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**Business Incubator for the Redevelopment of a Brownfield in Harare
(Zimbabwe)**

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Summary

The continuous economic decline and rising unemployment rates in Zimbabwe have led to a dire situation across all sectors, ranging from agriculture to industry. These impacts are a true eyesore to the country's reputation and represent a case of social blight. Despite the numerous startups in the country, there is no clear evidence of improvement in the general quality of life for citizens.

The industrial landscape of the country has faced unprecedented challenges, in some cases leading to premature deindustrialisation, leaving the country with brownfields scattered across all regions, particularly in major cities like Harare and Bulawayo, which contain some of the largest industrial brownfields, visible scars on both the urban landscape and the national economy.

By 2022, Zimbabwe's economic landscape was boasting over 40,000 startup businesses within the 0–2-year range. The country's economic chart is steadily rising, indicating economic growth. However, critics argue that Zimbabwe is becoming a “tuckshop country,” driving away its citizens rather than empowering them.

This thesis explores brownfields: how the term is defined, how to identify a site as a brownfield, how brownfields are classified, and the various strategies for remediating, reusing, or revitalising these derelict areas. We also examined successful international case studies of brownfield regeneration to assess feasibility, with special attention to how sites were remediated and historical elements preserved. Research on brownfields is still in its infancy globally, with some countries yet to publish significant studies on the subject.

The central proposal is the development of a sustainable business incubator, to be located on the least contaminated portion of a brownfield site, while the remaining sections undergo further research into possible bioremediation techniques. The business incubator will be accessible to both the commercial and light industrial sectors, thus supporting startups, fostering job creation, and contributing to the reduction of derelict sites across the country.

Keywords: Business incubator, startups, Zimbabwe, Harare, industrial brownfields, sustainability, unemployment, economic turmoil.

Résumé

Le déclin économique continu et la montée du chômage au Zimbabwe ont conduit à une situation critique dans tous les secteurs, de l'agriculture à l'industrie. Ces conséquences ternissent la réputation du pays et constituent une véritable plaie sociale. Malgré la prolifération de jeunes entreprises, aucune amélioration tangible de la qualité de vie des citoyens n'est encore perceptible.

Le paysage industriel zimbabwéen a subi des bouleversements sans précédent, menant dans certains cas à une désindustrialisation prématurée. Cela a laissé derrière lui de nombreux friches industrielles réparties à travers tout le territoire, notamment dans les grandes villes comme Harare et Bulawayo, où l'on retrouve les plus vastes friches industrielles du pays, devenues des stigmates visibles pour les habitants et un poids pour l'économie nationale.

En 2022, le pays comptait plus de 40 000 jeunes entreprises âgées de 0 à 2 ans. Bien que les indicateurs économiques montrent une tendance à la hausse, certains critiques affirment que le Zimbabwe devient un « pays de kiosques », incapable de retenir sa population active.

Ce mémoire s'intéresse aux friches industrielles: leur définition, les critères d'identification, les différentes typologies ainsi que les stratégies de remédiation, de réutilisation ou de revitalisation. Plusieurs projets internationaux de reconversion réussie de friches ont été analysés pour évaluer la faisabilité d'une telle transformation, tout en examinant les méthodes de dépollution et la conservation d'éléments historiques.

L'idée centrale est d'implanter un incubateur d'entreprises axé sur la durabilité dans la partie la moins contaminée du site, tandis que les autres zones feront l'objet de recherches approfondies sur les techniques de biorémédiation. Cet incubateur sera accessible aux secteurs commerciaux et artisanaux, soutenant ainsi les jeunes entreprises, favorisant la création d'emplois et contribuant à la réduction du nombre de sites à l'abandon dans le pays.

Mots-clés: Incubateur d'entreprises, jeunes entreprises, Harare, friches industrielles, durabilité, chômage, crise économique.

ملخص

أدى التدهور الاقتصادي المستمر وارتفاع معدلات البطالة في زيمبابوي إلى وضع كارثي في جميع القطاعات، بدءًا من الزراعة وحتى الصناعة. تُعد هذه التأثيرات وصمة حقيقية على سمعة البلاد وتمثل حالة من التدهور الاجتماعي. على الرغم من وجود العديد من الشركات الناشئة في البلاد، لا يوجد دليل واضح على تحسن في الجودة العامة لحياة المواطنين.

واجه المشهد الصناعي في البلاد تحديات غير مسبوقة، مما أدى في بعض الحالات إلى تصفية صناعية مبكرة، تاركًا البلاد مع أراضٍ صناعية مهجورة منتشرة في جميع المناطق، لا سيما في المدن الكبرى مثل هراري وبولاوايو، التي تضم بعضًا من أكبر الأراضٍ الصناعية المهجورة، والتي تشكل ندوبًا واضحة على كل من المشهد الحضري والاقتصاد الوطني.

بحلول عام 2022، كان المشهد الاقتصادي في زيمبابوي يضم أكثر من 40,000 شركة ناشئة ضمن الفئة العمرية من 0 إلى سنتين. يشهد الرسم البياني الاقتصادي للبلاد ارتفاعًا مطردًا، مما يشير إلى نمو اقتصادي. ومع ذلك، يرى النقاد أن زيمبابوي تتحول إلى "بلد الدكاكين الصغيرة"، مما يدفع مواطنيها إلى الهجرة بدلاً من تمكينهم.

تستكشف هذه الأطروحة موضوع الأراضٍ الصناعية المهجورة: كيفية تعريف المصطلح، وكيفية تحديد الموقع كأرض صناعية مهجورة، وكيفية تصنيف هذه الأراضٍ، والاستراتيجيات المختلفة لمعالجة هذه المناطق المهجورة، وإعادة استخدامها أو تنشيطها. كما قمنا بدراسة حالات دولية ناجحة لإعادة تأهيل الأراضٍ الصناعية المهجورة لتقييم الجدوى، مع إيلاء اهتمام خاص لكيفية معالجة المواقع والحفاظ على العناصر التاريخية. لا يزال البحث في الأراضٍ الصناعية المهجورة في مراحله الأولى على المستوى العالمي، حيث لم تنشر بعض الدول بعد دراسات مهمة حول هذا الموضوع.

الاقتراح المركزي هو تطوير حاضنة أعمال مستدامة، يتم وضعها في الجزء الأقل تلوثًا من موقع أرض صناعية مهجورة، بينما تخضع الأقسام المتبقية لمزيد من البحث في تقنيات المعالجة البيولوجية الممكنة. ستكون حاضنة الأعمال متاحة لكل من القطاعات التجارية والصناعات الخفيفة، مما يدعم الشركات الناشئة، ويعزز خلق فرص العمل، ويساهم في تقليل عدد المواقع المهجورة في جميع أنحاء البلاد.

الكلمات المفتاحية: حاضنة أعمال، شركات ناشئة، زيمبابوي، هراري، أراضٍ صناعية مهجورة، الاستدامة، البطالة، الاضطرابات الاقتصادية.

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General Introduction

1. Introduction

Deindustrialisation, which is the decline of manufacturing in a nation's economy, is having a dire impact on African countries. Meanwhile, developed nations are shifting naturally from manufacturing to service industries, and many African countries are facing premature deindustrialisation, where industries shut down before they've had the chance to grow and drive significant economic progress (Magidi, 2024). This has led to the rise of brownfields: abandoned and underused industrial sites that often carry environmental hazards, turning once-productive areas into symbols of lost potential. Industrialisation has always been seen as a key step for countries aiming to grow and catch up with wealthier nations. Many African countries have followed this idea, hoping to replicate the success of industrialised economies.

However, as global trends shift (Industrialised economies are making a shift from manufacturing to trading desk (office and distribution networking), this implies that these economies are focusing on service provision because of heavy competition from imports coming from recently industrialised nations (China, India) with larger populations that provide cheap labour), developed countries are moving their manufacturing operations to places with cheaper labour (China and India (Amy Wunderlin, 2023.)). This shift isn't helping African countries grow industrially; it's leaving many struggling to keep up, with empty factories and wasted land instead of thriving industrial zones. This premature deindustrialisation not only stalls economic growth but also leaves behind environmental challenges. Brownfields, once centres of production and hubs of opportunity, have become obstacles to progress, reflecting the unfulfilled promise of industrialisation in Africa (Boulhol and Fontagné, 2006).

While developed countries are experiencing deindustrialisation as they transition towards service-oriented economies, Africa faces a unique and often premature deindustrialisation. Despite possessing abundant resources and potentially cheap labour, Africa is not yet a manufacturing hub. Instead, factors such as the rapid rise in staple food prices are leading to increased labour costs. However, experts argue that the real causes of deindustrialisation in Africa are poor governance and insufficient investment in educational infrastructure, which have hindered industrial growth and competitiveness (Grabowski, 2015).

Some industries are closing due to a lack of investment, obsolete equipment, a decrease in demand and high unit cost of production, competition from cheap imports, an erratic power supply, scarcity

and high cost of raw materials, and globalisation (Gopoza, 2020). This leads us to the concept of “deindustrialisation,” the process by which manufacturing declines as a proportion of total economic activity in a society or region (Crossman Ashley, 2019). The land is a finite resource that has to be carefully managed, and urban land development poses significant challenges. Due to these abandoned industrial sites, there is now the development of a real threat to the green field, so there is a need for the” remediation, regeneration and redevelopment of underused, abandoned, derelict and often contaminated lands and premises. The redevelopment of such sites in a sustainable way aligns with the UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. (United Nations, 2015). Remediating these sites allows usher land and remediate the problem of brownfield sites, which are now becoming an eyesore as they are next to the CBD.

2. Problematic

Zimbabwe has witnessed a decline in manufacturing, before it could have fully contributed to economic development. This premature deindustrialisation has resulted in the emergence of numerous brownfields: abandoned, underutilised, and often contaminated industrial sites across the country, with Harare serving as the prime example. This phenomenon is not only a reflection of global economic shifts but also a consequence of unique local challenges. For Zimbabwe, deindustrialisation is characterised by abandoned industrial sites, neglected infrastructure, and urban blight, leading to the rise of brownfields, vacant or underutilised land often contaminated by past industrial use. Harare, once a hub of industrial activity, now stands as a testament to the economic and social impact of this decline (Magidi, 2024).

Zimbabwe’s struggles with deindustrialisation and the rapid increase of brownfields in major cities like Harare, Gweru, and Bulawayo cannot be fully understood without considering its colonial legacy. During the colonial era, the economy was structured around resource extraction, with minimal investment in developing a robust local industrial base. Harare’s industrial zones, such as Workington, Graniteside, and Southerton, were established to support the colonial economy but lacked diversification and modernisation. Post-independence, the nation inherited these structural weaknesses, which were compounded by global trade imbalances and protectionist policies in developed countries that disadvantaged Zimbabwean industries (Kawewe & Dibie, 2000).

Political instability has further exacerbated the issue. Decades of weak governance, corruption, and inconsistent economic policies have discouraged both local and foreign investment. For instance, the indigenisation policies aimed at empowering locals often alienated foreign investors, leading to a withdrawal of capital and expertise. Harare's once-thriving industrial zones now suffer from a lack of innovation and reinvestment, leaving many facilities abandoned (BTI; Transformation Index, 2024).

Several economic factors have directly contributed to deindustrialisation in Zimbabwe and the rise of brownfields in Harare. A critical issue is the lack of investment in infrastructure, such as energy and transportation, which are essential for industrial growth. The country's unreliable power supply, exemplified by the closure of the Harare Thermal Power Station, has created a 30 MW deficit in the national grid, significantly increasing production costs for industries. (Harare Power Station, 2024).

Additionally, Zimbabwean industries face stiff competition from cheaper imports, particularly from Asia, which flood the local market with affordable alternatives. This has led to the closure of numerous local businesses, such as clothing, construction, and motoring firms. By 2016, around 292 companies had shut down nationwide, leaving behind vacant buildings and contributing to the growing number of brownfield sites in industrial areas like Msasa and Ardbennie. High production costs also play a role. Factors such as expensive raw materials, high taxes on production, outdated technology, and inefficient processes make local manufacturing less competitive on a global scale. For example, Unilever, a global manufacturing giant, announced its exit from Zimbabwe after 80 years, leaving behind another industrial site in Harare, which is now destined to become a brownfield (Kuwaza Kudzai, 2016).

The social consequences of deindustrialisation are profound. Job losses in the manufacturing sector have led to increased unemployment and poverty, particularly in urban areas like Harare. Abandoned industrial sites further contribute to urban blight, reducing property values and negatively affecting community well-being. The industrial areas of Harare, including Workington and Southerton, are littered with poorly maintained and deserted buildings, many of which are up for sale or rent but fail to attract buyers due to their dilapidated state. (Chimhangwa Kudzai, 2014). The environmental impact of these brownfields is equally concerning. Contamination from hazardous materials left behind by industrial operations poses risks to public health and limits the potential for redevelopment. The proximity of areas like Workington to Harare's Central Business

District (CBD) highlights the urgency of addressing these issues, as these zones could be repurposed for sustainable urban development.

Zimbabwe's deindustrialisation is further shaped by external and internal geopolitical factors. The country's high external debt burden diverts resources away from industrial and infrastructure development (World Bank Group, 2022). Meanwhile, global economic shifts favouring low-cost manufacturing hubs in Asia have left African industries, including Zimbabwe's, struggling to compete. Internally, the lack of skilled labour and limited access to affordable finance have stifled small and medium-sized enterprises (SMEs), often the backbone of industrial economies. In Harare, these challenges are evident in the stagnation of industrial areas, where systemic barriers constrain opportunities for innovation and entrepreneurship. (African Development Bank 2024)-

Following this observation, we raise the following questions:

- 1. How can Harare's industrial brownfields be transformed into economically vibrant spaces?**
- 2. How can adaptive redevelopment of a brownfield incorporate passive design principles to respond to Zimbabwe's climatic conditions and reduce dependency on failing energy infrastructure?**

3. Research Objective

The case study for this research focuses on the transformation of a former industrial brownfield site in Harare, Zimbabwe, into a business incubator. This site, previously used for the generation of electricity using coal and now underutilised, is located in the Workington industrial district. An area characterized by ageing infrastructure and fragmented urban fabric

The context of Zimbabwe, and Harare in particular, is marked by a growing need for economic revitalization, job creation, and support for innovation and entrepreneurship. However, spatial, infrastructural, and economic challenges have limited the potential for start-ups and small enterprises to thrive.

By situating the business incubator within a brownfield site, the project aims to not only rehabilitate underused urban space but also create a catalytic environment for economic activity, collaboration, and urban renewal. This case serves as a model for how adaptive reuse and sustainable design can contribute to the broader urban regeneration goals in a post-industrial context.

4. Hypothesis

Transforming Harare's industrial brownfield into a mixed-use development via a business incubator and the integration of commercial spaces, informal industries, and green zones, which can significantly enhance economic activity and promote social equity, and reduce urban blight. By applying adaptive reuse strategies and passive design principles responsive to Zimbabwe's climatic conditions, such developments can reduce dependency on failing energy infrastructure, lower the carbon footprint, and foster biodiversity. This approach supports the transition of informal industries into formal structures while achieving a sustainable balance between ecological restoration and urban revitalisation.

5. Objectives

- ❖ Regulating land use by promoting sustainable urban development, by repurposing underutilised urban land into a space that fosters growth for startups.
- ❖ To design an active business incubator that integrates informal home-based industries, fostering their transition into structured, sustainable, and architecturally optimised workspaces.
- ❖ Creating a space to educate traditional home-based industries about the legal frameworks necessary for transitioning into formalised startup enterprises/industries.
- ❖ By harnessing renewable energy, we can generate clean electricity, reduce our carbon footprint, and decrease our dependence on fossil fuels
- ❖ To create a vibrant, functional space amid an industrial area where the various industries can showcase their new tech and products, thus boosting economic activity.
- ❖ To preserve some of the significant architectural and historic features that are key to the locals.
- ❖ Community building by creating job opportunities for unemployed workers.
- ❖ To enhance environmental sustainability by implementing green infrastructure, which would end up improving and decreasing the full impact of the carbon footprint from the Workington industrial area.

6. Methodology

This research adopts a mixed-methods approach, combining qualitative analysis with design-based inquiry. The study begins with deep research on the definition and history of brownfields. The next step was to look at precedent studies of successful brownfield redevelopment, business incubator typologies. It was then evident that there was a need for a clearly defined urban approach, where there were limitations in access to maps of specific wards and districts.

The Site analysis of the selected brownfield location, utilizing tools such as GIS mapping, photographic surveys, and environmental assessments to understand the site's current physical, social, and ecological conditions of the chosen brownfield site.

The core of the research is the architectural design process, where conceptual frameworks such as adaptive reuse, sustainable urbanism, and spatial programming guide the proposal. An evolving design process helped in the development of the digital project model using architectural software (AutoCAD, Revit, ArcGIS, Adobe Illustrator, Enscape, Lumion, etc.).

Finally, the project will be evaluated through criteria aligned with sustainability goals (such as SDG 9 and SDG 11), assessing its potential for social impact, environmental performance, and economic revitalization.

7. Thesis Structure Overview

The thesis begins with a general introduction and the problem, setting the context and outlining the research questions that are to be answered.

Chapter I: focuses on the semantic and historical understanding of brownfields, their typologies, causes, and redevelopment strategies, with specific attention given to the Zimbabwean context.

Chapter II: presents an analytical approach, examining case studies of successful brownfield transformations and various business incubator models, followed by architectural programming based on user needs.

Chapter III: outlines the urban approach, including an in-depth study of Harare's urban fabric, site selection, and the development of a strategic intervention plan.

Chapter IV: details the architectural design approach, including zoning and spatial layout of the project.

Chapter V: addresses the technical approach, covering construction systems, structural design, environmental strategies, and building services.

Chapter I: SEMANTICS
RELATING TO INDUSTRIAL
BROWNFIELDS

1.1 Introduction

The number of abandoned industrial sites is steadily rising all around the globe. However, the reasons that lead to the abandonment of these industrial sites may vary; it is becoming evident in various countries of the world that intervention is required to make these sites active again. Some of the reasons that lead to the abandonment of these sites may be: that the building no longer performs its original function, the building might be under liquidation, unresolved property issues, and the user might have left it within the jurisdiction of the municipal administration (Olivera Dulic & Milena Krkljes, 2013). These abandoned sites are called Brownfields, a term that appeared in the late 20th century and is now becoming more important to urban planners and policymakers all over the world. These sites are becoming more and more important as they lead to a disruption in the urban fabric, and their redevelopment presents environmental, social, and economic advantages.

1.2 Definitions

The term “brownfield” was originally introduced to describe sites that had previously been used for development, in contrast with “greenfield” land that has not been used for development. (Olivera Dulic & Milena Krkljes, 2013) There is no single definition of brownfields worldwide, as every country has a different understanding of the term. Even within the EU nations, there is a consensus on the characteristics. According to a study conducted by CABERNET, about 16 EU countries have different definitions of the term, and some have not taken into account the definition of the term. (Dr Uwe Ferber et al., 2006). In terms of municipal spatial planning, a brownfield can be called a dismissed area, previously developed land, urban void, or weak area. (Dr

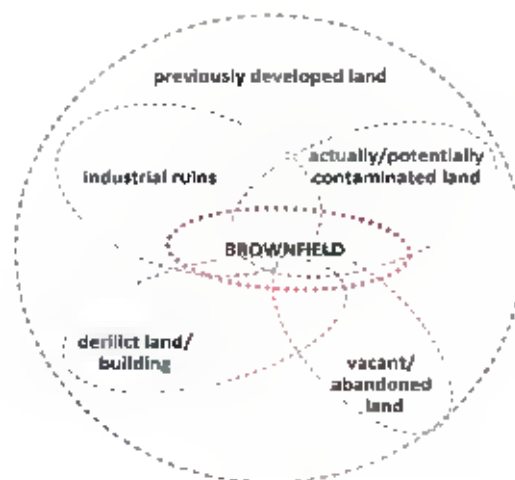


Figure 1. Different names by land conditions: Source ((Dr Uwe Ferber et al., 2006))

Uwe Ferber et al., 2006). To fully understand the significance of brownfields, it's important not only to define what the term includes but also to explain the features of their locations, which formally establish their connection to urban and, more broadly, metropolitan areas. (Rey et al., 2022a).

According to the Merriam-Webster dictionary, a brownfield refers to “a tract of land that has been developed for industrial purposes, polluted, and then abandoned”. More specifically, urban brownfields are characterized by a state of imbalance, which reflects an inadequacy between the site's occupation potential and the activities performed (dysfunction, escheat, obsolescence) and an extended period without investments, which tends to significantly reduce the site's value in use or even its exchange value in the foreseeable future.(Merriam Webster, n.d.).

In the UK, there is no agreed-upon definition of the term brownfield and even in the UK the term is generally used to mean previously developed land but PDL does not insist on the site being derelict or vacant “PDL in England can be categorized as vacant land, derelict sites or buildings, vacant buildings, land currently in use with planning allocation or permission and land that is in use with known development potential”(Anthony D. Leney, 2008).

The CABERNET (**Concerted Action on Brownfield and Economic Regeneration Network**) defines brownfields as sites that have been affected by the former uses of the site and surrounding land, are derelict or underused, may have real or perceived contamination problems, are mainly in developed urban areas, require intervention to bring them back to beneficial use.(Dr Uwe Ferber et al., 2006). The CLARINET (Contaminated Land Rehabilitation Network for Environmental Technologies) which is a European-based working group also suggests that brownfields are “sites that had previously been under the influence of their users and the surrounding areas, which are neglected or underutilized, which may have potential problems with lack of maintenance, which are located mainly in developed urban areas and require intervention to bring them back to beneficial use”(Uwe FERBER & Detlef GRIMSKI, 2002)

Another definition from the ‘Caen Normandie University’ is classified into the following principles:

1. *Dimension:* While a site size of over half a hectare (5000 m²) is preferable, smaller abandoned sites can also contribute to urban continuity.

2. *Type*: The quality and the nature of activity vary from site to site, as well as the type of activity that was being undertaken previously on that site and the level of existing infrastructure.
3. *Activity*: Vacant sites over extended periods of more than a year contribute to increased negative impacts on the surrounding area and the property that was previously used (Caen Normandie, 2016).

The US Environmental Protection Agency (EPA) defined brownfields as “real property, whose expansion, redevelopment or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant”. The EPA goes on to argue that the cleanup of brownfield sites tends to improve and protect the environment and benefit the local community. (U.S: Environmental Protection Agency, 2025).

Looking at the definitions above, we can then derive certain repeating characteristics that can be used to identify a brownfield: polluted (having been affected by its former use), abandoned for at least a year, vacant, derelict, underused, **and mainly in fully or partly developed areas.**

1.3 History of the Term “BROWNFIELDS”

The Industrial Revolution, which began in the 18th century, brought major changes to society and the economy. Cities grew quickly as factories and industrial sites were built, often without proper planning or concern for the environment (Nardinelli Clark, n.d.). Many industrial activities relied on hazardous materials such as heavy metals, chemicals, and coal, which polluted nearby land and water. As industries either modernised or closed down, abandoned industrial facilities became common in older urban areas. However, the term "brownfield" and its recognition as an environmental and planning issue only became widely used much later (Raymon Huston, 2020).

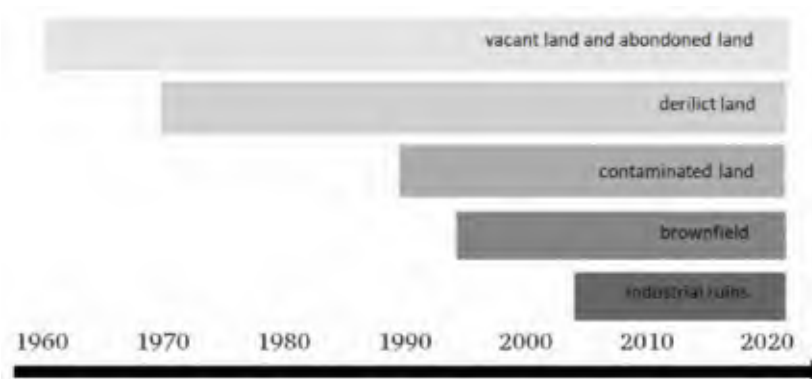


Figure 2. The terms that define brownfields overtime: Source ((Rey et al., 2022a))

By the mid-20th century, awareness of environmental problems and the health risks linked to industrial pollution began to grow. At the same time, the decline of heavy industries in many developed countries led to a rise in abandoned industrial sites. This led to the term "brownfield," which became widely recognised in the late 20th century. In the United States, the Federal Brownfields Law, introduced in 2002, provided funding and support to clean up and redevelop these sites. Over time, the idea of brownfields expanded to include a range of properties, such as old gas stations and contaminated residential areas. Today, efforts focus on redeveloping these areas in sustainable ways, combining environmental cleanup with community and economic benefits. This shift highlights the global importance of brownfield redevelopment as part of sustainable urban planning.(US EPA, n.d.)

1.4 Factors Contributing to The Formation of Brownfields

- ❖ **Mismatch Between Urban Fabric and Activities:** The statement emphasises a fundamental mismatch between the evolution of urban activities (short-term cycles) and the urban fabric (long-term dynamics of construction and infrastructure). This mismatch leads to a lack of coherence between the city structure and its activities.
- ❖ **Economic Downturn and Stagnant Market:** When things get tough economically, and there's no real change happening, we can't fix up empty buildings and land fast enough. This leaves more and more abandoned spaces, which slowly start to eat away at the liveliness of our neighbourhoods.
- ❖ **Technological Advancements:** Technological innovations, particularly those related to energy sources, transportation, and industrial processes, can significantly reduce the required operational space for activities. This can lead to the abandonment of existing facilities that become oversized in comparison to the newly injected functions in the urban area.
- ❖ **Industrial Restructuring and Relocation:** that is, the risk of large brownfield creation in metropolitan areas with dominant industries occupying large portions of space. Major industrial mutations can abruptly free up vast areas that are not readily absorbed by other activities.
- ❖ Globalised competition and economic factors often lead to the relocation of activities, either to the city outskirts for logistical reasons or to other countries for cost advantages. This accelerated shifting of locations contributes to brownfield formation.

- ❖ **Difficulty in Adapting Existing Urban Fabric:** Modifications in economic activities often create discrepancies between existing urban structures and the spatial needs of new activities. This mismatch makes it challenging to seamlessly transition between different uses within the city. As a result, the rate of abandonment and vacancy exceeds the rate of reuse, leading to brownfield accumulation.(Rey et al., 2022a)

1.5 Typologies of Brownfield Sites

Brownfield sites are complex entities defined by many factors. These complexities arise from the unique combination of characteristics associated with each site, making it challenging to develop standardised approaches to their identification, analysis, and remediation.

The CABERNET categorises brownfields in the following ways:

- Location (is the brownfield rural, peri-urban, urban, coastal areas)
- The former use (military complexes, industrial districts, railway land or railway complexes, residential, retail, leisure)(Dr Uwe Ferber et al., 2006)

1.5.1 Criteria for Identifying Brownfields

- ❖ **Level of Pollution:** This term describes how much contamination or environmental damage exists on the site, usually due to past industrial or commercial activities. It includes soil, water, and air pollution levels, which can influence the complexity and cost of cleaning up the site.
- ❖ **Duration of Site Abandonment:** This refers to how long the site has been unused or vacant since its last activity. Longer periods of abandonment often lead to more severe degradation, such as structural decay or increased contamination risks, impacting redevelopment plans.
- ❖ **Presence of Built or Unbuilt Space:** This term identifies whether the site contains existing structures or open land. Built spaces may have factories, warehouses, or office buildings, while unbuilt spaces are often open areas with little or no remaining infrastructure. This distinction affects the type of redevelopment and the level of preparation needed.
- ❖ **The extent of Site Modification (Degree of Artificialization):** This measures how much the site has been altered from its natural state through human activity, such as construction or landscaping. High degrees of modification suggest extensive changes to the landscape, which may involve complex infrastructure, soil sealing, or land reshaping.

- ❖ **Brownfield Land Composition:** This describes the physical and organisational layout of the land, including plot divisions, boundaries, and existing infrastructure. Understanding land structure helps in planning for access, zoning, and potential integration with surrounding areas.
- ❖ **Previous Function and Use:** This term indicates what the site was previously used for, such as industrial manufacturing, retail, or warehousing. Identifying prior functions helps assess possible contaminants, structural requirements, and regulatory constraints during redevelopment.
- ❖ **Historical and Cultural Significance:** This considers the site's history, any architectural heritage, and cultural value associated with it. Sites with historical buildings or cultural importance may require preservation efforts or influence redevelopment approaches to honour the area's heritage.

Brownfield sites can also be identified by type (e.g. under-utilised - not being used to their full potential, vacant - completely unused, derelict - severe disrepair, dangerous - risk due to physical condition)

1.6 Categorisation of brownfield sites based on prior use:

Categorising brownfield sites based on prior use provides a flexible framework for assessing land reuse potential. Various European authors have proposed categorisation systems with different focal points, such as economic viability, technical requirements, and environmental impacts.(Dr Uwe Ferber et al., 2006) Categories often consider location (rural, urban), type (vacant, derelict), development stage (urgent, planned), ownership status (public or private), and site size.(Dr Uwe Ferber et al., 2006). However, our approach emphasises prior site activity, a method that allows better estimates of contamination levels, remediation costs, and potential reuse options.(Dr Uwe Ferber et al., 2006).

Historically, classifications include industrial, railway, military, institutional, and commercial sites.(Yakhlef & Abed, 2019). To reflect evolving societal needs, especially with the shift towards sustainable energy, we propose updated categories: industrial, railway, military, waterfront, infrastructural, commercial, energy, and miscellaneous.

1.6.1 Railway Brownfields

Railway companies and armies are some of the largest urban landowners globally, often holding substantial, strategically located sites that have the potential to play a significant role in urban

development. These railway brownfields, found within metropolitan, suburban, and rural areas, frequently follow linear layouts due to past railway functions, presenting unique urban planning challenges.

There are three primary types of railway brownfields, each offering distinct development opportunities.

- ❖ **Abandoned railway stations**, such as Paris' Gare d'Orsay and Berlin's Hamburger Bahnhof, have been repurposed into museums and cultural centres, blending heritage with modern cultural use. Recent projects include Paris' Station F, a vast start-up campus located in a former freight hall, exemplifying adaptive reuse (Nouvelle & Sybille Aoudjhane, 2019).



Figure 3. Gare d'Orsay France: Source ((Paris Insider's Guide n.d.))

- ❖ Obsolete railway areas - once former logistics and freight transport hubs—have been reimagined as modern urban districts. Examples include London's King's Cross, a regenerated 54-hectare site, and Barcelona's Sagrera station area. In Switzerland, the 4-hectare Eco Park Neighbourhood in Neuchâtel represents a pioneering sustainable redevelopment of outdated railway land.
- ❖ **Industrial railway sites** - tied to former manufacturing activities, present unique redevelopment opportunities. Often, these areas are managed by multiple private landowners, complicating planning. Helsinki's 90-hectare Pasila district, once an industrial railway area, is being transformed into a significant transport hub, while Tallinn's Ülemiste City, a former industrial rail site, has become a smart city district with businesses, parks, and cafes (Manon Sarthou, 2020)

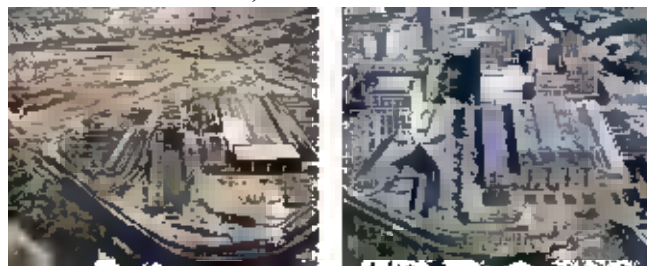


Figure 4. King's Cross: Source (William Mata, 2021)

1.6.2 Military brownfields

Military brownfields, resulting from the extensive global militarisation of the 18th to 20th centuries, cover vast areas in urban and peripheral regions worldwide. As military strategies evolved and budgets declined, particularly from the 1980s onward, extensive areas became obsolete, freeing up land for potential redevelopment. Military brownfields vary based on their initial use and location. Central sites, such as former command buildings, barracks, or arsenals,



Figure 5. Les Capucins le nouvel: Source (Roman Jouan & Christopher Billant, n.d.)

often feature substantial historic and architectural significance.

1.6.3 Infrastructural brownfields

Many infrastructure sites, like those in industrial sectors, become abandoned due to technological changes, creating urban and metropolitan brownfields. While it's challenging to list every type, some categories stand out for their potential in functional transformation and rehabilitation. These sites include former military installations, agro-food facilities, and industrial structures, each with unique architectural features that make them viable for reuse.

- ❖ **Agro-Food facilities-** Many former agro-food infrastructure sites, like slaughterhouses and grain silos, have been abandoned due to changing industry practices and stricter regulations. Several European cities have successfully transformed these sites into cultural centres, museums, concert halls, and mixed-use developments. By preserving their industrial heritage and adapting them to new functions, these projects contribute to urban revitalisation and cultural enrichment.(Transparency International, 2024)



Figure 6. Regeneration of a former slaughterhouse area into a new neighbourhood dedicated to culture, Madrid: Source: **Fred Romero, 2017** (Rey et al., 2022b)

- ❖ **Tertiary sector facilities-** Many former tertiary facilities, such as post offices, sports complexes, and administrative buildings, have become obsolete due to technological advancements or changing societal needs. However, challenges such as high maintenance costs and a lack of suitable reuse opportunities can hinder the revitalisation of these large-scale tertiary brownfields.



Figure 7. Abandoned Athens Olympic 2004

1.6.4 Mining Brownfields

These are often landscapes left behind after decades or even centuries of mineral extraction, both urban edges and remote regions around the world. The advancement in technology and health research led to the closure of the Shabanie asbestos mine because of the health concerns related to Asbestos.(Järholm & Burdorf, 2024). The character and location of these former sites heavily influence their potential for future use, ranging from sites close to the central business districts to sites that are in the periphery or in remote areas.(Rey et al., 2022a). Some of these abandoned mining sites have historical features that might be repurposed, to vast peripheral areas requiring extensive environmental remediation before any new development, creative reuse, and community revitalisation can safely occur.



Figure 9. Ruhr valley Germany: Source (Qi Lydia Chen Yue, 2023)



Figure 8. GZU Campus: Source (GZU, n.d.)

Efforts have been made to repurpose mining brownfield sites. In countries like Germany's where the Ruhr Valley, a former coal mine, has been transformed into cultural and recreational spaces(Qi Lydia Chen Yue, 2023). In Zimbabwe, notable examples include Gaths Mine in Mashava and Madziwa Mine in Shamva. Gaths Mine, once a significant asbestos producer, was leased by Great Zimbabwe University (GZU) in 2012 for 20 years to establish a university campus.(Herald News, 2013)

1.6.5 Commercial Brownfields

As online shopping and changing consumer habits impact traditional retail, many large shopping malls are facing closure or decline. This has led to the emergence of commercial brownfields, characterised by vacant and underutilised retail spaces. These sites, similar to industrial brownfields, require careful consideration for sustainable redevelopment. Examples like Berlin's Kunsthaus Tacheles and Milan's Magic Movie Park demonstrate the potential for creative reuse of former commercial spaces(Guelda Voien, 2017).



Figure 10. Magic Movie Park, outskirts of Milan abandoned since 2006: Source (Rey et al., 2022b)

1.6.6 Energy brownfields

Energy brownfields, such as decommissioned power plants, refineries, and gas storage facilities, are emerging as a new type of brownfield site. Successful redevelopment can yield significant benefits, including economic revitalisation, environmental improvement, and community development. Examples of successful projects include the Battersea Power Station in London and the Vienna Gasometers. By embracing sustainable design principles and innovative approaches, we can transform these former industrial sites into vibrant and sustainable destinations, contributing to a greener and more resilient future.(Ayelen Poliero et al., 2019)



Figure 11. Mulheim-Karlich Nuclear Power Plant. Source: (DW, n.d.)



Figure 12. Battersea Power Station London, UK. Source: (Archdaily, n.d.-a)

1.6.7 Diverse Derelict Sites

Since the 1950s, many urban areas have seen a range of sites become obsolete due to shifting functions, population migration, and de-industrialisation. These diverse sites highlight how socioeconomic shifts continually produce new urban brownfields. Some examples include:

- ❖ **Hospital/Healthcare Brownfields:** Hospital closures or relocations create sizable vacant properties in urban centres. (Pascal & Kostrzewa, 2017).

- ❖ **Religious Brownfields:** Many religious sites, including churches, synagogues, and convents across Europe, have been abandoned due to declining attendance or population shifts.
- ❖ **Educational Brownfields:** University and school properties, when relocated or closed, leave behind large structures that can be difficult to repurpose due to their specialised layouts.
- ❖ **Prison Brownfields:** Closed prisons often occupy central urban spaces and are increasingly being transformed into mixed-use developments.
- ❖ **Recreational Brownfields:** Closed amusement parks and similar recreational sites also add to brownfields, with some sites in Denmark and France, like Fun Park Fyn and Parc Avenue, left empty after closure, contributing to unused land within cities.
- ❖ **Speculative Brownfields:** Some areas are intentionally left vacant for future real estate development, a common practice in growing cities. (Mahta Heydari, 2022).
- ❖ **Strategic Brownfields:** Rarely, brownfields serve strategic or symbolic purposes, such as buffer zones in cities with historic divisions, like the buffer zone of the city of Nicosia between Turkish- and Greek-Cypriots, where land was intentionally left vacant for political or security reasons.(Foka Zinovia, 2014)

1.6.8 Industrial brownfields

Industrial brownfields generally refer to urban areas once used for industrial or manufacturing purposes that have since become idle, deteriorated, or unsafe without remediation. Other countries adopt a broader view, including lands cleared after demolition or spaces undergoing reconversion.

1.6.8.1 History of Industrial Brownfields

The concept of industrial brownfields originated with the post-World War II industrial shifts, particularly from the 1950s onward. As industries relocated from central urban areas to suburbs or abroad,.(Lusso & Bruno, 2014).

The regeneration of brownfields as a concept emerged in the 1960s, with countries like the UK recognising the need for reclaiming derelict industrial land. Switzerland, where limited land resources added urgency to repurposing industrial sites, began integrating brownfield regeneration into urban planning by the 1990s, focusing on job creation. Economic crises in the late 2000s accelerated brownfield formation, where shifts in manufacturing resulted in widespread deindustrialisation.(Modica & Marcello, 2019)

1.6.8.2 Types and Categories of Industrial Brownfields

Industrial brownfields are typically classified based on location, size, former function, and potential for reuse. These categories include:

1. **Urban Industrial Brownfields:** Found in or near city centres and examples include former textile mills, breweries, or steel factories that hold historic or architectural value, prompting efforts to repurpose them for cultural, educational, or administrative uses. Many European cities have successfully transformed such sites, like the Friche La Belle de Mai in



Figure 13. La friche la Belle Mai, Marseille: Source (John Bingham-Hall, 2022)

Marseille, into vibrant cultural or commercial hubs(Joséphine BERTRAND, 2018)

2. **Large Suburban or Peri-Urban Industrial Sites:** These sites, located on city outskirts, are larger areas often occupied by sprawling industrial complexes like steel plants, refineries, or logistics hubs. Examples include the Internationale Bauausstellung Emscher Park in Germany's Ruhr region, where large industrial lands were revitalised with ecological and cultural themes, or the Belval project in Luxembourg, which preserved vast green spaces during redevelopment(Lusso & Bruno, 2010)

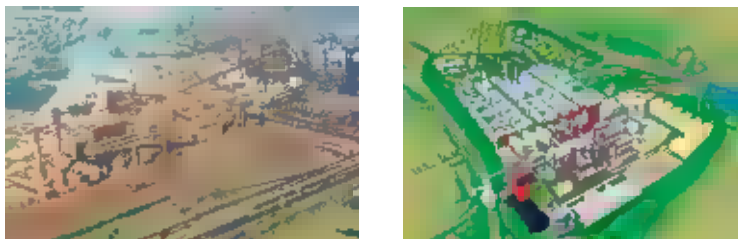


Figure 14. The Belval Project, Luxembourg: Source (Agora, n.d.)

3. **Peripheral Brownfields:** Situated in more rural or remote areas, these brownfields were primarily industrial zones that once supported local economies. Many sites in Eastern Europe, including former Soviet factories and mining areas, fall into this category. These areas face distinct challenges in attracting investment due to geographic isolation, but offer significant potential for tourism or heritage-based regeneration.

4. **Mixed-Use Transformation Sites:** Some brownfields have been repurposed into multi-functional spaces that blend residential, commercial, and recreational uses. Examples include Parco Dora in Torino, Italy, where an old steel plant was transformed into a park, and the Queen Elizabeth Olympic Park in London, a former industrial area reconfigured for the 2012 Olympics with sustainable urban features(Hou, Al-Tabbaa, and Hellings 2015).

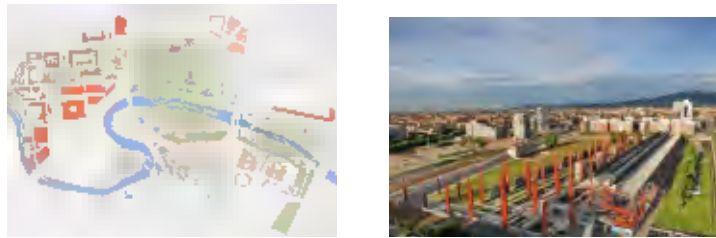


Figure 15. Queen Elizabeth Olympic Park: (Buesking2417, 2013)

5. **High-Tech and Creative Hubs:** In recent years, a growing trend is the transformation of brownfields into tech campuses or cultural centres, often linked to the digital economy. Notable examples include Eura Technologies in Lille, France, a digital campus within a former industrial zone, and the Werk Spoor District in Utrecht, Netherlands, which now hosts creative entrepreneurs and eco-focused businesses(Rey et al., n.d., p. 17).

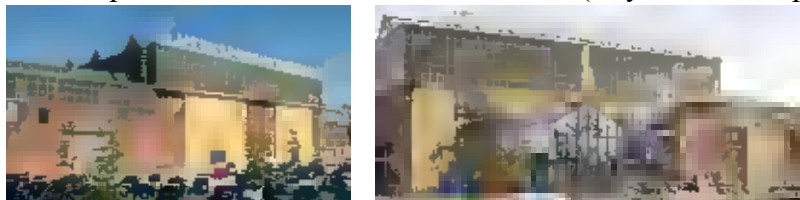


Figure 16. Werk Spoor Cathedral, Netherlands: Source (Autobahn, n.d.)

6. **Specialised Industrial Heritage Sites:** Some brownfields, particularly in historic cities, have undergone “patrimonialisation” to preserve their architectural or cultural significance. This includes cases where buildings are converted into museums, galleries, or artistic hubs. For instance, the Kanal Pompidou in Brussels, Belgium, is a former Citroën factory reimagined as an arts and innovation space (Joséphine BERTRAND, 2018).

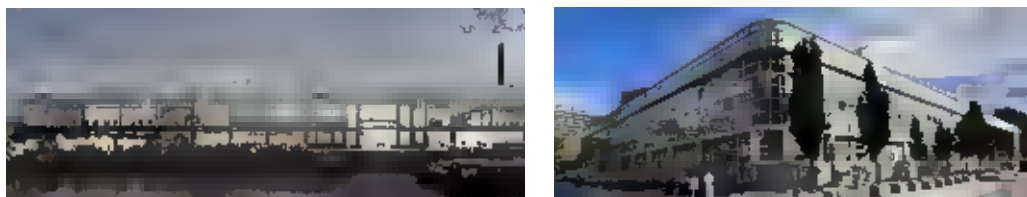


Figure 17. Old Citroen Factory, Brussels: Source (Archdaily, n.d.-b)

1.7 Steps To Successfully Redevelop a Brownfield

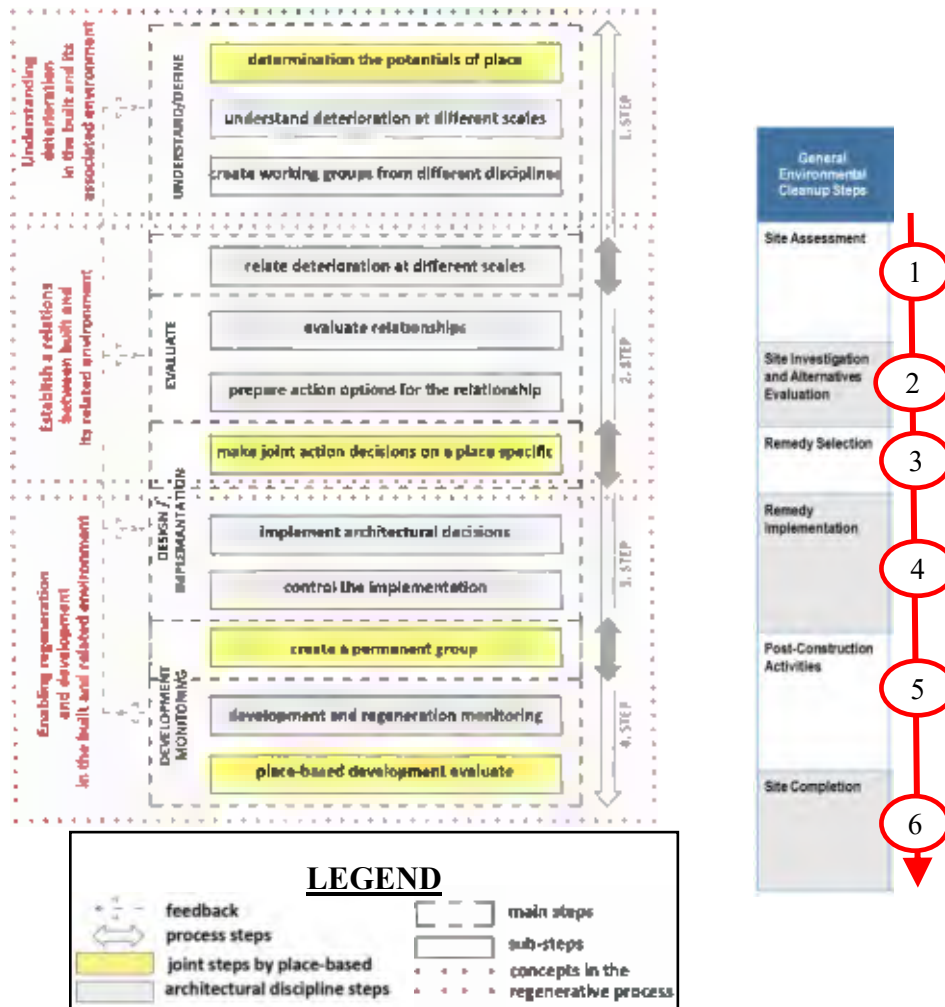


Figure 18. Steps for brownfield redevelopment: Source(U.S: Environmental Protection Agency, 2025)

- ❖ Understand and Define: Defining the area by its dimensions (exact size and features). Identify potentials (ecological, sociological, economic, cultural, technological, etc.) with help from different disciplines. Form working groups based on the needs (ecological, sociological, economic, cultural, technological) of the place.
- ❖ Evaluation: Evaluate the different possibilities and see how they relate in an integrated framework. Establish and evaluate the relationships of the different possibilities. Prepare action plan based on the determined needs of the place.
- ❖ Design & Implementation: Take collective decisions on the interdependent action options created by different experts in the various needed disciplines. Implement the relevant decisions and monitor the progress.

- ❖ Development Monitoring: Monitor the long-term development and continuity of the regeneration process. Form a permanent monitoring group to discover new potentials, maintain dynamism/vitality, and evaluate if the implemented actions are working well.

1.7.1 Bioremediation of Brownfields

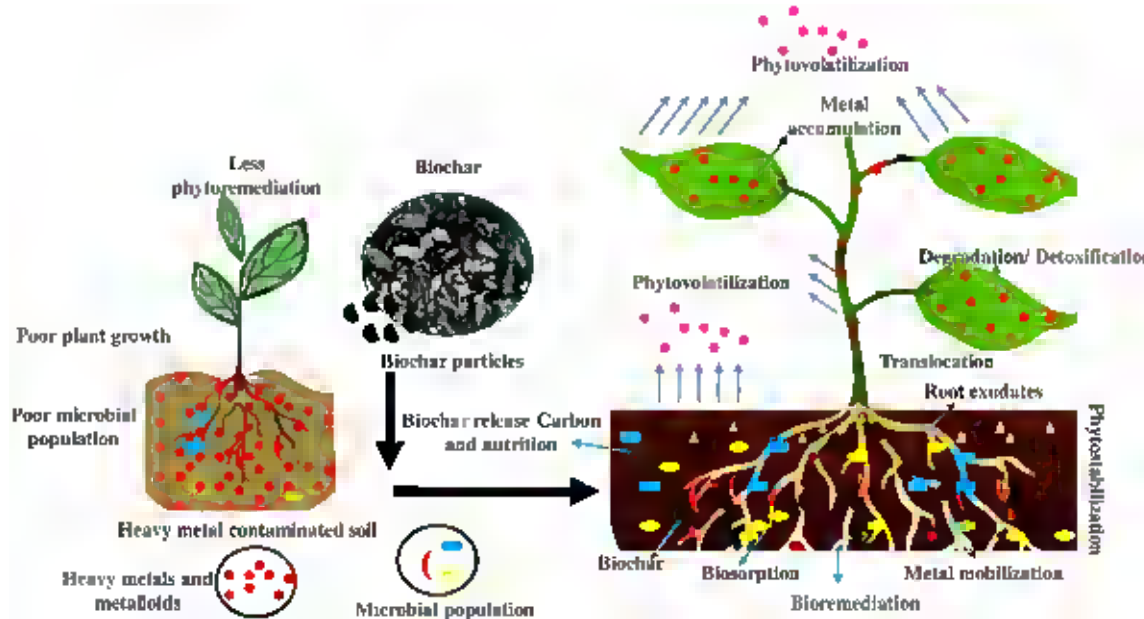


Figure 19: Photo Showing Bioremediation of The Soil via Phytovoltazation: Source (Nathanail, 2011a)

A decontamination process using biological organisms, such as plants and microorganisms, to break down or immobilise pollutants, reducing toxicity and restoring the brownfield site to its natural state. This definition of bioremediation emphasises using microorganisms to convert toxic substances into non-toxic forms. Phytoremediation: A subtype of bioremediation, using plants specifically to absorb and detoxify contaminants in soil and water.(Nathanail, 2011)

1.8 Advantages of Brownfield Re-Development

The advantages of brownfield redevelopment in relation to the 4 pillars of sustainability, within these structures we are going to show the possible benefits of brownfield redevelopment.

Sustainability Pillar	Objective	Advantages of Brownfield Redevelopment
Environmental	Optimal use of resources by	<ul style="list-style-type: none"> ❖ Reduction in need for landfilling of contaminated soils/materials (by use of bioremediation and other technologies) ❖ Reduction in waste directed to landfilling and

		<ul style="list-style-type: none"> extraction of new resources (from the demolition) ❖ Reduction in use of virgin construction materials and energy costs for transportation (restoration/adaptive reuse) ❖ Reduction in pressure to develop greenfield ❖ Optimal use of existing infrastructure ❖ Increased opportunities for affordable housing ❖ Reduction in greenhouse gas emissions
	Impact management	<ul style="list-style-type: none"> ❖ Reduction in threats to environmental health ❖ Removal of asbestos or other building hazards ❖ Reduction in illegal activity at site (via demolition) ❖ Potential for alternative stormwater management(re-use) ❖ Reduction in heat island effect and improved air quality ❖ Improved environmental health and ecological functions
Sociocultural	Quality of life	<ul style="list-style-type: none"> ❖ Reduction in risks to human health ❖ Reduction in neighbourhood blight ❖ Preservation/enhancement of community heritage ❖ Restoration of community’s ‘sense of place’ ❖ Potential focal point for community events, recreation, other activities (via restoration/adaptive reuse) ❖ Potential access to waterfront or natural features (open space/green space) ❖ Provision of live/work opportunities ❖ Increased awareness of ecological functions (via ecological restoration)
	Sociocultural link	<ul style="list-style-type: none"> ❖ Preservation/enhancement of community heritage (via restoration/adaptive reuse) ❖ Restoration of community’s ‘sense of place’ (via restoration/adaptive reuse) ❖ Potential focal point for community events (via restoration/adaptive reuse and public open space/green space)
Economic	Economic efficiency	<ul style="list-style-type: none"> ❖ Increased attractiveness for private sector investment (by remediation of site) ❖ Mitigation of responsibility of site contamination (via remediation, demolition, ecological restoration) ❖ Potential for material recovery of economic value (demolition) ❖ Reduction in site’s negative impact on local property value ❖ Increased land values of nearby properties (by use of

		<ul style="list-style-type: none"> public open space/green space) ❖ Optimal use of existing infrastructure ❖ Potential to avoid costly investment in infrastructure
	Endogenous economy	<ul style="list-style-type: none"> ❖ Creation of local jobs ❖ Potential re-employment of similar skilled labour jobs previously lost ❖ Potential catalyst for further development ❖ Improvement in local economic growth ❖ Increased population to support local businesses and community services ❖ Potential tourist or regional recreational value
Governance	Project specificities	<ul style="list-style-type: none"> ❖ can be tailored to the unique needs of each specific site ❖ need for flexible and mixed development ❖ potentially leverage or adapt existing elements present on the site for new uses.
	Decision-making process	<ul style="list-style-type: none"> ❖ The involvement of multiple disciplines in development leads to better decision-making. ❖ Monitoring from different levels (top-down and bottom-up) ensures robust oversight and adaptability.

Table 1. Advantages of Brownfield Re-development: Source (Author)

1.9 Brownfields in Zimbabwe

Brownfields in Zimbabwe emerged during the industrial boom of the 20th century when the country established manufacturing, mining, and railway hubs. These sites often became derelict due to economic decline, political instability, or the collapse of industries, especially after structural adjustment programs in the 1990s and the post-2000 economic crisis. Urban centres like Harare, Bulawayo, and Kadoma are dotted with abandoned factories, railway yards, and disused mining sites.



Figure 20. National Blankets: Source
(Mohammed Adow, 2013)






Figure 21. Reuse of a Brownfield as a Church: Source:



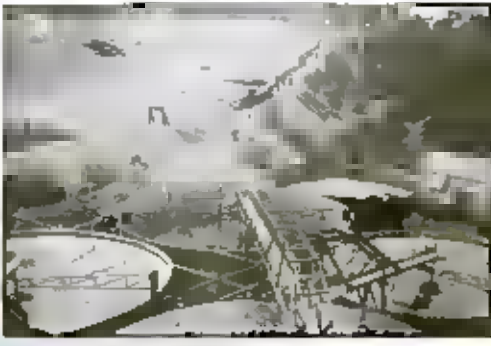

According to news reports, the second largest city in Zimbabwe, Bulawayo’s industrial areas are becoming a ghost town because the number of industries that are closing, which were around 87




in the year 2013, and these factories range from heavy to light industries. Some of these industries are now being taken over by some churches.(Mohammed Adow 2013)

1.9.1 Examples of Brownfields in Zimbabwe

Most Zimbabwean cities were mainly mining-based towns, and the closure of the mine would lead to all the employees of the mine being unemployed, and these employees would eventually succumb to poverty.

<u>Name</u>	<u>Location</u>	<u>Brownfield Type</u>	<u>Assessments</u>
Nan Jiang Africa	Bikita	Mining <i>Diamond mine</i>	<p>The mine was prematurely closed in 2014 due to a licensing dispute with the Ministry of Mines and Mining Development (MoMMD). Despite discovering diamonds in 2013 during prospecting, the consortium left, falsely claiming no diamonds. The mine with the buildings and equipment has all been abandoned.</p> 
Mashava mine	Masvingo	Mining <i>Asbestos mine</i>	<p>The Mashava Mines, formerly asbestos mines under Shabanie Mashava Mines (SMM), were taken over by the Zimbabwean government in 2004 under controversial circumstances. Poor management led to deterioration, unpaid salaries, and operational collapse. Currently, only 10 workers dewater King Mine, while 600 remain on unpaid leave.</p> 
Zim cast	Gweru	Industrial <i>Iron</i>	 <p>The company has closed, and the plant is deteriorating, the lack of investment and maintenance led to the demise of the company, however the reason of closure is not clear.</p>

Ran Mine	Bindura	Mining <i>Gold mine</i>	<p>The mine was operated by GNP Industries for 103 years, closed in 1999 due to economic challenges. After brief operations by Ex drill and Aurora Gold, workers lost jobs, pushing 1,000+ artisanal miners into illegal gold mining using mercury without Personal Protective Equipment (PPE). Child labour, commercial sex work, and police corruption thrive, while unsafe blasting damages homes.</p>  <p>Workers earn more as Artisanal and Small-Scale Miners than in formal jobs.</p>
Kariba Fire Batteries	Kariba	Industrial	<p>The company has closed, and the premises have since been taken over by the Zimbabwe Electricity Supply Authority (ZESA).</p> 
Madziva Mine	Shamva	Mining <i>Nickel mine</i>	<p>Madziva nickel mine, owned by BNC, closed in 2001 due to low nickel prices and unstable ground conditions, though some cite political factors. Now housing a teachers' college, abandoned equipment remains. Former workers were left jobless and turned to illegal gold mining in Umfurudzi Park, selling on parallel markets.</p> 
David Whitehead	Gweru	Light industry	 <p>David Whitehead textiles, Kadoma Spinning Mill, was once a</p>

			<p>textile manufacturing powerhouse. It became defunct in the 1990s due to economic challenges and competition from imported goods. The old spinning mill became operational again in 2024 after a capital injection from the Agri Value Chain Zimbabwe (AVCZ). This project shows the advantages and the unlocked potential of brownfields.(Tamuka Charakupa, 2025).</p>
Shabanie Mine	Zvishavane	Asbestos	<p>Shabanie Mine (Zvishavane), once Zimbabwe's largest asbestos employer (2,000+ workers), closed in 2004 due to low asbestos demand. Taken over by the government in 2008, it now produces 260 tonnes/month through reprocessing. Operations continue with reduced shifts (32-night workers vs. the original 84/shift) to cover maintenance.</p> 
Fort Concrete	Gweru	Industrial	 <p>It was primarily a manufacturer of concrete products, with a significant focus on producing railway sleepers. It also produced other concrete items for infrastructure, such as culverts and materials for bridges and roads. Its operations were closely tied to the needs of the National Railways of Zimbabwe (NRZ).</p>
PG Industries	Harare	Industrial	 <p>PG Industries had its brands become "dormant." The parent company, PG Industries (Zimbabwe) Limited, was delisted from the Zimbabwe Stock Exchange in April 2019, indicating significant corporate and financial distress</p>


BP Shell	Harare	Energy	 <p data-bbox="691 443 1403 695">BP and Shell significantly scaled back and eventually exited their joint operations in Zimbabwe around 2008 to 2011, selling their assets as the country faced economic and political challenges. The handover takeover by Zuva had challenges and disagreements that led to legal challenges and court cases brought by employees seeking clarity and resolution regarding their employment status and benefits.</p>
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Table 2. Table Showing just a few Brownfields in Zimbabwe: Source (Author)

Zimbabwe's abandoned mines along the Great Dyke reflect decades of economic collapse, creating severe humanitarian and environmental crises. The closure of mines and companies in various sectors has led to significant economic, social and environmental decline. Giving rise to cases of child labour (e.g., Ran Mine in Bindura, where young underage girls are coerced into sex work and environmental hazards like asbestos waste at Shabanie Mine (Shamiso Mtisi et al., 2020). However, systemic barriers persist, including corruption (Transparency International's 2022 Corruption Index ranks Zimbabwe 158/180(Transparency International, 2024). reliance on informal ASGM, which produces 60% of Zimbabwe's gold but uses child labour and mercury(Shamiso Mtisi et al., 2020). Despite this, some revival efforts show promise: Pickstone Mine formalised artisanal mining through tributary agreements, while the state-run Shabanie Mine processes 260 tonnes/month of asbestos despite 60% job cuts. The former mining sites at Gaths Mine in Mashava (asbestos/gold) and Madziva Mine in Shamva (nickel) have been **repurposed for educational use**. Gaths Mine now houses the Great Zimbabwe University campus(Clayton Shereni, 2022), and Madziva Mine is being used by Madziva Teachers College(Shamiso Mtisi et al., 2020). However, significant environmental contamination from past mining persists. At the former Gaths Mine site, asbestos exposure risks severe respiratory diseases, including cancer(Järvholm & Burdorf, 2024). At the former Madziva Mine site, nickel residues pose potential risks like cancers and allergies. Unclear remediation means these hazards threaten those using the sites without extensive research; the students at these educational facilities are at risk. The former textile industry (David Whitehead) has been brought back to life. This shows that there is hope for the redevelopment of these brownfield sites.

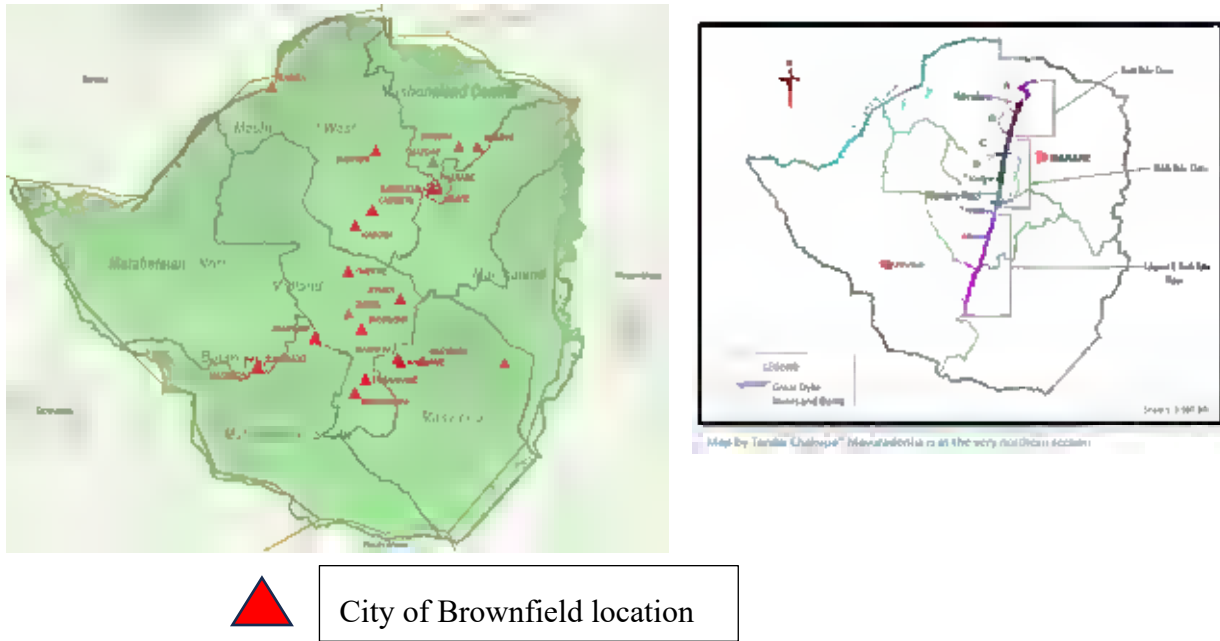


Figure 22 Location of the Brownfields in the Table: Source (Author)

Conclusion

By defining the different terms that have been used in the past to define a brownfield, we have a clear definition of what a brownfield is. Then we focused on the process of identifying how we can see that a specific land is a brownfield, which then allows us to define whether our site is a brownfield based on the characteristics of the land that is in question. Then, by understanding the factors that lead to the creation of brownfields, we can realise the potential places where brownfields might arise. After the identification of brownfields, when then have a specified criteria that help us identify whether the land in question is truly a brownfield site. Focusing on the level of pollution, we can see the types of contaminants that can be found on different sites depending on the old use of the site. Based on the prior use of brownfields, we then discover that we have railway, military, infrastructural, commercial, energy, industrial and diverse derelict brownfield sites. What action must we take then to redevelop these sites? There are different approaches to brownfield reconquest, such as Urban regeneration, restructuring, densification, renewal, rehabilitation, conversion, re-use and bioremediation. However, regardless of all these efforts to the redevelopment of brownfields, we have challenges that arise in the process of brownfield redevelopment. Focusing on Brownfields in Zimbabwe, using the definition and the criteria and identification methods previously discussed, we then get to identify the types of brownfields that are in the country.

2 ANALYTICAL APPROACH OF **THEMATIC EXAMPLES**

2.1 EXAMPLE 01: BASE4WORK (Jurkovic’s Heating Plant)



<i>Technical sheet</i>	
Project name	Jurkovic’s Heating Plant
Program	Creative industry, architects, start-ups and smaller IT companies and freelancers
Project owner	Penta Real Estate
Architect	Martin Pasek
Date Delivered	2020
area	6300 m ²
Location	Bratislava; Slovakia

Table 3. Technical sheet for Base4work: Source (Author)

2.1.1 Project Description and Location

The Jurkovič Heating Plant is a revitalised national cultural monument, originally designed by Slovak architect Dušan Jurkovič and built in 1942. Damaged during WWII and decommissioned in the late 20th century, the structure was designated a cultural monument in 2008. Its recent transformation by Penta Real Estate integrates Art Nouveau, modernism, and functionalism, blending heritage with contemporary design. Architects preserved original elements, including the roof, crane, windows, and coal hoppers, while introducing glass-floored meeting rooms and

Figure 23. Elevation of the Base4Work: Source (Archinfo, 2018)

additional levels through innovative construction. (Archinfo, 2018). *"I believe that we have found*

the most ideal model for using the space and breathing new life into the Jurkovič heating



Figure 25. Jurkovic Plant Before Reconversion: Source (Archinfo, 2018)



Figure 24. Jurkovic Plant after reconversion: Source (Archinfo, 2018)

plant,"(Martin Pašek, 2018).

2.1.2 (Reconversion Concepts) The Concept for the Site/ Master Plan

The architectural concept of the Jurkovič Heating Plant draws on the integration of urban living and green public spaces to foster healthy, active lifestyles and community interaction. The

Masterplan Emphasises:

Health and Activity: Walkable routes, play areas, and fitness infrastructure encourage physical and mental well-being for all age groups. **Connection to Nature:** Incorporating green spaces, gardens, and natural planting fosters relaxation and sustains mental health through proximity to nature. **Inclusivity and Play:** Child-friendly, interactive design integrates formal and informal play spaces to build connections and foster a sense of belonging. **Social Interaction:** Community facilities, picnic areas, and seating create hubs for socialising, enhancing communal engagement, an amphitheatre, and gardens. **Accessibility:** Welcoming entrances link the park to the city and commercial zones, ensuring seamless integration with the urban fabric. **Multifunctionality:** Sculpted landscapes and varied activity zones cater to diverse uses, promoting a dynamic and cohesive community hub within a dense urban context(Townshend Landscape Architects, 2018).

2.1.3 Spatial Design (Plans, Sections[structure], Views)

Site Plan



KEY
TERRASE
COWORKING
MULTIFUNCTIONAL
RESTAURANT
AUDITORIUM
LOBBY

Figure 26. The Site Plan for The Base4work: Source (Archinfo, 2018)

The project is a mixed-use transformation/development of a brownfield, with residential, commercial and recreational use. This allows the project to have a long-term usage because of the

mixed-use development that is involved. It improves the quality of life of the inhabitants of the residential developments around the co-working area. This goes on to show the environmental, socio-cultural and economic benefits of such brownfield developments.

Ground Floor



floor	composition	No	Area(m ²)
Ground floor	Toilets and changing rooms		50+13
	restaurant		406+54
	Start-up Offices	3	104
	Auditorium	1	200
	Installations and services	5	20
	Reception and lobby		498
	Sanitary		30

Figure 29. Ground floor: Source (Author)

Table 4. Spatial Table for the Ground floor: Source Author



Figure 28. First Floor Functional Layout: Source Author

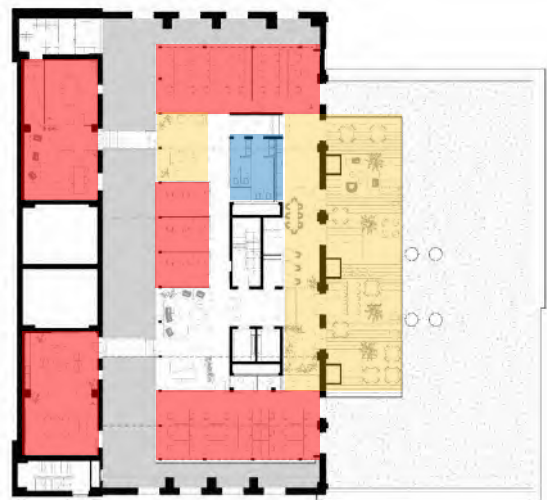


Figure 27. Second Floor Functional Layout: Source (Author)

floor	composition	No	Area (m ²)
1 st floor	Lobby (shared area)		450
	Co-Working Areas	6	200
	Meeting areas	3	120
	Installations (stairs, elevators, conduits)	5	20
	Sanitary		50+13
	Lecture room		200

floor	composition	No	Area(m ²)
2 nd floor	Lobby (shared area)		500
	Start-up Offices	3	25
	Meeting areas		
	Installations (stairs, elevators, conduits)	5	20
	Sanitary	3	15
	Terrasse		310

Table 6. First Floor Spatial Layout: Source (Author)

Table 5. Second Floor Spatial layout: Source (Author)

First Floor

Fixed Desks and Hot Desks are flexible and functional workstations suitable for freelancers, start-ups, and small teams. Private Offices are secure, private spaces tailored for corporate clients and focused work. Phone Booths and Workshop Rooms are enclosed areas for private calls, brainstorming, and small-scale collaborations.

Second Floor

Community Centre: A dynamic hub combining a lobby, café, and co-working areas to encourage interaction and social connectivity. Meeting Rooms: Accommodates groups of 4 to 18, providing tailored settings for professional meetings. Networking Zones: Designed for informal gatherings, fostering a collaborative work culture.

Third Floor



Third Floor

Flexible Workspaces: A mix of hot desks, fixed desks, and offices, emphasising adaptability for diverse users. Speciality Meeting Rooms: Unique spaces built within the iconic concrete hoppers, offering a blend of industrial charm and modern functionality.

Figure 30. third Floor Spatial Layout. Source (Author)

2.1.4 Building Sections

- ❖ **Original Elements:** Rugged columns, walls of original bricks, and the dominant three reinforced concrete hoppers. Over 31,000 bricks were reused from the original façade and walls. Historical industrial high-divided windows.
- ❖ **Revitalisation Process:** The original concrete structure was retained, cleaned, and strengthened to withstand modern load requirements. Reused bricks from the façade restored the historical aesthetic while enhancing structural integrity. Technical and structural reinforcements ensure the building meets the current safety and performance standards, blending rugged industrial textures with contemporary materials for a cohesive, resilient design.(Big See, 2022)



Figure 31. Section View of the Base4Work: Source (Author)

2.1.5 Interior Views

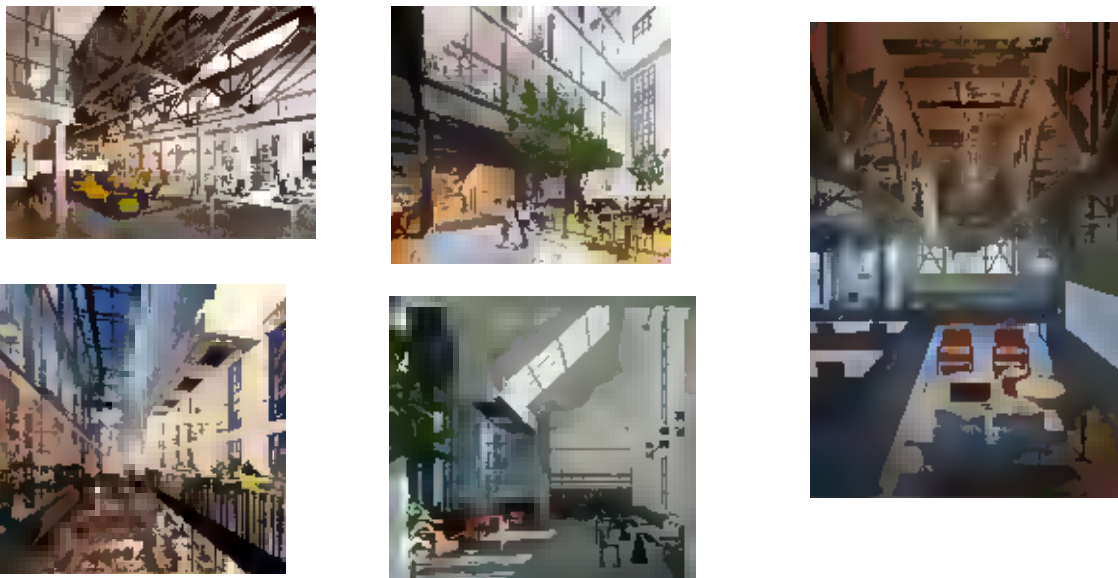


Figure 32. Different Interior Views for the Base4Work: Source (Archdaily, 2021)

The Base4Work (Jurkovič Heating Plant) interior blends industrial history with modern comfort. The raw concrete hoppers and steel structures highlight its heritage, softened by natural fibreboards and perforated details. Warm terracotta tones, muted blues, and greens create a welcoming feel, while open ceilings and natural light add to the sense of space. Acoustic panels ensure quiet work areas, while wood accents and ceramic tiles add warmth. Unique meeting rooms with glass floors and a rooftop terrace bring creativity and inspiration to the space.(UBM Magazine, n.d.).

2.2 Example 02: WerkspoorFabriek



Figure 33. the main Façade for the WerkSpoor Fabriek:
Source ((Landezine International Landscape Award, 2023))

<i>Technical Sheet</i>	
Project name	Workspoor Fabriek
Program	Shared areas, beer brewery, manufacturing industry, studio, installations
Project owner	Autobahn
Architect	Zecc Architecten
Date Delivered	2019
Area	9200m ²
Location	Utrecht; The Netherlands

Table 7. Technical sheet for Werkspoor Fabriek: Source (Author)

2.2.1 Project description

Located in Utrecht, Netherlands, Werkspoor Fabriek is a thoughtfully revitalised industrial warehouse in the historic Werkspoor District.

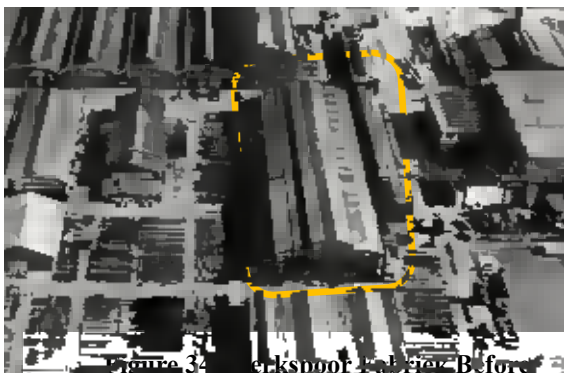


Figure 34. Werkspoor Fabriek: Before reconversion: Source (Archdaily, n.d.-c)



Figure 35. Werspoor Fabriek: After Reconversion: Source(Archdaily, n.d.-c)

Originally built as part of the Royal Dutch Tool and Railway Material Factory established in 1828, this expansive **175x25x15-meter** hall has been reimagined into a **multi-functional hub** for a wide range of creative and industrial enterprises(Usine, n.d.). The redesign preserves its **historic architectural character**, utilising the building’s generous spatial qualities with new mezzanines, **flexible partitions**, and restored skylights that enhance natural light while improving **energy efficiency**. Inside, the layout features large open areas, intimate units, and interconnected mezzanines, offering a layered, visually connected experience for both users and visitors. The project houses **35 tenants(users)**, but tenant size varies wildly (a lone artist vs. a small company).(The City Garden, 2023). Each aspect of the design maintains a balance between **open, adaptable areas and smaller workspaces**, fostering collaboration within a factory-inspired environment. This **sustainable redevelopment** embraces the **industrial heritage** of Werkspoor while welcoming modern demands, offering spaces for **events, businesses, and public gatherings**, and bringing new life to Utrecht’s industrial past(Usine, n.d.).

2.2.2 Reconversion Concept

Site plan

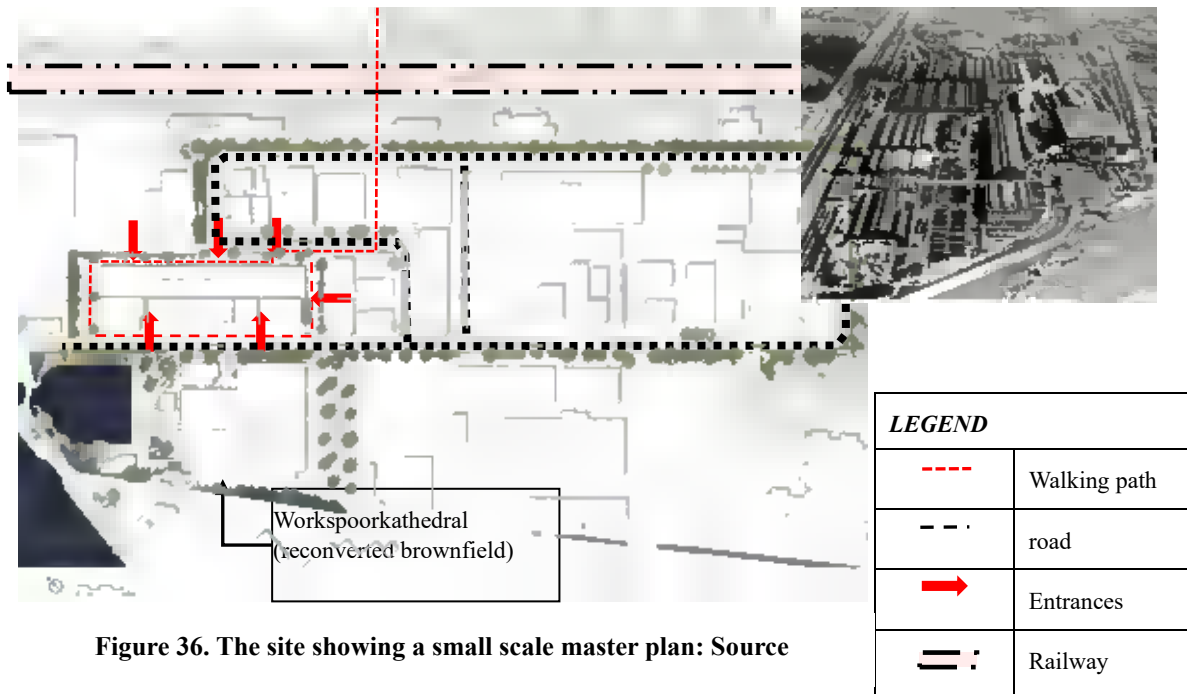


Figure 36. The site showing a small scale master plan: Source

The transformation of Werkspoor Fabriek reimagines this historic warehouse into a vibrant, multi-functional space, preserving its industrial scale and character. The design introduces new mezzanine floors and flexible partitions to maximize functionality while maintaining openness, creating a visually connected journey through large open areas and intimate workspaces. Key architectural elements like skylights and steel-framed windows were restored with modern insulation for energy efficiency, blending heritage with sustainability. This adaptable layout fosters a collaborative environment for diverse businesses, embodying Werkspoor’s industrial legacy while meeting contemporary needs in Utrecht’s evolving landscape (Landezine International Landscape Award, 2023).

2.2.3 Spatial Design (plans, sections, structure)

Here we explore the different functionalities of the interior spaces of this project, gaining insight on specific spatial functions and needs in relation to this project as a business incubator/start-up model. Also, it gives a perspective on the specific area of different spaces according to the principal function and areas of the subspaces.

2.2.4 Analysis of Floor Plans



Figure 37. Werk Spoor Fabriek Ground Floor: Source (Author)

Ground Floor

1. Creative and Manufacturing Businesses: This floor hosts a variety of businesses, from creative entrepreneurs to manufacturers like the De Leclere brewery.
2. Hospitality and Event Spaces: Areas on this floor facilitate gatherings and collaborations between businesses, enhancing learning and community within the manufacturing sector.
3. Industrial Entrances and Mezzanine Levels: Each business has its distinct industrial-style entrance, with double-height spaces featuring mezzanine floors to expand usable space.

floor	No	composition	Area(m ²)
First floor	1	Shared areas	310
	2	Beer brewery	2010
	3	Creative Manufacturing	2050
	4	Studio	
	5	installations	220

Table 8. Ground Floor Spatial Table; Source (Author)

1st Floor



Figure 38. Werk Spoor Fabriek First Floor: Source (Author)

De Stadstuin (Part 1): This organization occupies the first and second floors. It supports community development by leasing office space to smaller and medium-sized creative businesses, helping foster a collaborative environment.

Floor	No	composition	Area(m ²)
First floor	1	Shared areas	910
	2	Beer brewery	110
	4	Studio	1000
	5	installations	220

Table 9. First Floor Spatial layout: Source (Author)

2nd Floor

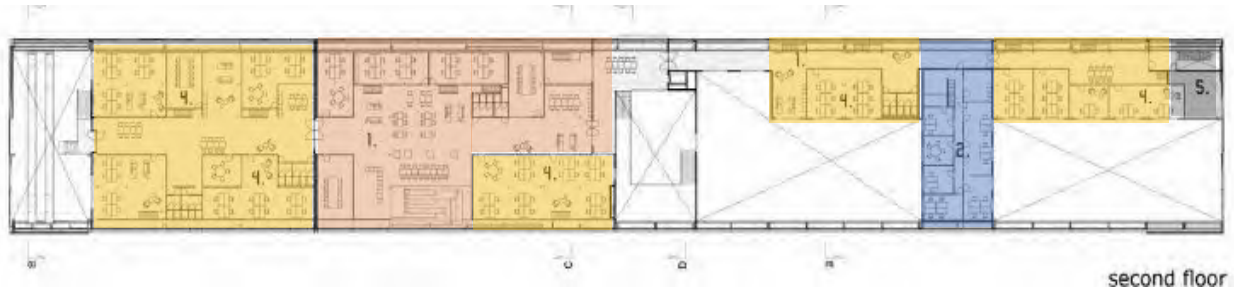


Figure 39. Werk Spoor Fabriek Second Floor: Source (Author)

De Stadstuin (Part 2): The third floor continues with De Stadstuin's community spaces, providing additional areas for creative and medium-sized businesses.

floor	No	composition	Area(m ²)
First floor	1	Shared areas	210
	2	Beer brewery	2010
	3	Creative Manufacturing	910
	5	installations	220

Table 10. Second Floor Spatial Table: Source (Author)

3rd Floor



Figure 40. WerkSpoor Fabriek Third Floor: Source (Author)

The third floor continues with De Stadstuin's community spaces, providing additional areas for creative and medium-sized businesses.

floor	No	composition	Area(m ²)
First floor	1	Shared areas	110
	4	Studio	2010
	5	installations	220

Table 11. Second Floor Spatial Table: Source (Author)

Additional Spaces (Distributed Across the Building)

2.2.4.1 Sections



section A-A

Figure 42. Werk Spoor Fabriek Main Section: Source Author

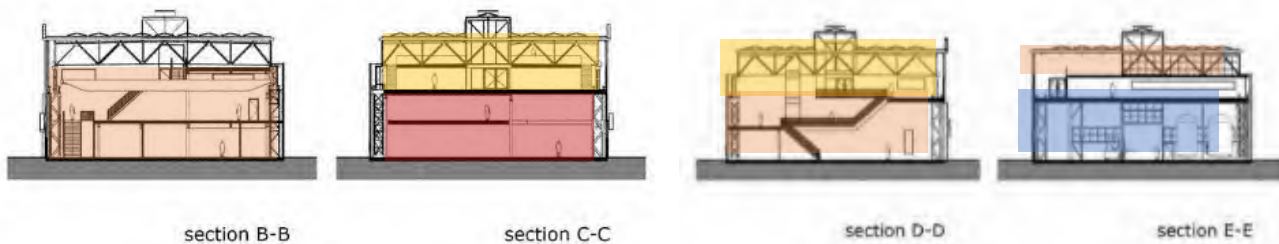


Figure 41. Werk Spoor Fabriek Various Sections: Source (Author)

The architects utilised the Werk Spoor fabriek's **modular steel framework** and high ceilings to create a versatile, multi-functional space. Mezzanine floors were added for extra functionality, preserving the industrial character. The shed roof with expansive windows was enhanced to

maximise natural light, improving energy efficiency. Restored brick facades maintained the historic aesthetic while boosting insulation.(Zecc Architten, 2020)

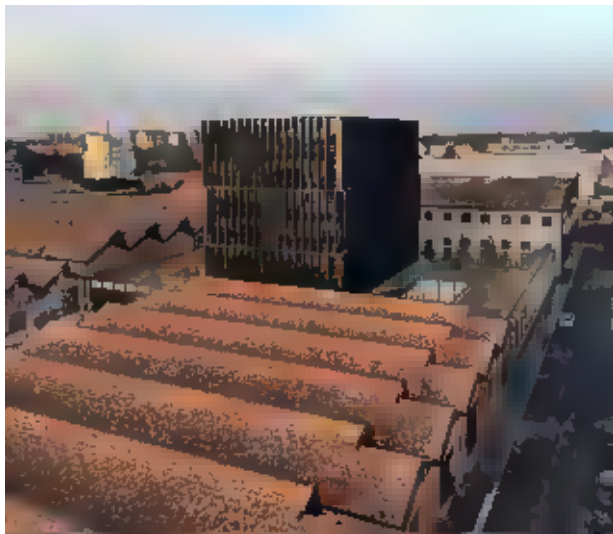
2.2.5 The Interior

The use natural light and large windows in factories and offices to boost energy efficiency, enhance well-being, and improve productivity. These windows reduce artificial lighting needs, create a visual link to the outdoors, highlight architectural elements, and support adaptable spaces, fostering an open, comfortable, and productive environment.



Figure 43. These Images show the various updated interior layouts of the project: Source (Archdaily, n.d.-c)

2.3 Example 03: Gucci HubMilan headquarters(Caproni Factory)



Technical Sheet	
Project name	Gucci Hub Milan headquarters
Program	holding offices, showrooms and spaces for fashion shows and operations connected with graphics, as well as a canteen and restaurant
Project owner	Gucci
Architect	Piuarch
Date Delivered	2016
Area	30000m ²
Location	Milan; Italy

Figure 44. Bird’s eye view of the Gucci Milan Headquarters: Source (Archdaily, n.d.-a)

Table 12. Technical Sheet of The Gucci Milan Headquaters: Source (Author)

2.3.1 Project Description

The Caproni factory, a historic brownfield site in Milan's eastern suburbs, has been masterfully redeveloped into Gucci's Milan headquarters. Once an aviation production facility, this 1915 industrial complex has been reimagined, preserving its 1920s architectural essence. The adaptive reuse project revitalises abandoned warehouses with exposed-brick facades, shed-style roofs, and zenith lighting, transforming them into offices, showrooms, and event spaces. A central landscaped plaza, enriched with green spaces, fosters connectivity and sustainability. A six-story glass tower integrates modernity into the historical fabric, creating a dynamic interplay between past and present, exemplifying sustainable urban regeneration of industrial heritage.



Figure 45. View from the Interior Garden

2.3.2 Reconversion Concept

Preservation of Industrial Heritage: The project started by acknowledging the historical value of the 1920s Caproni factory. Key architectural elements, including exposed-brick facades, modular bays, and shed-style roofs, were preserved and celebrated as a nod to the site's industrial past.(Akron srl, 2013).



Figure 46. Images Showing the Before, during the transformation and after Transformation: Source (Joaquin Minaya, 2018)

Reimagining Functionality: The hangars, originally used for aircraft assembly, were transformed into flexible spaces for offices, showrooms, and event venues, including a grand hall for Gucci fashion shows, ensuring functionality without losing their historic character. **Integration of Modern Design:** A six-story glass tower was introduced to unify the site and house additional functions.

Its sleek design, featuring a glass façade with metal sunscreens, contrasts yet harmonises with the industrial architecture.(Joaquin Minaya, 2018).

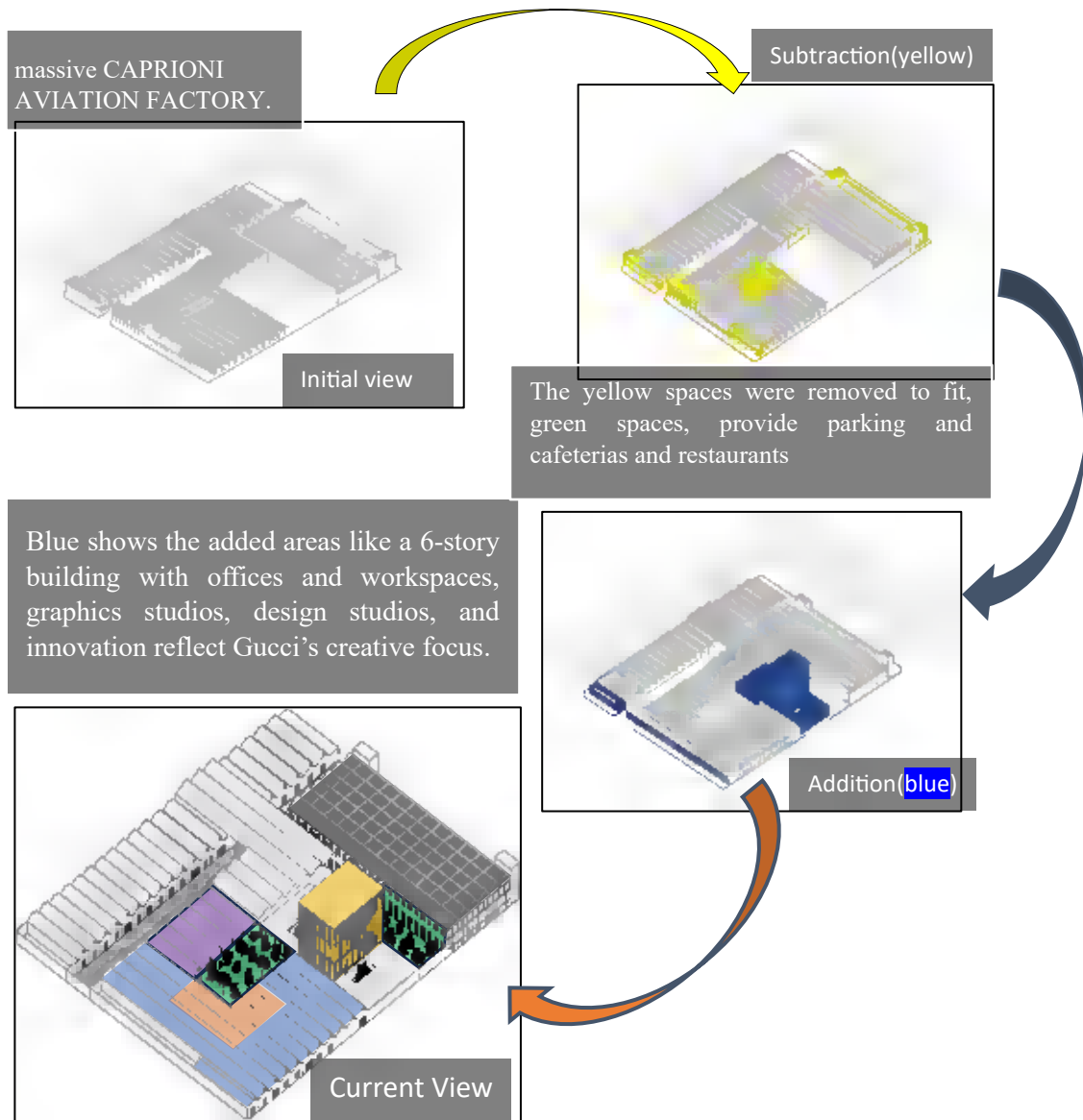


Figure 47. Images Showing the Steps during the transformation of the Gucci Milan Headquarters:
Source (Author)

Hangar Conversion: The expansive hangars **retain their modular bays and exposed brick facades**, forming multi-functional spaces for showrooms, offices, and events.

Cafeteria and Restaurant: Situated near **green courtyards**, the dining spaces encourage relaxation and social interaction in a comfortable, light-filled environment.

Intermediate Floors: Offices and Workspaces: Modular layouts accommodate diverse needs, including open-plan offices for collaborative work and enclosed spaces for focused tasks.

Creative Studios: Dedicated areas for graphics, design, and innovation reflect Gucci’s creative focus, integrating modern functionality with industrial heritage.

Upper Floors (Six-Story Tower): Executive Offices and Meeting Rooms: Vertical sunscreens regulate light and temperature, ensuring energy efficiency and comfort.

floor	composition	Area(m ²)
	Show rooms	
	Offices	
	Event space	
	Installations (stairs, elevators, conduits)	
	plaza	
	Cafeteria	
	Restaurant	
	Creative studios (graphics, design, innovation)	
	Meeting rooms	

Table 13. Shows The Different Subspaces Within the project: Source (Author)

2.3.3 Interior design

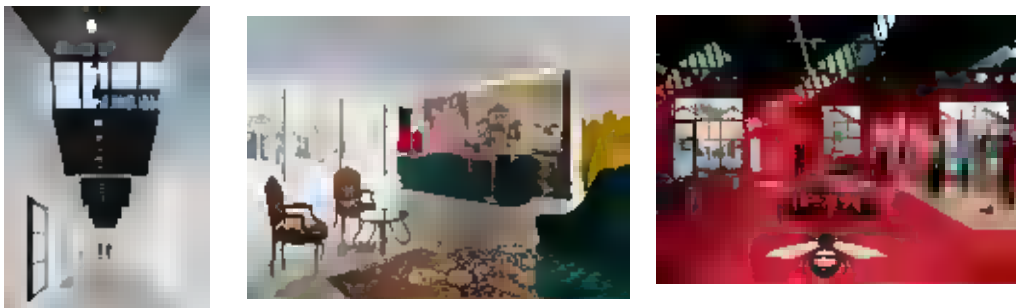


Figure 48. The modern Interior touch inside of the headquarters: Source (Archidaily, n.d.-a)

There is a clear use of bright colours to evade the industrial character within the building, there is a great deal of natural light penetrating the building’s interior to reduce energy consumption during the day.

2.4 EXAMPLE 04: Xpace Digital Park

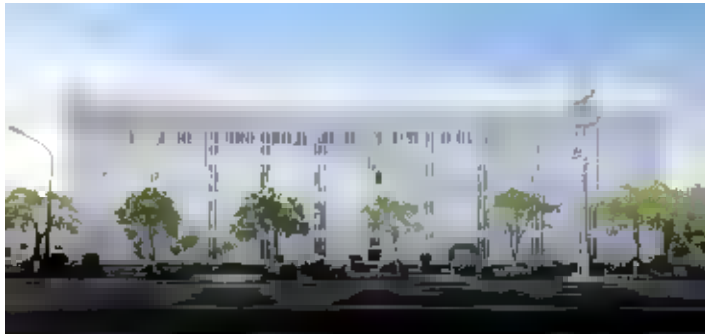


Figure 49. The main façade of the Xpace Digital Park: Source (STUDIO QI(Shanshan Qi) et al., 2020)

Project name	Xpace Digital Park
Program	startup campus for tech companies, offices, and residential
Project owner	-----
Architect	Studio Qi, JL-Office
Date Delivered	2020
Area	30000 m
Location	Hangzhou; China

Table 14. Technical Sheet of the Xpace Digital Park : Source (Author)

2.4.1 Project Description

The XPACE Digital Park in Xia Oshan District, Hangzhou, showcases a remarkable transformation of former industrial factories into a thriving **tech startup campus**. Designed by Studio Qi and JL Office, the project **preserved the modular frameworks** of the original structures. Pedestrian-friendly pathways replaced vehicle-centric routes, promoting connectivity and accessibility across the site.(STUDIO QI (Shanshan Qi), JL office (Lluis Ortega, and Julia Capomaggi) 2020)

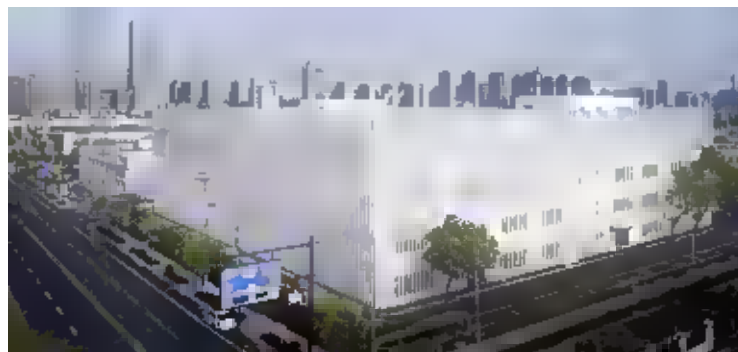


Figure 50. Right Side Elevation of The Xpace Digital Park: (STUDIO QI(Shanshan Qi) et al., 2020)

2.4.2 Reconversion Concept

The architectural reconversion of XPACE Digital Park reflects a thoughtful integration of the existing industrial structures with modern needs, preserving the site's historic value while

introducing a new identity. The architects aimed to create an urban attractor by transforming the old factories into a vibrant campus for tech startups.

The design unified the compound through coordinated material and colour treatments on the facades, promoting visual coherence while improving energy performance. The introduction of a new parametrically designed skin, made of *prefabricated GRC vertical louvres*, not only enhanced sun protection and privacy but also shaped the site's distinctive urban identity, responding to both the industrial surroundings and the tranquil water stream nearby (STUDIO QI (Shanshan Qi) et al., 2020).

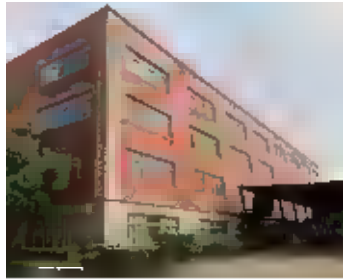


Figure 51. Before Reconversion: Source (STUDIO QI (Shanshan Qi) et al., 2020)



Figure 52. After Reconversion: Source. (Archidaily, n.d.-b)

2.4.3 Spatial Design (Plans, 3D Views, 2D Plans)

The analysis of the different plans, including the 3d views, allows us to visualise the prominent changes and additions that were made to the brownfield sites and to see the adaptation of the spatial designs to the old structure

2.4.3.1 Site Plan

Central to the landscaping strategy is the **creation of pedestrian-friendly spaces**. The new campus is designed with pathways that guide visitors and employees through the site, promoting **walking and interaction with the surroundings**. The pathways weave between the buildings, offering smooth transitions between the **industrial and green spaces**. These elements provide **visual relief, improve air quality, and create microclimates** within the site.

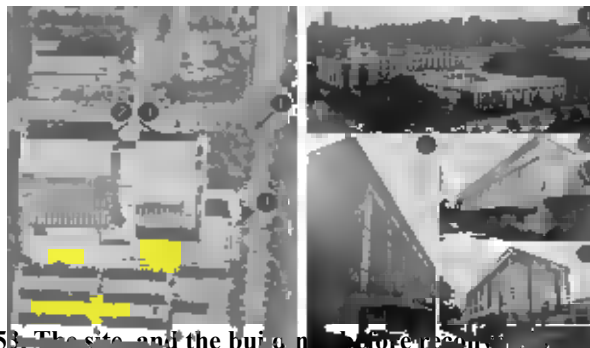


Figure 53. The site, and the building before reconversion. Source (Studio QI, 2021)

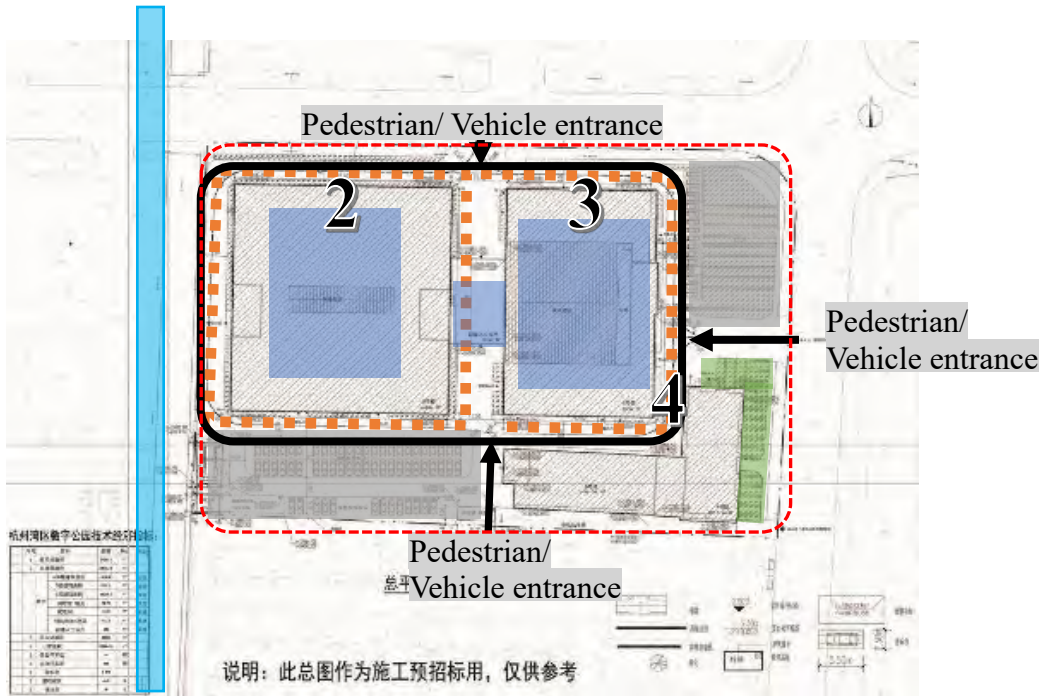


Figure 54. Site interventions: Source (Author)

2.4.4 3d Views



Figure 55. The Canteen and Apartments Within the Old Factory buildings: Source (STUDIO QI & JL office, 2020)

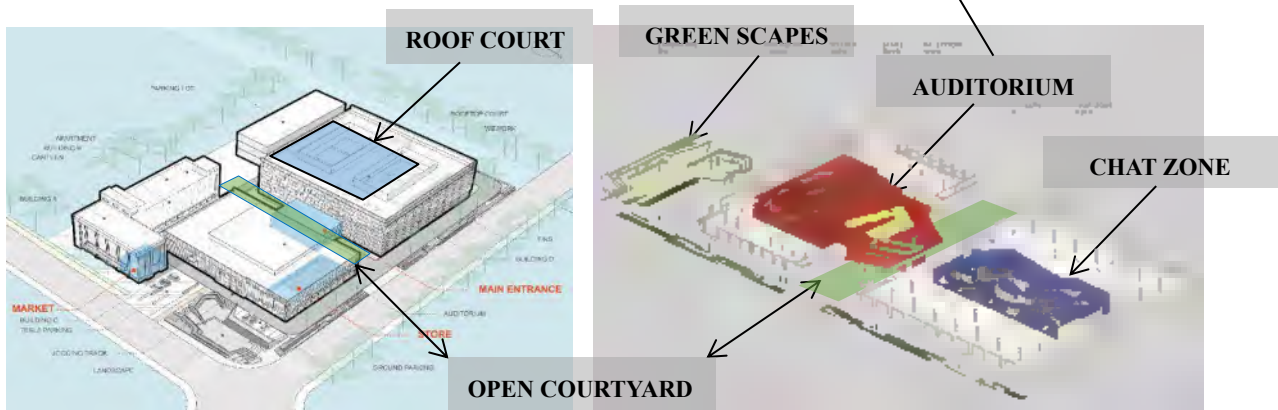


Figure 56. The Transformed areas: Source (STUDIO QI & JL office, 2020)

2.4.4.1 2D Plans of Co-Working Block

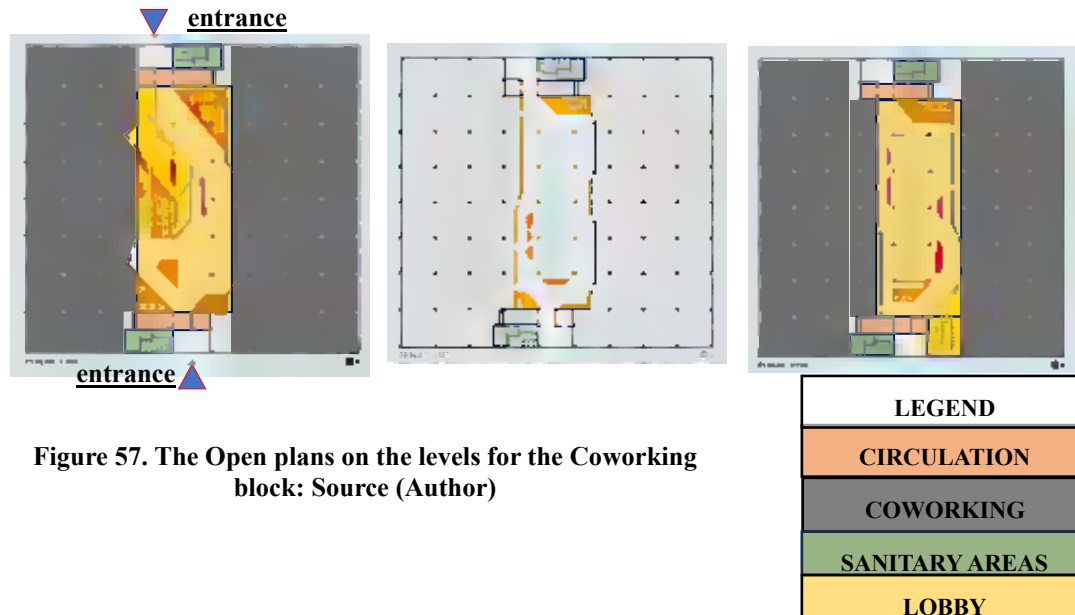


Figure 57. The Open plans on the levels for the Coworking block: Source (Author)

The building showcases a pure repetition of the open plan from the ground floor to the fourth floor, emphasising its **adaptability and multifunctional potential**. **Toilets** are strategically stacked at **both far ends on every floor**. Meanwhile, seating areas are thoughtfully distributed, with their placement varying across each level to **enhance spatial dynamics and enforcing interaction**. Essential services are positioned along the perimeter of every floor, ensuring **seamless functionality**. The **central courtyard** serves as a **vibrant void**

2.4.5 Façade Design

The design integrates a parametric approach, utilising prefabricated vertical louvres made of **Glass Fibre Reinforced Concrete (GRC)**. These louvres create a dynamic interplay of **light, shadow, and rhythm** while enhancing **energy efficiency** and **privacy**. The parametrically designed facade choreographs a relationship between the **fenestration, site orientation, and external viewpoints**. Each louvre varies in shape and spacing to optimise visual effects, creating a flowing, curtain-like aesthetic. The **smooth curvilinear order reacts to its surroundings**, with elegance catering to the bustling roadways and serenity near the **water stream**. The material choice, primarily **GRC**, emphasises **durability and modernity**.

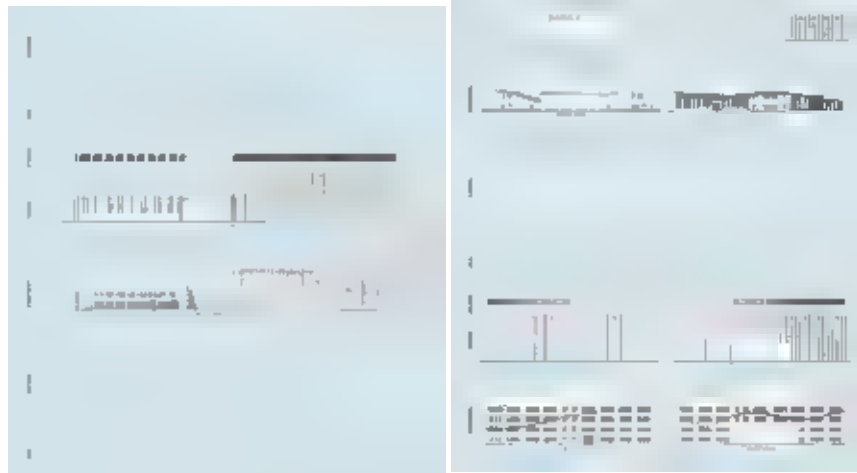


Figure 58: The façade Transformation when it was cladded with a parametric design:
 Source (STUDIO QI & JL office, 2020)

2.4.6 Interior Design










These interior views show the residential block, which was added to the block with an open courtyard in the middle of the project that has a strong relation to the open spaces of the new development.

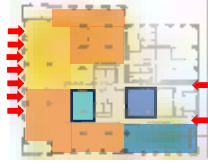

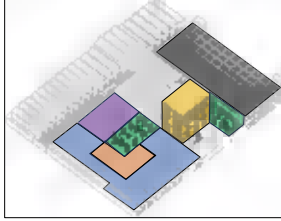


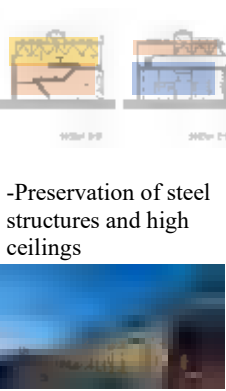
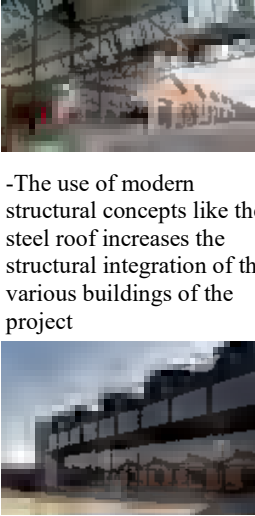



Figure 59. The Canteen and Residential areas. Source (Urban Next, 2020)

2.5 Synthesis of Example Anlysis

Name	<u>BASE4WORK</u> <u>(Jurkovic’s Heating Plant)</u>	<u>Werkspoorfabrie</u> <u>k</u>	<u>Gucci Milan</u> <u>headquarters</u>	<u>Xpace Digital Park</u>
------	---	--	---	----------------------------------

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Technical sheet</p>	 <p>-the program is Creative industry, architects, start-ups, smaller IT companies and freelancers -built area 6300m² -2020 -carrying capacity of 450</p>	 <p>-the program includes shared areas, a beer brewery, a manufacturing industry, a studio, and installations -built area 9200m² -2019 -houses 35 tenants</p>	 <p>-holding offices, showrooms, spaces for fashion shows and design spaces, a canteen and a restaurant -total area 30000m² -2016 -has 250 employees -300 car parking spaces -The carrying capacity is greater than 5000</p>	 <p>-The program is a startup campus for tech companies, offices, and residential -total area 30000m² -2020 -The carrying capacity is approximately 7000 people</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Reconversion Concept</p>	 <p>-Preserving original structure emphasises architectural integrity. -The park and amphitheatre enliven the dynamic Sky Park. -Spaces foster social interaction and inclusivity, revitalising the brownfield for local appeal.</p>	 <p>-The abandoned warehouse's open layout perfectly accommodates adaptable spaces ideal for business incubators. -Shared areas foster interaction and collaborative idea exchange.</p>	  <p>-Preserved brick walls blend seamlessly with a modern steel roof structure, enhancing heritage and structural integrity. -Selective spatial modifications promote sustainability.</p>	  <p>-The old brick façade was covered entirely by louvres made of GRC, enhancing light and energy efficiency -The enhancement of roads to allow for pedestrian and cycling paths made the design sustainable.</p>

Conversion design	plans	 <p>-The ground floor has event spaces, food areas and an art Gallery</p> <p>-From the first floor to the top floor, there is a mixture of flexible working spaces, shared areas, and meeting rooms</p>	 <p>-The ground floor is all about creative manufacturing, and some shared spaces are also available</p> <p>-From the first to the last floor, they are characterised by working spaces, meeting rooms and shared spaces.</p>	 <p>-Proximity to green spaces enhances comfort, promotes relaxation, and encourages employee interaction.</p> <p>-The spaces are large and easily malleable (open floor plan)</p>	 <p>-By the usage of an open plan made the project became flexible and user-friendly</p> <p>-The site is inclined, and it allowed for an open auditorium within the project.</p>
	Sections and views	 <p>-wall cladding, adding insulation while retaining a natural aesthetic</p> <p>-Reused bricks from the façade restored the historical aesthetic while enhancing structural integrity</p>	 <p>-Preservation of steel structures and high ceilings</p> <p>-By the creation of mezzanine floors, they preserved the industrial characteristics</p> <p>-The preservation of the brick facades kept the historic aesthetic intact, at the same time boosting insulation.</p>	 <p>-The use of modern structural concepts like the steel roof increases the structural integration of the various buildings of the project</p> <p>-The use of steel structures that have been embedded in the brick façade enhanced the structural integrity and fixed the issues with the roof</p>	 <p>-The structure of this project was intact and usable.</p> <p>-The façade is fluid, showing the nature of the stream that flows just on the side of the project.</p>





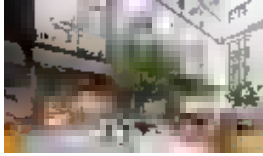


Interiors				
		-The use of natural light and large windows promotes energy efficiency	-The focus was to create a luxurious environment from the ruins.	
	-Interior blends industrial history with modern comfort. -Warm terracotta tones, muted blues, and greens create a welcoming feel, while open ceilings and natural light		-adaptable spaces, the use of wood, which softens the industrial feel of the space	-The interior environment is comprised of open plans with open courtyards. -This opens the doors to the vast spatial requirements of different companies.

Table 15. A summary Table for The Brownfield Redevelopment Projects: Source (Author)

2.6 Conclusion

- ❖ **Materials:** Prefabricated Glass Fibre Reinforced Concrete (GRC) vertical louvres for durability and modernity.
- ❖ **Functionality:** Enhances energy efficiency, privacy, and light control while maintaining a flowing, curtain-like aesthetic.
- ❖ **Parametric Design:** Dynamic louvre shapes and spacing optimise light, shadow, and visual rhythm, responsive to orientation and viewpoints.
- ❖ **Aesthetic Evolution:** Smooth, curvilinear facade adapts to surroundings—urban roads and tranquil water streams—while unifying the campus identity.
- ❖ **Inspiration:** Blends industrial robustness with contemporary design, honouring the site’s legacy and purpose as a tech startup hub.

2.7 Business incubator(overview)

In defining a business incubator, two key terms require clear differentiation: **incubator and startup**. An incubator refers to a supportive structure designed to nurture early-stage businesses by providing resources, mentorship, and networking opportunities. On the other hand, a startup is a newly established company, often innovative and scalable, that

seeks to grow rapidly with the help of such support systems. Understanding these terms is essential to grasping how incubators function as catalysts for the success of startups.

2.7.1 Definitions

Business incubating organisations: These organisations are dedicated to helping new businesses get off the ground and grow. Their main goal is to provide the support, resources, and guidance that startups need to succeed.

Business incubator: is a supportive environment designed to help startups and small businesses grow by providing the resources they need during their critical early stages. These organisations are typically funded by sponsors like governments or corporations, or they sustain themselves by charging rent or, in some cases, taking equity in the startups they support. Incubators provide a range of resources and services, including:

- ❖ **Shared office space:** Offering affordable and flexible workspace solutions.
- ❖ **Access to equipment:** Providing access to tools and technologies.
- ❖ **Business support services:** Mentorship, training, networking opportunities, and assistance with business planning, legal, and financial matters(Hausberg & Korreck, 2020).

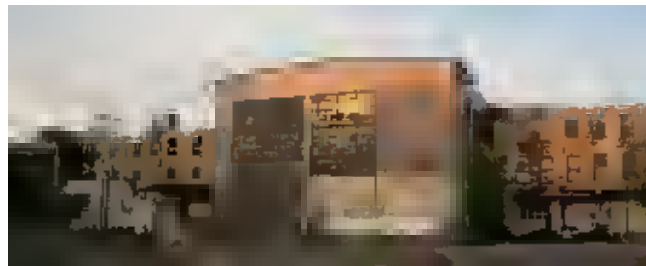


Figure 61. The first ever Business Incubator: Source (Justin Peters, 2017b)

2.7.2 Historical Overview of Business Incubators

The concept of business incubation dates back to 1956 in Batavia, New York. When a major factory closed, a local family purchased the vacant space and divided it into small offices for rent. They also provided assistance and consulting to the businesses. This initiative, known as the Batavia Industrial Park (BIP), is considered the prototype of a business incubator. In the 1970s, June Lavelle further developed the concept of business incubation through a revitalisation program for an abandoned industrial structure, the FCCI incubator. (Justin Peters, 2017a). The first academic incubator was established in 1980 at Rensselaer Polytechnic Institute (RPI). This

initiative focused on enriching the academic environment by transferring and commercialising technologies to promote economic development.(Andrew Corbett, 2013).



Figure 62. The first Academic Incubator: : Source (Andrew Corbett, 2013)

2.7.3 Typologies of Business Incubators and Similar Organisations

Types						Dimension			
strong intervention incubator			laissez-faire incubator			support strategy			
property development (single-/multi-tenant) incubator			business assistance (shared space, services) incubator						
real estate (1st generation)		intangible assets (2nd generation)	network (3rd generation)						
generalist incubator			specialist incubator			business strategy			
mixed incubator	technology incubator	cooperative incubator		traditional incubator		incubatee focus			
non-profit incubator			university incubator		for-profit incubator				
mixed-used incubator	technology incubator	incubatee focus incubator	manufacturing incubator	empowerment incubator	targeted incubator				
spin-off			start-up			institutional mission			
mixed-use incubator		manufacturing incubator	product development incubator						
mixed Incubator	technology incubator	econ, develop, Incubator	social incubator	basic research Incubator					
for-profit property development incubator	non-profit development corporation incubator	for-profit collaborative incubator	academic incubator	for-profit seed capital incubator		sponsor/partner focus			
university incubator	regional business incubator	virtual incubator	independent commercial incubator	company-internal incubator					
network incubator			university incubator						
business innovation center	regional public incubator	university business incubator	independent private incubator						
publicly sponsored incubator	privately sponsored incubator	university-related incubator	nonprofit-sponsored incubator						
industrial estate	managed workshop	multi-purpose BI	business park	ent. Center	BIC	science park	innovation center	tech. center	multi-dimensional

Figure 63. The Different Types of Incubators: Source (Hausberg & Korreck, 2020)

Mixed incubators: Provide services from the pre-incubation to post-incubation phases, supporting a wide range of startups across various sectors. This is the type of business incubator we are focusing on in this project

2.7.4 Services and Benefits Provided by Business Incubators

Services Offered by a Business Incubator



Figure 64: Service offered in a Business Incubator: Source (Faster Capital, n.d.)

Benefits of Joining a Business Incubator Program



Figure 65: Benefits of Joining a Business Incubator: (Faster Capital, n.d.)

Conclusion

After exploring different brownfield redevelopment projects, their underlying philosophy and steps of reconversion, there is a need for a multidisciplinary approach that balances environmental restoration with social and economic regeneration. The next phase was to look into business incubators and highlight their effectiveness in reducing startup failure rates and encouraging economic diversification, as there are a lot of startup businesses that never become fully fledged business operations. By drawing inspiration from how other projects were integrated into broader master plans for transforming entire urban blocks, it becomes clear that a multidisciplinary approach is essential. This is particularly practical given the large size of former industrial sites. The introduction of modern design elements, while preserving the character and history of the industrial past, adds a contemporary feel without erasing the site's

identity. All the case studies referenced have successfully aligned with the core pillars of sustainability, generating economic benefits (employment, reduction in construction costs), having an environmental improvement by the use of (green spaces and clean energy via solar panels), in the sociocultural dimension they enforce community integration by use of central hubs and public spaces. Projects like Base4work and Xpace Digital Park demonstrate this clearly; as mixed-use developments, they go beyond commercial functions by incorporating residential and community spaces, highlighting the vast and versatile potential of brownfield sites.

3 CHAPTER URBAN APPROACH **OF HARARE AND SITE** **ANALYSIS**

3.1 Introduction

This chapter examines Harare's urban dynamics, focusing on spatial and functional challenges. It begins with a review of urban planning frameworks, analysing their impact on urban morphology, transport infrastructure, mobility, the economy, and the natural environment. Through this analysis, the chapter identifies key inefficiencies and underlying issues, shaping the area's general problematics. These findings inform hypotheses and strategies for urban intervention, aiming to address the brownfield while looking at the potential for sustainable development by use of a targeted urban project.

3.2 Presentation of Zimbabwe

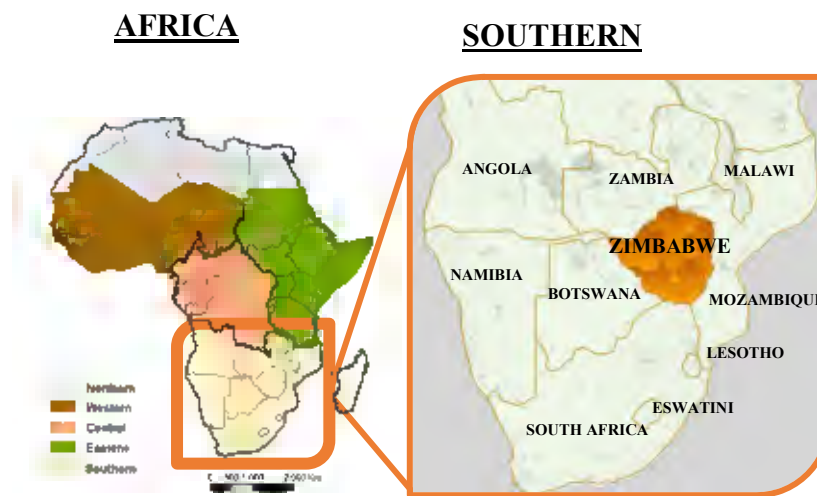


Figure 66: Location of Zimbabwe: Source (Author)

Zimbabwe is a landlocked country in southern Africa. It shares a 200-kilometre (125-mile) border with South Africa to the south and is bordered to the southwest and west by Botswana, to the north by Zambia, and the northeast and east by Mozambique. Its capital city(province) is Harare (formerly called Salisbury).(Kenneth Ingham; Kenneth Bradley, 2024). There are three main regions that the define the climatic landscape of Zimbabwe these are the:

- ❖ The Highveld: A prominent ridge covering 25% of the country, elevating 1,200 and 1,500 meters. Moderate temperatures throughout the year.
- ❖ Middle Veld: A transitional plateau lying at 900–1,200 meters, covering 40% of Zimbabwe. It has moderate rainfall.
- ❖ Low Veld: Located in the south, this area is below 900 meters and constitutes 23% of Zimbabwe's land. It is characterised by hot, semi-arid conditions and low rainfall.

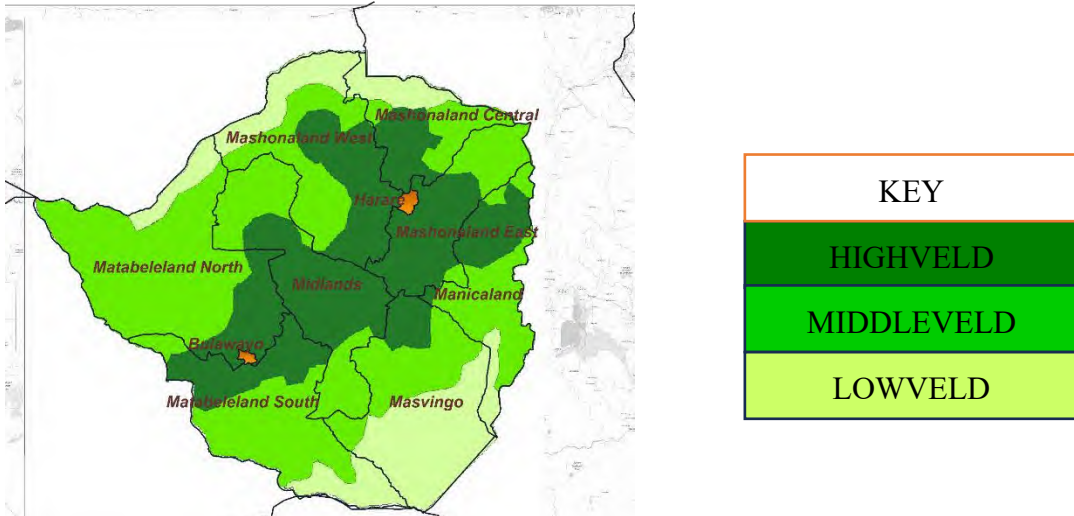


Figure 67: The different Regions of Zimbabwe basing on elevation above sea level: Source (Author)

3.3 History of the City of Harare

Harare, originally named Salisbury, was founded in 1890 by the British South Africa Company. Its early development was characterised by a **grid-like street pattern**, typical of colonial urban planning. The city's architecture reflected European styles, primarily **Victorian and Edwardian**, with buildings constructed from **brick and stone**. The architectural style of these buildings was influenced by international trends, particularly modernist and postmodernist movements. (Dzimba Dzamabwe, 2002).



Figure 68. Urban Plan of the CBD in 1891: Source (Dzimba Dzamabwe, 2002)

Harare's urban tissue has evolved, shaped by various factors such as **colonial legacy, economic growth, and social change**. The CBD remains the heart of the city, characterised by a concentration of **commercial buildings, government offices, and financial institutions**. Harare's

urban evolution was rooted in **colonial segregationist urban planning**, characterised by distinct zoning that separated European, African, and industrial areas. African residential areas, like Mbare, were relegated to the periphery, featuring dense, low-cost housing with minimal amenities, reflecting the colonial agenda of economic exploitation and social hierarchy.(Mcgregor Joann & Chatiza Kudzai, 2020). Today, Harare’s urban fabric reveals a dynamic interplay between its colonial legacy and sustainable innovations (the Eastgate Mall)(George Masimba & Anna Walnycki, 2024).

3.4 Functional and Spatial Evolution

The Harare Metropolitan Province has undergone significant land use and land cover changes from 1984 to 2018, reflecting rapid urbanisation and population growth. Central business district (CBD) and industrial areas also increased, doubling their coverage from 3.7% in 1984 to over 7% by 2018. Vegetation, once the dominant land cover, saw a dramatic decline from nearly half the province's area in 1984 to just over 25% in 2018, highlighting the environmental **cost of urban expansion** without **densification**.

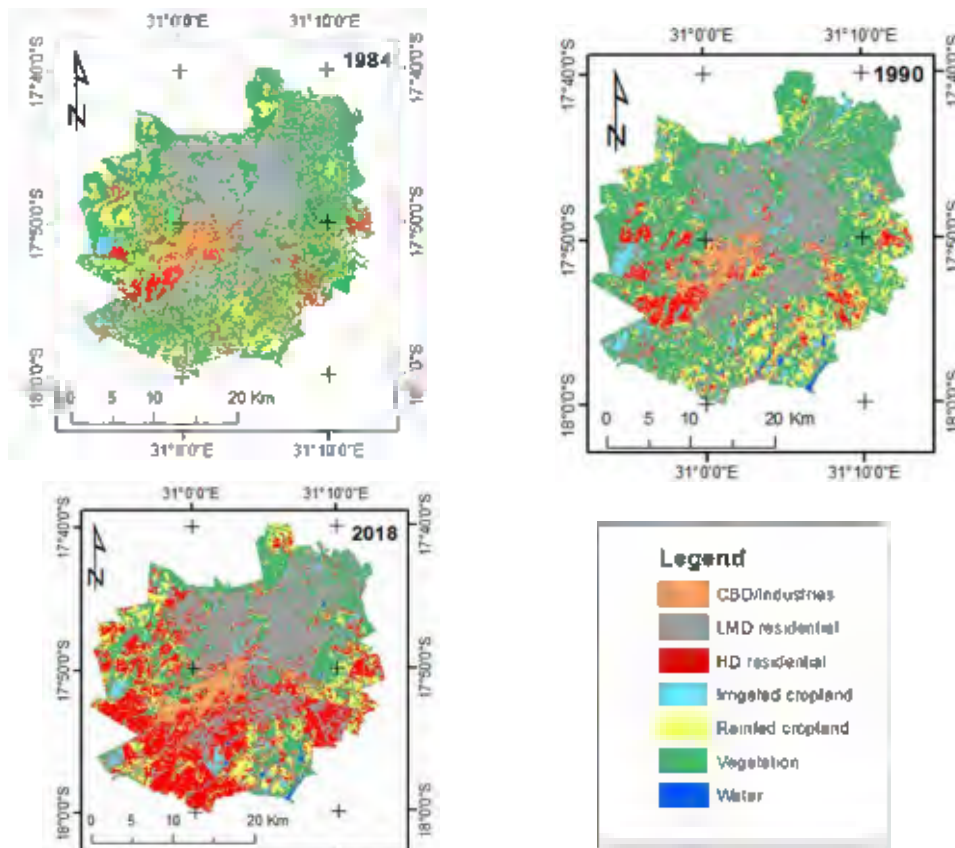


Figure 69. The Spatial Evolution of Harare: Source (Maronedze & Schütt, 2019)

Land Use	Description
CBD/ Industries (Central Business District)	Industries and central business districts are defined with a high fraction of impervious surfaces, mainly buildings and a small proportion of vegetation.
LMD residential (Low Middle Density)	Leafy and well-established low- and medium-density suburbs surrounded by high vegetation
HD residential (High Density)	areas with low vegetation cover or clustered settlements, with areas undergoing development and bare exposed land
Irrigated Cropland	Cultivated land under irrigation schemes
Rain-fed Cropland	Cultivated land or land with crop residues after harvesting
Vegetation	All wooded areas, shrubs and bushes, riverine vegetation and grass-covered areas
Water	Areas occupied by water, rivers, wetlands, reservoirs and dams

Table 16: Table Defining Terms in The Patial Evolution Figure: Source (Maroneddze & Schütt, 2019)

3.5 Architectural diversity in Harare

The urban spread was directionally distinct: high-density areas initially expanded westward. Still, they later moved towards the south and southeast, while low- to medium-density suburbs concentrated. North-eastward, both cases resulted in urban sprawl. These patterns reflect the dynamic pressures of socio-economic factors and infrastructure development.

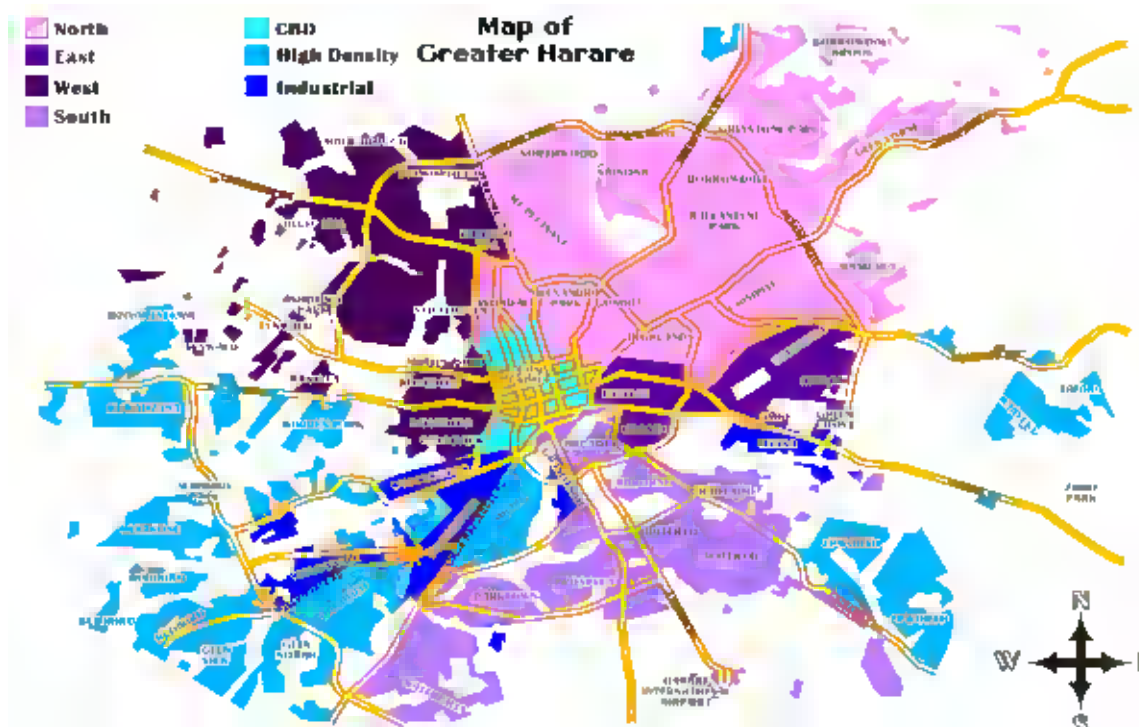











Figure 70. Map Of Greater Harare with Major Routes: Source (Tavonga Njaya, n.d.)

3.5.1 Major Landmarks in Harare

Name	Description of Architectural Style	Image details
RAINBOW TOWERS	<p>It was built in 1982-1986, previously known as the Sheraton Harare, now known as the 5-star Rainbow Towers Hotel. The building showcases a blend of Modernist, high-tech and Brutalist architectural movements. The dominant tower curves as it approaches the roof, and all the buildings on the site are rectilinear blocks. The facade features a repetitive window grid and textured concrete, while the design emphasises functionality and monumentality.</p>	 <p>Large curtain walls on the facade</p>
NATIONAL HEROES' ACRE	<p>Zimbabwe's National Heroes Acre is a monument honouring the nation's heroes. Designed with a symbolic layout resembling AK-47 rifles, it features the Tomb of the Unknown Soldier, an Eternal Flame tower, and historical murals. Influenced by socialist realism, the site uses black granite and grand scale to create a solemn and significant space. The space feature's significant circular theme revolves around the obelisk in the centre.</p>	  
RBZ (REPUBLIC BANK OF ZIMBABWE)	<p>Reserve Bank Tower is a 28-story building in Harare, Zimbabwe. At 120 m (394 ft), it is the tallest building in Zimbabwe since its completion in 1997. The building is a sleek, efficient example of Contemporary Modernism. Its tall, slender form maximises office space and offers panoramic city views. A smooth, reflective glass and steel facade. The entrance is understated and integrated with the streetscape.</p>	    

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">EASTGATE MALL</p>	<p>Harare's Eastgate Centre, completed in 1996, is a prime example of biomimicry. Inspired by termite mounds, its design uses natural ventilation and cooling. Two structures linked by a glazed roof and central atrium facilitate airflow, with warm air rising through roof chimneys and cooler air drawn in below. The exterior blends brick and concrete with glass and steel, featuring a concrete facade with ledges and greenery for shade and heat dissipation. This approach creates a sustainable, energy-efficient space, minimising the need for air conditioning.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">JOINA CITY</p>	<p>Joina City is located in Harare, Zimbabwe and was completed in early 2010. It stands as a modern architectural statement in the city. The design showcases a contemporary aesthetic with clean lines and extensive use of glass. The façade cancels out the height by the use of lengthy horizontal windows, there is also a rhythmic play of rectangular windows. There is an atrium that often hosts events and provides a dynamic public space within the mall. The windows are the exterior features, a mix of materials, including concrete, steel, and large glass panels, creating a sense of openness and modernity.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">VARIOUS BUILDINGS IN THE CAPITAL</p>		

Table 17: The points of interest in Harare CBD: Source (Author)

3.6 Geographic Study

We are going to study Harare’s physical and spatial characteristics by examining the precise location, the prevailing climatic conditions, assessing the topographic context and the broader urban context surrounding the site. This geographic study will give us insight into making important and informed sustainable development decisions.

3.6.1 Geographic Location

The capital city of Harare lies between 17°49’39.79” south latitude and 31°03’12.13” east longitude and covers three districts (Harare Urban, Harare Rural, Chitungwiza and Epworth districts).

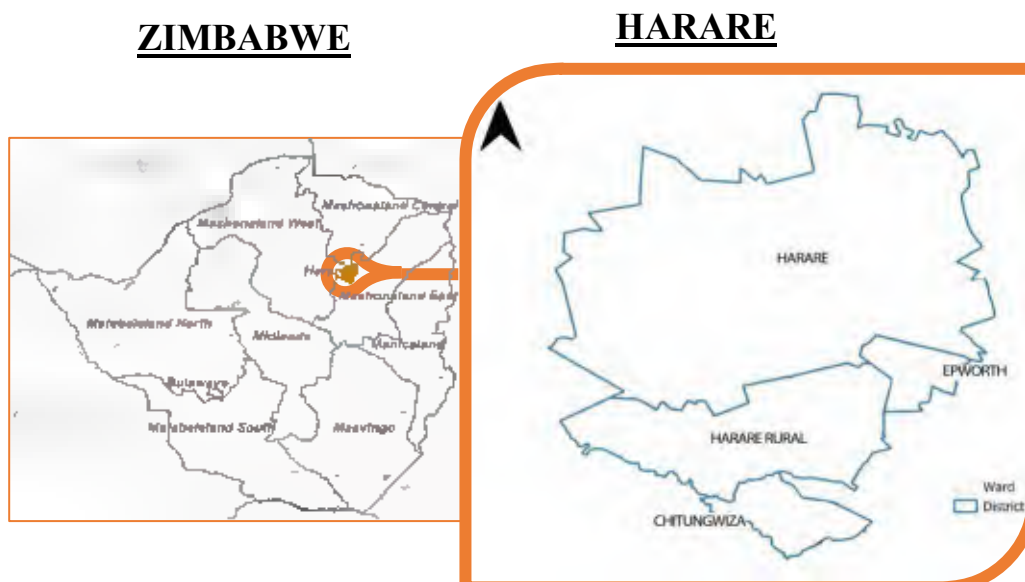


Figure 71: Location of The Harare Metropolitan Province: Source (Author)

3.6.2 Demography

Harare’s population demonstrates steady growth, with the metro area reaching approximately 1.6 million in 2024. Showing that the capital is indeed a dynamic urban hub in Zimbabwe, characterised by increasing urban density and the associated demands for housing, infrastructure, and services. This then stresses the existing urban infrastructure, failing the infrastructure to support the ever-growing population. This growth highlights the need for sustainable urban planning, adaptive reuse of spaces like brownfields, and innovative designs to accommodate population pressures while fostering economic and social vibrancy.

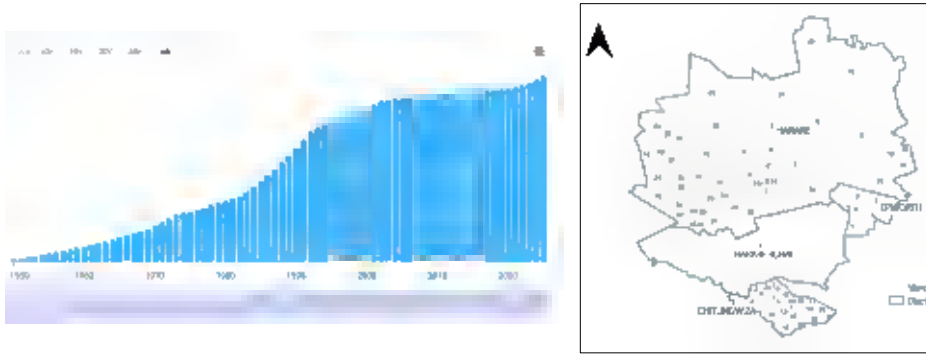


Figure 72: Demographic Graph of Harare and Different wards: Source (Macrotrends, n.d.)

3.6.3 Climatic Conditions

Harare, located at an altitude of 1,487 meters, benefits from a temperate highland tropical climate characterised by moderate temperatures, seasonal rainfall, and distinct wind patterns. (Weather and Climate, n.d.)



Figure 73 Overview on Temperature and Rainfall. Source

3.6.4 Temperature

The city's annual average temperature is 21.94°C, with warm summers (November to March) and cool winters (May to August). Due to Harare's elevation, summer months bring mild daytime highs and cooler nights. (Weather and Climate, n.d.)

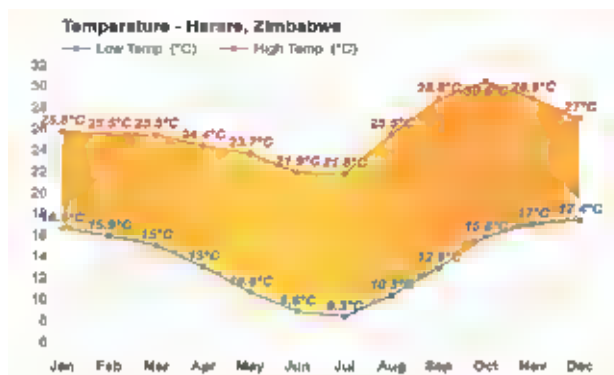


Figure 74: Maximum and Lowest temperatures experienced every month: Source (Weather and Climate, n.d.)

3.6.5 Rainfall

Harare experiences an average of 107.25 mm of rain annually over 115 rainy days. Rain is concentrated in the rainy season, marked by frequent thunderstorms in December and January.

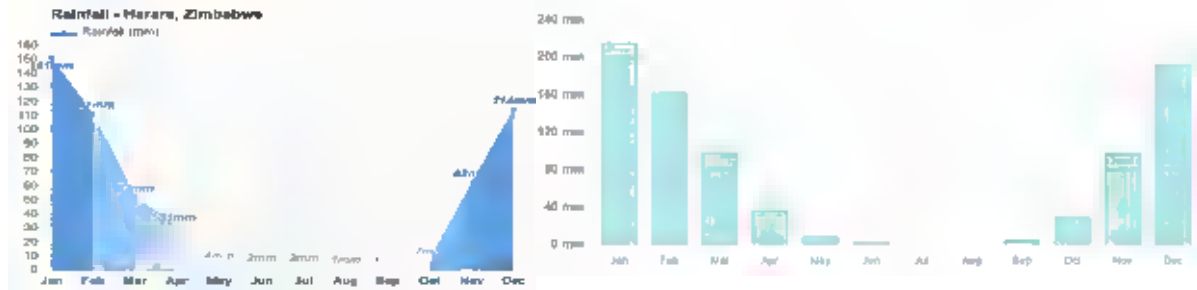


Figure 75: The Amount of Rainfall Experienced per month: Source (Weather and Climate, n.d.)

3.6.6 Wind Patterns and Wind Speed

Most prevailing winds in Zimbabwe have an easterly direction, which blows from the Indian and Atlantic Oceans. The main prevailing winds are the Southeast trade winds.



Figure 76: The Wind Patterns Experienced by Harare Annually: Source (Author)

The *northeast monsoon* is a seasonal wind from the Indian Ocean that blows during the summer and brings rainfall to the northern parts of the country, from December and January.

South East Trade Winds are air currents that blow from one region to another. They bring drizzle and light showers, causing clouds in winter and clear weather in Summer.

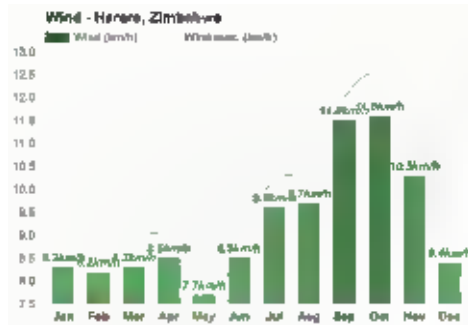


Figure 77: The Windspeed Per Month in Harare

Zaire/Congo air, otherwise known as the South West Trade Winds, comes from the Atlantic Ocean west of Zimbabwe. They bring a lot of rainfall, especially to the northern parts of the country.(ZIMSEC & Cambridge, n.d.).

3.6.7 Solar Exposure

Harare receives abundant sunshine throughout the year, with over 2,700 hours of sunlight annually. In terms of energy output from solar panels, you can expect around 6.55 kWh per day in Summer, 6.40 kWh/day in Autumn, 5.51 kWh/day in Winter, and 6.99 kWh/day in Spring for every kilowatt (kw) of installed solar. Despite frequent thunderstorms, clear skies dominate in the mornings, allowing for ample solar radiation. Harare enjoys long periods of clear skies and bright sunlight in spring and relatively warm daytime temperatures even in winter.(Aaron Robinson, 2019).

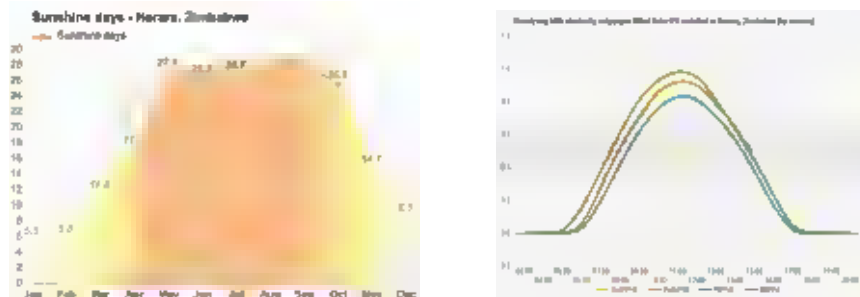


Figure 78: Solar Exposure Diagram Harare: Source

Synthesis:

Sunlight, rainfall, and wind patterns collectively shape Harare’s architectural and urban planning strategies, emphasising energy efficiency and resilience to weather extremes. Increasing climate variability due to global warming could lead to more unpredictable wind and rainfall patterns, necessitating adaptive urban and architectural solutions.

3.7 The Industrial Areas in Harare

There are 5 major industrial areas in Harare, namely: Workington, Southerton, Willowvale and Msasa industrial area.



Figure 79: The Industrial Districts In Harare: Source (Author)

3.7.1 Workington

It is situated approximately 7.2 km from Harare's Central Business District (CBD). This industrial area is characterised by a mixture of heavy, medium and light-scale industries. It includes sectors such as food and beverages, chemicals, petrochemicals, cable manufacturing, and more. The Workington district consists of 25 active members.



Figure 80: The Workington District in Relation to the CBD: Source (Author)

3.7.2 Southerton

Southerton is located about 7 km from the CBD of Harare. Southerton hosts a variety of manufacturing industries, including food processing and chemicals. The area has a mix of both large and small enterprises. The Southerton-Workington cluster is assessed as a joint cluster due to its regular collaborative programming, training programs, although it faces challenges related to governance and resource allocation.



Figure 81: The Southerton Industrial District: Source (Author)

3.7.3 Willowvale

Willowvale is located 11km from the CBD. It has four active members, primarily focused on manufacturing, including vehicle assembly and related industries. Compared to Workington and Southerton, Willowvale has lower activity levels in terms of circular economy initiatives. The cluster requires enhanced support and revitalisation to improve its engagement in sustainable practices. While there are opportunities for collaboration, the cluster faces challenges such as financial barriers and the need for technical and technological capacity.



Figure 82: The Willowvale Industrial District: Source (Author)

3.7.4 Msasa

It is located about 8 km east of Harare's CBD. Msasa is accessible via the Mutare Road, a major highway facilitating logistics. The area is known for warehouses and light industries, offering factory spaces with modern amenities like boreholes and security systems. It is close to residential suburbs like Greendale (3.5 km northeast) and Hatfield (5 km southwest) and to Mukuvisi Woodlands, a green area. Nearby facilities include Cresta Lodge, providing hospitality services, and several commercial amenities.



Figure 83: The Msasa Industrial Area: Source (Author)

3.7.5 Graniteside

Approximately 4 km south of the CBD, Graniteside serves as one of Harare's oldest industrial hubs. It is well-connected to major roads and public transport networks, making it a strategic location for manufacturing and logistics. The proximity to Mbare, a populated residential area, ensures a labour supply. Nearby healthcare facilities include Parirenyatwa Hospital, one of Zimbabwe's largest medical centres.

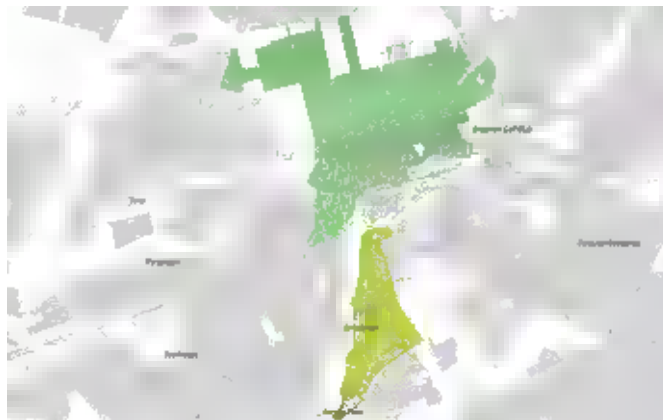


Figure 84: The Graniteside Industrial district: Source Author

3.8 Choice of Industrial District

- ❖ Proximity to CBD: At 7.2, Workington is closer to the CBD, offering easy access to business services.
- ❖ Diverse Infrastructure: Hosts heavy, medium and light-scale industries with banks, warehousing, and commercial spaces.
- ❖ Collaborative Ecosystem: 25 active members engage in training and workshops, fostering a supportive network for startups, unlike Southerton
- ❖ Circular Economy Leadership: Implementing Integrated Waste Assessment Plan (IWAP) and industrial symbiosis in Workington.
- ❖ Labour Supply: Its proximity to Mbare, Kambuzuma, Southerton residential area, and Belvedere ensures a steady workforce, unlike Msasa and Willowvale, which are further from dense residential areas.
- ❖ Logistics Advantage: Better connectivity to transport routes than Granite's or Msasa, supporting distribution and supply chains.
- ❖ Potential for Mixed-Use Development: Offers adaptable and scalable industrial spaces.

3.9 Industrial District Study

The industrial district of Workington was chosen based on the criteria used in the choice of site for the industrial district study. Its versatility and mixture of heavy and light industries make it the ideal and Its proximity to the CBD is key to the urban development strategy we are to propose in the master plan.

3.9.1 Situation

The industrial ward is encompassed to the north by middle-class residential areas, to the south by another industrial ward (Southerton) and a hospital and finally to the east and west by high-density suburbs of Kambuzuma and the CBD respectively. Its location, which is close to the old CBD and key residential areas like Kambuzuma and the ever-blossoming Belvedere, which is about to claim the title of Chinatown, makes Workington a great area for future urban expansion.

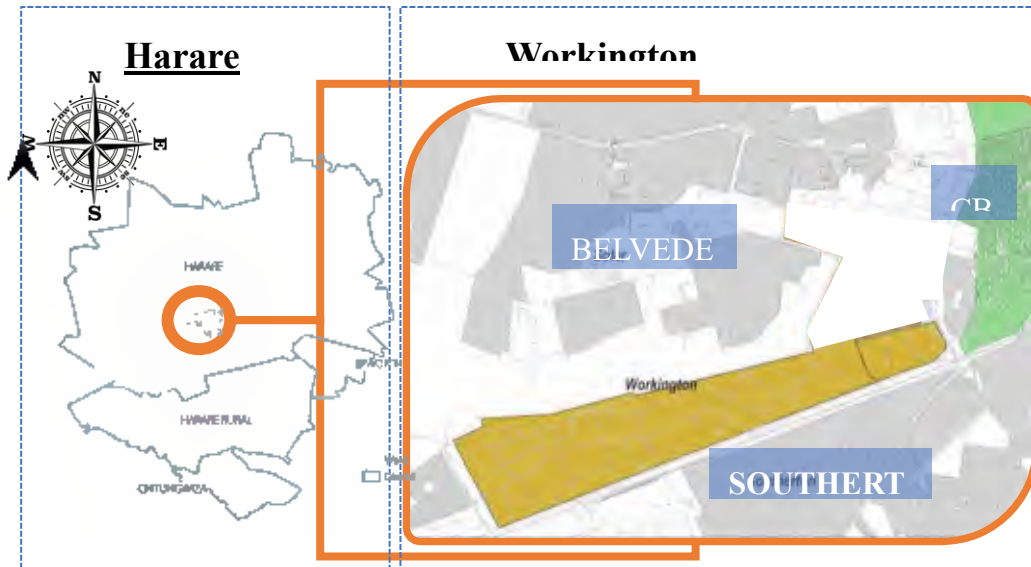


Figure 85: Location of the Workington Industrial District: Source Author

3.9.2 Demographic Study

The population in the combined Workington and Sotherton area, which is called ward 11, is around 18898 people according to the census taken in 2022. the surrounding areas which are

WARD	FEMALES	MALES	TOTAL	HOUSE HOLDS
Ward 11	9,245	9,653	18,898	5,262
Ward 12	9,897	10,397	20,294	5,558
Ward 13	11,049	12,418	23,467	5,936

Kambuzuma (ward 13), Belvedere (ward 5), which is now known for its growing Asian population over the years, the Central Business District (ward 6) and Mbare (wards 4 and 12), a high-density suburb which is a hub for illegal activities and commerce. This makes the total



Figure 86: The Wards Surrounding Workington: Source (Author)

population around the industrial ward 96447 people. However, the population for Workington is around 9653.

3.9.3 Area Classification and Urban Structure

There is a mixture of the types of urban grids that have been used in the urban structure, which include: a regular grid, irregular/broken grid, degree-3 and circuitous. This goes on to show the diversity in urban planning.

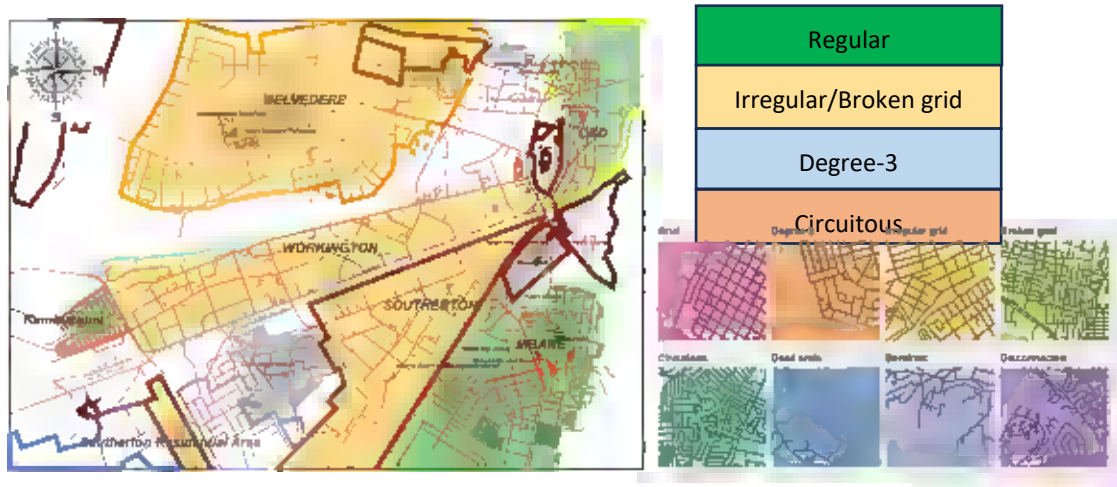


Figure 87: The Different Types of Urban Grids: Source (Author)

3.10 Fragment Analysis

The fragment is delimited based on 3 major roads that encompass the industrial district, and on the SW side of the fragment, the limit used was the Hospital that is found in the heart of the two industrial districts, making it an interesting point of interest.

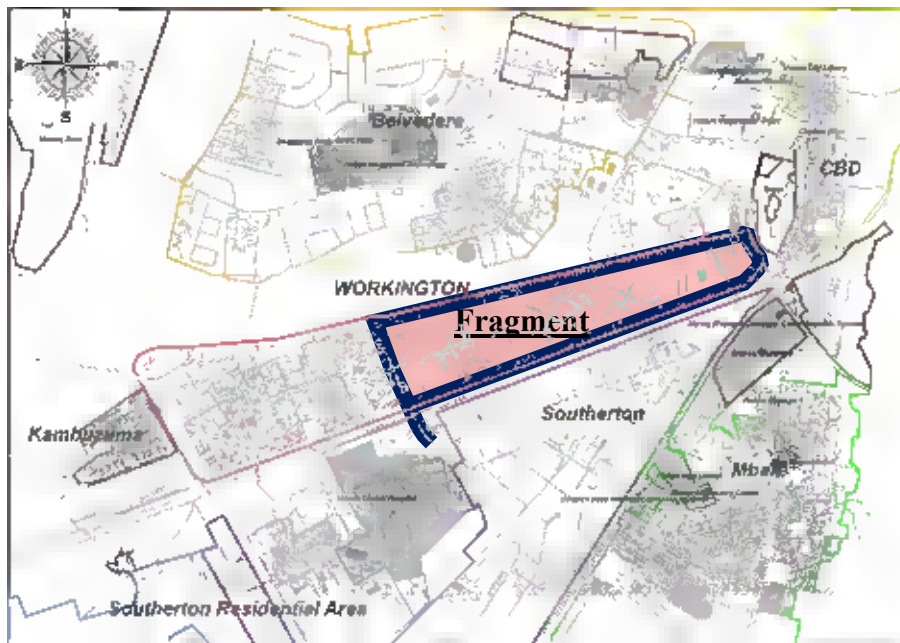


Figure 88: The Urban Fragment Of intervention: Source (Author)

Why This Fragmented

1. It has good accessibility, as it is encompassed on all 4 sides by roads that have high and medium traffic flow. It has easy access to routes that go in and out of the capital
2. Its proximity to the CBD makes it a future point of interest, and some industries are closing.
3. There are train tracks that present potential for ease in urban mobility
4. It contains a brownfield site

3.10.1 Types of Industries Within the Fragment

The terms heavy and light industry are equally popular with heavy and light manufacturing.

- ❖ Heavy industry refers to large-scale manufacturing processes that require significant capital, heavy machinery, and a lot of raw materials. Examples include: chemical production, commercial vehicles, heavy machinery manufacturing, metal production, etc.
- ❖ Light industry: Involves smaller-scale production that is less capital-intensive, often focusing on consumer goods that require minimal use of to no use of heavy machinery. Examples include: Warehousing, Light manufacturing and processing, assembly, and Business parks.

Based on the definition of light and heavy industries, the Workington district is fully **comprised of light industries** except for the **Harare Coal Power Station**, making it a misplaced development in the urban plan.

State of Buildings

The buildings are old and require some renovation because they have been in existence ever since the colonial era, and have just been switching ownership

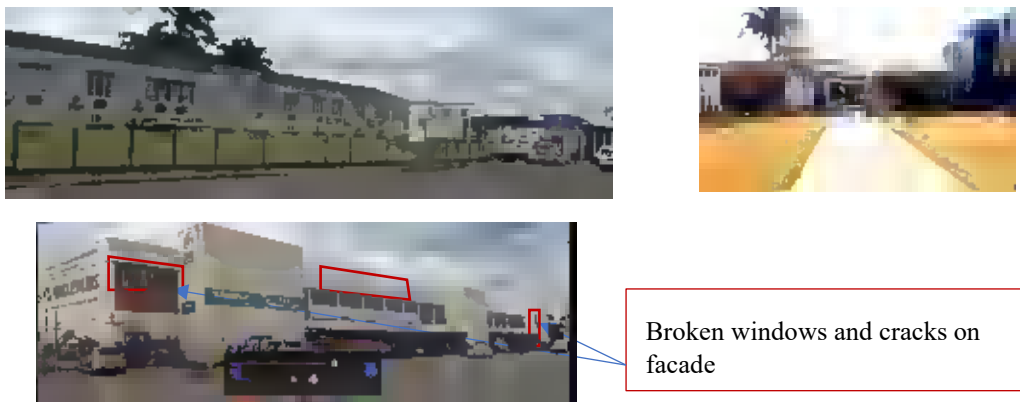


Figure 89: The different state of buildings: Source (Author)



Mining and Engineering repair shop



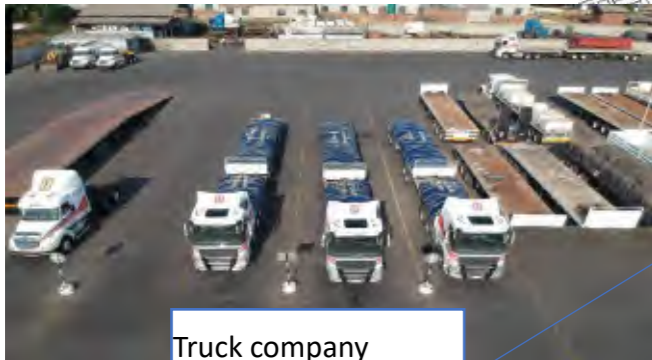
Steel company



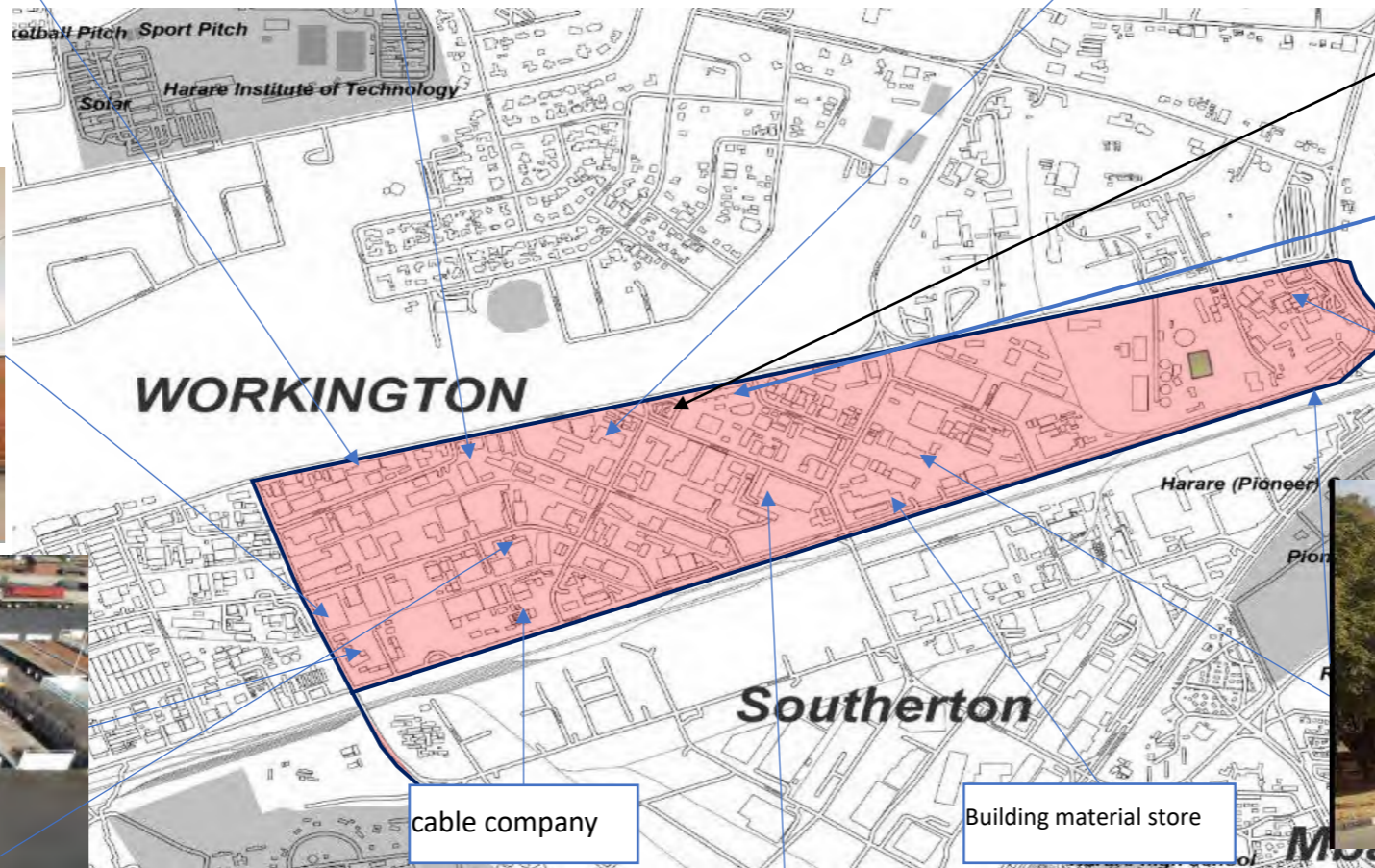
Agricultural company



Wood company



Truck company



Farming equipment wholesale



colcom (meat selling company)



Cottco (cotton buyer)



Car company



Farming equipment wholesale



Unilever

Figure 90: The Different Companies in District: Source (Author)

3.10.2 Building Heights, Facades, and Skyline

The heights of the buildings are within the ranges of **5m to 12m (Ground Floor +4)** because the structures are mainly warehouses. The tallest built structures being the Harare Power Station **Cooling tower, chimney and the grain silos** at the National foods which are between the heights of **30 to 70m**. The Zone's buildings are mainly made of **steel and brick facades** with **open plans**, supported by **steel beams and steel columns**, allowing for massive storage spaces. Some **flat, inclined, gabled, and sawtooth** roofing is typical in this industrial area's

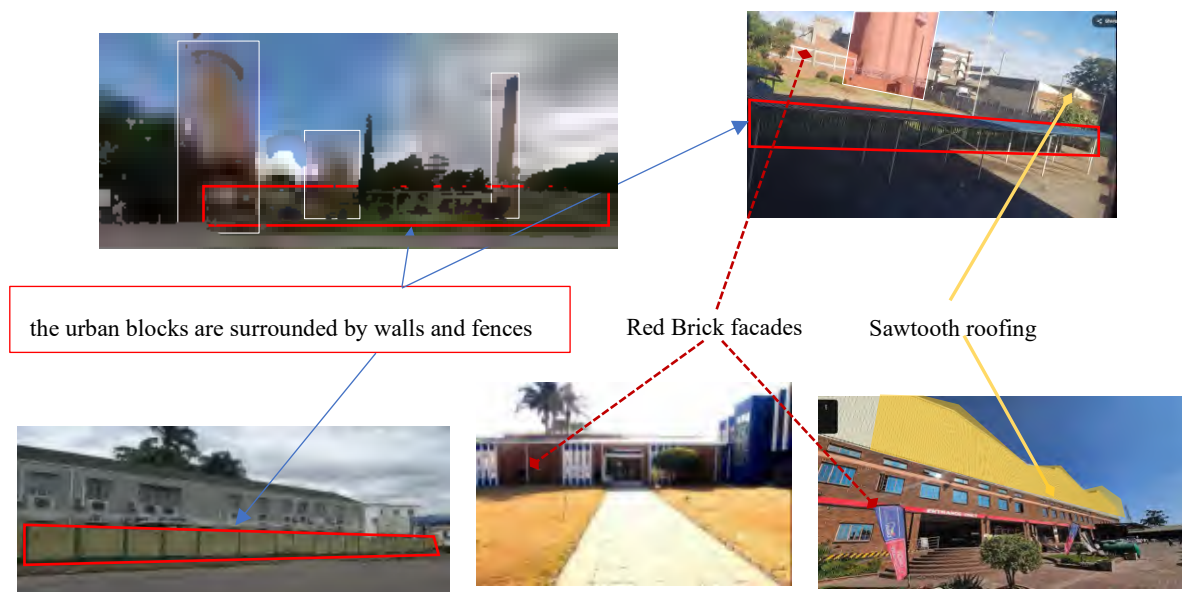


Figure 91: The Different Building Heights and Materials: Source (Author)

architecture.

3.10.3 Built and Unbuilt Space

The district is comprised of huge chunks of built land, giving it a very dense character; thus, the percentage of built to unbuilt areas is about 70%. Also, looking at the roads as built

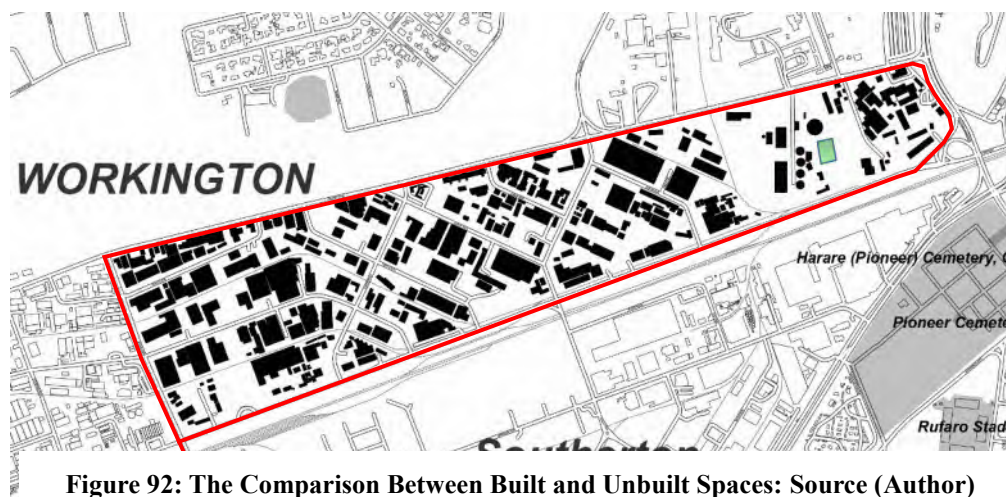


Figure 92: The Comparison Between Built and Unbuilt Spaces: Source (Author)

infrastructure, the percentage would be drastically lower. An intervention by the introduction of parks and public squares is due.

3.10.4 Accessibility

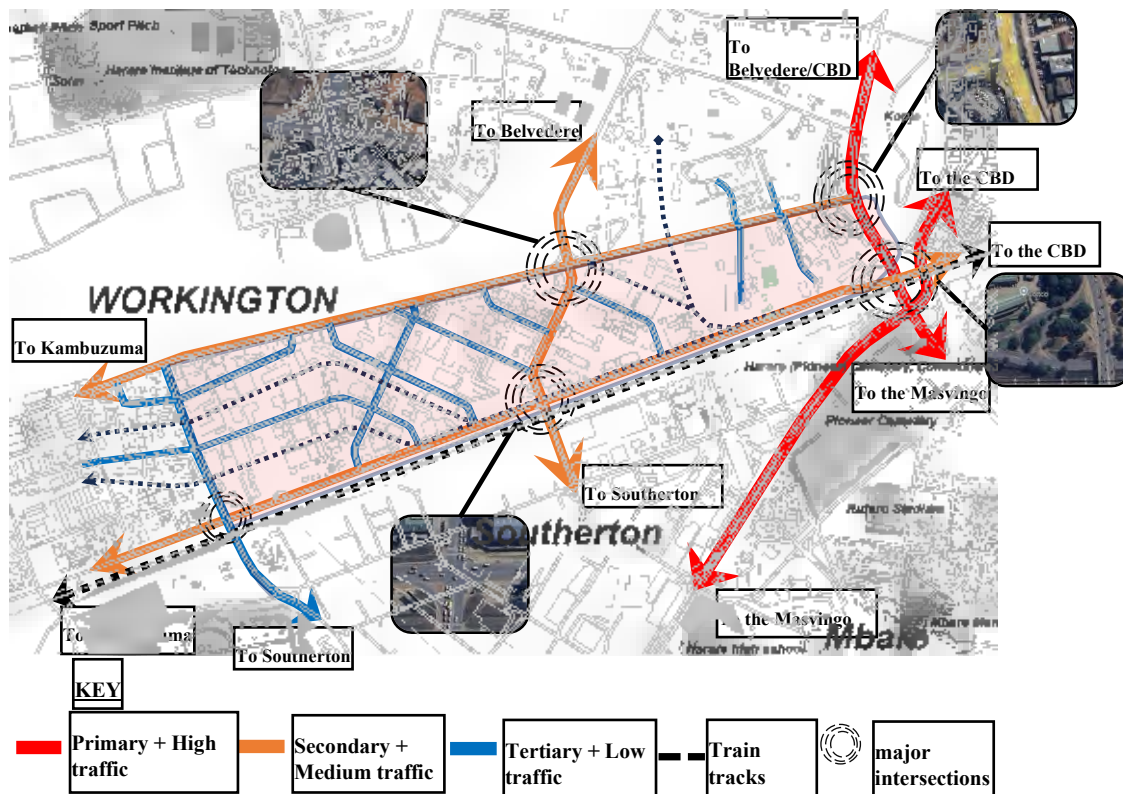


Figure 93: The Different Road Infrastructure: Source (Author)

3.11 Synthesis

Positives

- ❖ The proximity of the industrial zone to other industrial districts, residential areas, and the CBD makes it a point of interest.
- ❖ The zone is just close to major roads that lead to the CBD and out of Harare to other provinces like the Midlands and Bulawayo.
- ❖ The district is interconnected by tertiary routes that allow for the reduction in transportation costs and transit times, making it attractive for business.

Negatives

- ❖ There is a distinct lack of pedestrian paths and cycling tracks.
- ❖ The minor roads are poorly maintained and are beginning to affect the transportation and traffic flow.
- ❖ The proximity to the major route and a bus station increases traffic congestion at peak hours at the major intersections means there are chances of traffic congestion.

- ❖ The unused train tracks represent potential for sustainability via reconversion

3.12 Intervention Strategy

Following the urban analysis of the study area, we see the strengths and weaknesses of the Workington industrial district. We realise that there is a need for intervention and restructuring of the urban fabric of the area. The presence of an industrial brownfield in the district creates a disconnect in the area's morphology, functionality, and landscape. The need for urban renewal is evident, and to also make this district an economic hub by the use of the underutilised spaces.

3.12.1 Critic of the Fragment

- ❖ 4 of the major intersections show potential for traffic jams and unregulated traffic flow
- ❖ There are no minor routes to access the different functions in the zone; it has large land lots
- ❖ It is very linear, although it lacks roads to combat this monotony
- ❖ There are unused train tracks in the district

3.12.2 Objectives for Urban Renewal

1. **Reclaim the Harare Thermal Power Station Brownfield:** Transform the site into a space and destination for innovation and creativity
2. **Urban Renewal:** look into incompatible land uses and redevelop plots as the huge land lots need to be made smaller to fit the new and radical needs of a potential CBD
3. **Introduce Tertiary Facilities:** Projecting new facilities and functions that elevate the district's economic and social value.
4. **Revitalise Key Areas:** looking into the district's main axis (e.g. the intersection(junctions) points around the study area) by enabling them to cater for the projected urban demand
5. **Improve Mobility and Parking:** by regulating chaotic parking, providing designated parking areas, and pedestrianising high, medium, and low-traffic roads.
6. **Green Spaces and Public Areas:** Introducing parks, gardens, and relaxation zones to enhance the quality of life.
7. **Promote Functional Mix:** Encourage a blend of residential, commercial, and recreational uses to create a dynamic and accessible urban environment.

3.12.3 Reclaiming The Harare Thermal Station Brownfield

- ❖ Preservation of the all the five silos

- ❖ Introduction of a green zone for the coal field as a bioremediation strategy to make the land reusable
- ❖ Preservation of the South West part of the Power Station
- ❖ Integration of the main silo as part of the Final architectural intervention for the business incubators

3.12.4 **Urban Form and Landscape**

- ❖ **Introducing New Roads:** Design a **network of longitudinal and transversal roads** that connect with existing infrastructure, ensuring seamless connectivity, and finally adding pedestrian-dedicated routes in the district.
- ❖ Reduction of the land lots and use smaller land lots, which cater for various urban functions

3.12.5 **Implementation Steps**

1. Road Network Improvements
2. Block Division: Dividing the area into land lots (land blocks)
3. Mixture of Functions: Introducing a blend of residential, commercial, and recreational
4. Introduction of Green Spaces: Integration of parks and relaxation

Functions to Be Projected into the Fragment

<u>Peri-productive Industrial Services</u>	<u>Directional and Regulatory Services</u>	<u>Education and Culture</u>
Banks and Credit Unions	House locale and regional administrative bodies.	Technical training institutes
Insurance services	Chambers of Commerce	Vocational training centres
Microfinance institutions	Control and regulation (tax authorities, legal and arbitration centres)	Technology parks and innovation hubs
Trading companies	Labour Unions	Research institutes
Transportation companies		Culture (museums and art galleries)
Supply chain management headquarters		Community development (community centres, public parks and recreation facilities)
Residential Areas		

Table 18: The Different Projected Functions: (Author)

3.13 MASTER PLAN

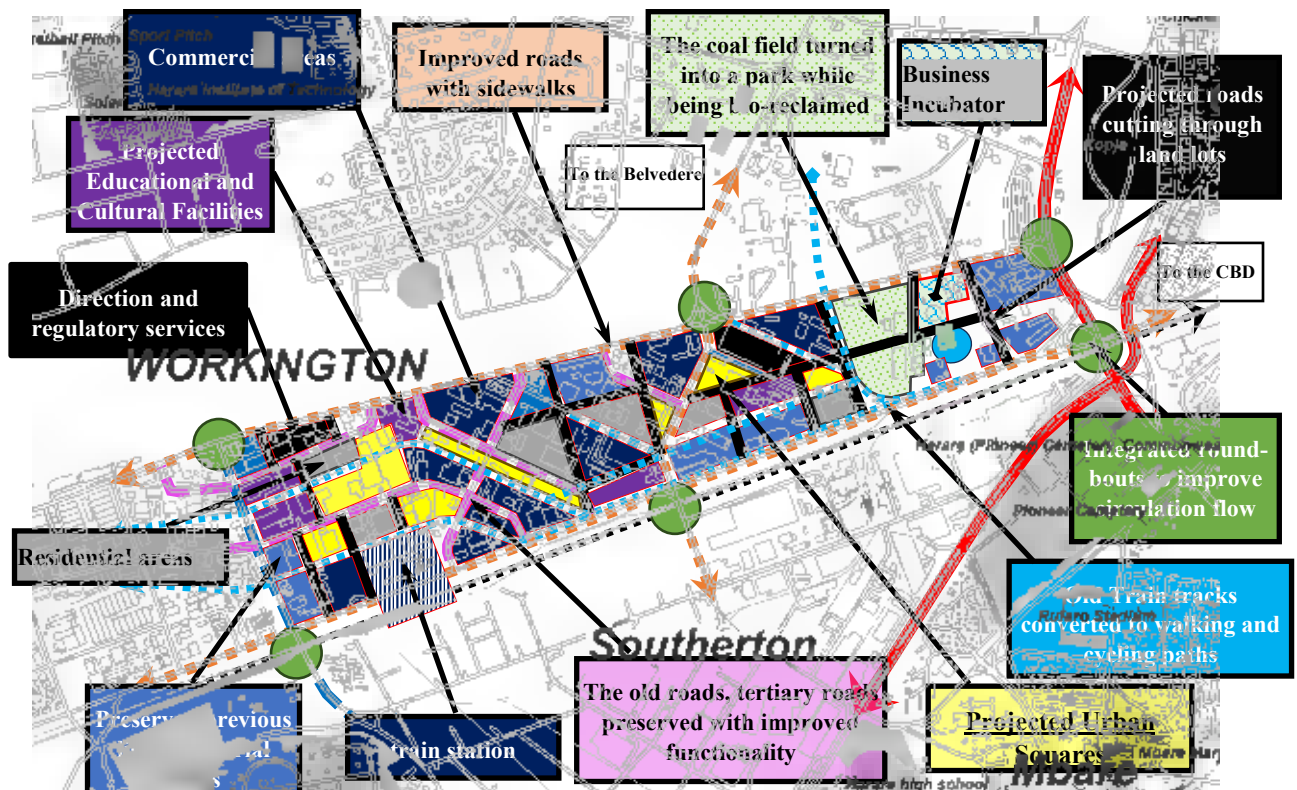


Figure 94: Proposed Master Plan (Author)

- Projected roads
- Projected walking paths
- Improved old roads with pedestrian tracks
- Injected roundabouts to improve circulation
- Management and regulatory services
- Education and Culture
- Preserved buildings and functions
- Commercial activities, Peri-productive industrial activities
- Projected Urban Squares and green Spaces

3.14 Site Analysis

The brownfield site is located in the Workington district, and the analysis of the environmental context and urban characteristics of the immediate surroundings is due. This site stands out in the urban context as a heavy industry and as the tallest structure in the district.

3.14.1 Location

The site is located within a coal power station, which is found within the Workington Industrial District. Which is to the southwest of the CBD.

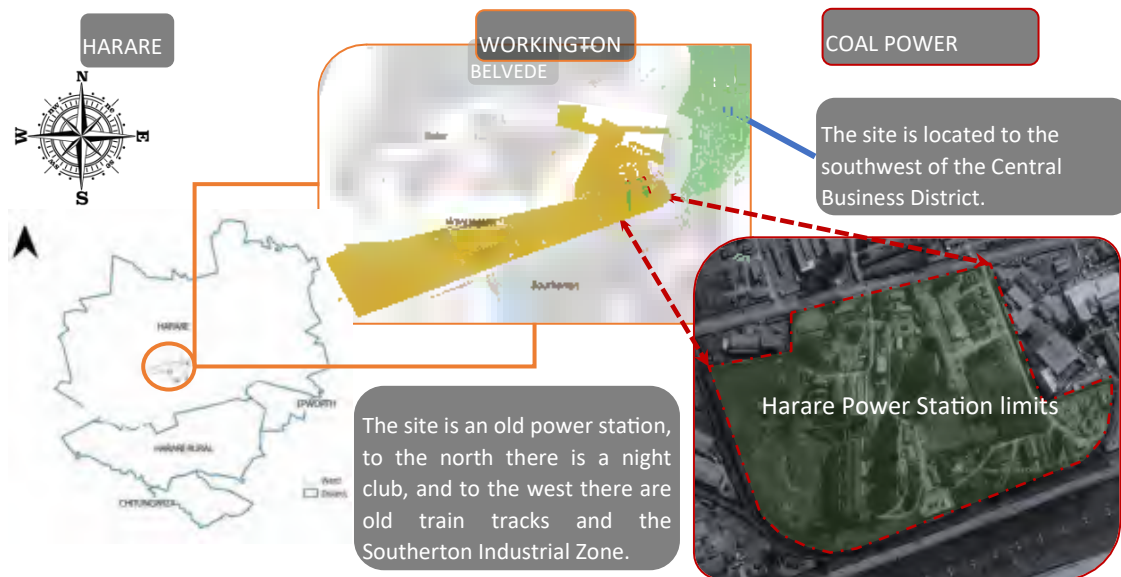
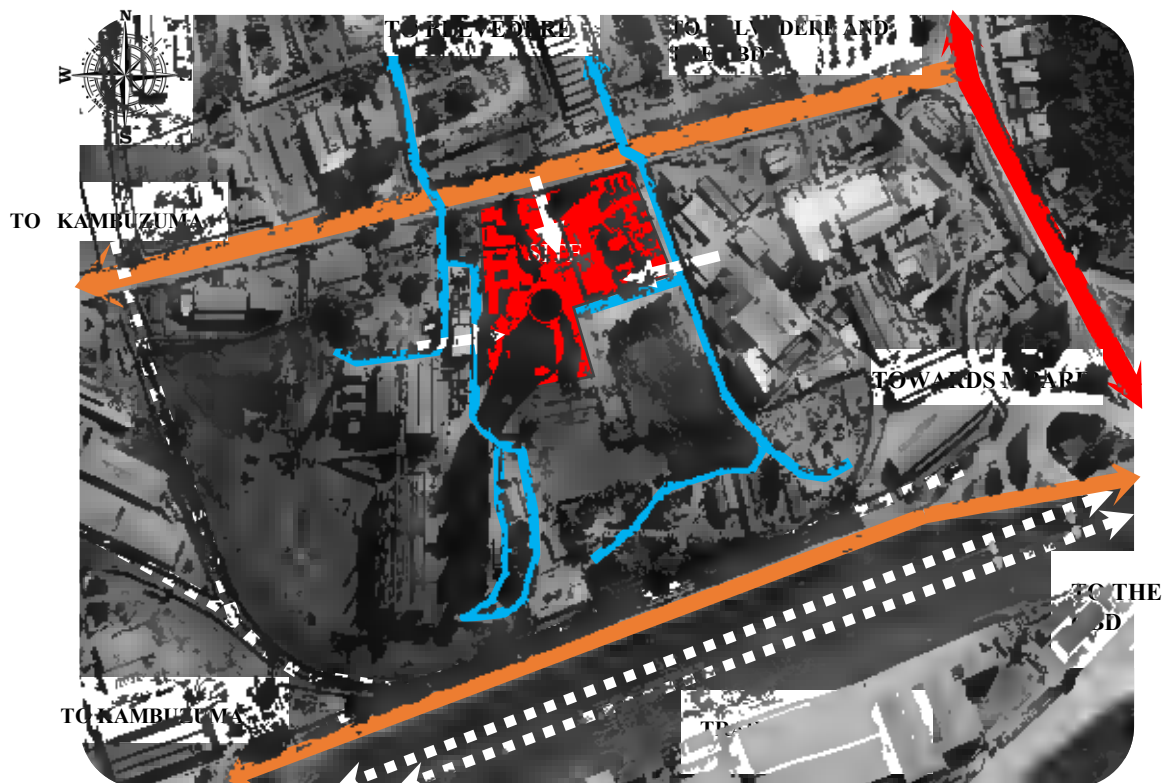


Figure 95: The Harare Power Station Limits

3.14.2 Accessibility



- ❖ The site is visible from three directions: the north, west, and east points

- ❖ Although well connected, there is a distinct lack of pedestrian roads and cyclist pavements.
- ❖ The updated roads will allow for the site to be accessible from all angles

3.14.3 Buildings Adjacent to Power Station

Despite its industrial classification, this zone exhibits a mixed-use character, integrating commercial, industrial, and residential typologies. Architecturally, the zone displays considerable diversity, encompassing forms from traditional vernacular, such as grass-thatched roofs, to contemporary concrete structures with brick infill.

- ❖ Fenestration pattern: elongated, linear, rectangular windows extending across building façades.
- ❖ Structural systems: load-bearing wall systems, often incorporating concrete lintels over window openings and concrete columns at structural corners. Steel is employed in a column-and-beam structural system.
- ❖ The material palette: red brick, white and green colours, concrete, and metal.
- ❖ Roofs are typically inclined/gabled, clad with metal sheeting, and supported by either steel or timber trusses.



Figure 96: The Buildings Surrounding the Site: Source Author

3.14.4 Utility Infrastructure

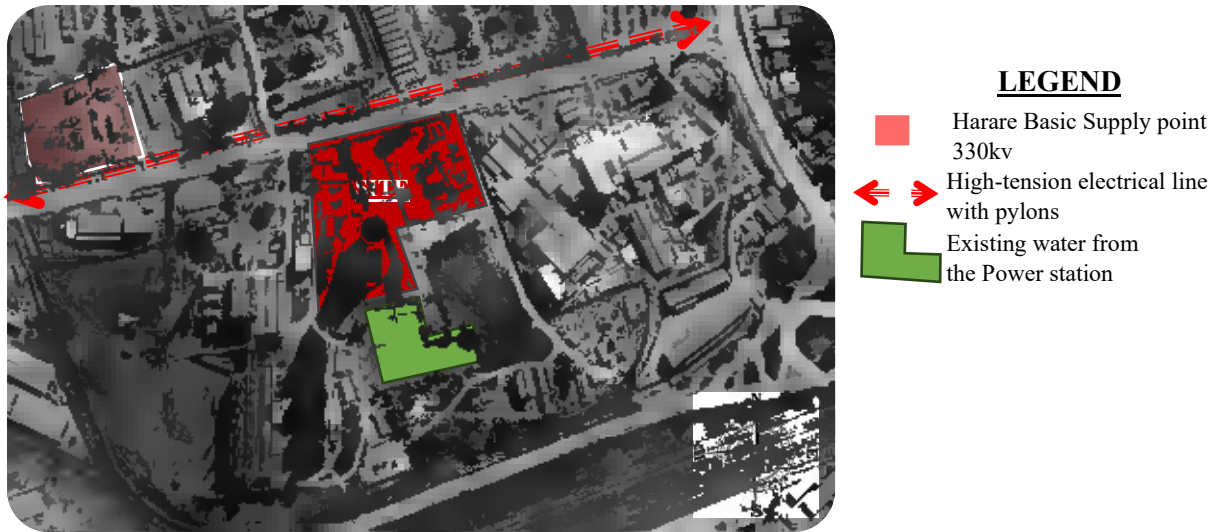


Figure 97: Utility Infrastructure Around Site: Source (Google earth)

3.14.5 Power Station Site Constraints and Proposed Changes

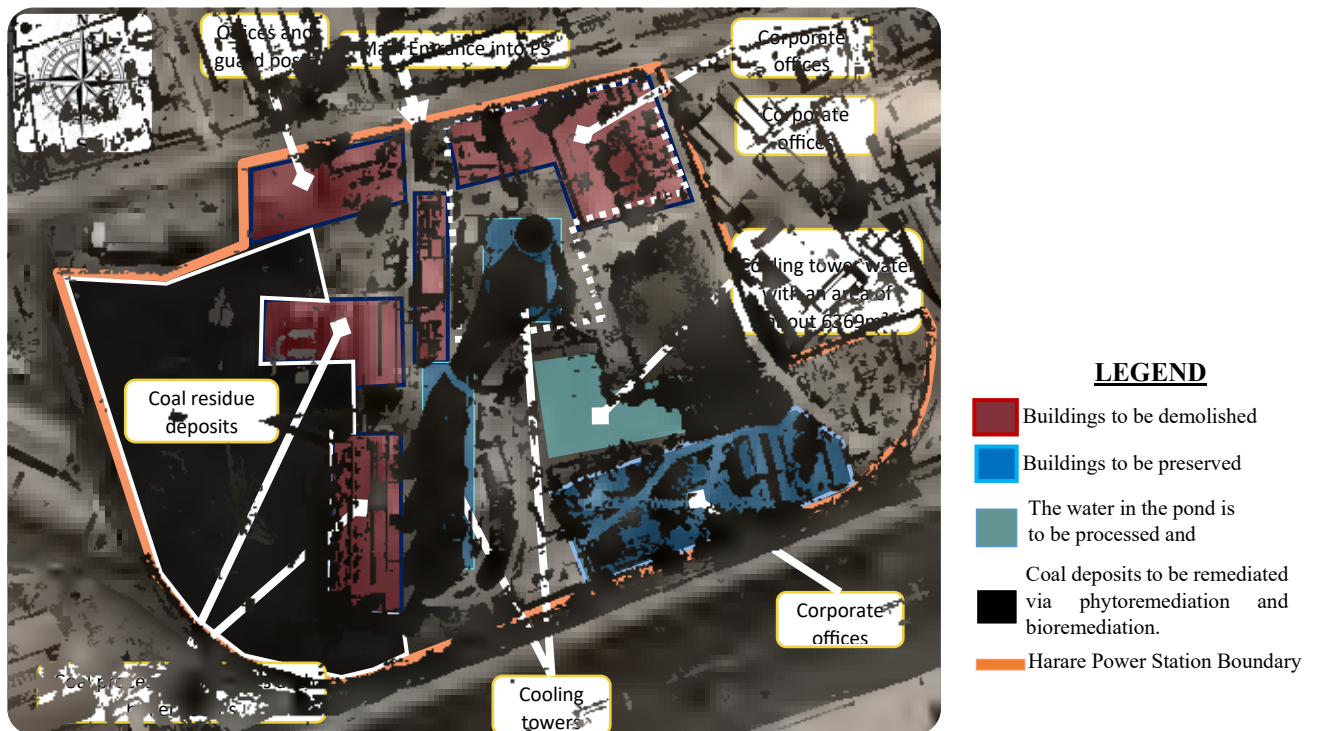


Figure 98: Proposed Modifications to the Harare Power Station: Source (Google earth)

The site is generally flat. After demolishing the buildings, residual bricks will be reused on the new building, and the rest of the materials will be directly used on the site for ground levelling and a base for the proposed road. This strategy significantly reduces construction waste sent to off-site landfills and conserves new building materials.

3.14.6 Site Shape

The has an irregular shape, which allows for various viewing angles of the project and dynamic spaces. The area of the site is 19968.77m² (2 hectares). The perimeter is 647.5m.

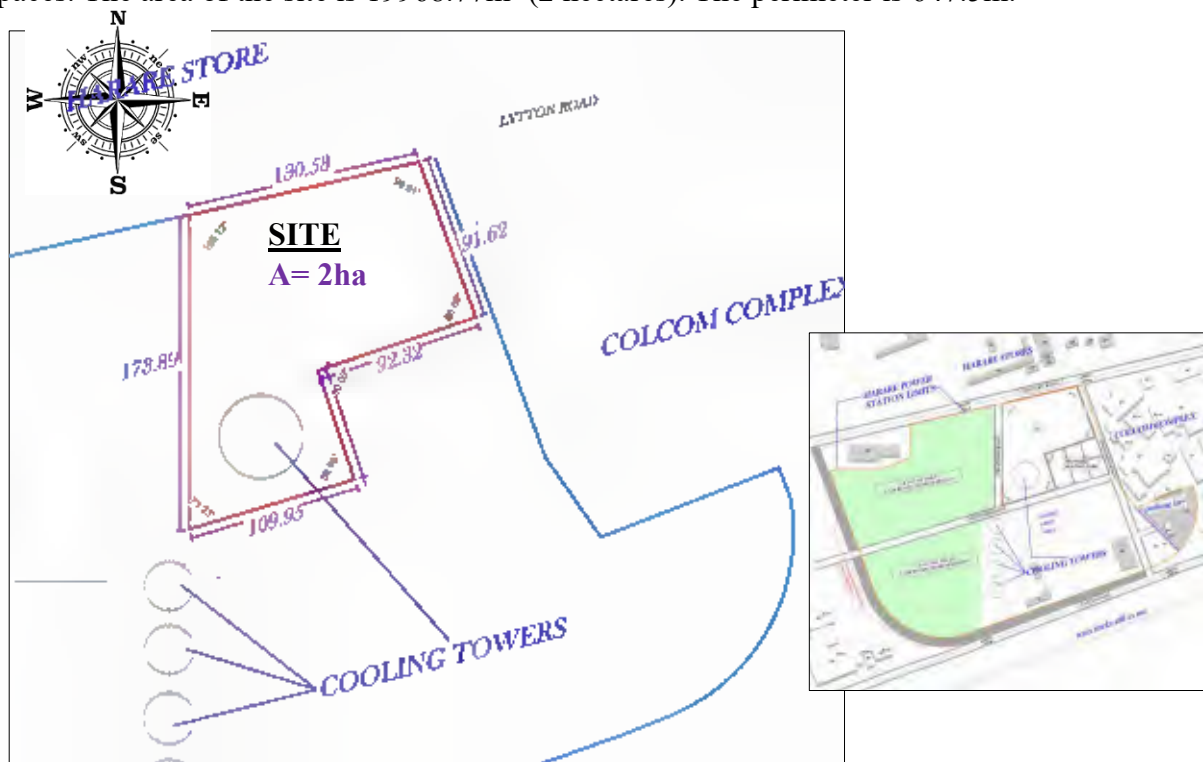


Figure 99: Site Limitations and Dimensions: Source (Author)

3.14.7 Micro Climate Overview

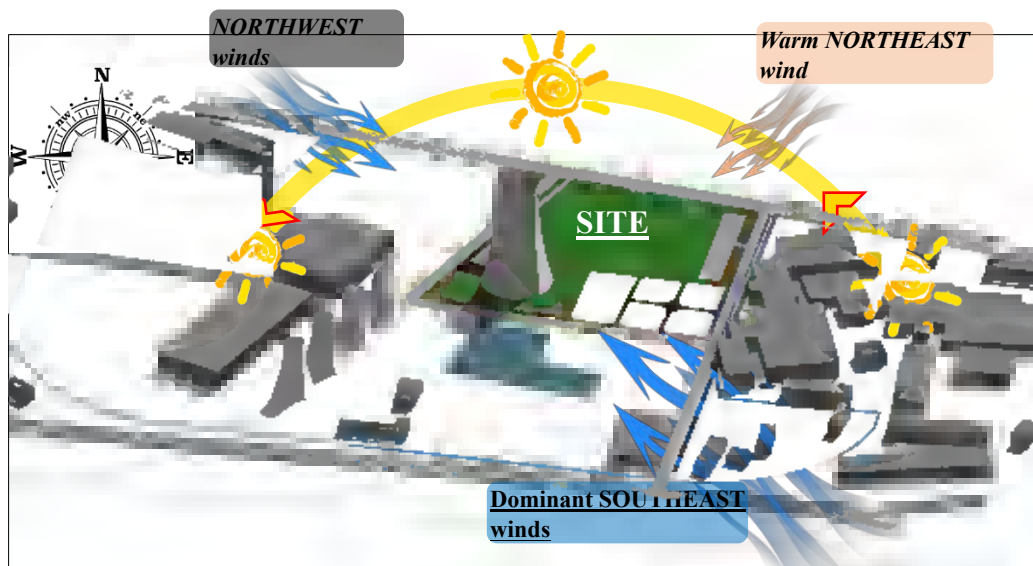


Figure 100: Site Climate Overview: Source (Author)

- ❖ The annual average temperature is 21.94°C, with the lowest reaching 8.3°C and the maximum being 30.5°C.
- ❖ The annual amount of rain is around 805.2mm/32 inches.
- ❖ The dominant winds are from the Southeast.
- ❖ It also receives over 2700 hours of sunlight annually.

3.14.8 Site Legibility and Visual Prominence

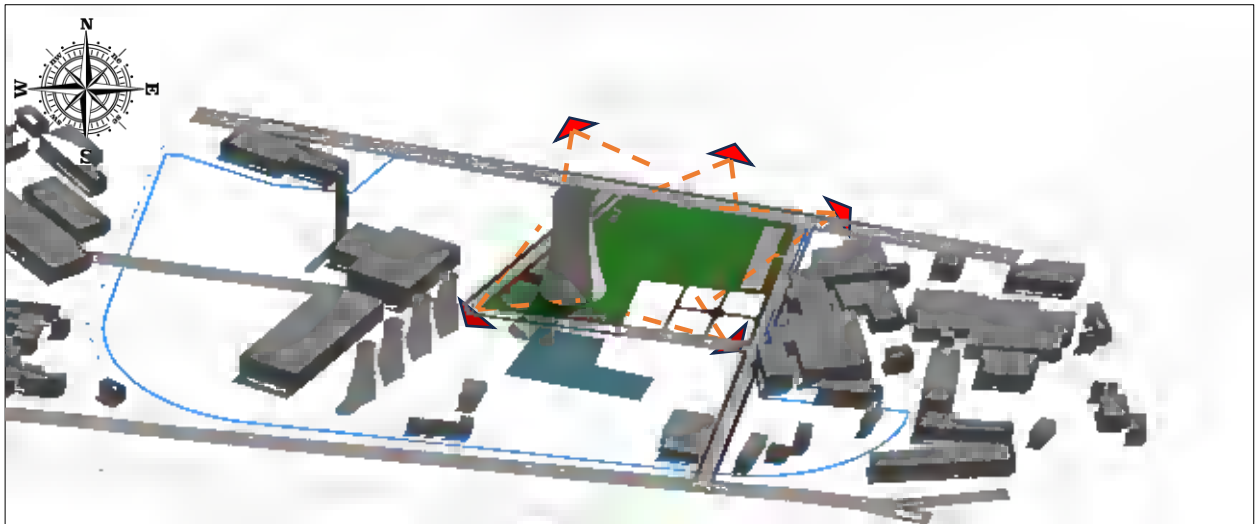


Figure 101: interesting Visual Angles: Source (Author)

After the placement of the projected roads, the site is now visible from all corners and angles.

3.14.9 SWOT Analysis

We are going to evaluate both internal and external factors to inform strategic planning and decision-making for the redevelopment of the PowerStation (Brownfield).

Strengths

- ❖ The site is easily accessible and offers strong visibility.
- ❖ It is ideally located in a district where it does not fit in the urban structure and morphology
- ❖ The location benefits from good sun exposure.
- ❖ It is well connected via a medium-traffic road network
- ❖ Existing structures on site with significant historical value, offering adaptive reuse potential.

Weaknesses

- ❖ Presence of noise pollution.

- ❖ Architectural facades do not receive appropriate treatment in the urban district (or "lack appropriate architectural treatment")
- ❖ Presence of a cooling tower within the site.
- ❖ Dominant winds have multiple effects on the building (structure, moisture penetration, effect on outdoor spaces, dust, transport pollutants)
- ❖ There are existing buildings in the power station (HCPS)
- ❖ Presence of site contamination (coal deposit field)
- ❖ Poor pedestrian connectivity
- ❖ Public perception issues or "social blight"

Opportunities

- ❖ Contribute to the urban densification policy
- ❖ Promote intellectual exchange (e.g., creating spaces for collaboration, research, or educational facilities).
- ❖ Creation of a dynamic environment.
- ❖ Availability of specific grants and building certifications (e.g., LEED, BREEAM) on brownfield clean-up.

Threats

- ❖ Environmental impact of the surrounding light industrial activities.
- ❖ Presence of air pollution.
- ❖ Poor road infrastructure
- ❖ Potential for unforeseen site complexities

Conclusion

After thoroughly analysing the selected site, including its needs and the broader urban context of Harare and the Workington district, we gained valuable insights into the area's urban morphology, structure, and constraints. The site analysis examining physical characteristics, accessibility, climate, and limitations allowed us to identify the site's strengths, weaknesses, opportunities, and threats. These findings form a crucial foundation for the next phase of our project. Implantation of the site to the side of the sun so as to maximize passive solar gain during colder months

4 ARCHITECTURAL APPROACH

Introduction

Drawing inspiration from successful brownfield redevelopment projects worldwide, it is evident that a multidisciplinary approach is **essential, one** that balances environmental restoration with social and economic regeneration. By integrating lessons from master plans that transform entire urban districts, we **recognise** the importance of **harmonising** modern design with the preservation of historical identity to create vibrant, sustainable economic hubs. This chapter focuses on implementing the architectural project into the chosen site within the urban context and, at the same time, creates a hub that attracts the general population as a response to failure in startup growth and economic diversification. Ultimately, our project aims to unlock the full potential of the site, aligning with sustainable development principles (from section 1.10) and fostering a dynamic, inclusive economic district as envisioned in the master plan.

4.1 Architectural Programming

After analysing the examples, we realise the needs in our project and, drawing from those examples and their core programmes, we can realise the necessary functions, spaces, and size of those areas in our project. Thus, we have the term architectural programming, which is a structured process that identifies and defines the needs, functions, and spatial requirements of a project before the design phase begins. (William M Pena, Steven A Parshall, 2001)

Through this process, we arrive at a clear understanding of the project's purpose. By analysing:

1. The objectives of the project.
2. Users: that is, who will use the space and their specific needs, expectations, and behaviours.
3. Functional requirements: the activities that will take place in the building, the relationships between different spaces, and the required adjacencies. We establish the necessary spaces and their relationships within the project.
4. Technical Requirements: Setting out the technical specifications for the building, including structural, mechanical, electrical, and plumbing systems.
5. Environmental Requirements: Addressing environmental considerations such as energy efficiency, sustainability, and impact on the surrounding environment.(Altearea Ingenierie, n.d.)

This phase involves defining the core functions that shape the spatial organisation, which are aspects that are essential to the success of the project.

To answer some of the needs of programming, we have to address some of the following questions.

For Who: Identifying the users, such as employees, students and the general public and focusing on their specific needs, expectations, and behaviours.

What: Defining the primary activities and functions that will occur within the building, such as workspaces, meeting areas, and public gathering spaces.

Where: by analysing the site, its urban context, the surrounding environment, and potential negatives/positives

How: by establishing architectural concepts such as incorporating sustainable design principles, ensuring accessibility, and creating a user-friendly environment.

4.1.1 Permanent Users and Occasional Users

By definition, these terms can lead us to the understanding of how the space and function will be distributed, following how the space is used in the architectural project. (Amit Devale, 2022) This project will host around 1200 people.

Permanent Users: refer to individuals who occupy a space on a continuous or long-term basis, such as residents in a home or employees in an office. Their interaction with the space tends to be more habitual, and thus their needs influence the design significantly. The number of permanent users will be 256.

Occasional Users: are those who use a space intermittently or temporarily. These users might include visitors, clients, or tourists. Their interaction with the space is typically less frequent but often involves different expectations, such as ease of navigation, clear signage, or short-term comfort.(Anita Johnson, 2023)

<u>Permanent Users</u>	<u>Staff</u>	<u>Occasional Users</u>
Start uppers	Cleaners	Job Seekers
Entrepreneurs	Security	Public
Creators	Gardener	Freelancers
Advisors	Lab Assistants	Researchers
Service providers	Maintenance technicians	The General Public
Event organisers		Corporate Representatives
Mentors		Technology Providers
Managers		
Freelancers		
Designers		
Consultants		
Lawyers		

Government Official		
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Table 19: Table of Users: Source (Author)

4.1.2 User Group analysis

	User Group	Activities	Spatial requirements
By Age	Adults	Working, meeting, communicating, relaxing, and refreshing	Private offices, meeting rooms, common areas, break rooms, restrooms, and lobby
By gender	Male	Working, meeting, observing, calculating, commanding, advertising, collaborating, Offices, meeting rooms, control rooms, break rooms	Private offices, Meeting rooms, and technical rooms
	Female		Private offices, Meeting rooms, technical rooms, Lactation rooms, Restrooms with changing facilities
By role	Director	Managing, controlling, supervising, preparing reports, signing agreements, meeting, delivering, paying, relaxing, eating, cleaning, moving, communicating, receiving, and integrating	Executive office with reception area, conference room, control room, break room, and board room
	Department Supervisors		Similar to directors but with potentially smaller spaces
People With Special Needs	Pregnant Women	Resting, working, Navigating, Social interaction, learning, moving around, accessing facilities	Comfortable seating, accessible restrooms, quiet spaces
	Visually		Tactile signage, contrasting colours, adequate lighting
	Individuals With Down Syndrome		Stimulating environment, sensory-friendly spaces
	People with mobility impairments (disabled)		Wheelchair accessibility, ramps, wide doorways, and grab bars.

Table 20. Shows how different users will use the Project

4.1.3 Qualitative analysis

1. Reception

As the first point of interaction, setting the tone for the incubator. Designed for welcoming visitors and providing general guidance. Well-designed reception areas foster interaction, as detailed in innovation hubs.

2. Research and Development

Facilities for technical innovation and product development, often integrating advanced tech and labs. R&D infrastructure examples include labs for product innovation in business centres

3. Event Spaces

Multi-purpose areas are designed for large gatherings, including conferences, workshops, and exhibitions. Emphasis on adaptability in incubator designs supports varied event needs

4. Enterprise and Services

Dedicated to providing essential support for startups and businesses, including consultancy and funding access. Common features in entrepreneurial hubs, such as enterprise service zones

5. Relaxation and engagement

Spaces promoting informal collaboration and mental recharge. Relaxation spaces are increasingly central in modern incubator designs

6. Administration

Central to managing the operational and strategic goals of the incubator. The designs vary, but are crucial for operational efficiency

7. Logistics

Spaces supporting the management of resources, storage, and material handling. Practical logistics are vital for seamless incubator operation.

8. Parking

Facilities ensure smooth access for users and visitors. Designed with accessibility in mind, parking solutions cater to various user needs.

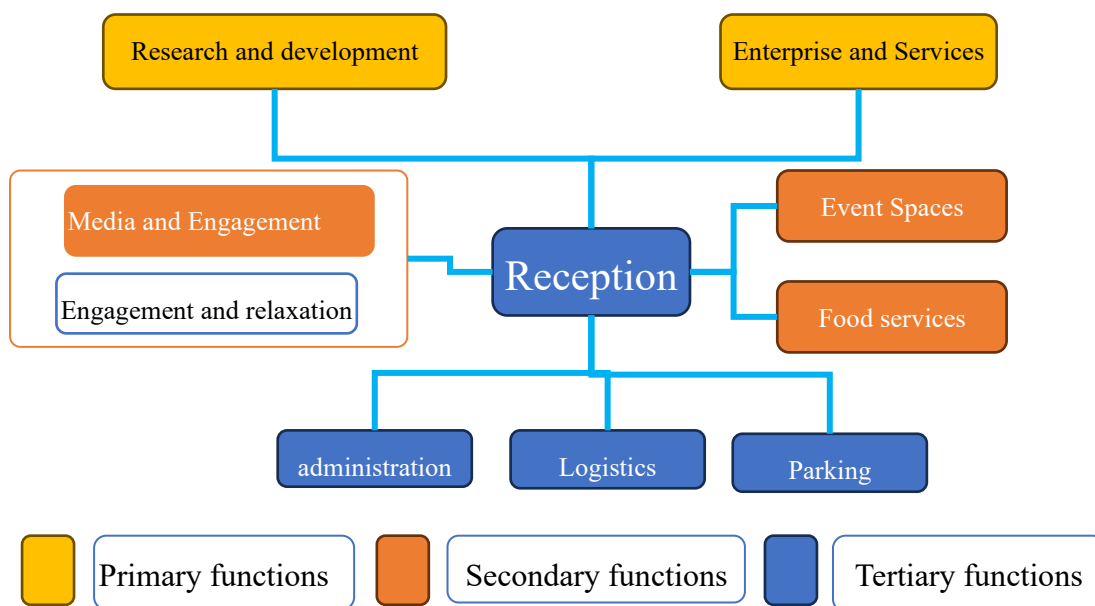



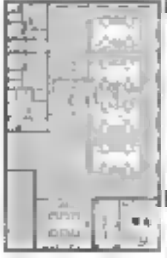

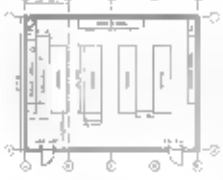
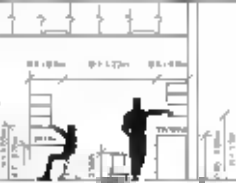
















Figure 102: The Different Functions of the Project: Source (Author)

4.1.4 Qualitative Program

Function	<u>Activities</u>	<u>Illustrations and standards</u>	<u>Comment</u>
<u>Reception</u>	<ul style="list-style-type: none"> -Greet and direct visitors. -Guest check-ins and security screenings. -Informing visitors about building functions and navigation. -Hosting casual meetings or initial client interactions. -Displaying promotional materials or announcements. 	<p>Atrium</p>  <p>Halls</p> 	<ul style="list-style-type: none"> -Open plan spaces -Monumentality, that is, the scale and grandeur -flexibility -prestige -acoustic comfort -Thermal comfort -safe and secure spaces
<u>Research and Development</u>	<ul style="list-style-type: none"> -Conducting experiments and field trials. -Developing and refining prototypes. -co-working spaces -Cross-functional collaboration on product development. -Research presentations and knowledge-sharing sessions. -Exploring new methodologies and approaches. Ideation -prototyping -Emerging technologies -ideation -prototyping -Emerging technologies 	<p>co-working areas</p>   <p>Laboratory norms and standards</p>    	<ul style="list-style-type: none"> -natural lighting and ventilation -stimulating spaces -promote focus and concentration -acoustic and visual comfort -flexibility and adaptability -collaboration and connectivity -spaces that increase innovation and creativity

<p>Event Spaces</p>	<ul style="list-style-type: none"> -Hosting conferences, seminars, and workshops. -Exhibitions and trade shows. -Cultural performances -Art installations. -Corporate events and product showcases. -Community outreach programs and public forums. -Training and certification sessions. -Gala dinners or networking receptions. 	 <p>conference rooms</p>  <p>Exposition room</p>  <p>Auditorium spaces and norms</p> 	<ul style="list-style-type: none"> -flexible and adaptable spaces -acoustic comfort and sound control -Visibility and sightlines are to be looked at and appropriately addressed
<p>Relaxation and Engagement</p>	<ul style="list-style-type: none"> -Casual networking -Group activities -Recreational games - team-building exercises. -Coffee breaks and informal chats in cafes. -Using outdoor spaces for relaxation or inspiration. -Holding informal brainstorming sessions. -Quiet time for reading or reflecting. 	  <p>Open lobby areas</p>  <ul style="list-style-type: none"> -gaming rooms -circulation that promotes interaction 	<ul style="list-style-type: none"> -inviting atmosphere and aesthetically pleasing spaces -functionality and flexibility -comfort and well-being of the users -open layout to promote engagement and interaction
<p>Administration</p>	<ul style="list-style-type: none"> -Strategic planning and decision-making meetings. -Financial management and budget allocation. -HR processes like recruitment and appraisals. -Facilities management and operational oversight. -Handling legal and compliance matters. -Internal reporting and record-keeping. -Managing external stakeholder relationships. 	 <p>En-closed offices</p>  <p>Landscape view</p>  <p>Meeting rooms</p>  <p>Office norms</p>  <p>Traditional Cubicles Open Space Team Cluster</p>	<ul style="list-style-type: none"> -Efficiency and workflow -privacy and confidentiality -professionalism and image -technology integration and high-quality finishes -secure and safe places for the workers

Office setups

Logistics	<ul style="list-style-type: none"> -toilets and changing rooms -management of electricity, water -Managing storage and inventory systems. -Packaging and labelling products. -Maintaining efficiency in distribution processes. 		<ul style="list-style-type: none"> -Ensuring energy efficiency of the building -Safety and security of equipment -Integration of new technology for the efficiency of machines
Parking	<ul style="list-style-type: none"> -Managing an electric vehicle charging station -Facilitating ridesharing and carpooling arrangements. -Overseeing bicycle parking and storage. -Organising shuttle services for large events. -Coordinating with public transport services. -Ensuring traffic flow and pedestrian safety. 		<ul style="list-style-type: none"> -ensuring ease of accessibility and convenience -Usage of sustainable materials -reducing water runoff and noise pollution -Solar panel covered parking spaces

Table 21: Spatial Norms and Needs: Source (Author)

4.1.5 Functions Area Schedule

FUNCTI ONS	SPACES	Subspace	Unit s	Area m²		
RECEPTION	Entry Security Checkpoint			5		
	Main Reception Desk			30		
	Visitor Waiting Areas/Lobby			400		
	Information Kiosks and display galleries			100		
	Public toilets	Male		1	30	
		Female		1	30	
	RECEPTION AREA =595					
RESEARCH AND DEVELOPMENT	Main Library	Reception	1	15	635	
		Storage	1	30		
		Quiet rooms	3	30		
		Bookcases and Sitting Area	1	500		
	Simulation Rooms		3	50		
	Prototype Work Areas		4	50		

	Research Laboratories	General laboratories	3	50
		Collaborative laboratory	1	80
	Product/ Prototype Testing Zones		3	60
	AI Research Lab		1	120
	Innovation and Design Studios		3	30
	Brainstorming areas		2	60
	Data Analysis Rooms		2	30
	Offices		5	32
	Multi-Purpose Room			350
	Toilets	Male	2	20
		Female	2	20
	Stockage	Dry	2	15
		Cold	2	15
	RESEARCH AND DEVELOPMENT = 2435			
ENTERPRISE AND SERVICES	Co-Working	Open spaces	8	30
	Offices		8	20
	Board Room		8	30
	Archives/Storage		8	10
	Client Meeting and Pitching Rooms		4	30
	Business Development Units		2	30
	Consultation Offices		3	25
	Legal Aid Rooms		2	25
	Financial Advisory Office		1	30
	Insurance		1	30
	Advertising Agency		1	30
	Toilets	Male	2	15
		Female	2	15
	ENTERPRISE AND SERVICES=905			
EVENT SPACES	Conference Halls		2	200
	Multi-purpose Auditorium		1	600
	Exhibition Space		1	500
	Technical control room			15
RE L/A XA	Break Rooms		5	30

	Meditation pods		6	20
	Lounge Areas		2	400
	Gaming Rooms		3	30
	Toilets	Male	1	15
		Female	1	15
RELAXATION AND ENGAGEMENT=1815				
<u>FOOD SERVICES</u>	restaurant	Kitchen	1	40
		Storage	2	10
	2 x cafeterias	Open the preparation and serving area	2	35
		Storage	2	10
	Dining Area (Restaurant and cafeteria)		1	600
FOOD SERVICES=715				
<u>ADMINISTRATION</u>	Accounts Offices		1	20
	Staff Lounge		1	50
	Human resources management		1	15
	Executive Office		1	30
	Deputy Manager		1	16
	Secretary		1	15
	Reception		1	15
	Meeting Rooms		1	40
	Toilets	Male	1	10
		Female	1	10
ADMINISTRATION=211				
<u>LOGISTICS</u>	Surveillance Room		1	20
	Technical Rooms	Mechanical Rooms (ventilation, heating, and air-conditioning systems)	2	20
		Electrical Room	1	20
		Telecommunication	1	10
		Water Management	1	30
	Inventory Management Rooms		6	10

		Storage Rooms		5	12
		LOGISTICS=220			
EXTERIOR SPACES	Parking	Bicycle Racks		16	0.9
		EV Charging Stations		10	11.25
		Parking Lot		92	11.25
		Parking Lot for the disabled		8	11.25
	Outdoor Patios		2	80	
	Green Spaces			1200	
	Built land		7 661.166m²		
Exterior Spaces		12 321.255m²			
Total area		19 645.939			
CES		0.38%			
COS					

Table 22: Area schedule: Source (Author)

Matrix of Spatial Relations Between Functions

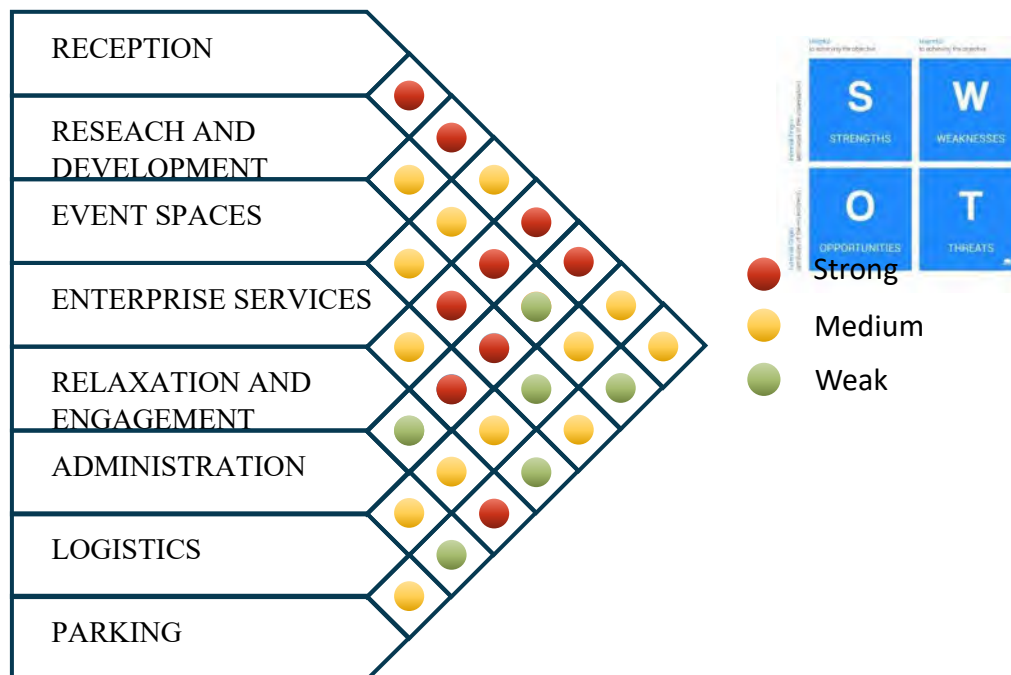
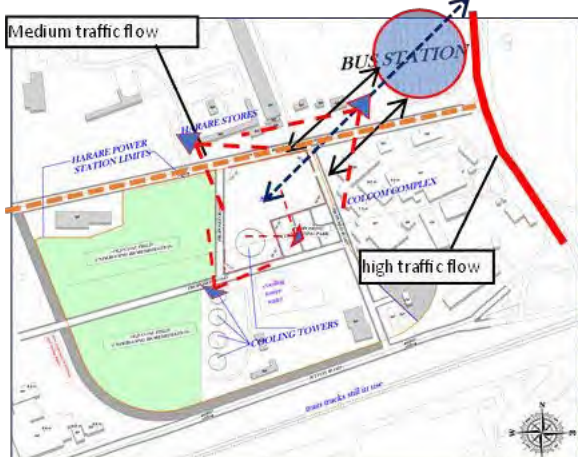
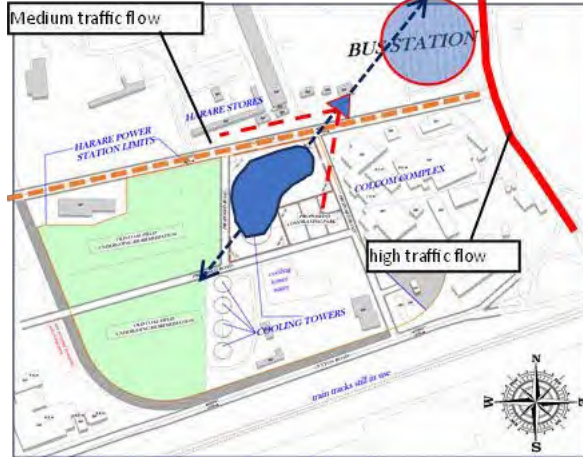
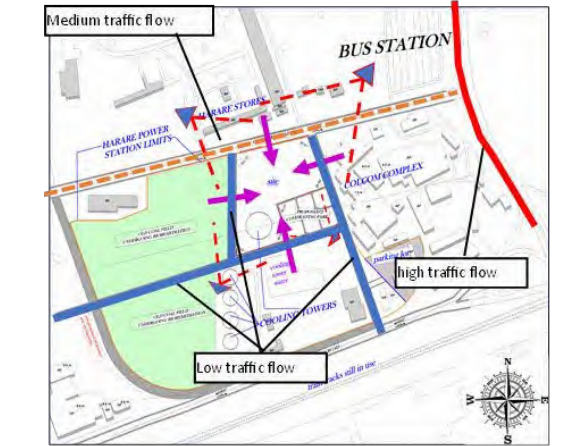
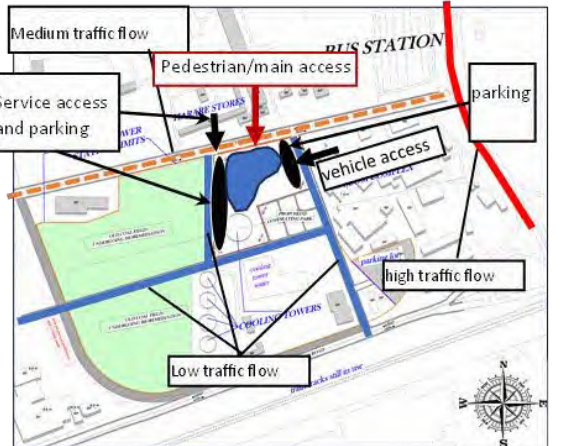


Figure 103: How Different Functions are Related: source (Author)

4.2 Zoning

By focusing on the internal factors of the swot analysis, which are the Strengths and weaknesses of the site, we can come up with a proper zoning that helps in capitalising on the strengths and

either neutralising the weaknesses or converting them to strengths that will give the project strong aesthetic and architectural value.

<u>Point Of Analysis</u>	<u>Intervention</u>
<ul style="list-style-type: none"> ❖ It is well connected via a medium-traffic road network 	<ul style="list-style-type: none"> ❖ The implantation of the project will follow the line of best visibility and closer to the medium traffic flow route.
	
<ul style="list-style-type: none"> ❖ The site is easily accessible on all 4 sides and offers strong visibility because of the proposed roads. 	<ul style="list-style-type: none"> ❖ We will access the site from 2 sides: by the medium traffic road to the north and the low traffic route to the east: for the parking/service access and to access the parking.
	
<ul style="list-style-type: none"> ❖ Existing structures on site with significant historical value, offering adaptive reuse potential. ❖ The location benefits from good sun exposure. 	<ul style="list-style-type: none"> ❖ By implanting a function that is related to light industrial activity (research and development) and refurbishing of the cooling tower fixing social blight. ❖ Implantation of the site to the side of the sun so as to maximize passive solar gain during colder months

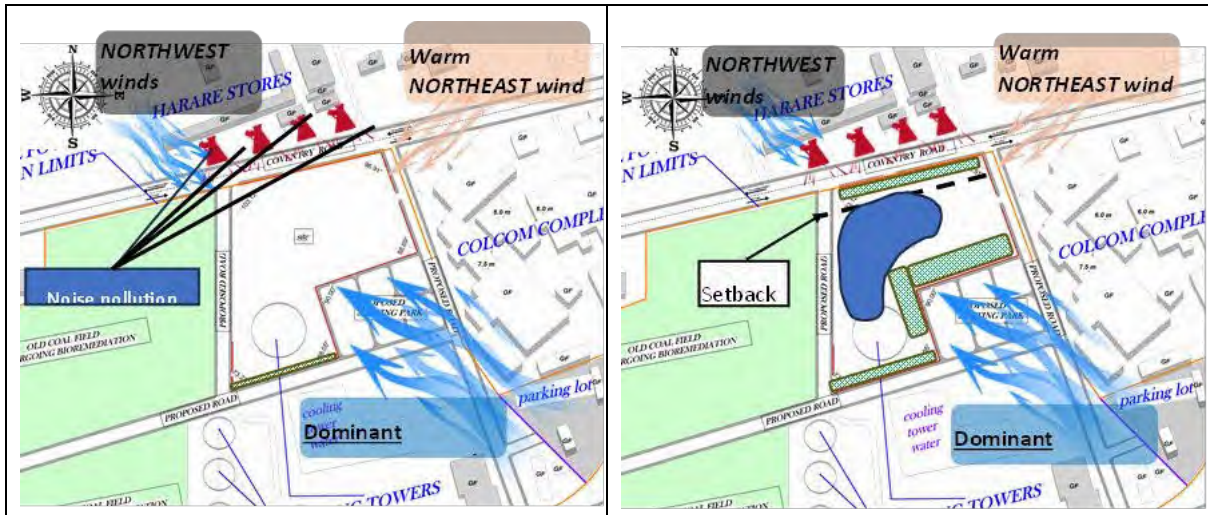


Table 23: Project Implantation: Source Author

4.2.1 Spatial Zoning

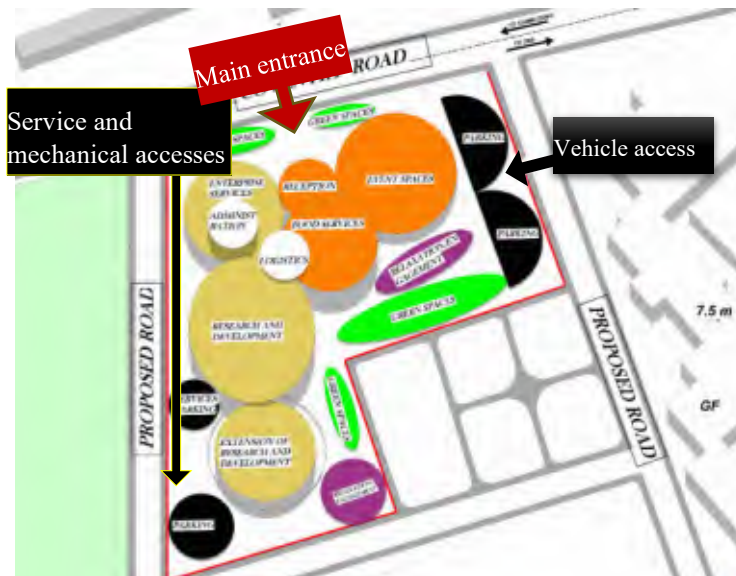


Figure 104: Spatial Zoning: Source (Author)

4.3 Inspiration

The drum is composed of two circular cow hides. When you dismantle the drum, it gives you two circular structures that are joined by threads. The interlacing of the threads around the drum gives rhomboid shapes.

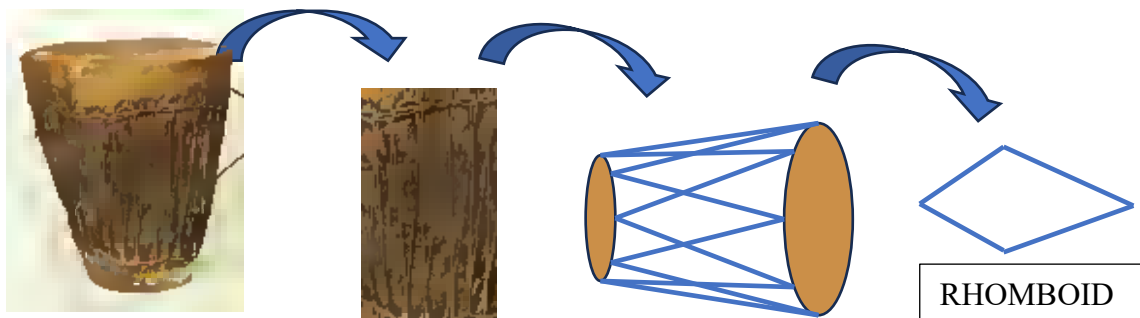
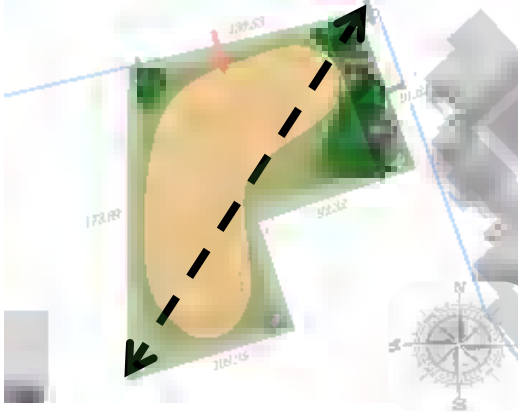
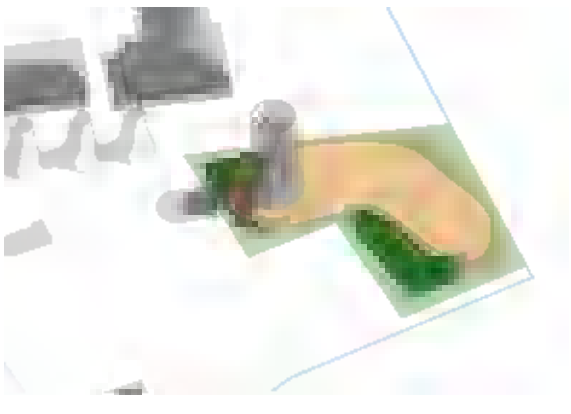
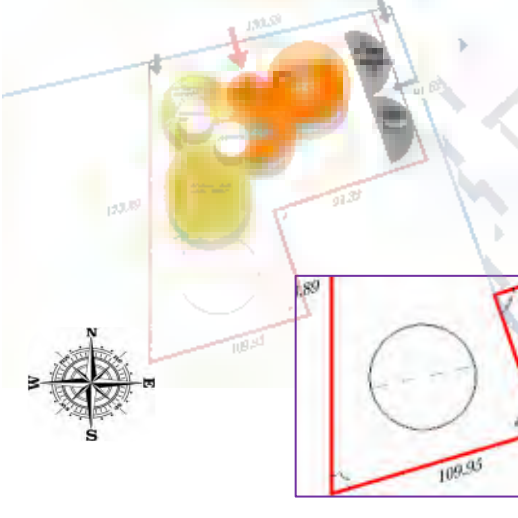
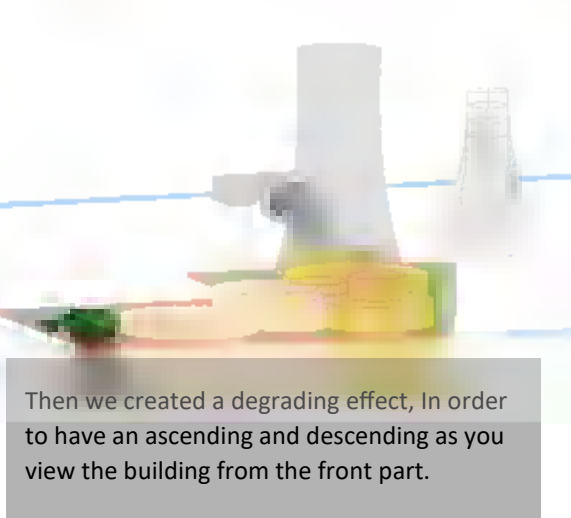

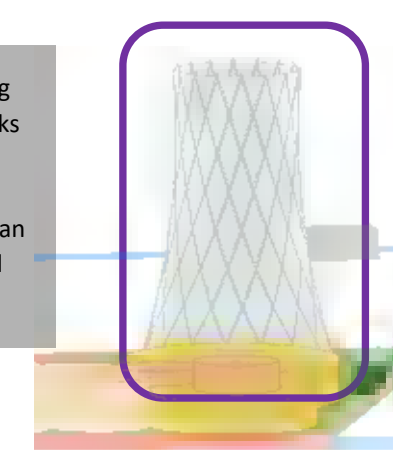


Figure 105: Drum Inspiration: Source: (Author)

4.4 Project Genesis

<u>Comments</u>	<u>2D</u>	<u>3D</u>
<p>By adopting the site shape which is an irregular L shape, the project can be implanted following the shape. Allowing a flexible placement of the functions</p>		
<p>By laying out the building functions in accordance to the spatial functionality and spatial relationships of the different areas, we get the 2D form and a probable 3D planning. The volume sizes attribute to the size of functions giving an area focused zoning.</p>		 <p>Then we created a degrading effect, In order to have an ascending and descending as you view the building from the front part.</p>
<p>The major constraint (cooling tower) can be a cultural symbol. By using the inspiration of the traditional drums which have the interlaced pattern that gives birth to a rhomboid shape.</p>		 <p>The cooling tower, looks like an inversed Zimbabwean Traditional drum.</p> <p>This then gives us this lattice structure on the cooling tower</p>

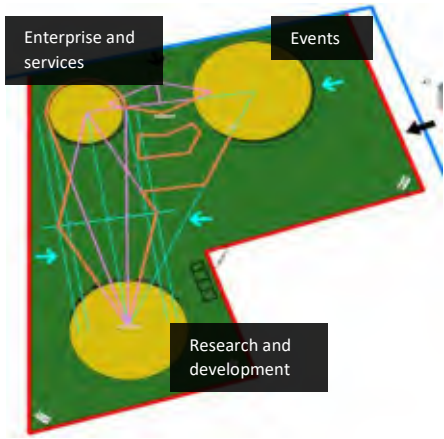
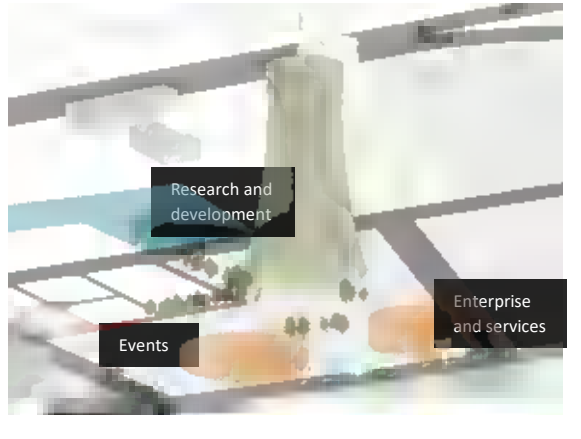

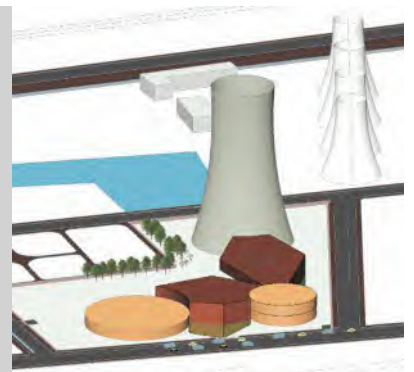
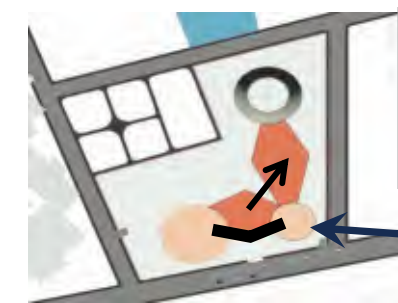
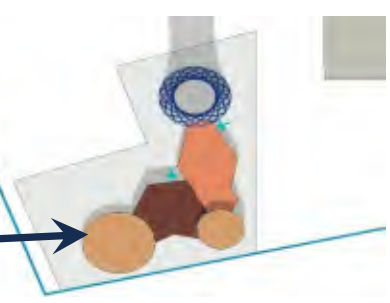
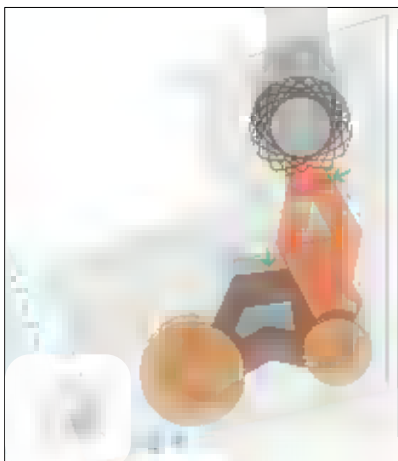

<p>Research and Development is already integrated within the cooling tower Which gives birth to 3 principal circles, (research and development, enterprise and event spaces). Then using the method of interlacing the two ends of the drum we end up with lattice or Criss cross structure. That joins all the functional circles.</p>		
		<p>By joining the 3 major circles. With the rhomboid shape, to an L form connected of 3 circular forms connected by 2 rhomboids</p> 
		<p>The inversion of the front part, and putting the elbow of the rhomboid</p>  <p>stretching</p>
<p>The prior work of the cooling tower was to cool the equipment at the Power station. Now we are going to use it as a chimney to cool the air of the building via natural ventilation, the stack effect and also to have air intake into the building by use of atriums.</p>		<p>This led to subtraction of the middle parts of the volumes so as to allow for air intake and lighting</p> 

Table 24: Genesis of The project: Source(Author)

4.5 Project description

The business incubator is going to be located in the Workington Industrial ward, which is located to the South-west of the Central Business District (CBD) of the capital city of Zimbabwe, Harare. The Workington Industrial ward is comprised mainly of Light industrial activities, and this allows for a business incubator to fully flourish within this district. The project was placed in an old power station that is no longer functional, and is slowly deteriorating, and is now misplaced in the urban morphology. The project will contribute immensely to the country as it tackles all 4 pillars of sustainable development.

The design of the project is based on the local musical instrument called a drum. The facility features 3 major functions: Research and development, Enterprise and Services, and Event spaces. These functions allow the project to host various social activities, which allow for interaction between different organisations. The spaces are made in a way that is flexible and allows multiple functions within the same space.

4.5.1 Site

As the site was an old power station, we had the flexibility to adapt the site to meet the needs of the incubator as outlined in the master plan. The proportion of built to unbuilt space is 0.62:1, meaning that for every 1 m² of unbuilt space, there is about 0.62 m² of built space. Built

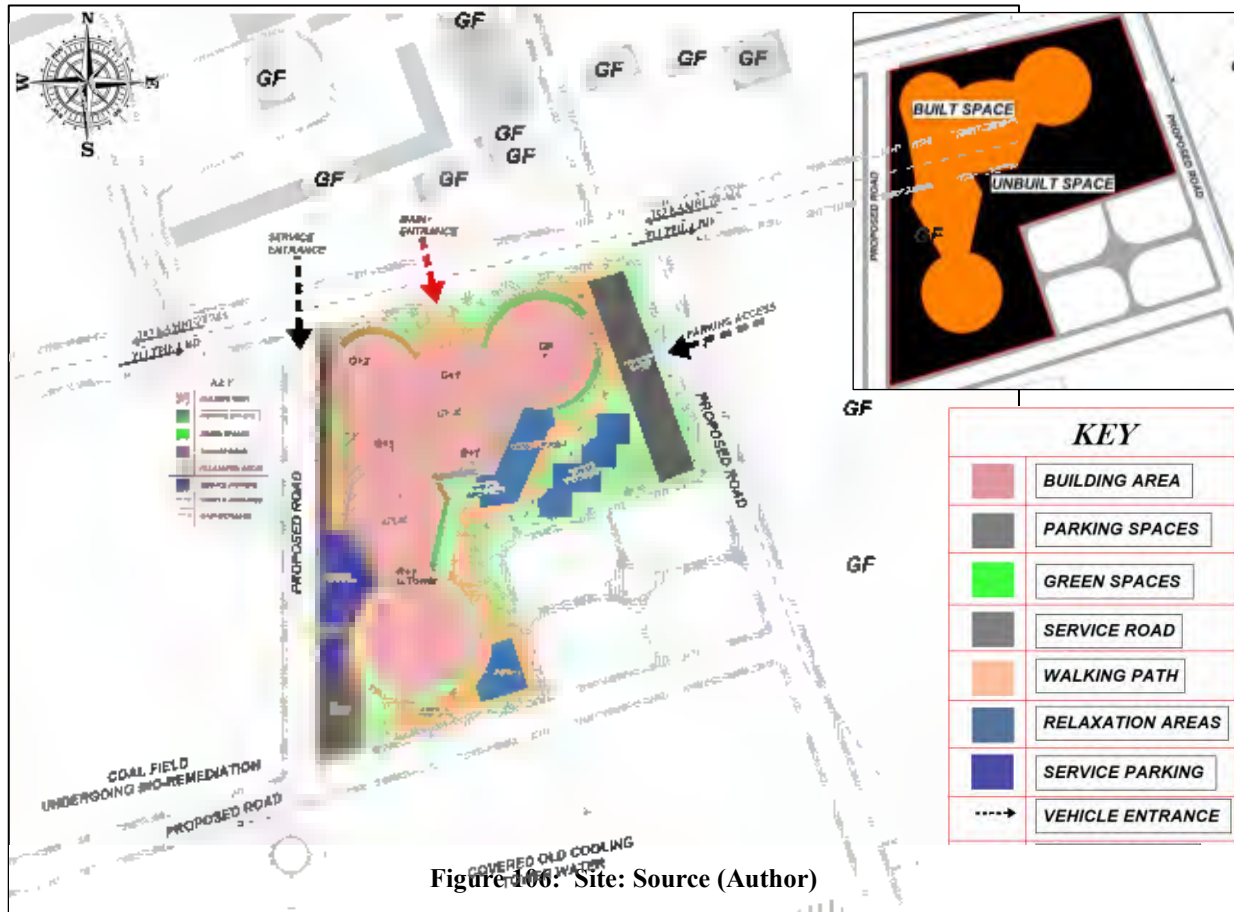


Figure 4.6: Site: Source (Author)

space=38.35%. The unbuilt spaces are divided into: Parking spaces; there are about 60 parking spaces accessible via the east side of the site and are dedicated to the public, and from the north part of the site, there is a service entrance we have 39 parking spaces dedicated to service and permanent users of the building. The whole site is surrounded by green spaces. The accessibility within the site is by the use of walking paths.

4.5.2 Ground Floor

The principal entrance into the business incubator is directly linked to the medium traffic floor route. At the entrance is a reception hall with a welcome and orientation area at the reception desk, a security checkpoint, a spacious waiting area(lobby), and information kiosks coupled with display galleries.

To the left of the main entrance, there are event spaces which include the auditorium, an exhibition space, and access to the Food and services area. Within the event spaces, there are sanitation areas and logistic spaces.

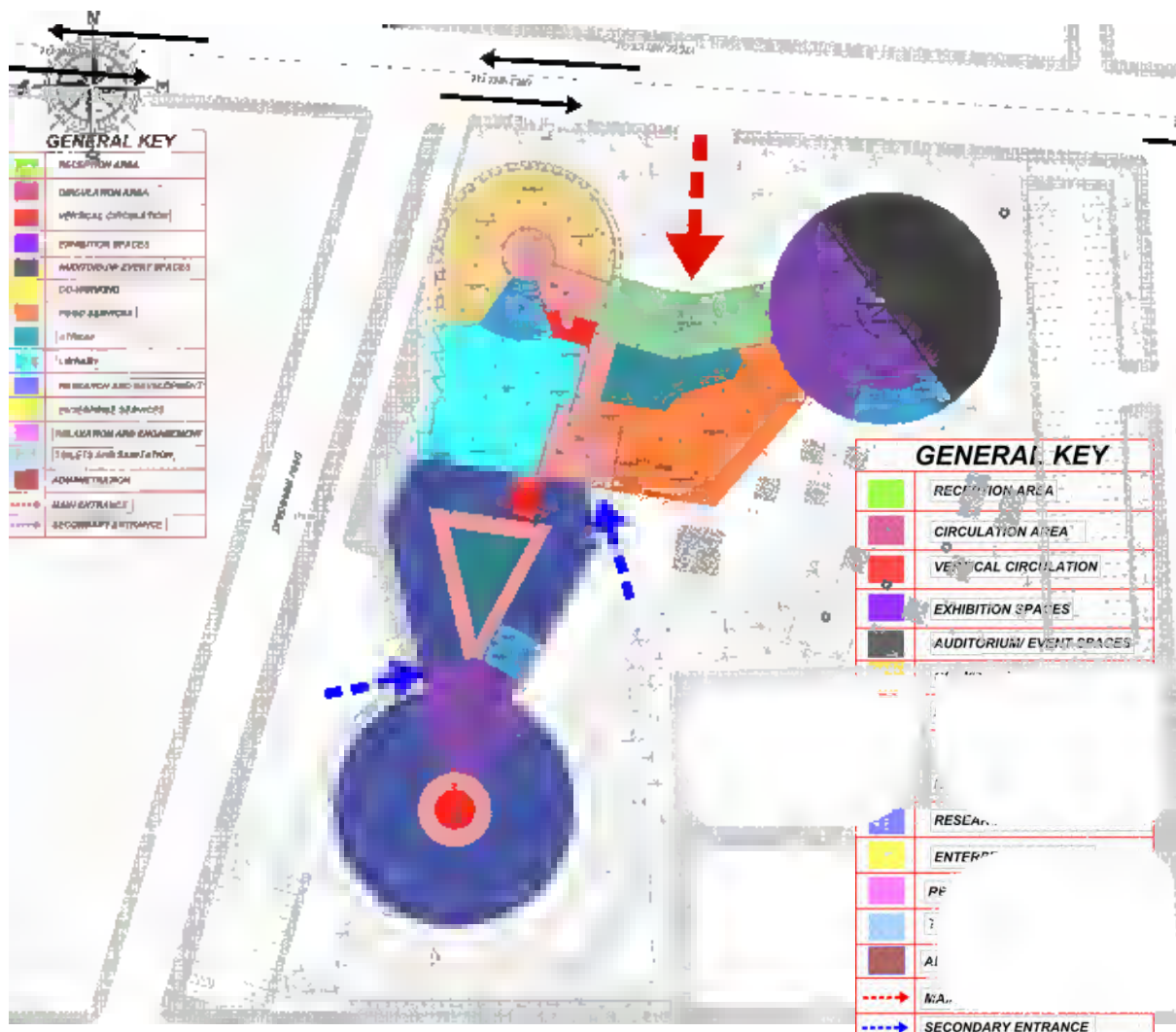


Figure 107:Ground Floor: Source (Author)

To the right, there is a hall that gives access to two major functions: enterprise services and Research and development. the hall then gives direct access to the co-working area, and within the very same hall, there are stairs and an elevator that give access to the upper floors. The hall leading to the Research and development area gives access to the library and Food service areas.

4.5.3 First Floor

The first floor primarily consists of relaxation and engagement areas, as well as event spaces (conference halls) positioned to the east of the project, alongside enterprise services and co-working spaces. These functions are all interconnected through a central circulation spine composed of a hall and a lounge.

Vertical circulation to the second floor is provided by three staircases and an elevator. The primary circulation core is located within the hall situated between the enterprise services and the reception area, offering direct access to the second floor. Upon arrival, the lounge is located

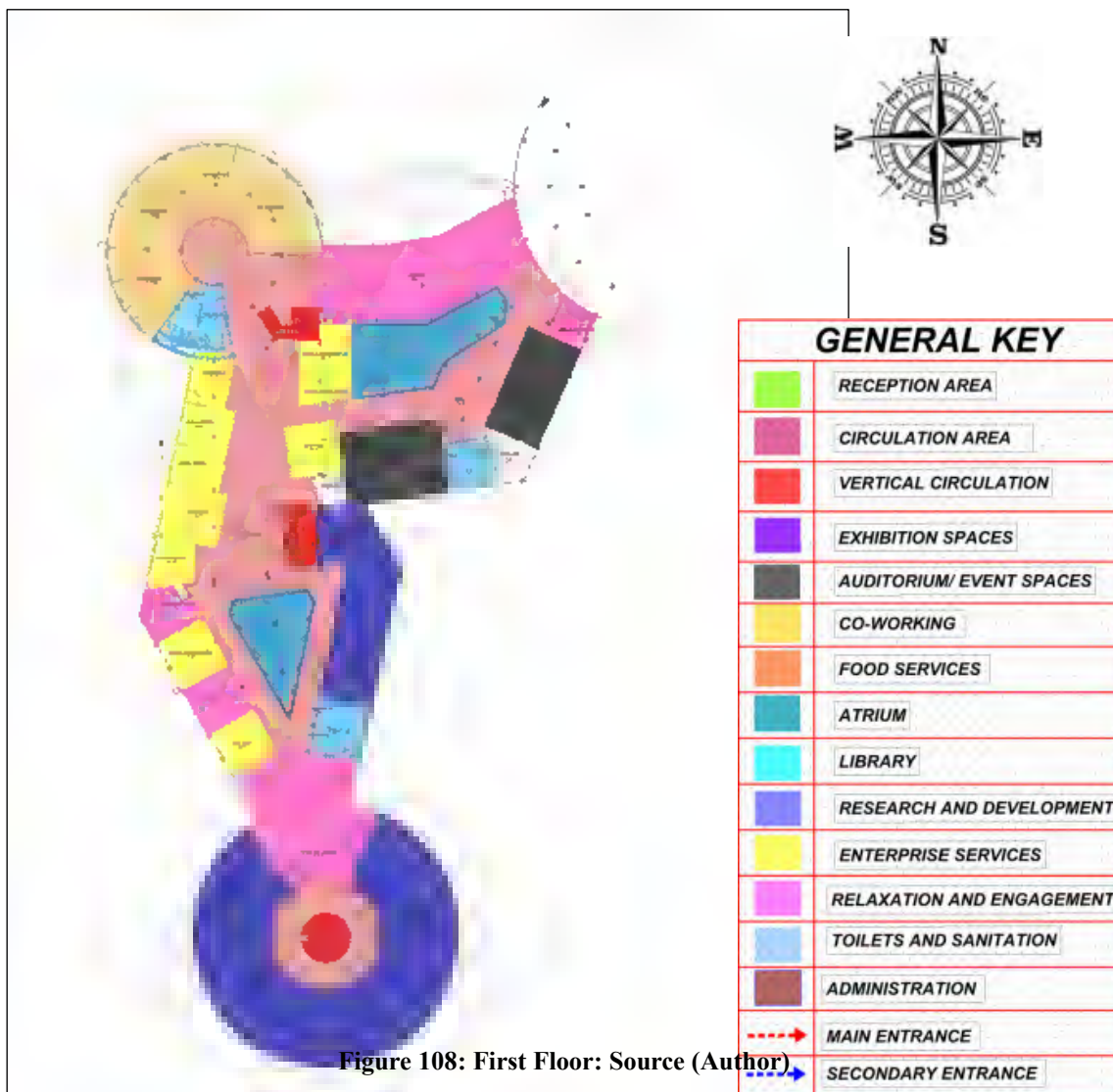


Figure 108: First Floor: Source (Author)

to the right, the enterprise services lie directly ahead, and to the left, a secondary hall/lounge provides extended access to additional enterprise spaces and a continuation of the research and development wing. This hall also connects to the event and conference facilities.

Fire escape stairs, integrated into the layout and accessible via the hall/lounge on the second floor, offer an alternative exit route and lead to a secondary entrance on the ground floor through an adjacent hall, ensuring compliance with safety and emergency regulations.

4.5.4 Second Floor

The second floor comprises one co-working space, the building’s administrative spaces as well as some relaxation and engagement areas.

This level is accessible only via the main stairway and the elevator. Upon arrival, users enter a circular hallway that serves as a circulation spine, providing access to the enterprise services, administration, a lounge, and the toilet facilities. To the right, there is a breakout space offering a visual connection to the lounge on the first floor and a framed view of the double-skinned façade on the main entrance.

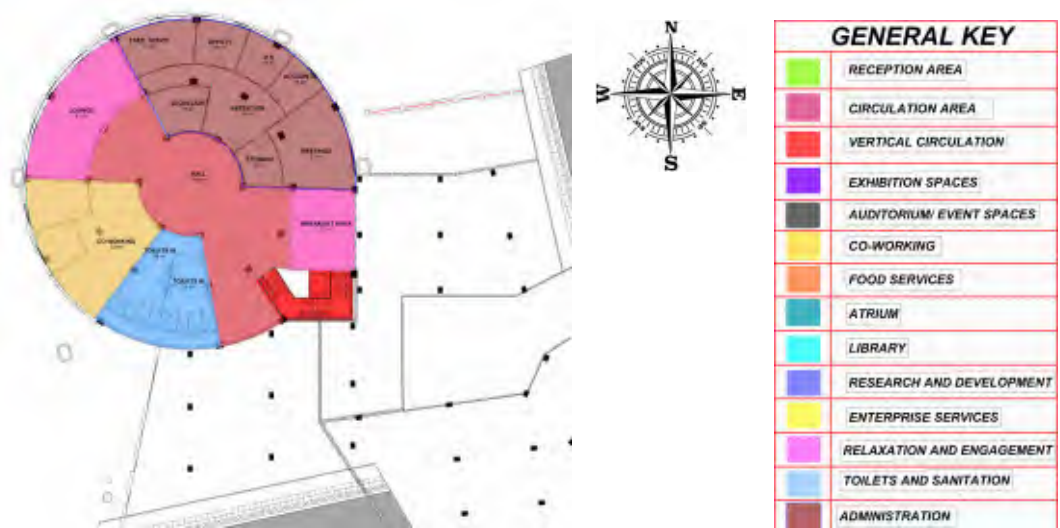


Figure 109: Second Floor Plan: Source (Author)

4.6 Building Facades

The facade design began with the design of the old cooling tower as it stands as the most **prominent vertical feature of the project**. It was initially flat but by **adding a soft curvature** to it and then **capping it with a light material** to soften its industrial **visual rigidity**. This is contrasted at the base by the **long, gently undulating roof and its topping on the front facade** base that runs beneath it, **referencing the curvature** we had initially put on the cooling tower.

The **frontal façade** also features a **tree-like design** as a reference to Zimbabwe’s **vegetation**, and this element supports the extended frontal part of the façade.

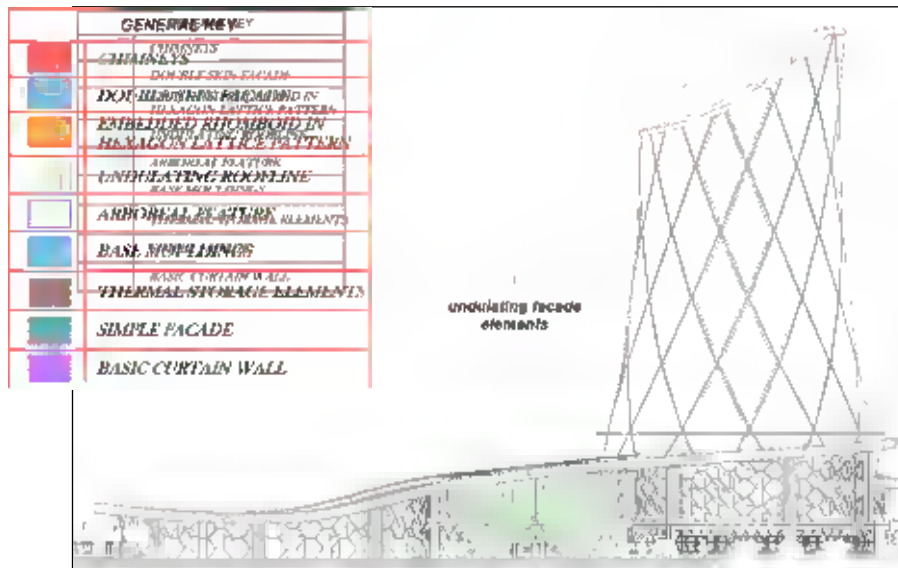


Figure 110: Front Elevation: Source (Author)

From the beginning, the overall shape and detailing of the facade have been **heavily inspired** by the **Zimbabwean traditional drum**. The **rhomboid motif** is expressed through the new **outer skin of the tower**, where we applied a bold **diamond-patterned rhomboid lattice**. Thus, we treated the lattice as both a **cultural reference and a decorative skin** that softens the former industrial identity of the cooling tower. The main facade incorporates **rhomboid-shaped windows** that have been embedded in **hexagonal panels**, reducing the scale of the facade and adding movement and depth. On the part where the general public can access the project, we worked with **large glazed curtain wall panels** framed by the **rhomboid pattern**.



Figure 111: Front Elevation: Source (Author)

As a reference to the local area’s architecture in the Workington industrial ward, we used the **common red brick** that is common in most buildings; some of these bricks are to be taken from the **demolition rubble** of the other parts of the Power station and then integrated into the new building.

Functionally, the facade was designed with **sustainability** in mind. The **vertical bands that visually articulate the facade whilst serving as passive chimney elements**, helping ventilate the interior and the double-skinned façade, through the stack effect. The **horizontal bands** on the ground floor and the first floor are **heavy thermal storage elements to maximize heat gain and dissipation** in cold months. The reuse of the **cooling tower** was not just symbolic, but



Figure 112: Front Elevation: Source (Author)

sustainable as it is also used in the **passive cooling system** of the project, and by its preservation, we preserved the site’s memory while **avoiding demolition waste and costs** because the tower is a concrete structure.

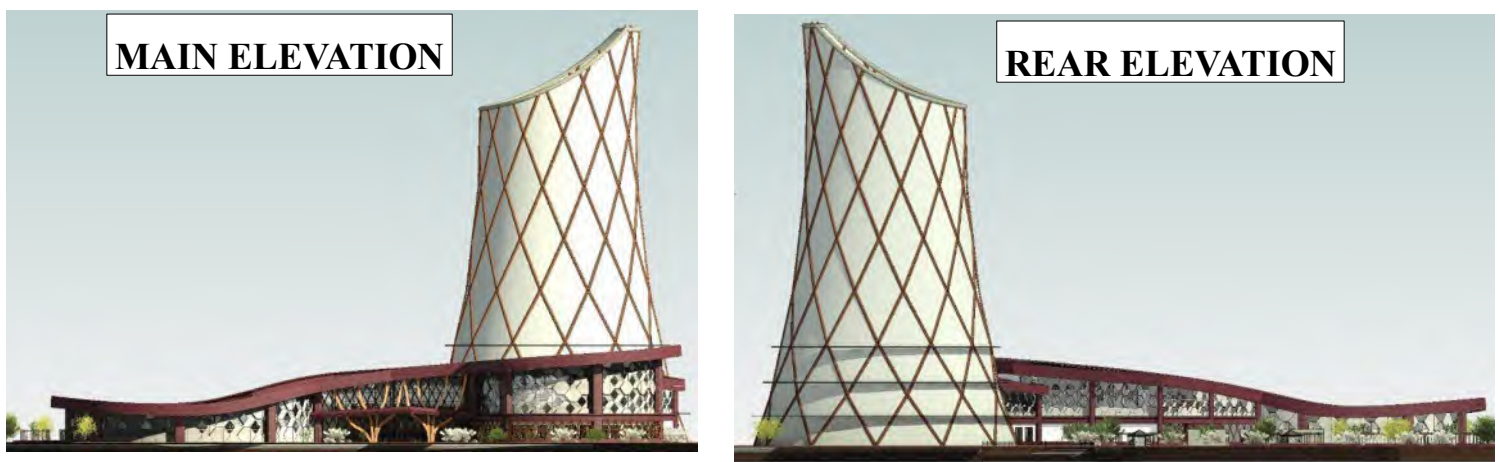
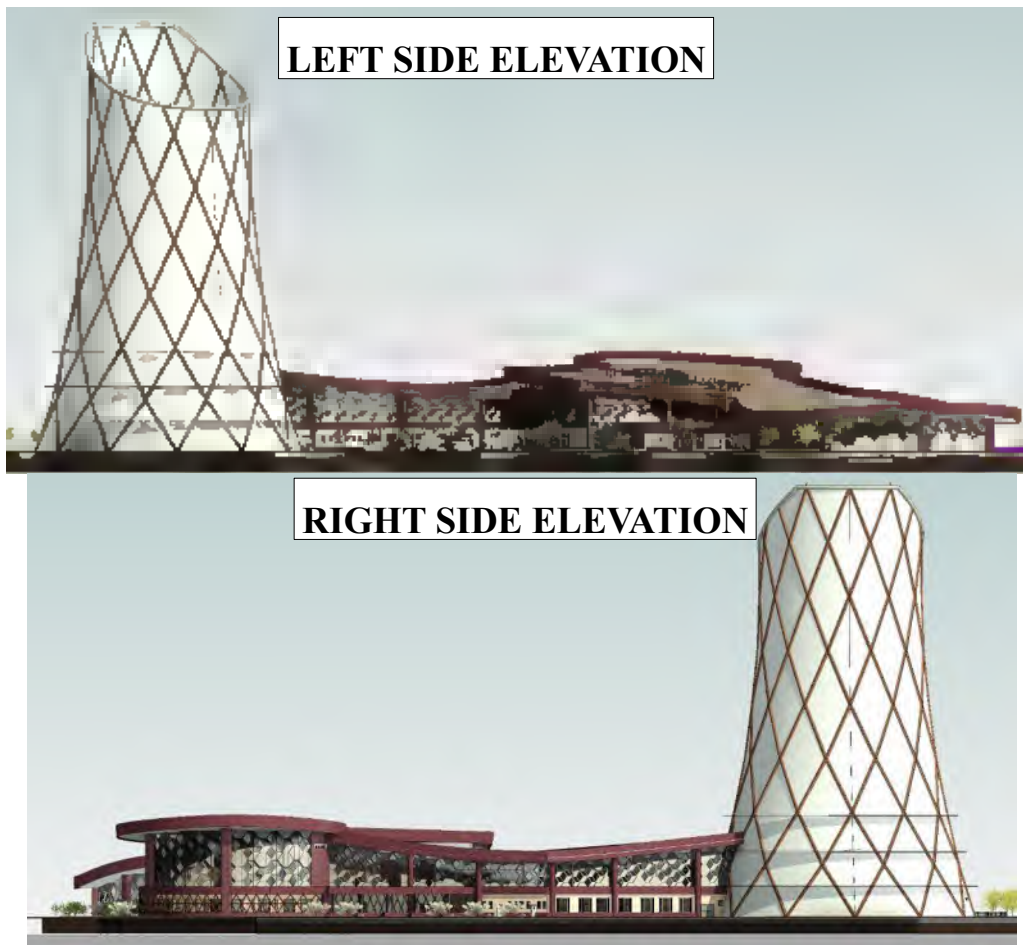


Figure 113: Different Architectural Elevations



Conclusion

In this chapter, we focused on integrating the project into Workington's urban morphology. Using an urban approach and site analysis, including a SWOT analysis. We assessed how the project's implementation would impact the urban landscape while simultaneously reducing social and urban blight caused by the abandoned structure. Key site features, such as the tall cooling tower, inspired passive cooling strategies, implemented through small chimneys distributed across the project and integrated into the double-skin façade's ventilation system on the sun-facing front. We also incorporated a research and development function into the ground floor of the cooling tower. and designed wall cladding inspired by local traditions and culture. The elevations were embellished with various design patterns inspired by the rhomboid; this transformed the project into an architectural attraction within an area dominated by outdated industrial infrastructure. By reusing bricks from demolished structures, the building seamlessly blends into its surroundings. These key sustainable features ensure the durability and long-term viability of the business incubator, while setting a precedent for the redevelopment of other brownfield sites across the country. This approach not only revitalizes derelict land but also promotes sustainable urban redevelopment.

5 TECHNICAL APPROACH

Introduction

This chapter outlines the fundamental strategies and systems that shape the architectural project. It details the key technical decisions regarding the building's structural integrity (substructure and superstructure), the selection of interior and exterior finishes, and the comprehensive integration of essential Mechanical, Electrical, and Plumbing (MEP) systems. The chapter further explores the specific materials, construction techniques, and technology employed to ensure efficiency, durability, and appropriate functionality, all within a clear sustainability framework.

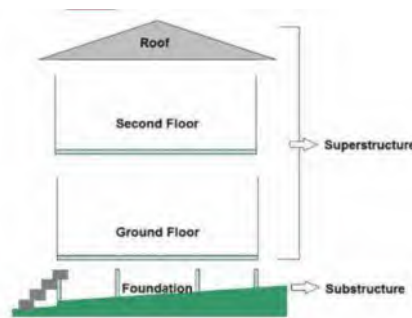


Figure 114: Substructure and Superstructure: Source

5.1 Substructure

The main role is to safely transfer all loads from the building above to the ground, preventing settlement and resisting external forces. We are going to be focusing on 2 foundation types: Isolated footing/pad footing and Strip footing.

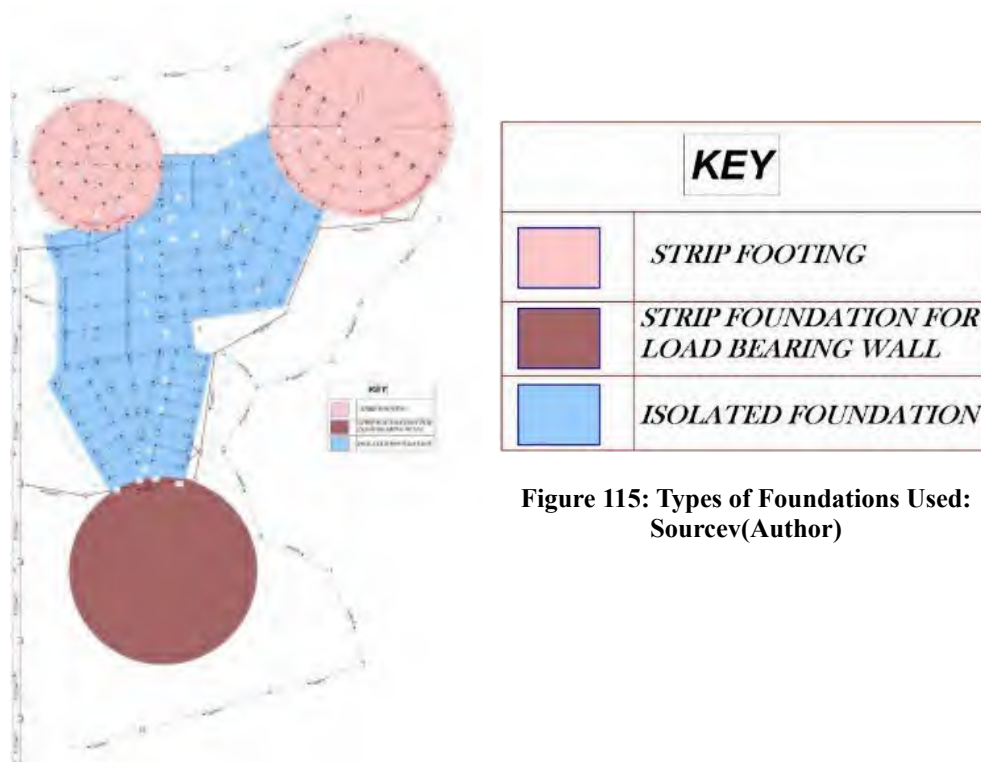


Figure 115: Types of Foundations Used: Source(Author)

5.1.1 Strip footing

It is going to be used in 2 cases in the enterprise services and the event spaces. Also, there is a continuous strip footing that supports load-bearing walls in the Research and Development. Width is generally calculated based on wall thickness and soil bearing capacity, often using the formula: (**Width=2T+30cm**.T=wall thickness). The footing is going to be using reinforced concrete.(The Constructor, 2009)

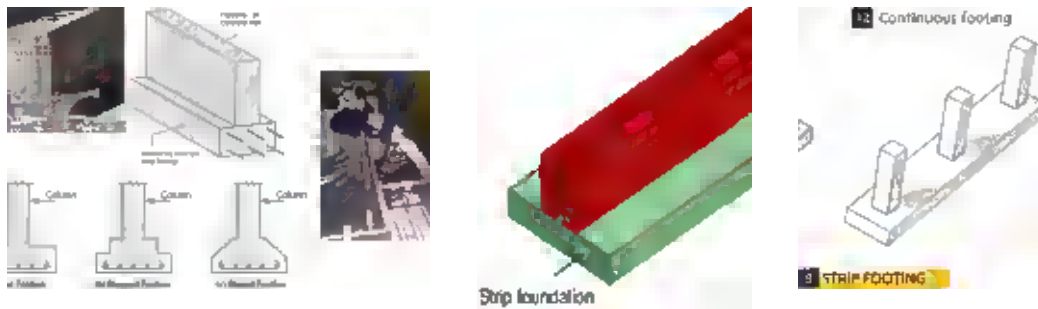


Figure 116: Different Cases Where Strip Footing is Used: Source: (Archidict, 2018)

5.1.2 Isolated/Pad Footing

This type of footing is going to be used to support individual columns that have significant beam lengths. This type of footing uses reinforced concrete as the primary material. They are all going to use steel reinforcements.



Figure 117: Single Column Foundation Used and how its reinforced

5.1.3 Waterproofing and Damp-Proofing

A continuous layer of impervious material (polyethylene sheeting) laid underground and on the sides of the bearing concrete slabs to prevent moisture from rising/penetrate into the floor structure.(Resisto, 2019)



Figure 118: Water Proofing and damp proofing: Source (Fab-Form, n.d.)

5.2 Superstructure

This is the whole upper part of the building after the foundations, and how they transfer the load from the foundations.

5.2.1 Columns

They are vertical structural elements that transmit loads from the superstructure to the foundations. They are constructed using reinforced concrete due to its strength and resistance to moisture. We will use rectangular columns because of their simplicity and cost-effectiveness.



Figure 119: building Columns: Source (Ching et al., 2014)

5.2.2 Floor structure system

Throughout the whole project, we use Hollow slabs, which are precast concrete floor elements that feature continuous, longitudinal hollow channels running throughout their length. These voids significantly reduce the overall weight of the slab. They also allow us to pass air through them and passively cool the slabs and the building.

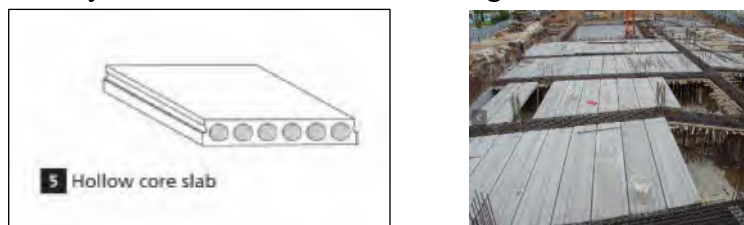


Figure 120: Hollow Core Slab: Source (Archidict, 2018)

5.2.3 Beams

Reinforced concrete beams are going to be used as they primarily carry and distribute transverse loads, which induce bending moments and shear forces across their length. However, they can also be subjected to axial forces (tension or compression) and torsion. They also support loads from slabs, other beams, walls, and columns.

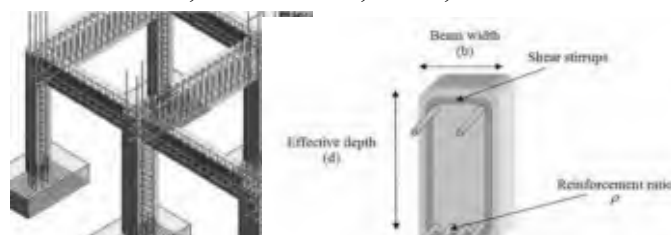


Figure 121: Reinforcement Beams: Source (The Constructor, 2009)

5.2.4 Curved Roofs

In the design of the undulating roof, we are precisely integrating heavy steel plates and stubs directly into the top of our reinforced concrete columns during their casting. We do this by accurately positioning these pre-fabricated steel components within the concrete formwork before the pour.



Figure 122: Curved Roofs With Trusses And GRC roof Sheets: Source (Newmill, n.d.)

5.2.5 Diagrid structural system

A diagrid structural system is defined by its lattice-like arrangement of diagonal members. This design allows for optimal load distribution, leading to highly efficient structural behaviour. The diagonal members operate in both tension and compression, effectively distributing loads. The diagrid articulation: Sources (author; (Skidmore et al., 2016); (Eluvathingal & Unni Kartha, 2021)



Figure 124: Diagrid Structural System: Source (Eluvathingal & Unni Kartha, 2021)

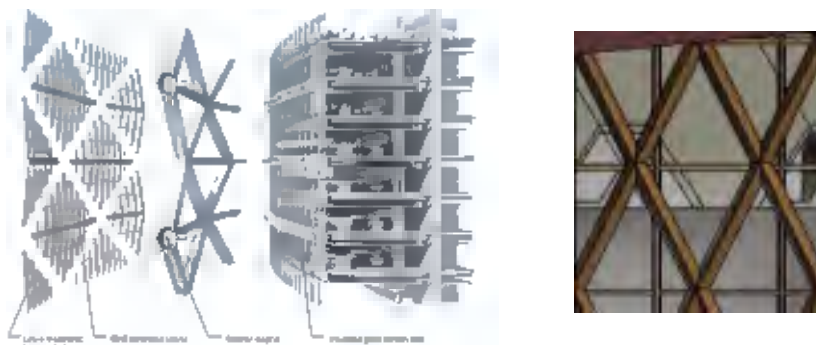


Figure 123: Double Skin Façade: Source (Eluvathingal & Unni Kartha, 2021)

The diagrid was used because of its ability to support itself on the cladding for the cooling tower and the flexibility it offers in having a double skin façade on the main façade.

5.2.6 Structural joints

There are seismic, expansion, contraction, isolation, and concrete construction joints. The project mainly uses expansion joints due to the lengths of the structural beams, and isolation joints because of the need to separate different structural elements or accommodate changes in structural behaviour/movement at specific points.(UltraTech, 2021).

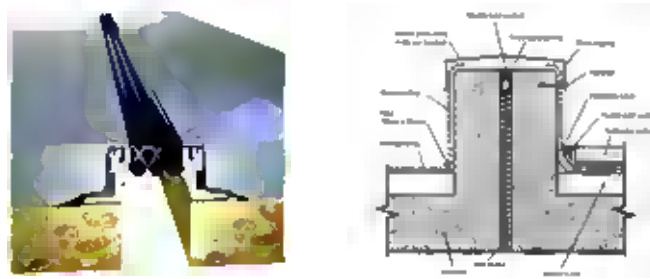


Figure 125: The Types of Construction Joints: Source (darachem, n.d.)

5.2.7 Elevator

The model mark for the elevator is going to be an Otis-made elevator with a capacity of 953kg, with dimensions of 1753mm by 1309mm.



Figure 126: Elevator from Otis: Source (Otis, n.d.)

5.3 Finishes

We will focus on the materials applied to the surfaces of the building, both interior and exterior, for aesthetic appeal, protection, and functionality.

5.3.1 Interior Walls

Due to the required flexibility within the interior spaces, we will utilise highly flexible interior walls, prioritising strong acoustic performance and high aesthetic value

5.3.1.1 Smart partitions

These are advanced partition systems that integrate technology for enhanced functionality. They typically use specialised glass (electrochromic Polymer Dis persed Liquid Crystal (PDLC))



Figure 127: Smart Partions: Source ((Anne Corning, 2022))

5.3.1.2 Demountable partitions

These are non-load-bearing, modular wall systems designed for easy assembly, disassembly, and relocation without damaging the building structure. Commonly feature aluminium frames with infill panels of glass, plaster boards (gypsum board), fabric, or wood.(Partition Systems, n.d.)

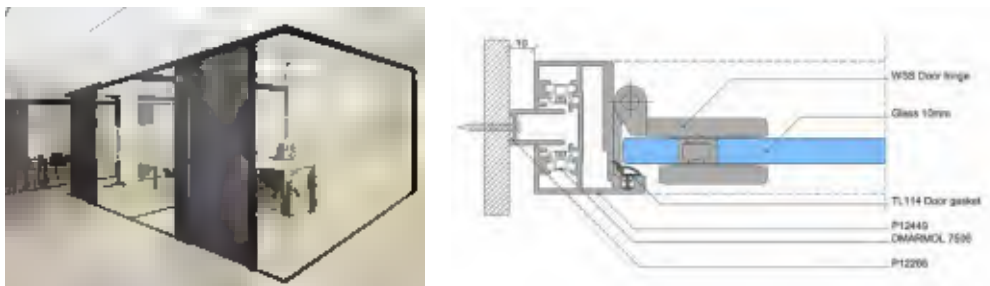


Figure 128; Demountable Walls: Source (Partition Systems, n.d.)

5.3.2 Floor finishes

These are the top layers applied to structural floors for aesthetics, durability, and specific functional requirements.

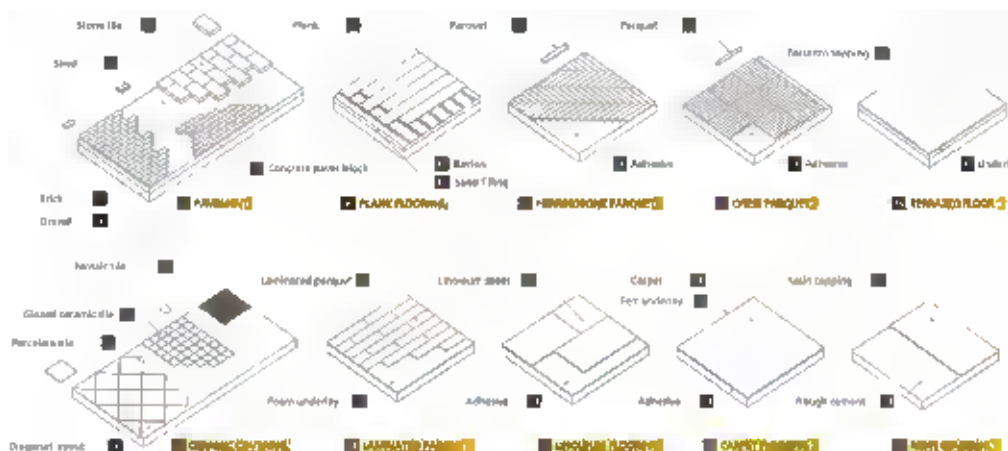
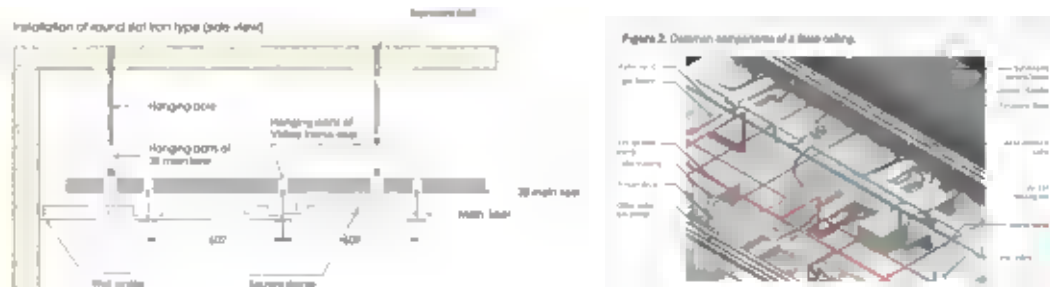


Figure 129: Types of Floors: Source (Archidict, 2018)

Types of floor finishes

- ❖ Patterned ceramic tiles: Tiles made from clay and other materials, often glazed and featuring decorative patterns. Used in halls and reception Areas
- ❖ Anti-slip tiles: Ceramic or porcelain tiles with a textured or abrasive surface to increase friction and prevent slipping, especially in wet areas like bathrooms and toilets.
- ❖ Timber flooring: Flooring made from solid wood planks or engineered wood products like Rhodesian teak/Mukwa, which can be used in office spaces and relaxation areas.
- ❖ Carpet: Textile floor covering, typically consisting of an upper layer of pile attached to a backing. This covering is to be used in the auditorium.
- ❖ Granite tiles/ stone tiles: Durable, igneous rock tiles, known for their hardness, scratch resistance, and varied patterns. It will be used for walkways and pavements outside the building.

5.4 False ceiling



It is a secondary ceiling that is hung below the main roof, creating a hidden space for electrical wiring, plumbing, and HVAC ducts. It also improves acoustics, integrates lighting, and aids in fire protection. Common materials used are gypsum plasterboard, acoustic tiles, metal panels, or timber slats. In the project Gypsum plasterboards are used

Figure 130: False Ceiling: Source ((Yeo et al., 2021))

5.5 Mechanical, Electrical and Plumbing plans and details

Here we are going to focus on the building's essential services that provide comfort, safety, and functionality for occupants.

5.5.1 Passive Cooling system

the passive system of the building was mainly inspired by the East gate mall which took its design inspiration from an ant mount. After drawing inspiration from some of the principle they used, we developed a passive building cooling system, that uses chimneys to passively cool the front and the interior of the building as the chimneys are also equipped with wind extracting fans as part of the system.

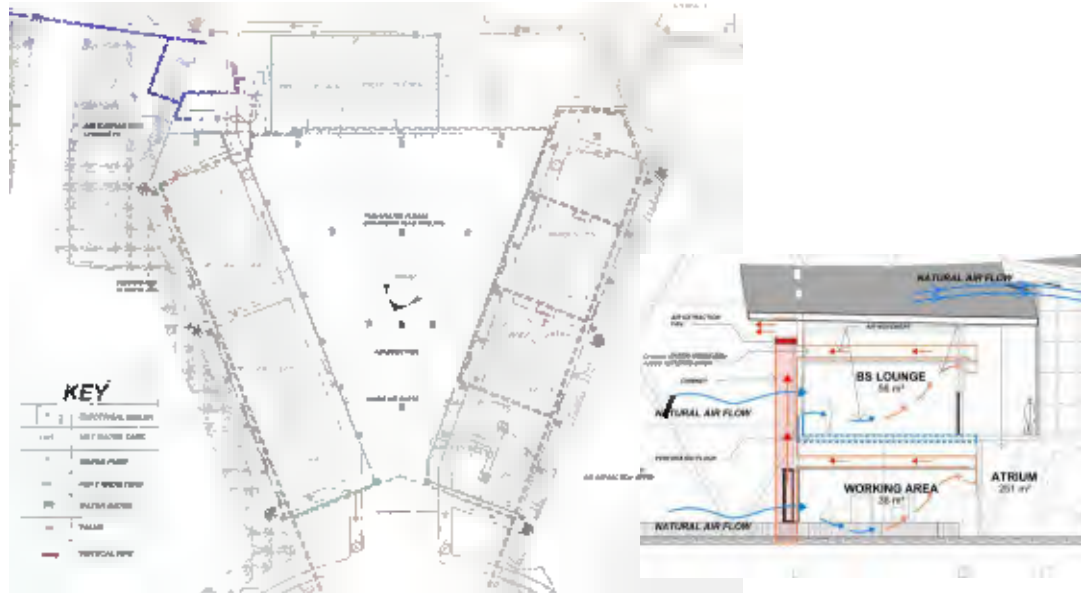


Figure 131: Assisted Cooling System: Source (Author)

5.5.2 Plumbing

For the plumbing plan, our water supply originates from the Harare Municipality water grid. Upon entering the project, the main water line branches: a portion of this potable water is directed to a boiler, which then distributes hot water to the building's interior via PPR pipes.

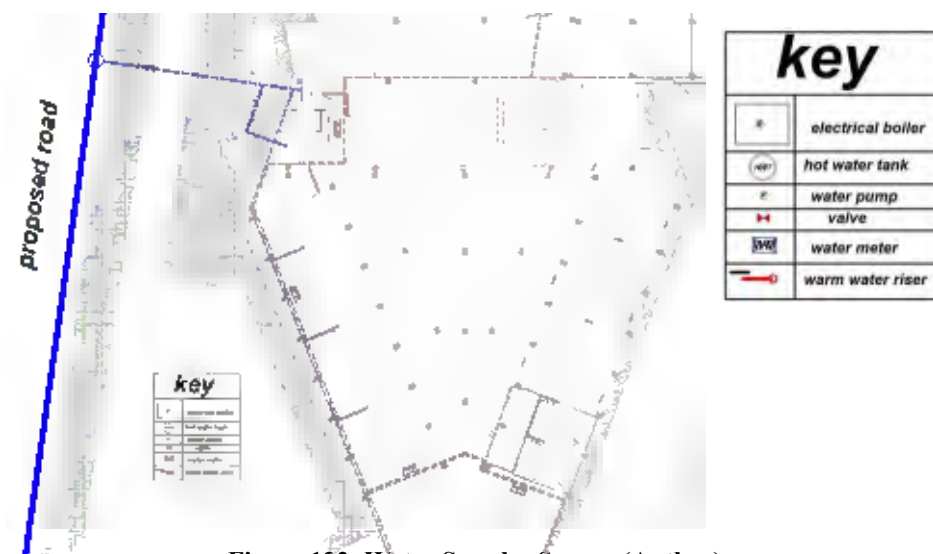


Figure 132: Water Supply; Source (Author)

Concurrently, another separate system ensures the direct supply of cold potable water for toilets, sinks, and also extends to serve the laboratories.

5.5.3 Roof water plan

Harare receives about 934mm of water annually, thus an efficient water management system on the site is necessary. This system can extend and impact the whole ward as there is potential reuse if the water is properly managed.

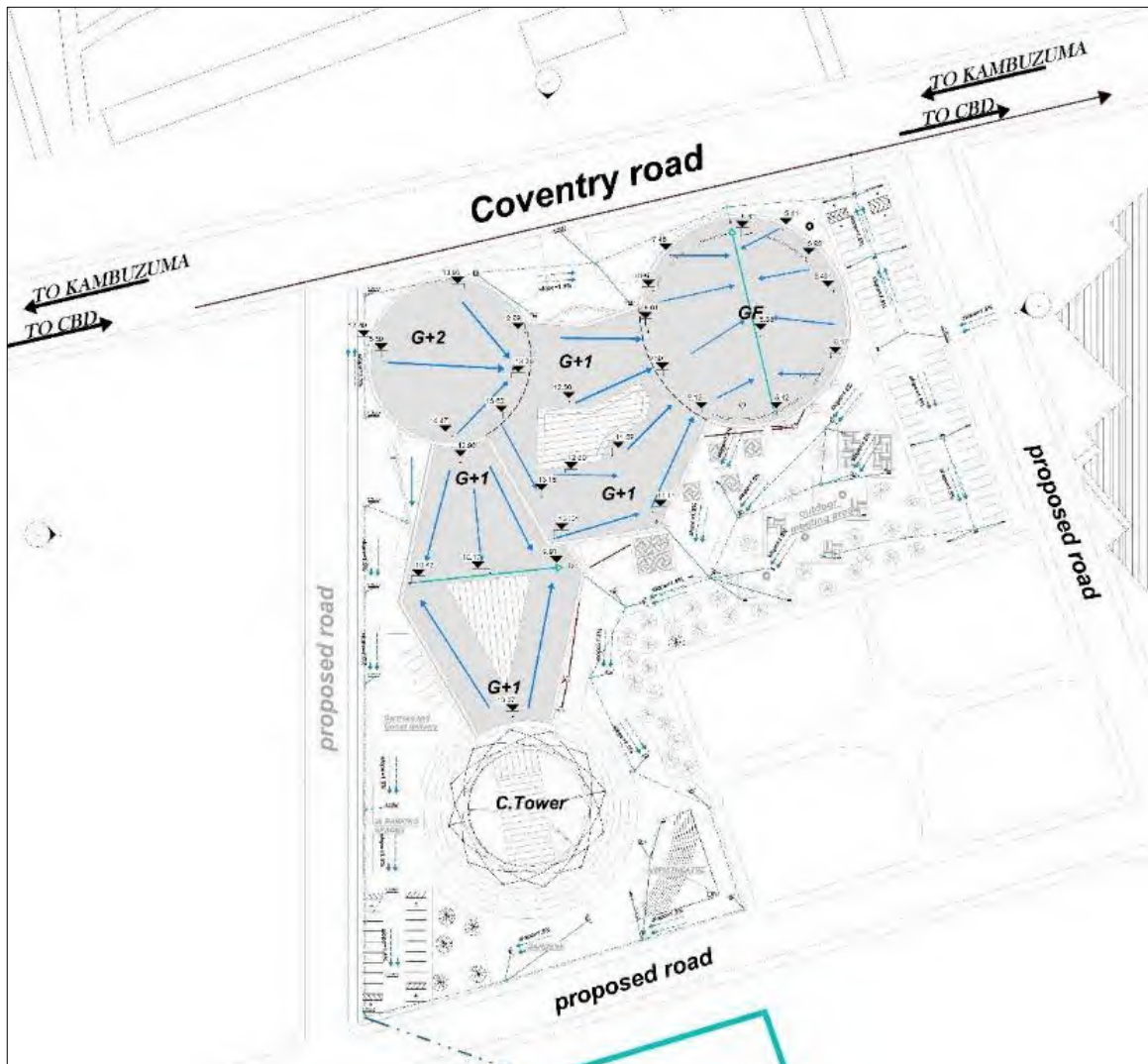


Figure 133: Site Water Management

5.5.4 Electricity (Plugs, Extractor fans)

The schematics below show how the project is going to have lighting, how it is going to have the electrical outlets distributed around the different spaces, also how the cooling system’s supplementary fans can be aided.

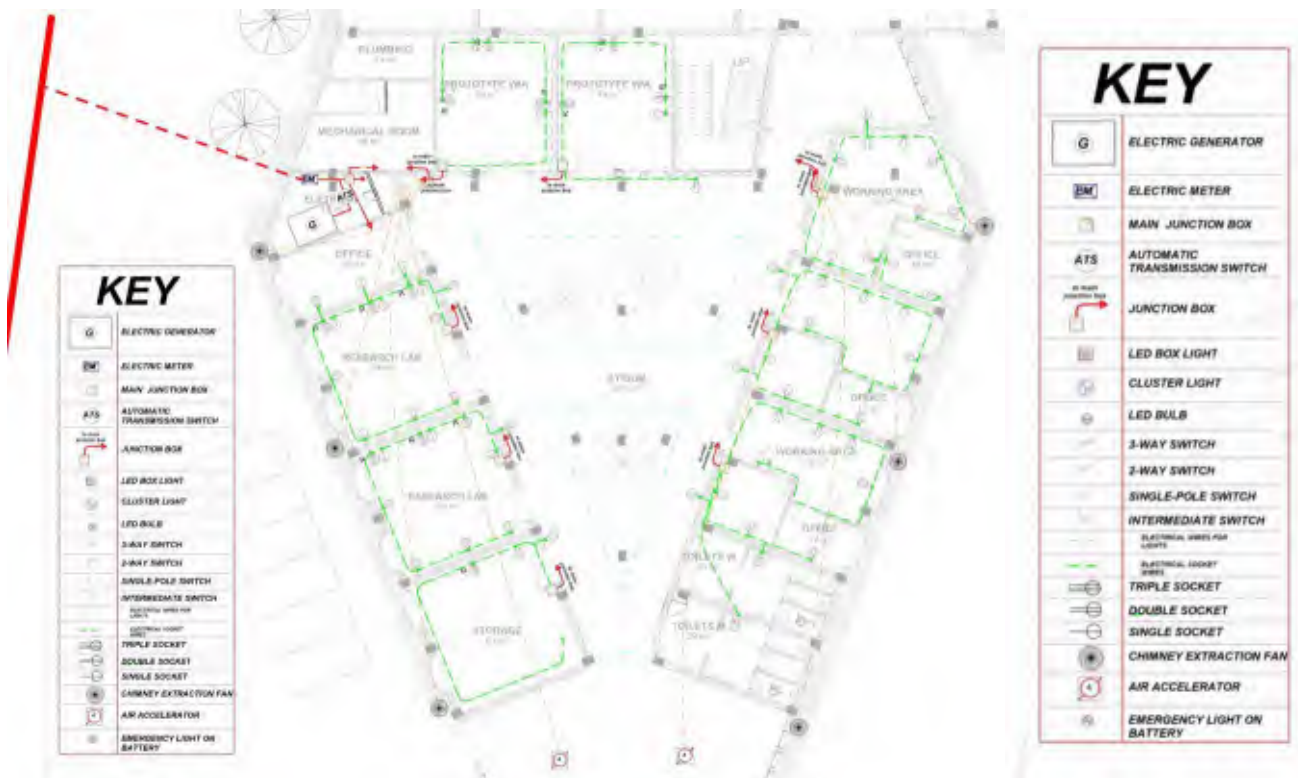


Figure 134: Plugs and Fan Plan: Source Author

5.5.4.1 Generator



Figure 135: Open Fram Generator: Source (YZL, n.d.)

As a backup source of power, we will use an industrial open-frame diesel generator are well-suited. Multiple generators are preferred over a single large unit for optimal efficiency and redundancy.

5.5.5 Fire safety plan

The plan features

- ❖ Smoke detector: A device that senses the presence of smoke, typically as an indicator of fire, and sounds an alarm to alert occupants.

- ❖ Emergency Stairs: Designated stairways, often fire-rated or external, provide a safe and protected route for occupants to exit a building during an emergency.
- ❖ Fire horse reel: A permanent fire-fighting appliance providing a controlled supply of water through a hose, designed for occupants to use in the early stages of a fire
- ❖ Emergency Exit Light Signage): Illuminated signs that mark and light the path to emergency exits, especially crucial during power outages or smoke.



Figure 136: First Floor Fire Escape Plan: Source (Author)

- ❖ Fire extinguisher: A portable device containing an agent that can be discharged to extinguish small fires or control them in their initial stages

Conclusion

The chapter explored the importance of the technical planning focusing on both structural aspect and how we get to achieve the aesthetic look but from a technical and structural sense. We explored how to build a strong substructure that can support the load of the superstructure. The choice of material is also key both for the interior and exterior finishes. Choosing the right materials for spaces and functions to ensure the seamless functioning of the project in its lifetime. The Mechanical, Electrical, and Plumbing (MEP) systems we looked at gave us how the project can be function using the pre-existing urban infrastructure.

Also trying to choose the right materials, modern building methods, and smart technology, all while keeping sustainability in mind, to make sure the project is efficient, durable, and works well for a long time. These basic technical decisions are what truly bring our building idea to life, creating a place that's both tough, responsible and aesthetically pleasing.

General Conclusion

Deindustrialisation has had a profound and detrimental impact on African nations, particularly Zimbabwe, where premature industrial decline has left behind abandoned factories, underutilized land, and environmental hazards in the form of brownfields. Unlike developed countries, which transition naturally from manufacturing to service-based economies, Zimbabwe's deindustrialisation has been abrupt, driven by a combination of historical, economic, and political factors. The country's colonial legacy left it with an underdeveloped industrial base, while post-independence governance challenges, lack of investment, and global economic shifts further weakened its manufacturing sector.

The rise of brownfields in Harare and other major cities like Bulawayo and Gweru reflects this economic stagnation. These abandoned industrial sites, often contaminated and neglected, contribute to urban decay, unemployment, and environmental degradation. The closure of key industries—such as Unilever's exit after 80 years—highlights the broader challenges of high production costs, unreliable infrastructure, and competition from cheaper imports. Without intervention, these brownfields will remain symbols of lost economic potential.

However, the redevelopment of these sites presents an opportunity for sustainable urban regeneration. By adopting a multidisciplinary approach that integrates environmental remediation, economic revitalization, and social inclusion, Harare's brownfields can be transformed into vibrant, energy-efficient hubs. Successful international examples demonstrate that repurposing industrial wastelands into mixed-use developments—combining business incubators, green spaces, and renewable energy solutions—can stimulate local economies while preserving historical identity.

Zimbabwe's path forward requires addressing systemic barriers such as poor governance, inadequate infrastructure, and limited access to financing. By leveraging sustainable development principles, aligned with the UN's SDG 15. The country can reclaim these derelict spaces, fostering innovation, job creation, and long-term economic resilience. The transformation of brownfields is not just an architectural challenge but a necessary step toward rebuilding Zimbabwe's industrial potential and ensuring a sustainable future.

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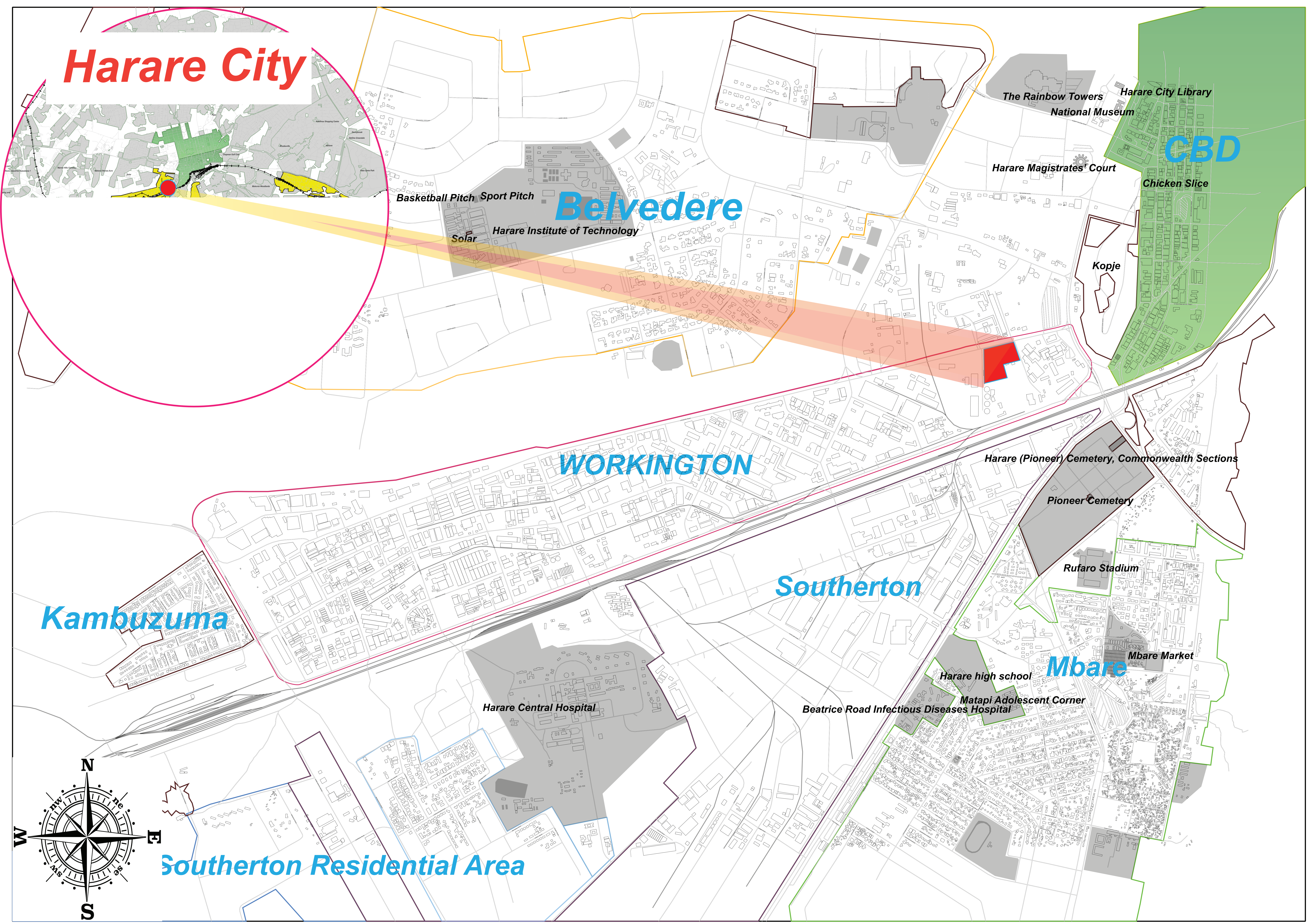
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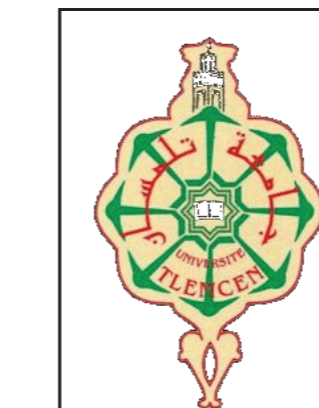
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ANNEX

Harare City

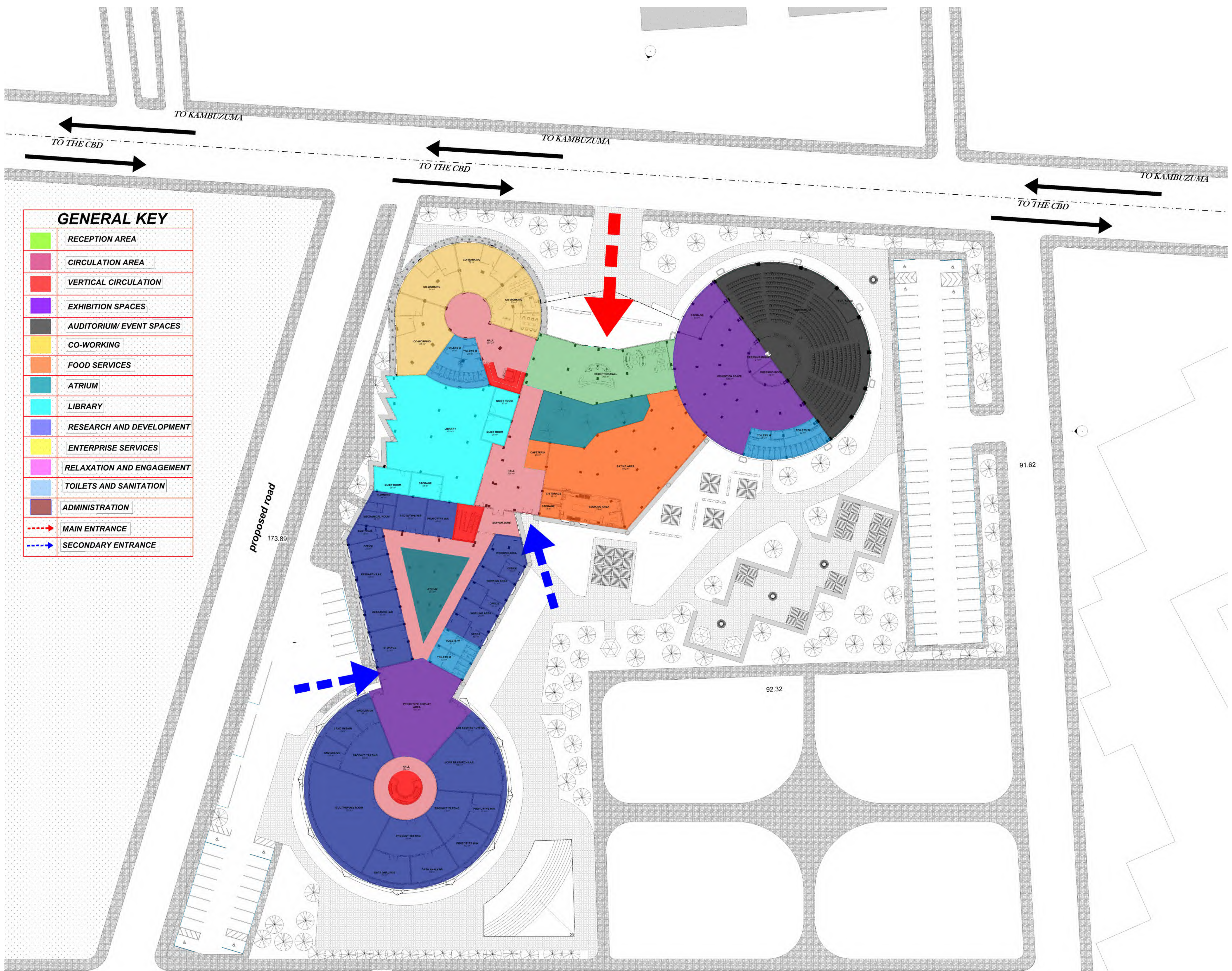


LOCATION



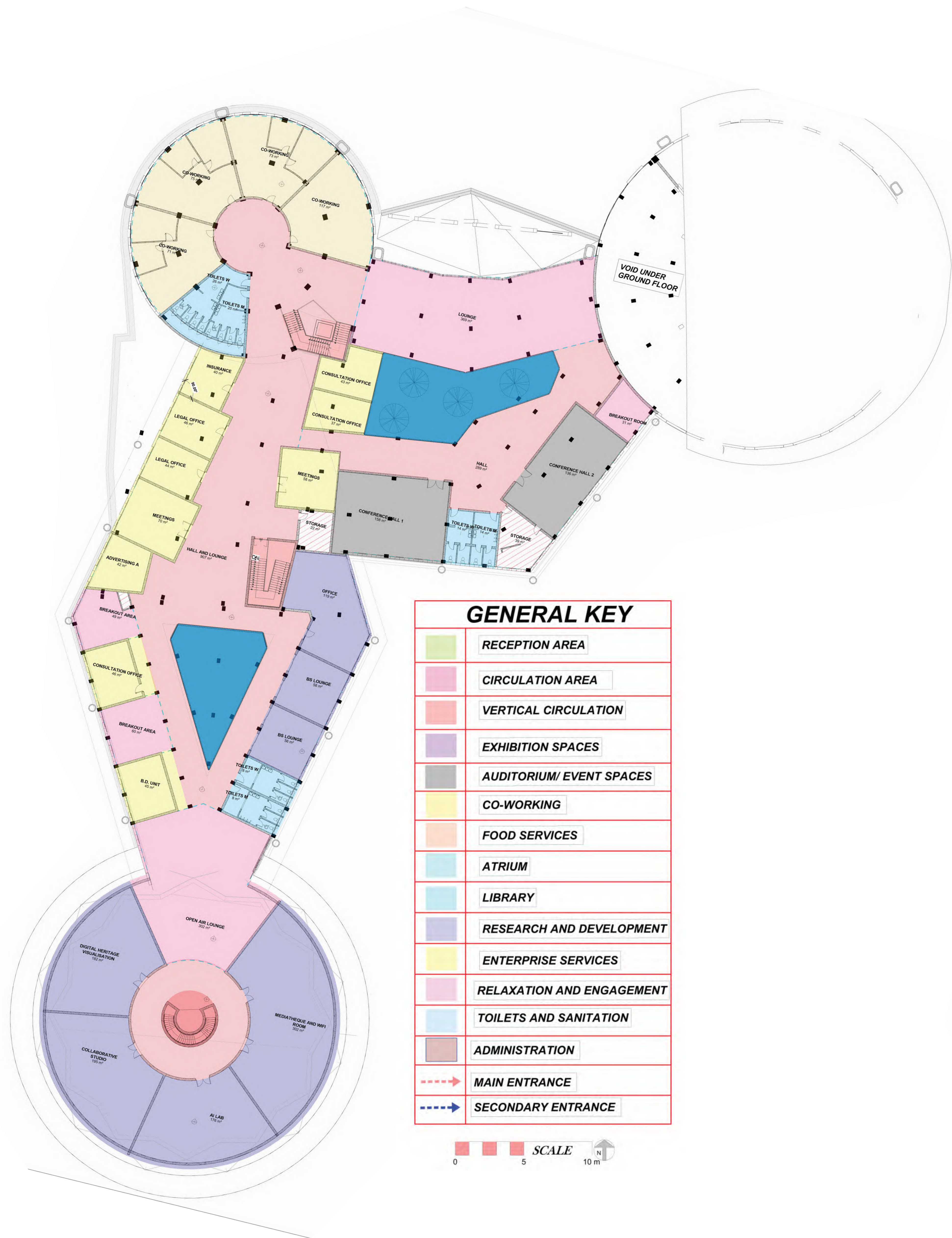
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FACULTY OF TECHNOLOGY
DEPARTMENT OF ARCHITECTURE
BUSINESS INCUBATOR FOR RE-DEVELOPMENT
OF BROWN FIELDS IN HARARE, ZIMBABWE





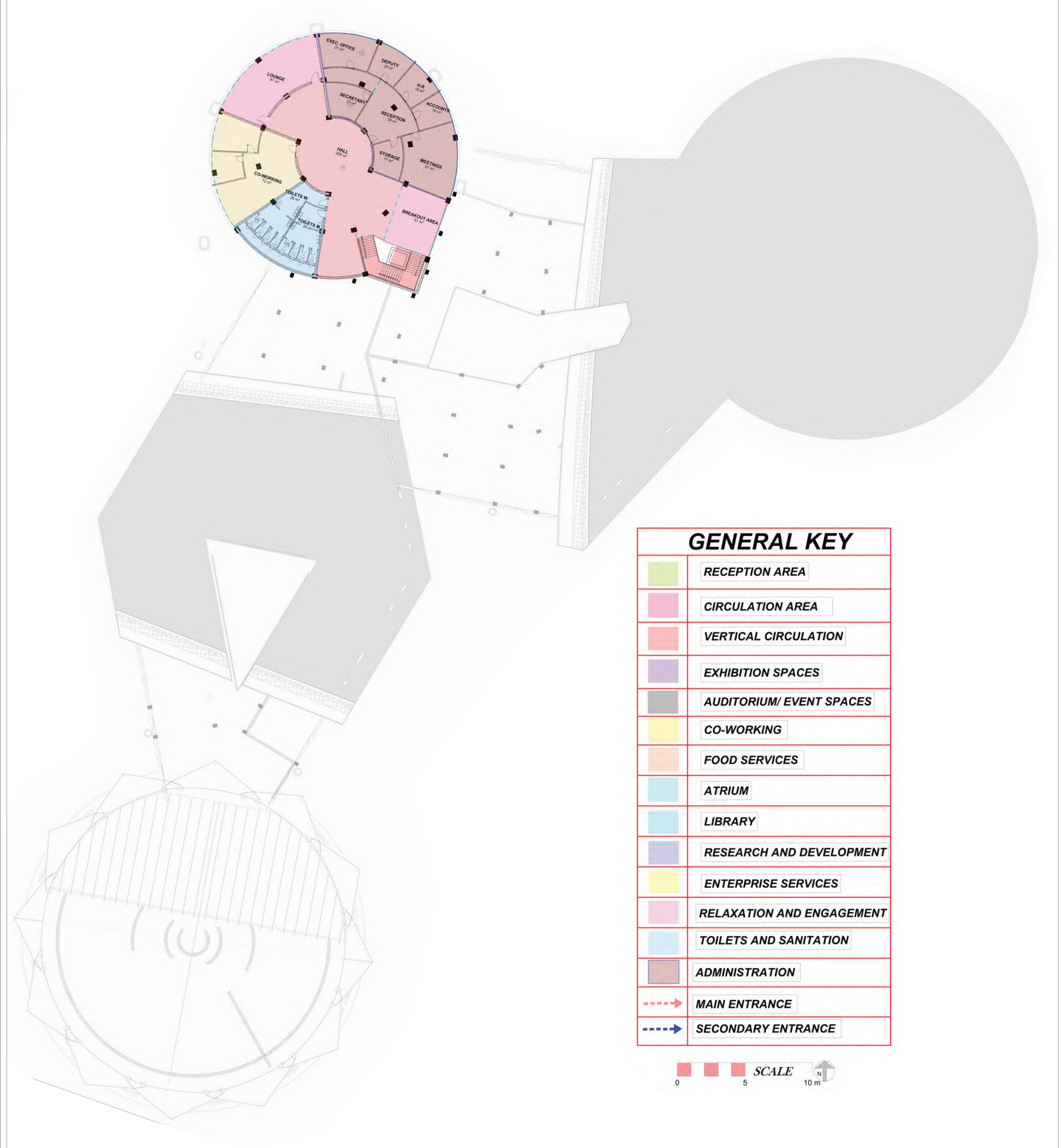
GENERAL KEY	
■	RECEPTION AREA
■	CIRCULATION AREA
■	VERTICAL CIRCULATION
■	EXHIBITION SPACES
■	AUDITORIUM/ EVENT SPACES
■	CO-WORKING
■	FOOD SERVICES
■	ATRIUM
■	LIBRARY
■	RESEARCH AND DEVELOPMENT
■	ENTERPRISE SERVICES
■	RELAXATION AND ENGAGEMENT
■	TOILETS AND SANITATION
■	ADMINISTRATION
- - - - - →	MAIN ENTRANCE
- - - - - →	SECONDARY ENTRANCE

GROUND FLOOR



GENERAL KEY	
	RECEPTION AREA
	CIRCULATION AREA
	VERTICAL CIRCULATION
	EXHIBITION SPACES
	AUDITORIUM/ EVENT SPACES
	CO-WORKING
	FOOD SERVICES
	ATRIUM
	LIBRARY
	RESEARCH AND DEVELOPMENT
	ENTERPRISE SERVICES
	RELAXATION AND ENGAGEMENT
	TOILETS AND SANITATION
	ADMINISTRATION
	MAIN ENTRANCE
	SECONDARY ENTRANCE

0 5 10 m SCALE



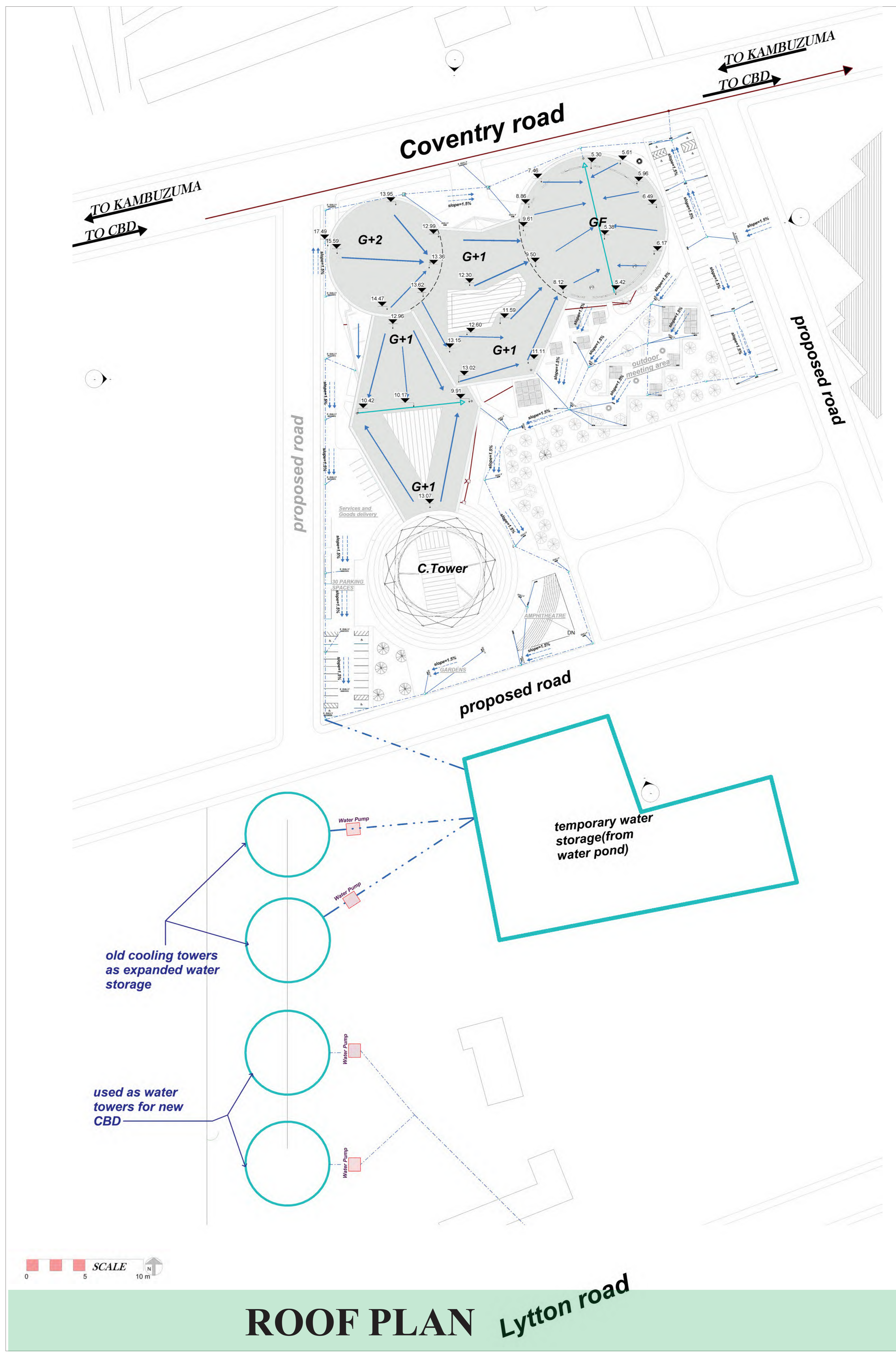
GENERAL KEY	
	RECEPTION AREA
	CIRCULATION AREA
	VERTICAL CIRCULATION
	EXHIBITION SPACES
	AUDITORIUM/ EVENT SPACES
	CO-WORKING
	FOOD SERVICES
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	ADMINISTRATION
	MAIN ENTRANCE
	SECONDARY ENTRANCE

0 5 10 m SCALE

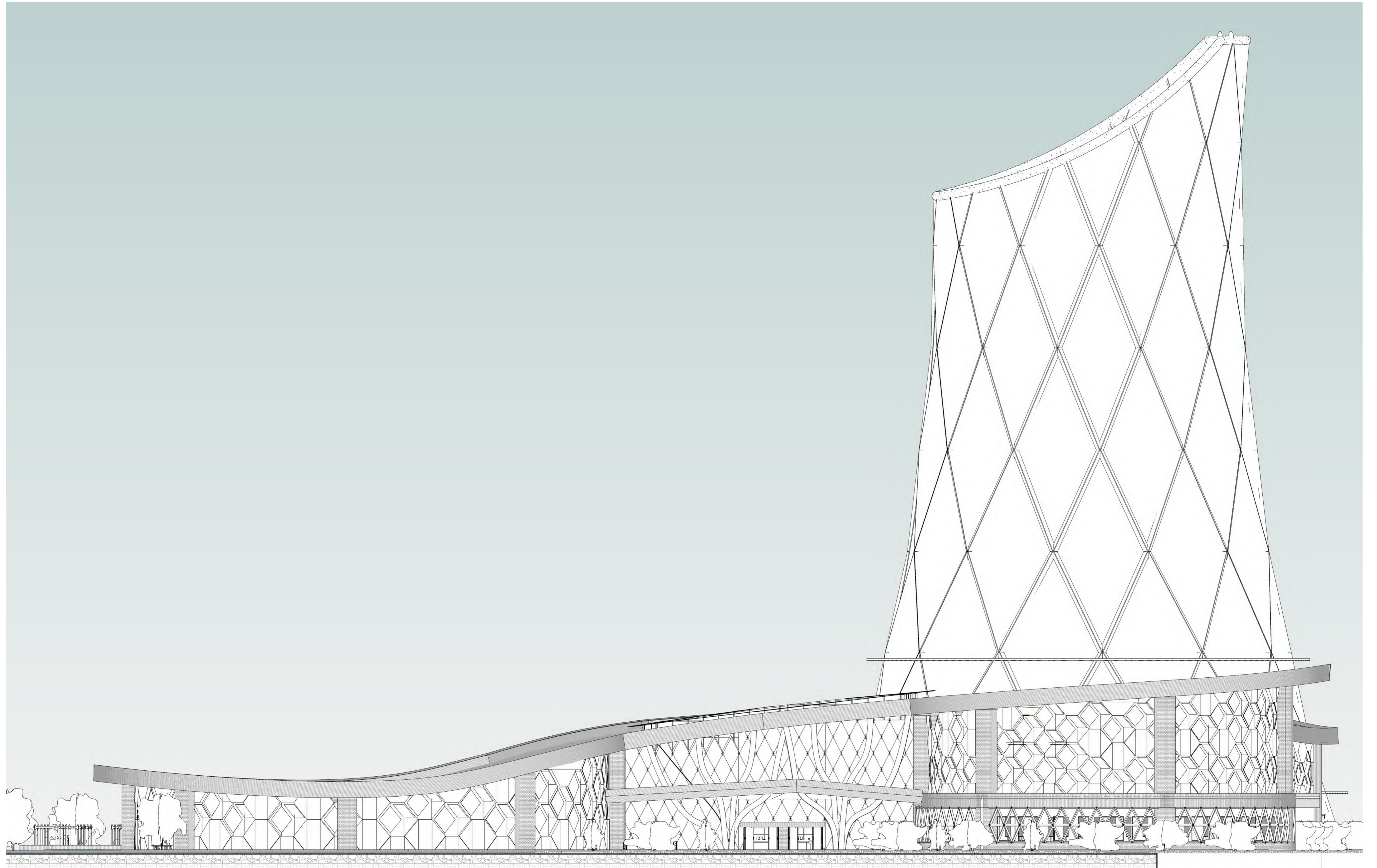
FIRST FLOOR

SECOND FLOOR





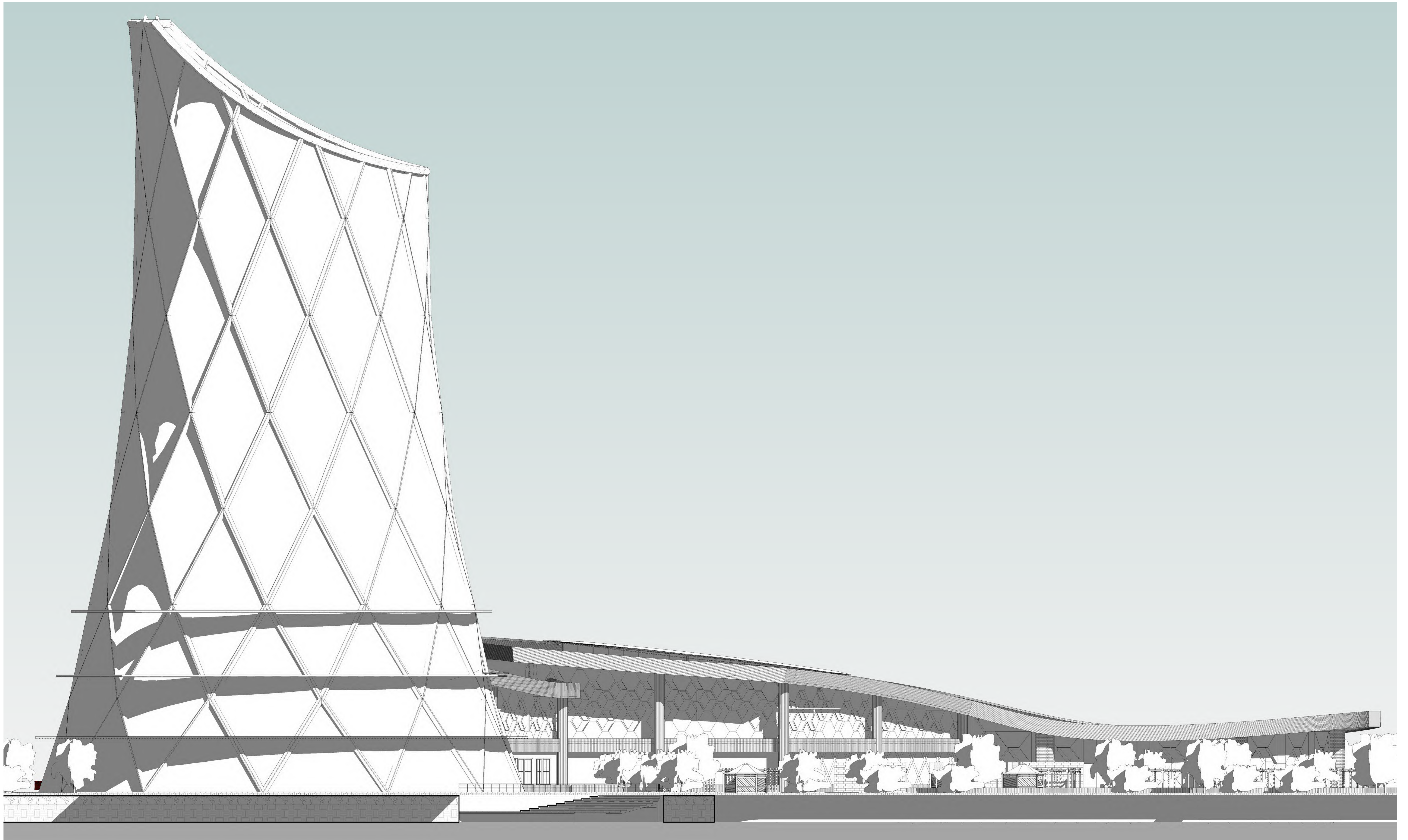


ROOF PLAN *Lytton road*

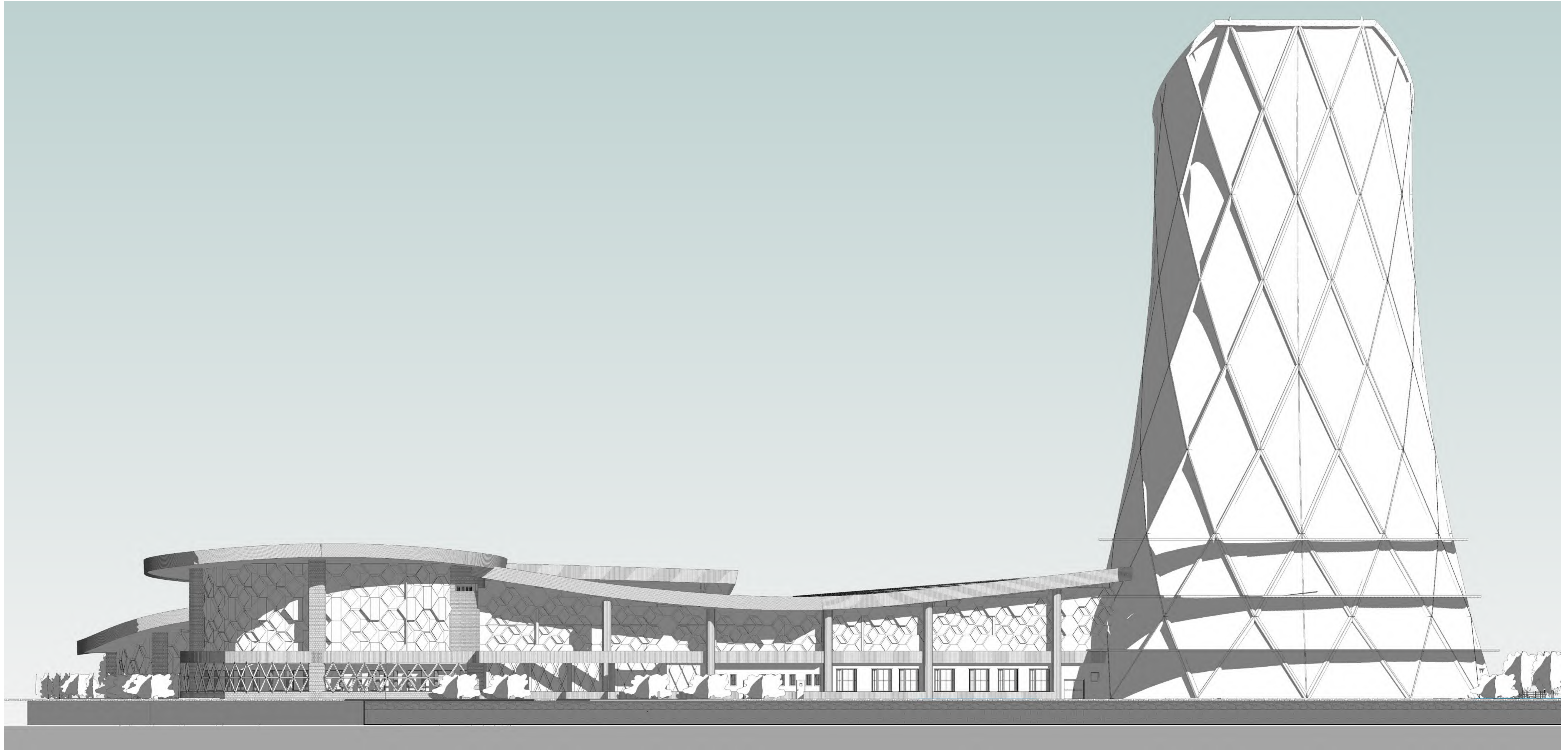


FRONT ELEVATION

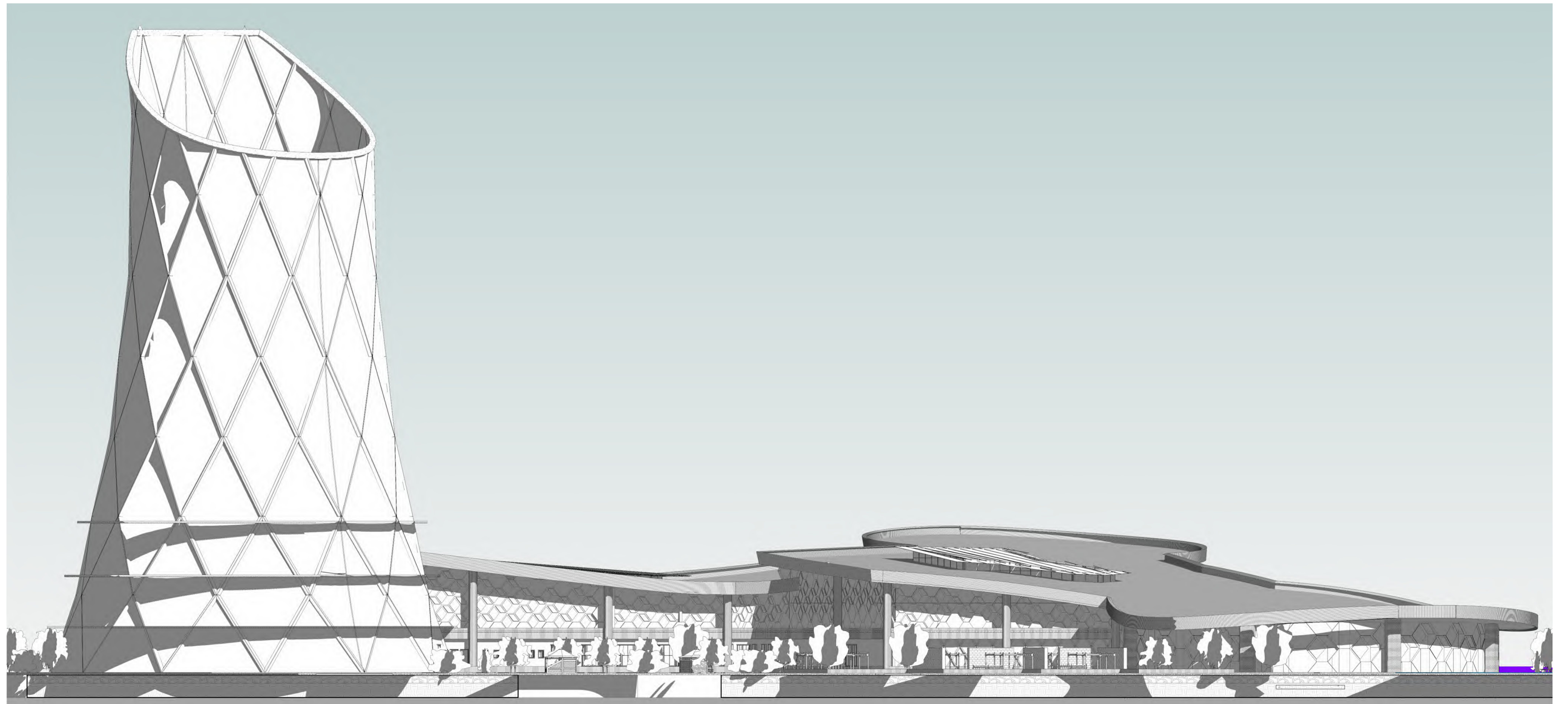
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<p>BUSINESS INCUBATOR FOR RE-DEVELOPMENT OF BROWN FIELDS IN HARARE, ZIMBABWE</p>		



REAR ELEVATION



RIGHT SIDE ELEVATION



LEFT ELEVATION

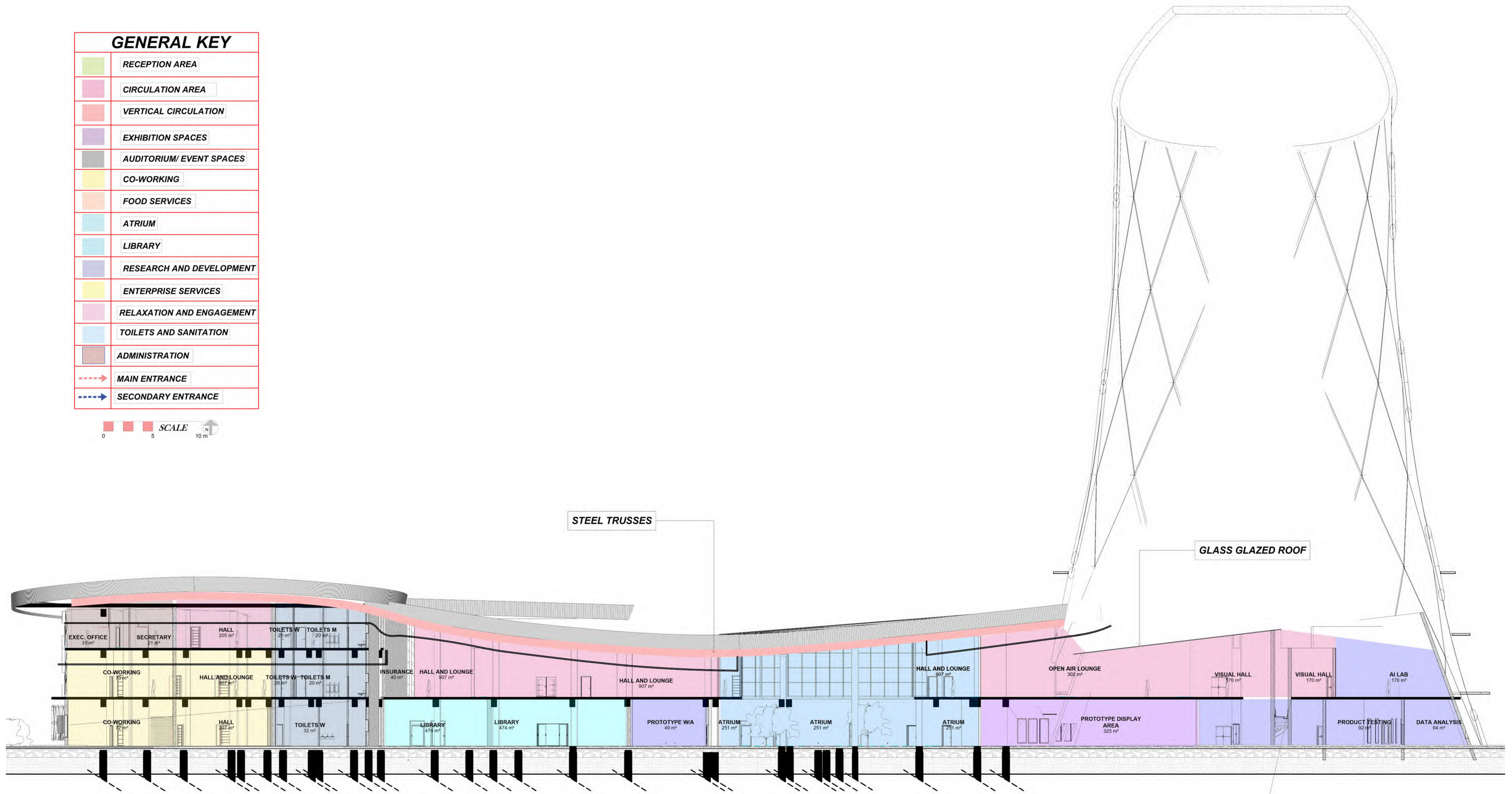


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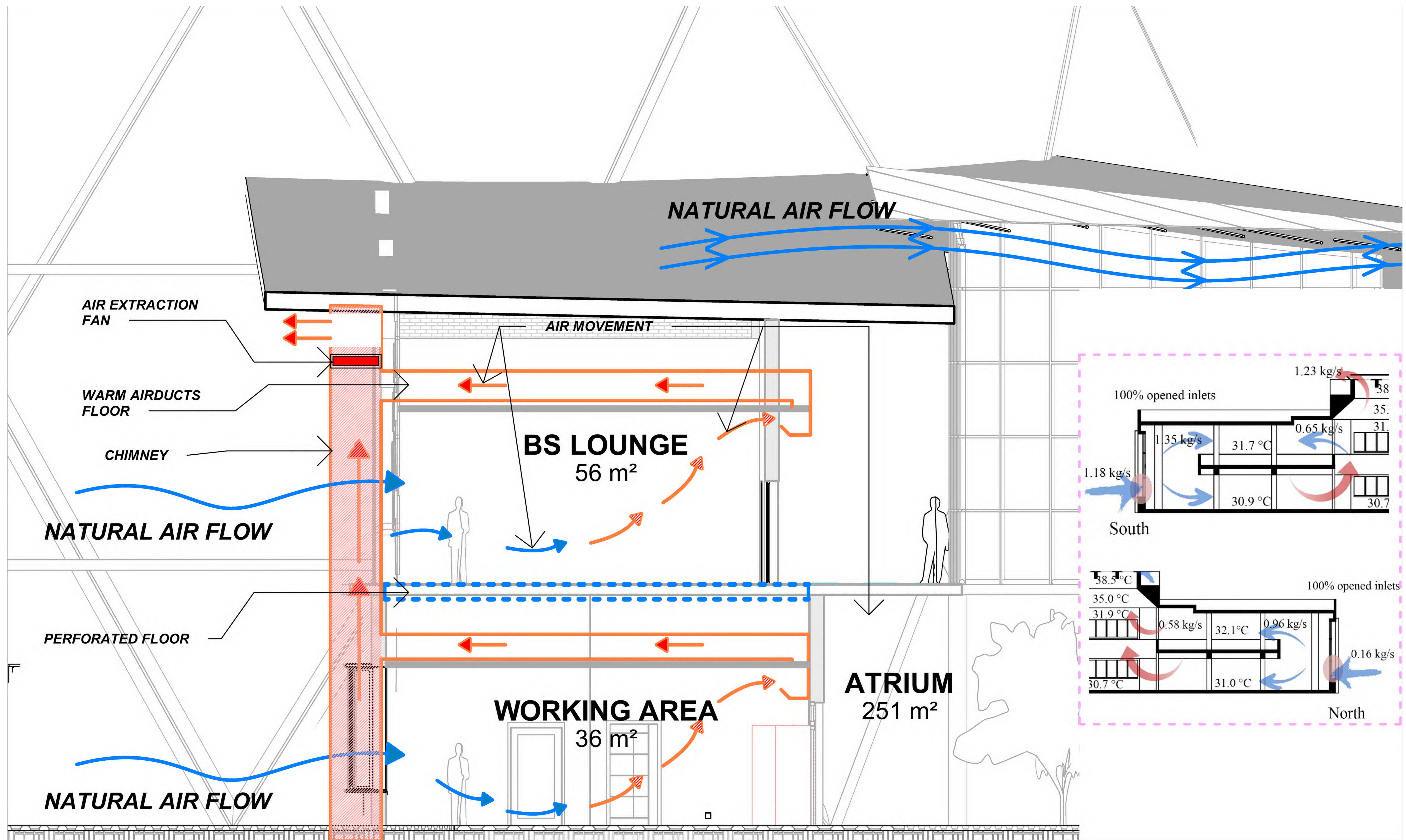
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GENERAL KEY	
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	MAIN ENTRANCE
	SECONDARY ENTRANCE

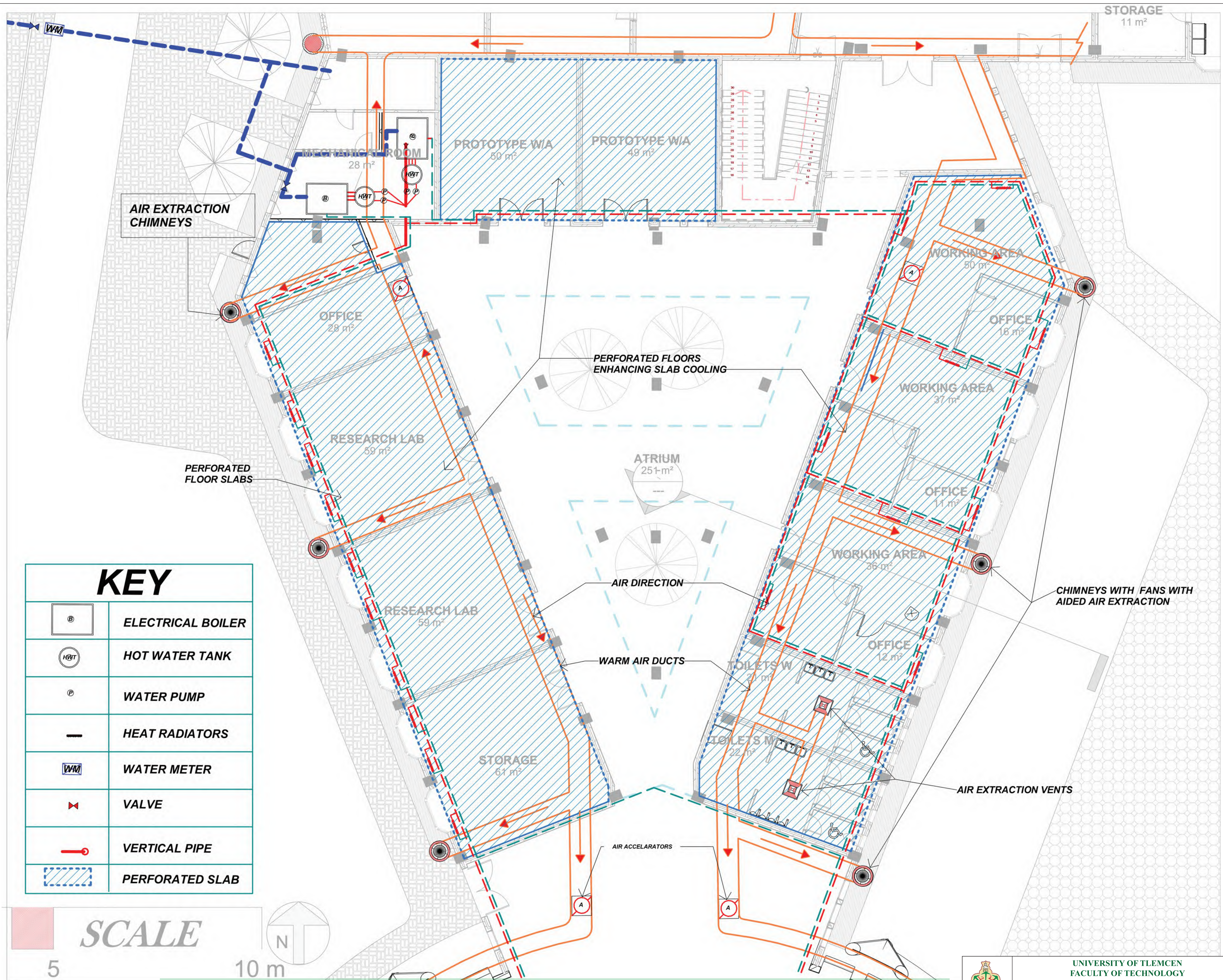


SECTION



AIRFLOW DIAGRAM

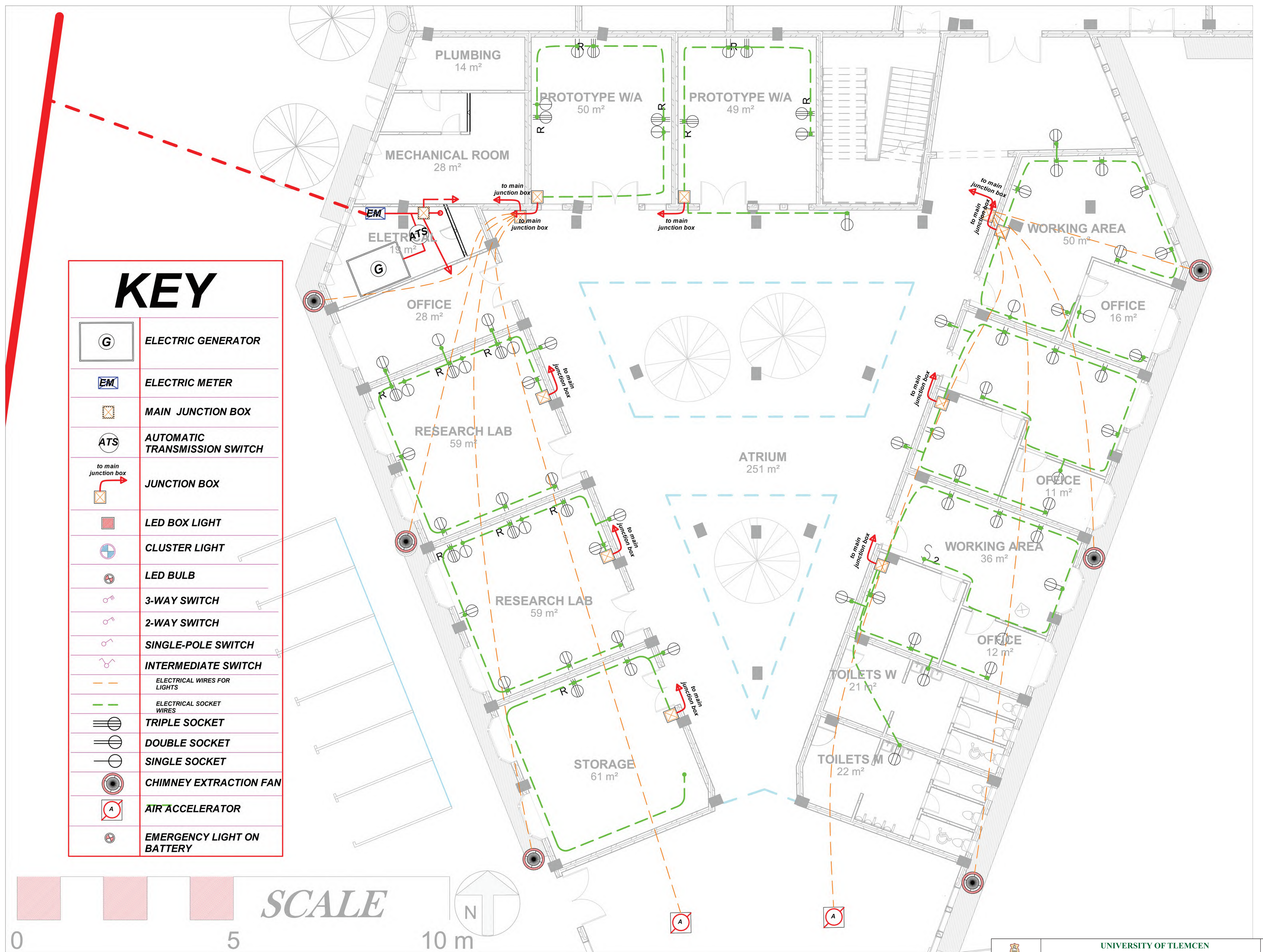




KEY	
	ELECTRICAL BOILER
	HOT WATER TANK
	WATER PUMP
	HEAT RADIATORS
	WATER METER
	VALVE
	VERTICAL PIPE
	PERFORATED SLAB



MECHANICAL PLAN (TEMPERATURE REGULATION)



KEY

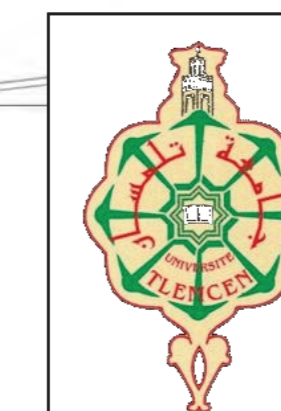
	ELECTRIC GENERATOR
	ELECTRIC METER
	MAIN JUNCTION BOX
	AUTOMATIC TRANSMISSION SWITCH
	JUNCTION BOX
	LED BOX LIGHT
	CLUSTER LIGHT
	LED BULB
	3-WAY SWITCH
	2-WAY SWITCH
	SINGLE-POLE SWITCH
	INTERMEDIATE SWITCH
	ELECTRICAL WIRES FOR LIGHTS
	ELECTRICAL SOCKET WIRES
	TRIPLE SOCKET
	DOUBLE SOCKET
	SINGLE SOCKET
	CHIMNEY EXTRACTION FAN
	AIR ACCELERATOR
	EMERGENCY LIGHT ON BATTERY

SCALE

0 5 10 m

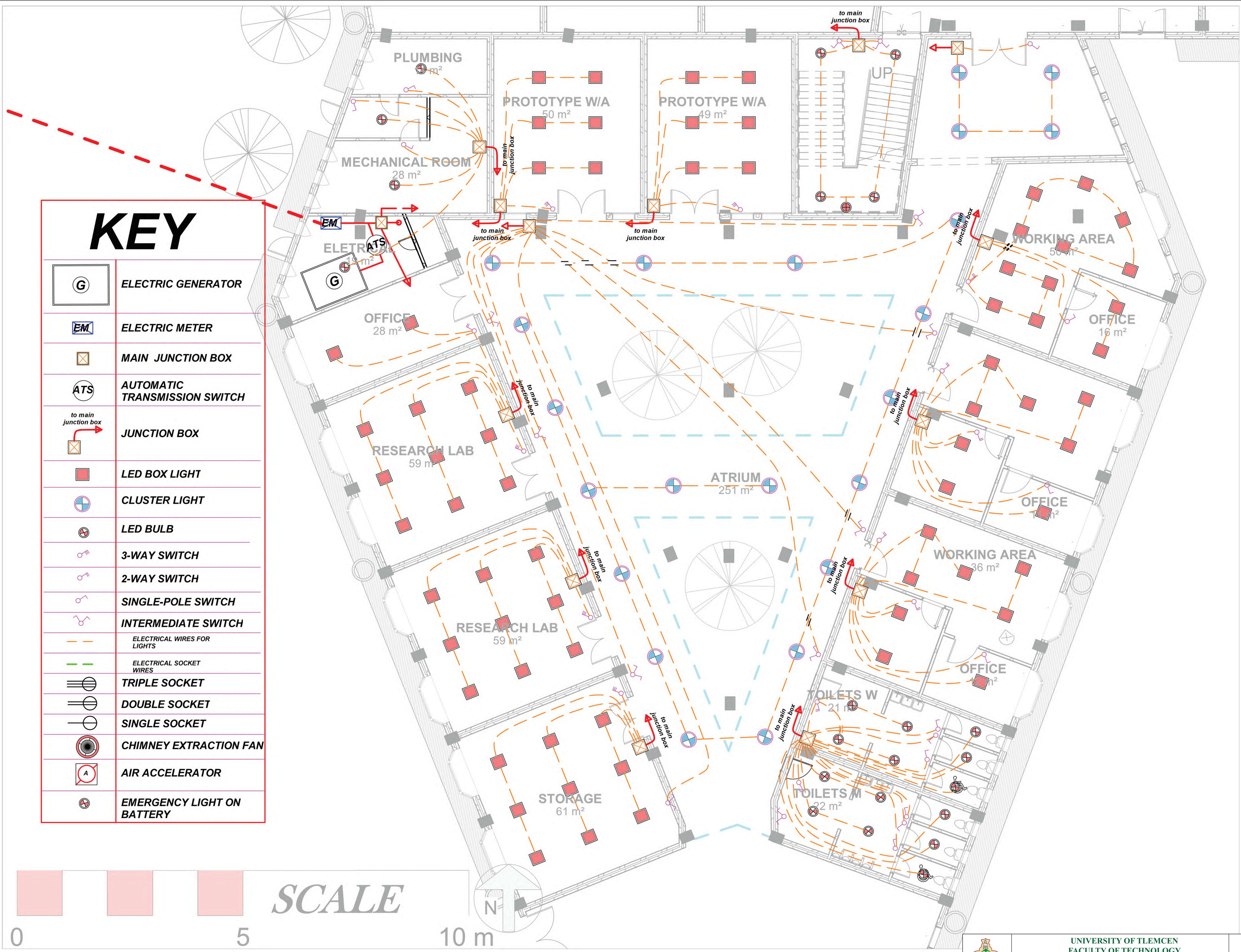


ELECTRICAL PLAN (PLUGS AND EXTRACTION FANS)



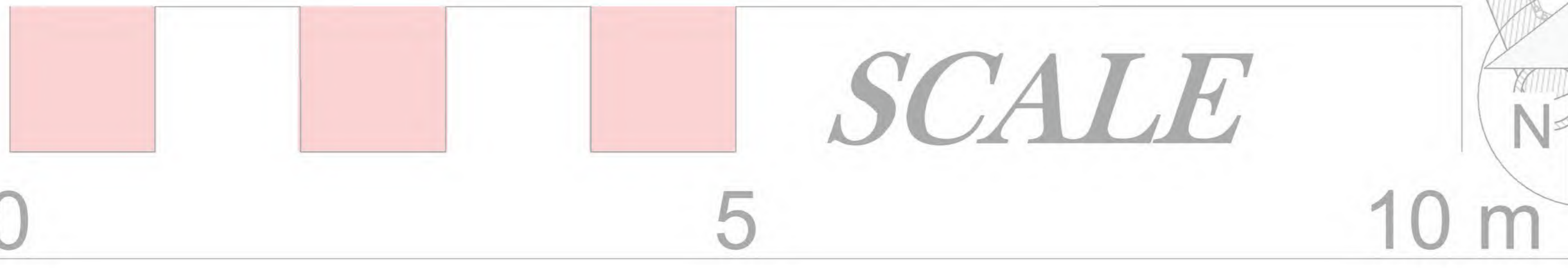
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KEY

	ELECTRIC GENERATOR
	ELECTRIC METER
	MAIN JUNCTION BOX
	AUTOMATIC TRANSMISSION SWITCH
	JUNCTION BOX
	LED BOX LIGHT
	CLUSTER LIGHT
	LED BULB
	3-WAY SWITCH
	2-WAY SWITCH
	SINGLE-POLE SWITCH
	INTERMEDIATE SWITCH
	ELECTRICAL WIRES FOR LIGHTS
	ELECTRICAL SOCKET WIRES
	TRIPLE SOCKET
	DOUBLE SOCKET
	SINGLE SOCKET
	CHIMNEY EXTRACTION FAN
	AIR ACCELERATOR
	EMERGENCY LIGHT ON BATTERY



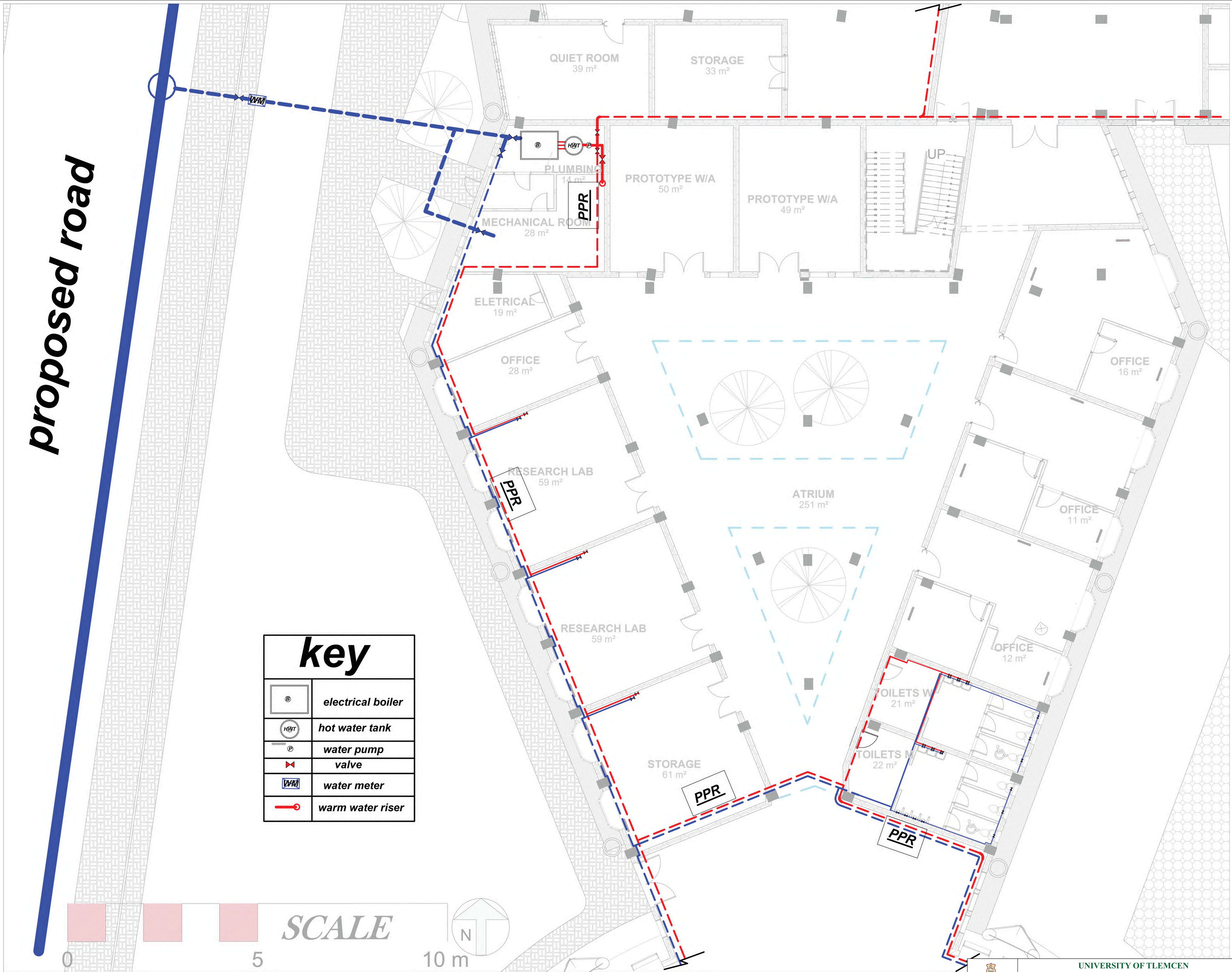
ELECTRICAL PLAN (LIGHTING SYSTEM)





proposed road

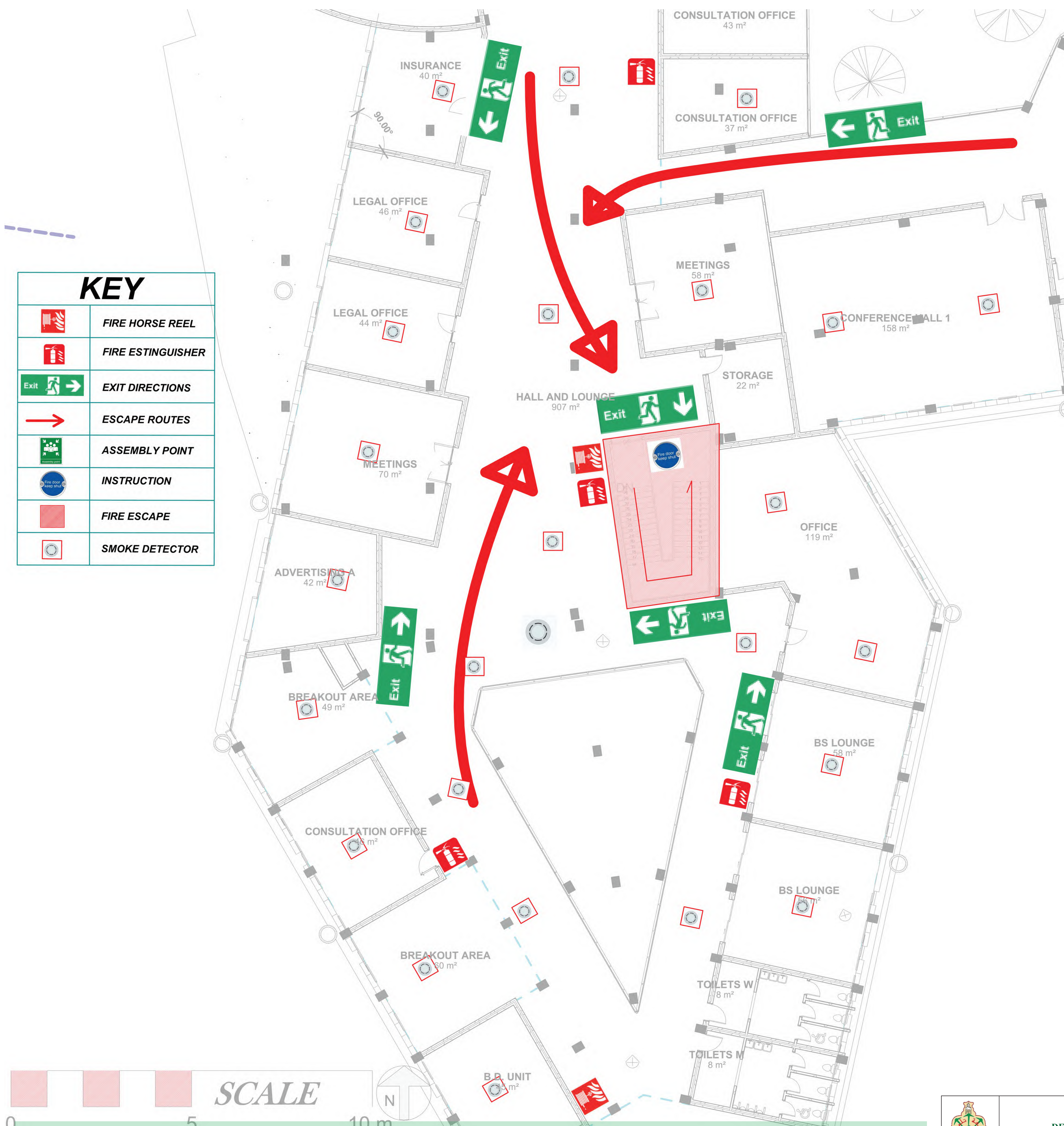
key	
	electrical boiler
	hot water tank
	water pump
	valve
	water meter
	warm water riser



PLUMBING PLAN (HOT/COLD WATER SUPPLY)



KEY	
	FIRE HORSE REEL
	FIRE EXTINGUISHER
	EXIT DIRECTIONS
	ESCAPE ROUTES
	ASSEMBLY POINT
	INSTRUCTION
	FIRE ESCAPE
	SMOKE DETECTOR

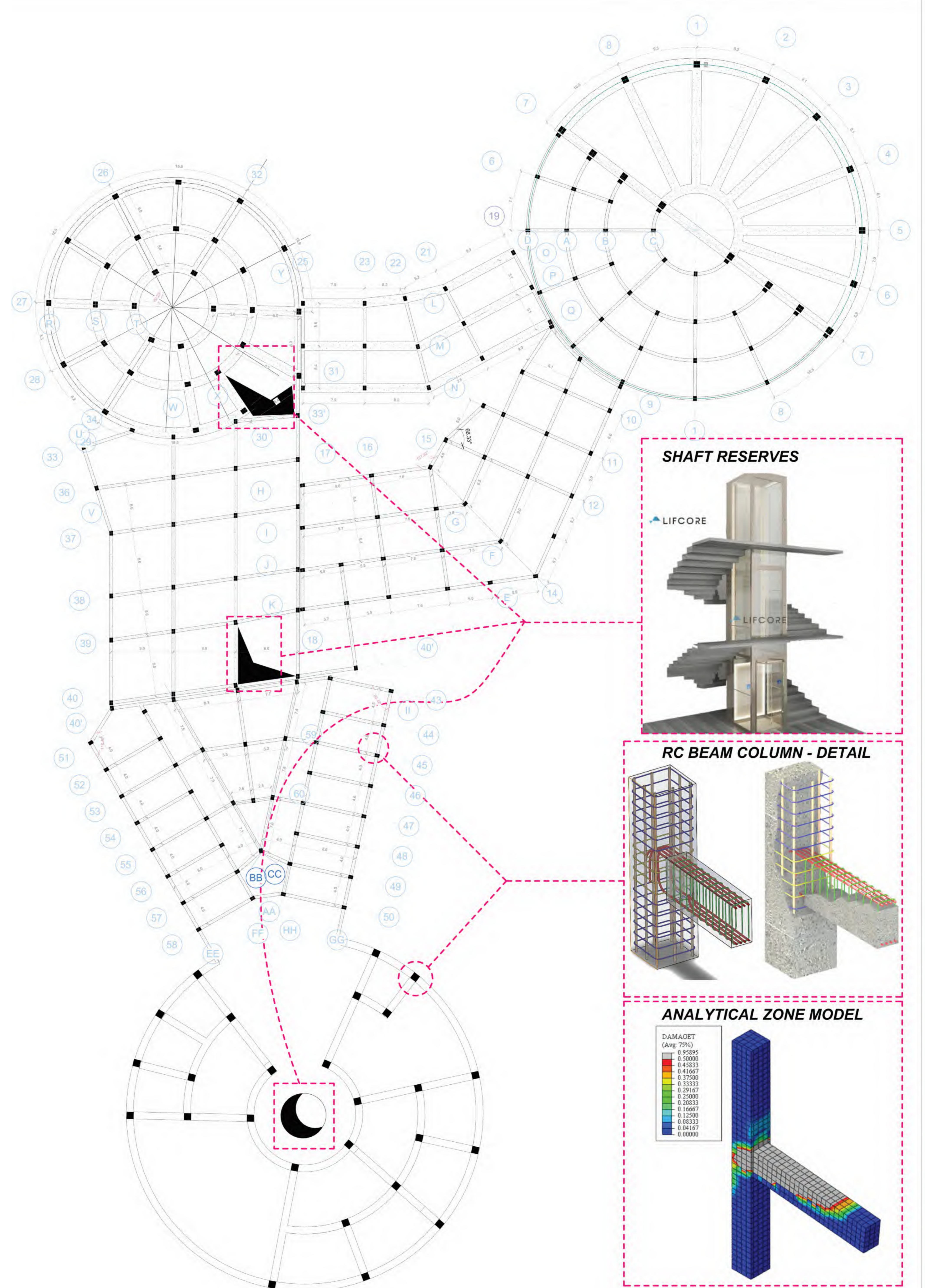
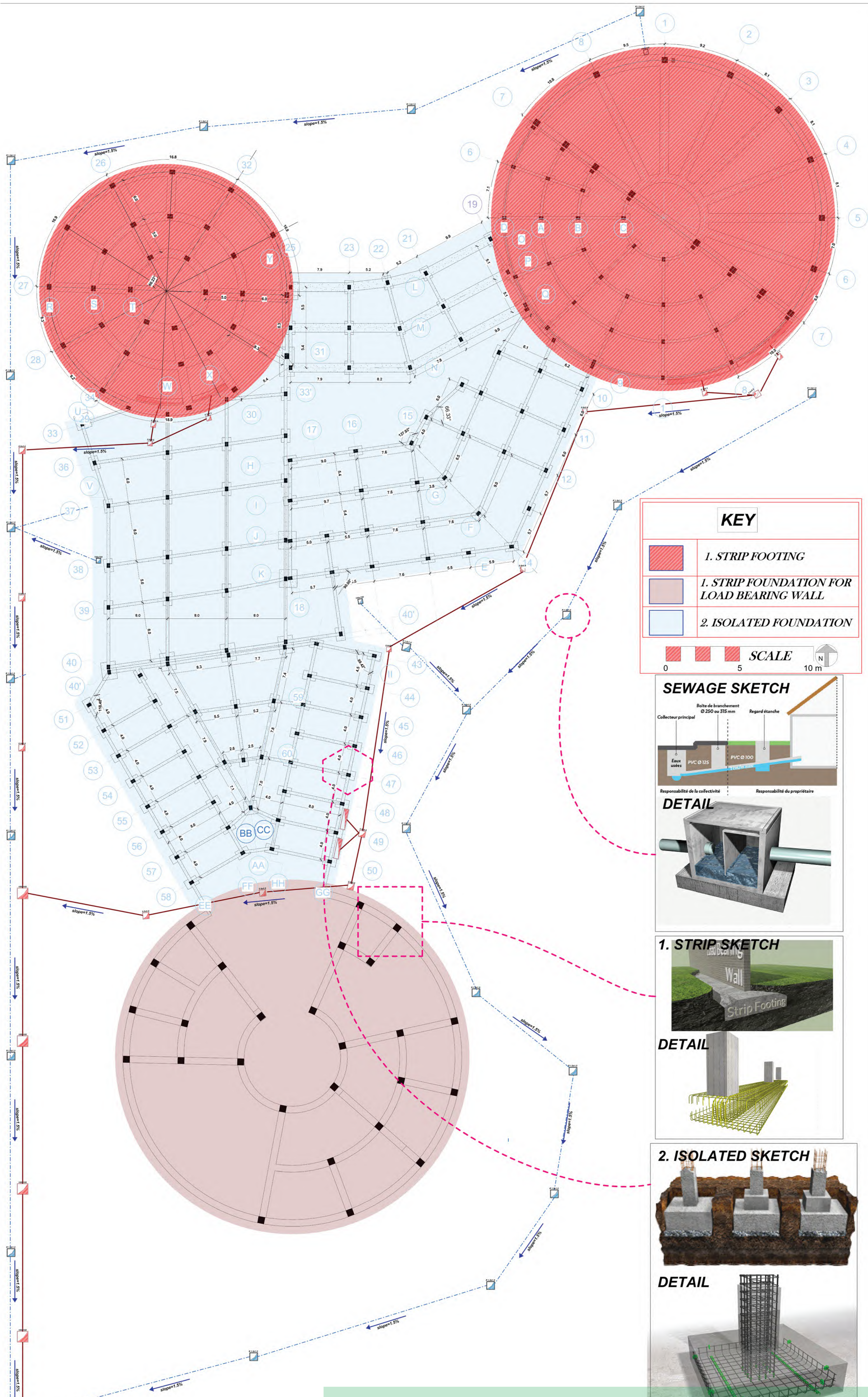


EVACUATION PLAN / EMERGENCY EXIT



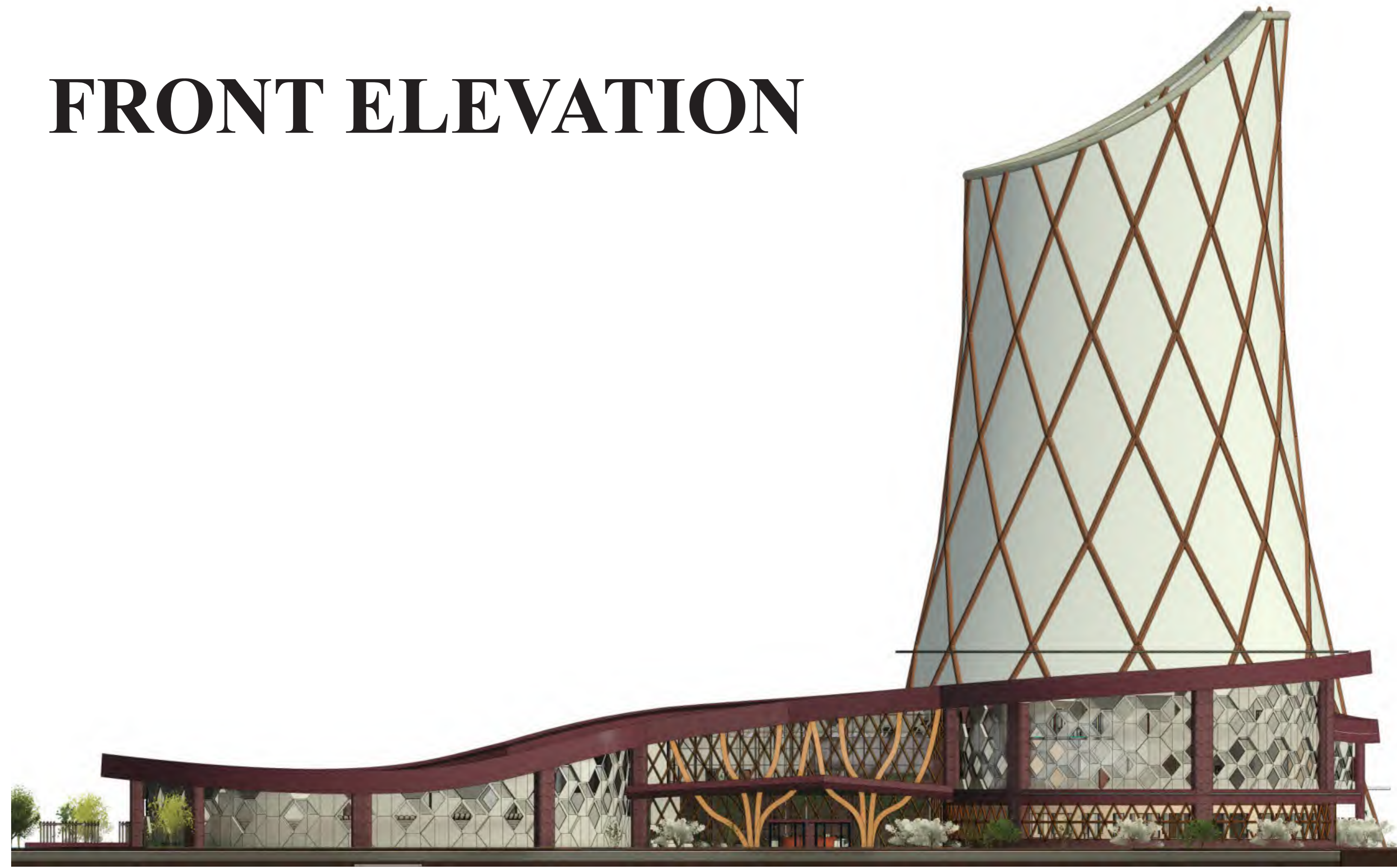
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 OF BROWN FIELDS IN HARARE, ZIMBABWE





FOUNDATION AND STRUCTURE PLAN

FRONT ELEVATION



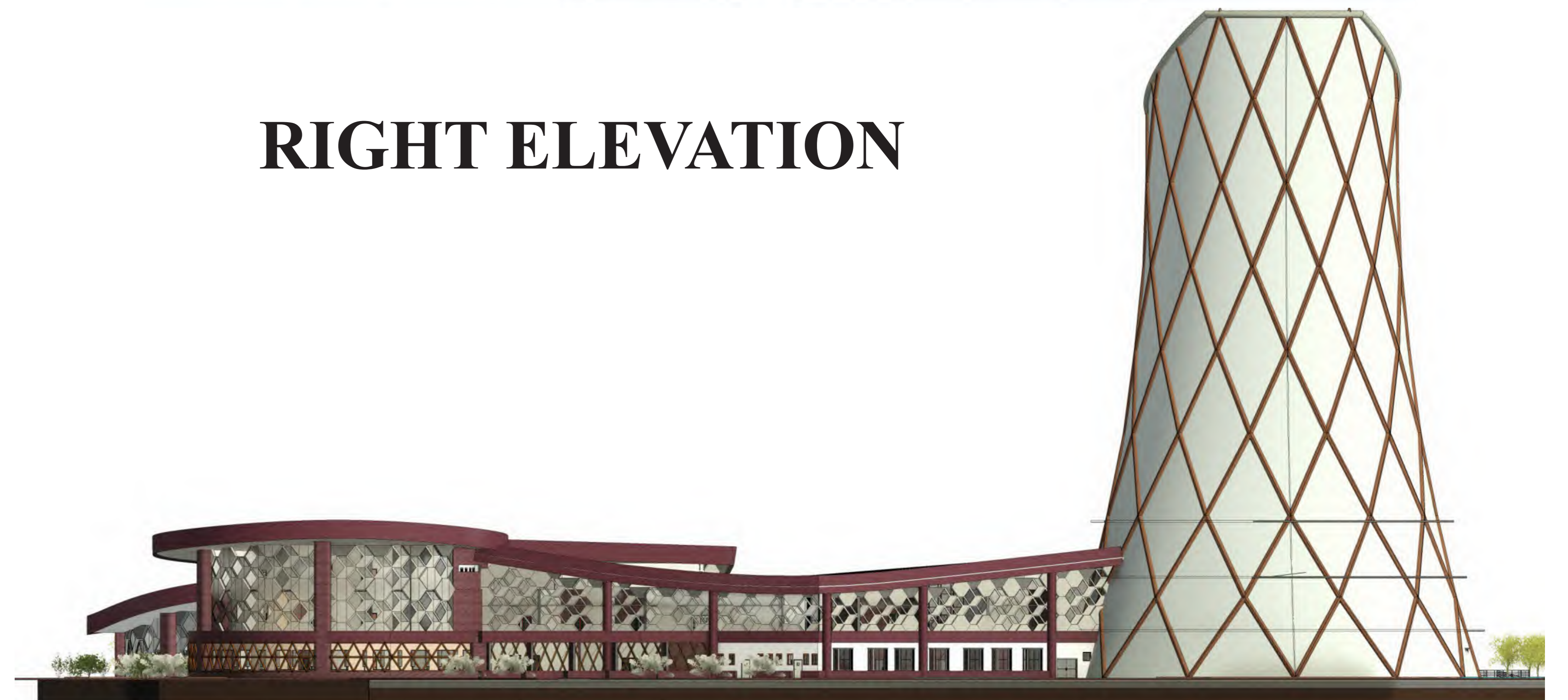
REAR ELEVATION



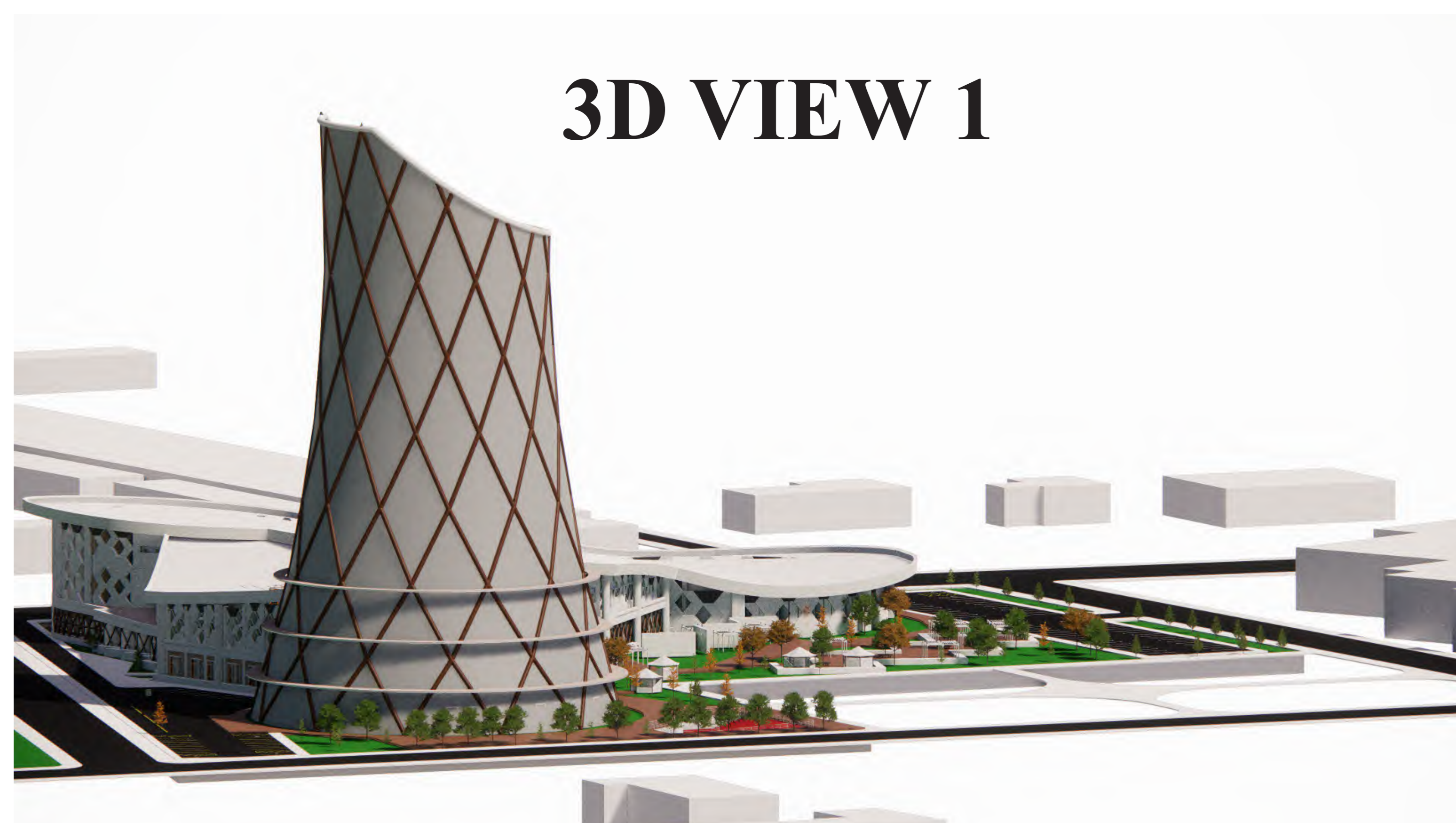
LEFT ELEVATION



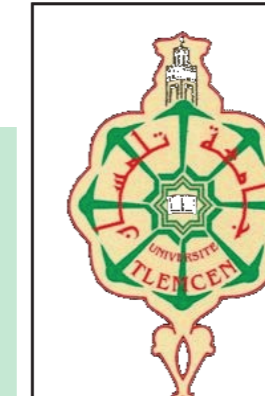
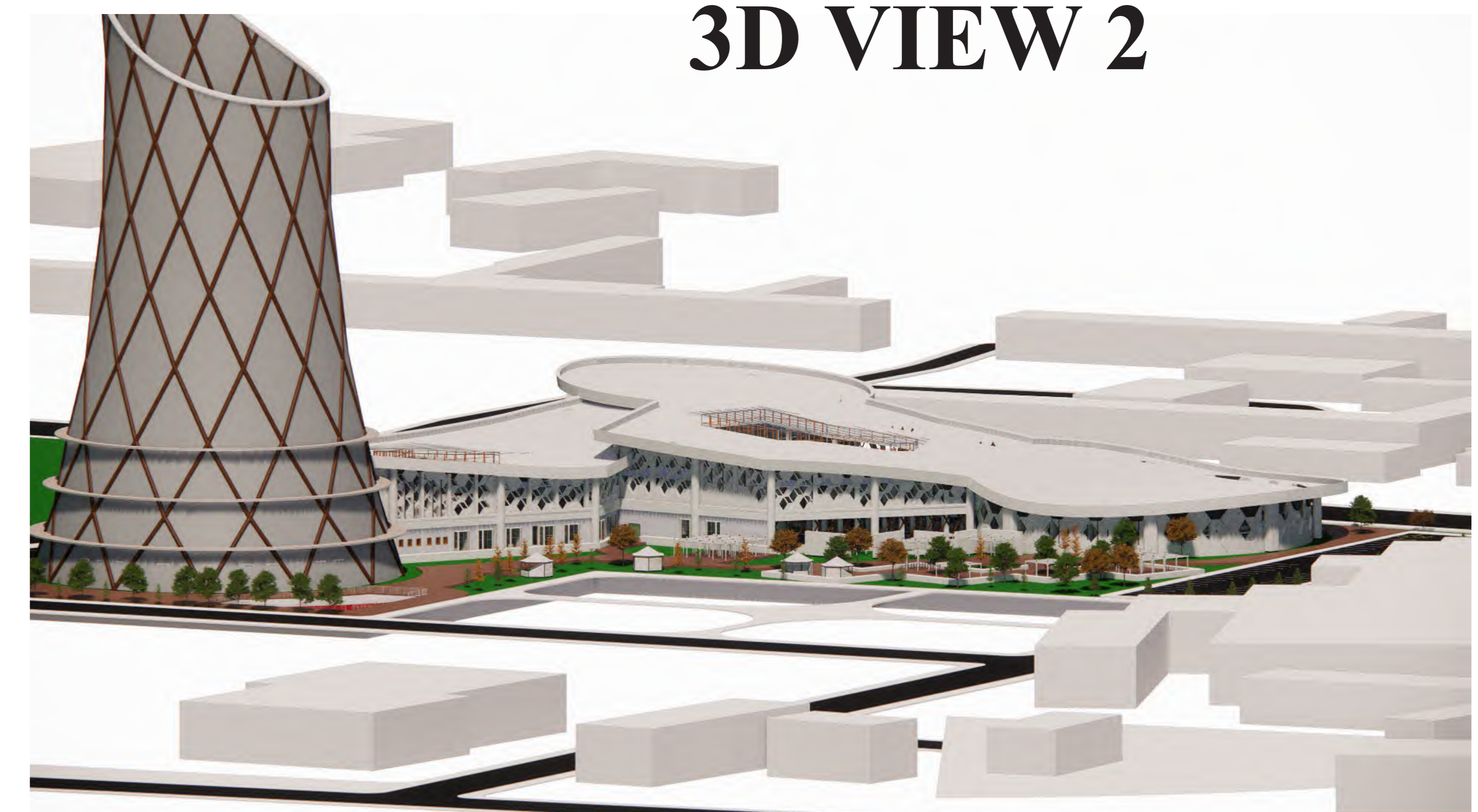
RIGHT ELEVATION



3D VIEW 1



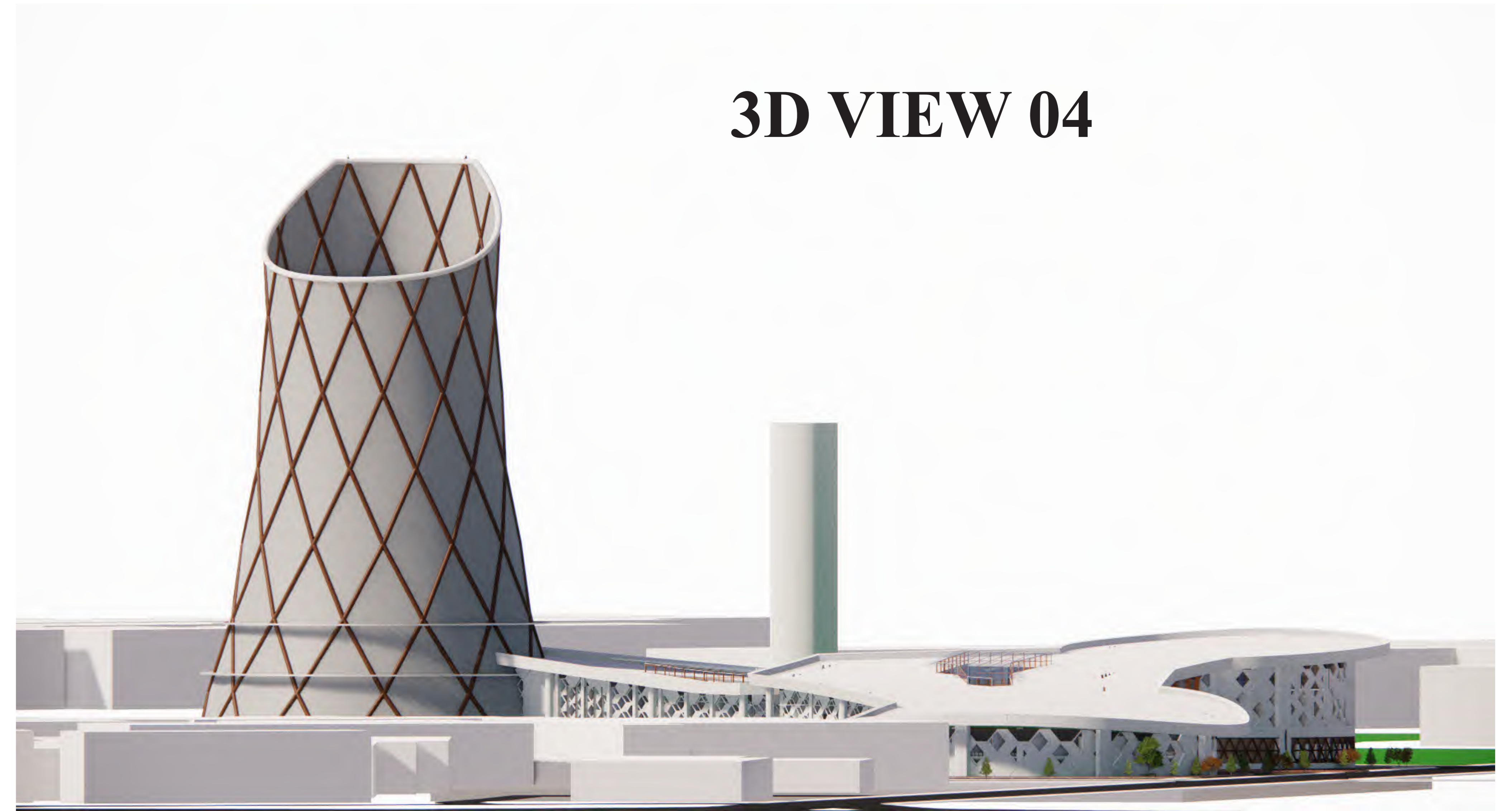
3D VIEW 2



3D VIEW 03



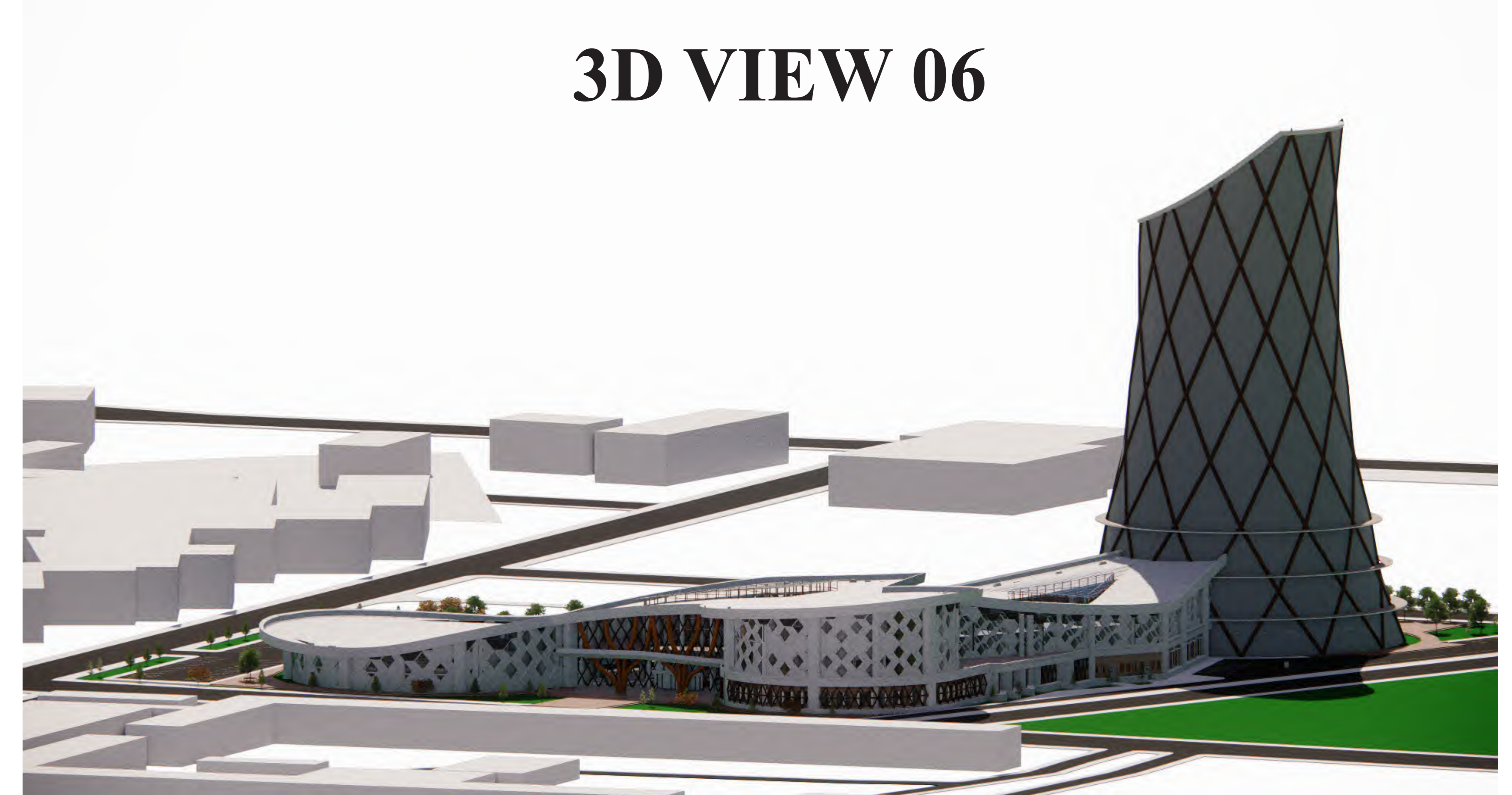
3D VIEW 04



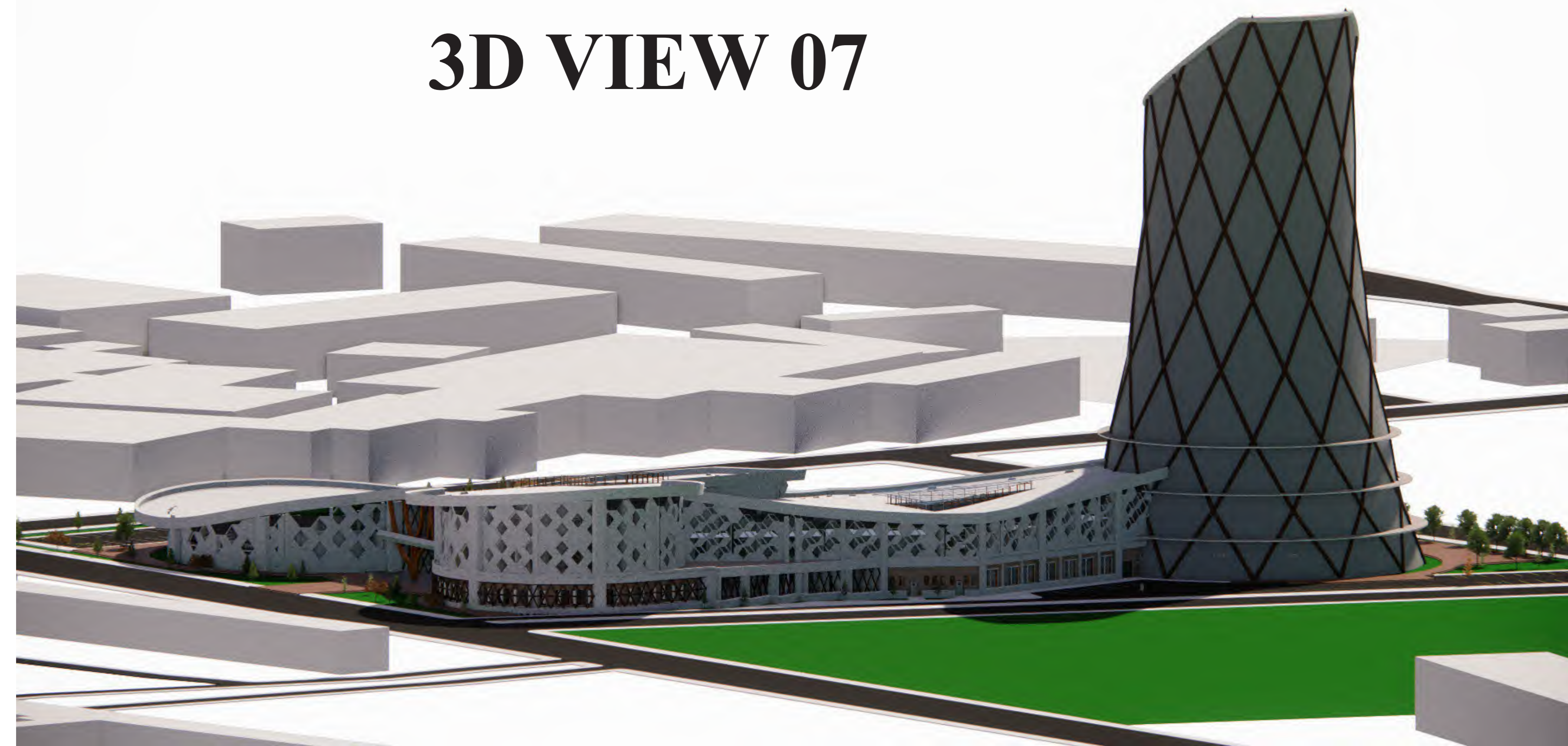
3D VIEW 05



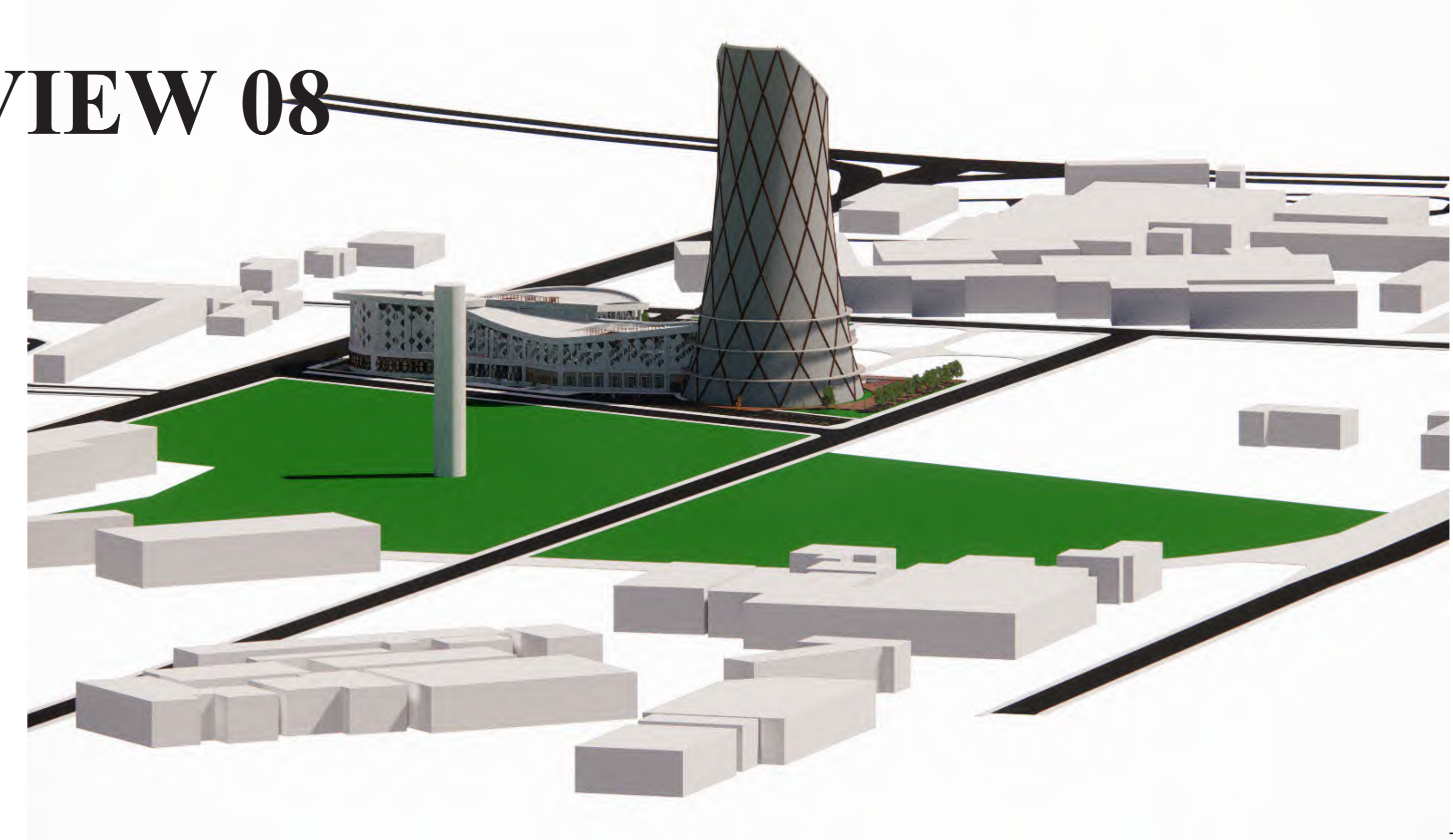
3D VIEW 06



3D VIEW 07



3D VIEW 08



ARCHITECTURAL RENDERS



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BUSINESS INCUBATOR FOR RE-DEVELOPMENT
OF BROWN FIELDS IN HARARE, ZIMBABWE



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