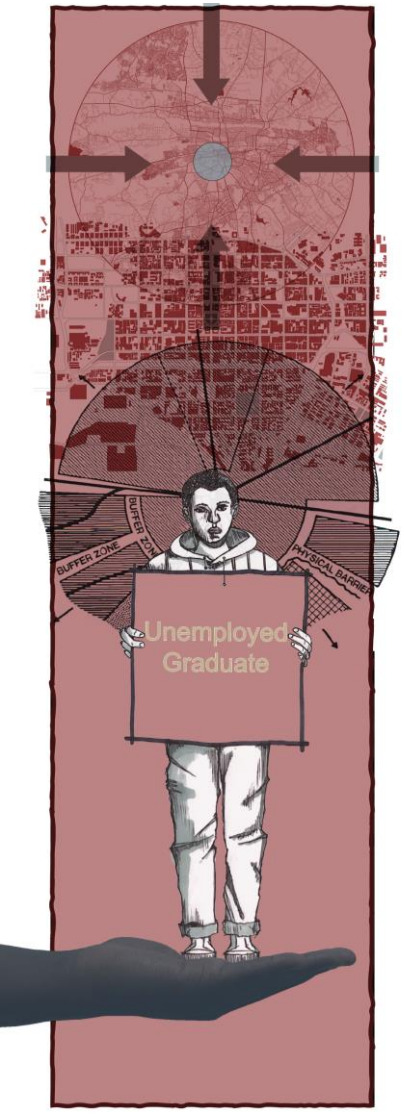


FIGURE 1
(AUTHOR, 2024)

URBAN NEG-ENTROPY?

URBAN RESOURCE ARCHITECTURE:
ENVISIONING A NATIONAL GRADUATE CENTRE

M A R K S G W A N G W A
1 4 2 3 1 1 3 2

SUPERVISOR: TARIQ TOFFAH

CONTENT

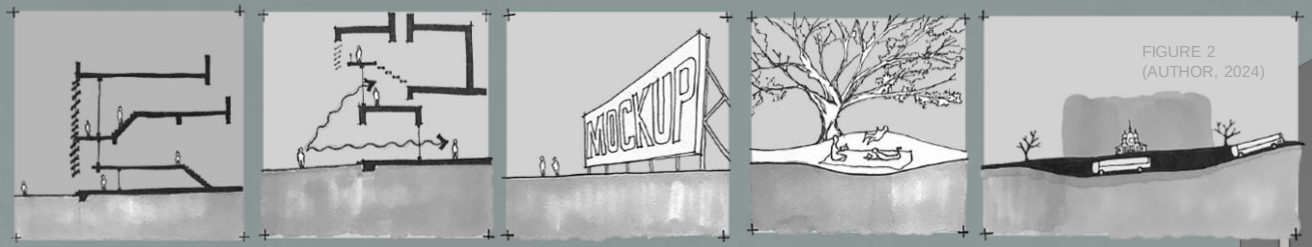


FIGURE 2
(AUTHOR, 2024)

PRETORIA OLD SYNAGOGUE

ABSTRACT

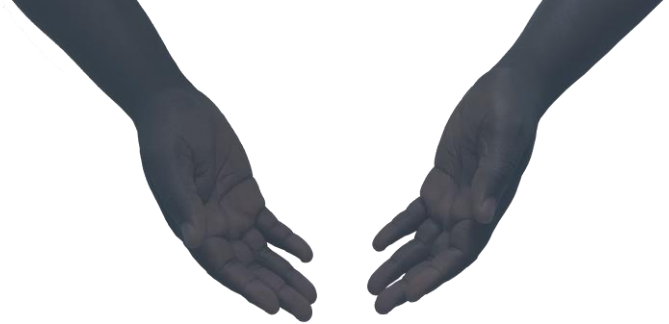


FIGURE 3
(AUTHOR, 2024)

This project aims to address the dual challenges of rapid urbanization and youth unemployment in Pretoria CBD by establishing a comprehensive educational facility tailored for unemployed graduates. Despite the abundance of tertiary institutions in the area, many students face difficulties finding jobs after graduating. This project aims to bridge this gap by offering targeted training programs, work experience opportunities, and resources to enhance graduates' CVs and job prospects.

The core concept revolves around creating a multifaceted centre that supports unemployed graduates through various means: acquiring practical skills, participating in relevant career workshops, networking opportunities, interview preparation assistance, and access to free internet for job research and applications. By integrating key stakeholders such as the National Youth Development Agency (NYDA), SITA, the Department of Education, and CEDA, the project fosters a collaborative approach to tackle unemployment. The NYDA's involvement is crucial, as it provides support for aspiring entrepreneurs, including training and funding, enabling graduates to leverage their academic knowledge to start and manage their own businesses. This might result in a trickling effect where educated people can start giving back to communities by creating job opportunities.

The project is strategically located in Pretoria CBD, adjacent to prominent landmarks like the National Library and the Old Pretoria Synagogue. This central placement not only ensures walkability and easy access to essential amenities, educational institutions, and government buildings but also integrates the facility into the urban fabric effectively. The site, owned by the government and currently hosting a SITA storage facility, will be repurposed to create an architectural solution that accommodates state entities while addressing pressing social issues.

Additionally, the design will respect and complement the historical significance of the Old Pretoria Synagogue, preserving its heritage while integrating new programs.

BACKGROUND: CONNECTION TO DIT

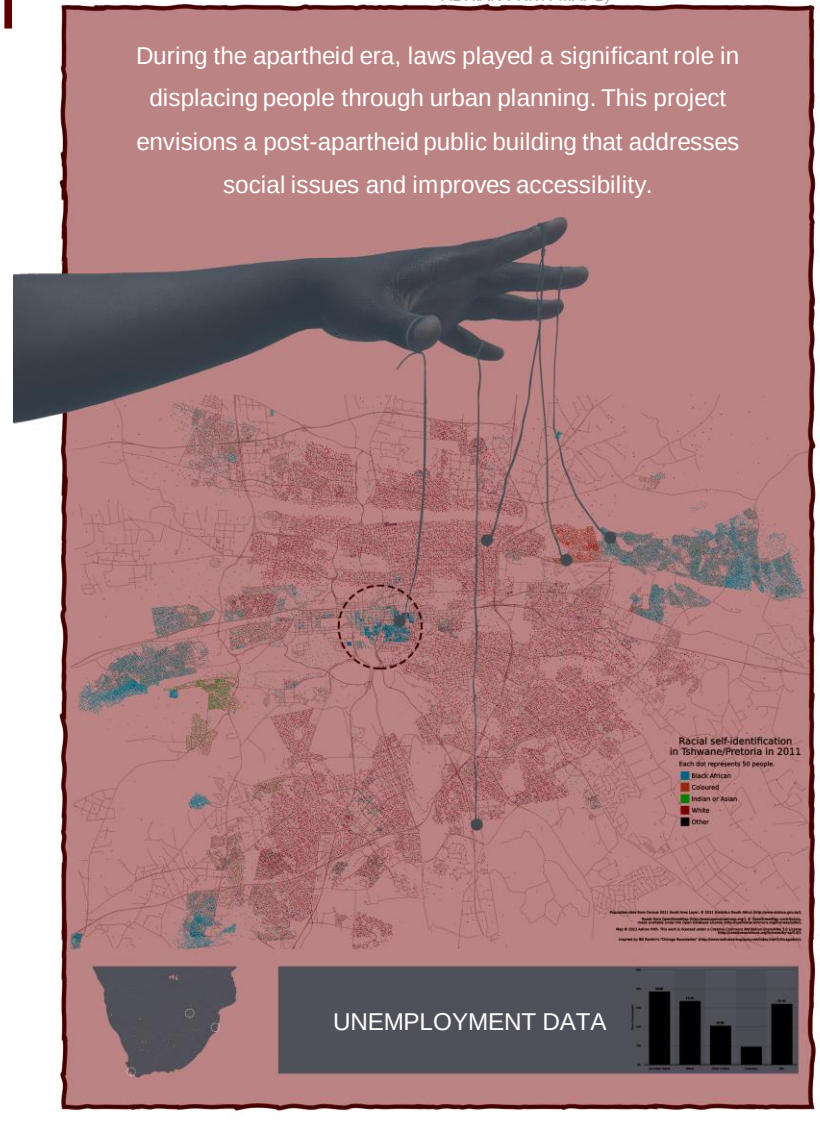
It is understood and accepted globally that rapid urbanization can shift population pressure from rural areas to cities. This pressure negatively affects resources in urban environments, leading to security challenges (Onyenechere et al., 2023, p. 5). According to Moyo et al. (2016, p. 338), this pressure, caused by a sudden increase in urban population, leads to a rise in informal traders in the city due to a lack of employment opportunities. This is accompanied by issues such as deterioration of urban infrastructure, encroachment on public space, accumulation of street waste, and noise pollution. These environmental hazards pose a threat to public health and sustainability in urban contexts (Onyenechere et al., 2023, p. 324).

Jacobs et al. (2023, p. 1) define urbanization as the relocation of a large number of people from rural areas to urban environments, which leads to population concentration. Darkey (2007, p. 59) notes that these relocations have become more prevalent since the democratization of South Africa, bringing significant spatial, economic, and social impacts to the City of Tshwane.

The City of Tshwane Municipality, South Africa's executive capital, is the largest municipality in terms of land area. The 2011 Census report revealed that the city has a population of over 2.9 million people, with 32.6 percent of its youth unemployed (Mudau and Kona, 2021, p. 23).

The significance of urban migration and youth employment in South Africa motivated this project. Young people move to the city in search of better opportunities or education. This project aims to combine the provision of learning opportunities with efforts to address joblessness. The proposed solution is a training institution that houses various organizations to meet the needs of unemployed graduates.

FIGURE4 (AUTHOR, 2024_ADOPTED FROM ADRIAN FRITH MAPS)



SELECTED SITE + HERITAGE

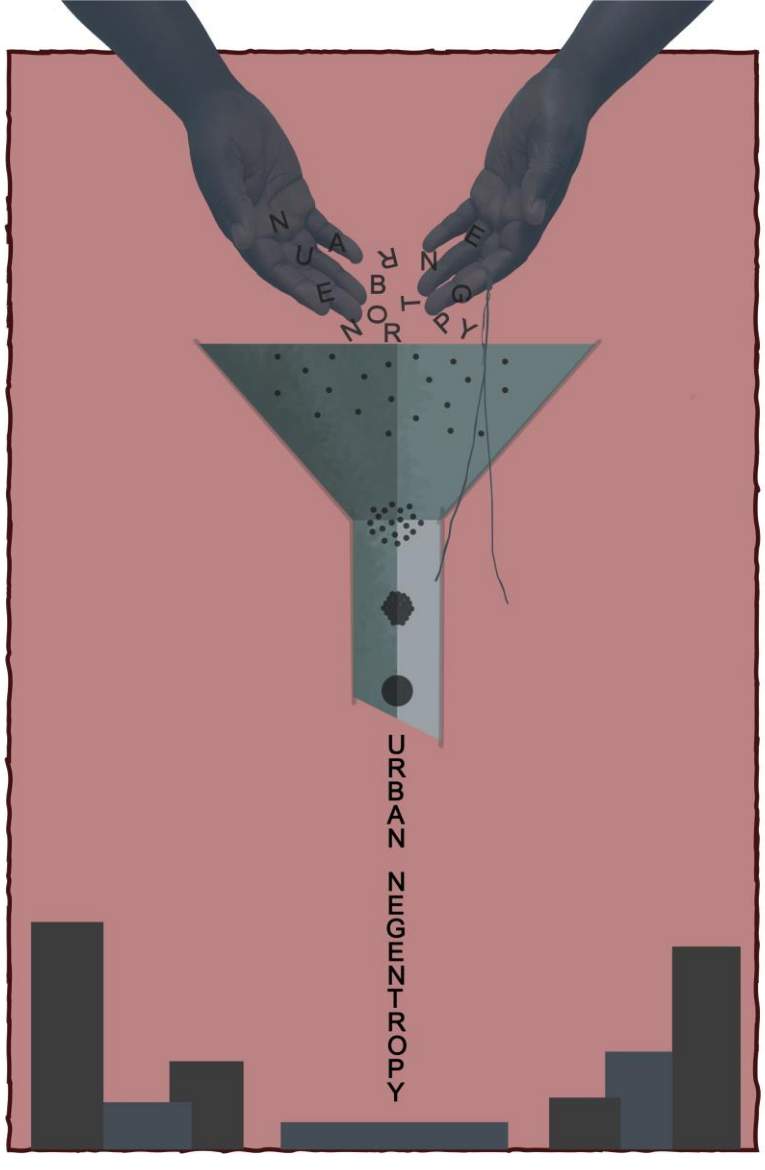
FIGURE 5
(AUTHOR, 2024)

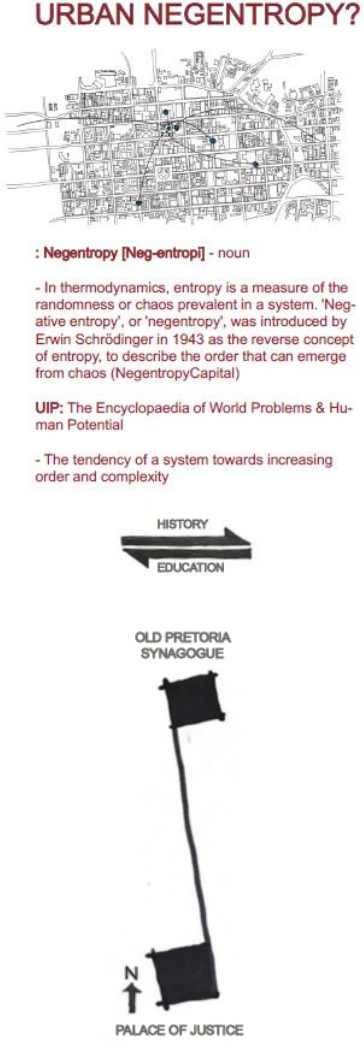
The project was initiated with defining a program, followed by selecting a site to meet the program's needs. Key criteria included a location in Pretoria CBD, walkability, and proximity to public transport interchanges or easy accessibility via public transport. The chosen site fulfils all these criteria and more: it is located behind the National Library, a critical resource centre. To the north is the Department of Education, and to the south, the Department of Home Affairs. A significant historical asset on-site is the Old Pretoria Synagogue, where the Rivonia Trials—a pivotal moment in South African history—took place. This building, also connected to the legacy of Steve Biko, currently stands abandoned and inaccessible. The project presents an opportunity to repurpose this historic structure, transforming it into an educational space with a memorial that honours its heritage and integrates learning, aligning with the goals of the new educational facility.

PRETORIA OLD SYNAGOGUE

URBAN VISION

FIGURE 6
(AUTHOR, 2024)





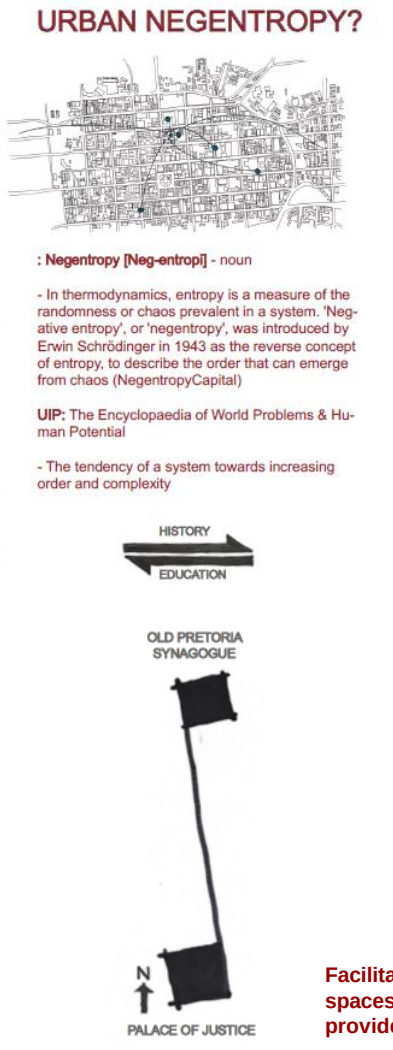
The concept of negative entropy is essential in defining a system where various members come together to form a single, organized structure within the city. This approach unites different organizations in one location, creating a cohesive system focused on order.

Negentropy, as defined by Carr-Chellman et al. (2023:19), involves counteracting the natural tendency of systems to disintegrate by reversing energy losses and promoting organization. Described simply as the opposite of entropy (Ho, 1994), negentropy is essentially a measure of energy created rather than energy lost, paralleling the concept of entropy in thermodynamics (Carr-Chellman et al., 2023:21-22). Miller (1978) suggests that biological life, such as cells that increase in order over time, exemplifies negentropy. This concept is especially relevant in social systems, where it fosters order, particularly in communication and collaborative frameworks (Carr-Chellman et al., 2023:22).

A negentropic system for this educational facility envisions a unified, collaborative framework where dispersed government institutions and support services converge into a single, cohesive structure. This centralized approach maximizes resources and operational efficiency, addressing the inherent disorder (or entropy) of scattered departments across the city that currently operate without coordinated efforts to support unemployed graduates. By establishing remote offices for relevant governmental departments and agencies within the educational facility, the design not only streamlines accessibility for users but also fosters a holistic, interconnected system dedicated to tackling unemployment and skill development. This negentropic model transforms the facility into a hub where social issues are addressed through a coordinated and resource-efficient approach, creating a structured and supportive environment in contrast to the fragmented, decentralized systems currently in place.

BRIEF: PROGRAM + USERS & STAKEHOLDERS

FIGURE 6
(AUTHOR, 2024)



Stakeholders

This concept of negentropy is achieved through the integration of diverse stakeholders, bringing together key government departments and agencies to form a unified, efficient system. By centralizing entities such as the Department of Education (DOE), Department of Trade, Industry, and Competition (DTIC), State Information Technology Agency (SITA), Small Enterprise Development Agency (SEDA), the National Library, National Youth Development Agency (NYDA), Department of Labour, CSIR, and Citizen Entrepreneurial Development Agency (CEDA), the facility fosters a collaborative framework. This integration enhances accessibility and resource sharing, enabling these organizations to work in tandem to address unemployment and support skills development for graduates within a single, structured environment..

Users

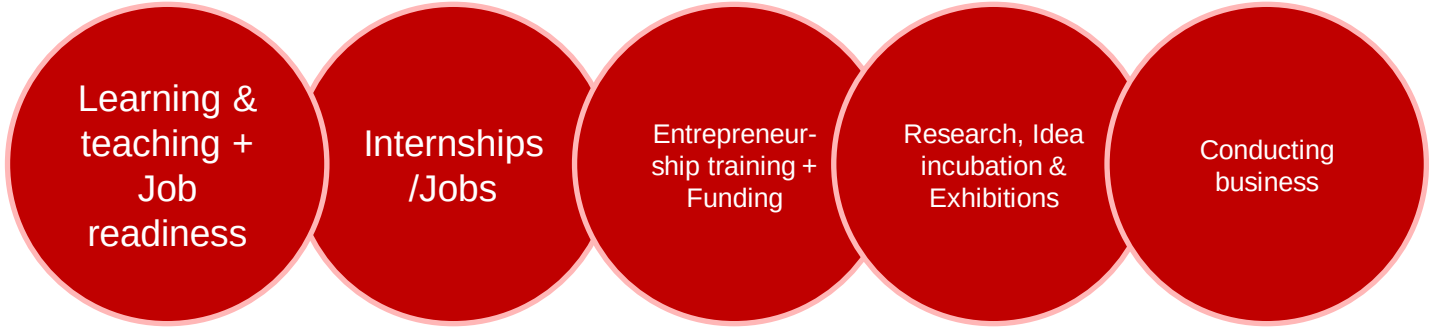
The primary users of this facility are unemployed graduates who will benefit from its range of resources, including research areas, lecture spaces, and internet access. The facility offers dedicated workspaces for business activities, group meetings, and social networking, as well as interview booths for job preparation and mock interviews. In addition, the building provides amenities to support street traders, such as wash sinks and ablution facilities. Visitors to the library also have access to leisure and recreational spaces, creating a balanced environment that fosters both professional development and personal well-being.

Program

In short, the core programs at the facility focus on learning from others, internships, entrepreneurship training, idea incubation and exhibition, and conducting business activities. These initiatives aim to equip users with the skills and opportunities needed for personal and professional growth.

Facilities Provided

- Chemistry/physics Labs
- Computer labs and cubicles
- Conference hall
- Exhibition spaces
- Large auditorium
- Lecture halls
- Lounge/seating
- Networking spaces
- Recreational spaces
- Workstations
- Workshop spaces



Facilitator/ spaces provided	Department of Labour Facility's management National Library Graduates	Department of Labour Facility's management SITA	SEDA NYDA CEDA	CSIR NERSA UNISA	Floating offices Meeting/Media Rooms Conference hall

CONTEXT & INFORMANTS

FIGURE 7
(AUTHOR, 2024)

The design of the educational facility in Pretoria CBD draws from various contextual informants that emphasize accessibility, inclusivity, and historical context. The project's location near the National Library and major government amenities anchors it within a nexus of resources essential for graduate learners, promoting synergy with existing educational and informational infrastructures. Positioned strategically within the city's one-way road system, the design acknowledges and integrates with established vehicle circulation routes, while also responding to pedestrian patterns that characterize the CBD's dense foot traffic. Additionally, proximity to the BRT route offers a vital connection to the broader urban fabric, countering the spatial disconnection imposed by apartheid-era planning. This centralization of an educational hub in Pretoria CBD serves as a purposeful inversion of apartheid spatial legacy, prioritizing accessibility for underserved populations and fostering a sense of shared public space within a historically fragmented city. The facility's placement and design thus reflect a commitment to urban integration, equity, and the provision of critical educational resources in a central, easily reachable location.

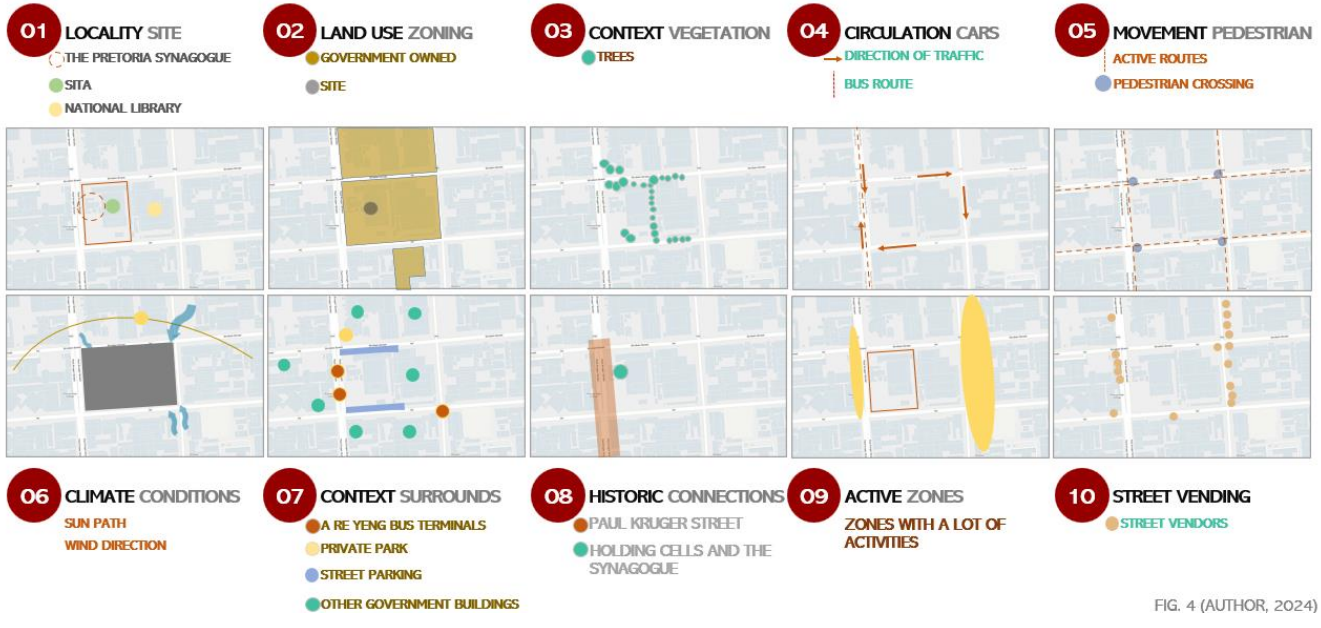
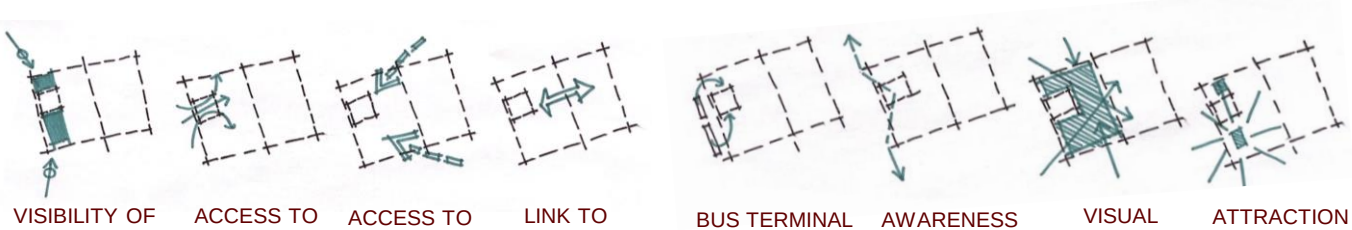


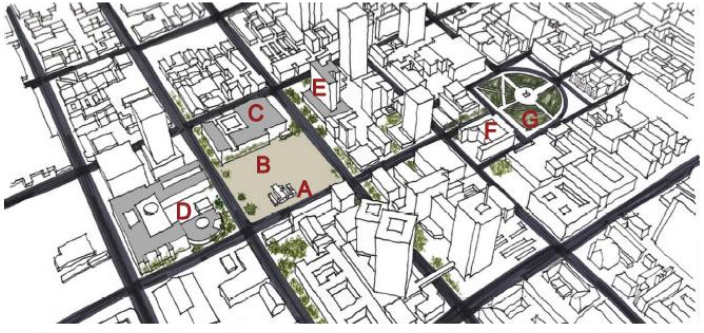
FIG. 4 (AUTHOR, 2024)

IMPORTANT CONSIDERATIONS

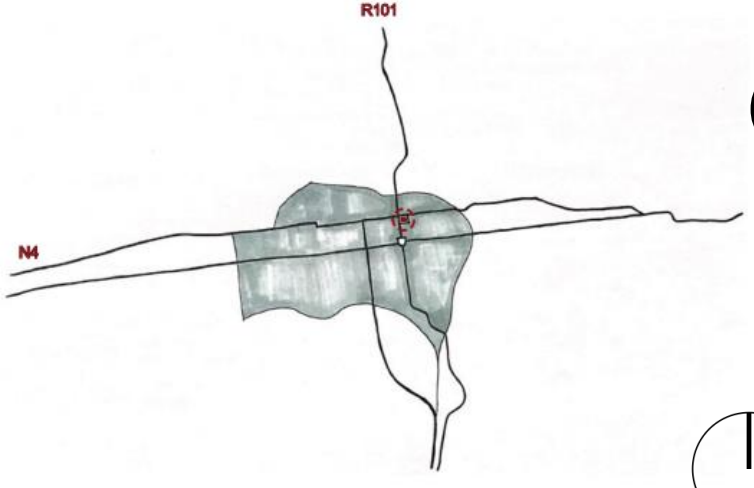


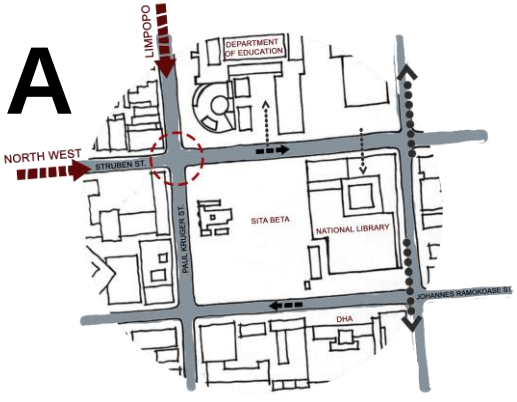
CONTEXT & INFORMANTS

FIGURE 8
(AUTHOR, 2024)

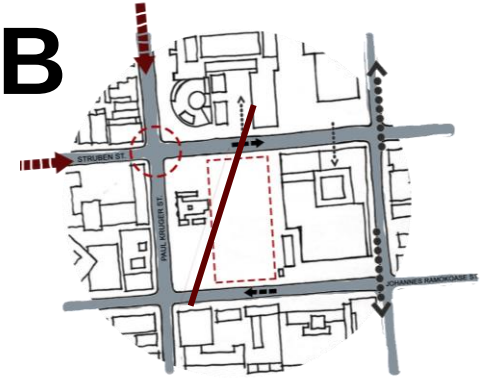


A OLD PRETORIA SYNAGOGUE B SITA C NATIONAL LIBRARY D DEPARTMENT OF EDUCATION E DHA
F PALACE OF JUSTICE G CHURCH SQUARE

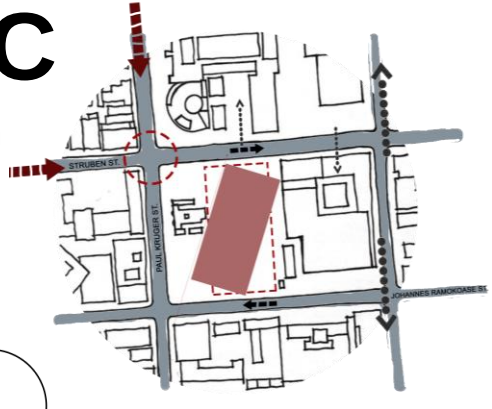




IMPORTANT INTERSECTION



PROPOSED BARRIER + FOOTPRINT



BUILDING TILTS TOWARDS INTERSECTION

CONNECTION TO LIBRARY

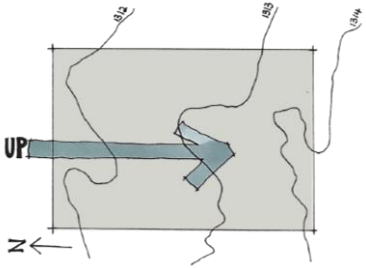
The location of the site is well-integrated with broader transport and public transport networks. There is an "A Re Yeng" bus station directly in front of the synagogue. Struben Street connects to the N4, which runs from the northwest, while Paul Kruger Street connects to the R101, heading to or coming from Limpopo. The building is just three blocks away from the taxi entry point for travellers coming from Limpopo, with the synagogue clearly visible from that point. All of this makes the surrounding intersection a key hub for migrants arriving in the area.

FIGURE... (MARKS GWANGWA, 2023)

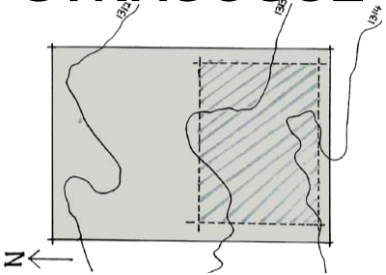
APPROACH TO SITE AND SYNAGOGUE

FIGURE 9
(AUTHOR, 2024)

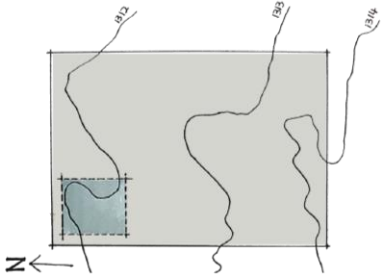
APPROACH TO SITE



SLOPE

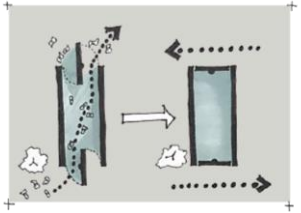


BASEMENT ON HIGHER END

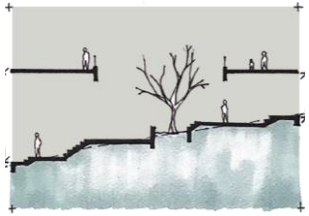


WATER COLLECTION ON LOWER END

SUBMERGE BUS TERMINAL



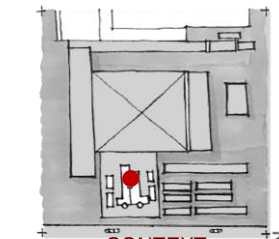
OPENING & CLOSING



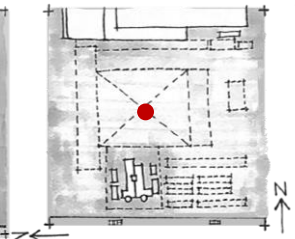
GROUND FLOOR FOLLOWING SLOPE

APPROACH TO HERITAGE: ADAPTIVE REUSE WITH ADDTIONS AND ALTERATIONS

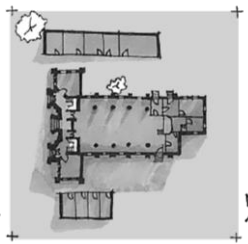
The synagogue is a key building on the site, holding significant value for this project. However, it is currently abandoned, poorly maintained, and in a state of decay. The architectural approach will focus on adapting and reusing the building, making thoughtful additions and alterations without completely altering its exterior, especially the main street-facing facade. Adaptive reuse is defined as giving a building new life through a new function (ODASA, 2014), or as a substantial transformation that involves both altering the building and its function (Wilkinson, Remøy, & Langston, 2014).



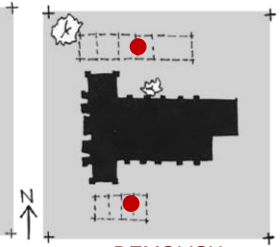
CONTEXT. SYNAGOGUE



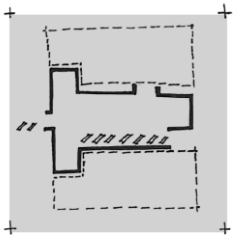
DEMOLISH SITA BETA BUILDING



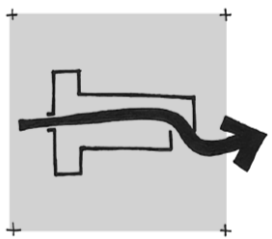
SYNAGOGUE FLOOR LAYOUT



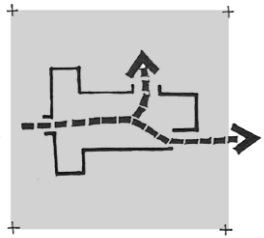
DEMOLISH HOLDING CELLS ON THE SIDES



EXHIBITION ON THE OUTSIDE. ONE SIDE OPENS TO A SQUARE



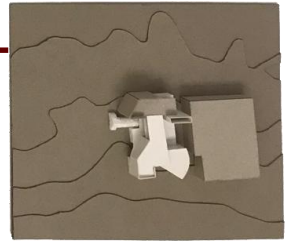
BETTER ACCESS



ITERATIONS: 9 MAQUETTES

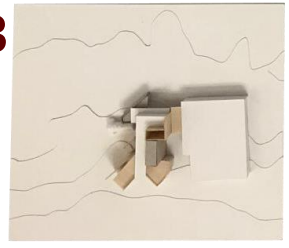
FIGURE 13
(AUTHOR, 2024)

01

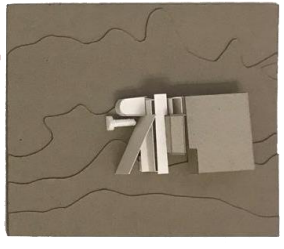


02

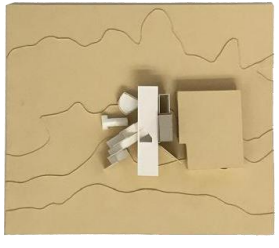
03



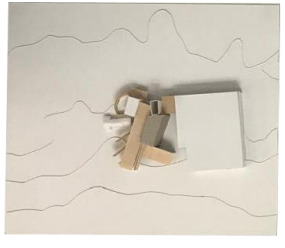
01



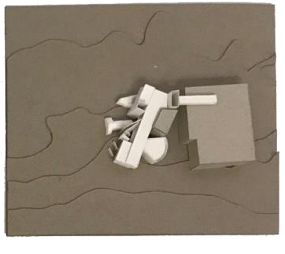
02



03



01



02

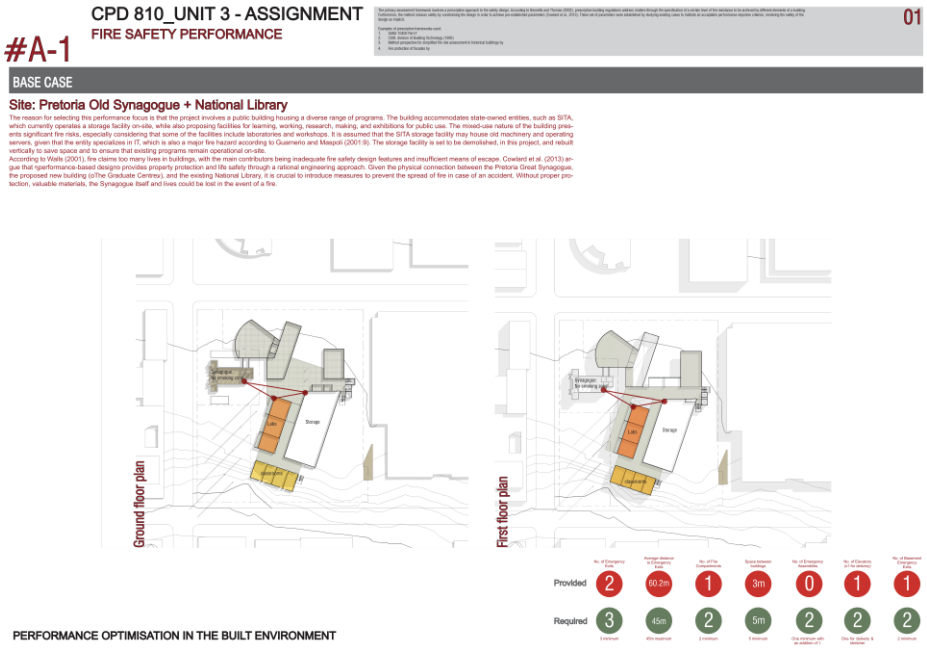
03

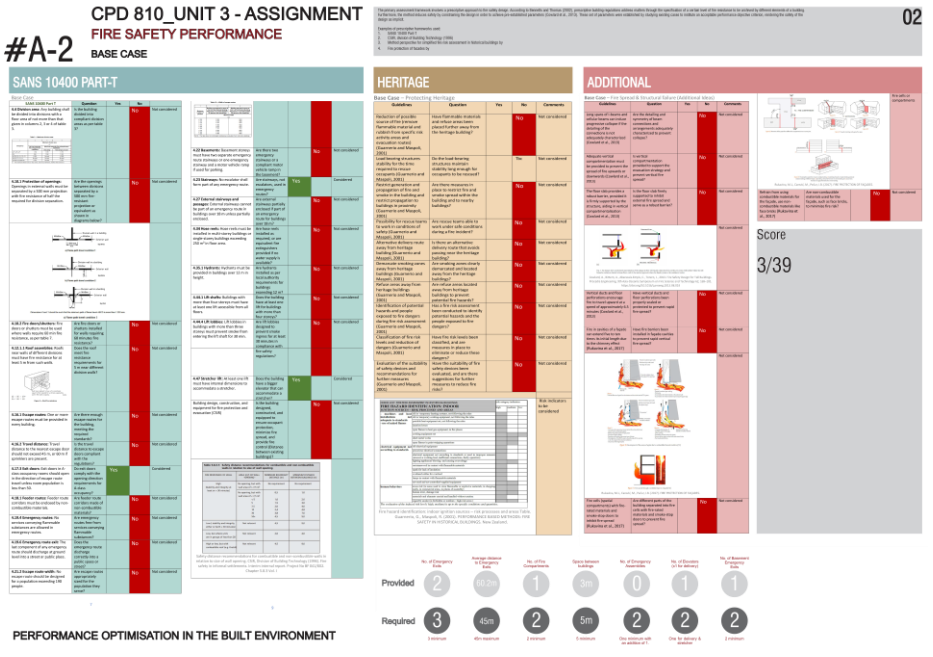
The spatial exploration focused on optimizing the placement of amenities to enhance practicality. This led to the decision to position the storage facility at the southeast corner of the property, along with a private service entrance to maintain operational efficiency. This strategic layout preserves the remaining edges of the site for public access, promoting a more open and inviting atmosphere while ensuring the storage facility remains functional and discreet.

The next stage of exploration involved iterating the design to meet fire safety requirements and standards, particularly important given the project connects three buildings: the National Library, the Synagogue, and the New Graduate Centre Building. These iterations were crucial to prevent the spread of fire between the buildings and ensure the safety and resilience of the entire complex.

ITERATIONS: FIRE PERFOMANCE

FIGURE 10
(AUTHOR, 2024)





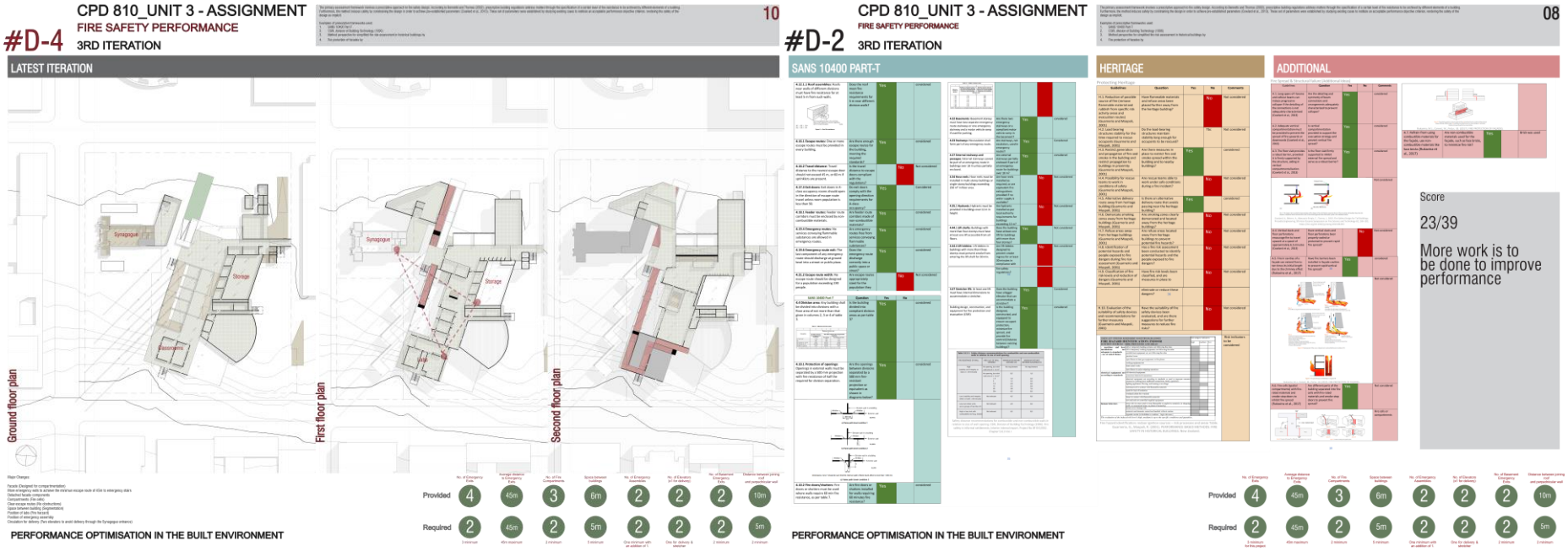
The primary assessment framework involves a prescriptive approach to fire safety design. According to Bennetts and Thomas (2002), prescriptive building regulations address matters through the specification of a certain level of fire resistance to be archived by different elements of a building. Furthermore, the method induces safety by constraining the design in order to achieve pre-established parameters (Cowlard et al., 2013). These set of parameters were established by studying existing cases to institute an acceptable performance objective criterion, rendering the safety of the design as implicit. The main idea is to maintain safety by limiting fire risks.

Examples of prescriptive frameworks used:

- SANS 10400 Part-T
- CSIR, division of Building Technology (1996)
- Method perspective for simplified fire risk assessment in historical buildings
- Fire protection of facades

FIRE SAFETY PERFORMANCE

FIGURE 11
(AUTHOR, 2024)



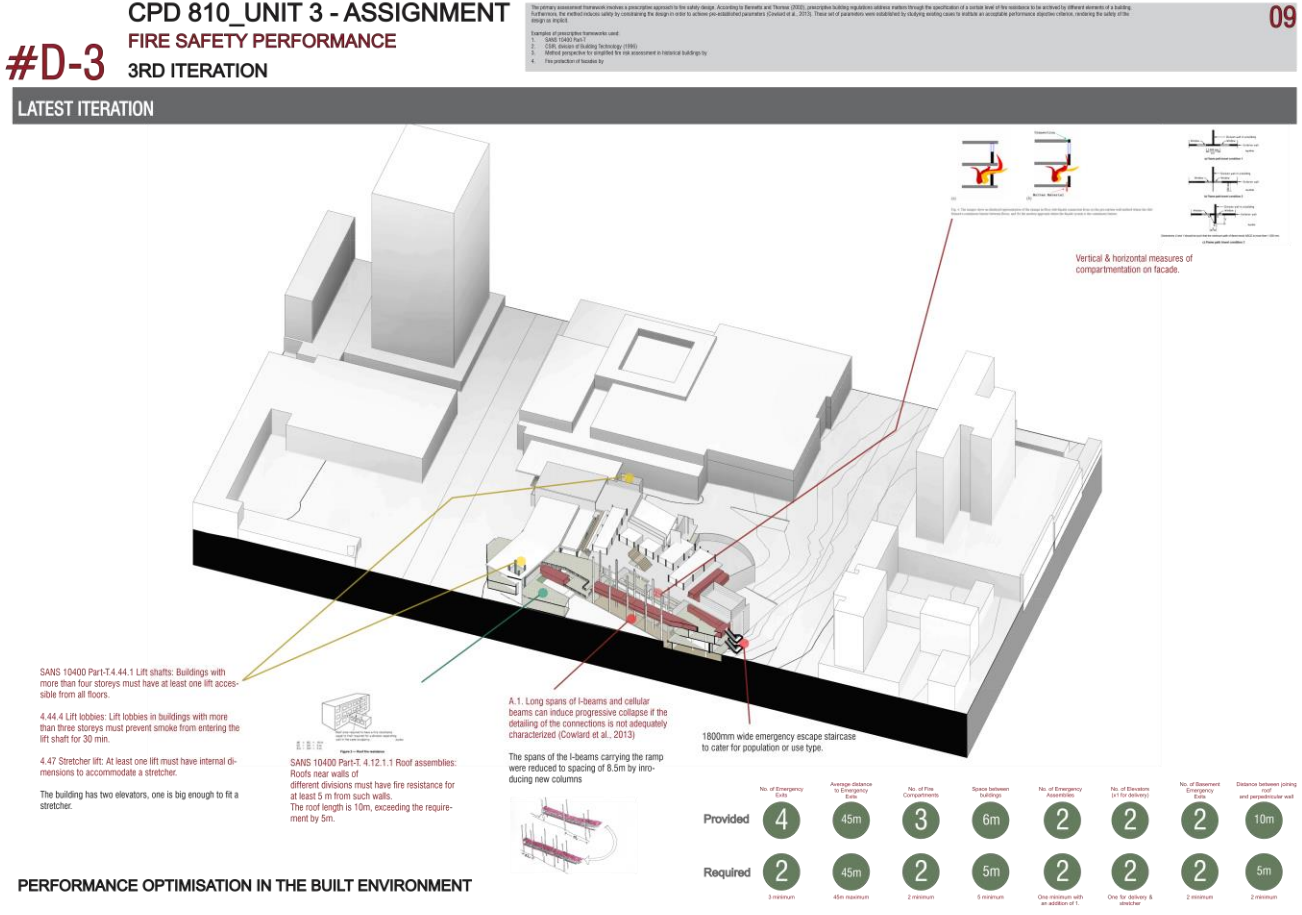
The final iteration shows a design that has considers fire compartmentalisation. This design also places fire harzards in different fire compartments further away from each other. The reason for selecting this performance focus is that the project involves a public building housing a diverse range of programs. The building accommodates state-owned entities, such as SITA, which currently operates a storage facility on-site, while also proposing facilities for learning, working, research, making, and exhibitions for public use. The mixed-use nature of the building presents significant fire risks, especially considering that some of the facilities include laboratories and workshops. It is assumed that the SITA storage facility may house old machinery and operating servers, given that the entity specializes in IT, which is also a major fire hazard according to Guarnerio and Maspoli (2001:9). The storage facility is set to be demolished, in this project, and rebuilt vertically to save space and to ensure that existing programs remain operational on-site.

According to Walls (2001), fire claims too many lives in buildings, with the main contributors being inadequate fire safety design features and insufficient means of escape. Cowlard et al. (2013) argue that “performance-based design” provides property protection and life safety through a rational engineering approach. Given the physical connection between the Pretoria Great Synagogue, the proposed new building (‘The Graduate Centre’), and the existing National Library, it is crucial to introduce measures to prevent the spread of fire in case of an accident. Without proper protection, valuable materials, the Synagogue itself and lives could be lost in the event of a fire.

FIGURE… (MARKS GWANGWA, 2023)

FIRE SAFETY PERFORMANCE

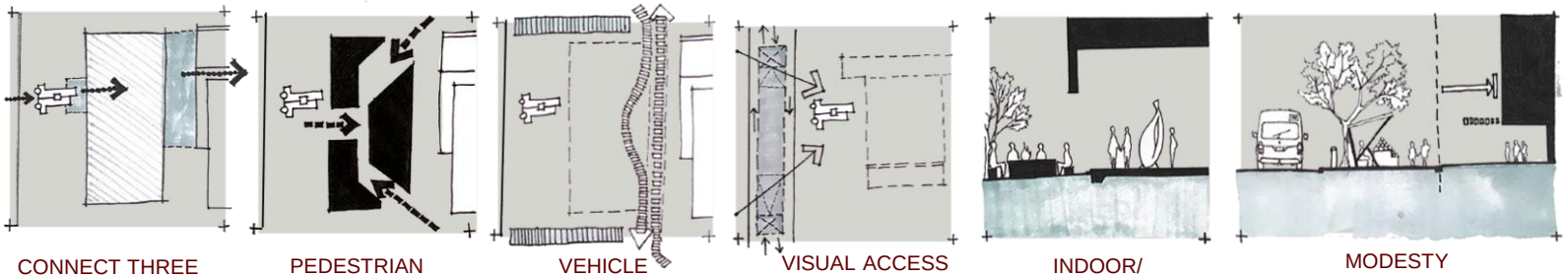
FIGURE 12
(AUTHOR, 2024)



Through an iterative process, the performance of the design, as evaluated against the compiled prescriptive fire safety assessment, has improved to address various safety aspects related to the protection of buildings and the preservation of lives. It is important to preserve both in this project, and the criteria used ensures that this is achieved through spatial planning, choice of material, compartmentalization, and means of escape.

TECHNICAL DRAWINGS: FLOOR PLANS

FIGURE 14
(AUTHOR, 2024)



CONNECT THREE BUILDINGS

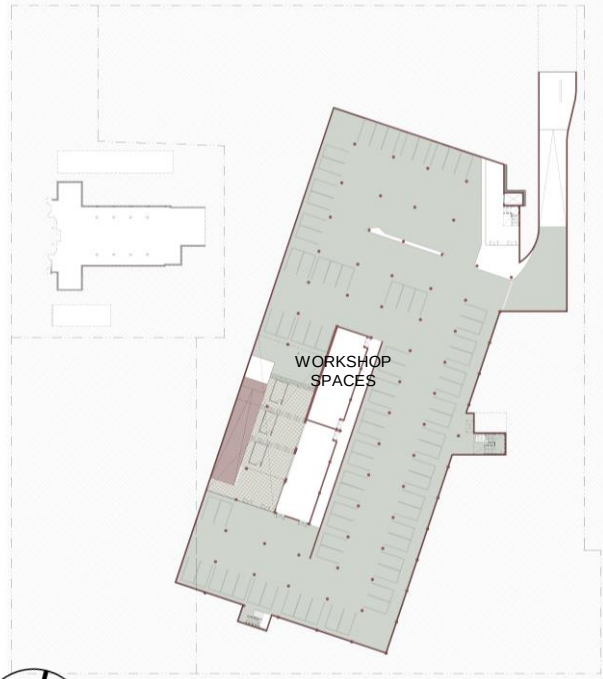
PEDESTRIAN ACCESS

VEHICLE ACCESS + STREET PARKING

VISUAL ACCESS

INDOOR/ OUTDOOR RELATIONSHIP

MODESTY



BASEMENT

The building features a basement primarily used for parking, along with two large workshop spaces. The ground floor is open to the public, with seating areas and transitional spaces that occasionally serve as exhibition spaces. It also includes offices and media rooms available for young professionals without dedicated office spaces, which can be booked through a registration system. A restaurant is located on the northern side of the building, designed to attract visitors to the adjacent library while offering a welcoming space for the public. The Synagogue serves as the main entrance for people accessing the upper floors, and it is connected to a new section that includes a seating area and vertical circulation, providing easy access to the higher levels.

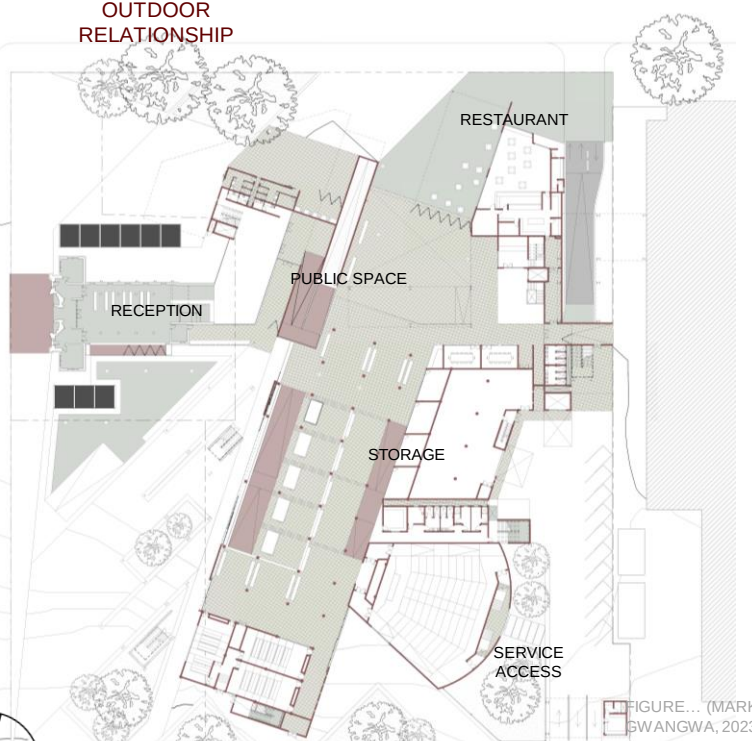
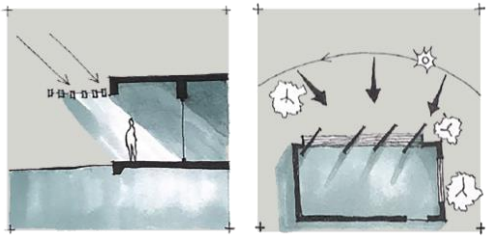


FIGURE... (MARKS GWANGWA, 2023)

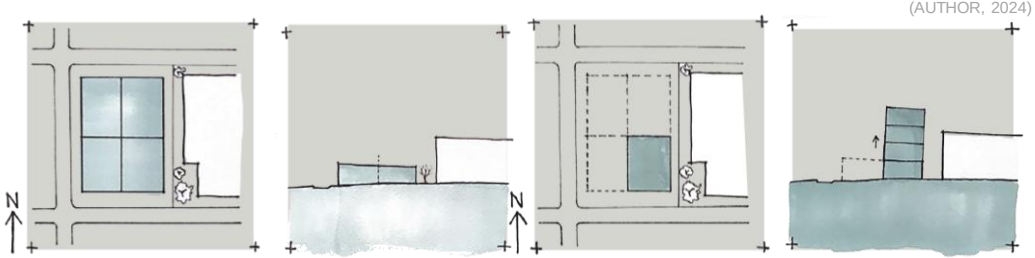
GROUND FLOOR PLAN

FLOOR PLANS

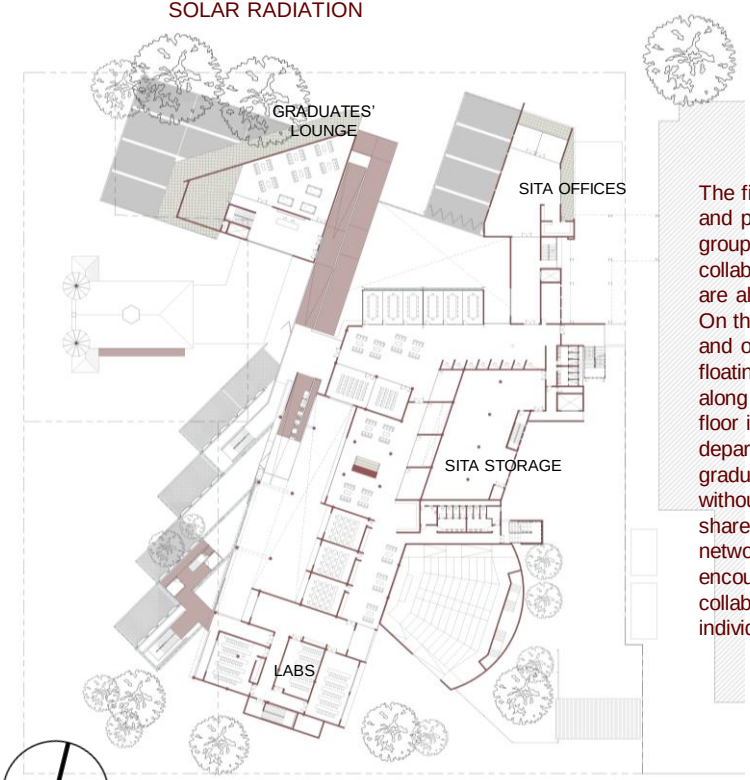
FIGURE 15
(AUTHOR, 2024)



SOLAR RADIATION



DEMOLISH EXISTING SITA STORAGE AND REBUILD VERTICALLY TO SAVE SPACE



The first floor is dedicated to learning and practical spaces, combined with group meeting rooms to foster collaboration. A series of boardrooms are also provided for formal meetings. On the second floor, you'll find offices and open-plan workstations, or floating offices, which can be booked, along with consultation rooms. This floor is primarily used by different departments, organizations, and graduates running businesses without dedicated office space. The shared environment promotes better networking opportunities, encouraging interaction and collaboration between entities and individuals.

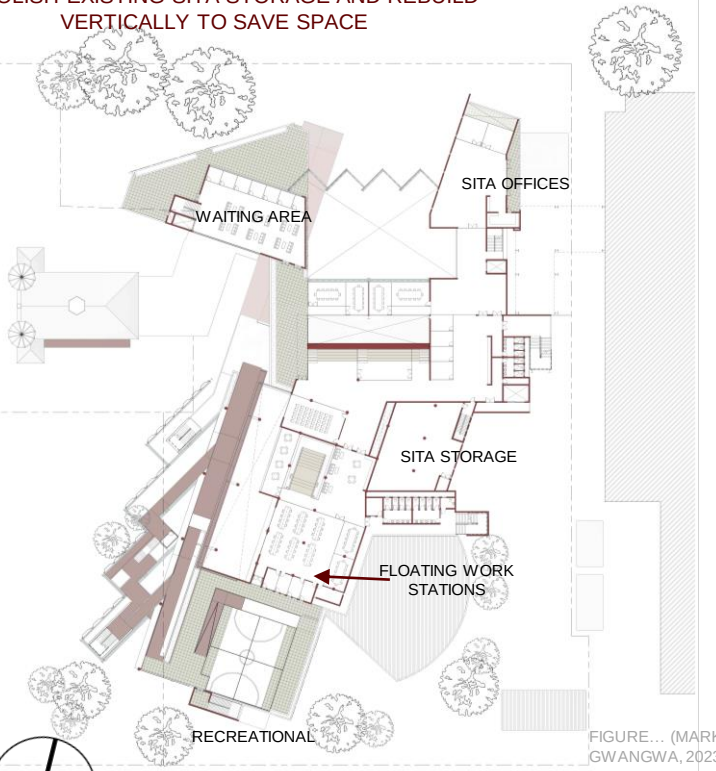
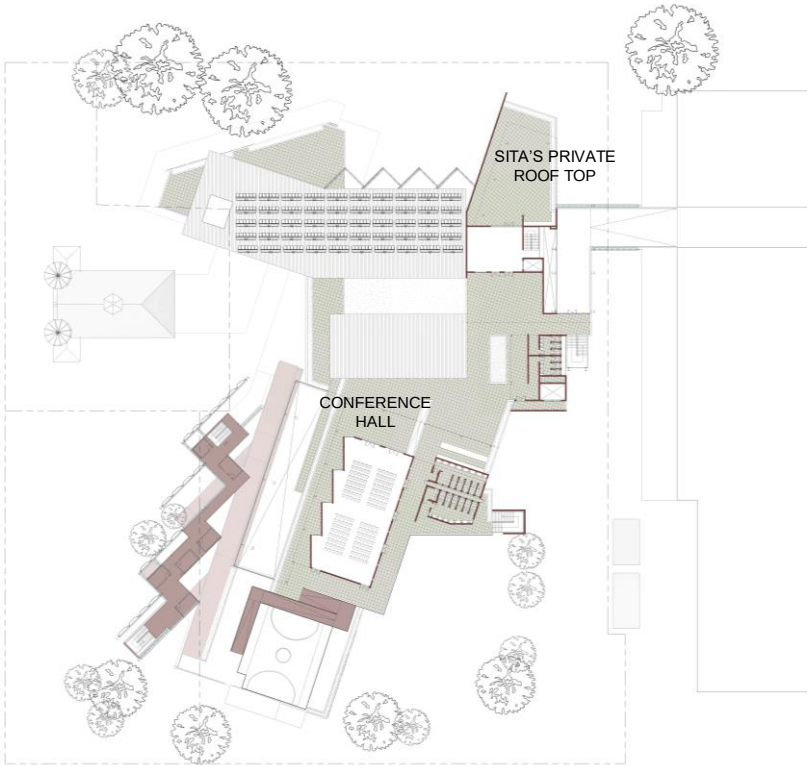


FIGURE... (MARKS GWANGWA, 2023)

FIRST FLOOR PLAN

SECOND FLOOR PLAN

FLOOR PLANS



THIRD FLOOR PLAN

FIGURE 16
(AUTHOR, 2024)

Reflection

Reflecting on this project, I realize how much its scope and impact have evolved throughout the design process. Initially, the program was focused on a narrow group of graduates with specific qualifications, but as the project developed, I recognized the importance of broadening its reach. Expanding the scope allows the facility to serve a wider range of individuals, fostering greater networking opportunities and creating a stronger sense of community. The concept of negentropy—essentially, creating order and value from disorder—has inspired me to envision a project that can address a variety of social issues. By involving multiple stakeholders, the project not only creates a space for collaboration but also brings diverse support services into one accessible location. This integrated approach can increase efficiency, helping individuals get the assistance they need in one place, rather than having to navigate multiple systems. I believe that with further engagement, additional stakeholders can be brought into the fold, and this project has the potential to serve as a prototype that can be replicated in other areas where there is a high demand for support and opportunity.

FIGURE… (MARKS GWANGWA, 2023)

NORTH ELEVATION

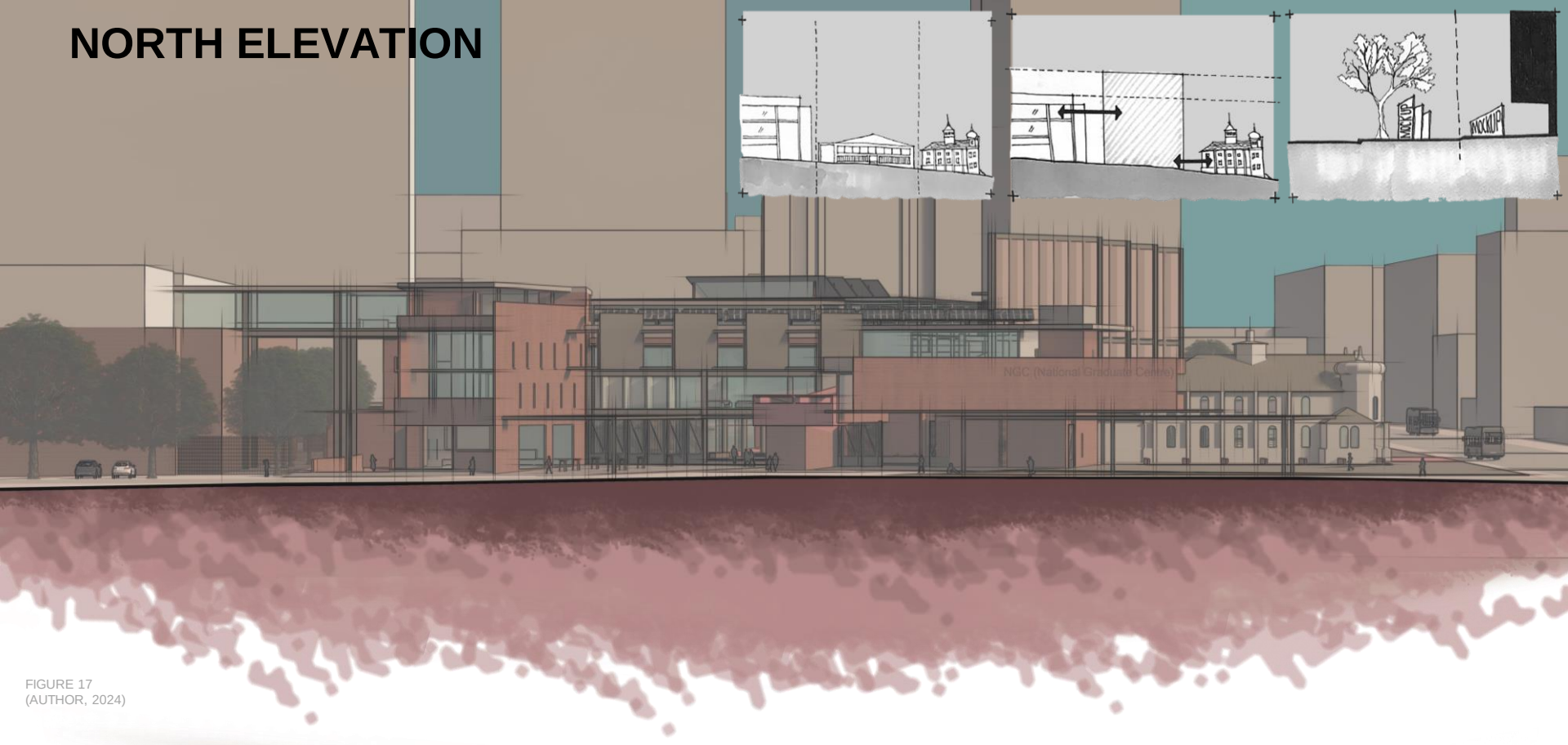


FIGURE 17
(AUTHOR, 2024)

THE END

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