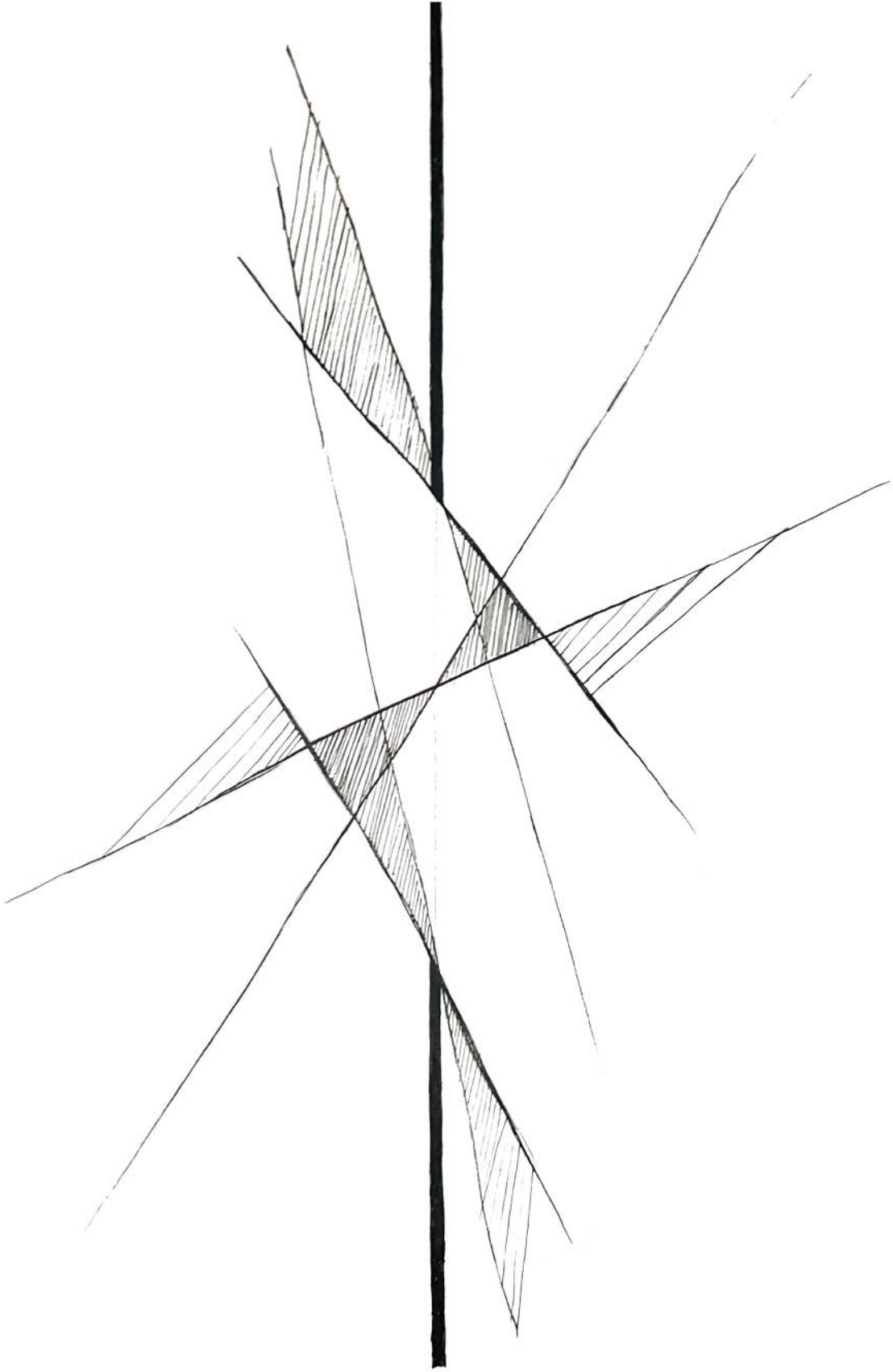


# ACTIVATING THE EDGE

## A CENTRE FOR URBAN CITIZENSHIP

T. Nortjé  
2018



# ABSTRACT

Universities are social institutions functioning as negotiating forces at the intersection of localities and people (Taylor & Luter 2013:16). The current fence surrounding the University of Pretoria, Mamelodi Campus spatially express a knowledge environment that is isolated and inward-looking even though relationships exist between the community of Mamelodi and the institution.

This dissertation investigates the architectural manifestation required, to facilitate the spatial establishment of the university as anchor institution within a university campus setting, in South Africa.

Through an historical review of campus architecture and planning, an understanding is gained of the development of the current system of thought that is associated with the exclusivity of the institution. The insularity of current campus architecture has allowed for seclusion within the knowledge environment.

The paradigm of current new campus design and architecture, within South Africa, are analysed as possible informants to design these relevant facilities.

The edge of the University of Pretoria, Mamelodi Campus is the focus of this dissertation where a new boundary condition is proposed. Jan Gehl (2014) states that the edge where building meets street, is one of the most important places to be in the city.

Service learning is investigated as a means to facilitate the exchange of knowledge to not only contribute to the communities surrounding universities, but add to the research and relevance of our institutions, within the urban environment. The exchange of knowledge can become a bridge between town and gown. Through a comprehension of the spatial requirements of such a facility, architecture can contribute to the accessibility, legibility and transparency of the institution.



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### **COURSE CO-ORDINATOR**

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### **RESEARCH FIELD**

Human Settlements & Urbanism

Submitted in fulfilment of part of the requirements for the degree Master of Architecture (Professional) in the Faculty of Engineering, Built Environment and Information Technology

### **THE SITE**

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Cnr Solomon Mahlangu and Hinterland  
Street

25°43'24.3"S 28°23'56.2"E

### **THE CLIENT**

The University of Pretoria

### **THEORETICAL PREMISE**

Anchor Institution Theory and campus architecture, Urban design promoting public life.

### **KEYWORDS**

Accessibility, edge condition, urban, spatial, threshold.

# DECLARATION

In accordance with Regulation 4(c) of the General Regulations (G.57) for dissertations and theses, I declare that the dissertation which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my dissertation has already, or is currently being submitted for any such degree, diploma or other qualification.

I further declare that the dissertation is substantially my own work. where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in text and list of references.

Timme-Loise Nortje

# EXPRESSION OF THANKS

My Heavenly Father for this life that was given to me, where His joy is my strength.

My mother, Anneliese Burger for your creative heart and unconditional love that I will carry with me forever.

Prof. Arthur Barker and Dr Carin Combrinck for your endless commitment and guidance.

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Figure 1.1 University of Pretoria, Mamelodi Campus current edge condition (Author 2018).

CHAPTER ONE

INTRODUCTION

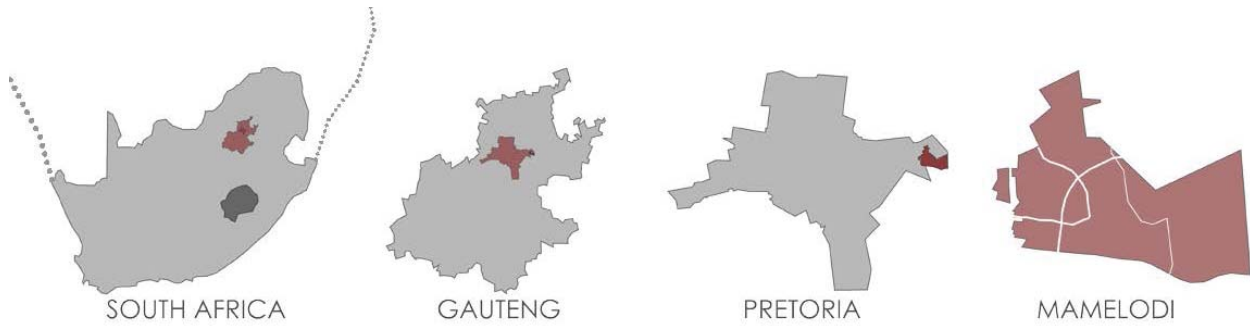


Figure 1.2 Locality Plan (Cochrane 2017)

Inaccessibility and a legacy of spatial separation within the historical development of Pretoria remains an inhibitor to the residents of Mamelodi – a township located on the periphery of The City of Tshwane, 40km from the city centre. Economic opportunities in Mamelodi are limited and when employment opportunities present itself it requires a lengthy commute. This leads to a large proportion of income and time being spent on transport.

The street forms the public space (Gehl 2013:2, Hertzberger 2005:64). In Mamelodi the street is where ceremonies are held, and people meet and engage. It is alive with activity throughout the day. Various small informal businesses and spaza shops line the streets and people wash and repair cars.

In the midst of all this is the University of Pretoria Mamelodi Campus, tucked behind a high fence and





**Figure 1.3 The street as public space in Mamelodi (Author 2018)**

cut off from the activity around it. On entering the campus, the change in atmosphere is immediately noticeable. A noisy interactive setting becomes a quiet, peaceful environment. This boundary is at the core of this dissertation.

This project explores architecture as the threshold that mitigates the current liminal boundary between campus and community - the boundary is a contested site where clear spatial differences are manifested (Hasdell 2016:1).

A university is a knowledge incubator, where ideas are captured, researched, confirmed or improved upon. It allows others to gain access and add value to ideas. A university makes critical contributions to economic growth within communities, and adds value to a city, not only through this sharing of knowledge gained but also through its role as an anchor institution (Ehlenz 2018:76).

High fences and spatial exclusion create physical barriers between the university campus and the urban environment, which contributes to the identity of exclusivity within our institutions (Hendricks & Leibowitz 2016). Globally, a dominant concern is urban citizenship and the right to the city (Blokland, Hentschel, Holm, Lebuhn & Margalit 2015); access to amenities and resources has become crucial for the sustainable development of cities.

A responsive architectural manifestation is required to inspire accessibility and transparency within institutions through the creation of spaces that allow for encounters between people, resulting in meaningful places. The scholarship of engagement (Boyer, 1996) forms an integral part of the exchange of knowledge between student, university staff, and the community. Through the creation of a spatial platform, architecture can contribute to the establishment of physical places of belonging and integration, which can build relationships.

## 1.1 Problem Statement

Mamelodi is testimony to the legacy of spatial separation that form part of the historical development of Pretoria and inhibits the access of such communities to the rest of the city. The University of Pretoria, Mamelodi Campus came into existence because of this spatial segregation. The campus was previously part of the Vista University: a mainly distance-learning entity designed to keep black South Africans from attending universities designated for white students during the apartheid era (Akor 2008:172).

The campus is part of the University of Pretoria, but it remains spatially segregated from the urban environment. This leads to the isolation of facilities and a fragmented city with neither legibility within the urban landscape nor identifiable landmarks. Where there are high walls and fences there is no sense of place or identity, circulation patterns or hierarchy of spaces (Nice 2008:11).

The current state of high fences and buffer zones surrounding the campus are perceived as bastions of exclusivity (Hendricks & Flaherty 2018:1). Jan Gehl (2013:99) argued that buildings that engage the street signals that a city is welcoming and helps increase the feeling of safety. The Mamelodi campus plays an important role as anchor institution in the community but it enforces the separation of Mamelodi from the rest of the city with its strong consciousness of boundary and limitation.

## 1.2 Research Question

What are the urban spatial requirements and architectural response required from a university campus, as anchor institution, and how should the campus manifest itself in the urban context of Mamelodi?

Sub question

What are the spatial frameworks appropriate to anchor institutions that can be informed by their developmental aims?

How can anchor institution theory inform the architecture?

### 1.3 Research Methodology

The research aimed to establish the spatial articulation required for university campuses to be relevant to their settings and manifest in ways that align with the goals of the institution as an anchor in society and the city. This study employed field research, historical analysis and precedent studies, as qualitative research methods, within an interpretive research paradigm, which allowed a flexible approach to the data collected (Braun & Clarke 2006).

#### Field Research

“In order to define this quality in buildings and towns, we must begin by understanding that every place is given its character by certain patterns that keep on happening there.”

Christopher Alexander (1979).

Through mapping, transect walks and unstructured interviews, an understanding was gained of the existing urban relationship within the community and the institution, and the relationship between the institution and the community. Time was spent engaging pedestrians and the users of public transport as they move along the edge at various times of the day. The focus was on the early mornings, to understand life in Mamelodi and to observe how the edge is used.

#### Literature Review

A historical analysis of campus architecture in general and a review of the planning of the Mamelodi Campus from inception, granted understanding of the development of the current system of thought associated with the exclusivity of the institution.

The paradigm of current campus design and architecture in South Africa has brought to the forefront what universities can contribute to our cities and how they can become active stakeholders within the urban landscape. It highlights how universities can contribute to places of meaning.



Figure 1.4 Street edge-condition on the corner of Solomon Mahlangu and Hinterland Streets with the University campus in the background (Author 2018)



**Figure 1.5** Locality map of the University of Pretoria, Mamelodi Campus in relation to the Pretoria CBD and the other campuses of the University of Pretoria (Author 2018)

**Precedent studies**

A case study research strategy was employed, as it is an accepted method to apply to city and regional planning research (Yin 2012). Case studies on the current paradigm of campus design and architecture in the South African urban environment were identified. These formed the baseline to establish whether the current paradigm is a successful model for the future development of university campuses on a spatial level.



#### 1.4 Delimitations & Assumptions

It is not the aim of this dissertation to design and spatially resolve the campus of the University of Pretoria in Mamelodi as a whole. The focus is on designing a vision for the edge conditions that border on Hinterland Street, to create a base from which future development can ensue. The edge is thus the main focus of architecture that endeavours to encapsulate what spatial inclusivity should be for an educational facility in Mamelodi.

The existing main entrance to the campus is also situated on this edge and the project recognises it as an entity that has the potential to become an important node and unimposing landmark in the city. As the streets in Mamelodi are the main public space, the intention of this project is to enable the university to interact with this space.



Figure 2.6 Aerial photograph of the Unievrstity of Pretoria Mamelodi Campus and the surrounding community and urban fabric (Author 2017).



## CHAPTER TWO

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# CONTEXT

“At every instant, there is more than the eye can see, more than the ear can hear, a setting or a view waiting to be explored. Nothing is experienced by itself, but always in relation to its surroundings, the sequences of events leading up to it, the memory of past experiences.”

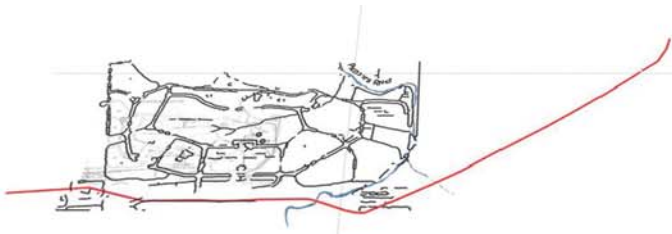
Kevin Lynch (1960:1)



Physical boundaries demarcate ownership within a city, a western construct, where all space is private unless it is designated and regulated as public. In the African context, all space is public unless it is defined by ritual as private space (Van Rensburg & Da Costa 2008:32). The conceptualisation of space is thus not static, but rather a dynamic process. Globalisation has weakened this layer of anonymity within the African city - where a deeper understanding of space moves beyond boundaries. In contrast, the apartheid city has a strong consciousness of physical boundaries and was designed to manipulate, oppress and display authority (Van Rensburg et al. 2008:32).

The township of Mamelodi is characterised by formal housing and informal settlements. The current single-zoned residential typology not only leads to urban sprawl but also spatial, social and economic fragmentation (Steyn 2005:1). Necessity dominates the urban fabric instead of social richness.

This project is situated within an urban framework that identifies the inherent strengths in the context and argues for an in-situ upgrade of existing opportunities.



Settlement established for indigenous people looking for employment in the new city of Pretoria

1860  
Population 12



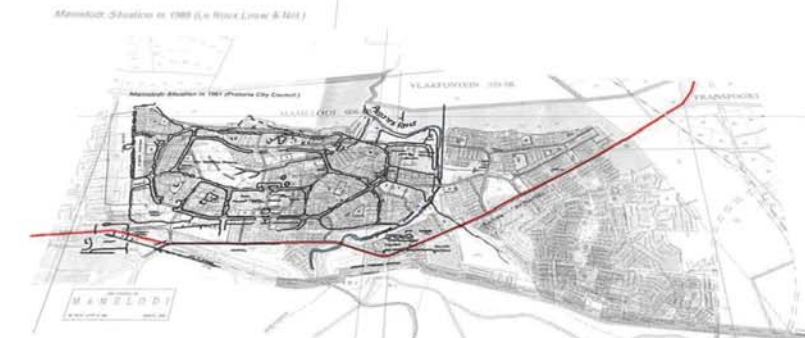
Delagoa bay railway line built from Maputo to Pretoria, first stop at Eerste Fabriek Station

1875  
1890



Location of railway led to the decision to declare the area a black residential area.

1905  
1913  
1920



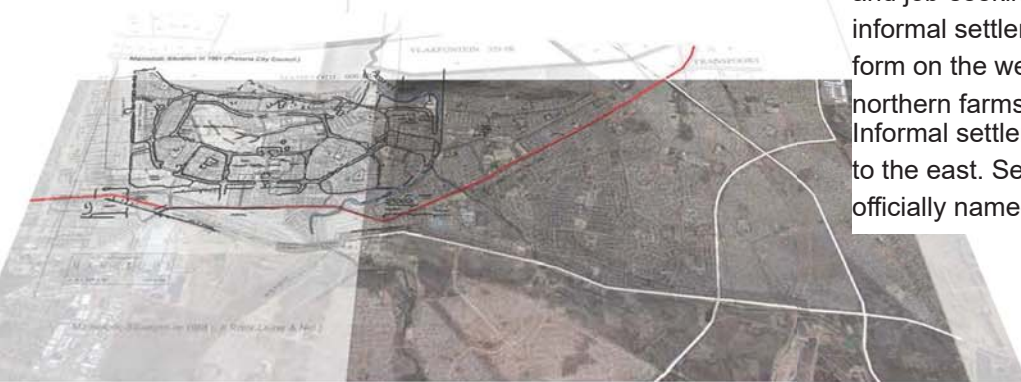
Formally declared a 'black township'

1935



Post-war industrialisation and job-seeking caused informal settlements to form on the western and northern farms.

1950  
1953



Informal settlement expand to the east. Settlement officially named Mamelodi.

1958  
1960  
1965



First informal settlement in the east named Mandela Village  
Democratic elections held in SA

1970  
1985  
1991  
1994  
2010  
2000

Population close to 1M  
350 000

(Nico & Walker et al, 1991)

## 2.1 Urban Vision – “Emergent City”

The study was approached through three themes: the historic development and urban expansion of Mamelodi; the availability of education and resources; and economic opportunity. Mamelodi was declared a formal township in 1953 under the Group Areas Act, 41 of 1950. It was designed for racial segregation (Matooane 1999). Mamelodi is fenced by the railway to the south and the Magaliesberg to the north and east, with industrial buffer zones to the west to ensure a self-contained and controlled area. Rapid urbanisation within Mamelodi exists within a context of inequality and poverty (Du Plessis & Peres 2013:1). This has resulted in the growth of informal settlements and the continuance of poor living conditions. The township is in a critical state as expansion possibilities are becoming limited.

From the field research and early morning unstructured interviews conducted with people waiting in line for public transport, pendulum migration is evident. People travel far distances to different parts of the capital city of Pretoria and return

home late from formal employment opportunities. The industrial areas of Silverton and Watloo are the largest formal employers in the vicinity and are located 14 km away (Steyn 2008:161).

Economic networks fluctuate throughout the day, as customers travel to and from work, which has resulted in distinct building typologies. Informal businesses protrude from, or are attached to, the boundary walls to serve the migratory community from early morning. Through interaction and a study of the community it was established that pedestrian movement remains high throughout the day, as school children line the streets on their way to and from school. The street edge is negotiated according to need; depending on the time of day, week, month or year. Although many people enjoy the community spirit and associated street life, they do complain about the lack of economic opportunities (Steyn 2005: 3). The street is also a contested space as it sporadically becomes host to protest action as a place to voice dissatisfaction.

There is a high rate of unemployment in the township

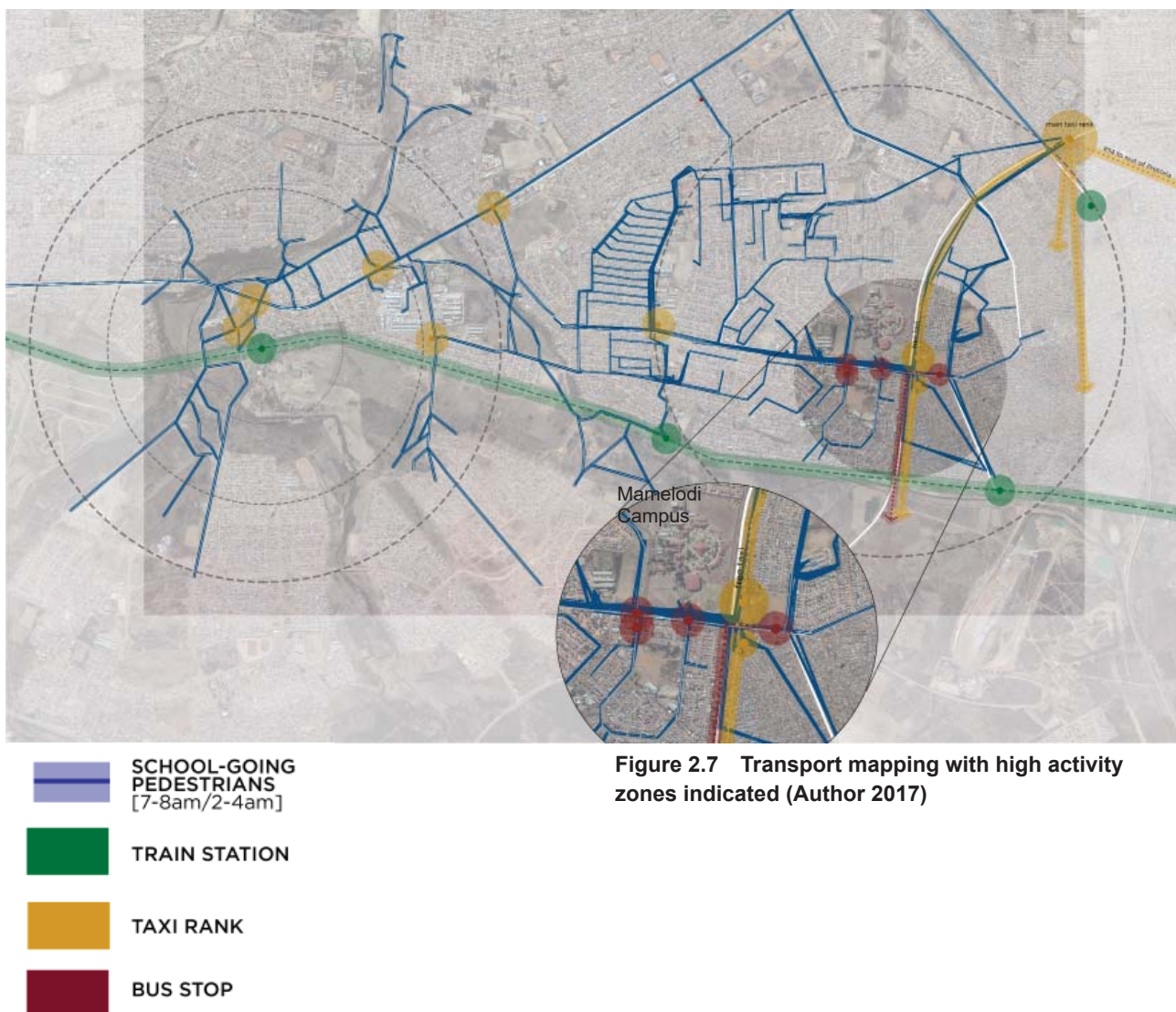


Figure 2.7 Transport mapping with high activity zones indicated (Author 2017)

(Du Plessis & Peres 2013, Mokoena 2017), and people rely on public transport to reach formalised employment opportunities. Through field research (walking in the streets and the spatial analysis of the residences in Mamelodi), it was noted that a lot of Mamelodi residences have been added to in the form of formal additions to the houses. These include additional living spaces or businesses that occupy the boundary wall to the street; therefore, engaging the street.

For the urban vision, the stance is taken that informal settlements and townships are here to stay, as they

remain for some, the only option(Steyn 2008:161). This “study is a preliminary exploration: an attempt to capture ideas and to suggest how they might develop” (Lynch 1960:3).

Although the urban vision is speculative, it is realistically placed within the setting. It aims to build upon the context’s main characteristics and challenge a new way of urbanism: an in-situ upgrade. Emphasis was placed on mapping to identify new nodes of development. These could increase accessibility and public safety and offer more economic choice.

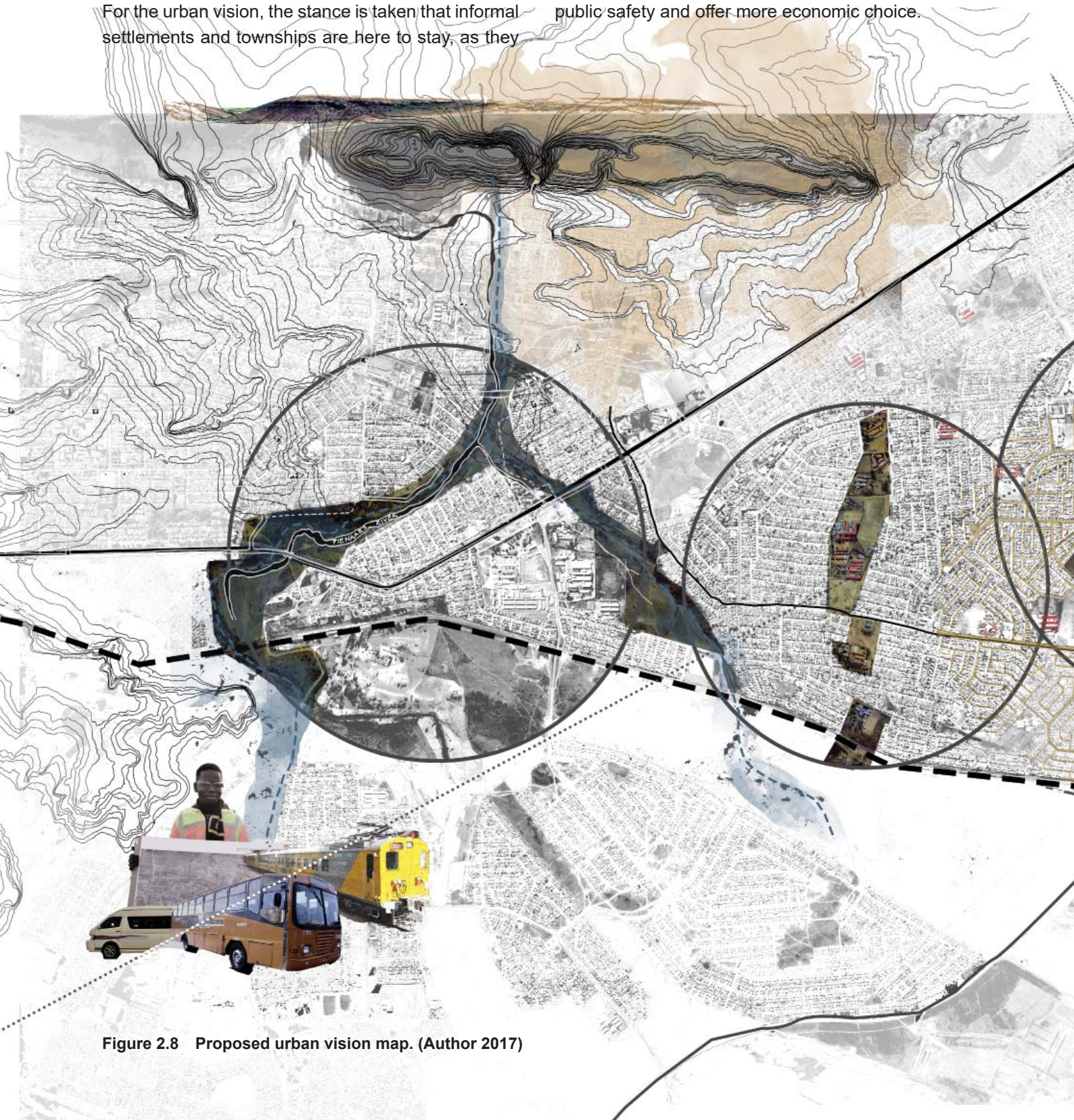


Figure 2.8 Proposed urban vision map. (Author 2017)



Figure 2.9 Photographs showing the unique street culture of Mamelodi, where tent astructure are erected over the the street for ceremonies that take place over the weekend (Author 2017)



Four principles of urban vision were applied to the future development of Mamelodi:

The strengthening of networks – This principle aims to strengthen the existing social, economic and environmental networks to create complete communities of resilience and accessibility. The existing local networks need to become complete and integrated to ensure the well-being of the community (Gehl 2013:6)



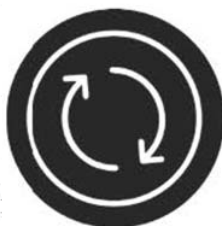
The celebration of uniqueness – The unique street culture and vibrancy that exists in Mamelodi can inform methods of place making and identity forming on an urban scale. The day-to-day character of Mamelodi can contribute to the engagement of communities and the ownership of the urban fabric both collectively and individually



Diversification and densification – The densification of nodes within the urban fabric contributes to the resilience of neighbourhoods. Bringing economic choice and diversity through mixed-use precincts can combat the monofunctional nature of suburban Mamelodi by allowing for the effective use of space and nodes of economic, social and cultural activity (Gehl 2013:13).

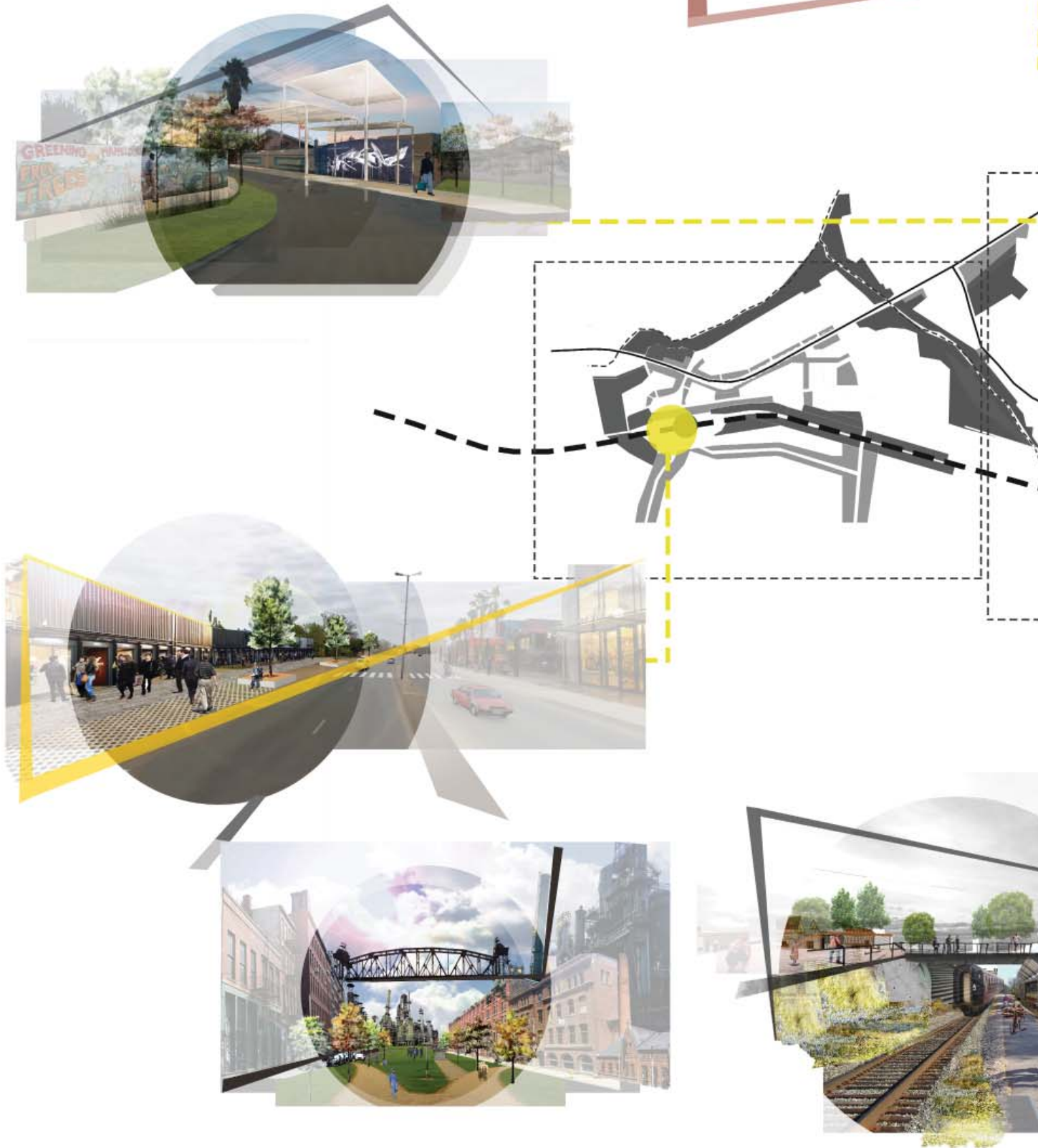


Infrastructure upgrade – The economic, social and cultural health of communities rely on the efficiency and sustainability of infrastructural systems. The upgrade of existing and unused infrastructure, to be more durable and reliable, is crucial as service delivery is pertinent to the development of emerging cities.



This project aimed to create multi-use nodes along development routes, which are predetermined by pedestrian routes. Through the use of collages, the existing street settings in Mamelodi were reimagined for the future.

**Figure 2.10** Through the use of collages, the existing street settings in Mamelodi were reimagined for the future (Author 2017)



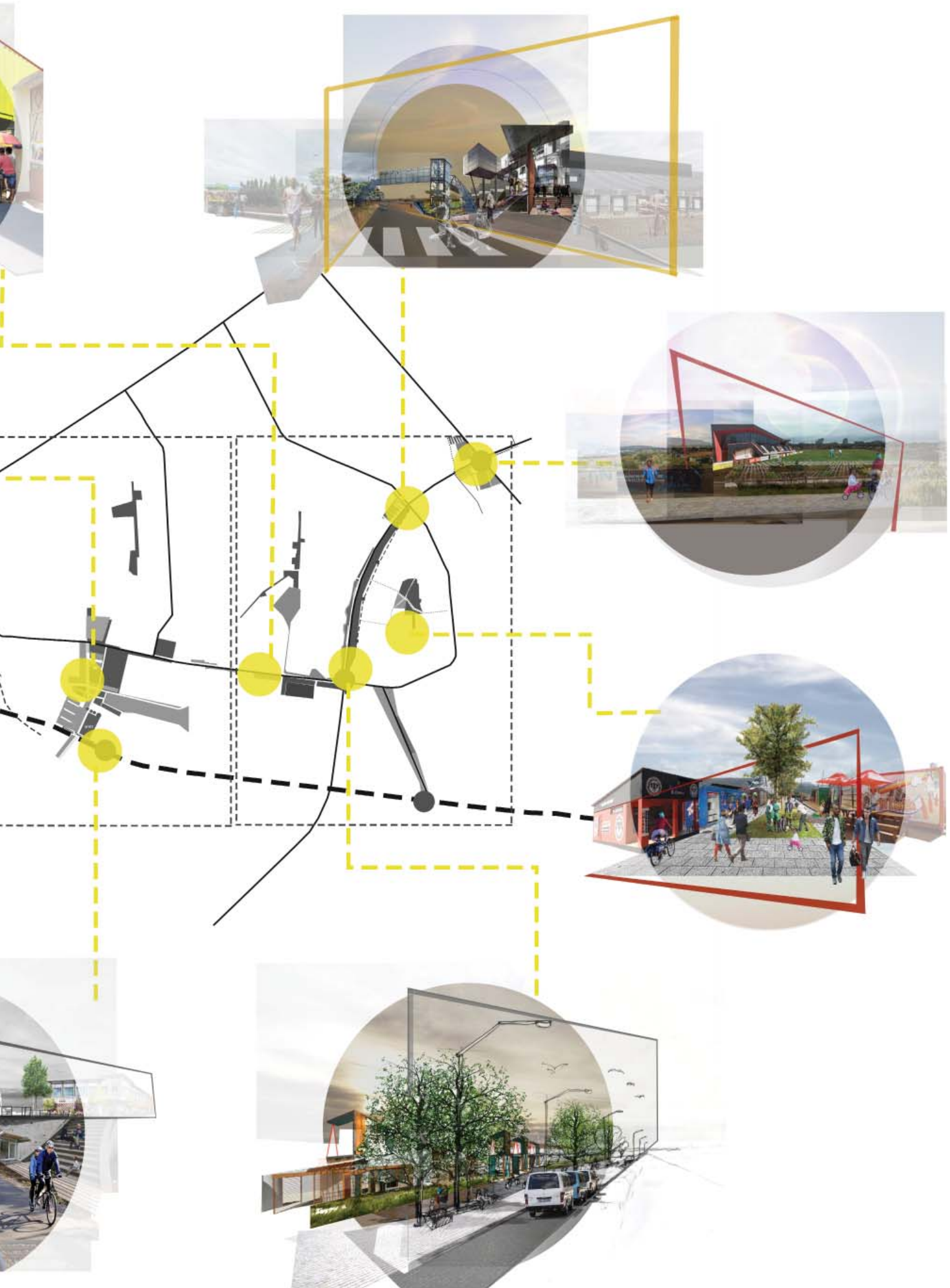




Figure 2.11 Figure ground drawing showing the footprint of the University Campus in relation to the urban fabric and footprints of Mamelodi (Author 2018)



## 2.2 The Site

The origin of the Mamelodi campus contributes to the legacy of spatial separation inherent in Mamelodi. Vista University was established by the apartheid government in 1981 as a multidisciplinary institution structured around distance learning (Nice 2008). There were eight campuses in South Africa, four of which were permanent campuses that had a single architectural author (Van Niekerk 2017). The first permanent campus was constructed in Soweto in 1990, the campuses in Bloemfontein and Port Elizabeth followed in 1992 and the Mamelodi campus was constructed in 1993. Each campus was designed to accommodate approximately 2 000 students. A single design concept was used for all four campuses: the library building is the focal point, serving as a symbol of knowledge, with all other activities and functions placed around it. A tower marks the entrance and main threshold to this central space or heart of the campus (De la Rey 2017).

In 2002 the Minister of Education gave notice, in terms of the Higher Education Act, 101 of 1997, of his proposal to merge Vista University with other institutions to overcome the apartheid-induced divide between historically white and historically black institutions (Akor 2008:172). The campuses of Vista University were incorporated into existing institutions (the University of Pretoria and the University of the Free State) or became part of new institutions, such as the University of Johannesburg and Nelson Mandela Metropolitan University in Port Elizabeth.

The field research revealed that the Mamelodi Campus has sizeable buffer zones of grassed areas between the campus buildings and the fence that sform a space which is largely unused, except for the sports field and action sports field, which students use for a game of soccer during the lunch hour. The lack of intimate meeting spaces on campus forces students to meet in the open, impersonal grassed areas or behind buildings, as the only alternatives. As the library only allows for quiet self-study, collaborative meeting spaces are limited to empty lecture halls and the student cafeteria.

The University of Pretoria makes a significant contribution to the City of Tshwane, Gauteng and South Africa in an economic capacity regarding the number of graduates annually and its quality of research it produces (University of Pretoria 2013). It also contributes in the form of community engagement modules that are compulsory, credit-bearing, curricular or voluntary for students. The



Figure 2.12 The Soweto campus footprint (Author 2018)



Figure 2.13 The Bloemfontein Campus footprint (Author 2018)



Figure 2.14 The Port Elizabeth campus footprint (Author 2018)

university understands that the social responsibility of the institution forms a third pillar of responsibility for higher education - the other two pillars being teaching and learning and research (De la Rey et al 2017:173).

The students who study on the Mamelodi Campus are enrolled in four-year programmes for BSc, BIS, and BCom degrees. These programmes allow students who are not academically prepared, but are willing to work hard, access to these fields. The University of Pretoria has recognised the need to improve the mathematics and science skills of high school students to maintain the high quality of education within South African tertiary institutions. The university has therefore introduced the After-School Maths and Teacher Mentorship programmes (De la Rey 2017)

The University of Pretoria Mamelodi Campus has also established permanent service learning programmes. These include the Business Clinic, the Itsoseng Psychology Clinic, the Siyathemba Occupational Therapy Clinic, the Community Design Hub and the Law Clinic. These networks were identified as entities and relationships that operate within a spatially secluded environment: the programmes have a direct relationship with the community, but no spatial manifestation. These initiatives are elaborated on in Chapter 4 as they inform the selected programmes for the new architectural proposal and activation of the edge.



**Figure 2.17** Above: Courtyard and seating spaces on campus (Author 2017)

**Figure 2.16** Right: Entrance tower and main threshold to the heart of the campus (Author 2018)



**Figure 2.15** Below: Buffer zone behind the lecture halls (Author 2018)





Figure 2.18 Above: The Library that is central to the campus (Author 2017)



Figure 2.19 Above: Hockey field used for informal soccer games between classes (Author 2017)



Figure 2.20 Left: Campus plan with buffer zone indicated (Author 2017).

Figure 2.21 Below: The Arena with edge condition (Author 2018).



Figure 2.22 Image depicting the site within the confines of the fence that surround the campus with the resultant buffer zone. (Author 2018)



TOWER THRESHOLD

THE CURRENT DISCONNECT OF THE MAIN THRESHOLD OF THE ARCHITECTURE TO THE STREET ENTRANCE

ARENA

THE SITE IN BETWEEN

FENCE AND STREET ENTRANCE





## CHAPTER THREE

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# THE CONTINUUM OF CAMPUS ARCHITECTURE

In 1967, Michel Foucault contested the notion of linear time (Foucault 1984:46). In a lecture, he stated that space must be understood over time in relation to various historical circumstances (Foucault 1984:46). His argument was that the major concern is not if there is enough space, but knowing what the requirements of the relationship between spaces should be to achieve a given end (Foucault 1984:46). The anxiety of our era is not time, but space, and there remain oppositions (as Foucault described): between family space and social space; between cultural space and useful space; between the space of leisure and that of work (Foucault 1984:46). It is therefore important to understand not only how university campuses developed through history and time but also the circumstances that shaped them spatially.

### 3.1 The Inception of the University

The development of universities as institutions tells a story of spatial isolation from inception. The university, as institution in general, owes its establishment at the end of the first millennium to a requirement for shared knowledge. According to the Guinness Book of World Records (2017), a university known as Ell-Karouine, founded in 859 AD in Fez, Morocco carries the title of, “the oldest existing and continually operating educational institution in the world.” It is claimed that Ell-Karouine was first erected as a community library by the daughter of a wealthy merchant. It then developed into the first degree-giving institution in the world, but remained accessible only to a select few.

Arabic and Greco-Roman learning, which included law, mathematics, medicine, science and philosophy, found its way to Europe at the end of the first millennium. It led to the establishment of the oldest university in Europe - the University of Bologna - in 1088. An increase in the number of priests, missionaries and administrators required more advanced training than the inward-looking monasteries and cathedral schools of the time could provide (Morpurgo & Ferruolo 1986:1-2). Universities were characterised by their urban settings. Today, 70 of the universities that had been established in Europe by 1520 still exist in recognisable forms; with unbroken histories and similar functions as to when they were first established (Morpurgo et al. 1986:2)

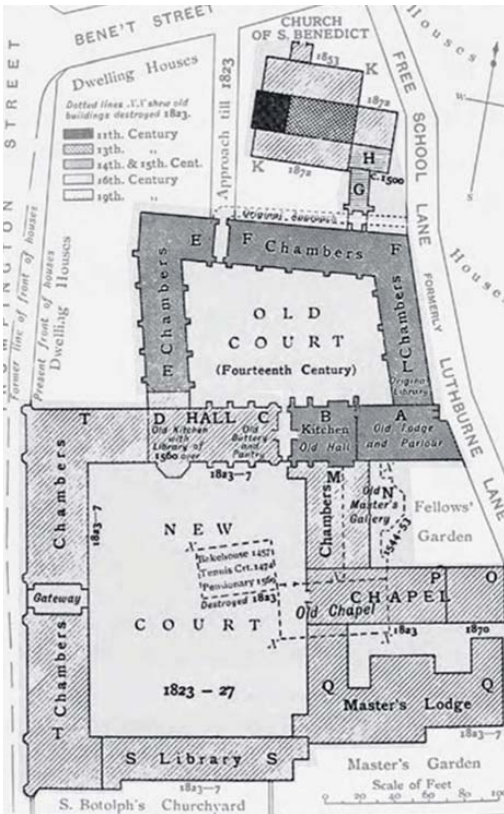


Figure 3.23 Corpus Christi, Cambridge, United Kingdom, Illustrated 1897 (Turner 1984).

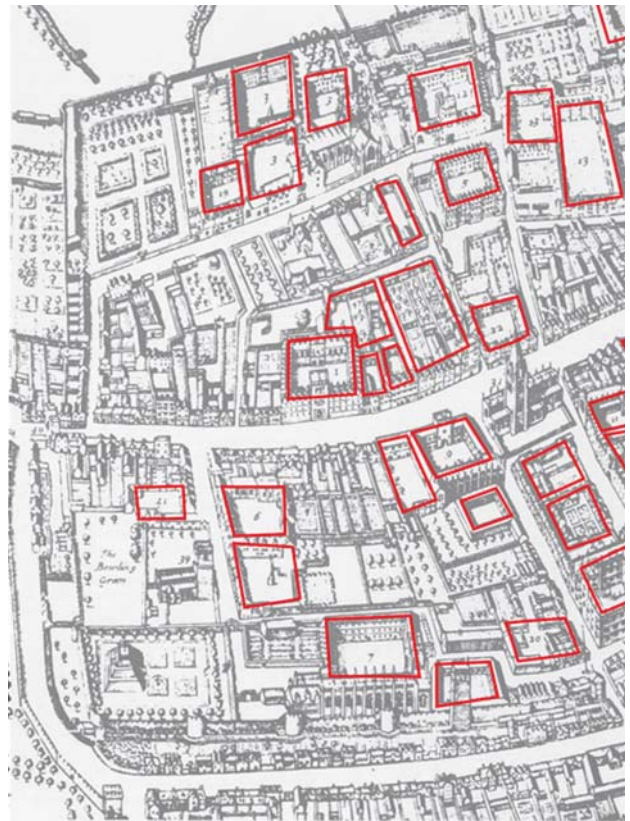
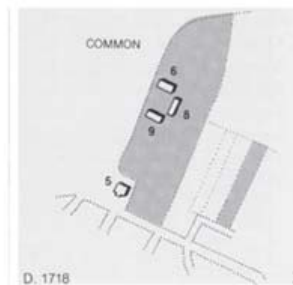
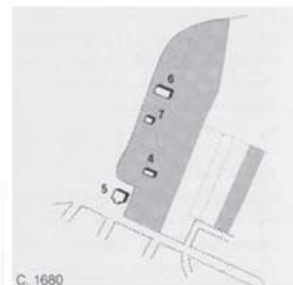
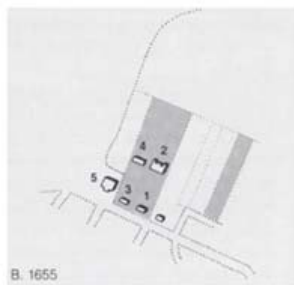
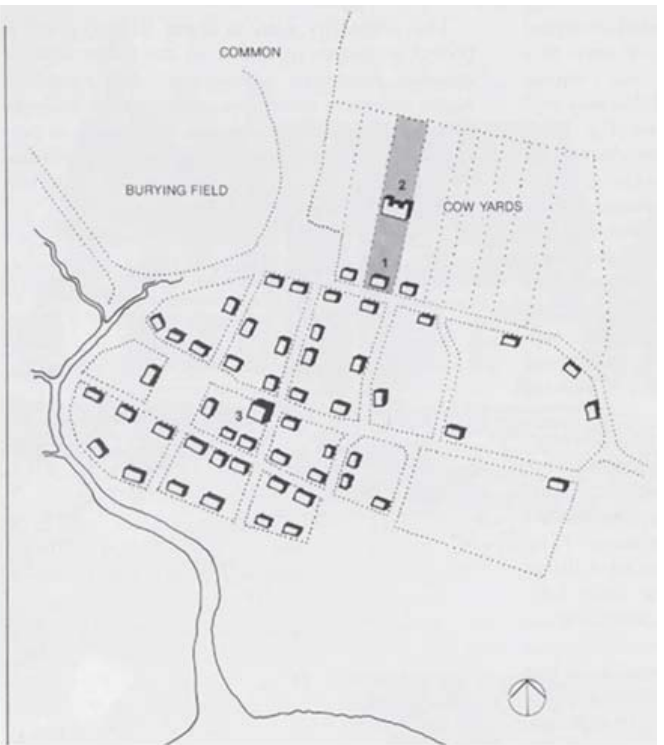
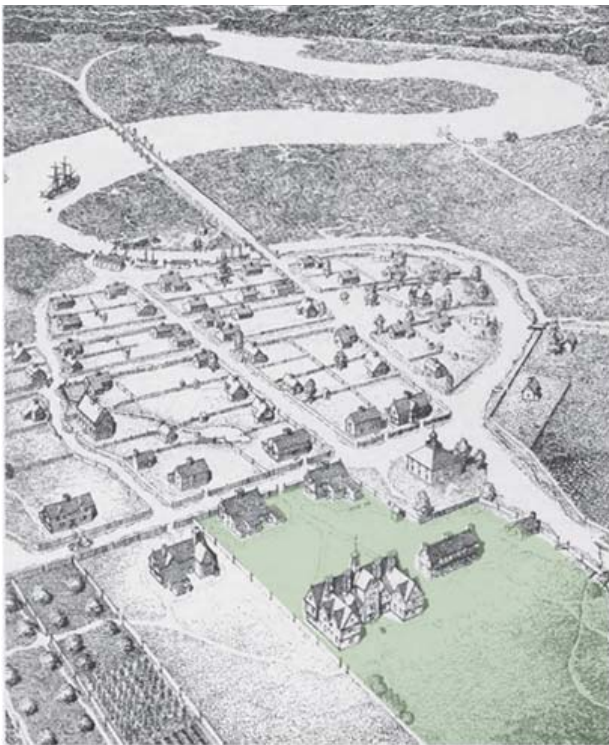


Figure 3.24 The courtyards of Oxford University, United Kingdom 1675 (Turner 1984).

Figure 3.25 Below: Harvard University, Boston, Massachusetts, 1640 (Turner 1984).





In the 14th century, the British university model was established. It emphasised the education and housing of undergraduates and staff: forming a community within itself (Turner 1984). As most English colleges of the time were founded in monastic structures, the buildings were arranged around courtyards. The use of the courtyard thus being based on the English tradition of the cloistered monastery. This monastic structure of housing and community remained relatively unchanged within the development of the university. The courtyard also provided safety and isolation for focussed studying. The courtyard typology of Oxford University led to well-defined street edges, an optimised use of space, and increased security, which created an identity of place that is still recognised in Oxford today (Turner 1984).

Harvard, the oldest university in the USA, was established 4 km outside Boston in 1640. The Massachusetts Bay Colonists expressed their puritan beliefs by emphasising community cohesion and religious conformity and the importance of higher education in achieving these. Higher education

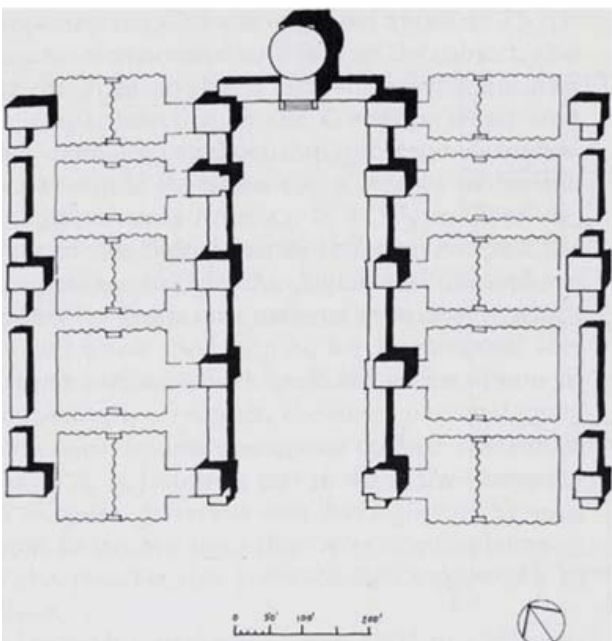


Figure 3.26 University of Virginia Campus. Designed by Thomas Jefferson in 1817 (Turner 1984)

was only considered fully effective when students studied, ate, slept, worshipped and played together. Isolation free from distraction was therefore seen as an imperative. Harvard was established in a singular building on a plot of land. In 1650, the college acquired the adjacent plot. This was the birth of the American university model: the creation of separate buildings in the landscape. This set the American college apart from the linked structures of British colleges. The American model claimed the term campus - meaning 'field' in Latin (Turner 1984:23).

Le Corbusier described the American university as an urban unit in itself; a small or large city, but a green city and a world in itself (Turner 1984:32). It formed a self-contained community of individual buildings, where the spaces between the buildings convey importance.

In the 18th century, the American model of individual buildings became more structured. It developed a grand central avenue with two rows of buildings facing each other across an open space. The campus could easily be extended and thus allowed for growth. At the beginning of the 19th century, Thomas Jefferson designed the University of Virginia - basing his design on the use of a central lawn (regarded as the central village green) lined with five classical houses (called pavilions). He added a central focal point, the iconic Rotunda, and connected the pavilions with low, colonnaded walkways (Turner 1984:59). This model became a popular form and was very influential in American campus design. It also became the model for all historical campus plans in South Africa (Peters 2011:78). The central lawn with focal building can be recognised in the planning of the Universities of Pretoria, Witwatersrand, Free State, Cape Town and the North-West.

### 3.2 The University of Pretoria Main Campus



Figure 3.27 University of Pretoria Campus Masterplan 1930 (Wikiwand, 2018)

The University of Pretoria's main campus in Hatfield has a rich architectural history that developed over many decades. The planning of the campus resembles the American campus model with the central lawn surrounded by pavilion structures. The focal point is to the end: The Old Arts Building constructed in 1911 (Brink 2012:11). The campus was initially part of the urban fabric and the roads on campus could be accessed by the public. As the number of enrolled students increased, development extended to the east of Roper Street, which resulted in a public road running through the campus. In 1993, the campus obtained the city council's permission to close this road to the public. The first applications for this closure were made during the design of the Humanities building, which was inaugurated in 1977 (Brink 2012:19). The fence that isolates the campus from the surrounding urban fabric was erected soon after the closure of the road.

### 3.3 Single-author campuses

#### Rand Afrikaanse Universiteit

The monumental endeavour of a single-author campus was completed in 1975 (Peters 2011:42) with the design of the Rand Afrikaanse Universiteit (RAU) in Johannesburg by the Meyer, Pienaar, Smith Partnership in collaboration with Jan van Wijk. The intention was to create a framework with the capacity to accommodate an unknown future: an octagonal layout allowed for extension around the periphery while inhibiting extension to the centre (Peters 2011:44). The design sought to achieve monumentality and the creation of a landmark within the city. The former principal of RAU, who had commissioned the design, had wanted the architects "to make a statement about the Afrikaner who arrived

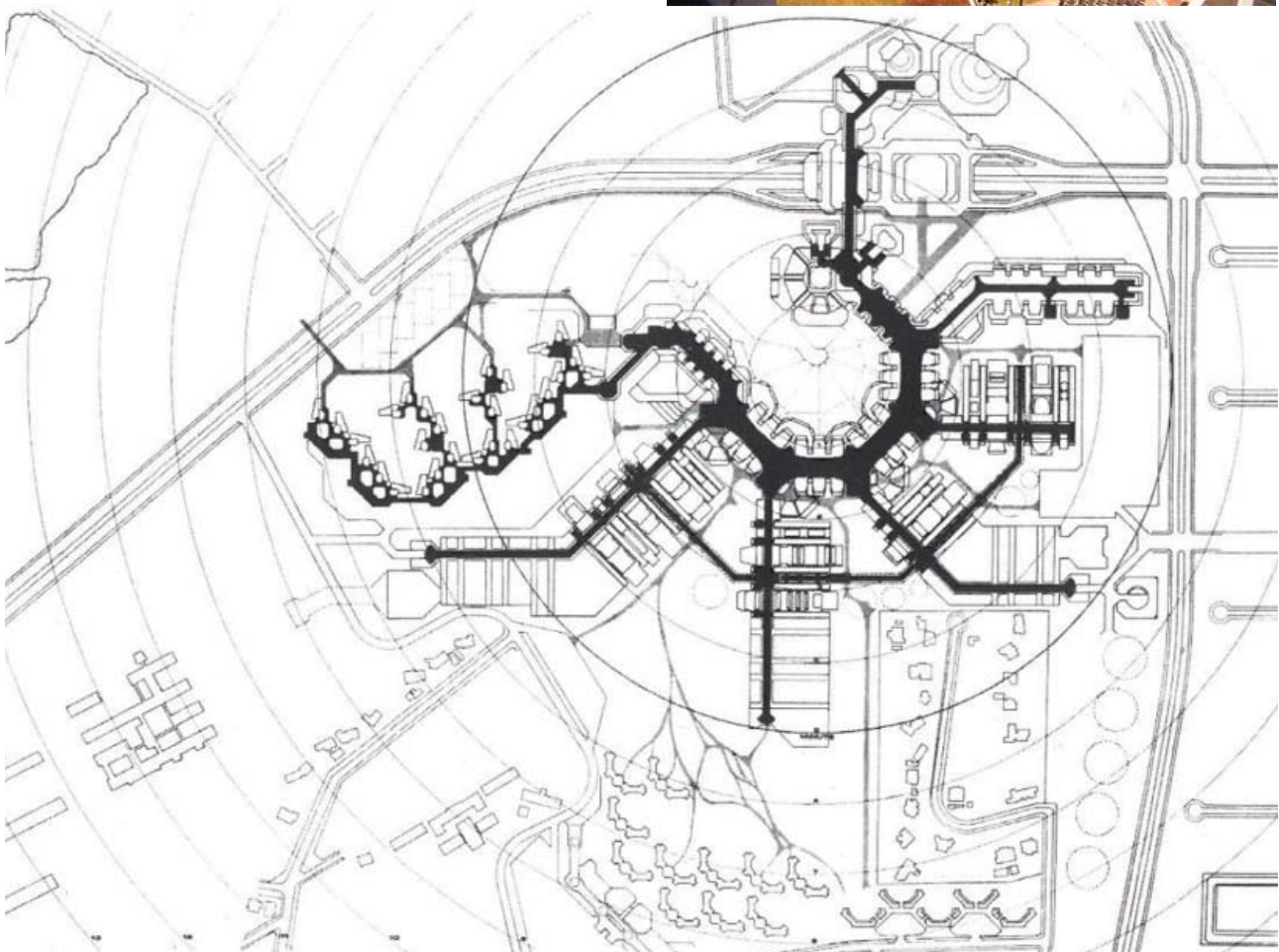


Figure 3.28 Rand Afrikaanse Universiteit, University of Johannesburg circulation plan (Peters 2011)

in the city” (Fisher, Le Roux & Mare 1998:284).

### The Salk Institute for Biological Studies

The Salk Institute was designed by Louis Kahn in 1965 for Jonas Salk (who had discovered and developed the polio vaccine). The inspiration for the model of the campus was the isolated monasteries and cloisters of 13th century Italy. That isolation also served as impetus for the origin of the institution in general as it was intended to nurture Nobel laureates in an isolated environment, away from the distraction of teaching and grant-writing required by conventional universities (Leslie 2008:200).

The Salk Institute features laboratories with enormous open workspaces. A structural system of pre cast, pre stressed concrete trusses and folded plates allows for Kahn’s “served” and “servant” spaces. Services and utilities could be run between the floors. Laboratory spaces could be adapted as required and easily connect with services and utilities (Leslie 2008:211).

In contrast to the large open laboratories Kahn designed intimate studies that occupy the periphery of the courtyard. These he described as the cloister

of the courtyard. A saw tooth arrangement ensures that all 36 studies have a view of the Pacific Ocean. These studies were designed for quiet self-study, free from distraction (Leslie 2008:212).

As single-author campuses, the design of both RAU and the Salk Institute sought monumentality. The architecture endeavours to convey the importance of the institution and of the select few allowed to study and conduct research there. Leonard Burkat, compared the Salk Institute to a temple of wisdom (Leslie 2008:218).

Kahn had originally planned to create a tree-lined garden within the courtyard, but Luis Barragan, a Mexican architect, advised Kahn and Salk to create a plaza with hard surfaces. Salk considered Kahn’s architecture pure poetry and agreed to the plaza without the gardens (Leslie 2008:214). The original intention of the architectural plan was to encourage communication and contemplation through the use of the courtyard. Salk conveyed that new generations will use the outdoor space and recognise the architecture as time progress, but as Leslie puts it: “That never happened” and the courtyard is not a space for staying. (Leslie 2008:215).

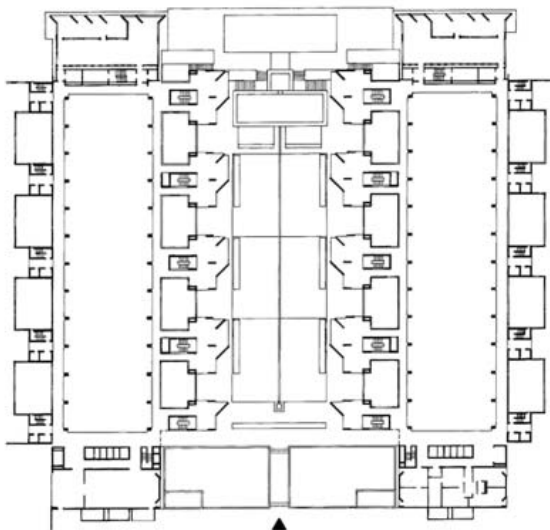


Figure 3.29 Above: Plan and courtyard view of the Salk Institute (Leslie 2008)



Figure 3.31 Photograph of the one of the laboratories (Leslie 2008)



Figure 3.30 Photograph of the one of the studies (Leslie 2008)

### 3.4 A New Campus-design paradigm in South Africa

A new paradigm of campus design emerged in South Africa with the proclamation of two new universities to be built in terms of the Higher Education Act, 101 of 1997 by the Department of Higher Education and Training (DHET) in 2013 (Burke & Hodgson 2016:21). Ludwig Hansen Architects and Urban Designers were employed to design the urban frameworks for both the Sol Plaatje University in Kimberley and the University of Mpumalanga in Mbombela. From the outset, it was established that the design of the universities had to engage their settings and enable the growth of the knowledge environment (Hansen 2016:23).

The principles identified to guide the design of the campus infrastructure and architecture included the integration of the campus with the existing urban fabric - allowing for shared public spaces to facilitate the occurrence of public meetings and events. These principles also incorporated the enablement and mobility of university staff and students through

the accommodation of students on campus within a collaborative environment where the exchange of ideas can take place. Lastly, the principles of environmental sustainability had to be included (Hansen 2016:23). Distinct urban codes were given in terms of the specific buildings: a perimeter block typology was prescribed with an interface on street level and predetermined courtyard spaces.

The individual building designs were commissioned by way of a two-phase architectural competition. The DHET expressed the importance of the physical environment and its influence on the quality of both the learning experience and of teaching (Leading Architecture and Design 2013).

Campus frameworks in South Africa have shifted from an internally focused configuration that promotes a fortified form of the campus to an inclusive and accessible framework where a perimeter block typology for individual buildings on campus provides secure internal courtyard spaces. This allows the architecture to link directly to the public realm and fosters interaction between students and the general

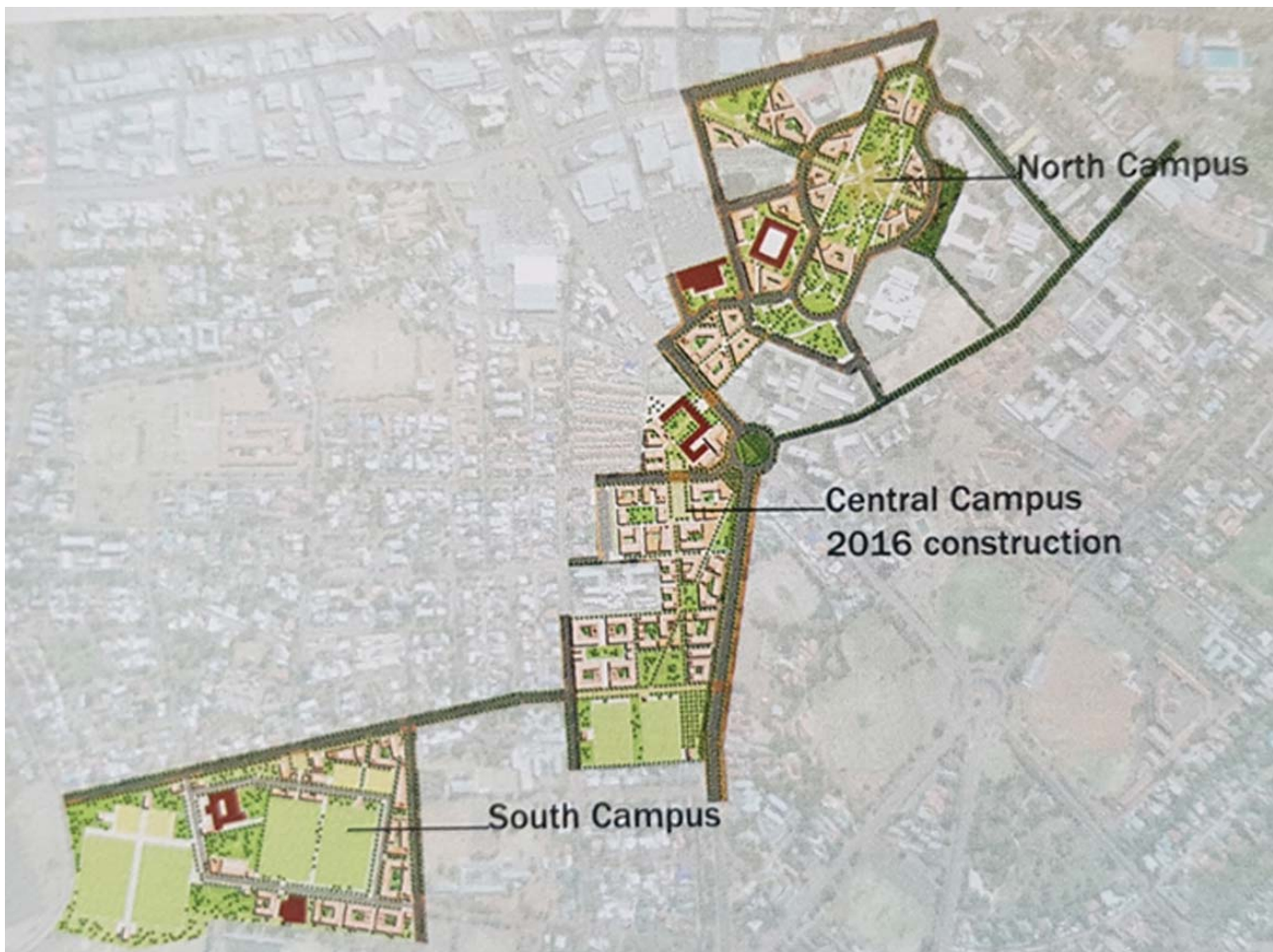


Figure 3.32 Sol Plaatje University campus framework integrated into the urban fabric of Kimberley (Hansen 2016)

public. It therefore contributes to places of meaning and encounters within the urban environment (Thomashoff 2016:25) as the campus and city become integrated. On the central campus of the Sol Plaatje University a public square is formed by Campus Buildings 1-3, the library to the south, and a public street to the north. There is a mixed-typology building, with classrooms, lecture halls, auditoriums, a health- and wellness centre and offices, to the east. A student residential building captures the public space to the east.

Retail spaces have been allocated on street level, although most of the spaces are still vacant (except for a dance studio and a Laundromat). As the intention is for retail to become an activator of the public edge, Campus Building 3 (by Wilkinson Architects) has a hierarchy of publicness to privacy from the ground to the higher levels (Thomashoff 2016:25). The square is also activated by a semi-permanent basketball court that is well-used by students.

The campus layout has a rigid spatial framework

that endeavours to regenerate the urban fabric with shared space, which served as driver for the campus plan. Multifunctional spaces allow for restructuring, depending on academic needs. The architecture seeks to promote inclusiveness that is relevant and engaged with the setting in an effort to integrate the development of knowledge into the surrounding community (Hansen 2016:21-23). The architecture of this Sol Plaatje University campus responds appropriately to the framework and fits the context (Thomashoff 2016:28).

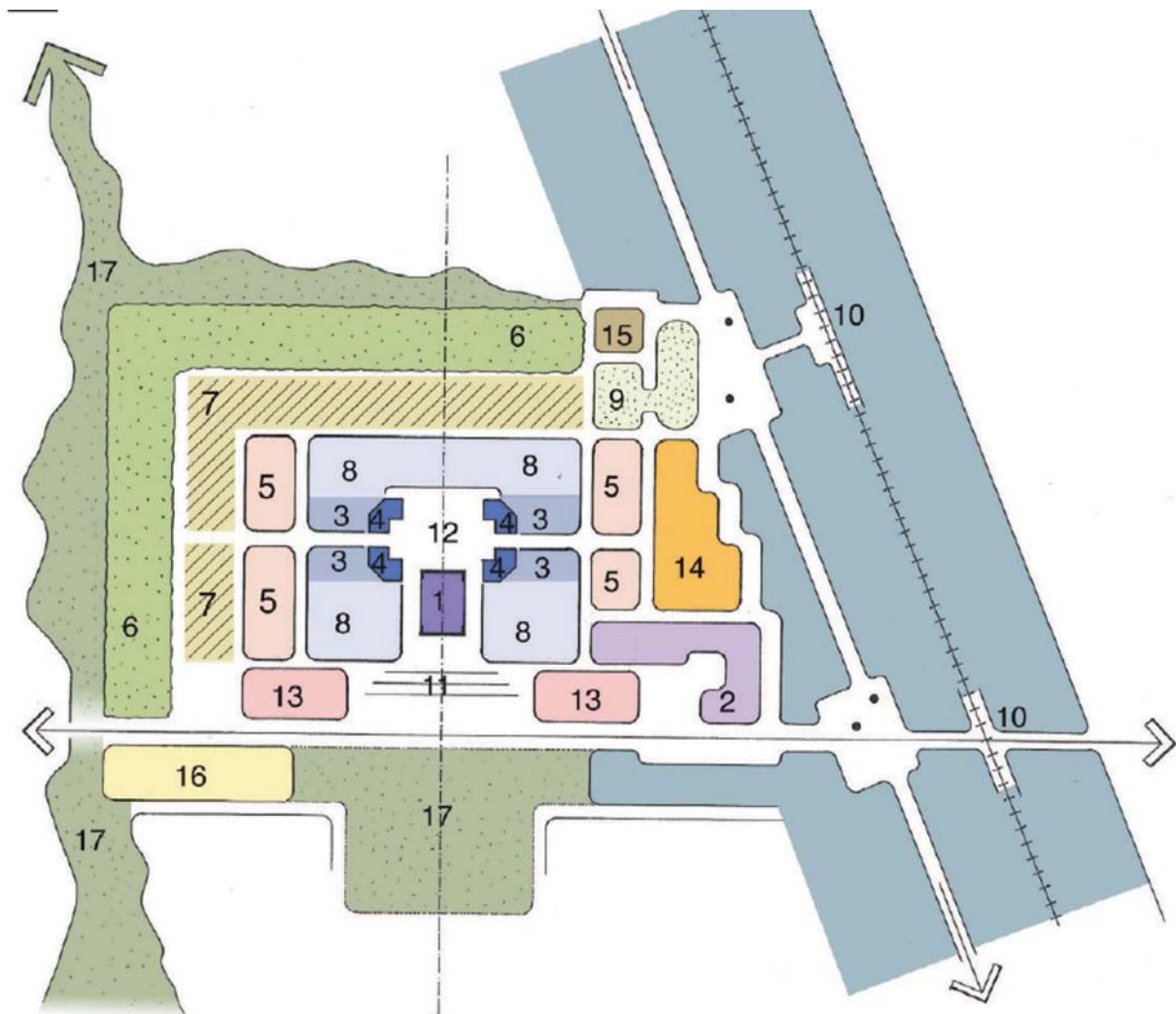
In contrast to the Sol Plaatje University, the University of Mpumalanga also established by DHET in 2013, is located in a more rural setting (Hansen 2016:24). This inhibits the potential to engage the city of Mbombela (Nelspruit), and a valuable contribution has thus been missed. The university still seeks to impact the skills development of the local community and actively contributes to its economic development through the construction phases of the individual buildings (Hansen 2016:21-23). Such economic impact and considerations are a common thread in The Scholarship of Engagement, anchor institutions,



Figure 3.33 Sol Plaatje university, Kimberley central public square (Author 2018)

- 1 MOST ACCESSIBLE: GREAT HALL/PLACE OF ASSEMBLY
- 2 GATEWAY: ADMINISTRATION
- 3 HIGHLY ACCESSIBLE: SHARED FACILITIES (LIBRARIES, EATING PLACES, RESOURCE CENTRES)
- 4 VERY LARGE NON-DISCIPLINARY SPECIFIC LECTURE SPACE
- 5 FAIRLY ACCESSIBLE MULTI-DISCIPLINARY RESEARCH FACILITIES
- 6 SPORT/RECREATION ON THE EDGES - SHARED WITH PUBLIC
- 7 RESIDENCES ASSOCIATED WITH SPORT
- 8 MORE PRIVATE DISCIPLINE-SPECIFIC ACADEMIC SPACE-EMBEDDED
- 9 SPORT CONNECTED TO METRO/SUB-METRO OPEN SPACE SYSTEM
- 10 URBAN CORRIDOR TRANSPORTATION STOPS
- 11 EXTERNAL FORECOURT SPACE
- 12 INTERNAL GATHERING SPACE
- 13 OUTREACH ELEMENTS: EXHIBITION, THEATRE AND ARTS, SPORT
- 14 STAFF HOUSING, UNIVERSITY RESIDENCES, URBAN HOUSING
- 15 MAINTENANCE
- 16 PRIVATE STAFF HOUSING IN THE URBAN PARK
- 17 PUBLIC PARK

Figure 3.34 National university diagram based on the need for publicness and privacy (Dewar & Louw 2017)



and the frameworks of existing and new campuses (Taylor Jr & Luter 2013, Hansen 2016, Dewar et al. 2017, Ehlenz 2018).

Prof Dave Dewar and Piet Louw (2017:29) stated that the framework for the development of a university campus enables debate at two levels. Firstly, the academic function of the university must resonate with its spatial form. Secondly, the normative performance qualities the design seeks to achieve must be expressed. This then clarifies both what the framework seeks to achieve and how well the design achieves these qualities.

The aspirations of anchor institutions in the USA have manifested on a spatial level: urban landscaping is promoted for the university campus to become a connective corridor (Taylor et al. 2013). This is also fundamental to the Sol Plaatje campus framework. Urban designer Ludwig Hansen (2016) described the campus framework as a central pedestrian spine promoting pedestrian transport. These spaces promote informal learning and deny the exclusivity of previous planning frameworks.

The main purpose of campus architecture is not only to accommodate formal educational processes within lecture halls and laboratories (Thomashoff 2016:27) but also to define and form public spaces to allow for informal learning. Buildings on campus must allow for surveillance over these public spaces to contribute to the safety of all who use it. A commonality noted in anchor institutions, with old or new campus frameworks, is the promotion of pedestrian- and non-motorised transport. Such paths must be well-lit at night and can form a visible connective element throughout the campus (Taylor et al. 2013, Hansen 2016).

Certain functions, such as sports facilities and retail spaces, within a university can contribute to the direct engagement of both the university as anchor and the community. Placing these functions on the edge of a campus enables sharing and interaction (Dewar et al. 2017:30). These amenities also ensure that activity is drawn to the public spaces.

Architecture should contribute to an identity of place. The university campus has meaning bound in the human experience of place and the environment; it should therefore be an unimposing landmark and not an artefact. The spaces between buildings should become more important than the buildings themselves, while the housing of students, on- and

off campus, can contribute to a lively culture of place (Hansen 2016:21-23).

In the proposed frameworks, nature becomes a place-making element, such as the attenuation of rain water on surface that contributes to the creation of sensual spaces. Strategic views should be enhanced, and an atmosphere of surprise and wonder be created to invoke curiosity (Dewar et al. 2017:30).

### 3.5 University Planning and Design

Dewar and Louw (2017:25) state that the design of a university campus can be compared to the design of a small town. It requires a flexible framework and not a master plan as future developments and requirements for university campuses are unknown. Proposed frameworks should relate to access that is clearly defined from public to private with hierarchical arrangements of spaces. Dewar and Louw (2017) proposed a national university diagram that illustrates the need for both publicness and privacy.

Themes within the literature review were identified and summarised (below). This summary provides a comparison between the themes of anchor institutions, the scholarship of engagement, and the spatial frameworks of University campuses before and after 2013 (the year the Sol Plaatje University and the University of Mpumalanga were established). The study endeavoured to identify not only the gaps in the research but also where the spatial frameworks of campus design fulfil the requirements of creating an “anchor Institution” (Taylor et al. 2013) and the scholarship of engagement” (Boyer 1996, Mtawa, Fongwa, Wangenge-Ouma, 2016).

### 3.6 Theme Analysis

## STRATEGIC FRAMEWORKS AND AIMS

	<b>The University as Anchor Institutions</b> (Taylor et al. 2013).	<b>The Scholarship of Engagement</b> (Boyer 1996, Mtawa et al. 2016)
<b>AIMS</b>	<p>Developing of real estate and the workforce</p> <p>Directing institutional purchasing towards local business and stimulating growth of other businesses.</p> <p>Stimulating the growth of other institutions in the community.</p> <p>Building local community capacity and infrastructure</p>	<p>Establishing both institution-wide and faculty-based committees composed of senior academic and support staff responsible for the operationalisation of community engagement as a core academic function.</p> <p>Investing in the future through the development of the knowledge industry and capacity building</p>
<b>PROGRAMMES</b>	<p>Programmes aimed at increasing diversity. Programmes aimed at addressing the issue of access and affordability</p>	<p>Programmes aimed at resolving the most pressing issues within society at the current time.</p> <p>Programmes aimed at ensuring service carries the same importance as teaching and learning within the priorities of the institution</p>
<b>ENCOURAGED RELATIONSHIPS</b>	<p>Employees to engage with the community</p>	<p>Faculty and students to engage with the community. An executive person to be responsible for community engagement and for putting a staff promotion and reward system in place. The university to assist in policy decision making from a historical, or social, or ethical perspective.</p>
<b>SPATIAL INTENTION</b>	<p>A cultural center based on shared values, which allows people to embrace their interdependencies. A culture of health and safety. Open public spaces with non-profit urban landscaping. Security patrol beyond the campus and into the community. A connective corridor with well-lit paths. The inclusion of retail spaces and sports fields to be encouraged.</p>	<p>Establishing a campus presence through an office for community engagement.</p>



## SPATIAL FRAMEWORKS AND ARCHITECTURAL INTENTION

Existing Campuses before 2013 (Peters 2011)	Existing Campuses after 2013 (Dewar et al. 2017, 2018)	Sol Plaatje University, Kimberley (Hansen 2016, Thomashoff 2016)	University of Mpumalanga, Mbombela (Hansen 2016)
<p>Exclusive facilities that create a logic of access. Public spaces (within the confines of the campus) as the primary organisational elements that promote informal learning. Buildings create common and public space within the confines of the campus. Edges of the campus are strongly defined and in fortified form. Accommodates students.</p>	<p>Open public spaces that promote informal learning are preferred over formal educational processes. The primary role of the building is to define and create the public space with maximum surveillance of the public space. Maximum usage of existing vegetation and continuities of green space are sought. Accommodates students</p>	<p>Promotes inclusiveness. Is relevant to and engaged with its setting and integrated into the urban fabric. Ties traditional, isolated activities only to lecture halls, laboratories and libraries. Integrates the development and exchange of knowledge into the surrounding community. Accommodates students.</p>	<p>Rigid spatial framework in a more rural setting with shared and common space as driver for the campus plan. Staff and students encounters are maximised through the design of courtyards and landscaped spaces. Accommodation of students is important to ensure cohesion where students are clustered around shared amenities in smaller groups.</p>
<p>Reactive to certain programmatic requirements within existing campuses and the priorities of the institution.</p>	<p>Building programmes determined by funding agencies, as opposed to internal university priorities within the priorities of the institution</p>	<p>Multi-functional spaces allowing for restructuring depending on academic needs. Mixed use by including seminar and teaching spaces, study areas and entertainment zones.</p>	
<p>Engagement between students and staff with student life being promoted. Activation of a discourse between old- and new architecture.</p>	<p>Local resource capturing is promoted. Varied responses to edges; depending on their role. Sport fields proposed at the edge of the campus to enable sharing with the community.</p>	<p>Full integration of the campus with the host city. Linked to civic buildings Shared responsibility &amp; social justice</p>	<p>Engagement between students and staff with student life promoted due to its rural setting.</p>
<p>Creation of an imposing landmark with strong axial alignments and vistas. Establishment of a strong pedestrian and non-motorised transport dominance integrated into green places and congregational areas.</p>	<p>Identity in architecture forms a driver for the campus plan. Recognition and enhancement of strategic views. Attenuation of rainwater on surfaces, as a place-making element. Sustainable buildings, with renewable inputs, are resource efficient. Creation of thresholds.</p>	<p>Iconic nature and identity. Built for the ages with resilient structures. Buildings to be environmentally sustainable. Perimeter block as the preferred building typology. Hierarchies of contrasting qualities of publicness and increased degrees of privacy. Hierarchy of internal space. Thresholds. Access control. Central courtyards for gathering and meeting informally.</p>	

The analysis establishes that anchor institutions have a spatial responsibility to the community in which they are situated. As an anchor institution is a large occupier of urban land, real estate development forms part of the strategic framework. Within the framework, mixed use typologies are important to ensure the presence of activity nodes and public spaces. Accessible green space combined with security and well-lit pedestrian paths to ensure safety are important in the creation of healthy urban environments. Spaces where people feel safe will be well-used spaces.

The analysis of the “scholarship of engagement” shows the establishment of an office to administrate student and faculty engagement with the community as the only spatial requirement. Spatial exploration in this case is left wanting and more investigation is required to establish the requirements for the creation of a platform for interaction that aims to benefit both the community and institution.

The establishment of two new universities in South Africa awakened the design community to the potential of these institutions to not only impact the urban environment but also create better places within our cities.

Historically, the development of campus plans had isolation and seclusion as principles, but integrated pedestrian pathways and meeting places strengthen the social function of the city space. Gehl (2013:6) described these social meeting places as spaces that contribute towards the aims of social sustainability and an open democratic society. Architecture can be instrumental in an existing institution’s spatial contribution to society. This spatial contribution can be through the creation of communal and interactive spaces on the edge that allow for intersection with the surrounding environment while maintaining a safe and secure environment for staff, students, and the public. A sense of place can be created when the city dweller is socially satisfied (Allers & Breytenbach 2015:28).

Gehl (2013:75) described the edge as a really good place to be in a city. It is the intention of the architecture that, through learning, students can positively contribute to a community, while they gain valuable insight into the realities of the urban dweller in South Africa. This is instrumental in an invaluable knowledge transfer from the institution to the public and the public to the institution. Where a building edge meets the street and where doors exist within this edge, points of exchange develop

– activities move from the inside to the outside and there is interaction with the city (Gehl 2013:75). The paradigm of campus planning must therefore be altered to regard spatial interaction as an important factor

The paradigm of campus planning must therefore be altered to regard spatial interaction as an important factor the creation of the desired connection between town and gown. The polarities of campus and surrounding urban life can become a catalyst for the creation of an urban public space. This space can be the intersection between the current paradigm of isolated tertiary institutions and the creation of a relationship with the surrounding communities. The high fence currently around the Mamelodi Campus creates undefined street edges with no landmarks. This causes the street edge to become a monotonous space without identity.

### 3.7 Cities for People - Architecture as life and form.

In the images (right) Jan Gehl illustrates how certain conditions can invite or repel the city dweller.

Gehl (2013:75) described the edge as the place where the building and city meet. The treatment of edges has a direct influence on the character of life within the city. The edge defines space and can contribute to comfort, security and organisation. Weak edges, or no edges, make for an impoverished city, as well-defined edges offer a level of protection, privacy and shelter to pedestrians that use the city (Allers et al. 2015:31).

The edge is not only a place where exchanges take place but also a staying zone. A building’s edge provides protection at peoples’ backs – knowing that no one can approach them from behind, people can enjoy the view of the city and other people (Gehl 2013:75). “All meaningful social activities, intense experiences and conversations need to take place in spaces where people can walk, sit, lie, or stand” (Allers et al. 2015:33).

The edge is also a zone for experience. The building edge on the ground floor is the most important element to this experience. For example, vertical elements in a building facade create rhythm. At an ordinary walking pace of 80 seconds per 100 meters a person travels approximately 5 to 6 meters every 4 to 5 seconds - this determines the interval at which the average

human requires sensory stimulation (Gehl 2013:76). The design of building facades can thus influence how the urban dweller experiences the city. If stimulating detail is created the walk feels shorter and is more enjoyable. When monotonous fences and boundary walls line the street, the walk feels long (Gehl 2013:76).

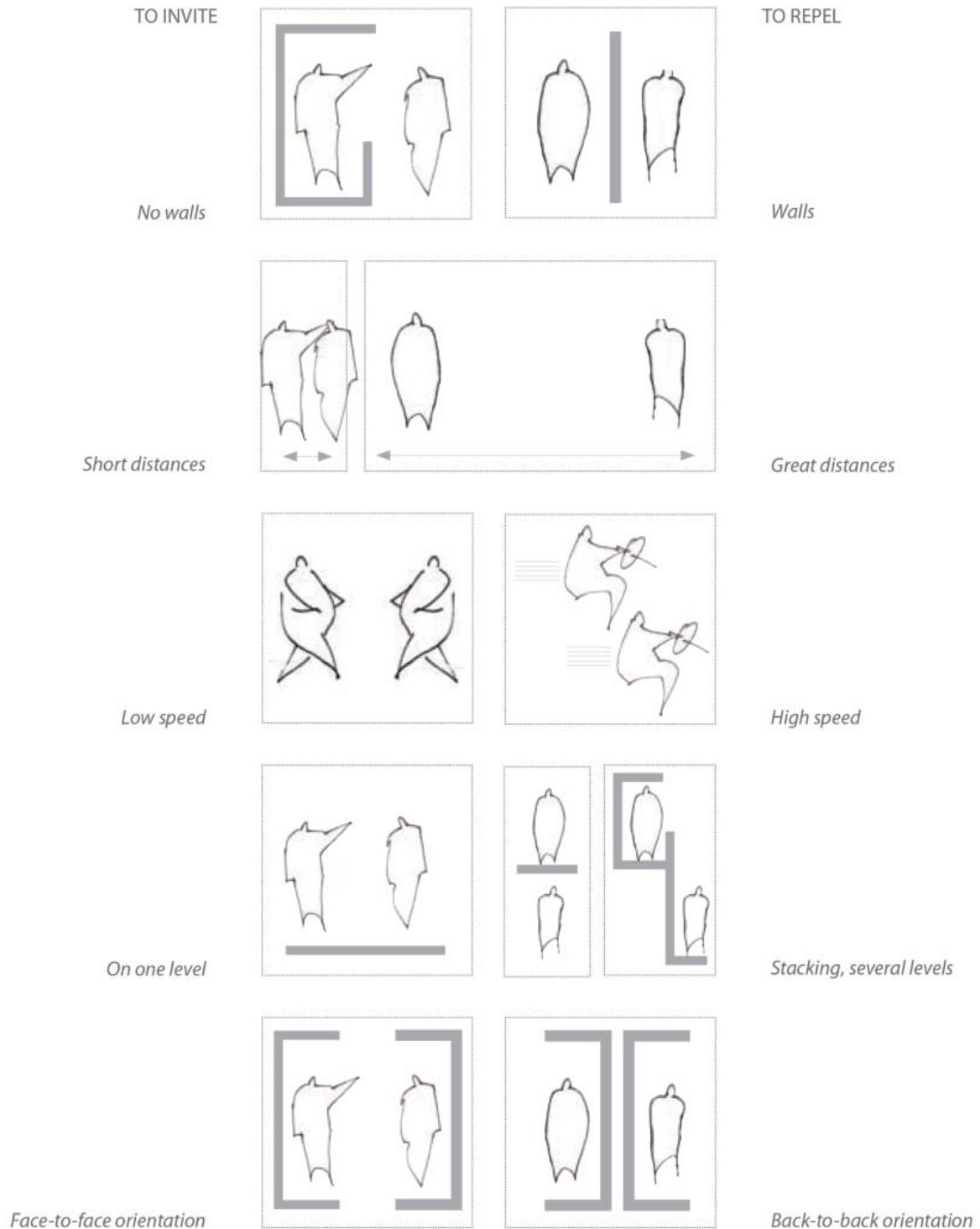


Figure 3.35 Diagrams depicting conditions that invite - or repel when seeing and hearing contacts (Gehl 2014:237)













Protection	<p>PROTECTION AGAINST TRAFFIC AND ACCIDENTS — FEELING SAFE</p> <ul style="list-style-type: none"> <li>• Protection for pedestrians</li> <li>• Eliminating fear of traffic</li> </ul> 	<p>PROTECTION AGAINST CRIME AND VIOLENCE — FEELING SECURE</p> <ul style="list-style-type: none"> <li>• Lively public realm</li> <li>• Eyes on the street</li> <li>• Overlapping functions day and night</li> <li>• Good lighting</li> </ul> 	<p>PROTECTION AGAINST UNPLEASANT SENSORY EXPERIENCES</p> <ul style="list-style-type: none"> <li>• Wind</li> <li>• Rain/snow</li> <li>• Cold/heat</li> <li>• Pollution</li> <li>• Dust, noise, glare</li> </ul> 
Comfort	<p>OPPORTUNITIES TO WALK</p> <ul style="list-style-type: none"> <li>• Room for walking</li> <li>• No obstacles</li> <li>• Good surfaces</li> <li>• Accessibility for everyone</li> <li>• Interesting façades</li> </ul> 	<p>OPPORTUNITIES TO STAND/STAY</p> <ul style="list-style-type: none"> <li>• Edge effect/ attractive zones for standing/staying</li> <li>• Supports for standing</li> </ul> 	<p>OPPORTUNITIES TO SIT</p> <ul style="list-style-type: none"> <li>• Zones for sitting</li> <li>• Utilizing advantages: view, sun, people</li> <li>• Good places to sit</li> <li>• Benches for resting</li> </ul> 
	<p>OPPORTUNITIES TO SEE</p> <ul style="list-style-type: none"> <li>• Reasonable viewing distances</li> <li>• Unhindered sightlines</li> <li>• Interesting views</li> <li>• Lighting (when dark)</li> </ul> 	<p>OPPORTUNITIES TO TALK AND LISTEN</p> <ul style="list-style-type: none"> <li>• Low noise levels</li> <li>• Street furniture that provides “talkscapes”</li> </ul> 	<p>OPPORTUNITIES FOR PLAY AND EXERCISE</p> <ul style="list-style-type: none"> <li>• Invitations for creativity, physical activity, exercise and play</li> <li>• By day and night</li> <li>• In summer and winter</li> </ul> 
Delight	<p>SCALE</p> <ul style="list-style-type: none"> <li>• Buildings and spaces designed to human scale</li> </ul> 	<p>OPPORTUNITIES TO ENJOY THE POSITIVE ASPECTS OF CLIMATE</p> <ul style="list-style-type: none"> <li>• Sun/shade</li> <li>• Heat/coolness</li> <li>• Breeze</li> </ul> 	<p>POSITIVE SENSORY EXPERIENCES</p> <ul style="list-style-type: none"> <li>• Good design and detailing</li> <li>• Good materials</li> <li>• Fine views</li> <li>• Trees, plants, water</li> </ul> 

Figure 3.36 Keyword list: 12 quality criteria concerning the pedestrian landscape (Gehl 2014:239)

### 3.8 A Pattern Language

Christopher Alexander (1979) described practical patterns to achieve community connection within the architecture of a university campus. What defines campus architecture are the spaces and movement between buildings and the various ways in which these spaces can be inhabited. Such spaces should allow not only circulation and movement but also rest, social engagement and collaboration. The intersection between quiet and busy places should be mitigated by intermediary spaces, which then become places that exist in their own right. To become a generator of form and place making, intermediary spaces should also mitigate the interior and exterior, the public and private, and the spaces for leisure and spaces work. A space can never be alive if the edge fails.

Universities have formed the identity they have today as a rite of passage. At the inception of the university as place of learning (in the first millennium), it was an isolated environment only accessible to a select few. Victor Turner (1969) defined liminality as the separation from a fixed or constant and known state into the limen (threshold in Latin) or rite of passage to emerge on the other side, again in a constant state, but one with new obligations and rights.

The Mamelodi Campus of the University of Pretoria forms an enclave in the surrounding city and is thus a liminal body. Peter Hasdell (2016:2) explained that liminal bodies have spatialities and autonomies created by complex coincidence and the negotiation of diverse factors. The resulting boundaries become contested sites where differences manifest: the regular protests in Mamelodi serve as a tangible indicator of collective disagreement and a desire for change within the community (Hasdell 2016:1).

The creation of positive public spaces on these boundaries can establish a new gateway to the campus and enable economic, social and cultural development. The design of shared courtyards and public spaces will foster appreciation for good environments and become a platform for learning within the community (Hansen 2016:24).

### 3.9 The patterns (Alexander et al. 1977)

**Activity Nodes:** Place buildings together in such a way that they create nodes of public life. (Alexander et al. 1977:163)

**Promenade:** A place for strolling (Alexander et al. 1977:168)

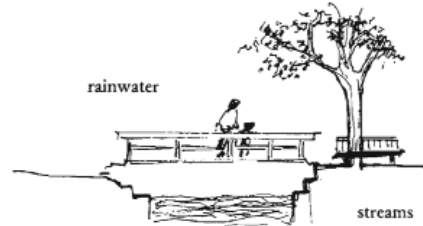
**Green Streets** (Alexander et al. 1977:266)

**Main Gateways** (Alexander et al. 1977:276)

**Road Crossing:** 450mm Raised walkways (Alexander et al. 1977:280)

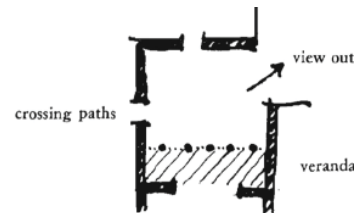
**Bike Paths and Racks** (Alexander et al. 1977:289).

**Figure 3.37** Pools and Streams: “Whenever possible, collect rainwater in open gutters and allow it to flow above ground, along pedestrian paths and in front of houses. In places without natural running water, create fountains in the street” (Alexander et al. 1977:327).



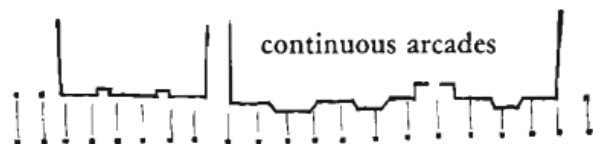
**Shopfront Schools:** Learning through seeing (Alexander et al. 1977:420)

**Figure 3.39** Courtyards that Live: Create paths that run across the courtyard with a view to other areas. Create a verandah connecting the courtyard to the building interior (Alexander et al. 1977:564).



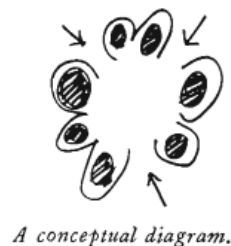
**Sheltering Roof:** Roof edges a person can touch (Alexander et al. 1977:569).

**Figure 3.38** Arcades: Covered walkways at the edges of buildings which are partly inside and partly outside. Arcades play a vital role in the way people interact with buildings. (Alexander et al. 1977:583)



**Pedestrian Density:** Estimate the number of people and determine the size of the space: the ideal being one person per 14 m<sup>2</sup> (Alexander et al. 1977:598)

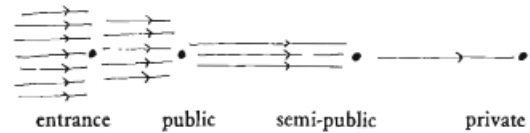
**Figure 3.40** Activity Pockets: “The edge defines the public space” (Alexander et al. 1977:600).



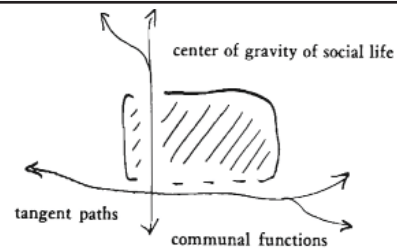
**Figure 3.41** Stair Seats (Alexander et al. 1977:605).



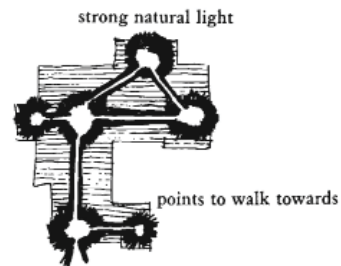
**Figure 3.42** Intimacy Gradient: Create sequence in the arrangement of the spaces from the most public to the "most private domains" (Alexander et al. 1977:610).



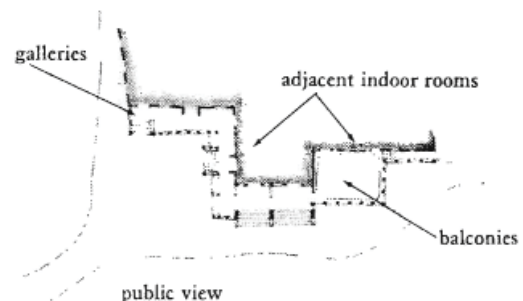
**Figure 3.43** Common Areas at the Heart: Create a common area that is tangent to the most important circulation spaces in the building (Alexander et al. 1977:610).



**Figure 3.44** Tapestry of Light and Dark: "Create alternating areas of light and dark, in such a way that people naturally walk towards the light." Place important spaces directionally towards the light. (Alexander et al. 1977:646).



**Figure 3.45** Gallery Surround: Create balconies and terraces that open onto the public space (Alexander et al. 1977:780).



- Open University. The dissolution between university and town
  - Student housing distribution. Student housing to be within a 500m radius from the centre of the campus
  - Real learning in cafes. Encourage privately owned and managed shops, restaurants, cafes, theatres on the busy corners of the campus so that they are accessible to both the campus population and the general public.
  - Local Sports. Good education cannot happen in a factory. Arrange sports facilities within 150m distance from campus.
  - Building Complex. Maintain human scale in public buildings. Buildings should be conceived as a collection, connected by arcades, paths and bridges.
  - Tree places
  - Wings of light. Minimise artificial light. Maximum building width should be 9m.
- (Alexander et al. 1977)

### 3.10 Threshold Spaces

Threshold spaces informs the required zones of exchanges within the building edge. Till Boettger (2014:10) explained that thresholds allow for connection to be re-established where boundaries are created. "Thresholds interrupt spatial boundaries for a transition from one zone to another" (Boettger 2014:10).

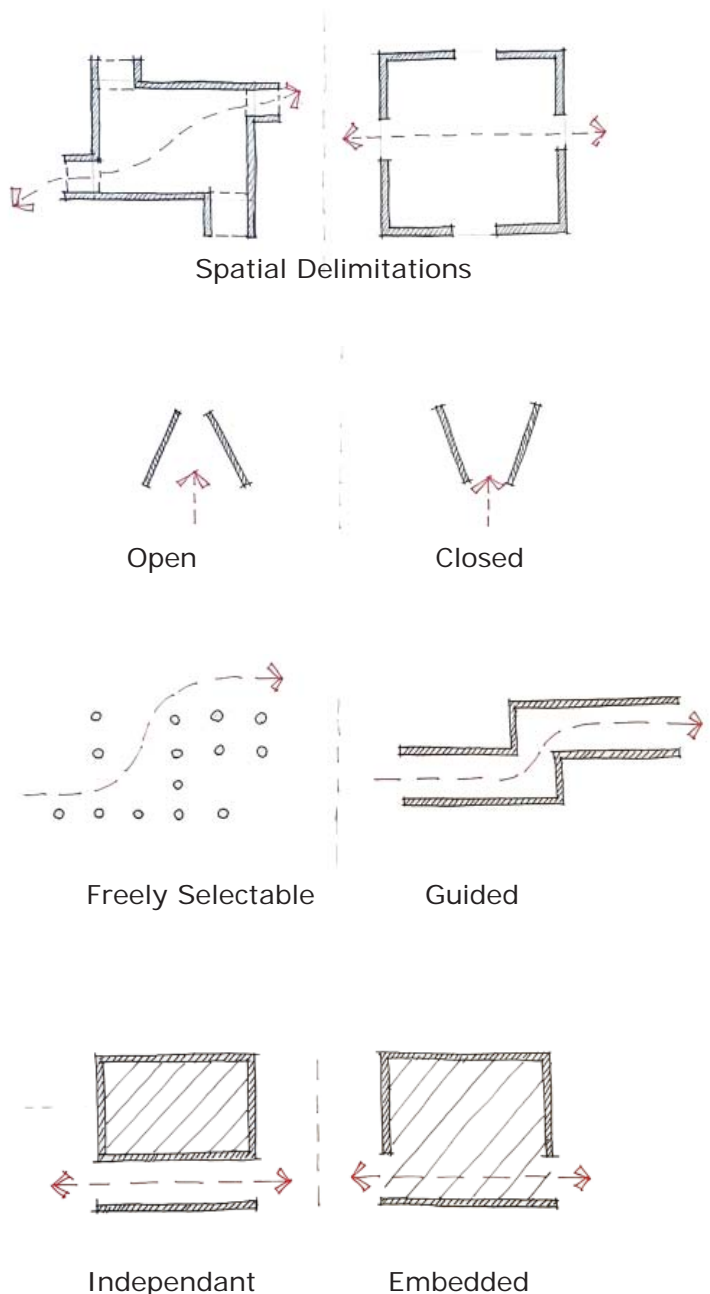
The time component within threshold spaces is significant. Thresholds are defined by the actions of entering and leaving, which can either be directed by a predetermined pathway or allow the user to choose a pathway. Boettger (2014:57) provided five parameters for threshold analysis:

- Spatial delimitation - Thresholds are defined by their edges and boundaries, which either facilitate or prevent movement.
- Spatial sequence - The sequence of movement through a space is significant in how a space is perceived.
- Spatial geometry - This geometry is defined by the relationship between the surrounding architecture and the threshold space.
- Spatial topography - The position of the architecture on the site determines the relationship between the architecture and its environment.
- Spatial materiality - The atmosphere of the threshold space determines whether a visitor feels welcome (Boettger 2014:59). A welcoming atmosphere can be achieved through materiality, transparency, openness, clarity and accessibility (Boettger 2014:59).

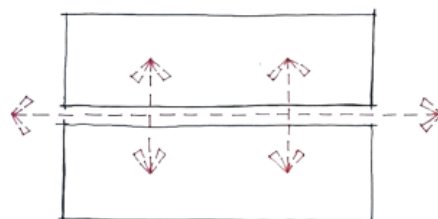
In the section below the Sol Plaatje University in Kimberley is analysed to facilitate a discussion on thresholds and edges.

Within arcades the use of the space will be determined by the means the edges are activated (Allers et al. 2015:33).

**Figure 3.46** Right: the figure shows an arcade that connects two ends. The success of the space requires interaction between its two long edges (Author 2018).



**Figure 3.47** Threshold spaces illustrated. Derived form Till Boettger (2014:121) (Author 2018)





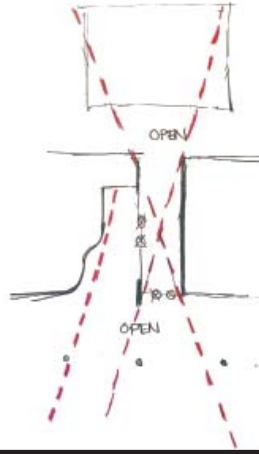


Figure 3.49 Sol Plaatje University, Building CX 003 (Wilkinson Architects). Once one has passed the security turnstiles, the threshold is open and leads into a courtyard. The threshold starts in a public square and ends in the courtyard, which is decorated by artwork (Photograph and diagram - Author 2018).

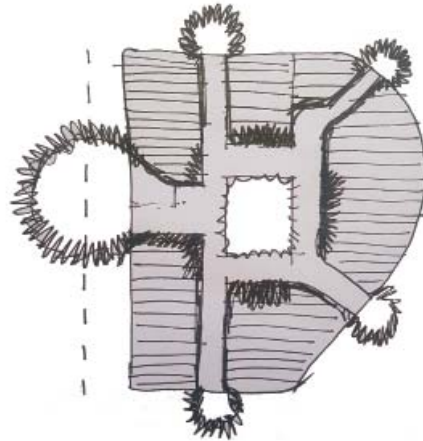


Figure 3.50 Sol Plaatje University, Building CX 003 (Wilkinson Architects). The threshold spaces within the building are guided. These spaces were designed to be cool – acting as thermal thresholds to the internal, occupied spaces. The user is guided in patterns of light and dark guiding them in certain directions (Alexander 1977) (Photograph and diagram - Author 2018).

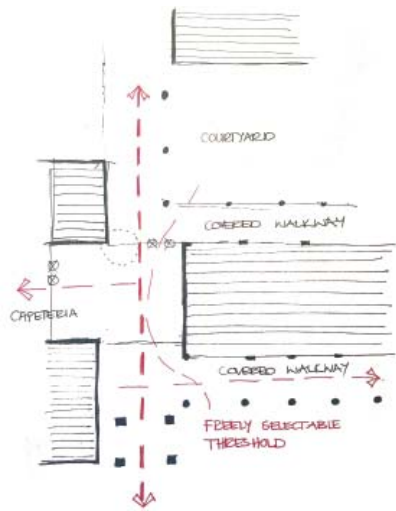


Figure 3.51 Sol plaatje University. Building 2, Student Residences (Savage and Dodd Architects). The threshold space is open. It is embedded in the cafeteria space to the left and allows for movement into the semi- private courtyard to the front and right (Photograph and diagram - Author 2018).

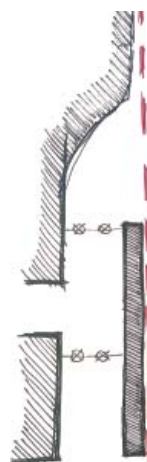
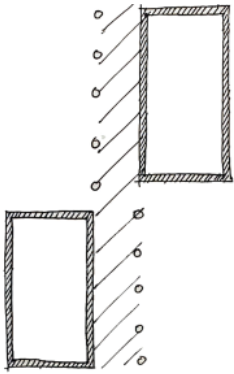


Figure 3.48 Sol plaatje University. The main threshold is directly accessible from the street via a passage with an entrance into the building to the left. The space is dark and isolated, which results in a space that allows for fast movement. No opportunity is created to dwell and activate the edge (Photograph and diagram - Author 2018).

Zones for exchanges discouraged with solid boundary



Zones for exchanges encouraged

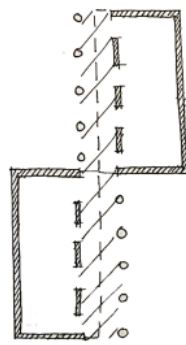


Figure 3.52 Connecting different buildings through arcades and allowing the interiors to interact with the created spaces (Author 2018).

### 3.11 The Edge Condition Investigated.

Sol Plaatje University

Urban Designer: Ludwig Hansen

Campus Building 1

Architects: Activate Architects

Campus Building 2

Architects: Savage + Dodd Architects

Campus Building 3 (CX003)

Architects: Wilkinson Architects, Mashilo Lambrecht Architects and GXY Architects.

Location: Kimberley, Northern Cape

Date completed: 2015 (Buildings referred to above)

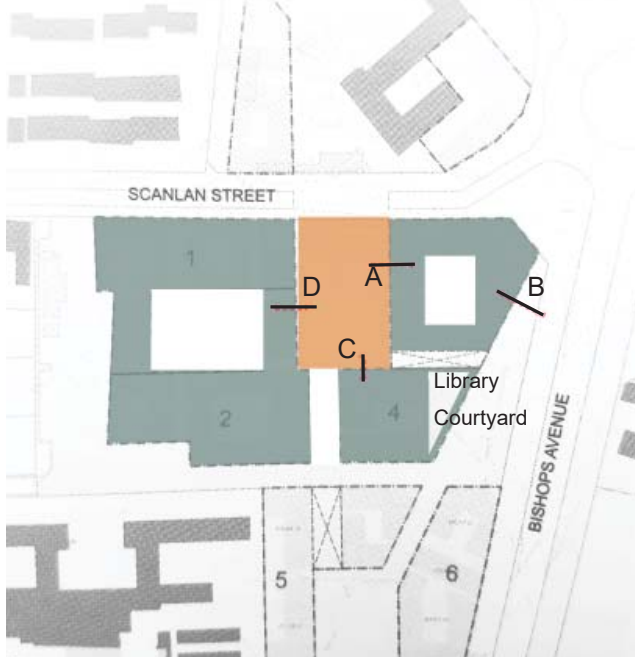


Figure 3.53 Sol Plaatje Central Campus site plan of the main public square derived from Hansen (2016:33). Positions of sectional diagrams indicated on the opposite page (Author 2018).



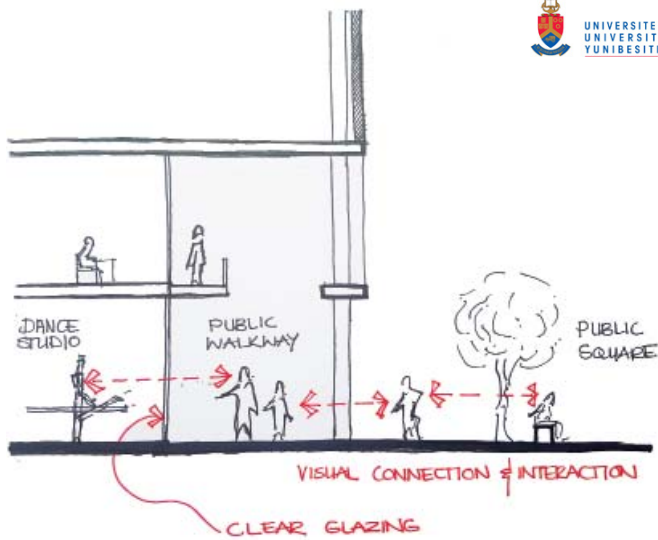


Figure 3.54 Sectional Diagram A shows the edge condition of Building CX003 in relation to the public square. Interaction is established between a dance studio and the public walkway, which creates a successful edge condition that also interacts with the public space (Author 2018).

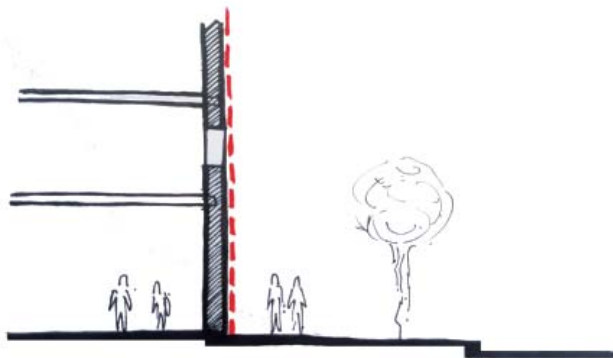


Figure 3.55 Sectional Diagram B shows the edge condition of Building CX003 in relation to the street. This edge is solid with no interaction. There is a pedestrian path shown, but it does not strike one as a safe space in which to dwell. As no visual connection is created between the building interior and the street, there is no passive surveillance. The building does, however, occupy the edge and form an unimposing landmark for the university on the corner of the busy street (Author 2018).

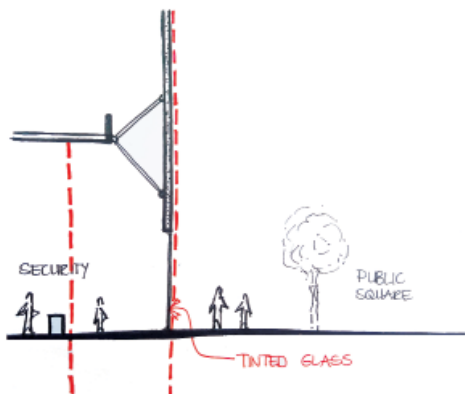


Figure 3.56 Sectional Diagram C shows the edge of and the main entrance to the principal university library (Design Workshop: SA). The facade is flat with no overhang to protect users as they approach the building. It is also difficult to distinguish the entrance door from the service door and fire escape doors: papers have been stuck to the door as signage to indicate the various doors. Tinted glass does not permit interaction between the interior and exterior space (Author 2018).

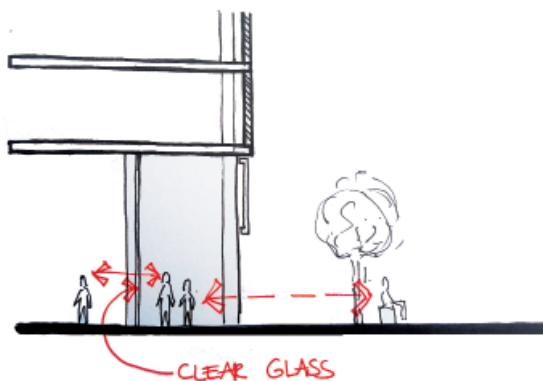
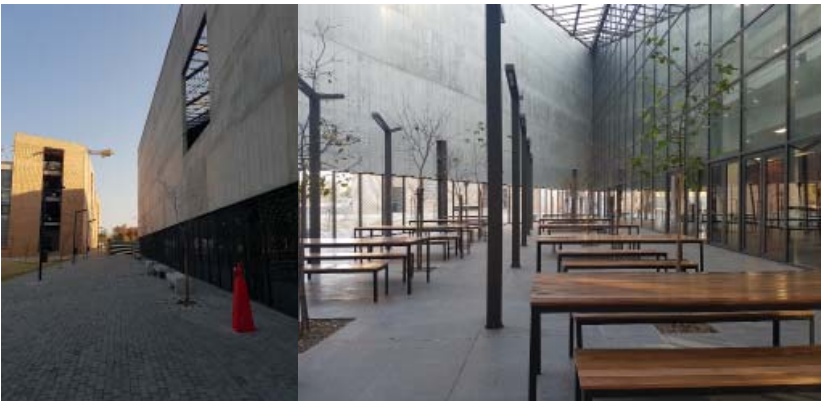


Figure 3.57 Sectional diagram D shows the edge of the student residences to the public square. A narrow walkway creates a threshold that provides a protected circulation space (from the residence to the street). Through the creation of seating, an opportunity can be created for users to linger, enjoy the view of the square, and people-watch (Author 2018).



**Figure 3.58 Sol Plaatje University (Activate Architects). The edge condition to the public square wraps around the corner and continues along the street edge. Level differences are negotiated using steps, which become seating in the shade of the building. Wheelchair accessibility is achieved as the levels merge in the square (Author 2018).**



**Figure 3.59 The main library courtyard (Design Workshop: SA). The space is shaded and cool, but does not translate and continue into the street edge (Author 2018).**



**Figure 3.60 Sol Plaatje University, edge of Building CX003 to the public square. Deep threshold spaces allow for shading of the building interior, which faces west (Author 2018).**

### 3.12 Contextual Precedent

Khayelitsha service centres and pay points

Architect: Piet Louw Architects

Location: Khayelitsha, Western Cape

Date completed: 2002

This building was selected due to its location within an informal settlement that is a result of the apartheid planning model. The architecture of this building seeks to create a generous public space that allows for encounters and meaning within the urban environment. Its layered portico acts as a gathering and recreational space that defines the external space and mediates between the internal and the external.

The edge condition of the building is optimised for public opportunity and interaction through the creation of a shaded and protected area, which also allows for movement through the space. Two defined thresholds capture the space at the edges. The building is robust and light-filled with strong, direct forms that are appropriate to the informal context. It is an identifiable structure that creates a meaningful public space by means of defining the edge. The centre features a courtyard and offices for local councillors. It is clustered with existing community facilities, which contributes to places of civic significance (SA Delivery S.a).



### 3.13 Functional Precedent

WITS Art Museum

Architects: Cohen & Garson Architects

Location: University of the Witwatersrand.

Date completed: 2012

The street edge of Braamfontein, in mid-city Johannesburg, is activated through the WITS Art Museum and coffee shop, which create public-accessible spaces. The spaces are designed to also form a student entrance to the campus, where the art department is located: the space is thus activated throughout the day.

The boundary between public and institution becomes almost invisible - allowing a sense of belonging in the urban dweller, as spaces are created that allow for moments of rest to enjoy the artworks.



Figure 3.61 Street view of the corner before completion of the Wits Art Museum (Google Maps 2007)



Figure 3.62 Street view of the corner after completion of the Wits Art Museum (Google Maps 2017)

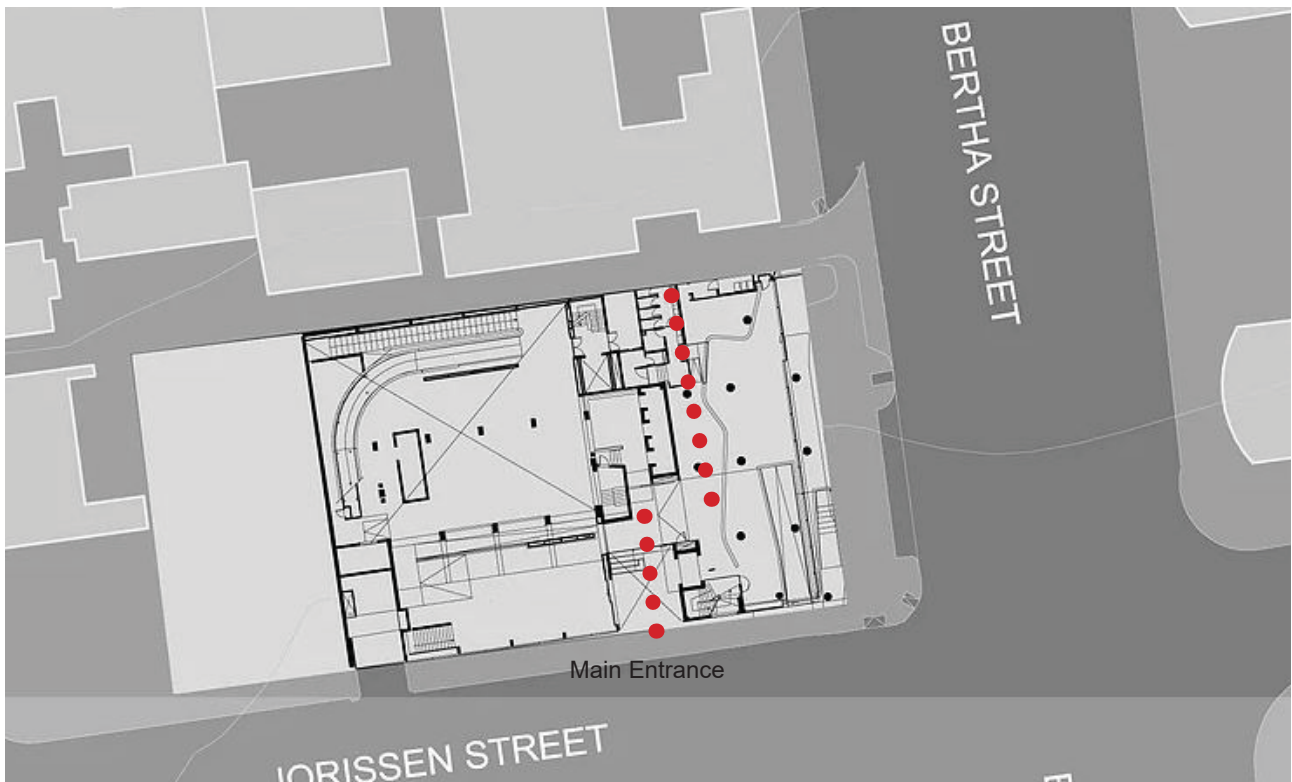


Figure 3.63 Floor plan in context with public entrance and movement through to the campus indicated in red. Derived from Cohen and Garson (Author 2018)

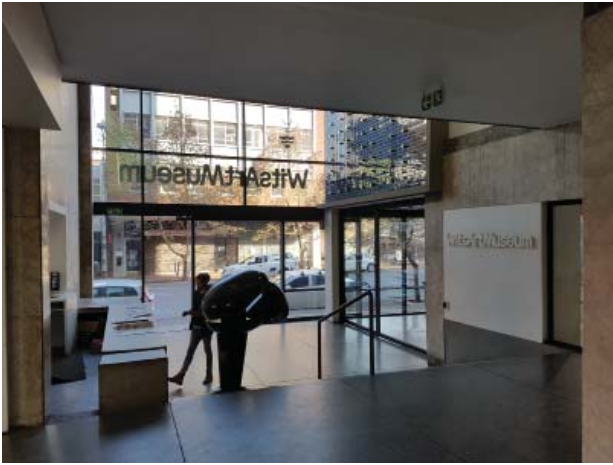


Figure 3.65 Main entrance and lobby of WITS Art Museum (Author 2017)



Figure 3.66 Clear glass between the street edge and the interior coffee shop allows for visual interaction.



Figure 3.64 Wits Art Museum public coffee shop. Students can enter at the main entrance and go up the stairs (onto the balcony visible at the top right of the photograph) to gain access to the campus (Author 2017).

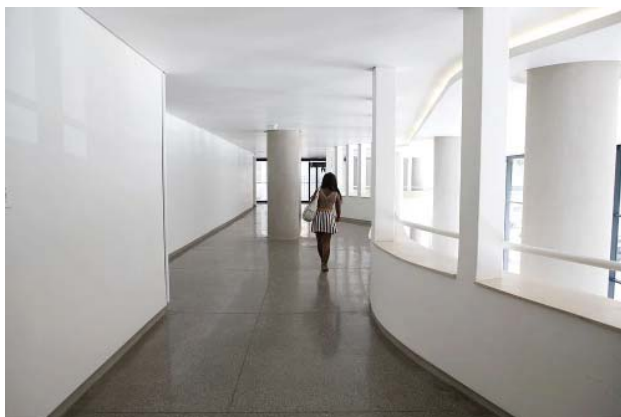


Figure 3.67 Threshold encountered before students reach the turnstiles to enter the campus (Cohen & Garson).





## CHAPTER FOUR

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# PROGRAMME



Business  
Clinic



Law  
Clinic



Itsoseng  
Psychology  
Clinic



Siyathemba  
Occupational  
Therapy  
Clinic



Community  
Design Hub



Maths &  
Science  
Reading Room

### 4.1 Anchor Institutions

Anchor institutions play a crucial role in the development of the communities and neighbourhoods in which they are situated (Taylor Jr & Luter 2013:2). As immobile entities, they are tied geographically to a certain location by “a combination of investment capital, mission, or relationships to customers or employees” (Taylor et al. 2013:7).

Anchor institutions occupy substantial portions of land and have a large presence within a society and city. These include institutions such as universities, hospitals and libraries. They are regarded as social establishments that mediate the intersection of people and localities (Taylor et al. 2013:7). Shek and Hollister (2017) described the need for the exploration of university social responsibility to promote activities that are ethical, inclusive and beneficial to the public. They emphasised environmental conservation, sustainability and balanced social development; the promotion of welfare and quality of life (especially of disadvantaged and vulnerable populations); and a commitment to building a better world (Shek & Hollister 2017).

One of the purposes of higher education is to produce citizens to serve the community. The intention is that the skills and knowledge gained by the educated person be used to contribute to the community once a student has completed their studies and entered the workforce. Educated citizens should thus contribute to the insurance of human rights; the development of a productive society; and the alleviation of human suffering, which is a matter of both ethical and social concern (Speck & Hoppe 2004:3).

The University of Pretoria has a notable impact on the community in which it is situated. The university published a report on its economic impact on the Tshwane region, on Gauteng, and on the country. In 2011, the institution and the student community contributed R14.06 billion (directly and indirectly) to the Tshwane region and provided a total of 22 997 employment opportunities (Koornhof, Herbst, de Wet, Hendricks, Vorster, 2013). There exists a great opportunity for the institution to expand its contribution further and to influence the communities within Mamelodi.

### 4.2 The Scholarship of Engagement & Community Engagement

Ernest Boyer (1996) argued that education must stay relevant to the most crucial matters within societies today. He proposed four models that are interrelated and necessary - referred to as the scholarship of engagement. The four models include the scholarship of discovery; the scholarship of integration; the scholarship of sharing; and the scholarship of application. The scholarship of engagement argues that cities determine our futures, focus must therefore be on the complex problems of urban life, for which there are no simple solutions. Through students engaging and working directly with the community, these shortfalls can be identified. Community engagement within a tertiary setting allows the theoretical knowledge a student has gained to become practice and then move back to theory. This then contributes to the authentication of such theoretical knowledge (Boyer 1996).

Within the context of higher education, community engagement can be approached in various ways: community-based research, participatory action research, service-learning, and professional community service. In “its fullest sense, community engagement is the combination and integration of service with teaching and research related and applied to identified community development priorities” (Lazarus et al. 2008:61).

The paradigm of thought regarding community engagement, has moved away from viewing the community as research objects and as beneficiaries of charity. The intent is for partnership with communities: with mutual benefit for all parties involved. University knowledge can contribute to the resolution of problems identified by communities, while students can simultaneously apply new knowledge they have gained (De la Rey, Kilfoil & Van Niekerk 2017:155).

<i>Scholarship of Discovery</i>	<i>Engaged Scholarship</i>
<i>Breaks new ground in the discipline</i>	<i>Breaks new ground in the discipline and has direct application to broader public access</i>
<i>Answers significant questions in the discipline</i>	<i>Answers significant questions in the discipline, which have relevance to public or community issues.</i>
<i>Is reviewed and validated by qualified peers in the discipline</i>	<i>Is reviewed and validated by qualified peers in the discipline and by members of the community</i>
<i>Is based on a solid theoretical basis</i>	<i>Is based on solid theoretical and practical bases</i>
<i>Applies appropriate investigative methods</i>	<i>Applies appropriate investigative methods</i>
<i>Is disseminated to appropriate audiences</i>	<i>Is disseminated to appropriate academic and community audiences</i>
<i>Makes significant advances in knowledge and understanding of the discipline</i>	<i>Makes significant advances in knowledge and understanding of the discipline and public social issues.</i>

Table 4.1. The scholarship of discovery compared to the engaged scholar Andrew Furco, Associate Vice President for Public Engagement University of Minnesota (2005) quoted in Iowa State University (2014)

A well complemented university environment can be created through various forms of scholarship (Boyer 1996). Table 4.1 (above) compares the traditional scholarship of discovery (also referred to as research) to the engaged scholar (that can include any type of scholar in any field of study). The scholar is engaged if the knowledge is not developed for its own sake, but rather with the well-being of society in mind (Checkoway 2013:8).

For the Scholarship of Engagement to be realised as a student body that is fully engaged with the community, an executive person must be appointed to be responsible for staff and community engagement and a reward system must be put in

place. This person’s task would be to assist in policy decision making from a historical, ethical and social perspective. It would need to be someone with knowledge of the specific community to be engaged.

According to Checkoway (2013), when knowledge is developed with the well-being of a society in mind, a scholar becomes an engaged scholar - irrespective of the field of study. The university should be a resource for teachers and other practitioners. It should enrich the civic and academic health of practitioners and scholars and be an environment that promotes communication. Speaking and listening to each other can ensure a healthy cultural setting for the growth of the knowledge environment. To this end, places and

spaces must be designed where communication can take place. The relationship between universities and communities is a critical success factor and community engagement is a part of the institution's core business (De la Rey et al. 2017:168).

### 4.3 Community Engagement Clinics on the UP Mamelodi Campus

There are a number of community engagement programmes currently available at the University of Pretoria, Mamelodi Campus. These programmes include the Itsoseng Psychological Clinic; Siyathemba Occupational Therapy Clinic; the Business Clinic and the Law Clinic of the University of Pretoria. These clinics inform the programme for the architecture of this dissertation.

The Itsoseng Psychological Clinic currently has a total of eight counselling rooms (with ancillary spaces) that are filled to capacity most days. Itsoseng translates into "get up" or "wake up" and the clinic's intention is for people "to get back up" (Visser 2017). The aim of the clinic is to turn the needs of the community into opportunities through individual, couples', and family counselling for a variety of problems. Services include psychological assessments, expressive art therapy, and career guidance. Itsoseng uses the opportunity to address the existing gaps in western-based approaches through continuous context-specific research in Mamelodi. The clinic also provides internships for psychology students and addresses the direct needs of the community (Visser 2017). Itsoseng works in partnership with schools in the community: school children can come to the clinic in the afternoons, where they can join in activities such as art, music and sport. Through these activities, Itsoseng provides a safe playing environment for children living in Phomolong, the informal settlement to the east of the campus. The clinic strives to provide context-sensitive services that enable the youth to become autonomous, self-sufficient leaders.

The Siyathemba Occupational Therapy Clinic provides free therapy to all children under the age of 18. It is run by fourth-year occupational therapy students from the University of Pretoria who address physical, mental and sensory problems. Siyathemba currently occupies four small offices/ therapy rooms and share a larger room with the Itsoseng Psychological Clinic where up to 50 children can be attended to (Visser 2017).

The Business Clinic was established on the Mamelodi

campus in 2011. It provides a unique service within the community by promoting entrepreneurship, with services that include business mentoring, counselling and coaching, training workshops, and information services. The Business Clinic assists community members in creating business plans; with the development of their business profiles; and through support in market development and research. Community members can also access valuable resources such as telephones and computers, which form a fundamental part of business development and planning (Mokoena 2017).

The Law Clinic of the University of Pretoria was originally founded by the Department of Human Rights in 1994. It was later taken over by the University of Pretoria in Hammanskraal (to the north of city) and the main campus in Hatfield. The Mamelodi branch opened its doors on the Mamelodi Campus in 2008. The clinic aims to provide a full range of legal services to the community. This allows access to equitable justice in areas where poverty and illiteracy are endemic. The clinic provides candidate attorneys and final-year law students the opportunity to practice law while being mentored by experienced lawyers, who are employed by the clinic (Grant 2018).

The community engagement programmes situated on campus are mostly located in areas that are not suitable spaces to the functions performed there. The Siyathemba Occupational Therapy Clinic currently occupies rooms with large viewing panels in the registration hall and the Itsoseng Psychological Clinic takes up a large number of academic offices in the administration building. The fact that these programmes occupy spaces not suitable to their functional requirements increases the difficulty of navigating the campus to reach these facilities (Mokoena 2017).

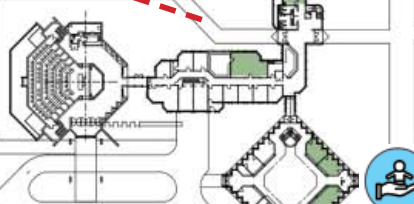
The campus property is 20.02 ha in size and there are currently 16 buildings with a gross floor area of 24 012 m<sup>2</sup>. Most of the activity on campus is focussed to the centre of the property.

Gehl (2014) describes the edge where building meets street as the most fundamental parts of a city. The campus thus has the potential to contribute to the urban environment through the occupation of the street edge, which is currently spatially lifeless as a result of the fence.

This project proposes that the community



Lush courtyard



OFFICE BLOCK OFFICE BLOCK

CHEMISTRY

PHYSICS

Campus Library



Campus Library








engagement and service learning programmes be moved to the edge of campus to ensure community access and create an opportunity for place making and interaction between the University of Pretoria, Mamelodi Campus and the surrounding community.

The expansion of the edge and placement of these community engagement programmes on the street edge - as positive urban space - can contribute to the spatial improvement of these communities. Bookstores, coffee shops, restaurants and shops can then open-up onto these spaces and contribute to the sharing and exchange of ideas. Meeting rooms are incorporated in the edge to grant community members access to its services. Gallery space allows for the institution to display information directly accessible to the community and also allows for artists to exhibit their work.

#### 4.4 Programmatic Requirements




















In line with the research conducted on the continuum of campus architecture and the related architectural theories of Jan Gehl (2014) and Christopher Alexander (1977), anchor institutions and the Scholarship of Engagement, the following programmatic requirements were considered necessary for the activation of the edge.

-  Business Clinic
-  Law Clinic
-  Itsoseng Psychology Clinic
-  Siyathemba Occupational Therapy Clinic
-  Maths & Science Reading Room

**Figure 4.68** Left: Plan of the Mamelodi campus showing the locations of the existing Community Engagement Facilities with photographs (Author 2018)

## PROGRAMMATIC REQUIREMENTS

	SPATIAL REQUIREMENTS	AREA	ADDITIONAL REQUIREMENT DESCRIPTION
Exhibition Space Reception and related circulation spaces		300m <sup>2</sup>	
Retail Areas		900m <sup>2</sup>	Book Store Coffee Shop Copy centre Food stores
 Business Clinic		375m <sup>2</sup>	Reception and waiting areas 4x Offices Open collaborative spaces
 Community Design Hub			Computer Laboratory Reading Room Access to Multipurpose Hall
 Occupational Therapy		450m <sup>2</sup>	Reception and waiting areas 8x Private consulting rooms 3 x Larger therapy rooms
 Psychology Clinic			Meeting Room Access to Multipurpose Hall
 Law Clinic		375m <sup>2</sup>	Reception and waiting areas 5x Offices Meeting Room
Computer Laboratory		375m <sup>2</sup>	
 Maths and Science Reading Room		400m <sup>2</sup>	Reception and waiting areas Collaboration Spaces Library Access to Multipurpose Hall
Cafeteria		800m <sup>2</sup>	Public seating Food Serving Space Kitchen
Student Residences		1000m <sup>2</sup>	Shared rooms with communal space

DESIGN POPULATION (SANS 10400-A)	PROVISION OF SANITARY FIXTURES (SANS 10400-P)	
A3 - 1 person/ 5m <sup>2</sup> 60 persons		
	4	 10
F2 - 1 person/ 10m <sup>2</sup> 90 persons	6	 6
	7	
A3 - 1 person/ 5m <sup>2</sup> 75 persons	4	 10
	6	 6
	7	
A3 - 1 person/ 5m <sup>2</sup> 90 persons	2	 5
	3	 3
A3 - 1 person/ 5m <sup>2</sup> 90 persons	3	
A3 - 1 person/ 5m <sup>2</sup> 90 persons	3	 7
	4	 4
	5	
A1 - 1 person/ seat 80 persons	3	 7
	4	 4
	5	
H2 - 1 person/ bed 32 persons	2	 4
	3	 3
	3	 3

### SPATIAL REQUIREMENTS LEGEND AND INTENTION

-  Accessible public space
-  Collaborative and interactive space. Busy spaces for both movement and staying where formal and informal meetings can happen.
-  Spaces that have a direct visual connection with the public space and street.
-  Semi-public space - as a space accessible to the public but with definite territorial ownership - like a shop or courtyard.
-  Edges as staying zones. People can sit or stand and view the goings in other spaces (Gehl 2013:75)
-  Semi-private space - as an access controlled space, accessible only to students/ staff and associated persons.
-  Private space - a space that can be isolated as per functional requirements
-  Quiet spaces irrespective of accessibility



Figure 5.69 An example of a Mamelodi resident activating the edge and inhabiting the wall creating economic opportunity.



## CHAPTER FIVE

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# DESIGN DEVELOPMENT

### 5.1 Concept

The concept intends to activate the edge (which, according to Gehl (2013:75), is the best place to be in the city) and invert the currently secluded campus to enable interaction with the street (the public space in Mamelodi). Analysis of the campus established that between the buildings are well-maintained green spaces and trees, which are the elements that provide the campus with its positive atmosphere.

The intention is to create unimposing landmarks through the design of public space. It is not to create a monument or pavilion structure where the building becomes the landmark. The aim is thus to establish positive public space characterised by what happens there.

The architectural language is informed by the environment. The expression of self in the surrounding residential buildings is most pertinent

in the patterns many of the houses display on their boundaries and edges. The houses themselves are not usually embellished – the patterns are displayed on their boundary walls and gates.

This led to the wall becoming the concept's main driver for form making. The wall represents the edge. It is an important place-making element that creates defined city spaces (which encourage exchanges), places in which to linger, and spaces from where the city can be enjoyed (Gehl 2013:75). The fence, which is currently a dividing element, is transformed into a building edge. It is thus converted into a connective element and a means to capture space. Courtyards become an important conceptual driver, as they shape exterior spaces that encourage collaboration and place making within the institution.



Figure 5.70 An example of a patterned boundary wall, using plaster, paint and steel work from artisans in Mamelodi (Author 2018)



Figure 5.71 An example of a patterned boundary wall, using brick in Mamelodi (Author 2018)

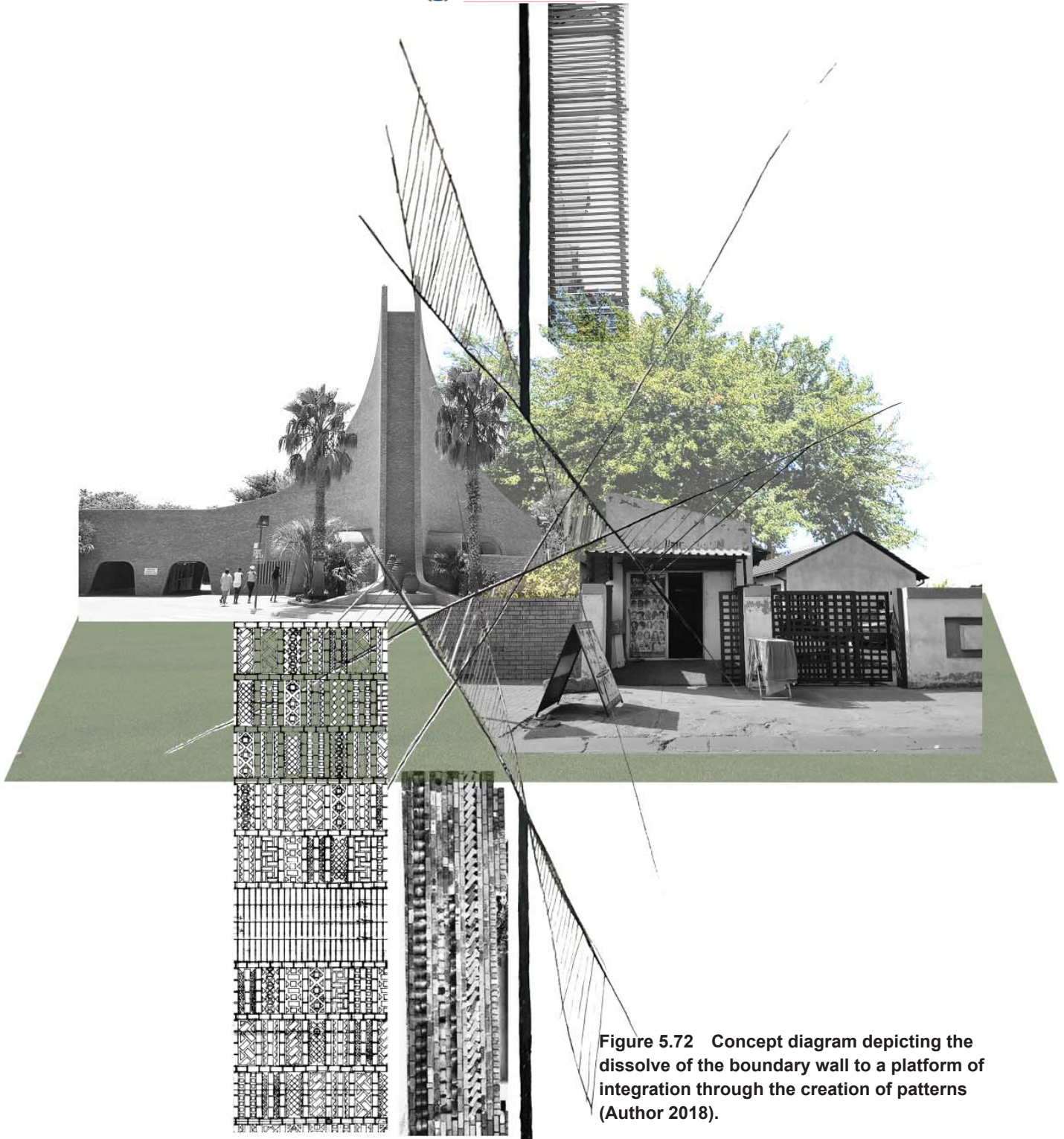


Figure 5.72 Concept diagram depicting the dissolve of the boundary wall to a platform of integration through the creation of patterns (Author 2018).

## 5.2 Design intention

The intention is to add a new layer to the original Vista University campus typology. The design and material choice seeks to contradict and contrast the existing campus, which was designed with isolation and separation as driving force. The existing built fabric on campus does not interact with the context in which it is located. If any such endeavours existed, these would have been the elements to relate to, but it is the landscape that creates the connective element, making the current campus an enclave and inviting the user to dwell within it.

The intention is to create a new campus typology by adding a layer to the campus; therefore the surrounding community becomes the main informant of the design.

As tertiary education evolves, its layers of history should remain visible and new layers be added – demolition is not feasible. The architecture should endeavour to reinforce the positive legacy of the past and where necessary give new direction for the future (Dewar & Louw 2017:29). The architecture



**Figure 5.73** The University of Pretoria, Mamelodi Campus indicating the site and proposed activation of the edge

seeks to resolve a present spatial requirement for campus architecture, which is a framework integrated into the host city (Hansen 2016) and not an introverted and fortified university campus.

The design encourages the addition of new layers to allow the university campus to become an architectural narrative. The current Mamelodi Campus architecture has a single author who has been involved with any additions and alterations for the last 25 years, since campus completion in 1993

(De la Rey 2017). The design intends to add another layer through the creation of a narrative: one of accessibility and integration. This would create architecture relevant to the creation of positive space on the edge of the Mamelodi campus.

### 5.3 Design Informants

The urban vision and theories of Jan Gehl (2014) and Christopher Alexander (1977, 1979) consider the pedestrian landscape to be a significant element within the city. Pedestrian movement at the front of the campus thus became one of the most important design considerations. Initially it was envisaged for the main entrance to only allow pedestrian access – promoting only non-motorised transport. This would, however, limit access to the institution, which contradicts the intention of this dissertation. Both pedestrians and motorised transport must be accommodated.

The approach was to identify existing elements and improve their condition instead of demolishing and rebuilding (as this not feasible) (Dewar & Louw 2017:29). To develop the existing, it was decided that the present roadway be retained and incorporated into the design. The fence and boundary wall, however, were the exception.

Through field research and investigation of the campus and by attending a university open day in the arena (22 April 2017), it became evident that the arena space was designed purely for functional purposes. This large area can seat 3 000 persons but has no threshold space. It thus requires an in-between space to mitigate the transition between inside and outside.

A prominent, existing building is the entrance building: a tower that marks the main threshold. This informs the first design axis. The axis runs from the existing tower building, along the new in-between space of the arena, to the street. It becomes the connection between the heart of the campus and the street (the most relevant public space in Mamelodi).

Pedestrian movement along Hinterland Street informs the second axis – mediation. Along this route is a storm water channel (currently situated behind the university fence). This storm water channel creates an opportunity for the landscape to become a space of integration between campus and community. The intersection of the two axes marks the area of main circulation, in the horizontal and vertical directions.

Water as a place-making element has been identified in multiple frameworks for the creation of positive public space (Alexander 1977, Gehl 2014, Louw & Dewars 2017). The creation of a bioswale can engender a landscape that transforms with seasonal changes. The landscape has the potential to create not only a positive outdoor space but also integration of the institution and community.

The busy street corner and informal trade allow for integration of the sports field's seating with the stalls of informal traders. Informal traders thus have a space to which they can attach, which also grants access to services such as electricity and water. The resolution of the sport component, which can include a gym and related functions, is proposed as part of the framework for the development of the edge. This dissertation, however, focuses on the activation of the edge through community engagement facilities and their related functions.

The intention is to create a foyer space for the campus. The foyer would contain an exhibition or gallery space where passers-by can interact with the university through exhibits of university events. This space can also be used for the exhibitions of local artists, which can spill out into the public square and main reception area to the north of the building (where an additional open public space allows for flexibility of use).



Figure 5.74 Section investigation of the street edge of the sports field (Author 2017).



Figure 5.75 Section investigation of the street edge with the stormwater garden (Author 2017)

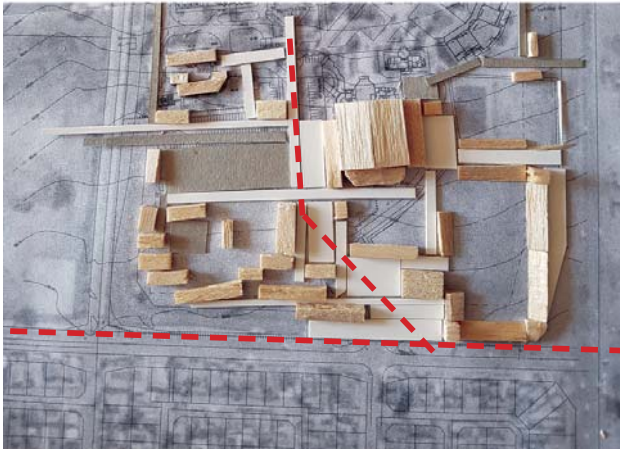


Figure 5.76 Conceptual model 1 (Author 2017)

### Conceptual Model 1:

The initial occupation of the edge had the pedestrian as main informant for the design (Gehl 2014). The placement of solid versus void created linked public squares to guide the user into and through the heart of the campus. This allowed for the building entrances to open onto these public spaces and create nodes of activity (Alexander et al. 1977).

The multiple entrances from the main public space did not allow for progression from the very public to the very private, which is a requirement of programmes such as the Psychology Clinic (Alexander et al. 1977).

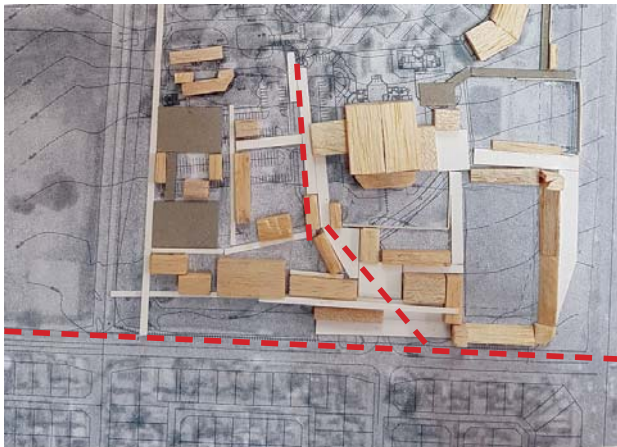


Figure 5.77 Conceptual Model 2 (Author 2017)

### Conceptual Model 2:

Larger buildings, with larger footprints, were investigated for a narrower guided path into the campus.

Security remained an issue. The buildings' larger footprints would also have led to larger heating and cooling loads – smaller, narrower buildings allow for natural ventilation and smaller cooling loads.

#### Critique

Not enough emphasis on the activation of the edge where more focus is placed on the intended users of the campus. Pedestrians moving along the street will not engage the edge (Gehl 2014).



Figure 5.78 Conceptual Model 3 (Author 2017)

### Conceptual Model 3:

More focus was placed on the street edge, which allowed for the creation of smaller, more intimate courtyards along the campus edge. A hierarchy of spaces with different levels of accessibility was created, which enabled the creation of positive and safe outdoor spaces for collaboration (Dewar & Louw 2017).

A main axis from the existing tower entrance was identified. This allows for a progression of courtyard spaces that pedestrians can enter and activate with movement. The main entrance opens directly onto the street.

## 5.4 Design Development

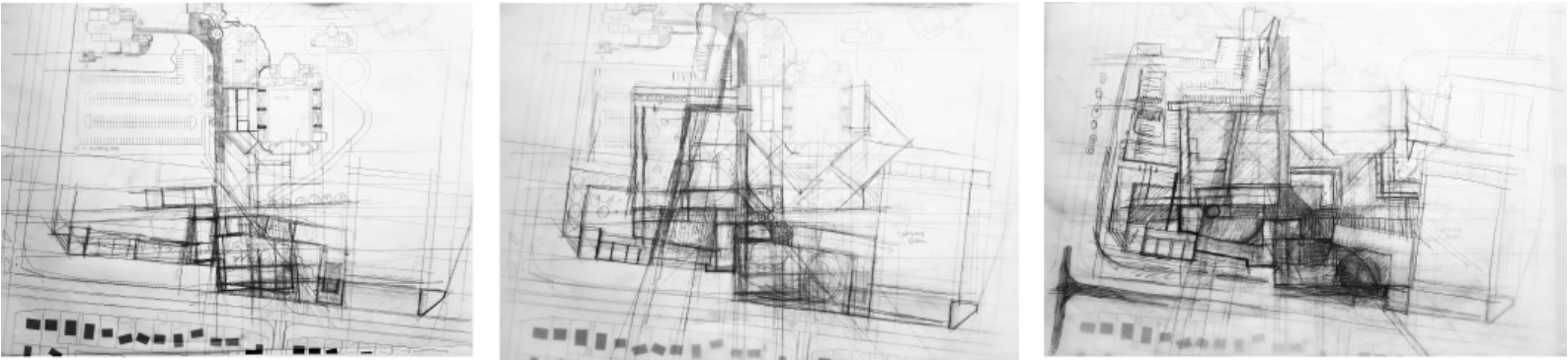


Figure 5.80 Drawings showing the conceptual development and the movement through space derived from Conceptual Model 3 described above (Author 2017)

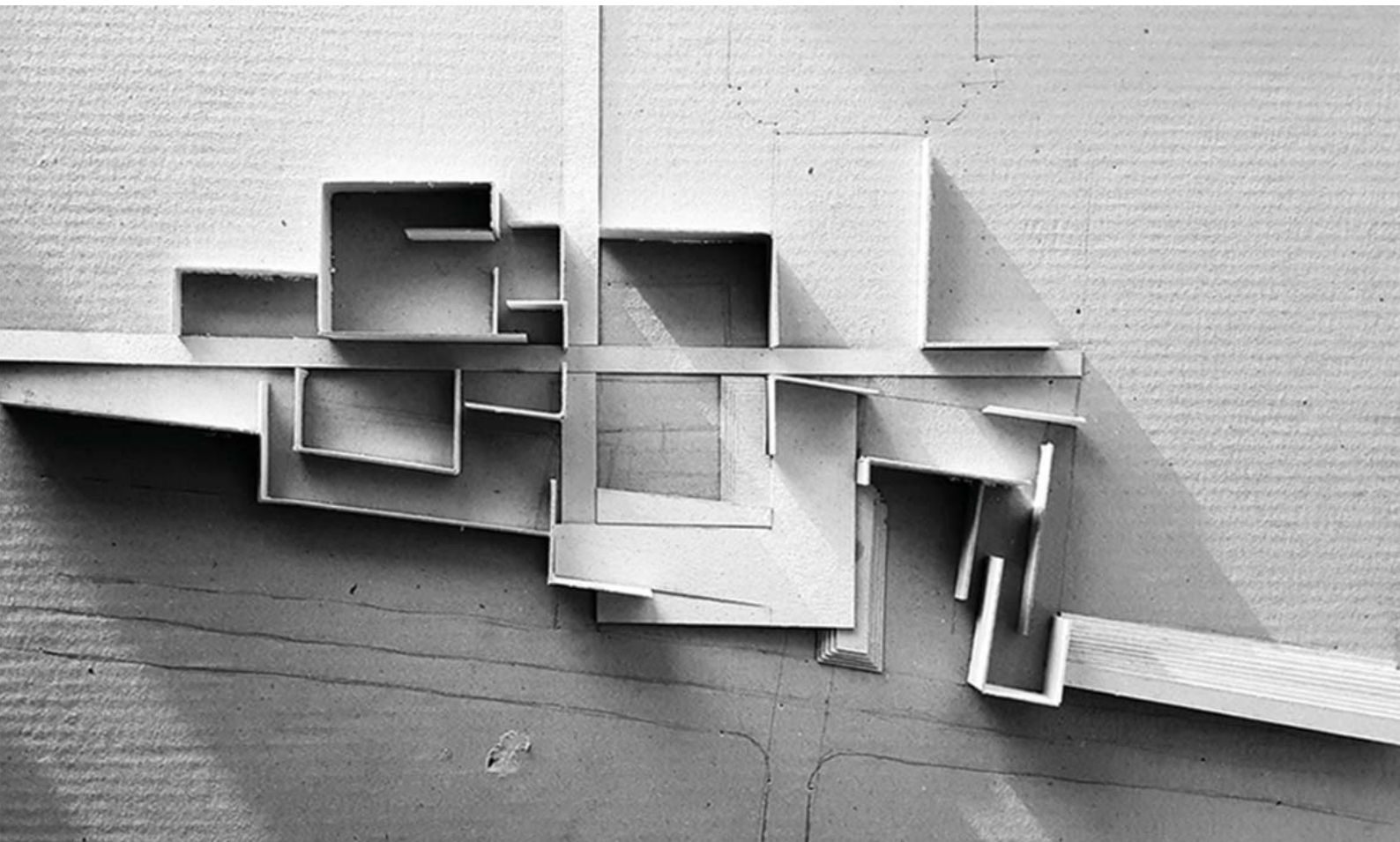


Figure 5.79 Concept model that explores walls and courtyards as the main elements to create the threshold and guide the user from the street (the main public space) to the more intimate courtyards of the individual Community Engagement Clinics. (Author 2017).

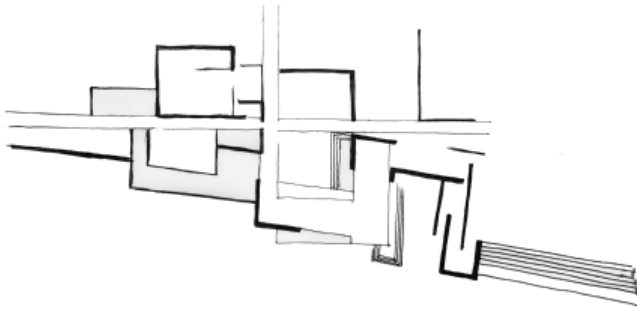


Figure 5.81 Parti diagram base on the concept model exploring wall with focus on crreating the street edge and guiding movement through and into the space (Author 2017)

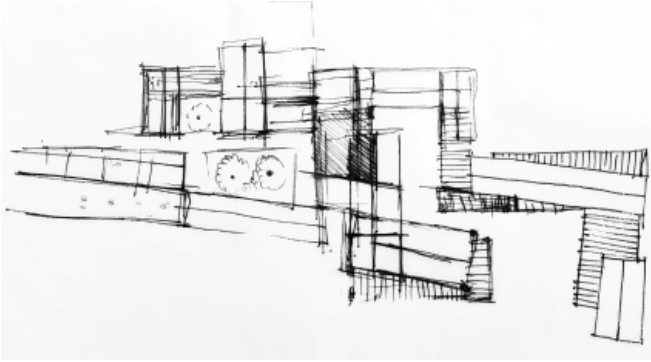


Figure 5.82 Exploring roofs through the creation of lower roofs to the street edge that protects the city dweller as they approach the building, creating places to stay (Gehl 2014) and enjoy the street and the people that move within it (Author 2017)

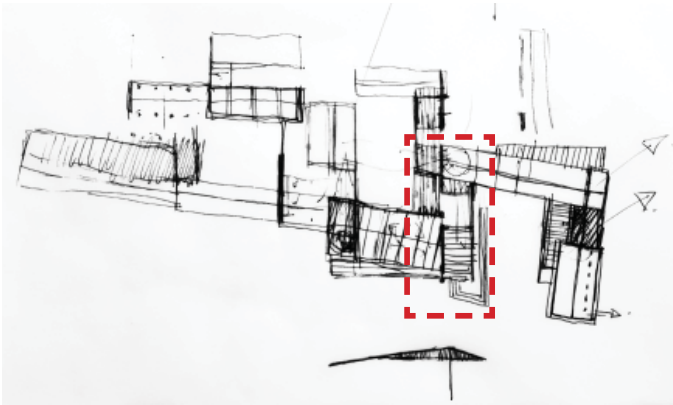


Figure 5.83 Investigating closing the courtyards for security purposes and creating a defined threshold that is guided into the courtyard (Author 2017).



Figure 5.84 Investigating the link and interaction between interior and exterior spaces to the public courtyards (Alexander 1977). With too many access points security becomes difficult to control (Sohn 2016, Geldenhuys 2015). Diagram (Author 2017).

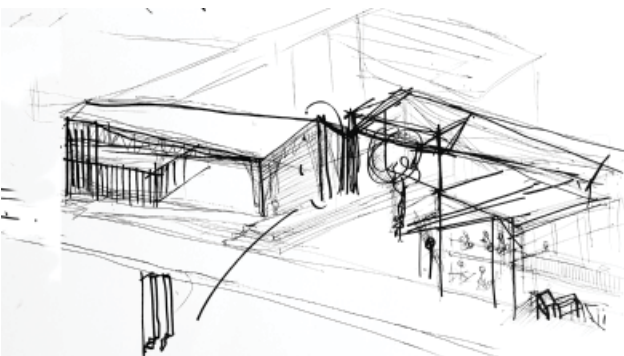
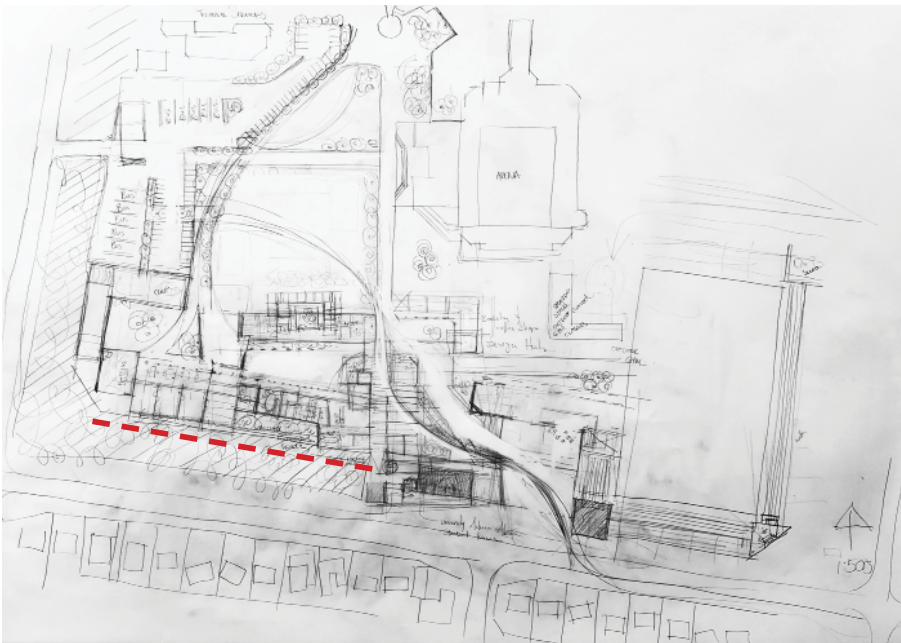
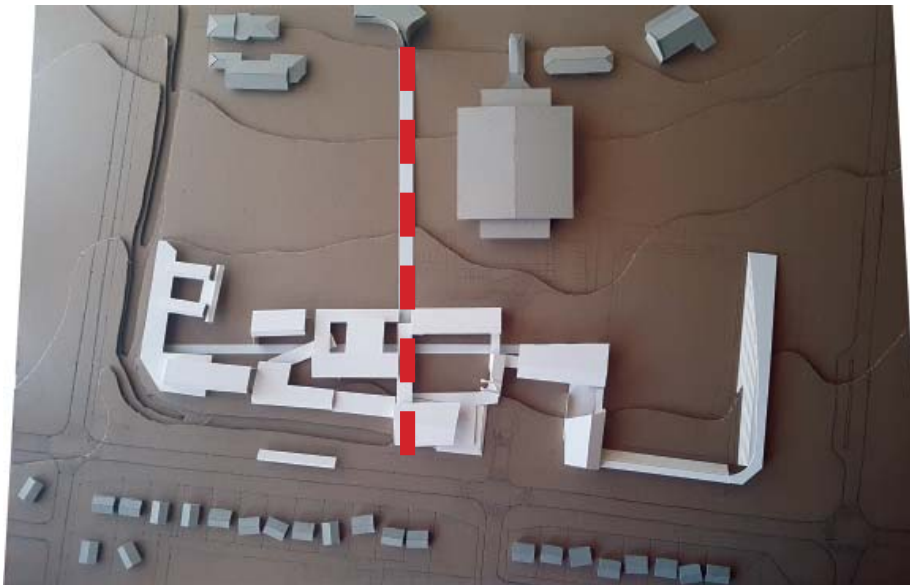


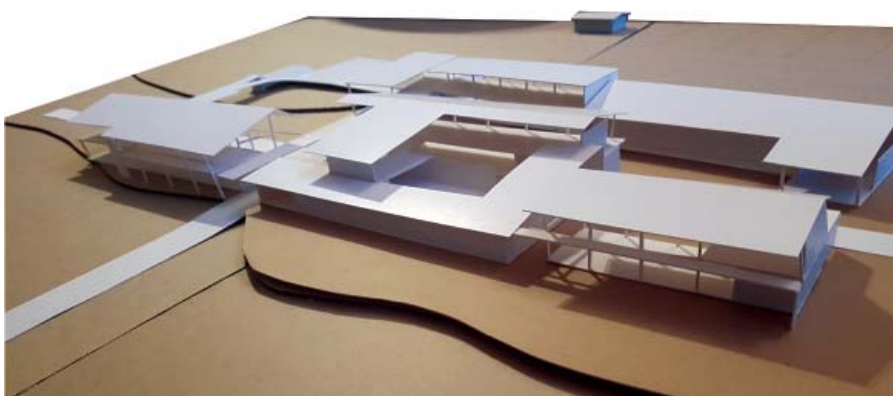
Figure 5.85 Conceptual drawing of public square (Author 2017).



**Figure 5.86** Drawing investigating program and location in relation to the public and semi-public courtyards. The flow of pedestrian movement through the spaces shown as they approach from the main public transport hub of busses and taxis. The edge condition to the servitude and street edge (Gehl 2014) requires resolution (Author 2017).

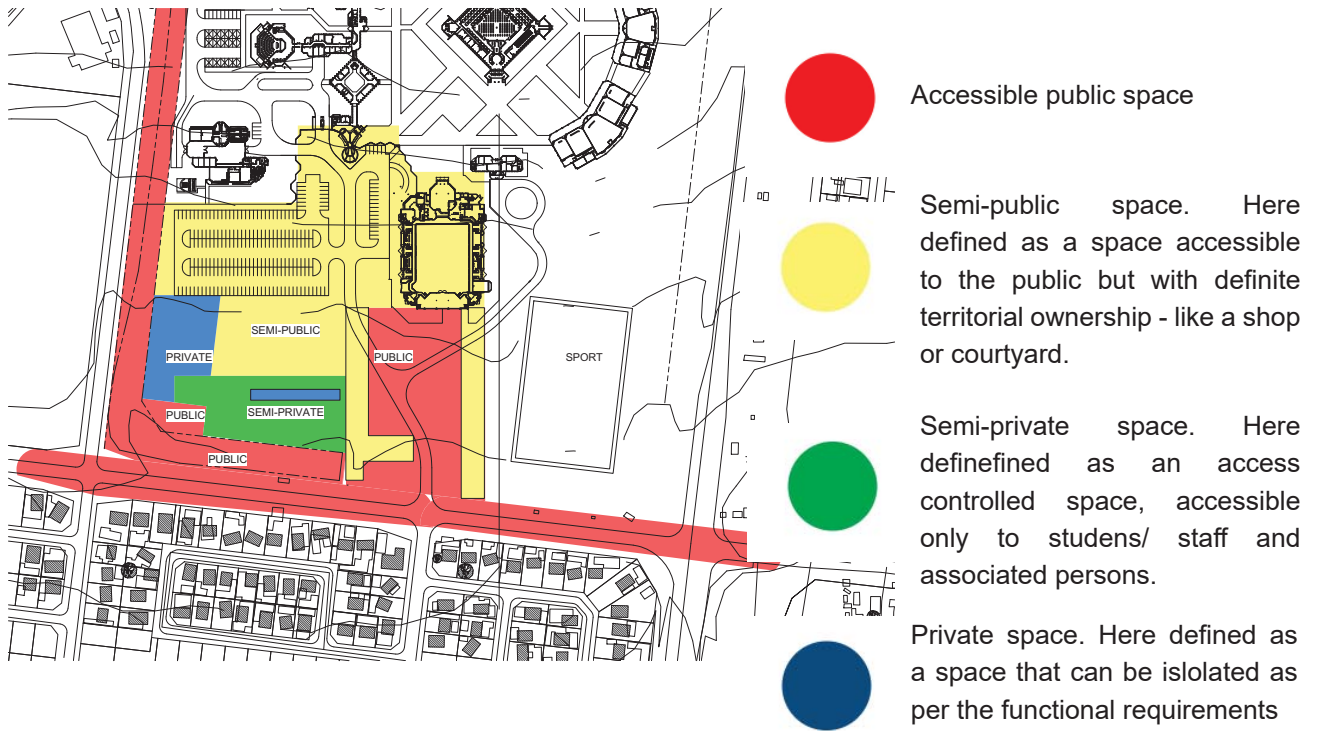


**Figure 5.87** Model investigating platform, wall and roof. Vehicle entrance investigated as pedestrian only access limits accessibility to the campus, which contradicts the intention of the dissertation (Author 2017).

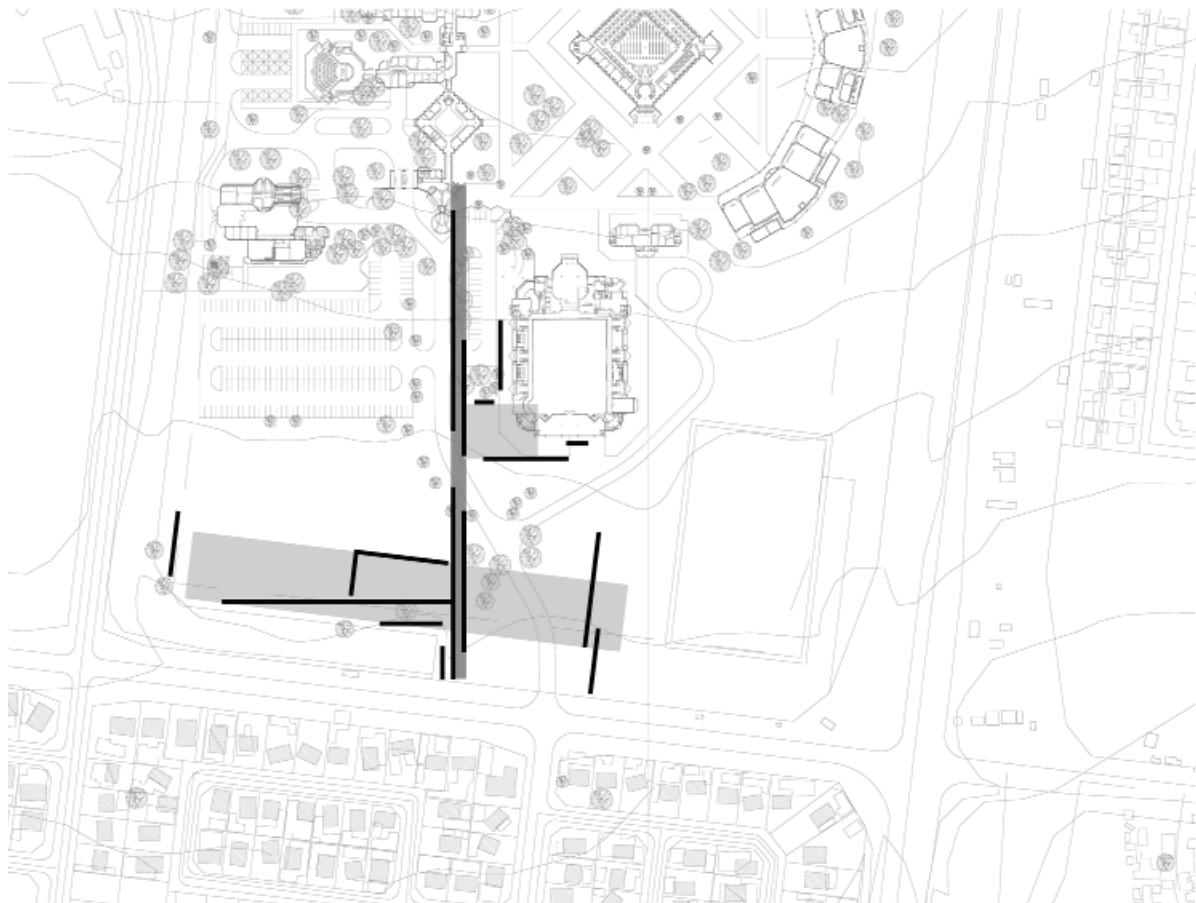


**Figure 5.88** Model investigating roof and structure. An overall roof supported by a (Author 2017).

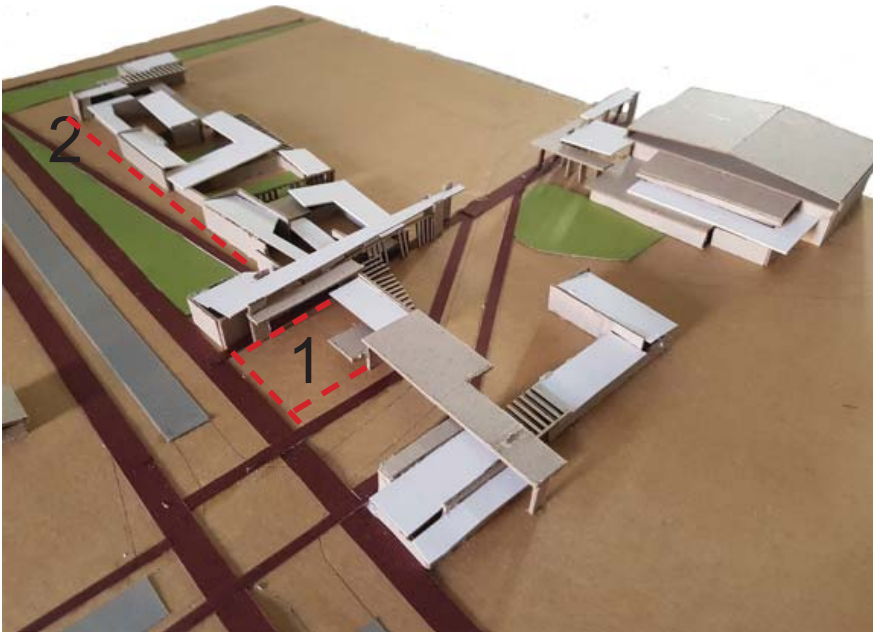




**Figure 5.89** Division of the edge from public to private space. The existing vehicle access to be retained to avoid wasting finances and material on creating a new roadway. The proposed public area to reach and include the Arena. (Author 2018).



**Figure 5.90** Hierarchy investigation. The main axis reaches from the street to the hearth of the campus and the existing tower entrance. The secondary axis mediates between the street the servitude with landscape design within the servitude and the activation of the edge through architecture (Author 2018).

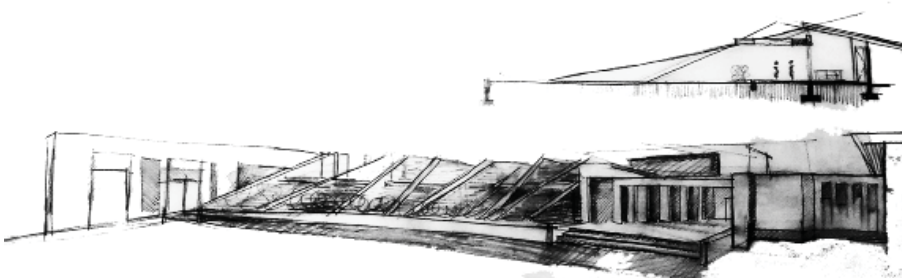


1. The public courtyard becomes a foyer to the campus that becomes embedded (Boettger 2014) into the interior spaces of the building.
2. The edge to the public space to be resolved.

Figure 5.91 Model where hierarchy and public space are explored with the courtyard typology (Author 2018).



Figure 5.93 Model with eyebird's view showing courtyard spaces (Author 2018).



View from the northern side investigating the Psychology Clinic with dividing screen walls in an effort to ensure privacy while ensuring a view over the campus.

Figure 5.92 Sectional exploration through the Psychology Clinic consulting rooms (Author 2018).



Figure 5.94 Above: Plan development (Author 2018).

It is important for the main approach to the campus to be filled with life (Gehl 2014). The size is determined as per Alexander (1977) pattern regarding pedestrian density. The ideal being one person per 14m<sup>2</sup>, The space should at most times seem lively if 25 persons move or stay within the space.

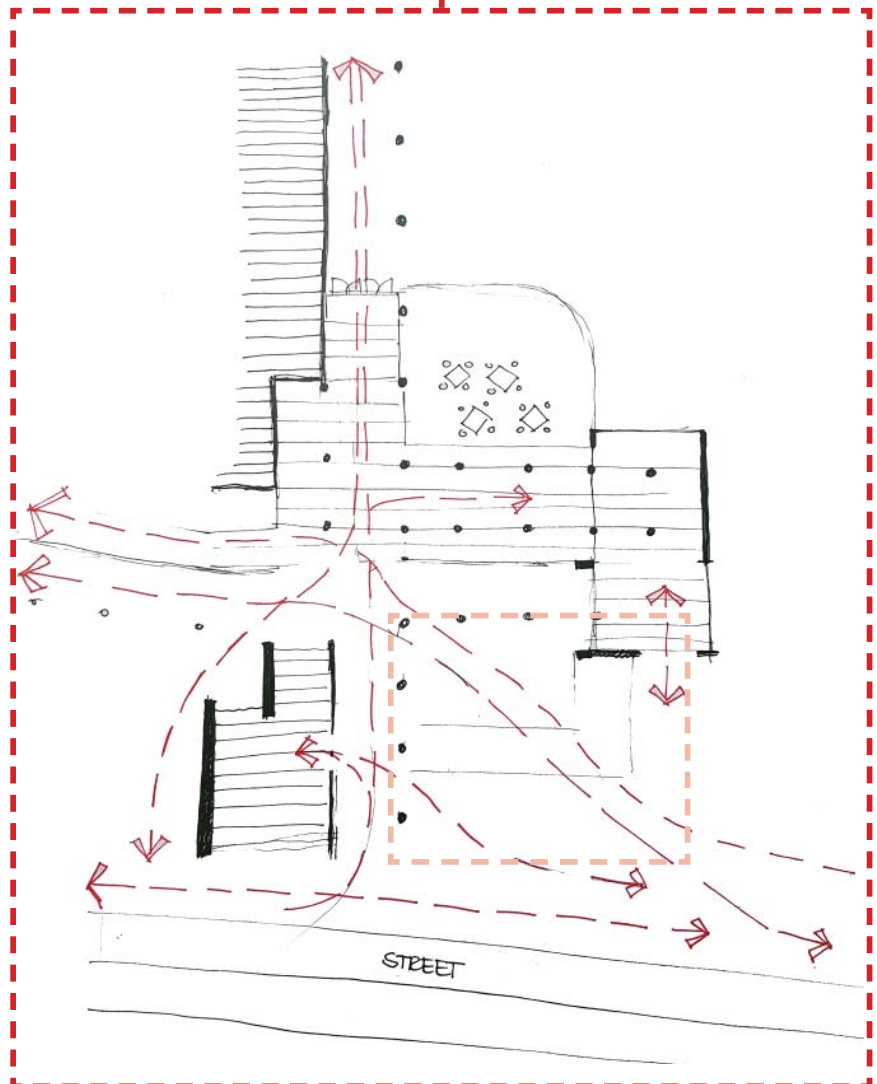


Figure 5.95 Movement through threshold investigated (Author 2018).

## 5.5 The landscape as connecting element

The site becomes the mediator between the public street and the privacy of student and staff only spaces, where different measures of security can be implemented. Completely public spaces filter into semi-public spaces where access control allows students and staff into semi-private and private spaces that are informed by the intimacy gradient as stipulated in A Pattern Language (Alexander et al. 1977).

In the South African context, security is of great importance. A prerequisite for people to use common public space is the reinforcement of real and perceived safety (Gehl 2014:97). The landscape design encompasses the principles of crime prevention through environmental design (CPTED) and violence prevention through urban upgrading (VPUU). These principles include (Sohn 2016, Geldenhuys 2015):

Surveillance and visibility of the public space through visual connections and clear lines of sight and night-time illumination (effective lighting). There should, therefore, be no blank walls but there should be surveillance from the buildings over the space. Dense vegetation is to be avoided, as the creation of hiding spaces must be prevented.

Owned space, rather than vacant land: the design of the landscape indicates ownership.

Defined access and safe movement: movement routes should be surveyed and end in defined public spaces or at the entrances to buildings.

Image and aesthetics should stimulate a sense of pride in the environment. Local, durable materials should be used with the inclusion of public art to convey a positive perception of the area.

Physical barriers or target hardening: activated edges that occupy the street and clearly indicated threshold spaces with limited entrances to buildings with passive surveillance.

Operation, maintenance and management: A well-maintained space is a crime deterrent.

Inclusive design that encourages use of the spaces by diverse groups of people.

The current storm water swale (a shallow grass-lined channel featuring both flat and sloped sides, which conveys storm water from one place to another) in the servitude that connects the site to the street is also an opportunity for place making (Dewar & Louw 2017, Alexander 1977, Gehl 2014).

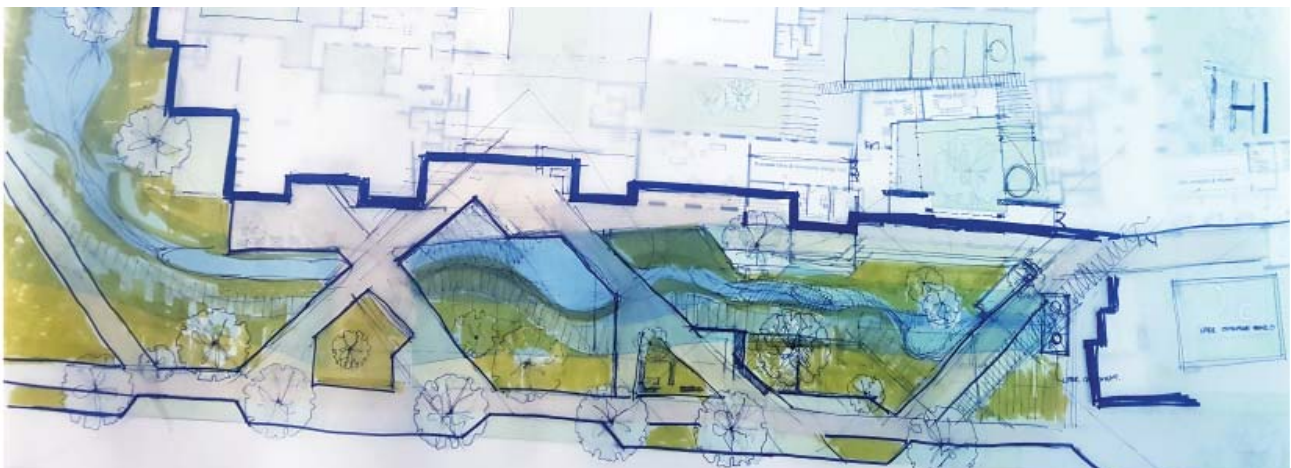


Figure 5.96 Landscape explorations as per CPTED and VPUU principles (Author 2018)

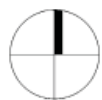
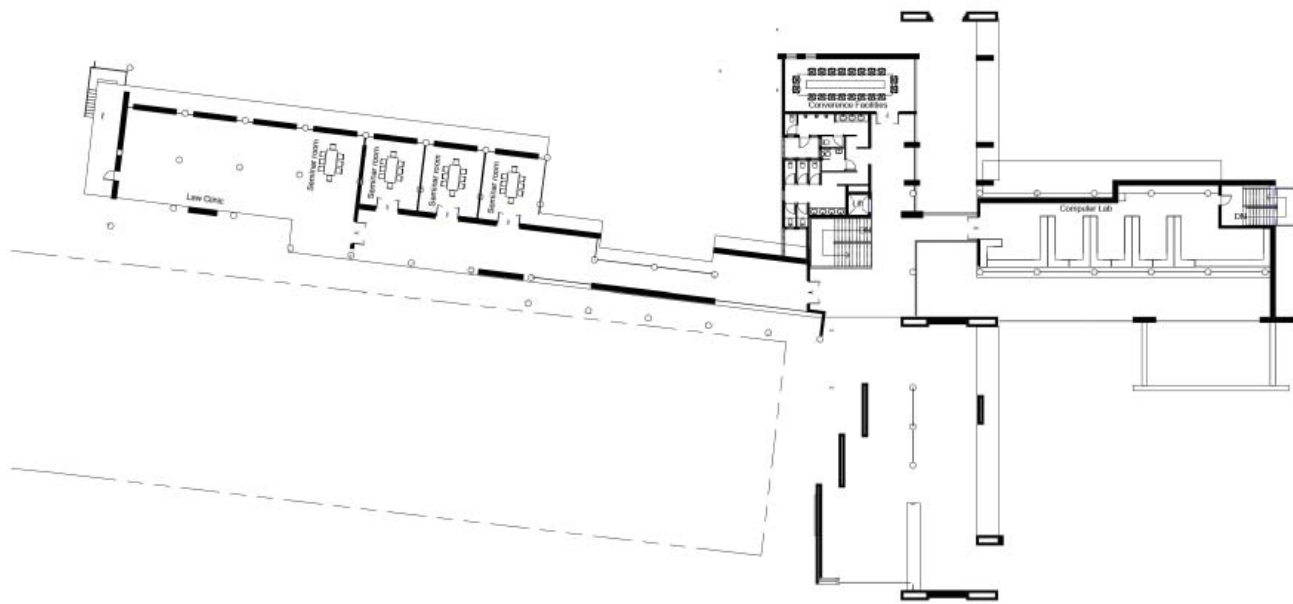


Figure 5.97 FIRST FLOOR PLAN DEVELOPMENT  
N.T.S



Figure 5.98 GROUND FLOOR PLAN DEVELOPMENT  
N.T.S



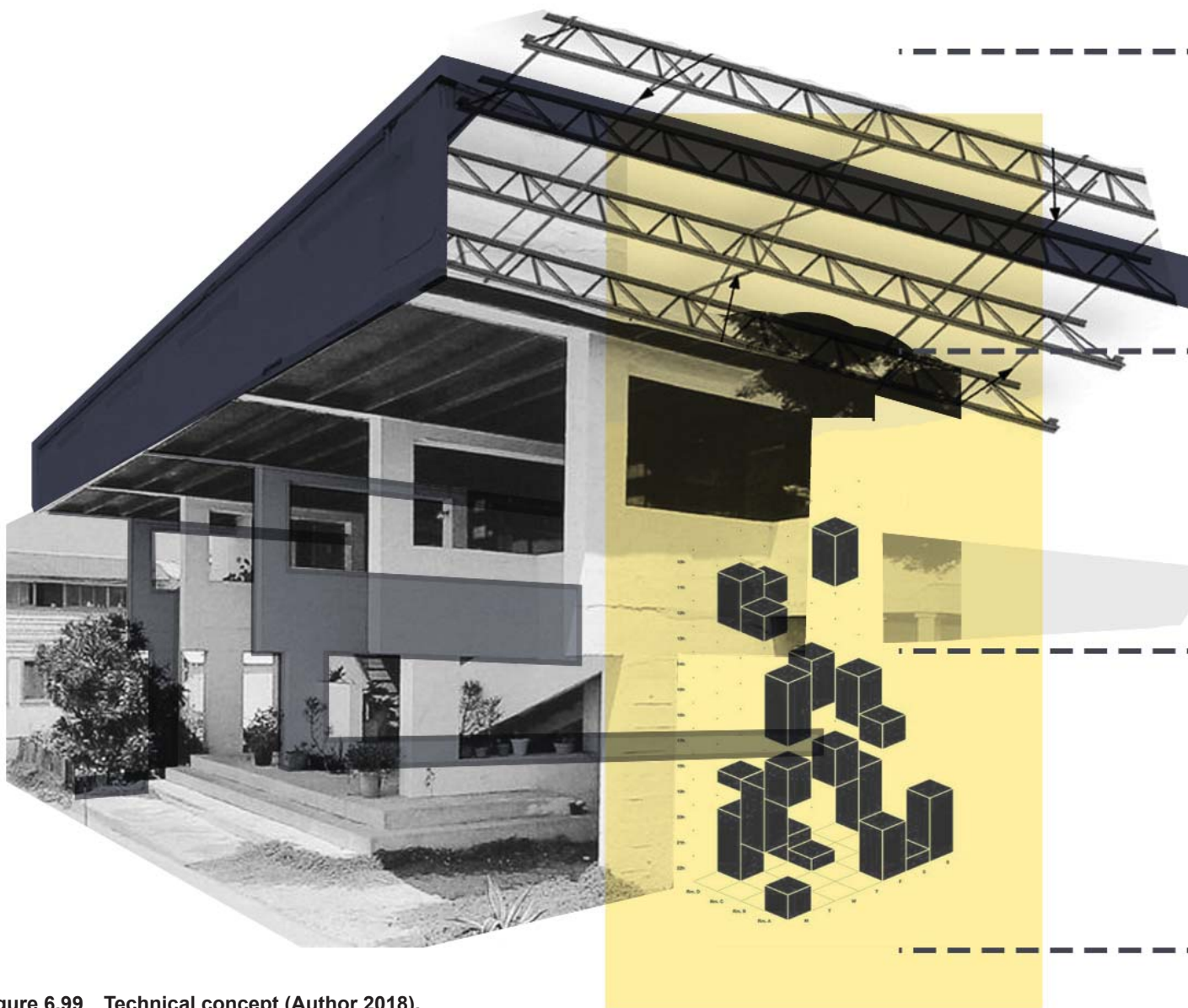


Figure 6.99 Technical concept (Author 2018).



## CHAPTER SIX

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# TECHNÉ

### 6.1 Technical Concept

The expansion of the boundary allows the wall to become an expressive element within the architecture. The residential boundary walls in Mamelodi is is also used as an element of the expression of pattern in the streets and defines the edges. These patterns created become the main informant for the detail design.

At the core of an anchor institution and the realization of the responsibility it has to the local community (Taylor et al. 2013), the institution aims to be a local purchaser and support the local business community.

The aim is to create architecture that is grounded in the local knowledge of Mamelodi. Identifying local craftsmen and woman and using their skill within the design. Skills identified include local concrete block making and steel work. Through the use of modular units patterns can be created.

The intention is to create a structure that can allow for commissioned artwork from the community to attach to the structure either creating canopy or screen. The structure should leave opportunity to allow for this.

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COLLECTIVE ROOF STRUCTURE  
THAT ALLOWS FOR FLEXIBILITY AND  
INDEPEDENCE OF WALL TO OCCUR  
BELOW.

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CONCRETE STRUCTURE AS PRIMARY  
STRUCTURE ALLOWING FOR A RYTHM TO BE  
CREATED CREATING SPACES FOR PEOPLE TO  
STAY AND VIEW THE CITY (GEHL 2014)

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MODULAR MASONRY UNITS SUPPLIED BY  
LOCAL MANUFACTURERS IN ACCORDANCE  
WITH ANCHOR INSTITUTION AIMS (TAYLOR ET  
AL. 2013).

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A PLATFORM FOR INTEGRATION

## 6.2 Primary Structure

The substructure consists of a robust reinforced concrete base that becomes a platform that binds all elements. From this stereotomic base a concrete frame construction allow for the flexibility and freedom within the secondary structure and future adaptability for the spatial requirements of the institution which must allow for unknown future activities (Dewar & Louw 2017). A rhythmic structure also allow for vertical rhythm that according to Gehl (2014:76) is required every five to six meters for a person while walking to remain stimulated by the edge condition of the building.

The roof as primary structure is supported by the concrete frame and is a pragmatic response to the

collection of rainwater. The mono pitch roof design also finds its origin in the community where the practicality of the roof as shelter is used in the spaza shops and economic endeavours of the community, such as roadside restaurants - which result in a typology of roof that allow for interaction between people in the community.

## 6.3 Secondary Structure

From the inception of the project the wall has been a focus in the creating of space and edge. The primary structure allows the design of the wall freedom to conform to the specific requirements of the programme. Locally manufactured blocks will be used.

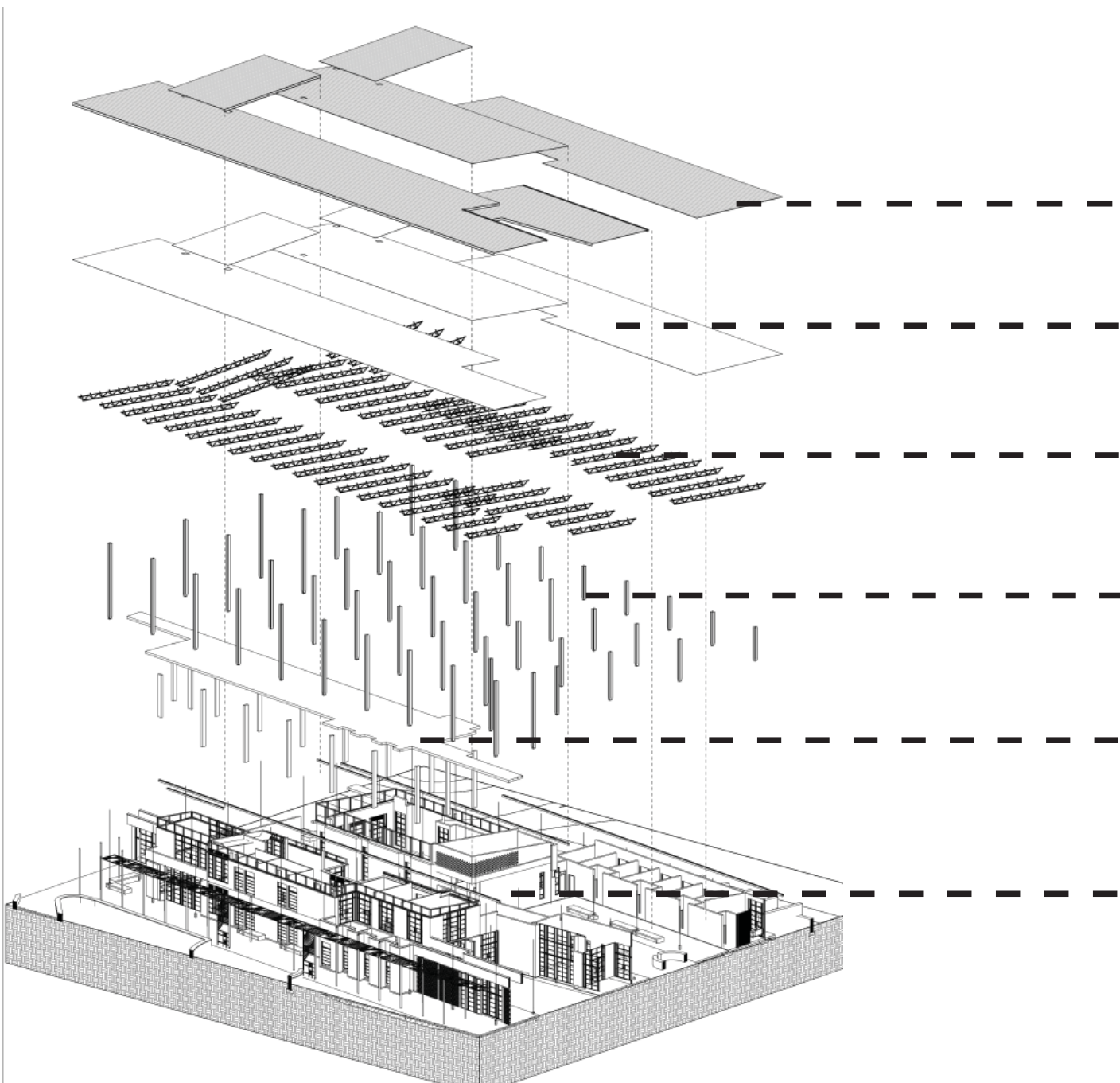
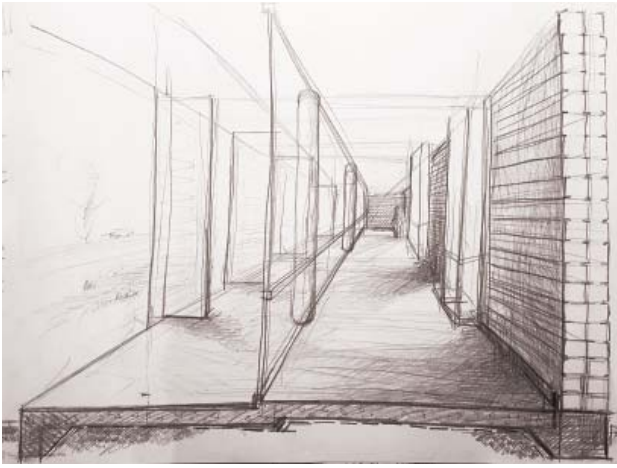


Figure 6.100 Structural Intention with focus on the complexity of wall (Author 2018).



**Figure 6.101 Conceptual interior perspective showing base column and wall with glass as a visually permeable wall. This allows the ground floor to interact with the public space and walkway which according to Gehl's theory of the edge is the most important point of interaction (Author 2017).**



**Figure 6.102 Photographs above: Structures for economic self enablement in Mamelodi (Author 2018).**

- — — PRIMARY STRUCTURE - ROOF AS PROTECTOR AND COLLECTOR.
- — — CEILING
- — — PRIMARY STRUCTURE - STEEL SPACE FRAME
- — — PRIMARY STRUCTURE - STEEL COLUMNS SUPPORTING ROOF
- — — PRIMARY STRUCTURE - CONCRETE FLOOR SLABS SUPPORTED BY CONCRETE COLUMNS
- — — SECONDARY STRUCTURE - COMPLEXITY OF WALL TO ALLOW FOR THE DIFFERENT PROGRAMMATIC REQUIREMENTS AND THE CREATION OF THRESHOLD.

## 6.4 Materiality

For the institution to become a local purchaser the local manufactures of building materials were investigated. A whole network of concrete block making exist within Mamelodi east. Upon investigating the premises of some of the manufactures it was noted that the quality of these blocks are not sufficient. The blocks are not dried on a flat surface resulting in skew

edges. The blocks are also not cured correctly by keeping them moist which results in cracks. These masonry units will have to be plastered and painted to ensure water does not permeate the surface. This will result in a high maintenance structure with high embodied energy.



Figure 6.103 Left: Block making in Mamelodi (Author 2018)

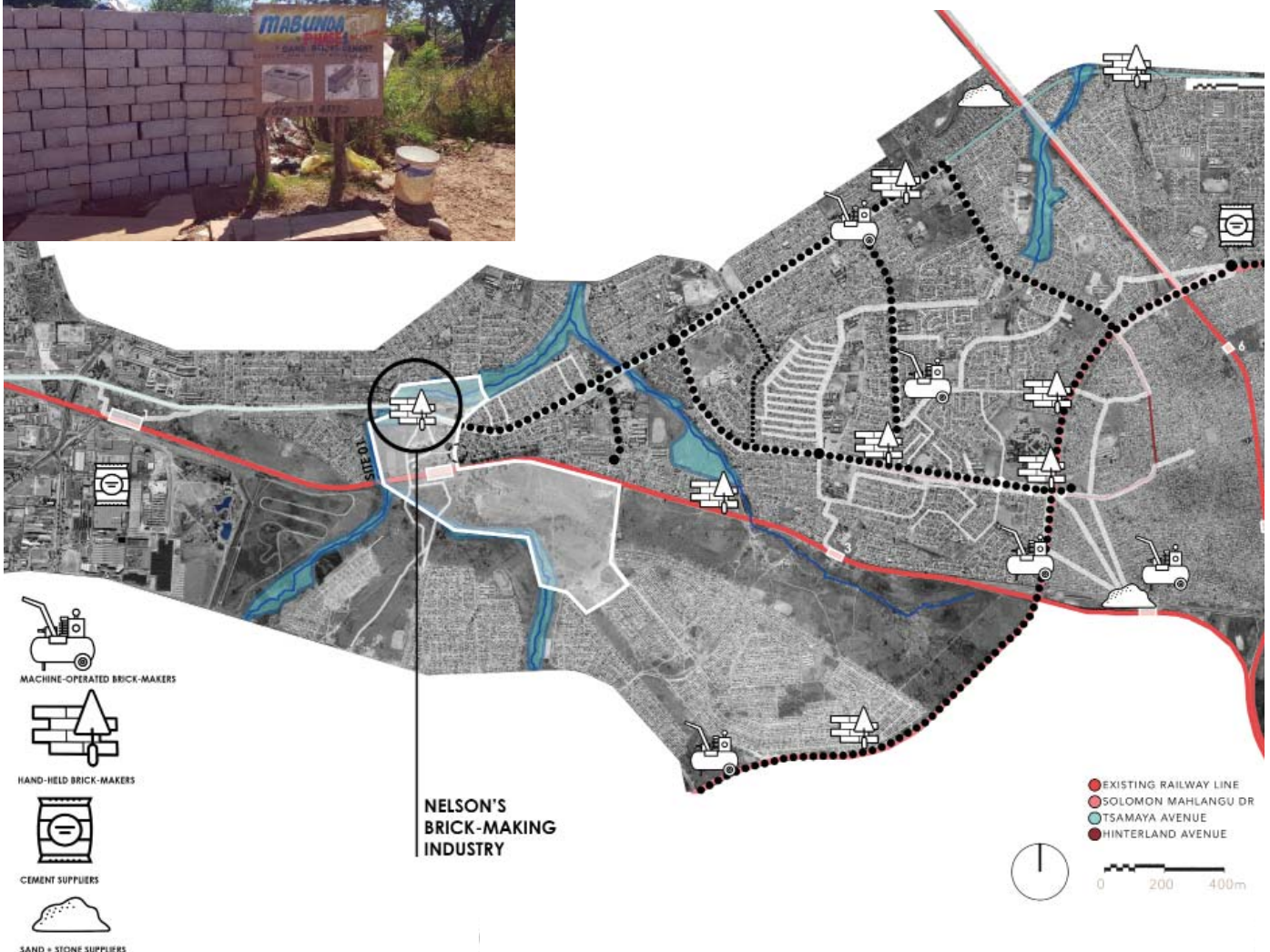


Figure 6.104 Mapping of concrete block makers in Mamelodi (De Abreu 2017)

The possibility to design a purpose made concrete block was investigated as alternative pattern making element. This will require a skills transfer by a specialised contractor to the local concrete block manufacturers in Mamelodi, while enabling these entrepreneurs to still manufacture the blocks for the works and improving on the quality of their product. This will also aid the local community who buy these materials from the local manufactures the opportunity to buy a better quality product that will lead to better structures in Mamelodi.

Most of the residents of Mamelodi display a triangular pattern on their boundary walls. The option to create a triangular purpose made block was investigated. The angles of the triangle were determined by the block being able to create a corner when laid to construct and navigate the 90° corner. These purpose made concrete blocks are not intended for the construction of all the walls. These will be utilised to mark significant thresholds and boundaries.



Figure 6.105 Mamelodi boundary wall with brick pattern (Author 2018)

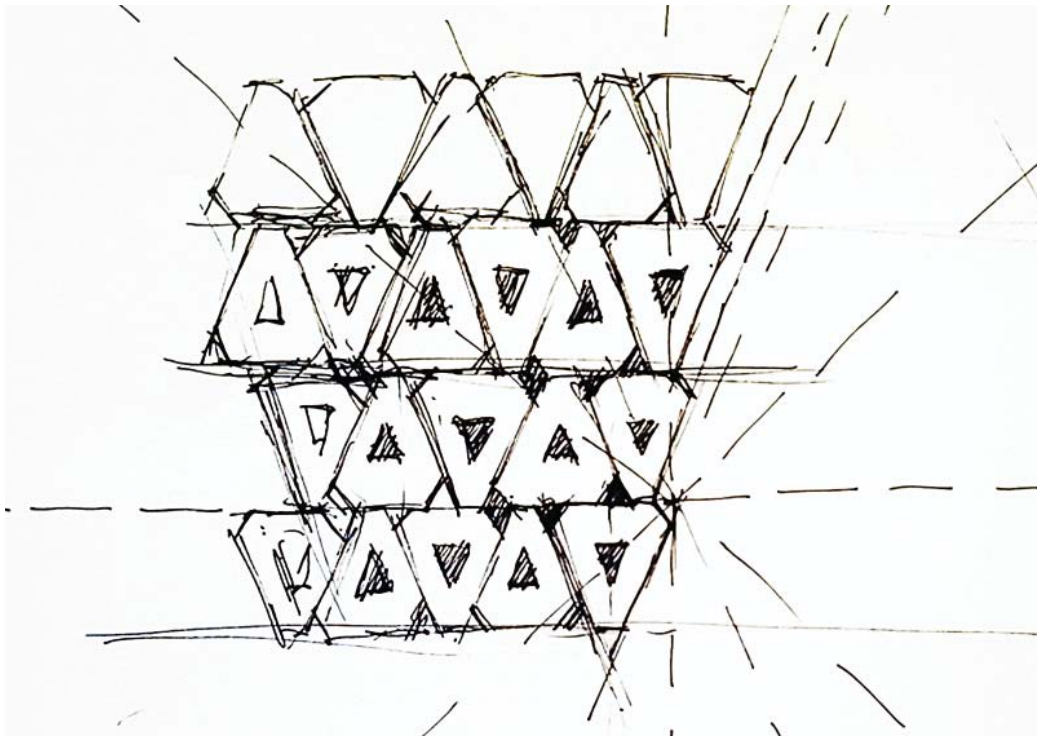


Figure 6.106 Pattern exploration (Author 2018)

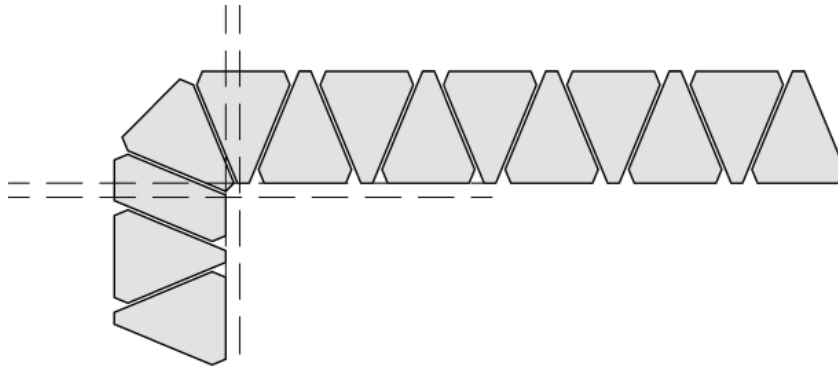


Figure 6.107 Block explored on plan creating a 90° corner (Author 2018)

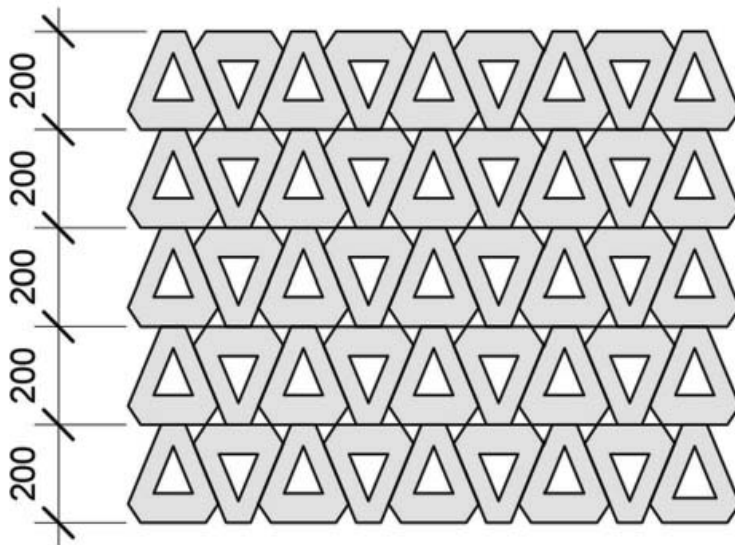


Figure 6.108 Triangular block explored as perforated wall allowing for natural ventilation (Author 2018)

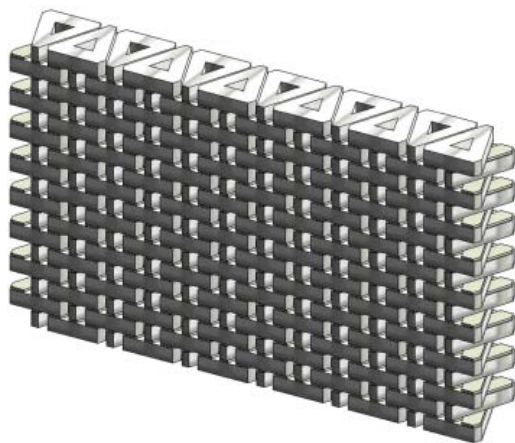


Figure 6.109 Three-dimensional exploration of constructed wall (Author 2018)

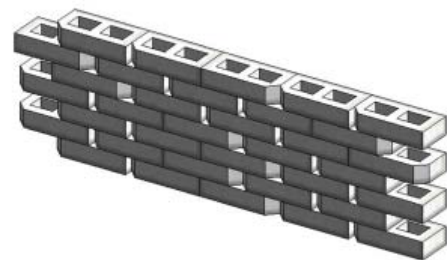
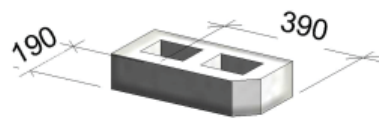


Figure 6.110 Three dimensional exploration of constructed wall using purpose made rectangular blocks with chamfered corner(Author 2018)



Figure 6.111 Block mould making and the casting of concrete (Author 2018).

Concealed fix roof sheeting (light coloured) to avoid unwanted heat gain.

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**Figure 6.112 Materials pallet (Author 2018)**

Hot rolled and mild steel beams supported by concrete columns.

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Purpose made concrete blocks to create wall Perforated for shading and ventilation.

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### Hydraform Blocks

In order to allow for the construction of the subsurface water storage tanks, 972m<sup>2</sup> clay soil must be excavated. Hydraform are soil cement interlocking blocks that can be dry stacked, which eliminates the requirements for mortar joints, except for foundation walls and the courses below the roofs structure and above lintels. These blocks are manufactured on site using a Hydraform machine with a specially designed chamber to form these blocks under pressure (Hydraform.com, 2018). On site training is provided the company. After manufacturing blocks are to be stacked 6 blocks in height underneath plastic sheeting for 24 hours. After 72 hours the blocks can be used for construction.

Hydraform is a certificate holder of Agrément South Africa and is certified for use in building classification A3 - places of instruction (SANS 10400:A).

Polished concrete floors with exposed aggregate as heat sink.

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Permeable locally manufactured concrete paving

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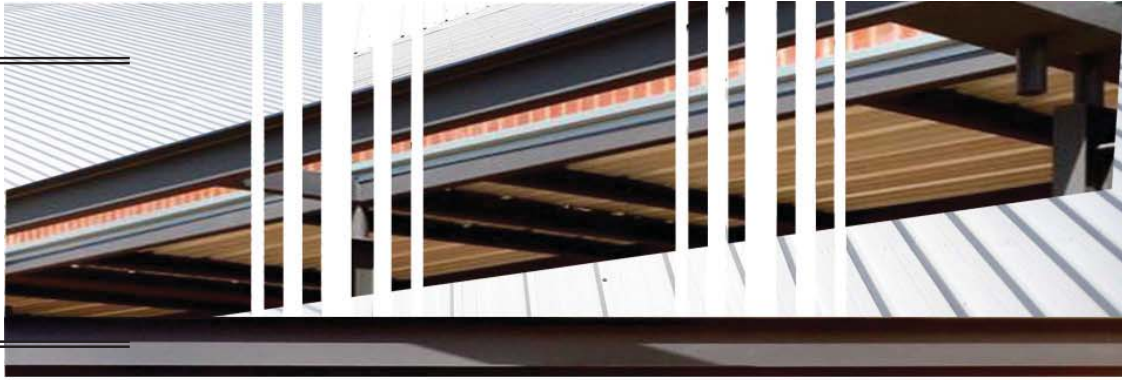
Locally manufactured concrete paving where solid surfaces are required.

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Dry stacked Hydraform blocks

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## 6.5 Climatic Situation

Pretoria is located in the temperate interior zone of South Africa (SANS 204:2011). It has a good climate with high quality sunshine and solar radiation (Conradie 2010). The city experiences long hot rainy summers and short dry winters.

## 6.6 Design Response

In relation to the design principles of creating a positive urban environment, the following climatic design responses were investigated:

- The orientation of the buildings along the street edge allowed for the optimal building orientation of between +15°E and +10°W (Schmidt 2013:104)
- Adjustable shading that prevent
- Minimized east west glazing and allowing the wall to block unwanted summer sun, but allow winter sun to warm internal surfaces.
- Cross-ventilation and passive cooling
- Using the wall as thermal mass. The roof design and adjustable screens to minimize thermal radiation to reach the wall. Night cooling to be employed to cool thermal mass where required. Roof and wall design to allow for solar radiation to reach the walls during the winter month.
- Floor to be utilised as a heat sink in summer.
- The use of insulation to keep out summer heat.
- Daylighting. Maximum width of buildings to be nine meters to allow for sufficient light (Alexander et al. 1977)

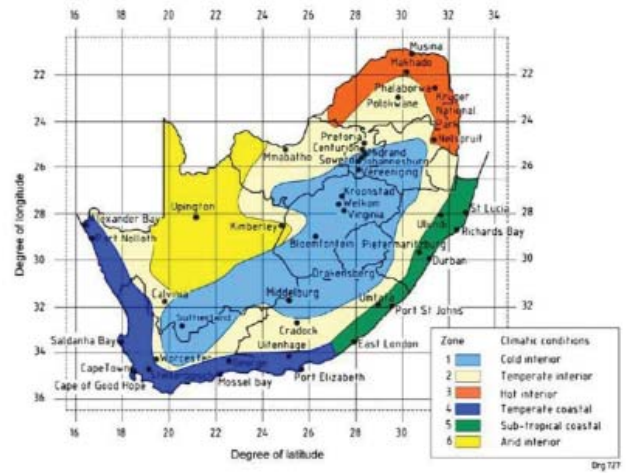


Figure 6.113 South African climatic zones ( SANS 2014:2011)

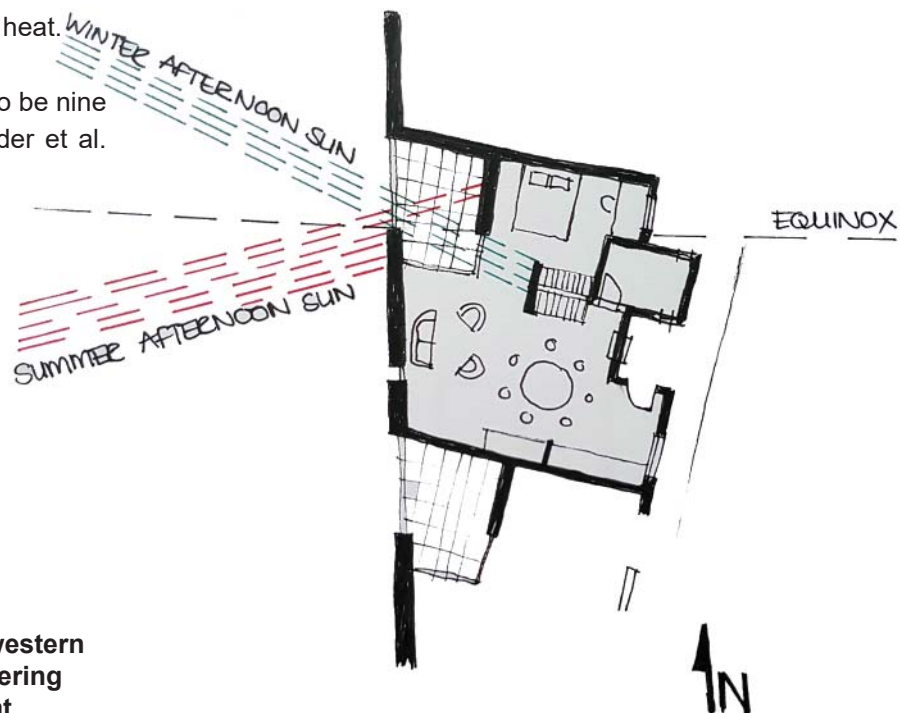
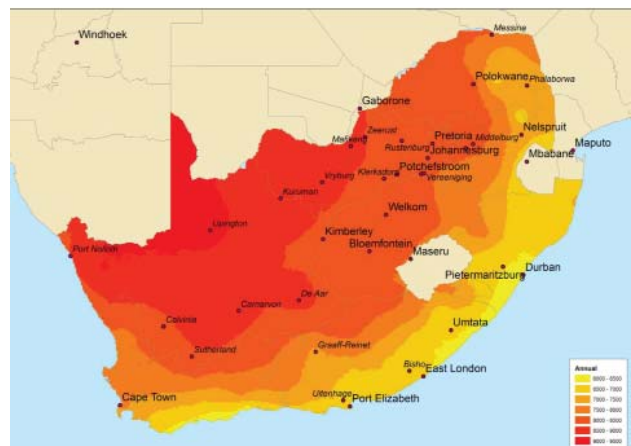


Figure 6.114 Design resolution of the western facade to mitigate summer sun from entering the living spaces while allowing it to heat internal thermal mas in the winter months (Author 2018)

## 6.7 Water

Water became a main informant for the design in order to create an interactive and positive public space within the landscape (Alexander 1977, Gehl 2014, Dewar & Louw 2017).

Instead of channelling the storm water to the nearest watercourse, ways and means were investigated to preserve the environment by prohibiting erosion, siltation and pollution. Water sensitive urban design (WSUD) was investigated as a strategy with sustainable drainage systems (SuDS) as the storm water management component (Armitage, Vice, Fisher-Jeffes, Winter, Spiegel, Dunstan 2013)

SuDS attempts to manage surface water drainage systems holistically in line with the ideals of sustainable development. It aims to design for water quantity management, water quality treatment, enhanced amenity, and the maintenance of biodiversity. In so doing many of the negative environmental impacts of storm water are mitigated and some benefits may in fact be realised. (Armitage et al. 2013)

SuDS refer to source control where the preferred method is to manage the storm water runoff as close to the source as possible. For this project, rainwater harvesting was chosen. Local controls, as the second line of defence, are incorporated into park designs and road reserves – swales and bio retention areas were considered appropriate for this intervention.

Regional controls are the last line of defence as they

require large scale interventions. Examples include detention ponds, retention ponds and constructed wetlands.

“The water cycle is one of the most critical processes to supporting life on this planet, and fresh waters are central to all aspects of our lives” (Woods-Ballard 2007).

Urbanisation and development result in hard impermeable surfaces that increase the quantity and flow of storm water. This, in turn, increases downstream erosion. Without infiltration into the soil, underlying aquifers are not replenished and baseflow does not happen, which results in biodiversity loss. SuDS propose means to manage quantity, quality, amenity and biodiversity.

Health and safety concerns were considered, as this currently fenced, inaccessible area will be made accessible. This green corridor is also on the walking route of school children and close to transportation nodes and informal dwellings. Precautionary safety measures include gentle side slopes that are less than 1 in 3. The water level must be shallower at the edges and a barrier must be created through the placement of vegetation.

There is a risk of pollutants from the street entering the water, for example from vehicles and littering. It is considered that these pollutants will be solids that can easily be removed from the water prior to its entry to the green corridor.

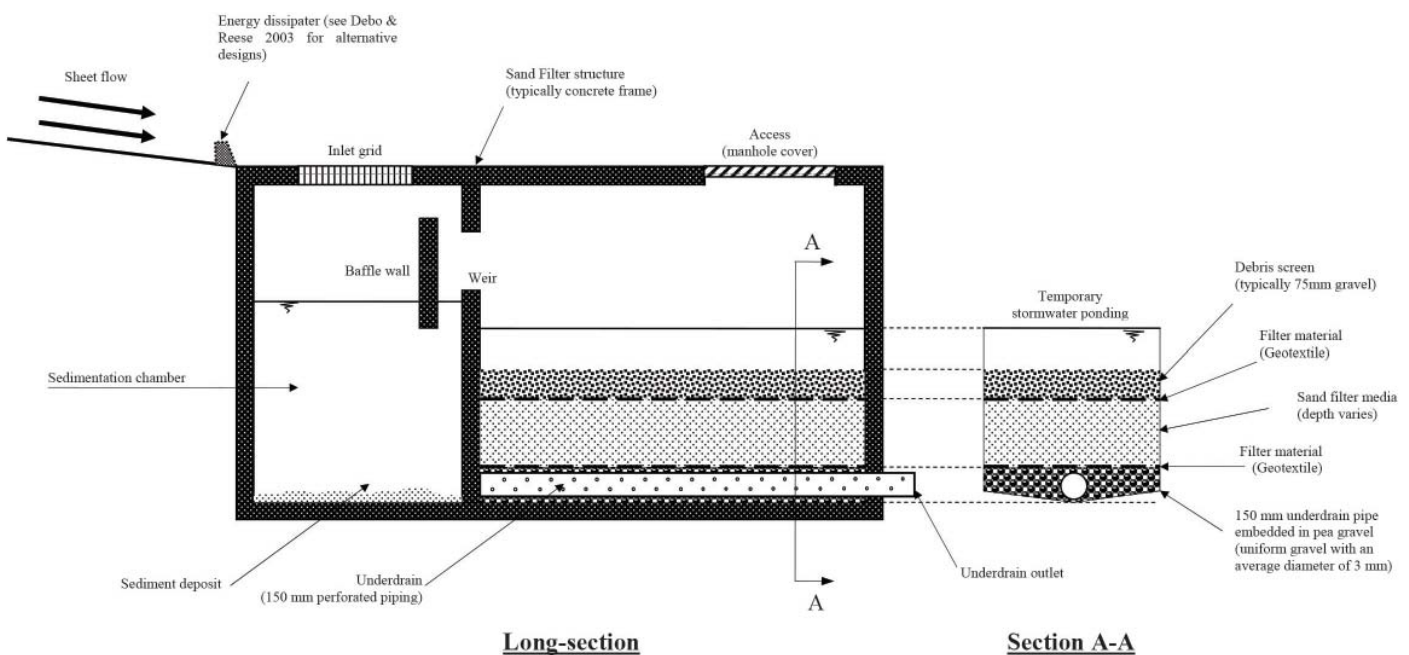


Figure 6.115 General design for sand filters with pre-treatment chamber for storm water (Armitage et al. 2013)



**Figure 6.116** Left: Local storm water control and position of the storm water landscape (bioswale in relation to the rest of the regional storm water system). (Author 2018).



**Figure 6.117** Below: Current storm water swale (grassed lined channel on site (Author 2018).

## 6.8 Rainwater Harvesting

Rainwater harvesting design includes the following requirements:

- Strategic placement of roof gutters,
- The catchment of leaves and debris with a first flush trap.
- Storage facilities,
- Diverter for leaves and organic debris.
- Using gravity or pump with pipeline to get the water where it is required.
- Filter and UV disinfection within the line.
- An overflow system.

The courtyards are utilised for the storage of the water in sub surface storage tanks. Rain water will be harvested from all roof surfaces and paved surfaces. Through the rainwater calculations it was established that the quantity of water harvested will be sufficient for the supply of toilet flushing and irrigation, except for the three dry winter months of the year.

Grey water recycling is employed to capture all waste water from basins, showers and the laundromat. Where appropriate water purification will be employed according to the need. The recycled water will only be used for flushing toilets.



**Figure 6.118 Storm water source control - positions of water storage tanks (Author 2018)**

- Rainwater storage tanks
- Greywater storage tanks
- Local storm water

## 6.9 Rainwater harvesting calculations

B1 LANDSCAPE IRRIGATION DEMAND (m<sup>3</sup>)

DESCRIPTION:	LAWN (m <sup>2</sup> ):	1564	AGRI (m <sup>2</sup> ):	0	PLANTING (m <sup>2</sup> ):	391	TOTAL MONTHLY IRR. DEMAND (m <sup>3</sup> )
MONTH	WEEKLY IRR. (m)	MONTHLY DEMAND (m <sup>3</sup> )	WEEKLY IRR. (m)	MONTHLY DEMAND (m <sup>3</sup> )	WEEKLY IRR. (m)	MONTHLY DEMAND (m <sup>3</sup> )	
January	0,02	125,12	0,025	0	0,005	7,82	132,94
February	0,02	125,12	0,025	0	0,005	7,82	132,94
March	0,02	125,12	0,025	0	0,002	3,128	128,248
April	0,02	125,12	0,025	0	0,002	3,128	128,248
May	0,01	62,56	0,025	0	0,002	3,128	65,688
June	0,01	62,56	0,025	0	0	0	62,56
July	0,01	62,56	0,025	0	0	0	62,56
August	0,02	125,12	0,025	0	0	0	125,12
September	0,02	125,12	0,025	0	0,005	7,82	132,94
October	0,02	125,12	0,025	0	0,005	7,82	132,94
November	0,02	125,12	0,025	0	0,005	7,82	132,94
December	0,02	125,12	0,025	0	0,005	7,82	132,94
ANNUAL TOTAL		1313,76		0		56,304	1370,064

B2 DOMESTIC / ALT DEMAND

MONTH	PERSONS	WATER/ CAPITA/ DAY (l)	DOMESTIC DEMAND (m <sup>3</sup> /month)
January	316	18	176,328
February	632	18	318,528
March	632	18	352,656
April	632	18	341,28
May	632	18	352,656
June	632	18	341,28
July	632	18	352,656
August	632	18	352,656
September	632	18	341,28
October	632	18	352,656
November	632	18	341,28
December	316	18	176,328
ANNUAL TOTAL			3799,584

3 TOTAL WATER YIELD

MONTH	AVE RAINFALL, P (m)	CATCHMENT YIELD (m <sup>3</sup> ) (Yield = PxAxC)	ALTERNATIVE WATER SOURCE (m <sup>3</sup> )	TOTAL WATER YIELD (m <sup>3</sup> )
January	0,13	877,71	0,00	877,71
February	0,09	560,94	0,00	560,94
March	0,09	580,74	0,00	580,74
April	0,05	343,16	0,00	343,16
May	0,01	79,19	0,00	79,19
June	0,01	52,79	0,00	52,79
July	0,00	26,40	0,00	26,40
August	0,01	39,60	0,00	39,60
September	0,03	164,98	0,00	164,98
October	0,07	481,75	0,00	481,75
November	0,10	686,33	0,00	686,33
December	0,11	712,72	0,00	712,72
ANNUAL AVE.	0,70	4606,31	0,00	4606,31

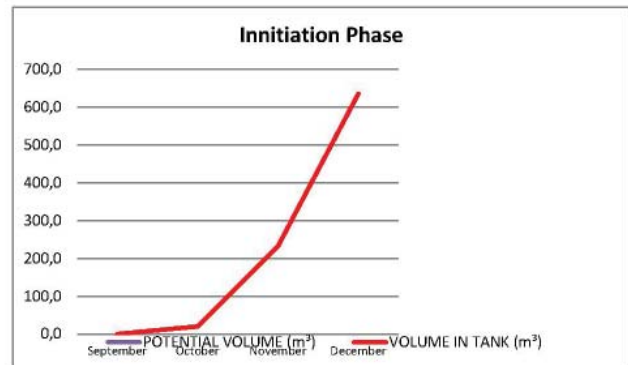
### C WATER BUDGET

TANK CAPACITY (m<sup>3</sup>): 972 2m deep Versitank system  
 MIN VOLUME (m<sup>3</sup>): 20

C1 WATER BUDGET

#### INITIATION PHASE

MONTH	YIELD (m <sup>3</sup> /month)	DEMAND (m <sup>3</sup> /month)	MONTHLY BALANCE	POTENTIAL VOLUME (m <sup>3</sup> )	VOLUME IN TANK (m <sup>3</sup> )
September	165,0	474,2	-309,2	0,0	0,0
October	481,7	485,6	-3,8	20,0	20,0
November	686,3	474,2	212,1	232,1	232,1
December	712,7	309,3	403,5	635,6	635,6
ANNUAL AVE.	2045,8	1743,3	302,5		



C2 WATER BUDGET

#### YEAR 1

MONTH	YIELD (m <sup>3</sup> /month)	DEMAND (m <sup>3</sup> /month)	MONTHLY BALANCE	POTENTIAL VOLUME (m <sup>3</sup> )	VOLUME IN TANK (m <sup>3</sup> )
January	877,7	309,3	568,4	1204,0	972,0
February	560,9	451,5	109,5	1313,5	972,0
March	580,7	480,9	99,8	1413,3	972,0
April	343,2	469,5	-126,4	1286,9	845,6
May	79,2	418,3	-339,2	947,8	506,5
June	52,8	403,8	-351,0	596,7	155,4
July	26,4	415,2	-388,8	207,9	20,0
August	39,6	477,8	-438,2	20,0	20,0
September	165,0	474,2	-309,2	20,0	20,0
October	481,7	485,6	-3,8	20,0	20,0
November	686,3	474,2	212,1	232,1	232,1
December	712,7	309,3	403,5	635,6	635,6
ANNUAL AVE.	4606,3	5169,6	-563,3		

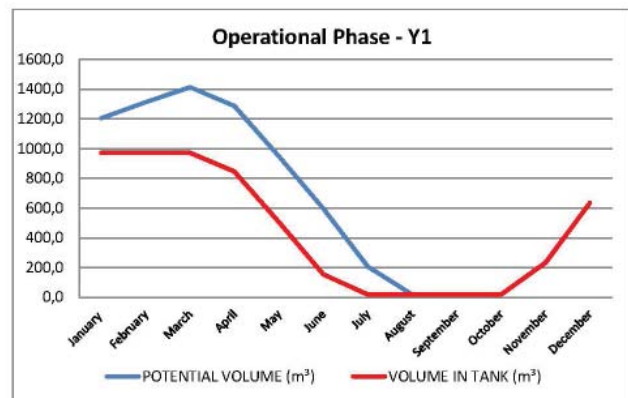


Figure 6.119 Water calculations for tanks (Author 2018, Fourie 2016)

## 6.10 Sustainable Building Assessment Tool (SBAT)

The sustainability of the performance of the design was assessed using the SBAT tool which focusses on three different sustainability categories: environmental, economic and social. The shortfalls will be addressed within the final design.

<b>SB SBAT REPORT</b>	Achieved <b>4,0</b>
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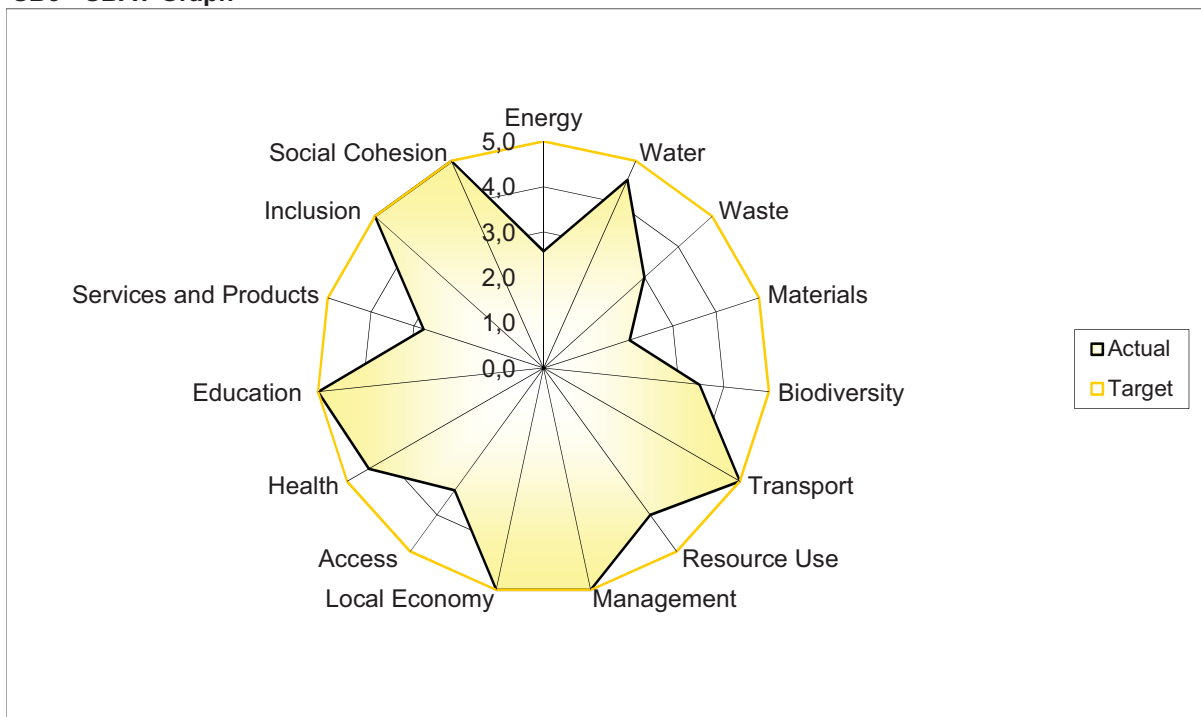
### SB1 Project

A Centre for Urban Citizenship - Community Engagement Facility

### SB2 Address

University of Pretoria, Mamelodi Campus

### SB3 SBAT Graph



### SB4 Environmental, Social and Economic Performance

	Score
Environmental	3,1
Economic	4,5
Social	4,4
<b>SBAT Rating</b>	<b>4,0</b>

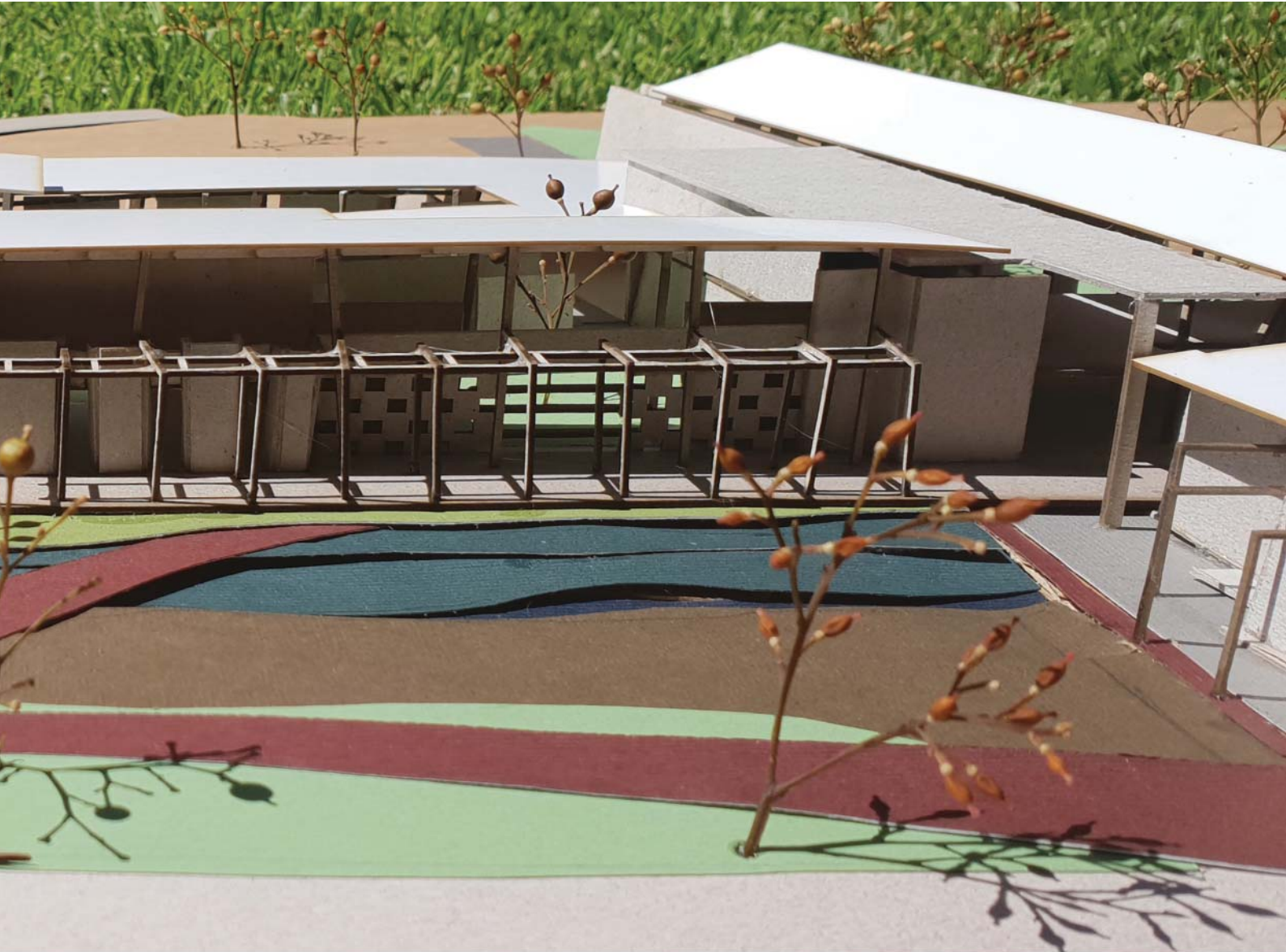


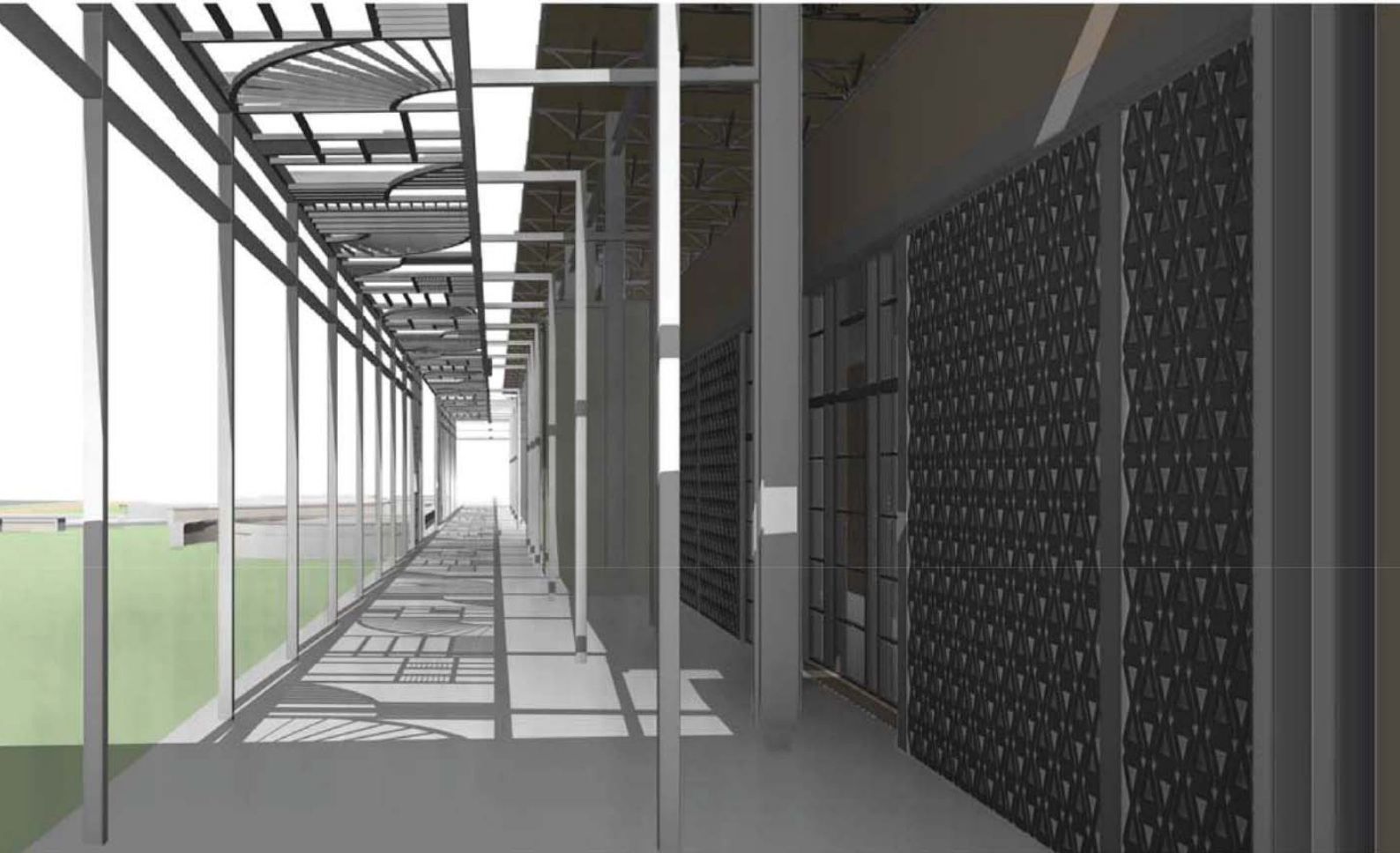


CHAPTER SEVEN

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**APPENDIX**  
DESIGN RESOLUTION &  
FINAL MODEL





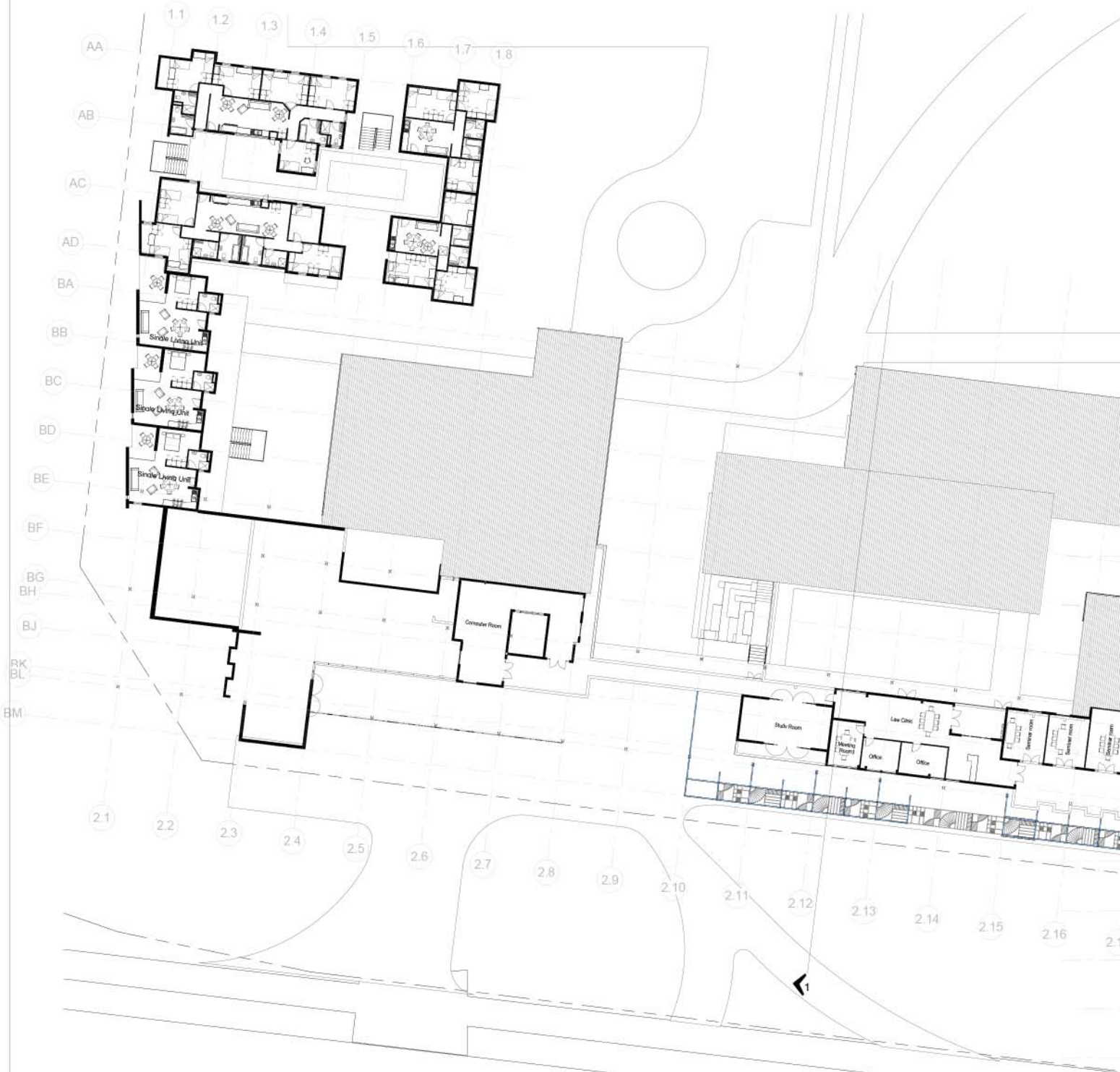


University of Pretoria Mamelodi campus - Proposed Site Plan  
Scale 1:1000

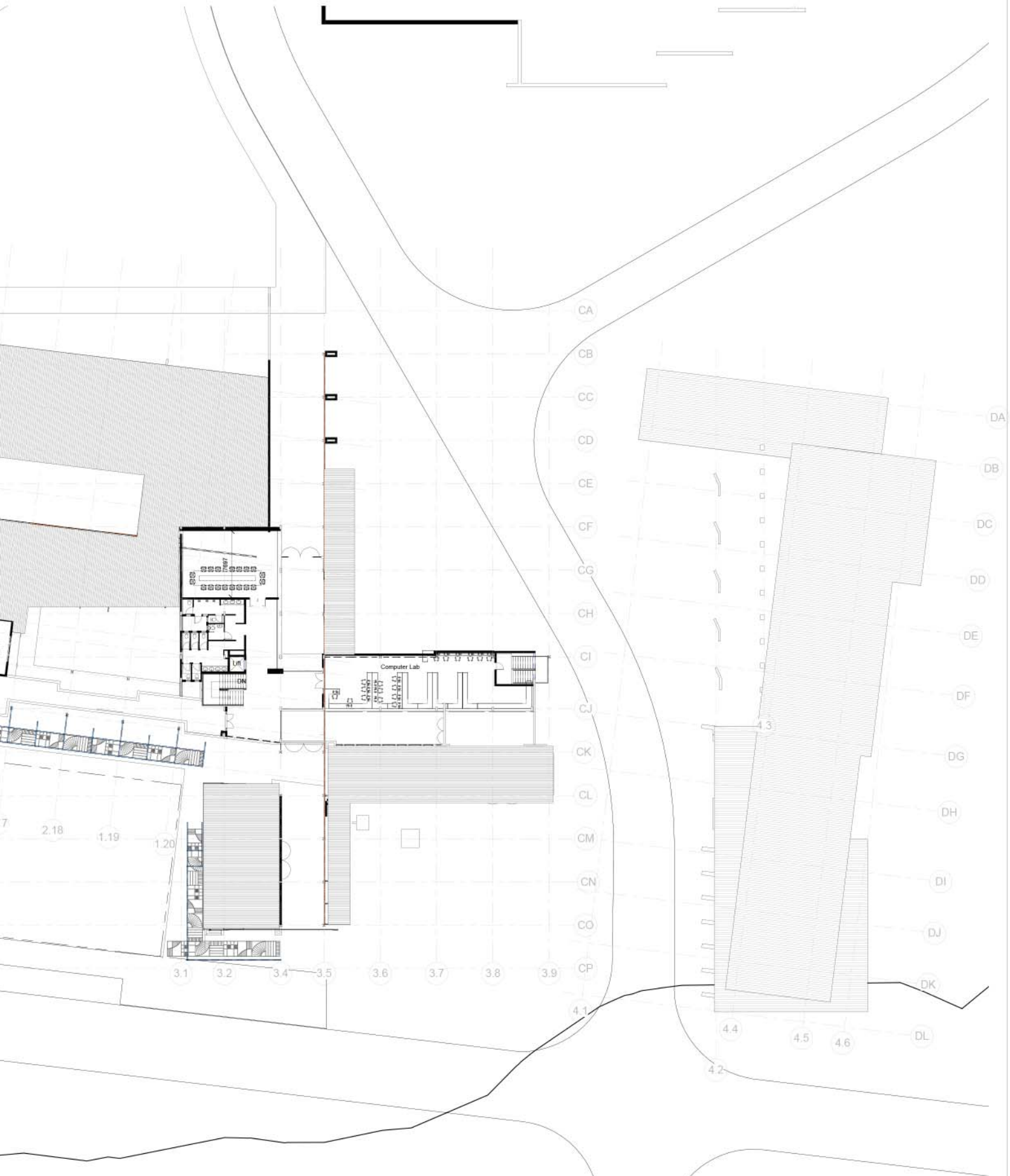


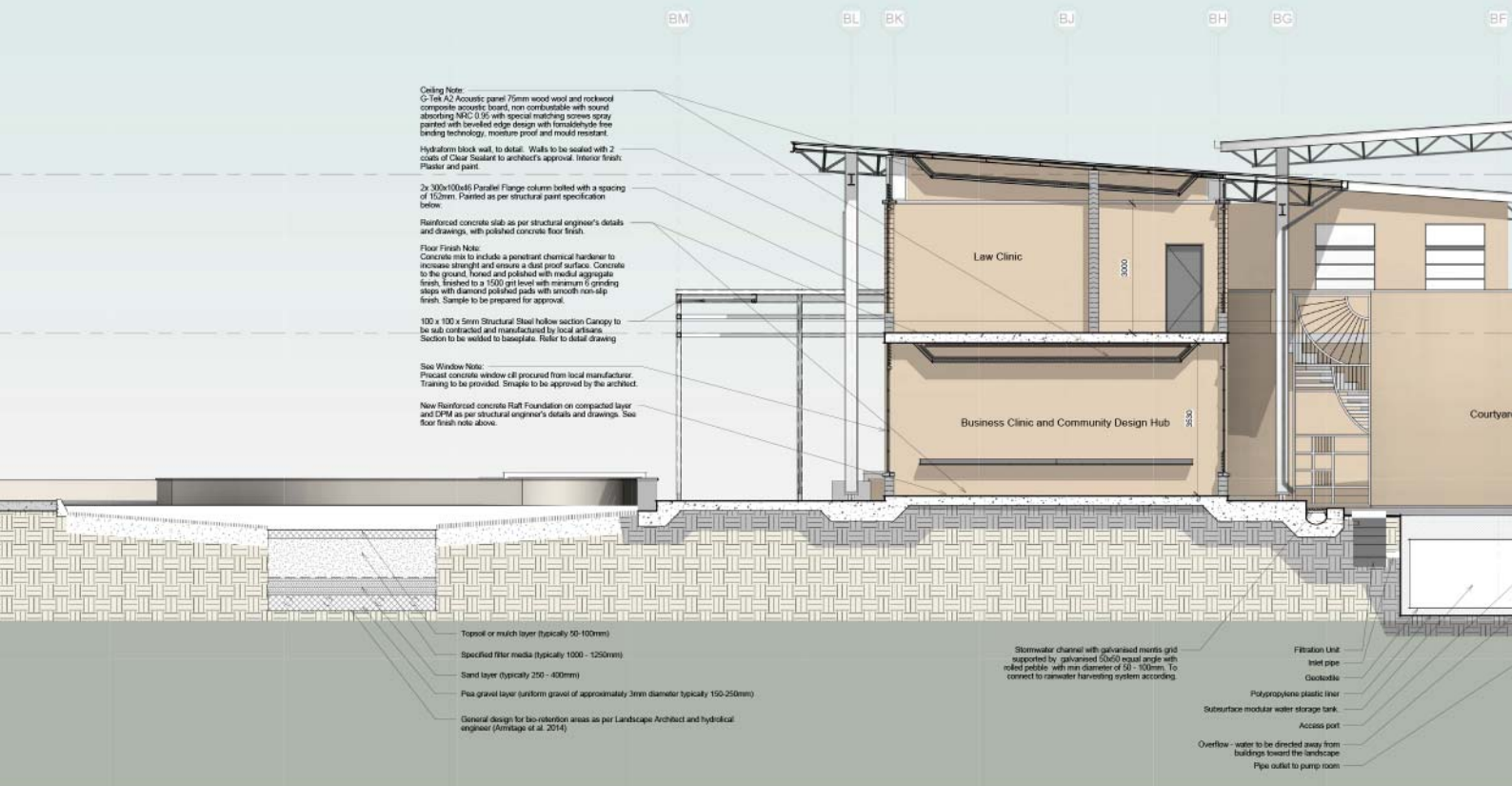
GROUND FLOOR PLAN  
1:200





FIRST FLOOR PLAN  
1:200





SECTION 1 BUSINESS CLINIC & MULTI PURPOSE HALL  
1:50





**Roof Note:**  
White Chromabond concealed for Kip-Tite 700 0.6mm thick light industrial steel sheeting and accessories fixed to steel purlins at 2000mm centres, all to manufacturer's specifications and details on space frame, steel equal angle truss, to structural Engineer's details and drawings.

100x75x20x2.0 Lipped Channel Purlins spaced at 1200mm centres as per space frame spacing

All Structural Steel to be primed and painted with thin film fire resistant water based paint for steel with expansion ratio of 50:1 with a primer, basecoat and sealer coat applied in strict accordance with manufacturer specification. With minimum 30 minutes fire rating in accordance with SANS 10400-1 Table 6 - 30mm structural stability required for both occupancy classifications of A3 pieces of instruction and D0 - Dormitories.

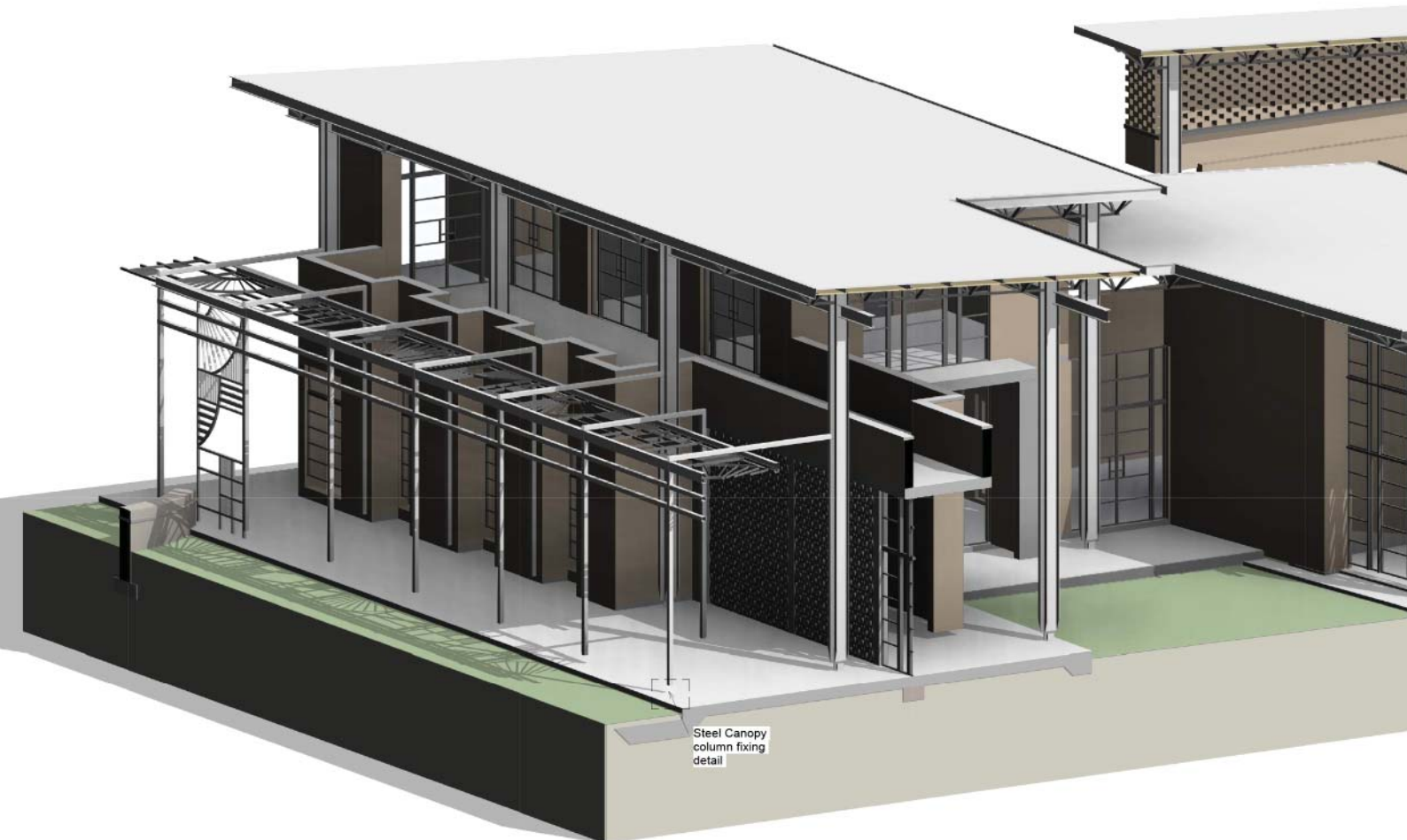
**Insulation specification:**  
Sikafoam FR405 grade reinforced aluminium reflective foil with laminate incorporated fire retardant properties in accordance with SANS 1381-4:2013 7 SANS 428

**Steel door and window note:**  
Purpose made size from standard steel framed sections door with side and top light with 50x100mm RHS structural support, to be primed and painted supplied with terminology as per door schedule. Frame lugs to be bent down into dry joint between blocks. Window frame to be sealed with appropriate external perimeter sealant. Clear safety glass in accordance with SANS 10400 Part N.

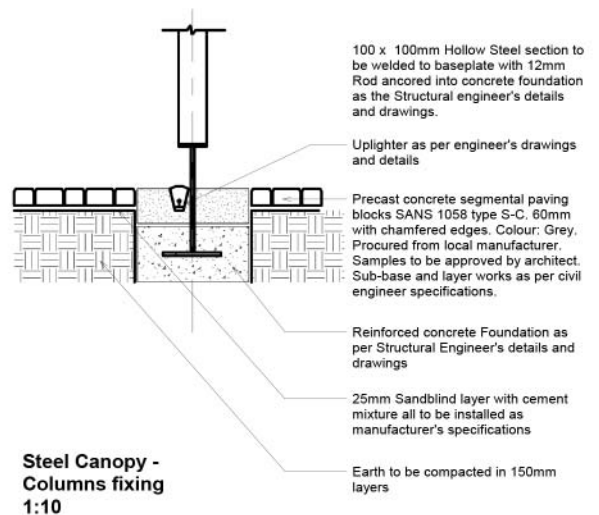
Ventilators and louvers shall be weather sealed with polymer rubber gaskets retained in grooves within the profile and secured with suitable adhesive. All penetration to be in accordance with SANS 613 and SANS 10400 Part XA.

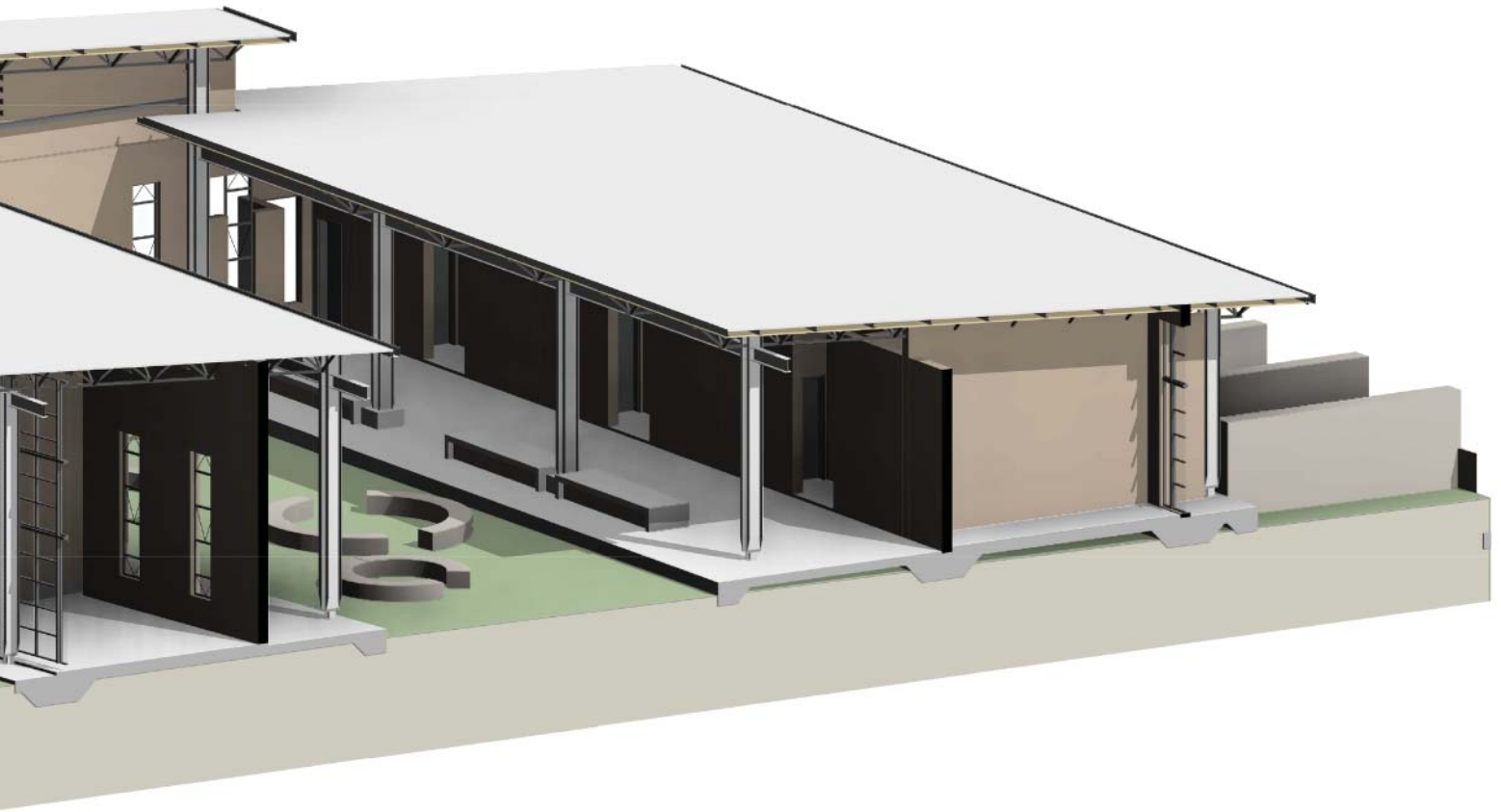
Precast concrete segmental paving blocks SANS 1058 type S-C, 60mm with chamfered edges. Colour: Grey. Procured from local manufacturer. Samples to be approved by architect. Sub-base and layer works as per civil engineer specifications.

Precast concrete mesh top. Colour: Grey. Procured from local manufacturer. Samples to be approved by architect.

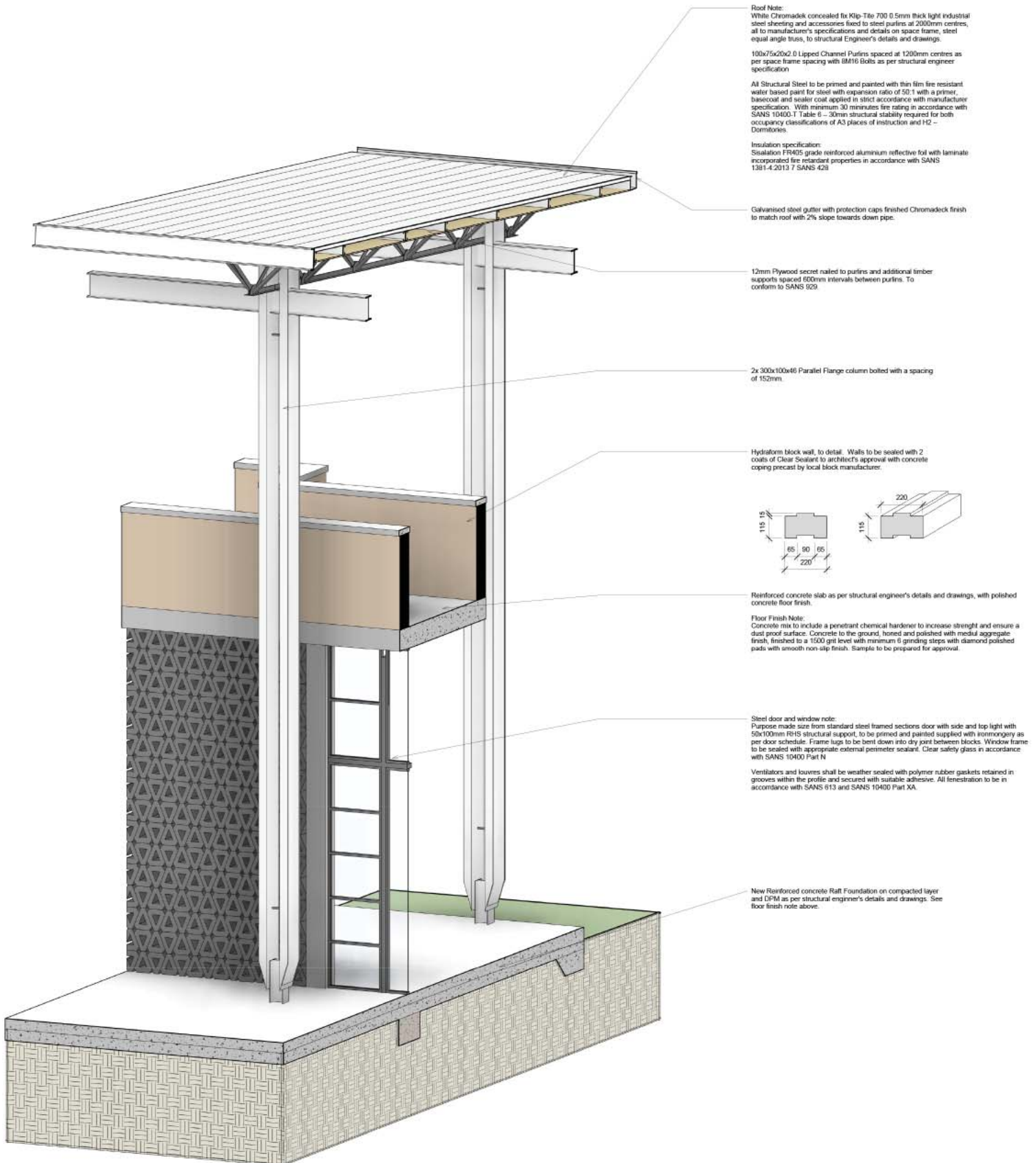


Steel Canopy column fixing detail

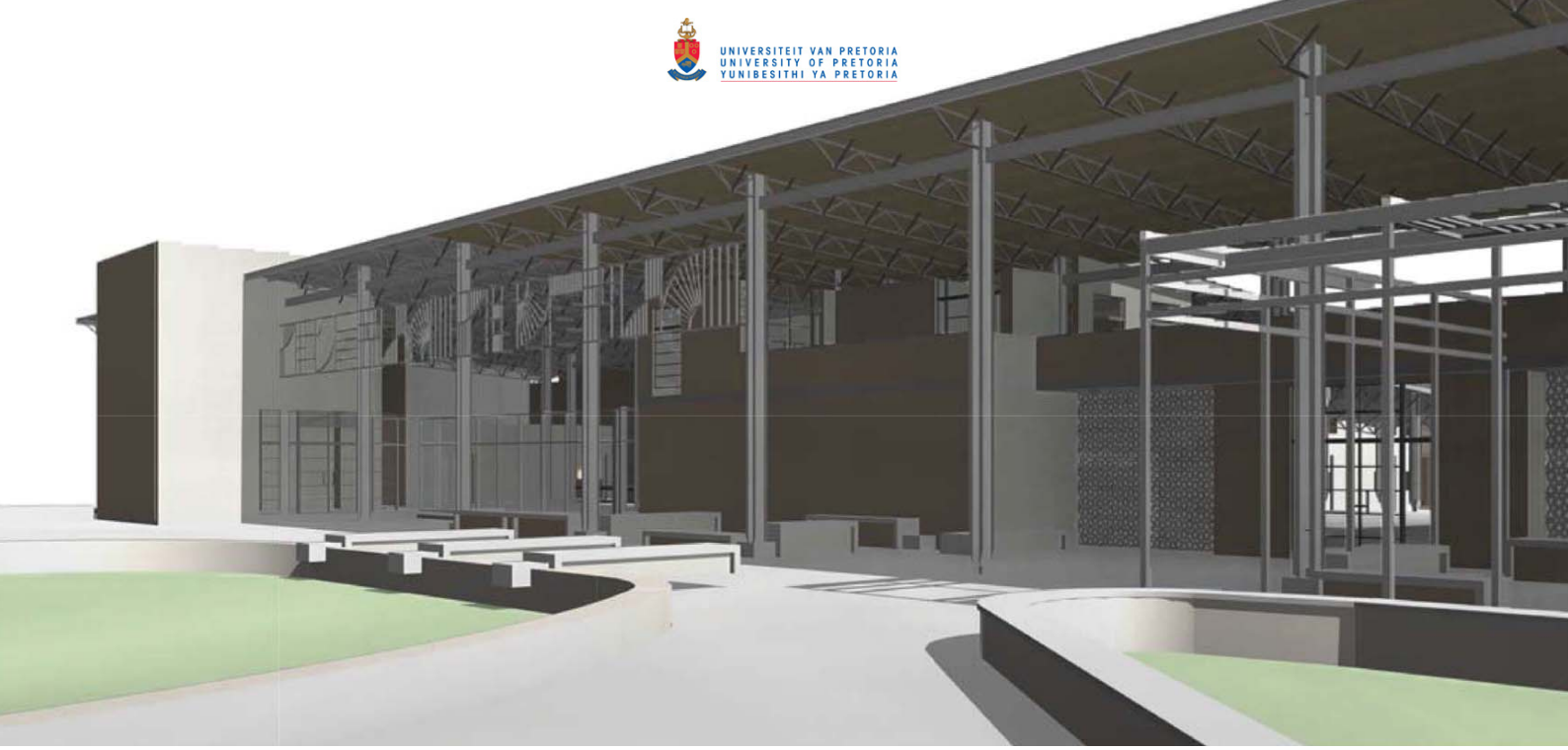




SECTIONAL VIEW THROUGH THRESHOLD SPACE TO THE BUSINESS CLINIC AND COUNSELLING ROOMS  
1:100

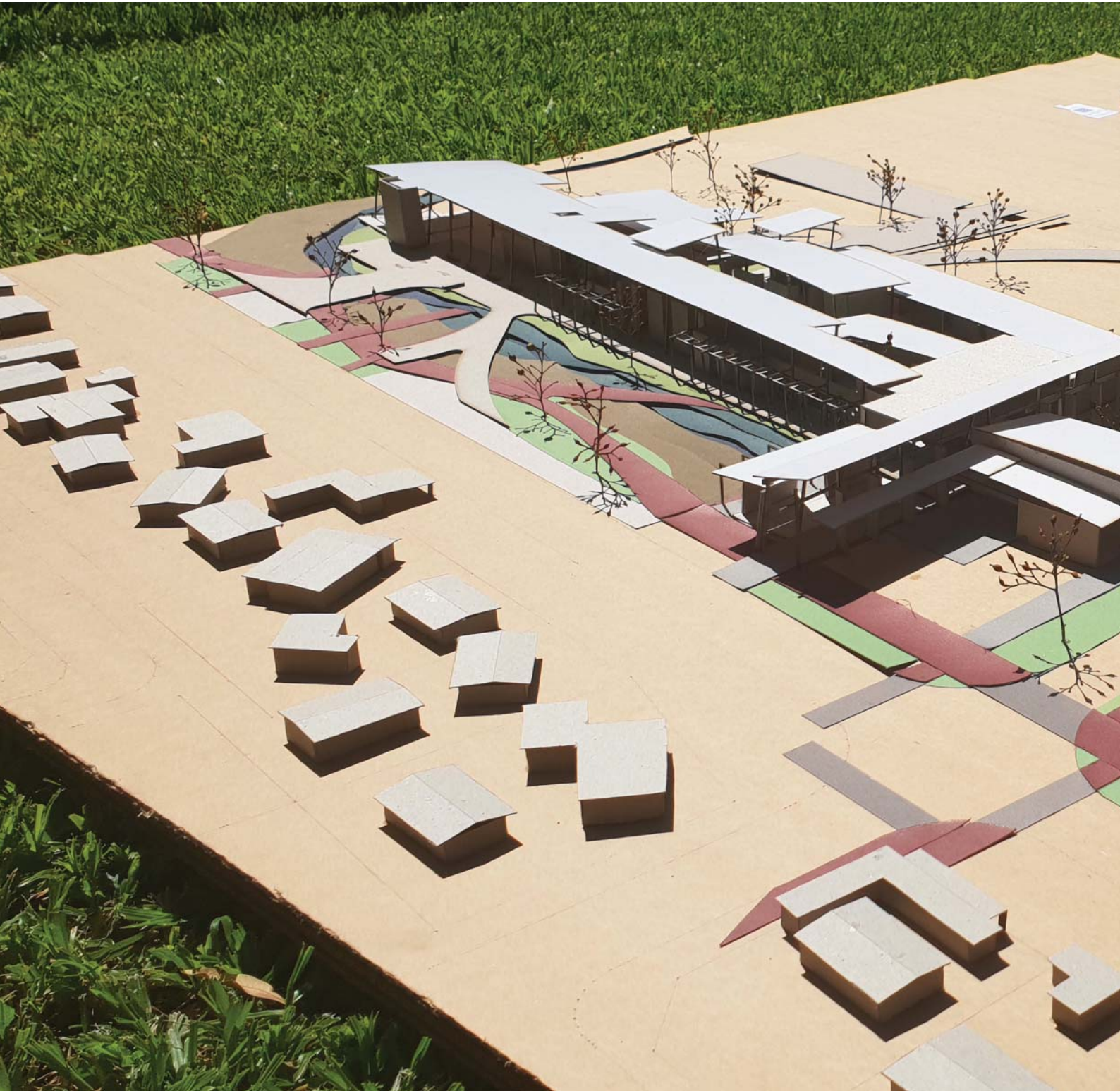


SECTIONAL VIEW THROUGH THRESHOLD SPACE TO THE BUSINESS CLINIC AND COUNSELLING ROOMS  
 1:20



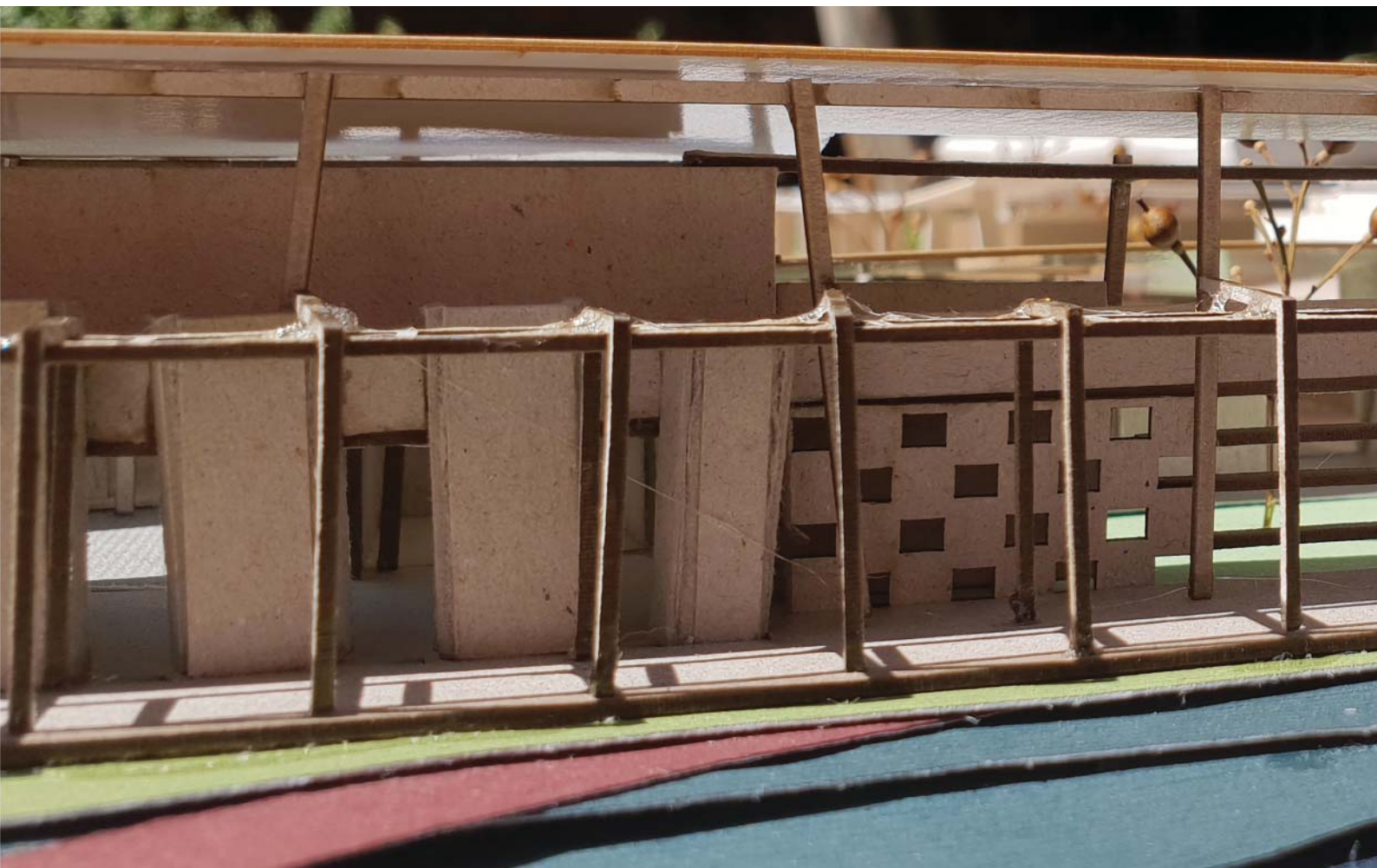


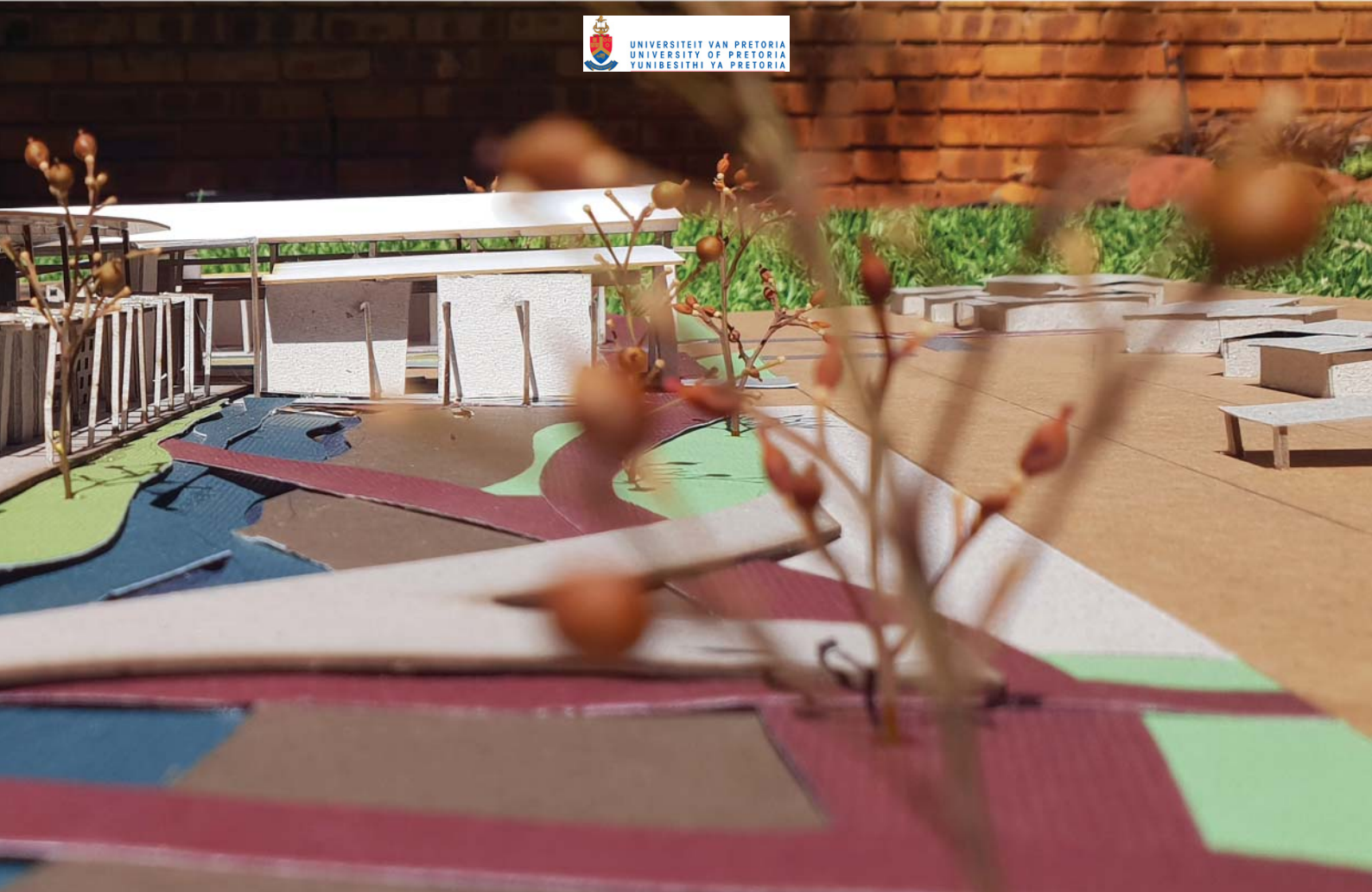


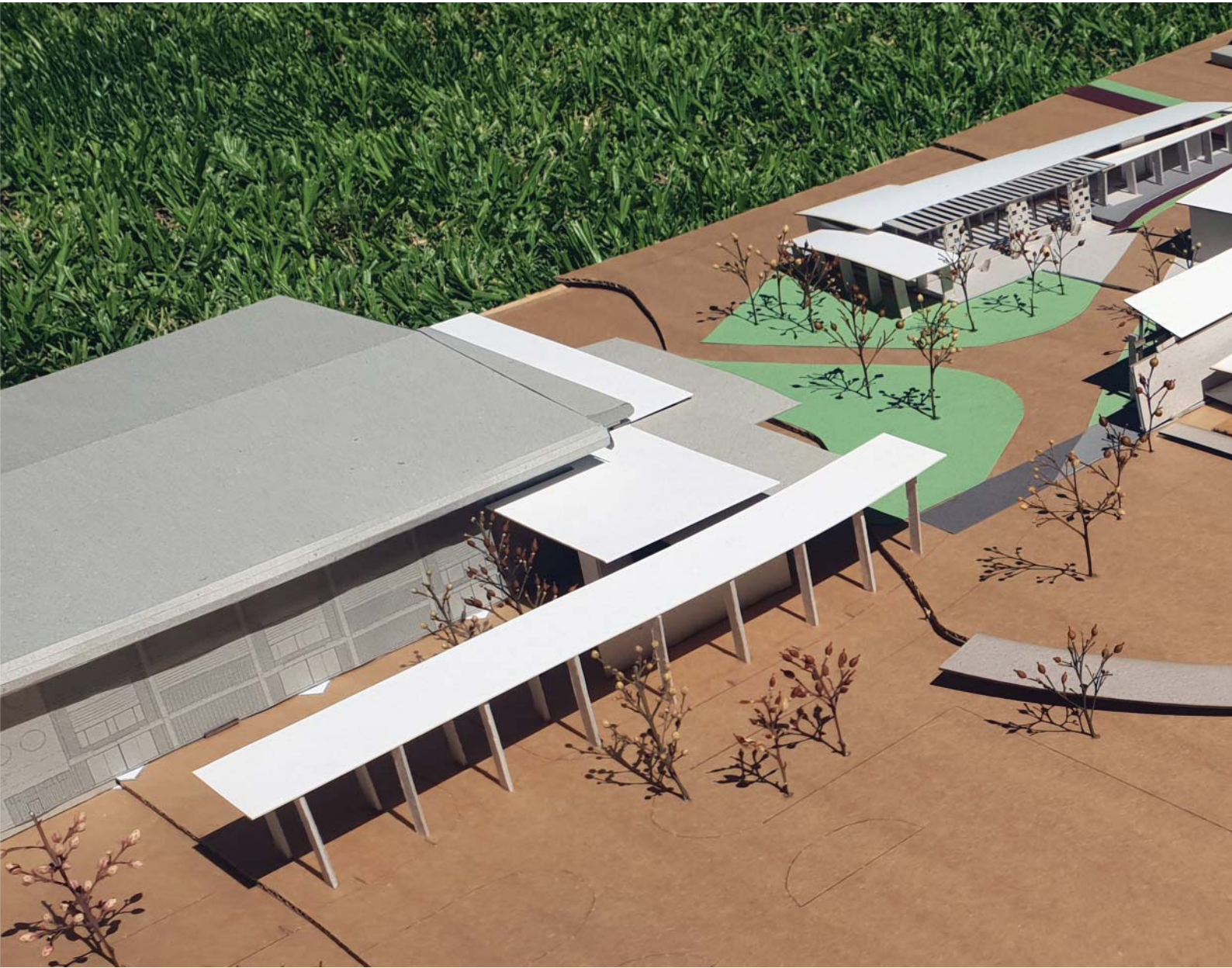


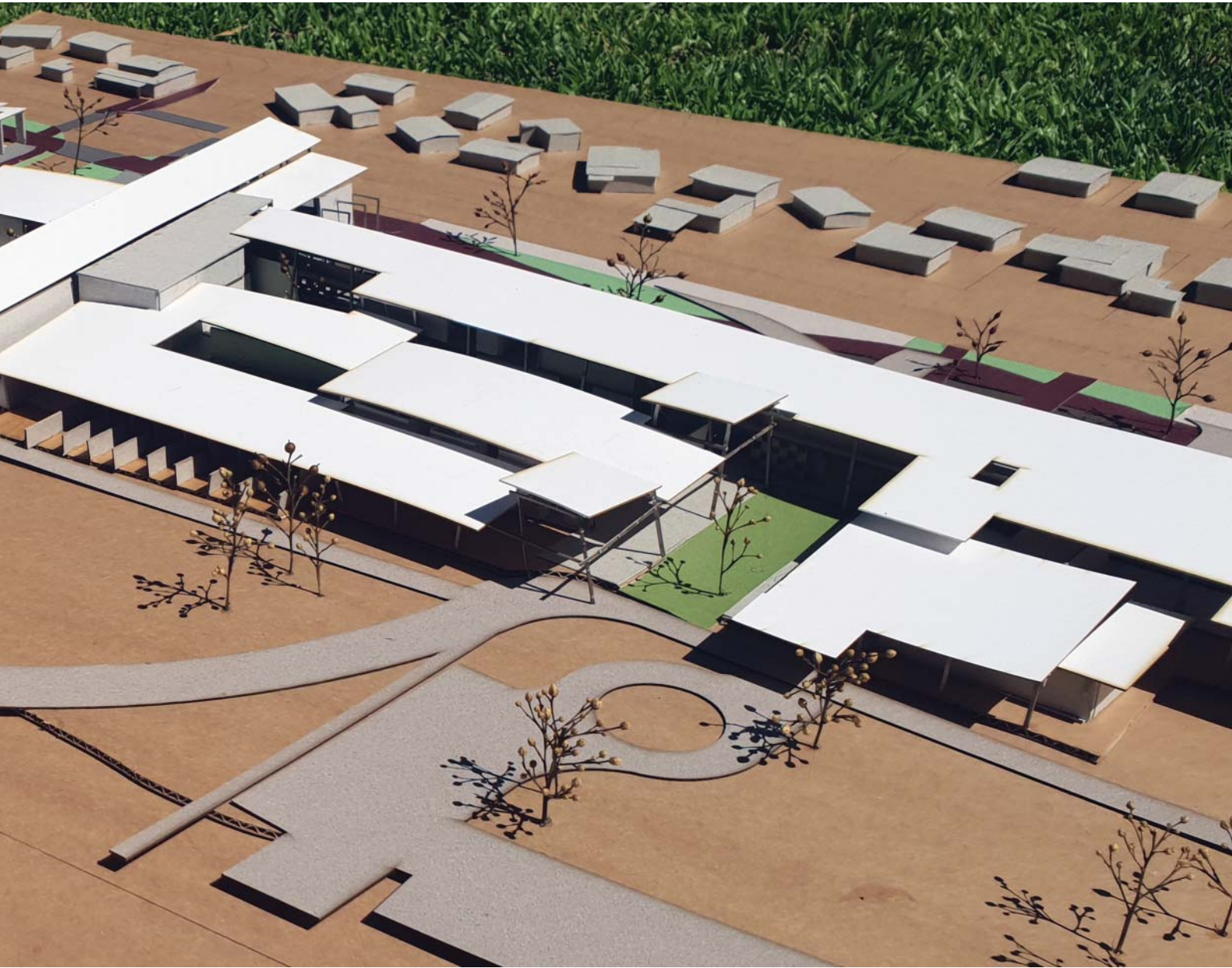




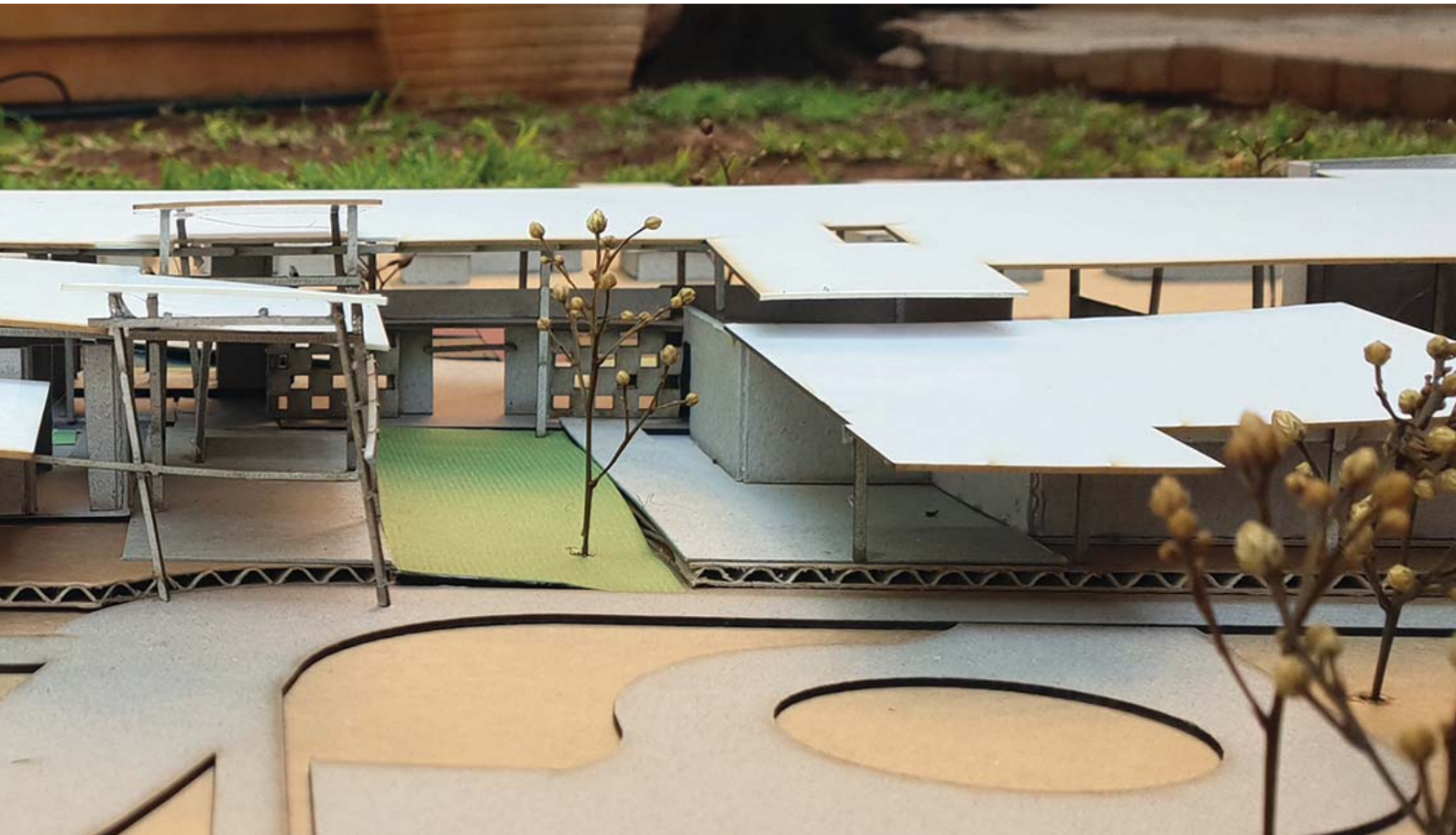




















# CONCLUSION

This dissertation advocate for the necessity to include the spatial aspirations of the university as anchor institution in the the futures planning and frameworks of our tertiary institutions.

“...great universities simply cannot afford to remain islands of affluence, self-importance, and horticultural beauty in seas of squalor, violence and despair.” (Boyer,1996)

The economic, social and spatial implications of our institutions on society must be considered on all levels to ensure sustainabale development of our cities. The potential is great and whole communities can benefit from them, not only student communities and faculty.

The urban citizen has the right to participate and make full use of urban public space (Blokland et al. 2015). Anchor institutions have the resources and means to

invite the urban citizen to actively participate in these spaces. The scholarship of engagement ensures a direct interaction between the community, faculty and students.

The role of university within society is changing and evolving from an inward-looking environment only accessible to the select few, to an institution with the responsibility of contributing to their urban environments - the Sol Plaatje University in Kimberley is testimony to this requirement.

The edges created by the architecture are of great importance (Gehl 2014). These edges should through movement paths, draw the pedestrian into the public spaces allowing for visual connection between interior and exterior. This will in return ensure passive surveillance over the public space ensuring a safer city for the urban citizen.

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