extracted:

- Plateau seperates the delivery "up" from the removal "down"
- Shape derived from the plan





Figure 62: Waste Disposal Installation (UNStudio, 2023: Online).

Ben van Berkel
UNStudio Architects
Delft, Netherlands
1995-2001

3.1.3 Precedent Study: UCLA Chiller Plant/Cogeneration Facility

The UCLA Chiller Plant/Cogeneration Facility was designed on a somewhat restricted site. It proudly showcases how engaging technology is by incorporating it into the composition and giving it careful thought. The sophisticated interplay of its deep contextual palette and thoughtfully expressed mechanical and electrical systems projects architectural honesty while being sensitive to its surroundings.

Instead of insisting on concealing the plant machinery, this enormous power plant is designed to become a beautiful artefact. These "vast power plants are erected to turn back the night, chiller plants are built to alleviate the heat of the day and steam generators to transform the cool of the night" (JPA, 2023: Online), and are kept out of sight so they cannot be a constant reminder of the work and energy needed to live comfortably in the unnaturally crowded conditions of our cities.

The systems featured in the building include a cast-in-place concrete basement and foundations, steel frame above-grade structure, precast and site-installed brick veneer, smooth and corrugated metal panel, exposed mechanical system with rigid cast ducts, and a steel staircase.

Prinicples Extracted:

- Celebration of the machinery of infrastructure
- Power plant design on street front
- Sculptural facade distinguishes service from academic spaces

Holt Hinshaw Jones;
Jones Partners Architects
University of California, Los Angeles
1994

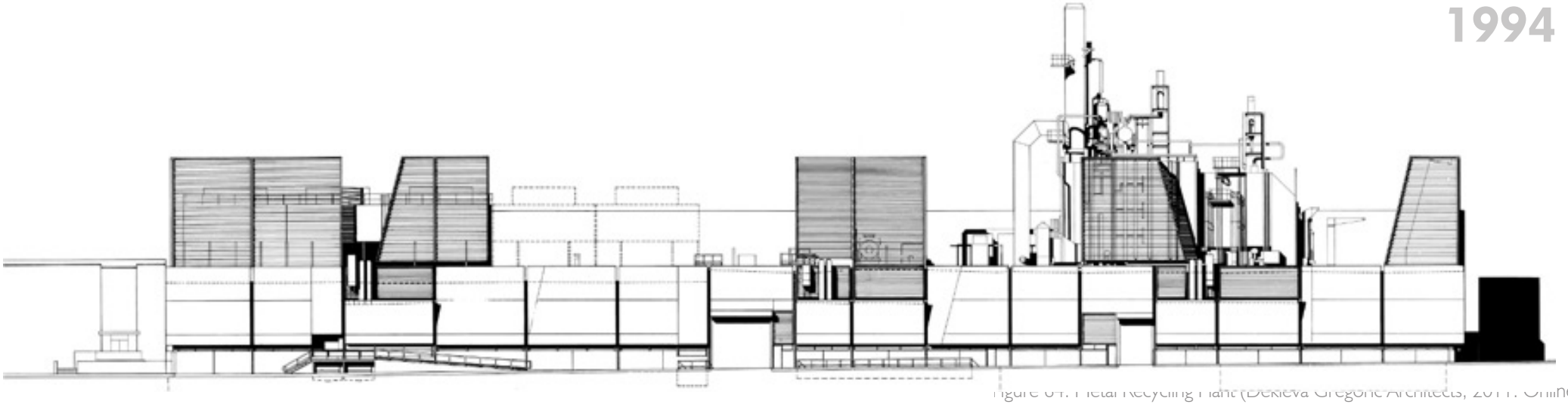


Figure 64: Metal Recycling Plant (Dekleva Gregoric Architects, 2011: Online).

3.1.4 Precedent Study: Metal Recycling Plant

Prinicples Extracted:

- Addressing the boundaries
- Expressing the context of material separation
- Contrast of materials

dekleva gregoric
Pivka, Slovenia
2007

The Metal Recycling Plant divides the immense production plateau from two small buildings to the edge of the site. This realises the abstract differentiation between the two core elements of the industrial zones, including the generic, flexible base and the specific, non-flexible activities on site.

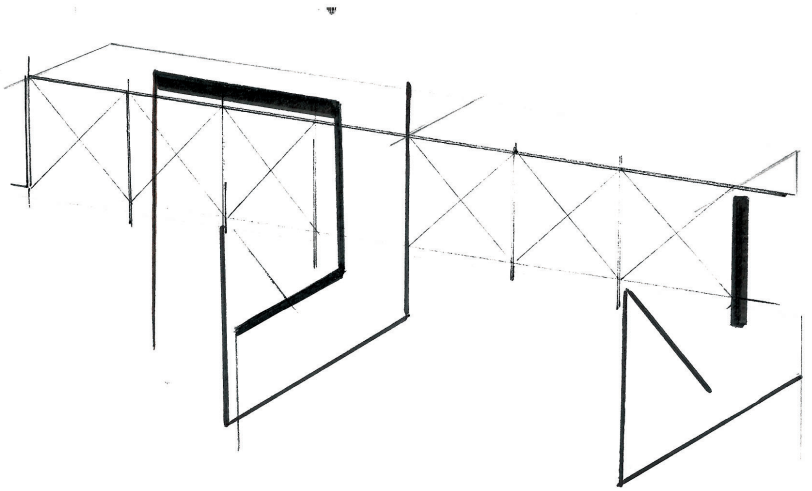
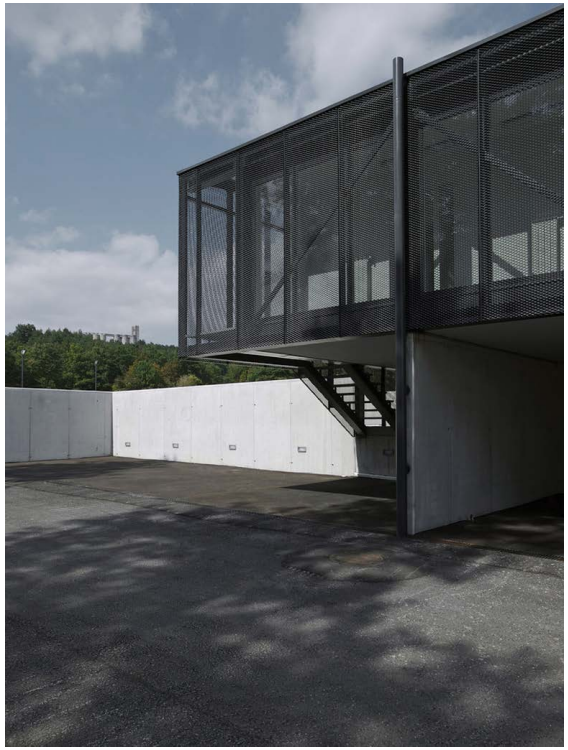
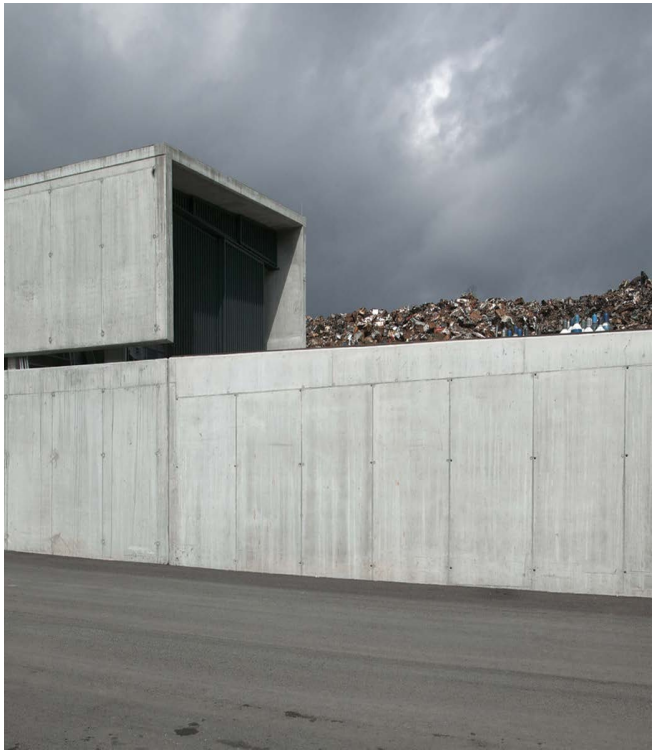


Figure 66: (Author, 2023).





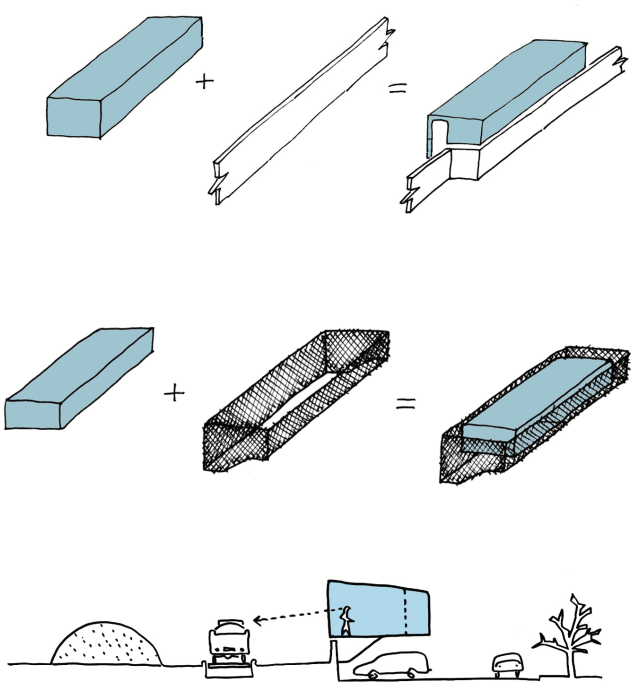


Figure 65: Metal Recycling Plant (Dekleva Gregoric Architects, 2011: Online).

ARCHICAD EDUCATION VERSION

> HEIGHT RESTRICTIONS
[20-25 M]

RWF
- collection
- Administration spaces
- Workshops
- general

→ BASEMENT PARKING

Exhibition space
- indirect (southern) light
- gallery spaces

(INCORPORATING THE POTENTIAL OF A NEW RAILWAY STATION & MOVEMENT NETWORK SITE)

Interfacing with pedestrian street facade

CAFETERIA

CIRCULATION SPACE (Elevator & Staircase)

EXHIBITION HALL

SERVICES

Main entrance (Jewellery school facing north)

circulation space from basement parking lot (main entrance)

JEWELLERY SHOPS

COURTYARD

BARETTE SHOPS / FLEA MARKET

Market stalls for trading.

RECYCLING WASTE FACILITY

WORKSHOPS

PEDESTRIAN ACCESS THROUGH GRAND SITE TOWARDS MAIN TRAIN STATION

RESTAURANT

RESTAURANT

REDIRECTED RECYCLING STREAMS

IDEAL ENTRANCE TOWARDS BASEMENT PARKING FROM MACHINE SITE.

HOW CAN THEY BE SEPERATE, YET STILL INTERLINKED?

LOADING ZONE

PREPARATION AREA

STORAGE

ABLUTIONS

INFORMATION + RECEPTION

JEWELLERY SHOP

MANAGER & STORAGE

ABLUTIONS

LOCKER ROOM

Internet cafe'

WAREHOUSE HOLDING BAY

SECURITY STRONG ROOM

WORKSHOP 01

WORKSHOP 02

WORKSHOP 03

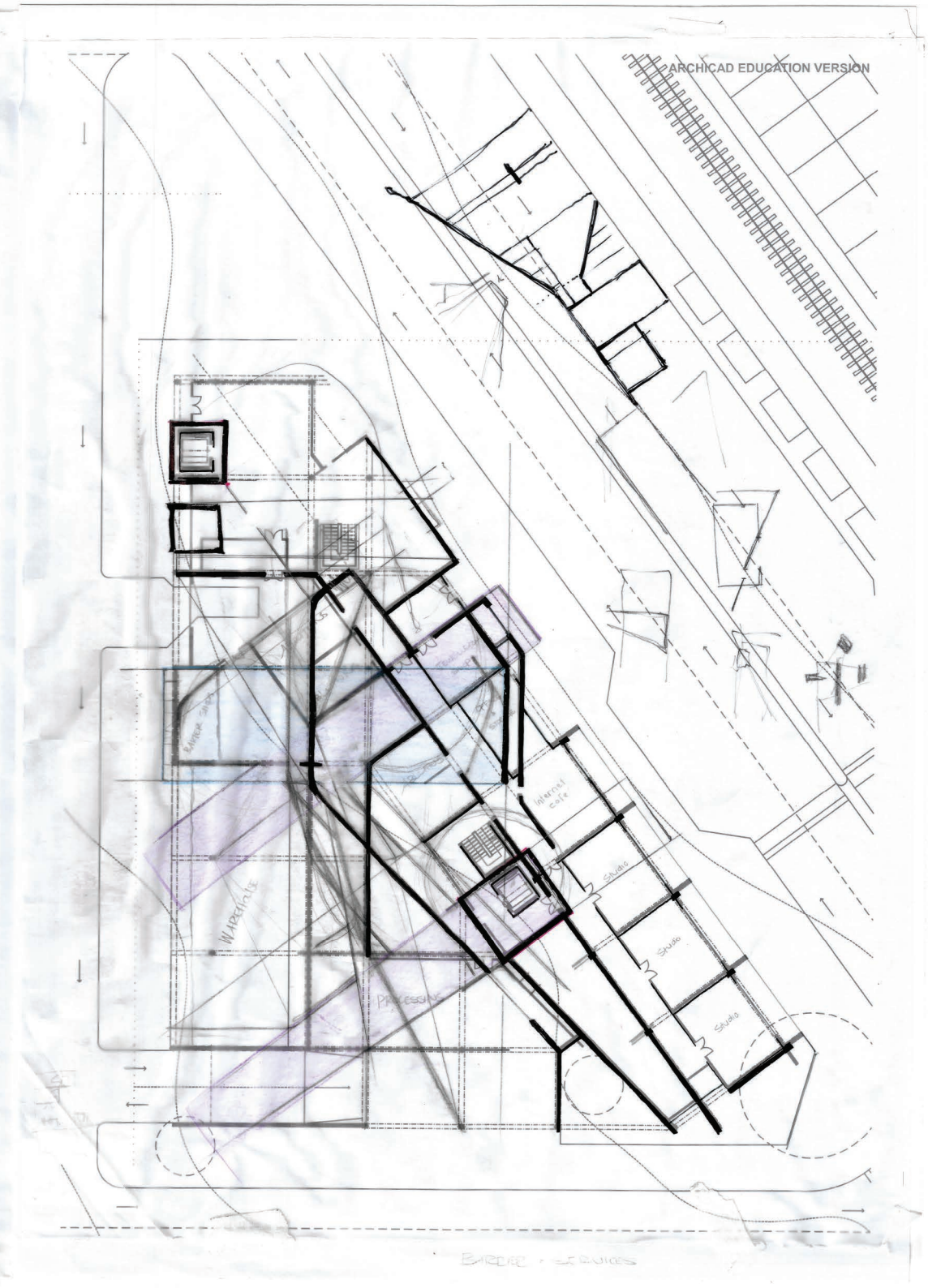
De-manufacturing

MECHANICAL SEPERATION 01

MECHANICAL SEPERATION 02

BARETTE SHOPS

REDIRECTED WASTE STREAMS



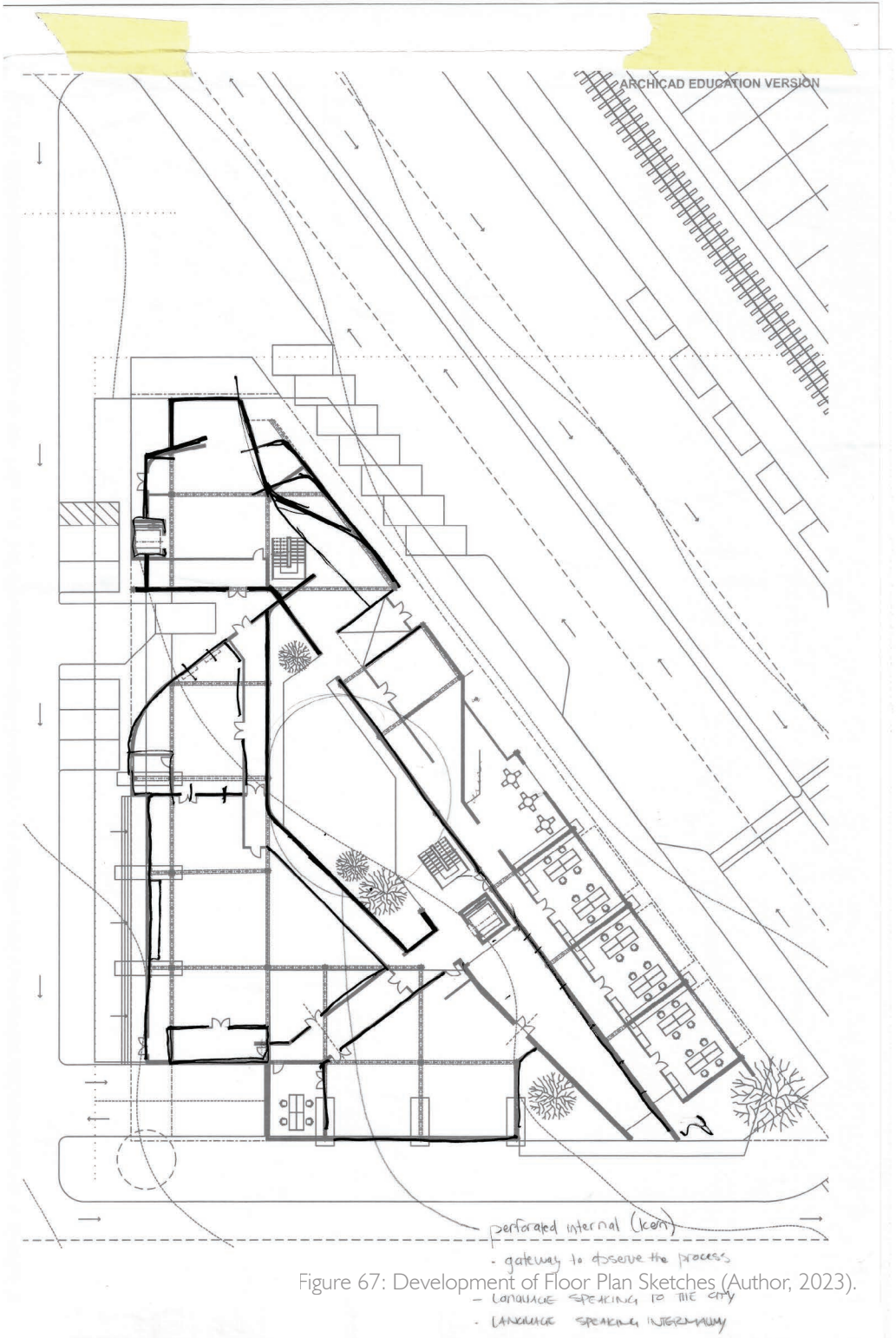


Figure 67: Development of Floor Plan Sketches (Author, 2023).

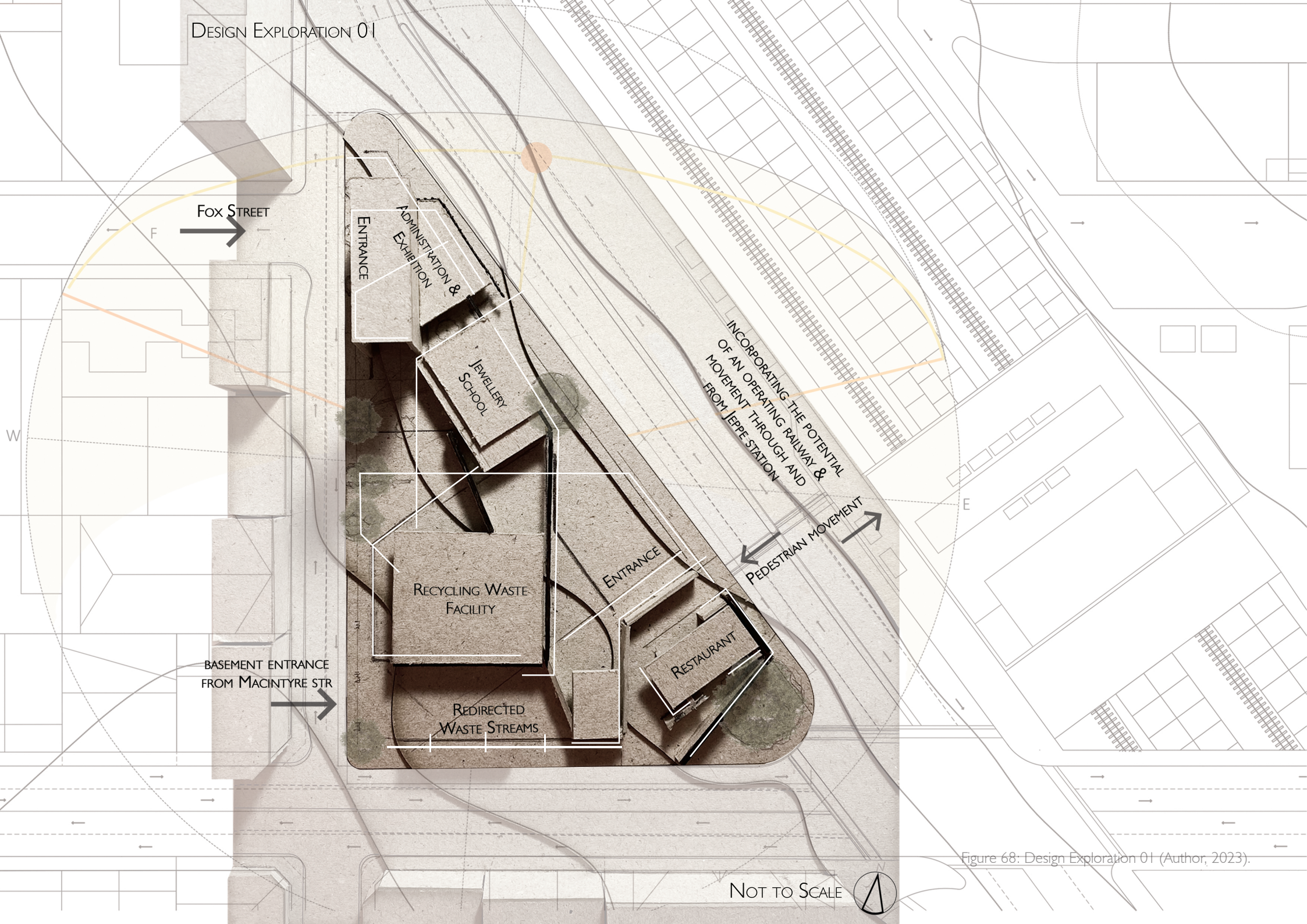


Figure 68: Design Exploration 01 (Author, 2023).

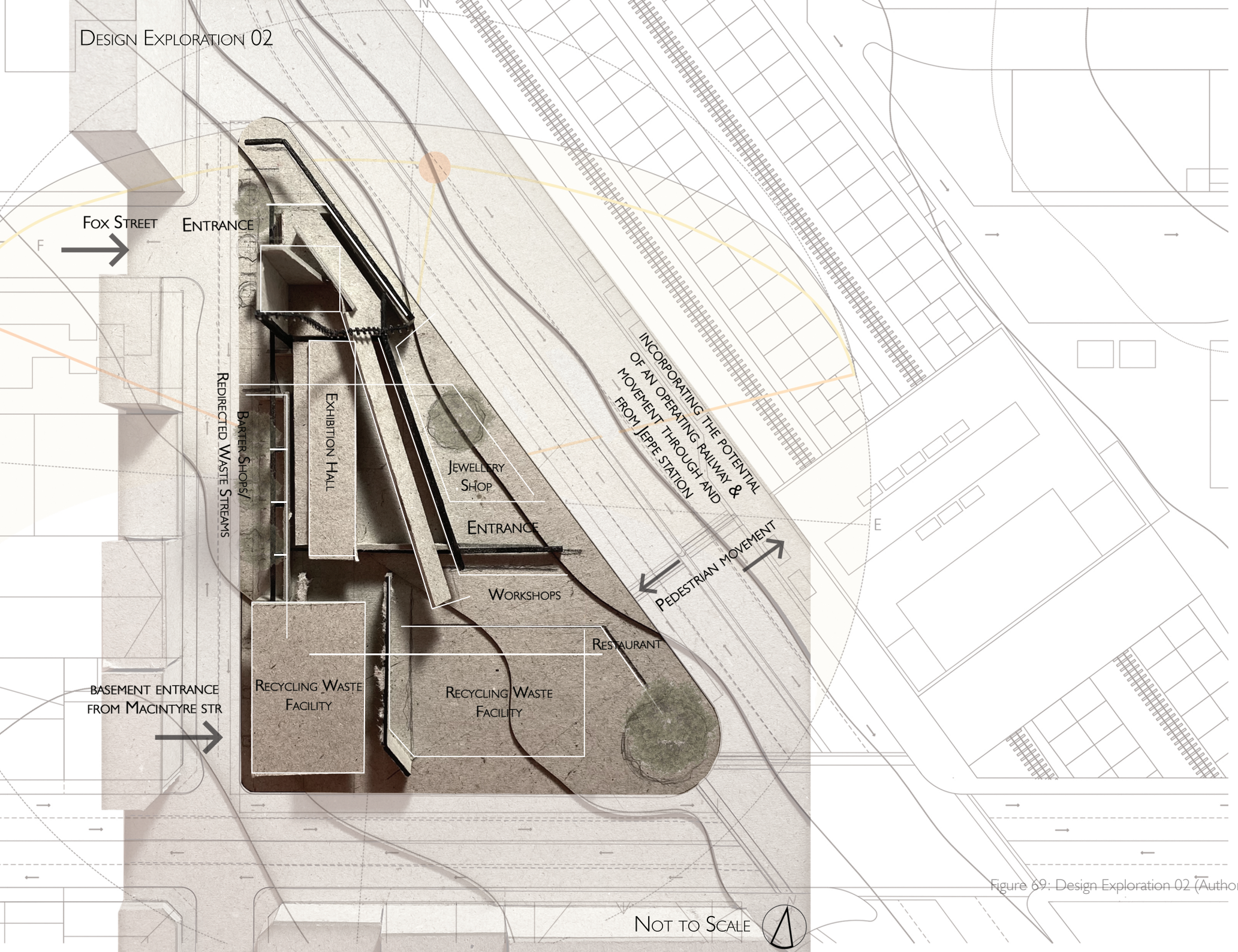


Figure 69: Design Exploration 02 (Author, 2023).

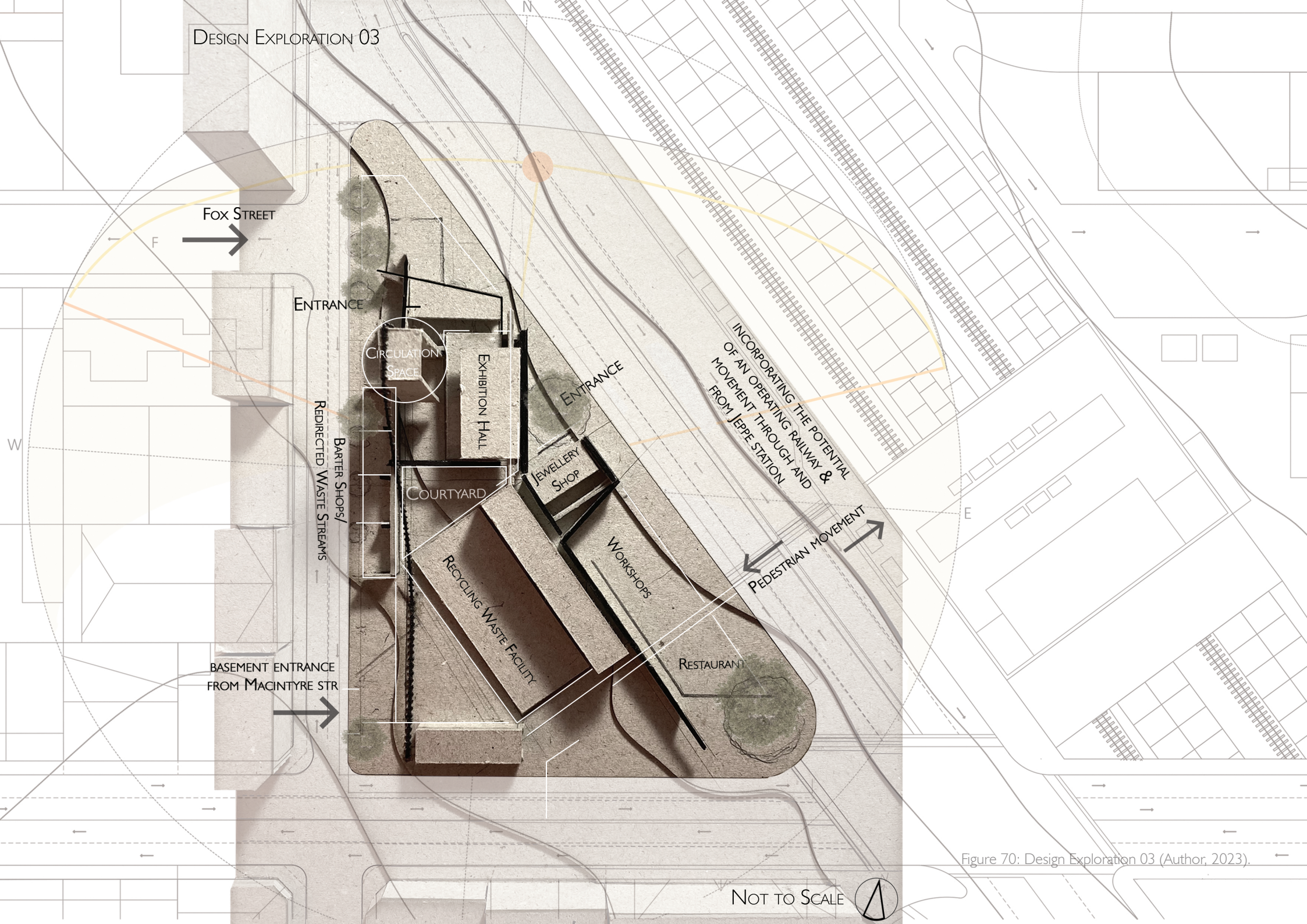
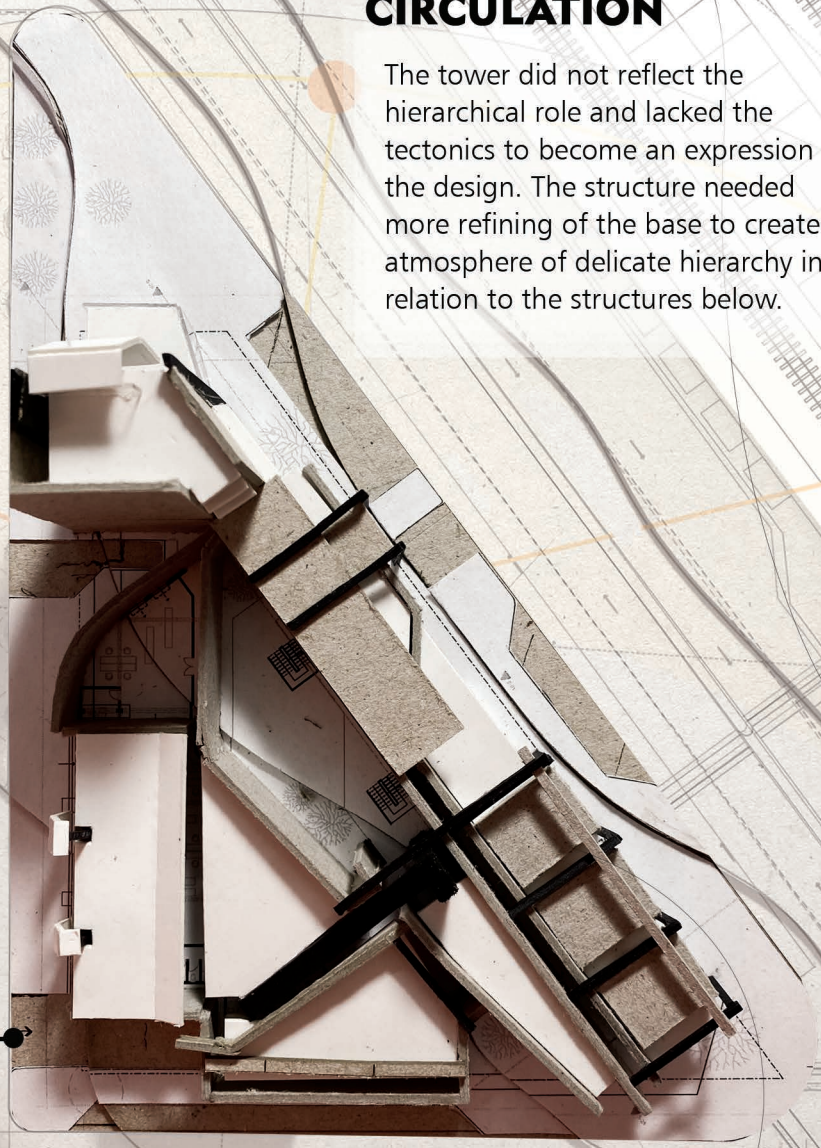


Figure 70: Design Exploration 03 (Author, 2023).

REFINING THE CIRCULATION

The tower did not reflect the hierarchical role and lacked the tectonics to become an expression of the design. The structure needed more refining of the base to create an atmosphere of delicate hierarchy in relation to the structures below.



The entrance towards the basement is located on the corner of the site from Macintyre Street raising concerns regarding traffic flow.

Not to Scale

The plan indicates that required development regarding spatial qualities is needed. Following the site layout, difficult spaces must be resolved to avoid small niches and corners of the plan that have no use and accommodate the courtyard's spatial arrangement. This specifically applies to the service yard dedicated for deliveries on Macintyre Street.

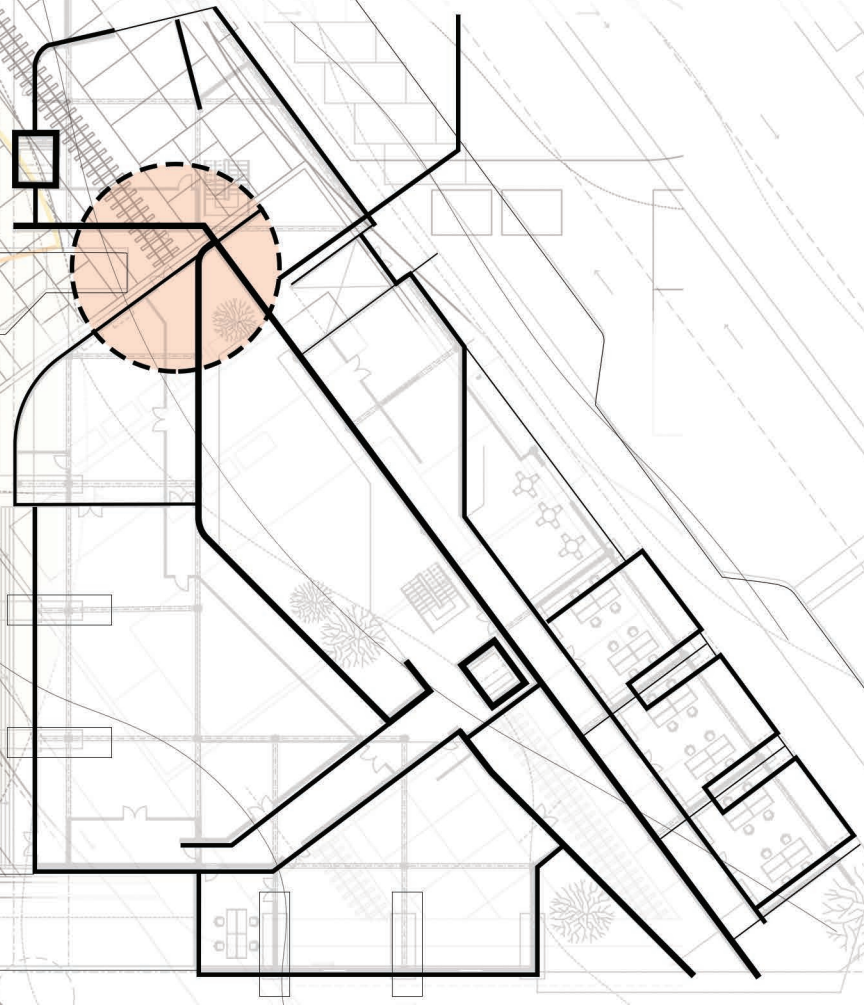
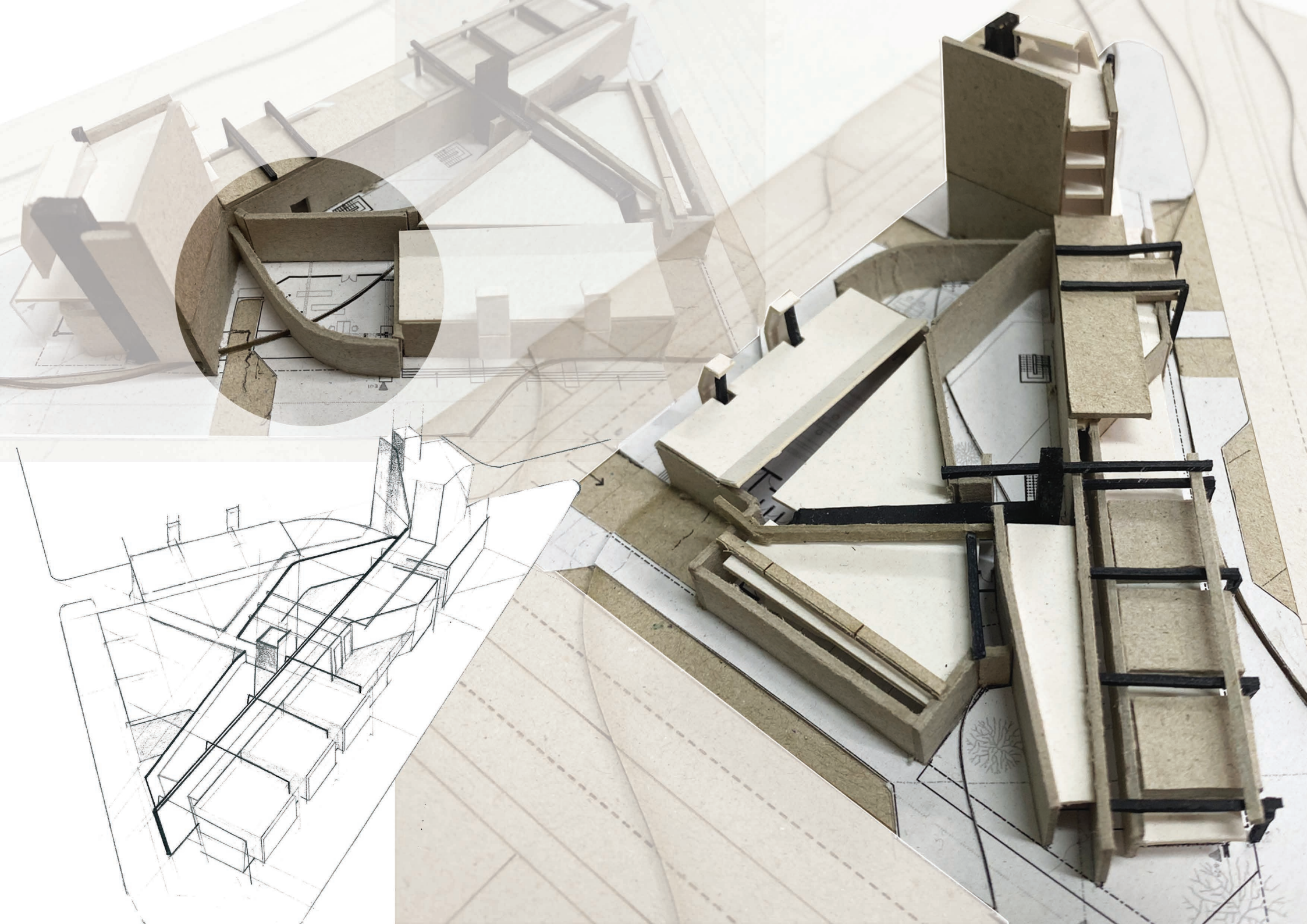
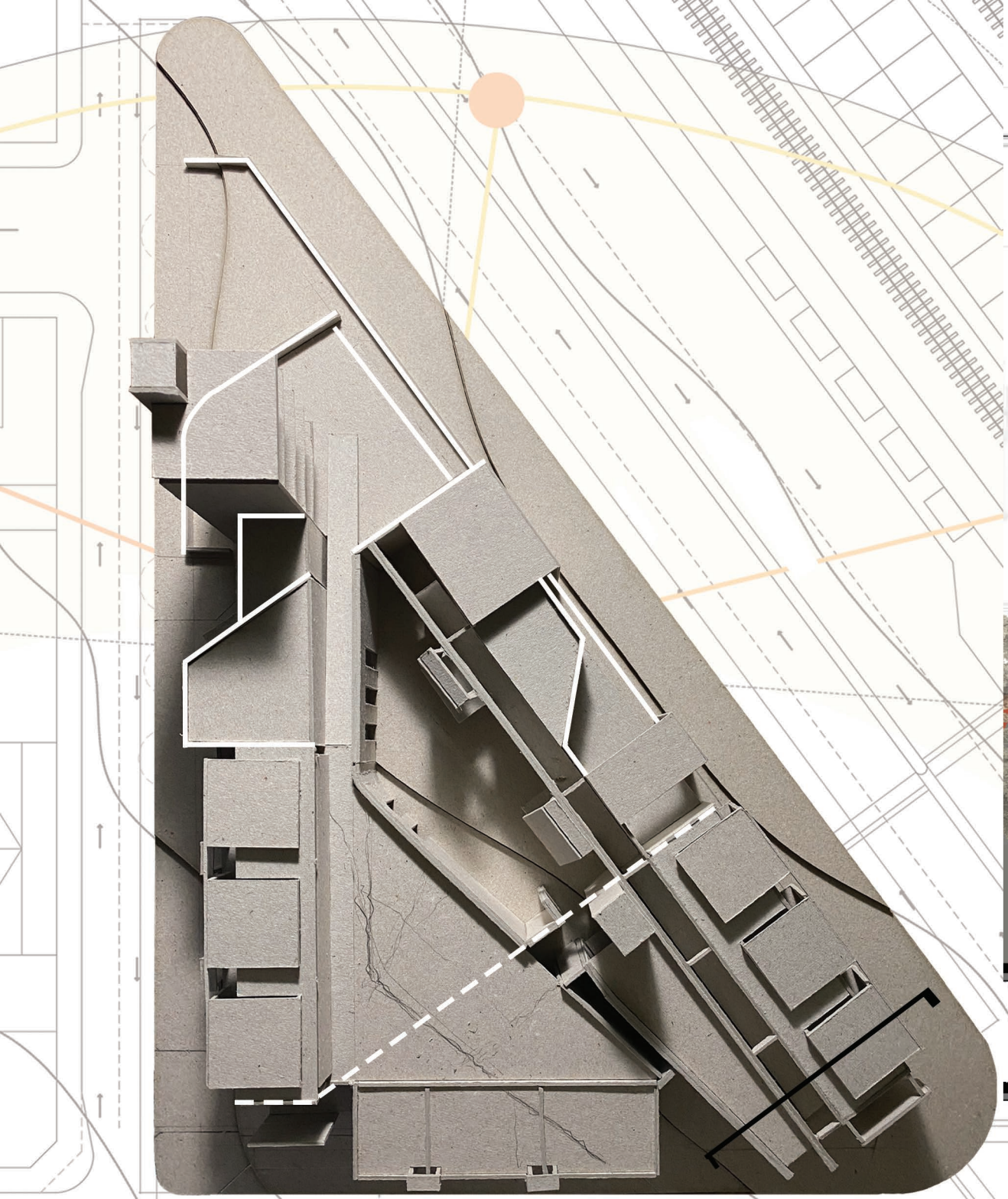


Figure 71: Design Exploration 04 (Author, 2023).

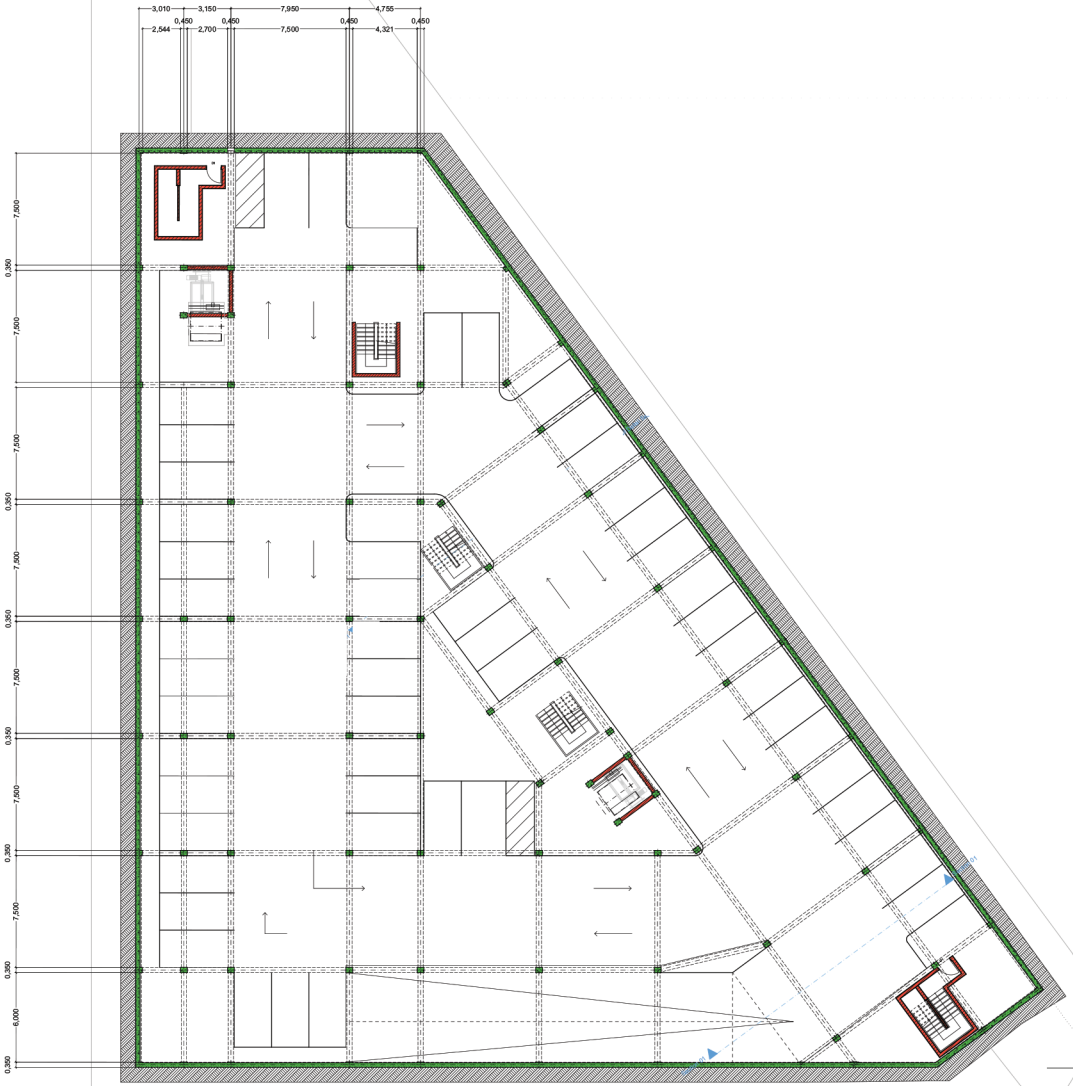
Ground Floor Plan
Scale | 1:500





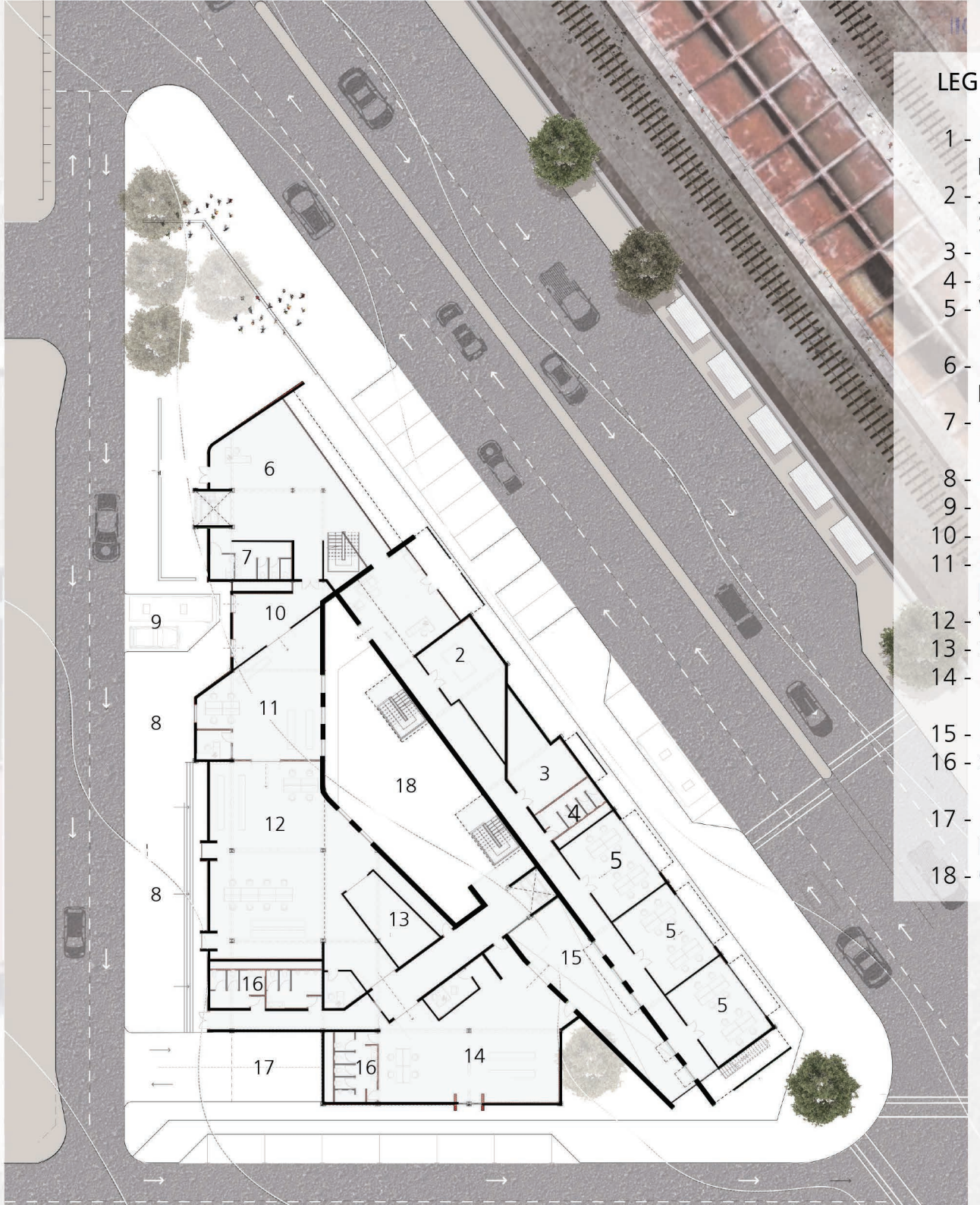


LOWER LEVEL
BASEMENT FLOOR PLAN
SCALE 1:500



UPPER LEVEL
BASEMENT FLOOR PLAN
SCALE 1:500





LEGEND:

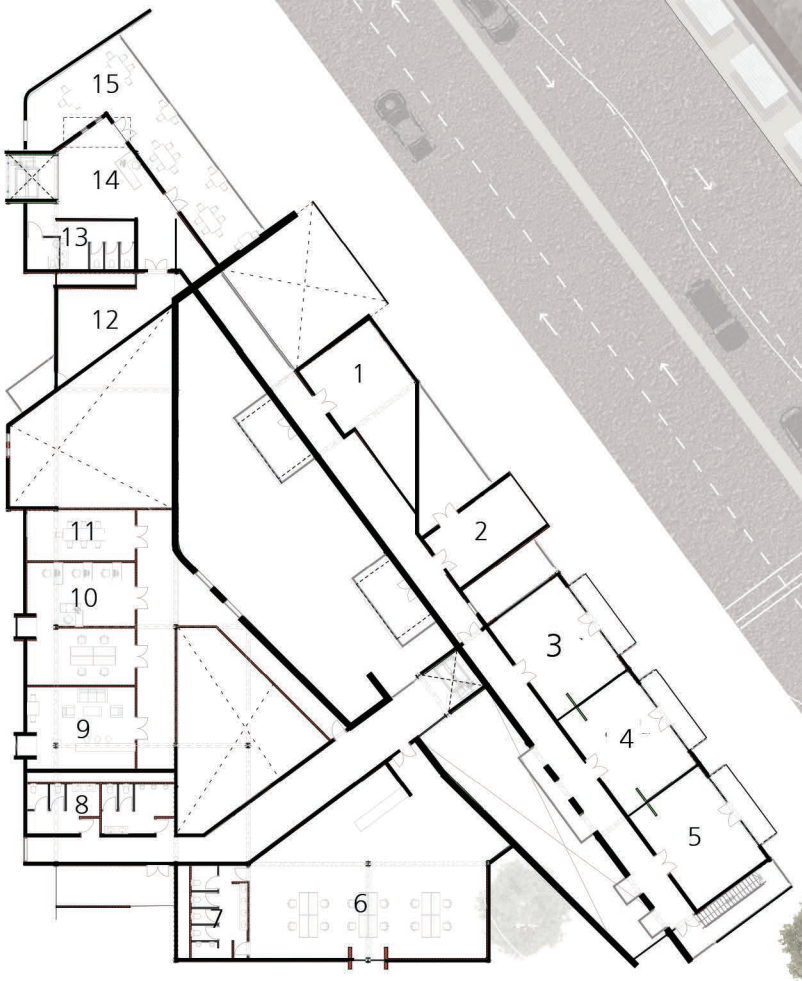
1 - Main Entrance 01
Reception and Information
2 - Jewellery Shop
Storage
3 - Internet Cafe
4 - Student Ablutions
5 - Workshop(s)

6 - Main Entrance 02
Reception and Information
7 - Public Ablutions

8 - Multi Market/ Trading Zone
9 - Loading Zone/ Delivery Bay
10 - Loading Platform
11 - Holding Bay/
Examination and Manual Sorting
12 - Warehouse/ Preparation Area
13 - Storage
14 - Processing Laboratory/
Mechanical Seperation
15 - Preparation Area
16 - Staff Ablutions

17 - Entrance to Basement
From Macintyre St
18 - Courtyard

GROUND FLOOR PLAN
SCALE 1:500



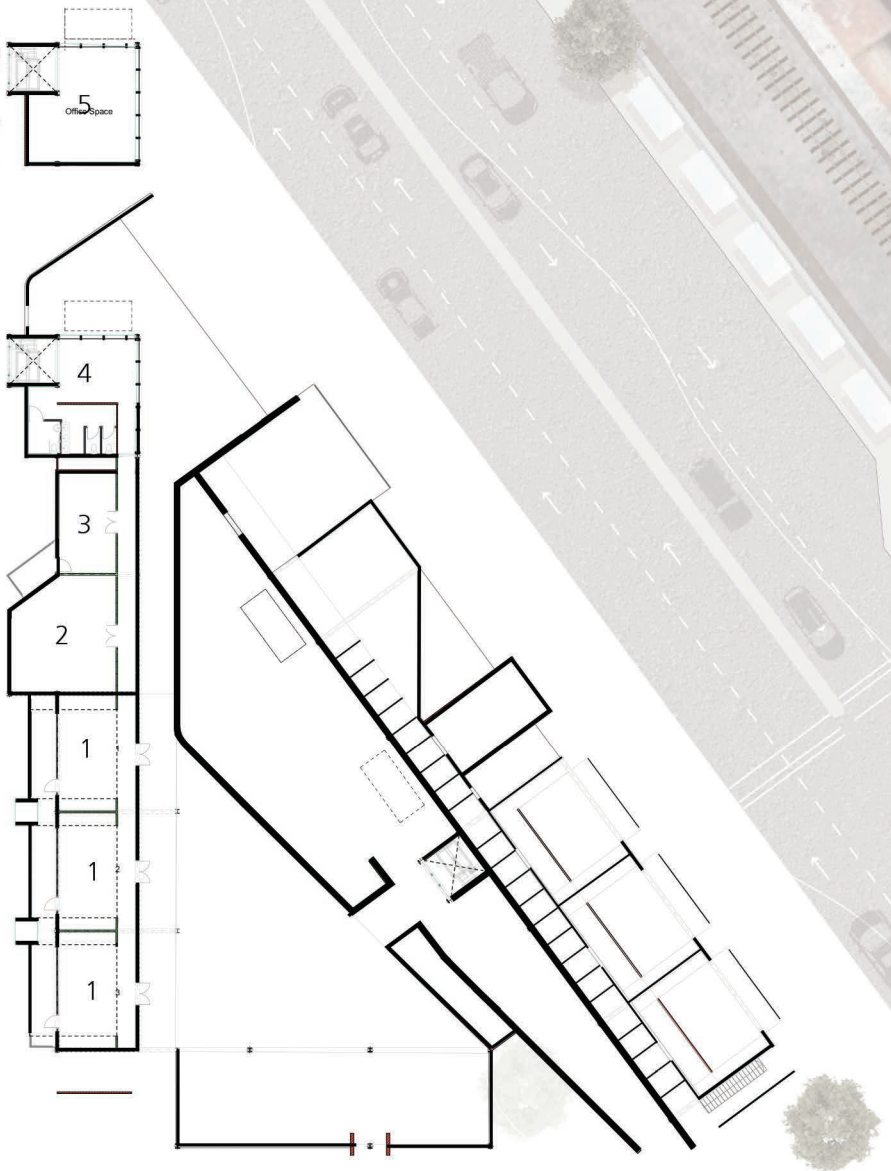
LEGEND:

1 - Office Space
2 - Office Space
3 - Silversmithing Laboratory
4 - Gemmology Laboratory
5 - Horology Laboratory
6 - Studio(s)
7 - Student Ablutions

8 - Staff Ablutions
9 - Tea Room
10 - Warehouse Administration Offices
11 - Boardroom
12 - Kitchen

13 - Public Ablutions
14 - Foyer Space
15 - Canteen/ Balcony Space

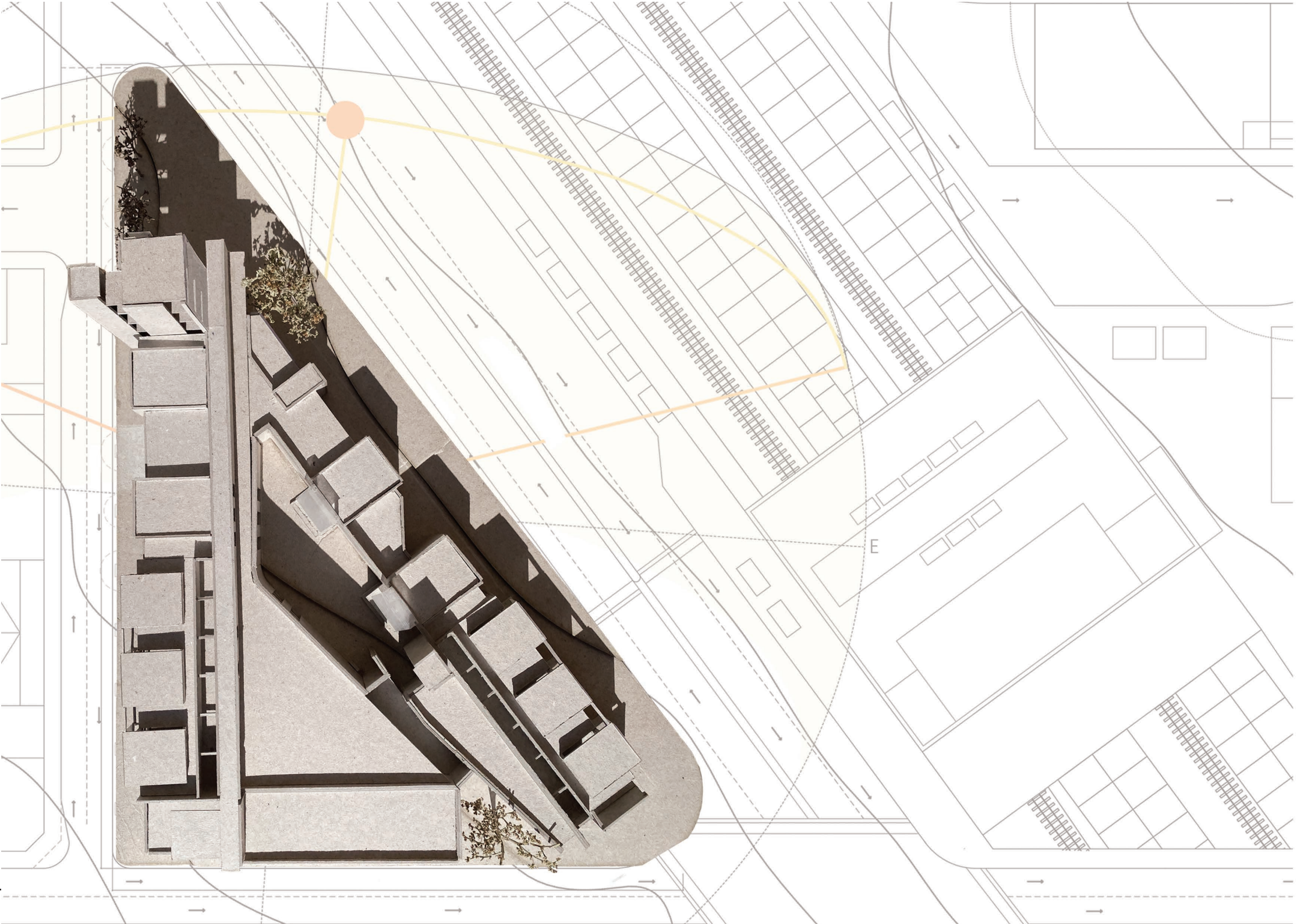
FIRST FLOOR PLAN
SCALE 1:500



LEGEND:

1 - Classroom(s)
2 - Computer Suites
3 - Kitchenette
4 - Office Space
5 - Office Space

SECOND FLOOR PLAN
SCALE 1:500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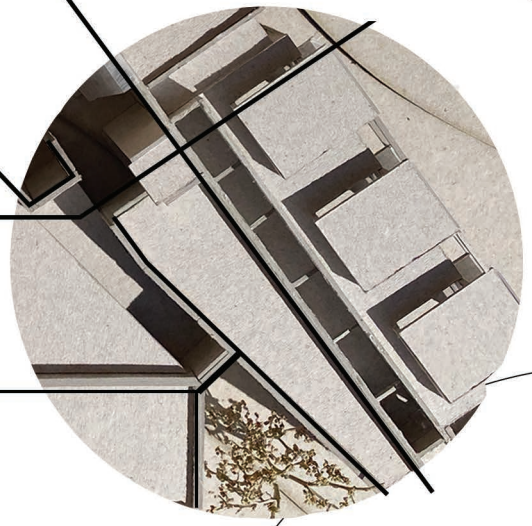
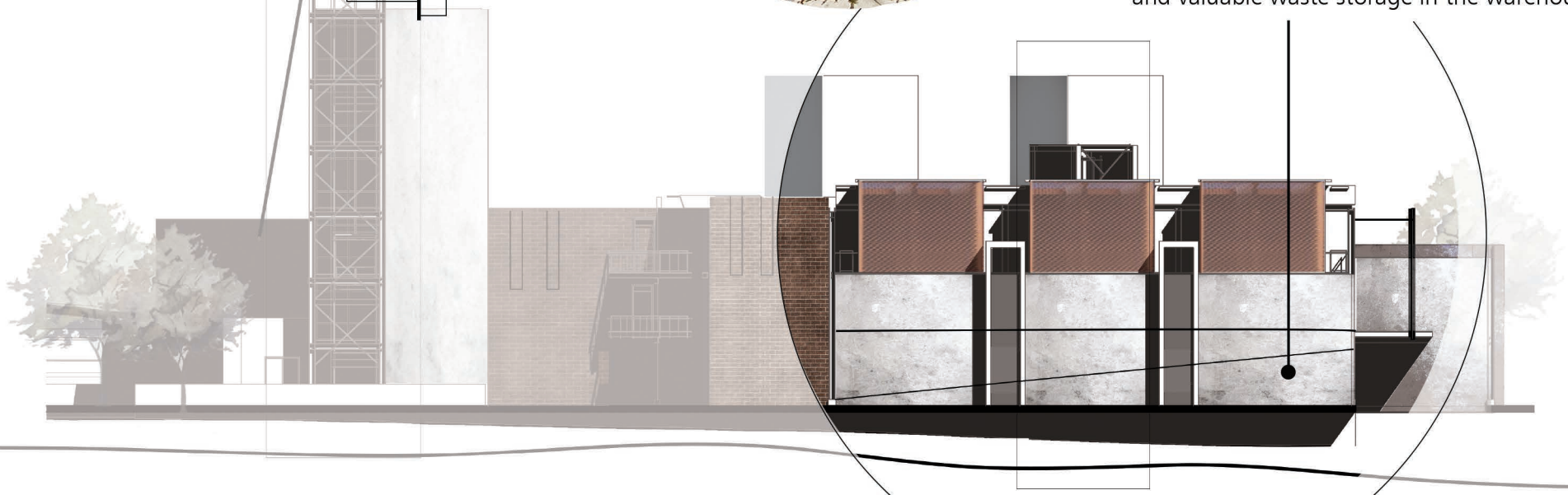
ADDITIONAL CIRCULATION
MAIN ENTRANCE & CIRCULATION
NORTHERN FACADE
NOT TO SCALE
TOWERS EXTRUDING FROM JEPPESTOWN TRAIN STATION
WESTERN FACADE
NOT TO SCALE

REFLECTION

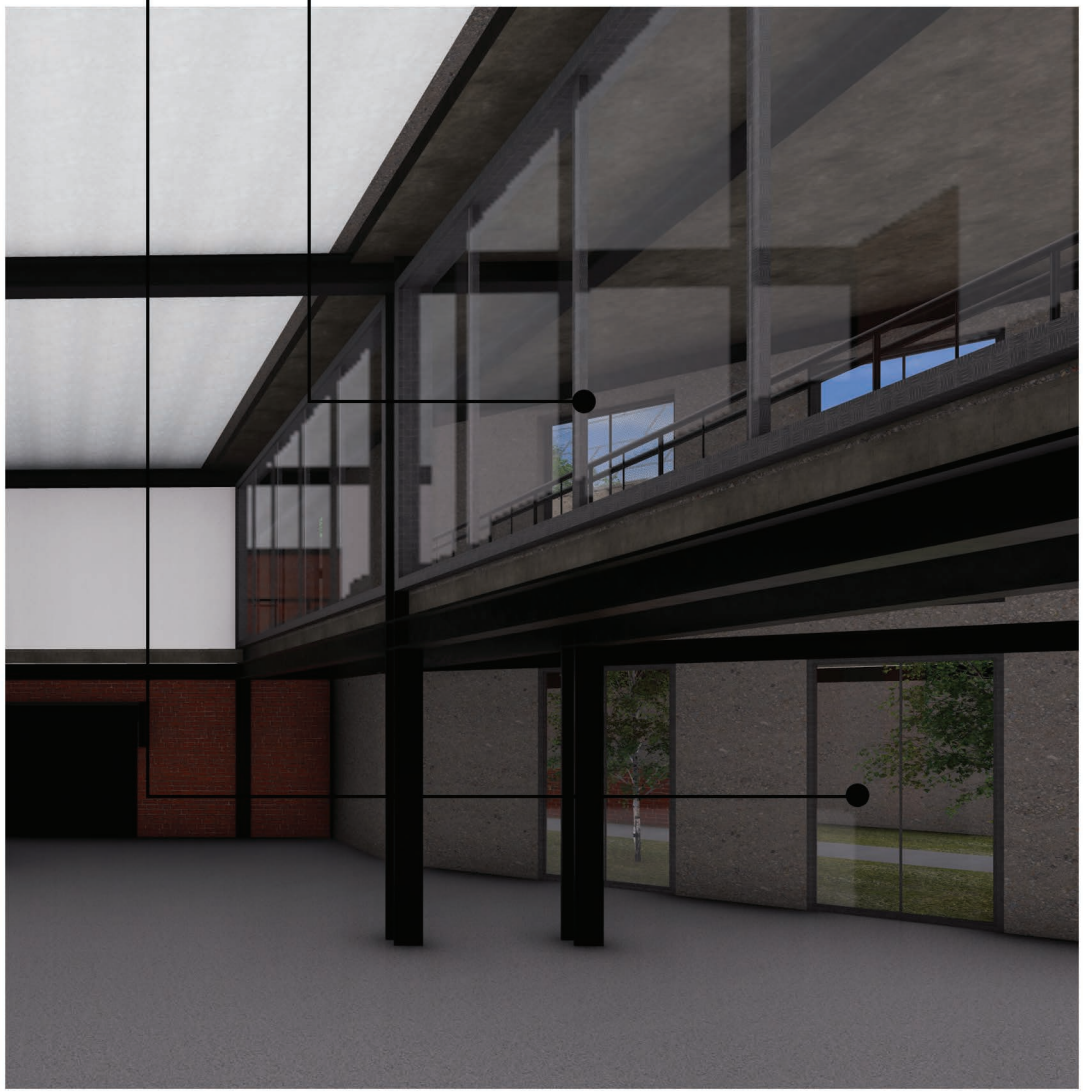


The western facade reflects the same typology of exposed workshops on the third floor, while maintaining a more private and robust facade beneath. This is to ensure the safety of machinery and valuable waste storage in the warehouse.



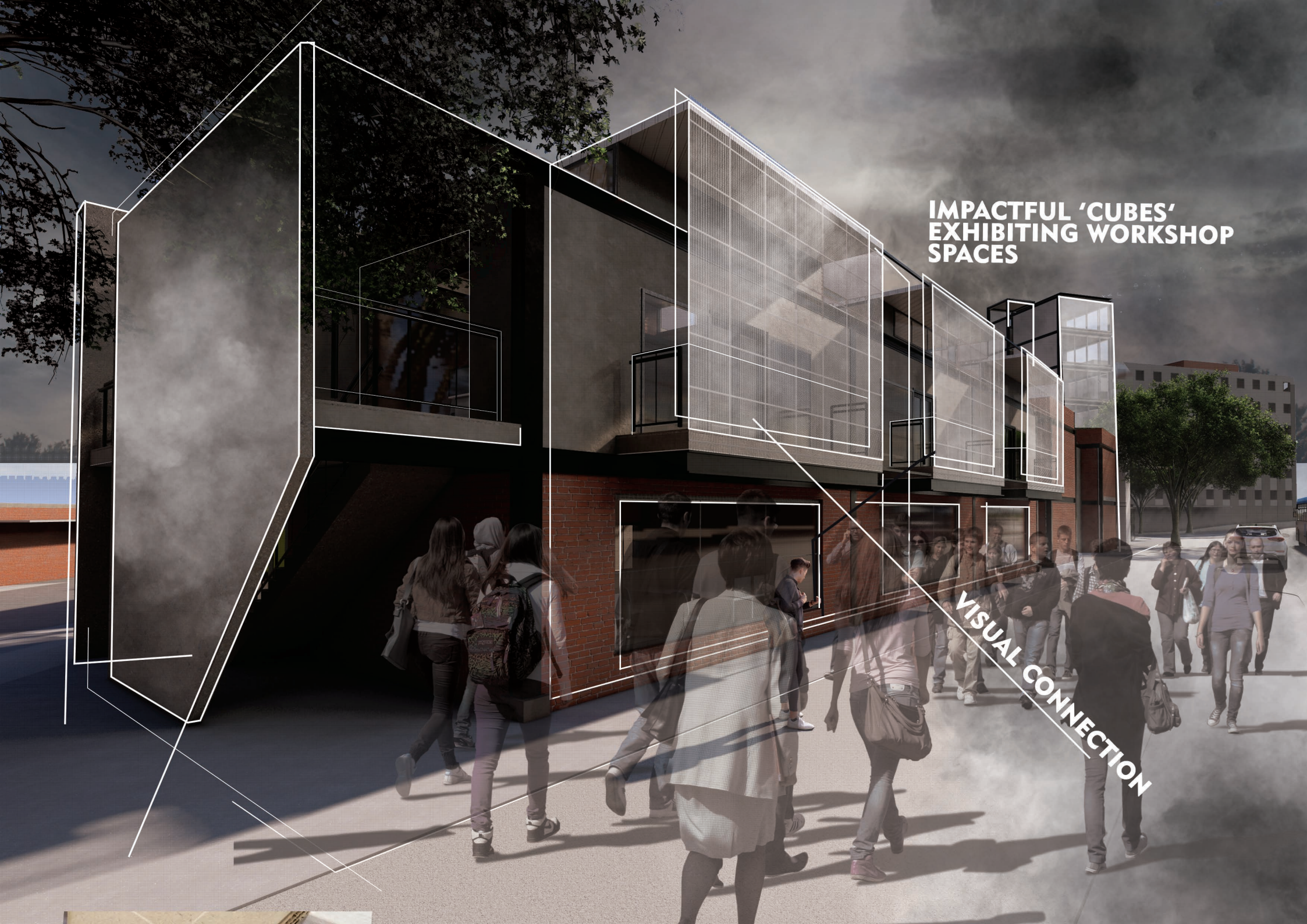
INTERNAL RELATIONS

Internal space of the warehouse allowing interaction from exterior courtyard and observation from first floor.



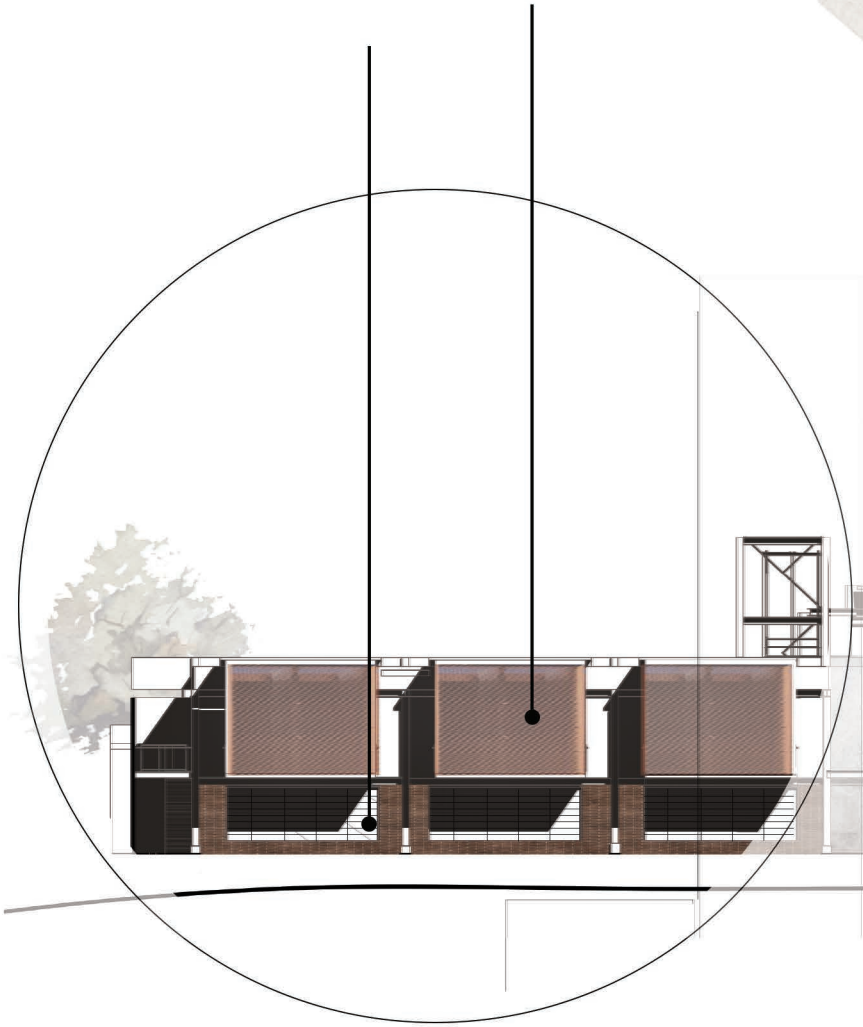
Section through the packaging area and workshops hovering over John Page Drive. This emhasises the relationship between the spaces, and both circulation towers.

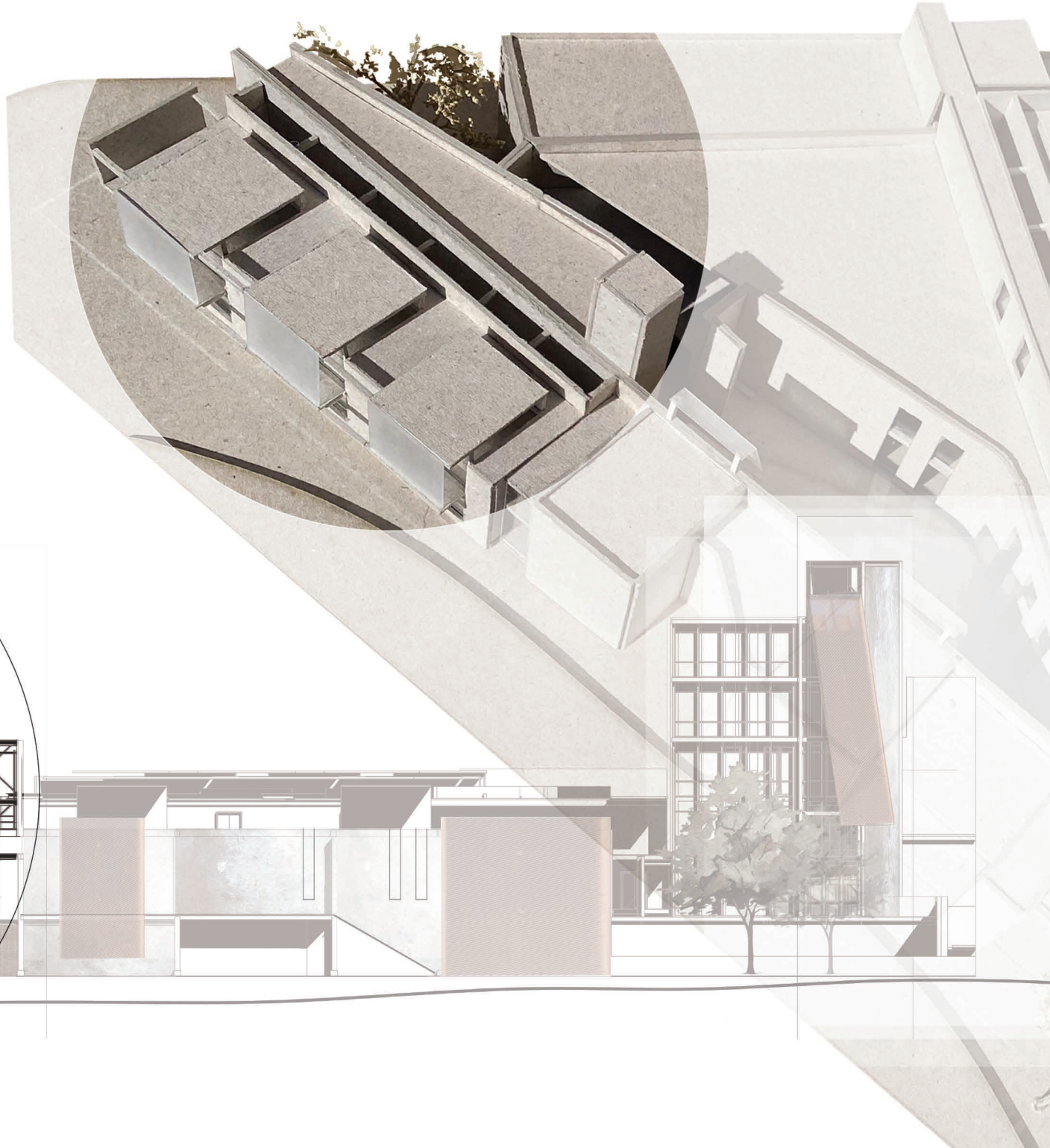



IMPACTFUL 'CUBES'
EXHIBITING WORKSHOP
SPACES
VISUAL CONNECTION

BARRIERS

When reconsidering the relationship between city streets and buildings. Barriers are created to limit the visual connection on the ground floor. On the first floor, perforated mesh facades allow for a sense of privacy without the use of a solid wall/ fence acting as a deterrent to trespassers.

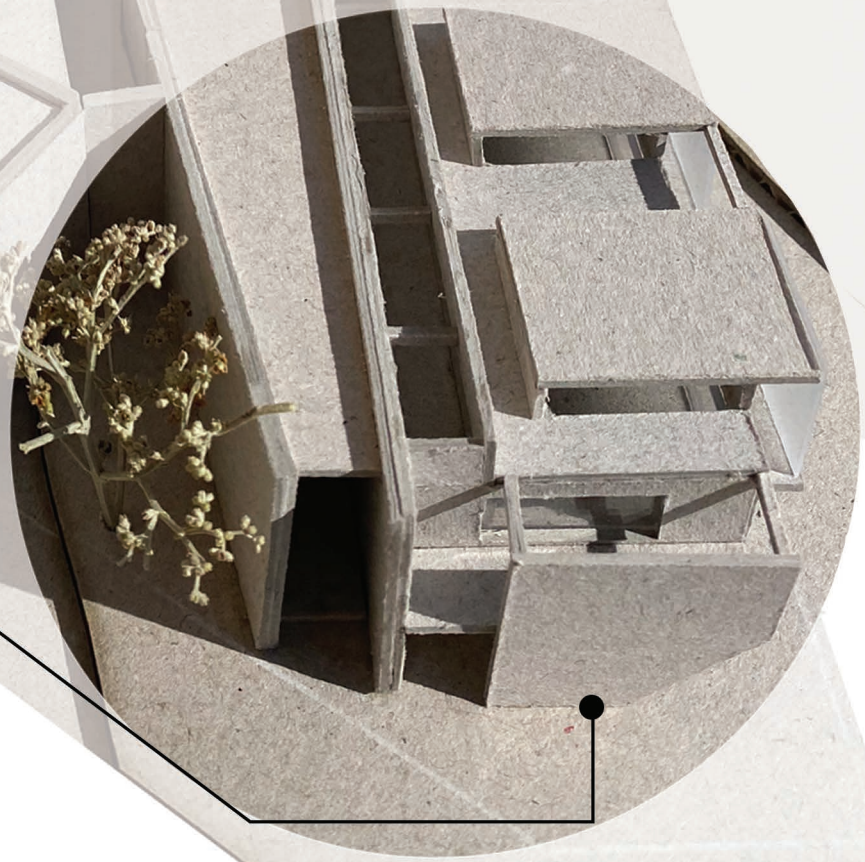


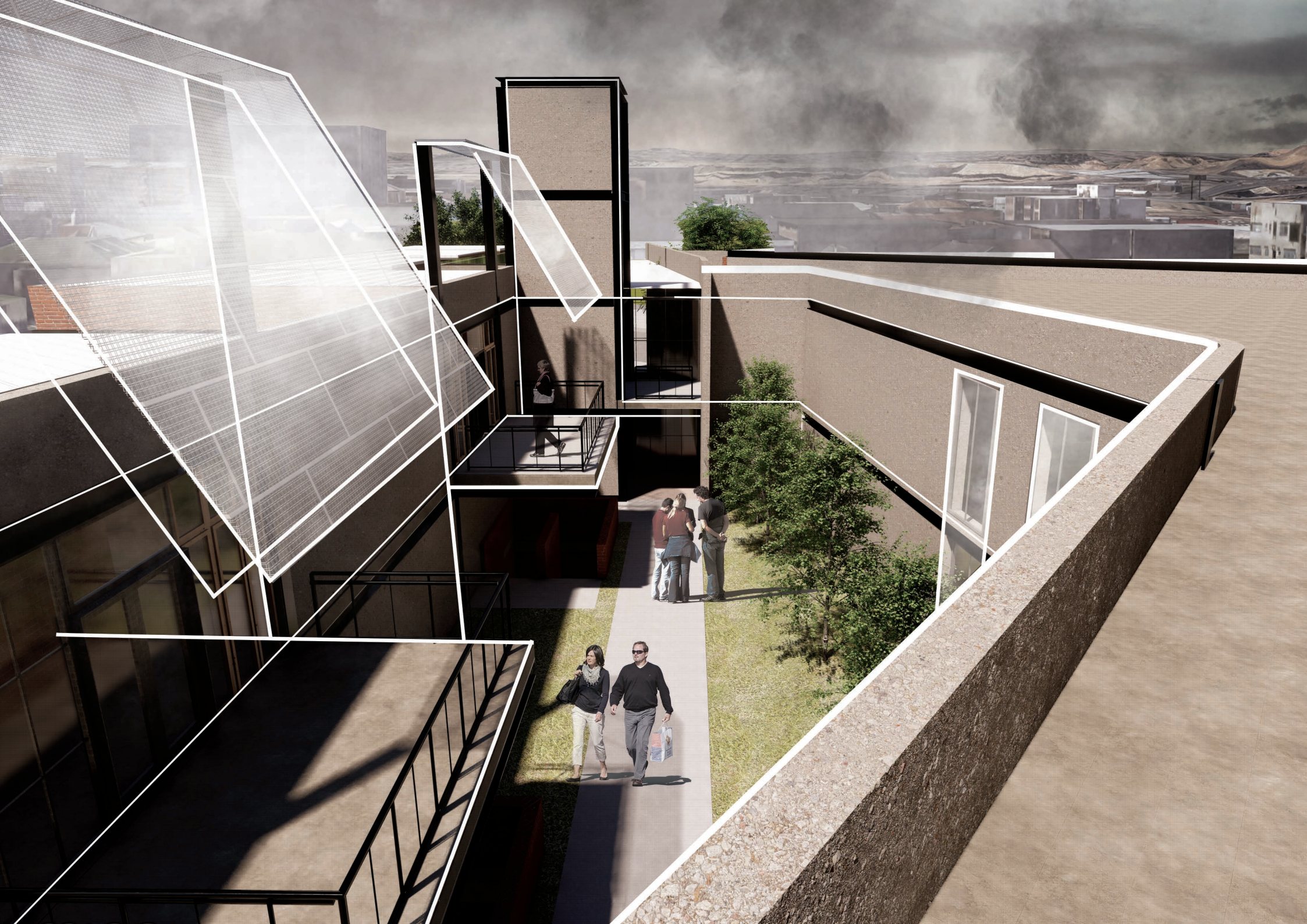


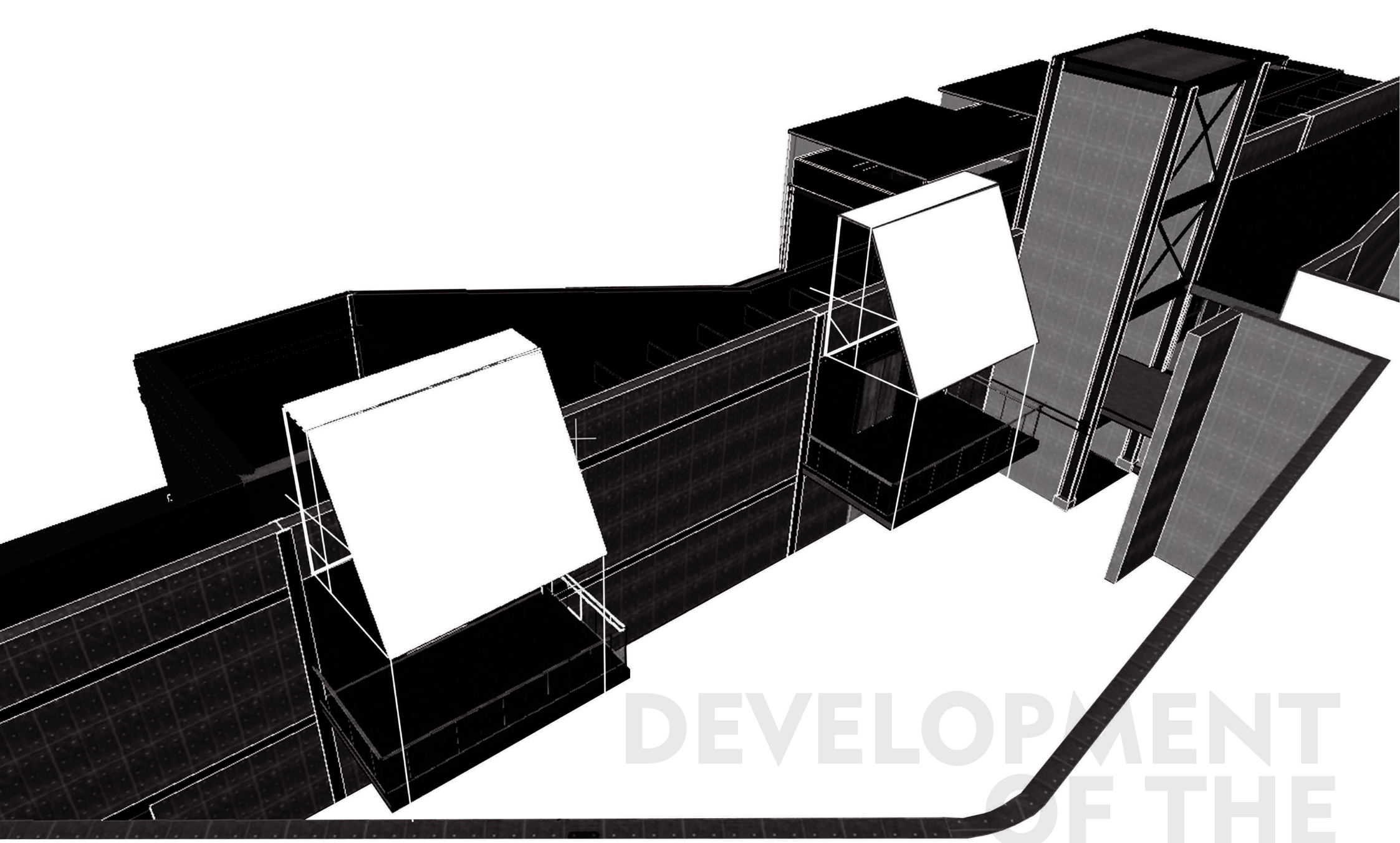
CREATIVE EVOLUTION

Expanding the building's edge. The ensures a sense of privacy to the design school, limiting visual distractions and sounds from the busy corner on Johan Page Drive and Macintyre Street







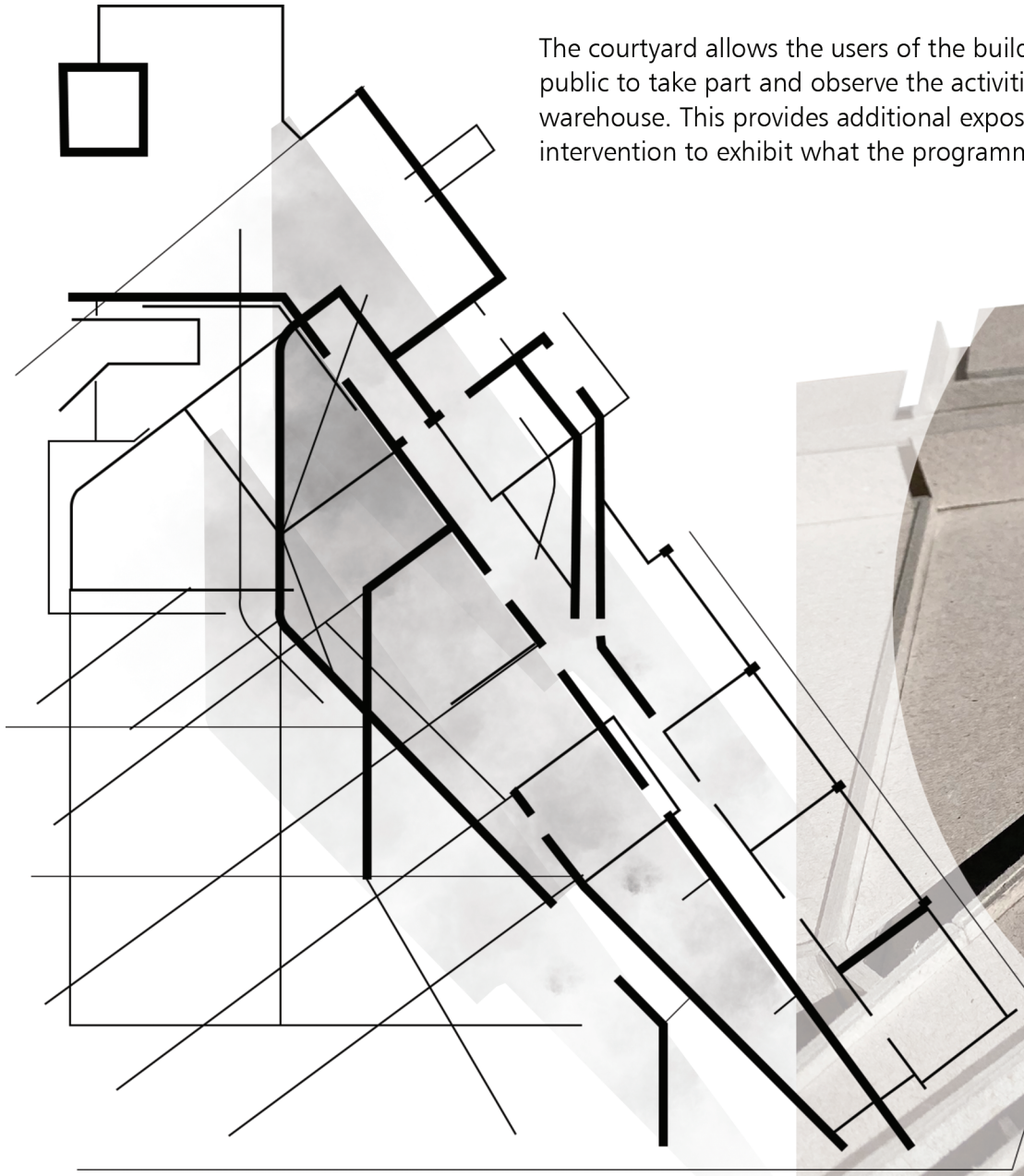


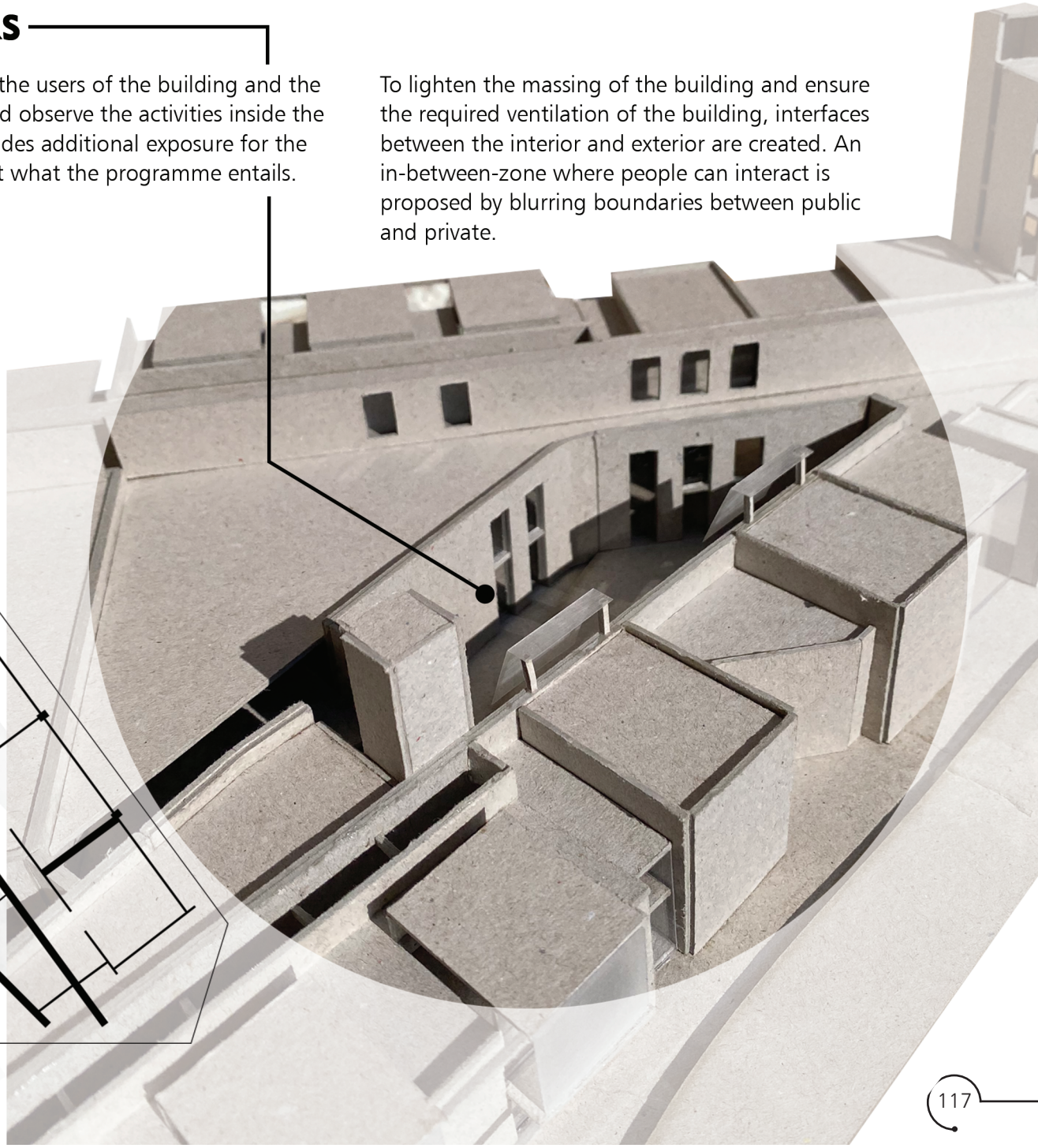
DEVELOPMENT OF THE COURTYARD

VISUAL ENCOUNTERS

The courtyard allows the users of the building and the public to take part and observe the activities inside the warehouse. This provides additional exposure for the intervention to exhibit what the programme entails.

To lighten the massing of the building and ensure the required ventilation of the building, interfaces between the interior and exterior are created. An in-between-zone where people can interact is proposed by blurring boundaries between public and private.



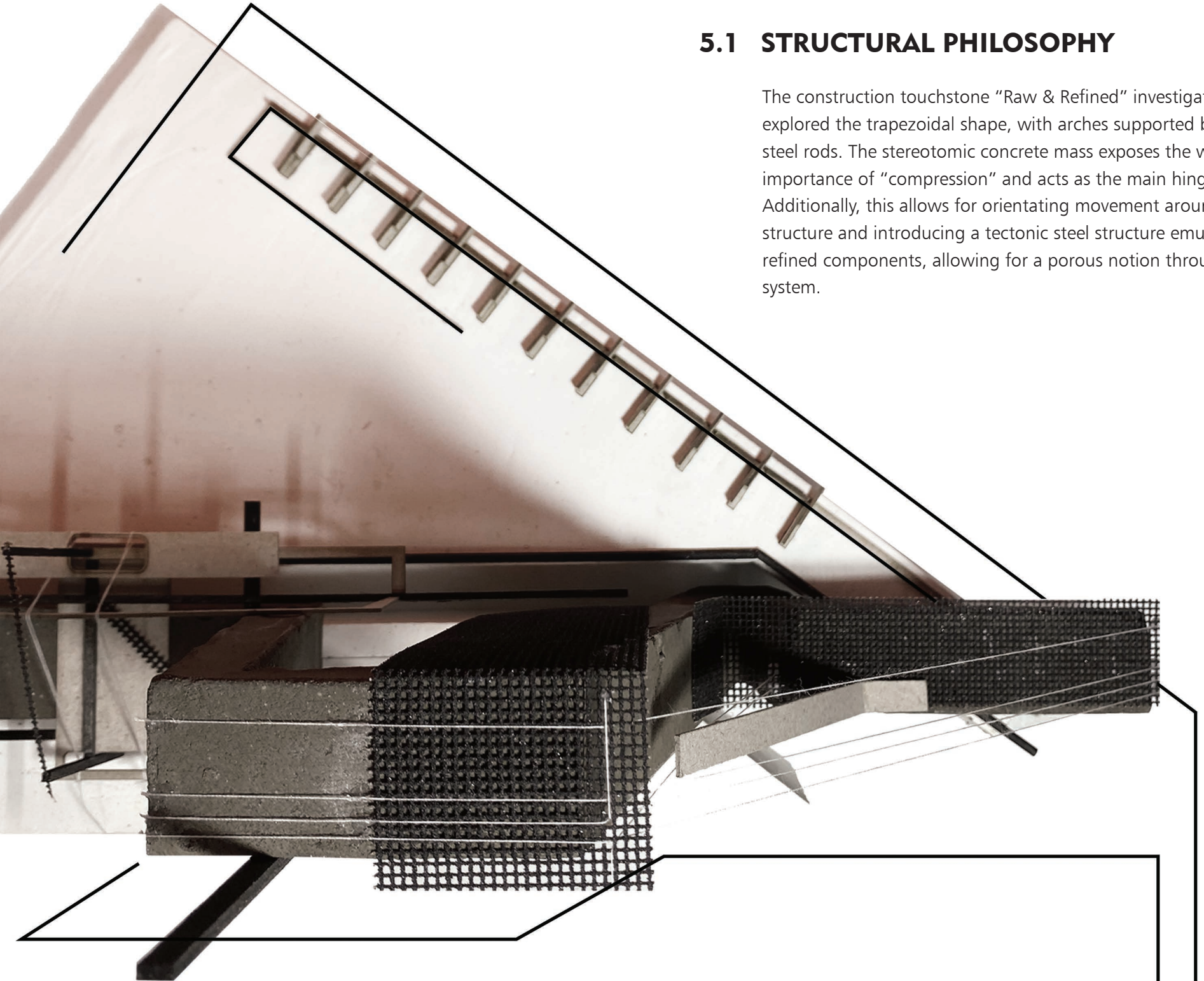


PART 03 | Technical Synthesis

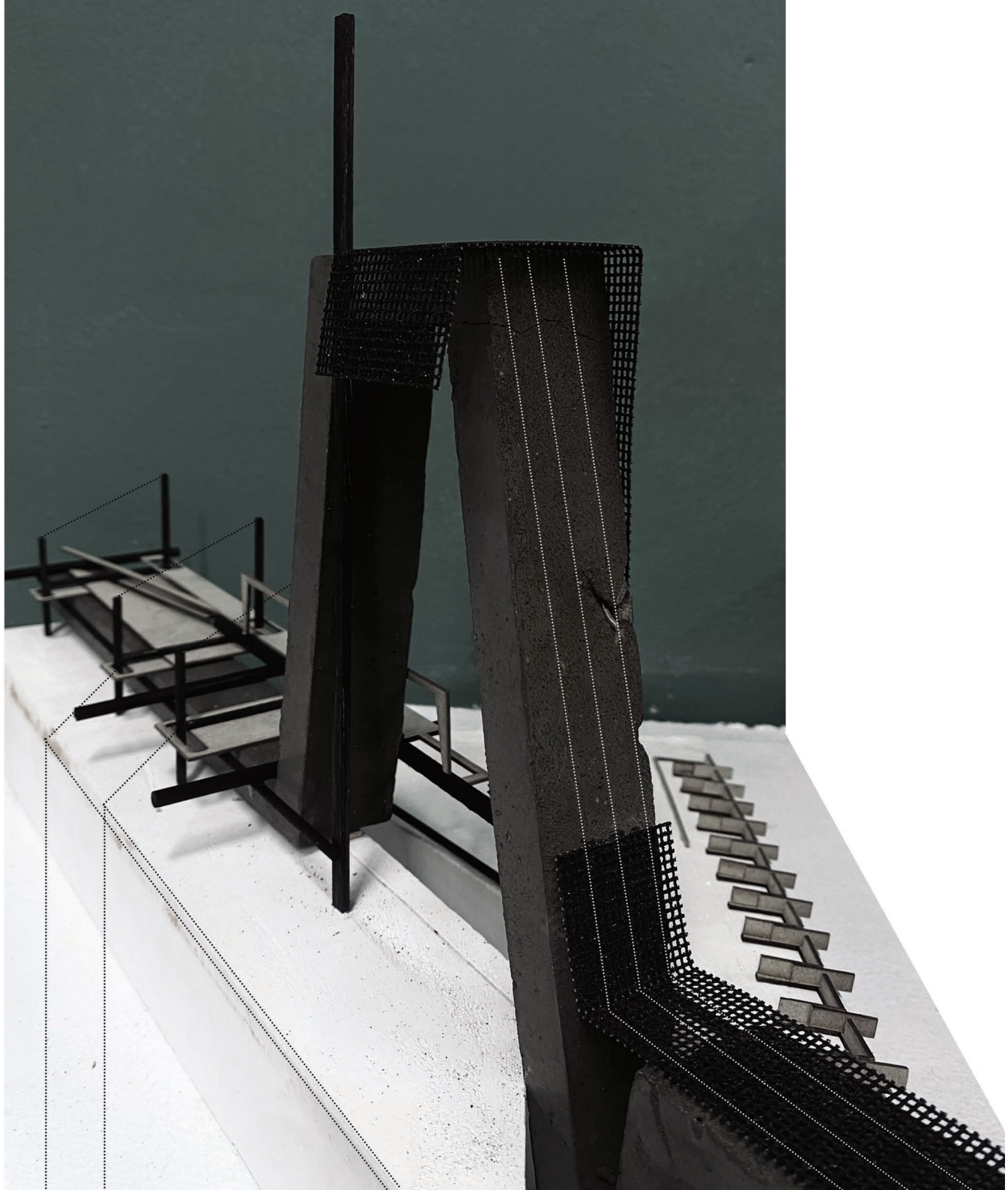
The technical report is structured and supported by drawings and focuses on the design from a constructional point of view. I will explore and communicate the structural systems, materials, and details, including the 3-dimensional exploration and communication of the buildings on a structural-technical level. The structural design is critically influenced by the environment, the sites' immediate conditions and influences, the climate, and historical value.

5.1 STRUCTURAL PHILOSOPHY

The construction touchstone “Raw & Refined” investigated and explored the trapezoidal shape, with arches supported by thin steel rods. The stereotomic concrete mass exposes the weight and importance of “compression” and acts as the main hinge element. Additionally, this allows for orientating movement around the main structure and introducing a tectonic steel structure emulating the refined components, allowing for a porous notion through the system.



RAW & REFINED



5.2 Urban Identity

The movement of pedestrians, vehicles, and trains all contribute to the characteristics of the immediate context and is essential to consider when addressing boundaries and selectively placing the functional needs of urban activities among the immense recycling production plateau.

Despite the need for parking bays for private use and service deliveries, public transport also plays a vital role in favouring valuable land and preventing excessive on-site and off-street parking. According to the City of Johannesburg Land Use Scheme, 2018, an accessible and responsive environment is supported by integrating a transportation network that promotes public transportation to aid the building programme associated with informal trading facilities on site.

The site covered by Zone B states that public transport is a priority in this area and is to be within 500m of walking distance from PRASA rail stations, Gautrain, and Bus Rapid (BRT) stations. Therefore, public transportation is given priority over private vehicles and encompasses a drop-off area for public transit on the northeastern side of the building to accommodate the users and other urban users commuting to and from Jeppestown Station.



URBAN IDENTITY

5.3 Basements

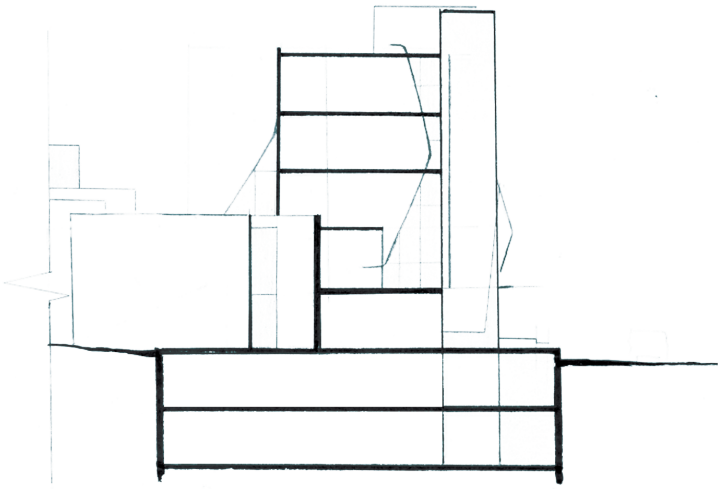
As the programme accommodates students, workers, and staff, the building houses two basement parking levels, making it a super basement providing over 100 parking bays. Parking is allowed due to the size of the site and accommodates an entrance ramp on Macintyre Street on the western façade and a second ramp to the lower basement level on the southern side of the site.

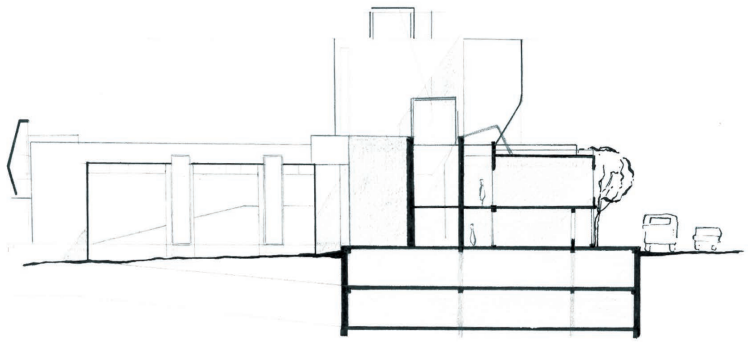
As with most multi-story buildings, the basement serves as the foundation of the building, apart from serving as a parking area. The basement occupies a more significant portion of the site than the footing of the building on the ground floor, as it is extended to the ERF boundary and not only the building line to allow for more space in the triangular site. Raft foundations are chosen because the substructure has a column and beam nature.

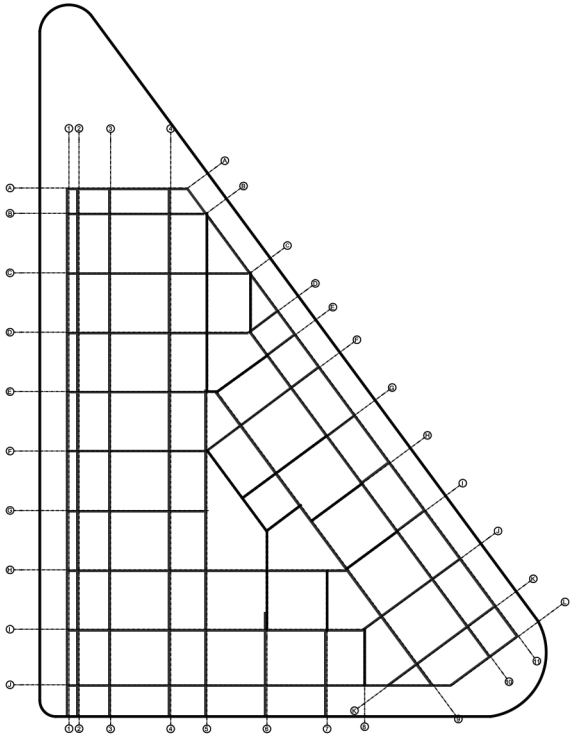
The basement's grid determines the positioning of the building's circulation spaces, mainly influenced by the parking regulations of 2.5 m x 5m parking bays. Access and vehicular movement through the basement create an uneasy structural grid layout because of the site's shape. However, the concrete slab allows unrestricted use of structural grids and a steel column and beam structure on the ground floor and upwards, ensuring efficient support for the design.

The fire escapes and elevation shafts allow for two platforms on each basement level that act as the main entrances to the inside of the building for different uses of accommodation. Another two fire escapes allow for exits to the exterior boundaries of the building and site.

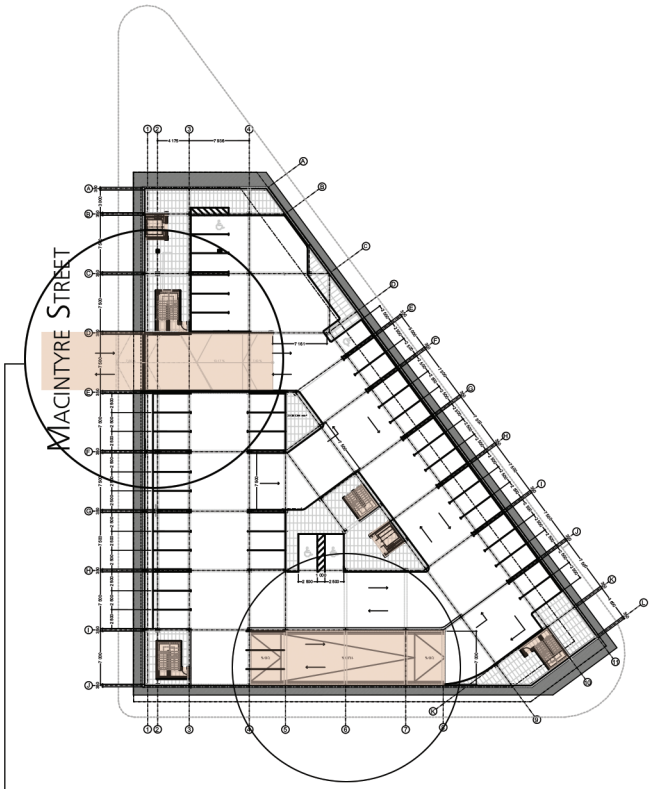
The structure will need to be mechanically ventilated because of its depth, with the primary purpose of pumping exhaust gases from the area and drawing in fresh air. The intake duct is in the northern half of the building, and two exhaust ducts are installed at the southern end and use evaporative cooling radiators to cool incoming air if extreme temperatures occur.



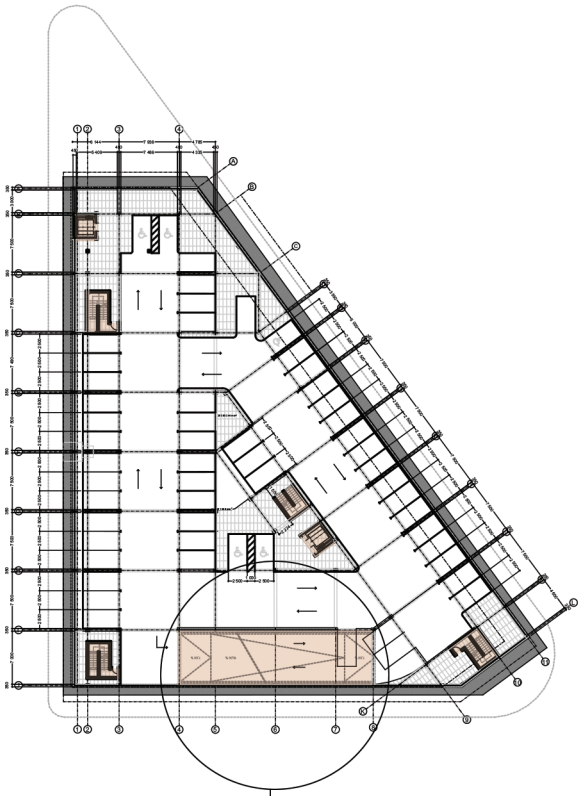




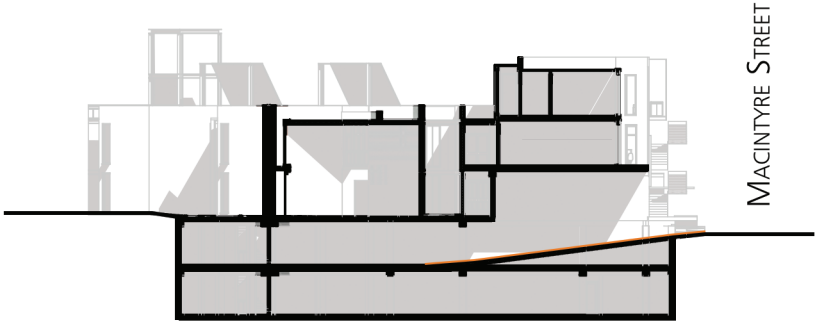
STRUCTURAL GRID
SCALE 1:1000



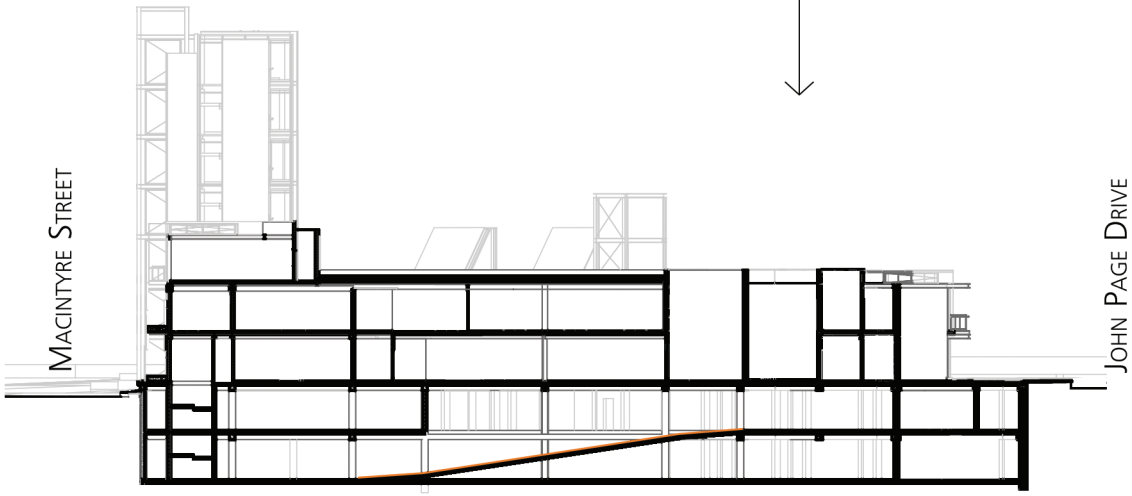
LOWER BASEMENT
SCALE 1:1000



UPPER BASEMENT
SCALE 1:1000



SCALE 1:500



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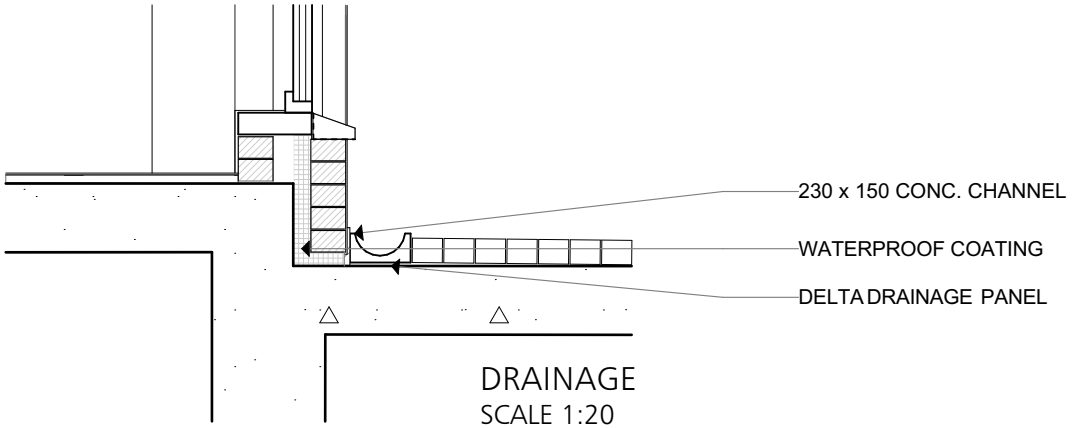
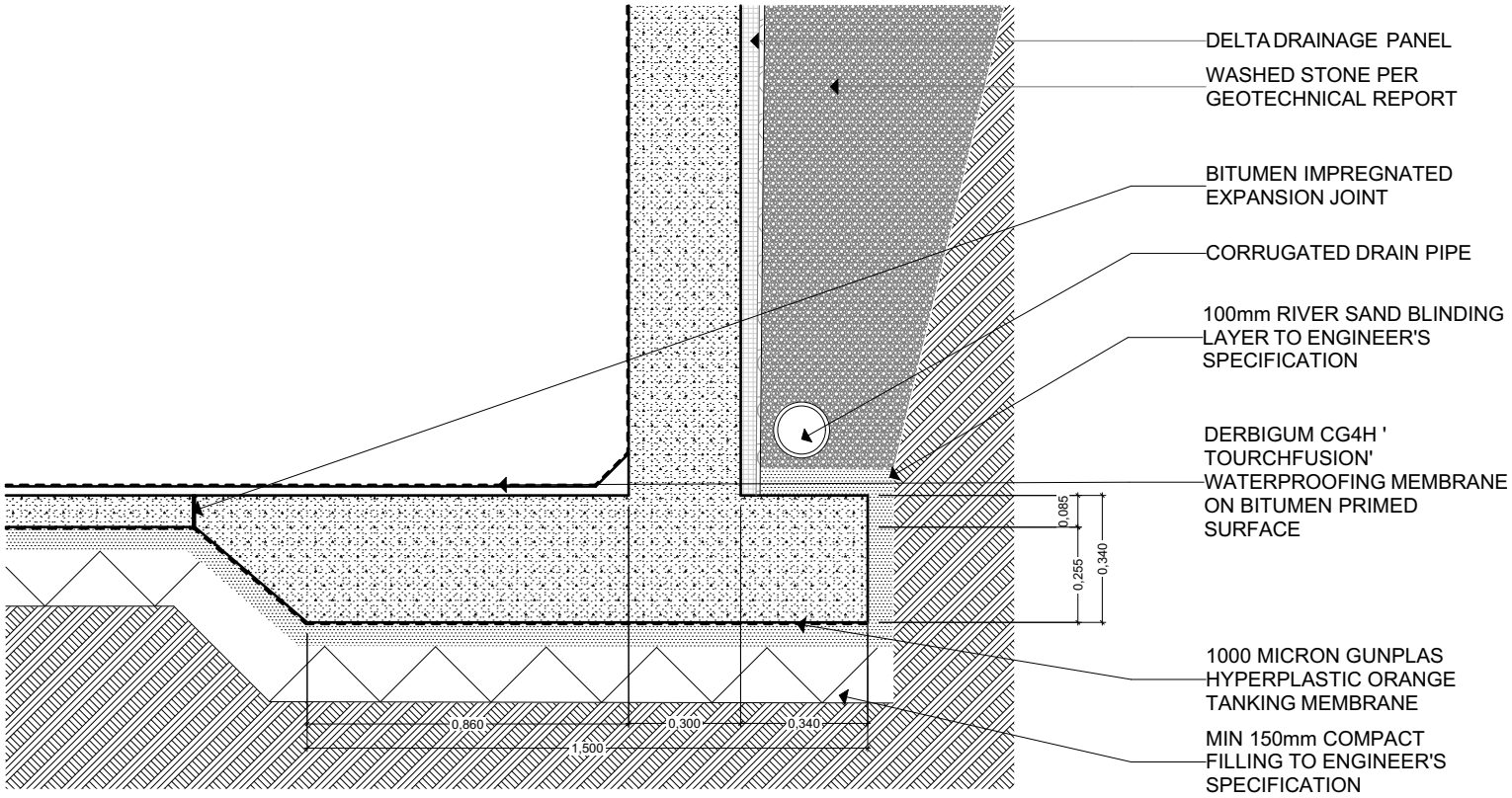


DRAINAGE
SCALE 1:20

Figure 73: Retaining Wall (Author, 2023).



RETAINING WALL
SCALE 1:20

Figure 72: Retaining Wall (Author, 2023).

5.4 Services

Different services are required regarding the recycling waste facility, and the building keeps all these services as close to one another as possible. The elevator shaft(s) are accessible from all floors, and the ducts accommodate all services on each floor, including plumbing and other services, while providing access to air conditioning systems.

The basement accommodates the formation of a refuge yard directly connected to the canteen's kitchen via a trash chute to increase the building's public edge. Trash can be collected on the sidewalk of Macintyre Street when the garbage is removed.

The building allows two delivery bays on each side of the basement entrance on Macintyre Street, one for delivering ready-made food to the canteen and the other for larger deliveries of e-waste to the warehouse (Drop-off zone/donating area). The western side of the building is pedestrian-friendly to accommodate the exchange of products/ redirected streams for materials unsuitable for the specific purpose.



5.5 Fire Strategy

In the event of a fire, all occupants must be able to leave the building quickly; therefore, a fire strategy must be implemented for all occupants to leave the building as soon as possible, and the fire must be contained, preventing its spread throughout the rest of the building.

The National Building Regulations (NBR) elaborates on the necessary guidelines for designing a building for fire safety. These rules were examined and implemented.

- Escape door travel distances must be no more than 45m. A structure with more than three storeys must have at least two emergency exits, and a fire resistance range of more than 120 min must be specified for the materials used in framing the escape routes.
- Steel and reinforced concrete form most of the structure. Concrete has adequate fire resistance. However, the steel component must be coated with an intumescent base paint.
- With regards to the basement, in addition to the four emergency exits, water sprinklers will be used as part of the fire anguishing system. The same sprinkler system used throughout numerous other spaces in the building should be sufficient to extinguish a fire. Dry chemical and fire hose reels should stop fires from getting out of hand.
- In the spaces where necessary machinery, valuable materials, and electric devices are used and stored, a carbon dioxide system will be used instead of a sprinkler system. This is recommended to avoid property damage and electrical outages. The system extinguishes a fire outbreak by removing all the oxygen in the space and eliminating any necessary water, foam, or chemical that needs to be cleaned up afterwards.







5.6 HVAC System

The building includes numerous machines and electronic equipment. Therefore, HVAC equipment should be installed to keep the building as cool as possible during the summer due to the amount of heat produced within an industrial design. The building has a variable air volume (VAV) system installed. It is used when different heating and cooling requirements exist within the same structure. The system distributes air at a constant temperature through a single supply duct. When a space needs more cooling, air supplies change without affecting other building areas.

5.7 Regulations

The height resistance of the site ensures a building with a maximum number of 6 storeys, creating an optimal hierarchy in the tower of the building on the northern side of the site, articulating the importance of the entrance space and guiding the visual element of the structure in proportion to the size of the base.

5.8 Street Edge

On the street edge, there are problems pertaining to its relation to the size of the warehouse facility on the western façade. It was chosen to expose the top floor balconies, connecting them to the north-eastern façade and establishing a visual connection between the building's occupants and the surrounding suburban scale. The structures and balconies are framed by the perforated skin, which also provides extra shade from the western sun. The balconies are constructed as pre-cast self-supporting slabs with balustrades supported by a steel frame with basic steel members that highlight their lightweight.

Because of the costly equipment and valuable materials kept inside, there are limited views into the warehouse facility from the street edge, but still enough to attract interest.

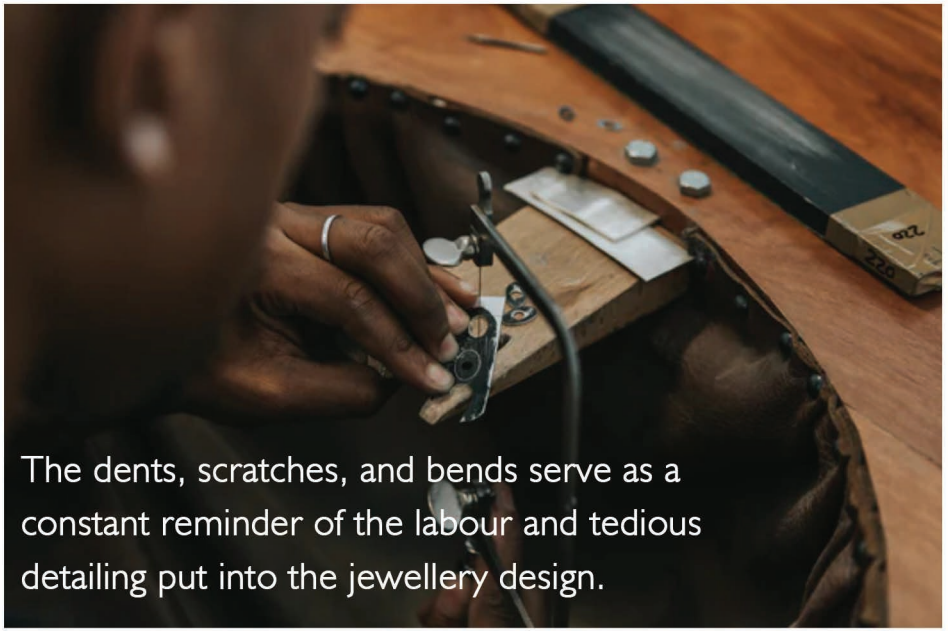
5.9 The Jewellery-Making Process

The metals arrive at the studio or workshop spaces, after they have been extracted from the circuit boards and purified, the silver and gold pieces are carefully measured and alloyed.

In the jeweller's studio, the bench and pin serve as the focal point of creation. The requirements of this working space include a strong and steady bench to support a variety of hand tools and machinery, specifically designed to be movable and controllable beneath the task lighting, with a removable pin secured to the edge of the bench and a flex shaft to assist in drilling, polishing, and cutting pieces.

At 893 degrees Celsius, the sterling silver melts, while 9K gold melts at 1040 degrees Celsius, using a torch that burns oxy-propane to create the hot, clean flame. The metal is poured into the ingot mould when it is flawlessly melted and smooth.





The dents, scratches, and bends serve as a constant reminder of the labour and tedious detailing put into the jewellery design.

Before being rolled to the necessary thickness, the edges need to be filed down considering that they may have sharp edges from the ingot mould.

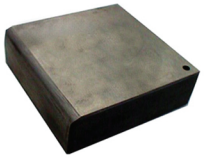
The continuous annealing of the metal is required during the manufacturing process. After heating it to a dull red colour, we immediately immerse the ingot in water to quench it to reduce the stress and increase its malleability.

The requirements of the specific design determine how the ingot is manufactured. The slow, mindful process of carefully carving and piercing out shapes with the jeweller's saw with a fine blade, with the additional annealing can shape and form the metal around various kinds of steel tools, depending on the design.

Silver and gold dust debris accumulates in fire-resistant leather pouches beneath the workbenches and then melts again in the next process.



Interchangeable Hammer



Block



Workshop Tool Organiser



Plier



Soldering Gas Torch



Ingot Mold



Piercing Saw



Soldier Pick



Precision Scale



Pitch Bowl



Multi Bench Pin



Flexi Shaft

Figure 74: Jewellery Design Tools (Cape Tools & Jewellery Supplies, 2023: Online).

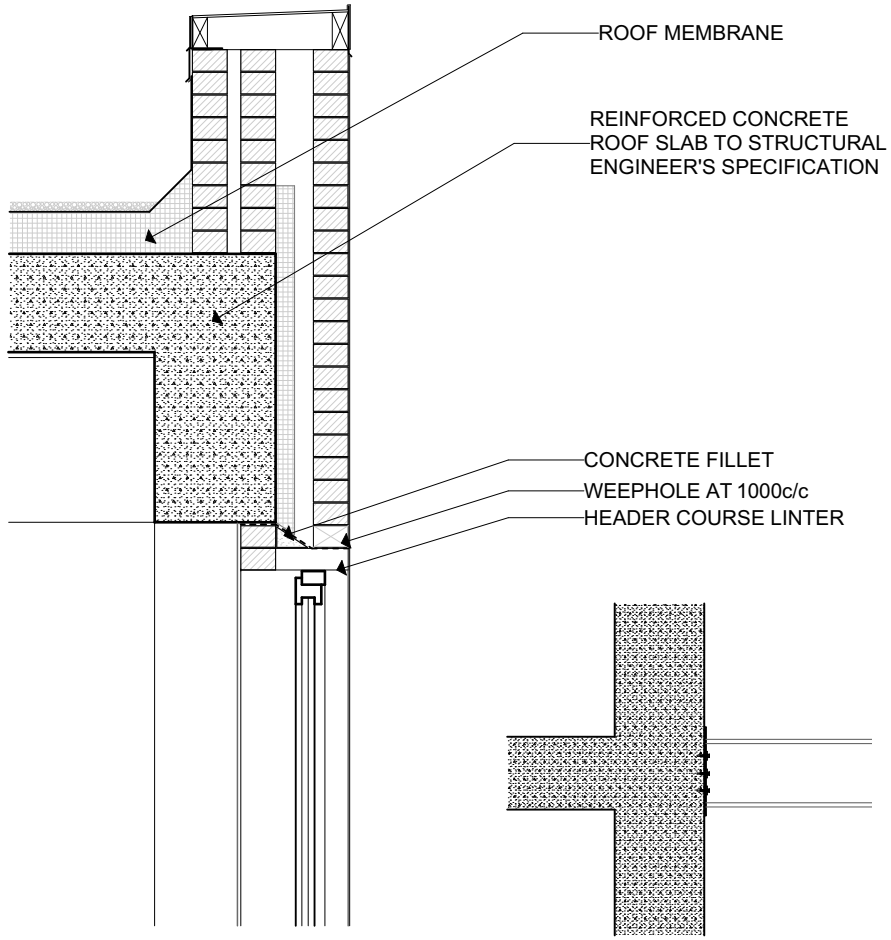
5.10 Structural Materials

The material palette aims to use a limited palette of simple materials and is influenced by the juxtaposing relationship between tectonic and stereotomic materials. The sense of material exchange – notably, recycling and renewal – is embedded in the building programme. Therefore, the primary objective of mine is to incorporate recyclable building materials into the construction philosophy. These materials would include soil from the site excavations, building rubble, recycled glass and slag for the concrete mixture, and recycled steel for the structural work and shading elements.

The large volume and robust materials of the cross-ventilated working environment attempt to bring an external feel to the internal realm of the warehouse.

One of the most popular building materials in South Africa is brick. Recycled bricks from demolished buildings are used in the interior walls, landscaping, and basements because of their tactile quality and modular structure. This sustainable material has a long lifespan, and the construction process is the best option for a building in Johannesburg because it does not require highly skilled labour. Regarding the climate, effective thermal massing is due to the materials' low embodied energy.

Regarding the structure itself, galvanized, hot-rolled mild steel C-channels and I-beams, which allow for disassembly and adaptability, are used in the steel components to support the tectonic approach. Each volume is handled differently with the steel structure bolted onto the columns and beams made of reinforced concrete, connecting to the more stereotomic approach.



PARAPET ROOF
SCALE 1:20


Exposed brick facade


Exterior concrete walls


Polished concrete interior finish

5.11 Flooring

In situ cast reinforced concrete slabs are used to build the floors. The choice of floor finish is polished concrete, which changes the concrete floor surface, with or without aggregate exposure, to achieve a specified gloss level. The product is smooth and robust. It can also be designed and coloured to perform a specific look and is used to reveal the natural beauty of the concrete, polished with specialised equipment, and covered with seal materials to close the pores.

The application is versatile and suitable for any space, such as industrial, educational, and commercial. The polishing process continues in several stages and involves mechanically processing the floor to achieve a surface with high durability and physical resistance to chemical and stain attacks to obtain the desired flatness and appearance level.

Polished concrete is manufactured on-site, with multiple trades and tight constraints around the "onsite factory"; therefore, specifications and plans are essential to ensure a successful installation.

One of the main reasons for choosing polished concrete floors is that the surface is very hygienic, resistant to spills, abrasion, and dusting, not as vulnerable to odours and stains, easy to clean, and takes advantage of its thermal mass abilities.

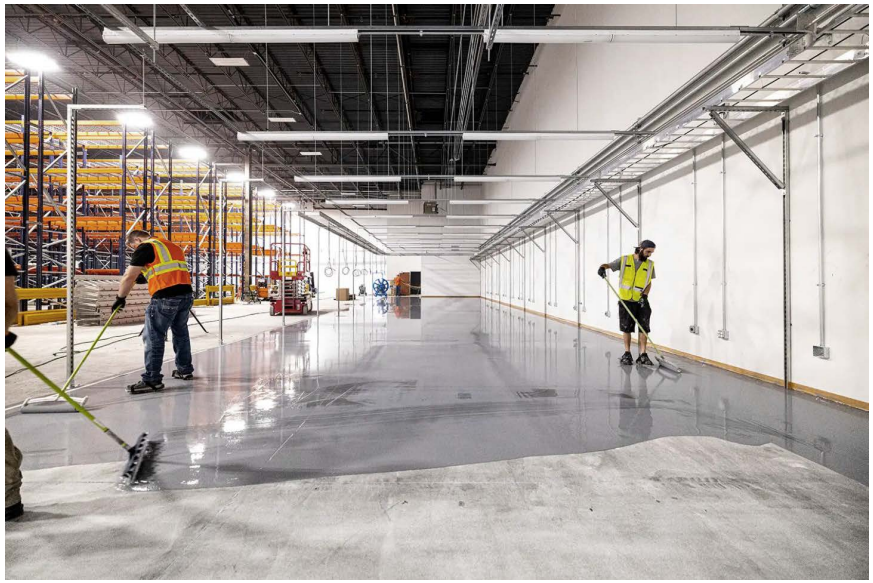


Figure 76: Installatiing polished concrete floors (Crafstsman Concrete Floor, 2023: Online).

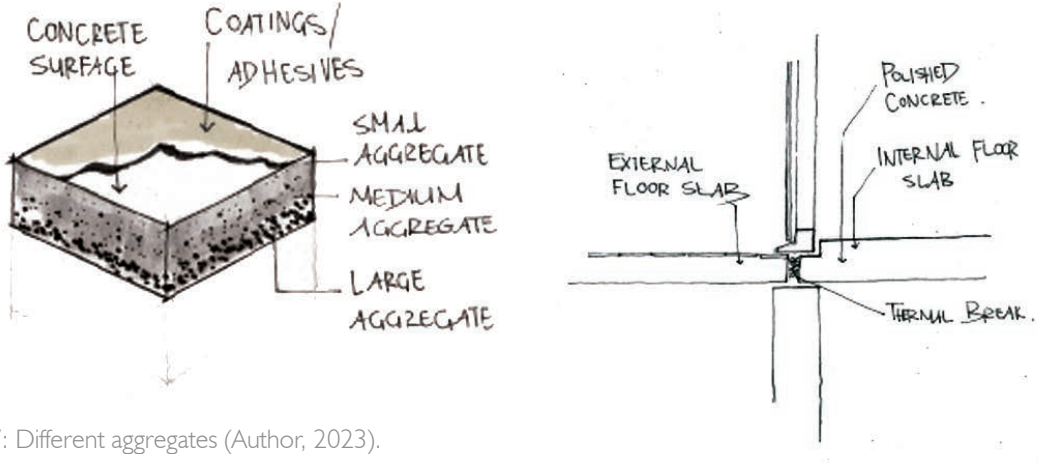


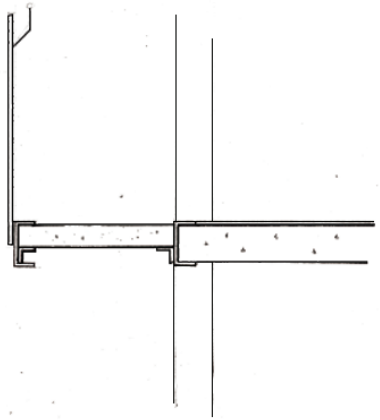
Figure 77: Different aggregates (Author, 2023).

5.12 Windows

Aluminium window frames are used throughout the plan due to their long lifespan and minimal need for maintenance. Depending on the application, doors can be hinged, sliding, sliding stacking, or roller shutter doors. To ensure precise installations, aluminium frames and mullions are simple to fabricate into the desired custom sizes, resulting in a broader range of design options than steel.



Most of the tower and additional facades are composed of aluminium frames with various transparent glass panels. Glass controls both the interface between the interior and exterior conditions of the building as well as visual access within it. Because of the inner and outer surfaces of the tempered glass that are in tension with the compressed outer surface, it has four times the strength of annealed glass. Tempered glass is made carefully to control heat inside the building. To minimise heat transfer and preserve thermal comfort in the interior spaces, Low E and double-glazed glass are used.



5.13 Barriers

Due to the high theft rate in Johannesburg, security is one of the most significant issues, significantly when visual connection deters undesirable behaviour and fencing the entire complex would be challenging and impractical. By reconsidering the relationship between city streets and buildings, screens ensure a sense of privacy and seclusion to create a barrier from the roads without using a physical barrier, such as a solid wall/fence acting as a deterrent to intruders and trespassers.



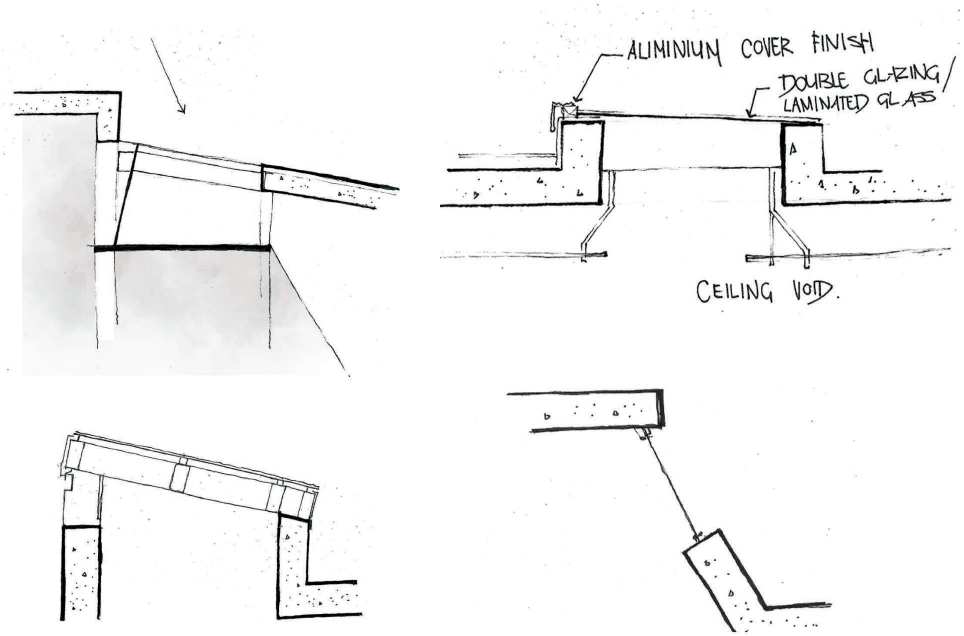
5.14 Skylight

In earlier iterations, the first-floor hallway lighting was of poor quality. This is where the skylight is structured, connecting users to the sky from within the building with a planted screen above filtering the light

The precedent is significant to the proposed design because it features a green space that is walkable and thoughtfully designed to let in natural light and create a vibrant interior. The column grid also allows for flexible utilization with the existing garden preserved while additional space is created underneath the surface.



Figure 79: Green Skylights (Divisare, 2012: online).



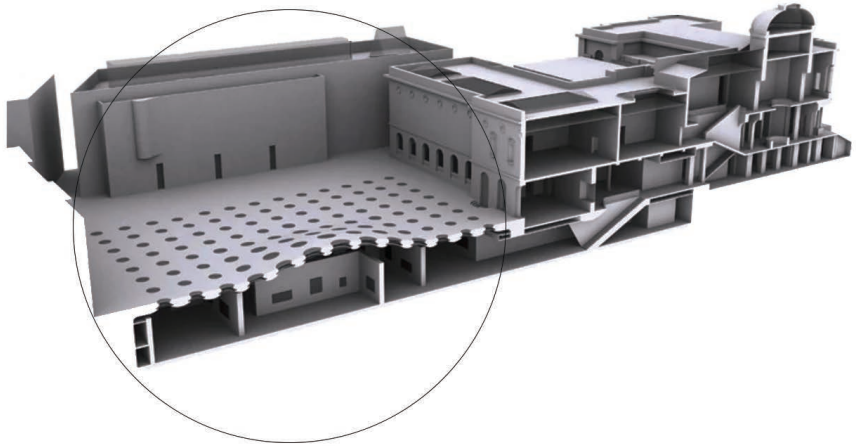


Figure 78: Sectional Perspective (DesignBoom, 2023: online).

5.15 CONCLUSION

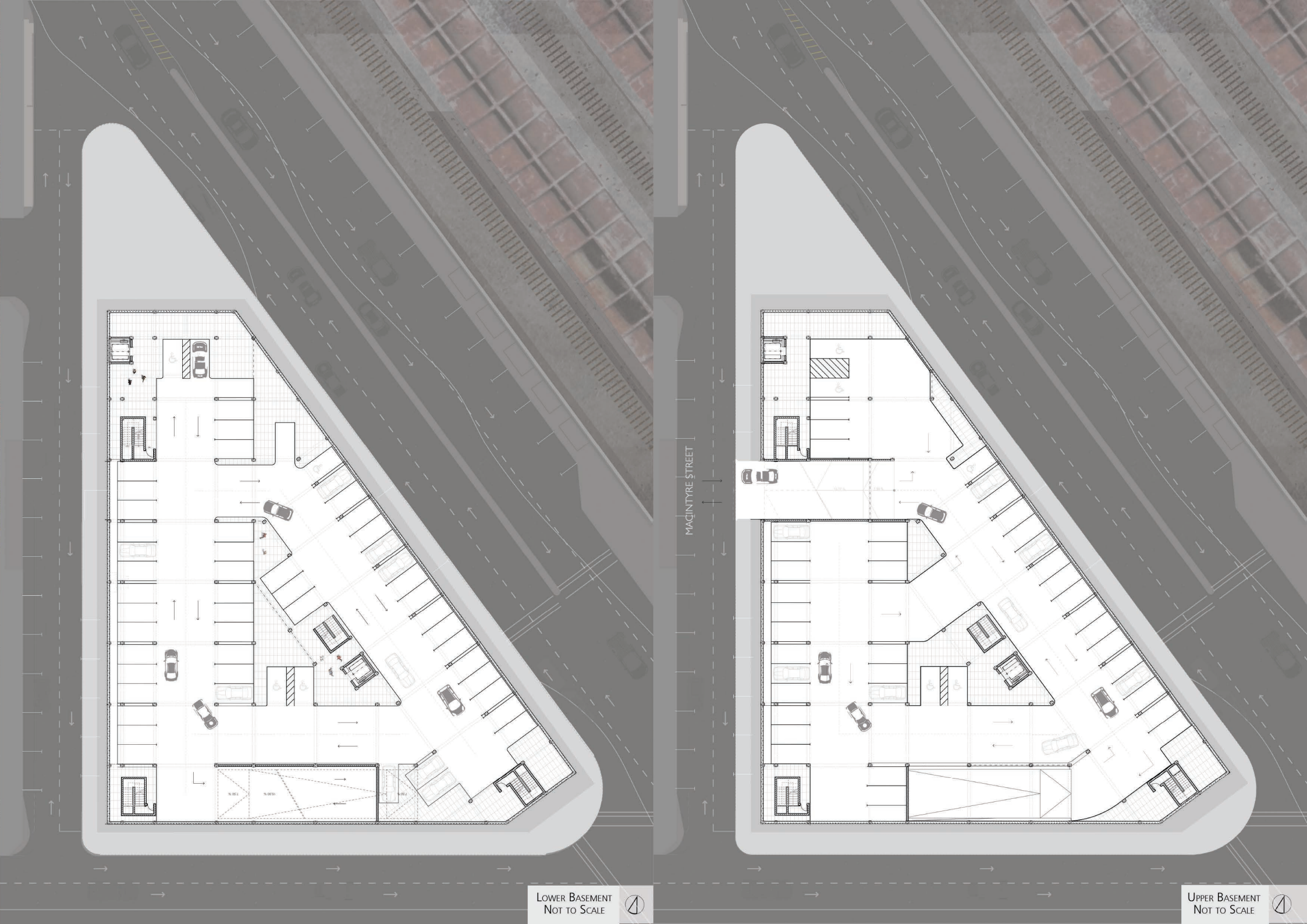
The site and its immediate surroundings are the core, from which we expand into developing the design and technical synthesis, informing social growth and economic expansion. Therefore, construction is essential for the project to function optimally within the immediate context, inviting an integrated structural system that contributes to the overall design development in the form of restrictions on functional and ornamental requirements. The purpose is to create a dichotomy between the old and new (transition of material use). By re-establishing the dialogue between the materials of economic significance and the artistry that will accommodate the course of economic and social regeneration.

PART 04 | Design Synthesis

This chapter presents the final design and the arrangement of the preceding chapters that have contributed to the final design proposal. The tools for design, construction, and theory, as well as the associated methodologies discussed in the preceding chapters, were developed into an experiential built form, and are consequently presented in this manner.

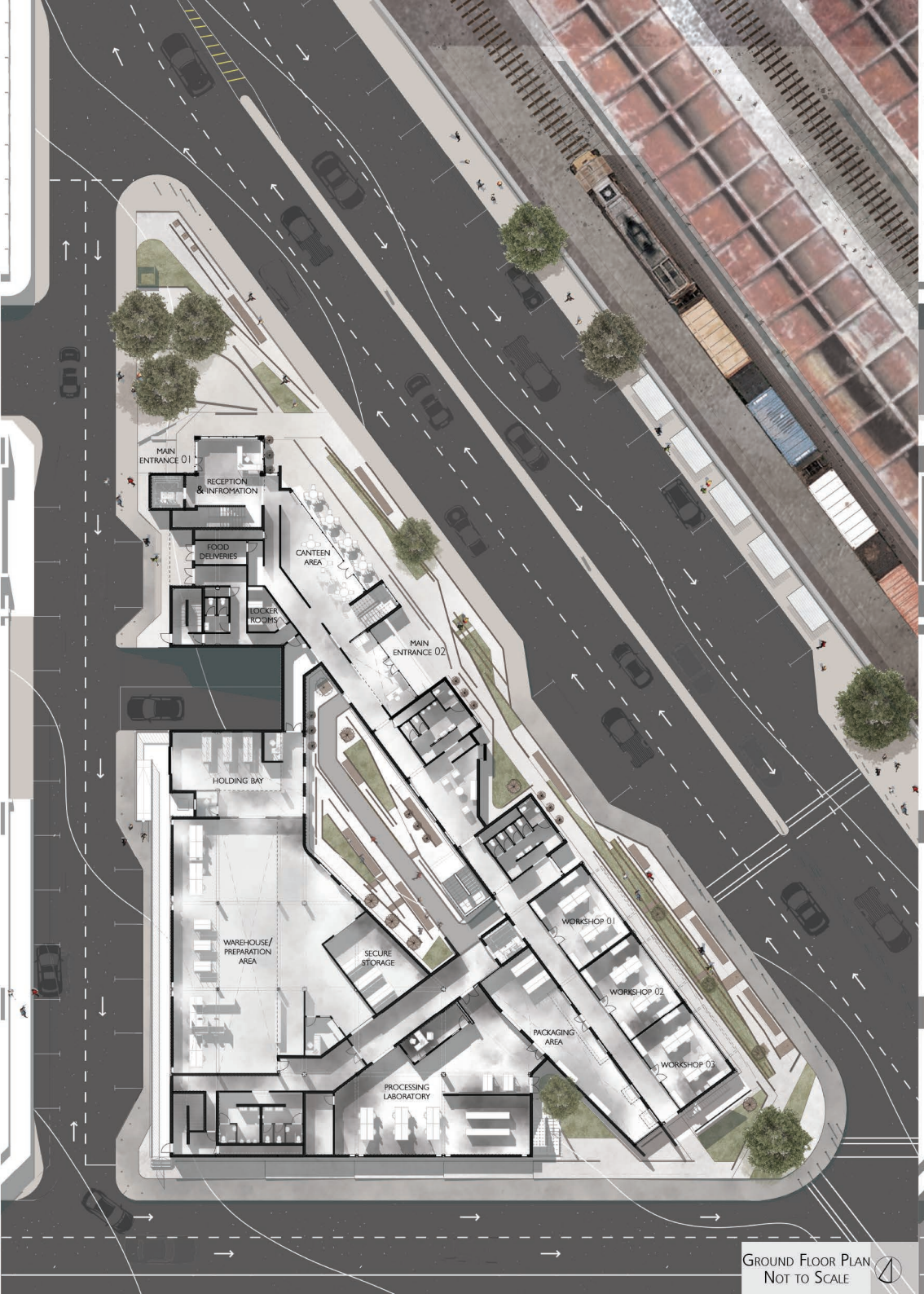


Site Plan
Not to Scale

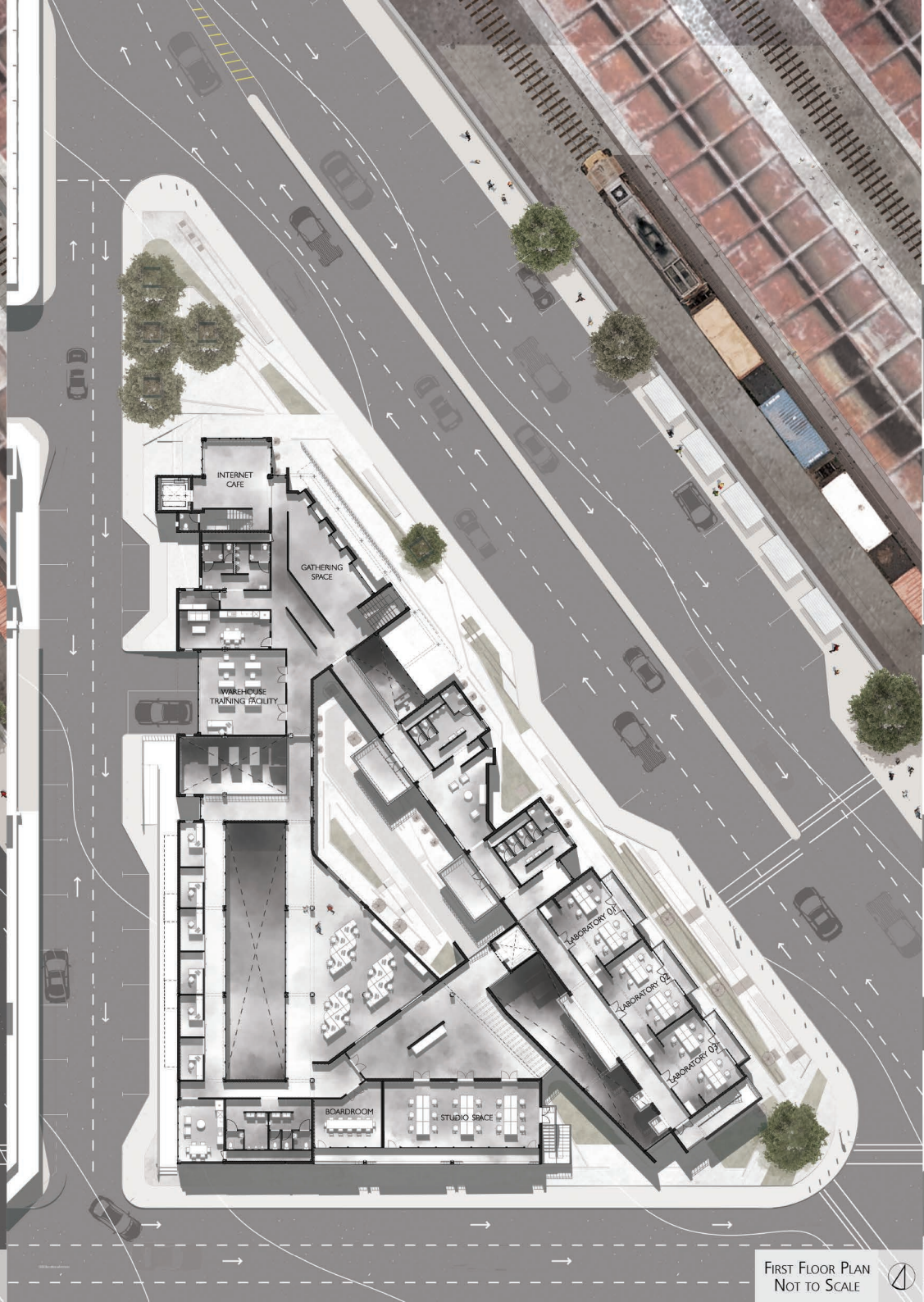


LOWER BASEMENT
NOT TO SCALE

UPPER BASEMENT
NOT TO SCALE



Ground Floor Plan
Not to Scale



First Floor Plan
Not to Scale



Second Floor Plan
Not to Scale



Third Floor Plan
Not to Scale





North Elevation

Not to Scale





West Elevation

Not to Scale





East Elevation

Not to Scale





South Elevation

Not to Scale




L10
bustránsit
transfer shuttle






L10 AIRPORT
CITY CENTER



PART 05 | Reflection and Conclusion

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CONCLUSION

The research question was to investigate how architecture can act as a mediator to expand the sustainable processing of electronic waste by exposing the jewellery industry and addressing the rapid evolution of technology. The additional goal was to investigate the social-economic change that is in dialogue with one's ability to express and take on an embodied entrepreneurial venture within the urban fabric of Maboneng.

Given the inevitable growth of the city, urban identities should be celebrated and embodied in the built form to inspire architectural application that will become an existential foothold for urban dwellers to celebrate the socially rooted approach to their cultural and economic values. After establishing the cultural and social importance of waste revelation as a tool to create educational and social awareness, it became clear that waste appreciation has become a critical yet lacking part of society.

Maboneng has created a sense of place and identity while inspiring young people to reinvigorate the integrated and inclusive neighbourhood; the place represents a contemporary cultural identity that enables urban insiders to interact with one another through a discourse that challenges innovation, knowledge, and values by raising awareness of the possibilities e-waste holds within. Whereas jewellery is an opportunity for designers to express themselves and practice investigating a wide range of issues or subject matters that include, but are not limited to, culture, fashion, customs, and rituals. It is found that the change in material changes how one perceives an object and ultimately addresses how we engage with our surrounding environment.

In closing, all implementation concepts regarding urban regeneration should oversee strategies supporting community-led projects and benefit those not part of the culture-led urban generation who pick up waste from the neglected sidewalks.

REFLECTION

The project got off to a quick start, introducing possibilities of e-waste and fulfilling a personal curiosity relating to the subject. The initial thought process started to match the design intent when selecting the site as it transitioned from minimal use to a recycling waste plant, offering skills development in waste recycling and jewellery design. Due to the site's potential for a mixed-use development, the project provided many opportunities to serve the community. The design's extensive research and numerous conceptual ideas were used to overcome the difficulty of addressing the appropriate method of extracting metals from e-waste.

The project became apparent when determining what needed to be done to address the local development in the Maboneng Precinct, and research started to flow more quickly after that. I found the challenges associated with the decision-making process of the building programme very time-consuming due to the lack of consumer awareness, the limited pro-recycling behaviours, and the complex mixture of materials that are difficult to separate and recycle. The design began to take shape as the investigation narrowed and the conceptual ideas became more focused on the potential that one idea could spark.

This dissertation project allowed me to develop and learn what architecture is capable of when approached with the proper mindset and amount of research. This process also clarified the potential that the urban environment offers its community. The urban setting has evolved into a system where people can find numerous opportunities to interact and assist others, rather than just a place where they have been forgotten

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