

RE-IMAGINING PRIMARY HEALTHCARE PROVISION IN SOUTH AFRICA



This dissertation investigates an alternative approach to primary healthcare provision in South Africa, one which considers a primary preventative take on healthcare provision as opposed to a solely curative approach and explores the potential of architecture in assisting in the healing process.

This is suggested through an intermediate scale healthcare facility situated on the Plastic View precinct in Moreleta Park, Pretoria East.

Submitted in partial fulfilment of the requirements for the degree of Masters in Architecture (Professional) in the Faculty of Engineering, The Built Environment and Information Technology at the University of Pretoria, 2016.

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Figure a. A helping hand (Author 2016).

In accordance with regulation 4[e] of the general regulations [G.57] for dissertations and theses, I declare that this dissertation which I hereby submit for the degree of Masters of Architecture [professional] at the University of Pretoria is my own work and has not previously been by me for a degree at this or any other tertiary institution. I further state that no part of my dissertation has already been, or is currently being, submitted for any such degree, diploma or other qualification.

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

Michelle Whitaker
2016

With special thanks to:

Dr. Carin Combrinck and Dr. Arthur Barker for your guidance and support throughout this challenging year.

My parents, Mark, Moira and Alison, whose love and support have gotten me through the emotional ups and downs to where I am today, without you this dream would not have been possible.

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- Electricity Calculations
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Vervolgens die Handves van Menseregte is toegang tot basiese gesondheidsorg 'n konstitusionele reg wat elkeen in Suid-Afrika toekom (SA 1997). Huidiglik bestaan Suid-Afrika se gesondheidsdienste uit 'n verdeelde privaat- en publiekesektor. Ongelyke toegang tot gesondheidsorg is aan die orde van die dag. Baie gemeenskappe het nie toegang tot die basiese gesondheidsorg wat hulle toekom volgens die reg nie. So 'n gemeenskap is die fokusarea van hierdie verhandeling, Plastic View, in Moreleta Park.

Daar word tans, en is ook al in die verlede, verskeie voorstelle gemaak om die huidige model te herstruktureer. Die voorstelle kan verdeel word in twee breë benaderings – die eerste stel voor dat die staat alle gesondheidsdienste verskaf en bestuur ('n sogenamende 'Top-Down- benadering) terwyl die teenoorgestelde benadering voorstel dat die gemeenskap self meer betrokke raak by die lewering van gesondheidsorg in hulle onmiddellike omgewing. Albei benaderings word later in die teks in krities geanaliseer, waarna tot die slotsom gekom word dat die twee wyses mekaar kan ondersteun wanneer dit saam geïmplementeer word. Die gemeenskap se betrokkenheid by die lewering van basiese dienste sal die druk op staatsinstellings verlig. Op hierdie wyse kan beter dienste aan almal gelever word binne die beperkte hulpbronne tot ons beskikking.

Dit is belangrik om in ag te neem dat gesondheid gedefinieer word as algehele fisiese, geestelike en sosiale welstand, eerder as slegs die afwesigheid van siekte (WHO 2003). Dus word daar in hierdie verhandeling gekyk hoe die ruimtelike omgewing bydra tot die proses van genesing by persone wat van gesondheidsentrums gebruik maak. Historiese voorbeelde, soos die ontwerp van kloosters en Florence Nightingale se pawiljoen-ontwerpe, dien as inspirasie eerder as kontemporêre gevallestudies. Die fokus van die ondersoek is die rol van argitektuur en die stedelike omgewing in die skep van 'n gesonde omgewing wat bydra tot die holistiese gesondheid van stedelike inwoners.

The Bill of Rights states that equal access to healthcare is the constitutional right of all people living in South Africa (SA 1996). However, with the current healthcare model being made up of a divided public and private sector, gross inequalities in terms of access to healthcare have become a familiar occurrence in the way our society functions and as a result, the statement above is not a reality for many communities. One such community is Plastic View in Moreleta Park, Pretoria East, the research site for this dissertation. In order to rectify this situation found across South Africa, a number of proposals have been put forward from both a governmental (top down) approach and a grass roots (bottom up) approach, in order to re-engineer the current primary healthcare model. These proposals are critically analysed in later text, and the conclusion that this dissertation proposes, from a programmatic point of view, is how the bottom up preventative approach to primary healthcare may be used to support the larger top down curative primary healthcare model in order to move closer towards a Health for All (Kautzky & Tollman 2009:26). As health is defined as not only being free from disease or infirmity, but rather a state of complete physical, mental and social well-being (WHO 2003), this dissertation investigates the role that the built environment can play in spatially support the proposals being made from a top down and bottom up approach by assisting the holistic healing process of all the users of such facilities. In order to achieve this, the architectural investigation focuses on facilitating a more preventative approach to health care as opposed to a solely curative approach, and turns to the historical beginnings of healthcare facilities for informants, rather than the case studies present in our society currently. These informants include the design of monastic cloisters and Florence Nightingale's pavilion designs which were centred around the holistic well being of the user's experience.

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10025007



INTRODUCTION

1. An introduction to site
 - A. Research and Mapping
 - B. Theory and Framework



Figure b. Contextual photo of Plastic View (UP Arch (MProf) 2016)

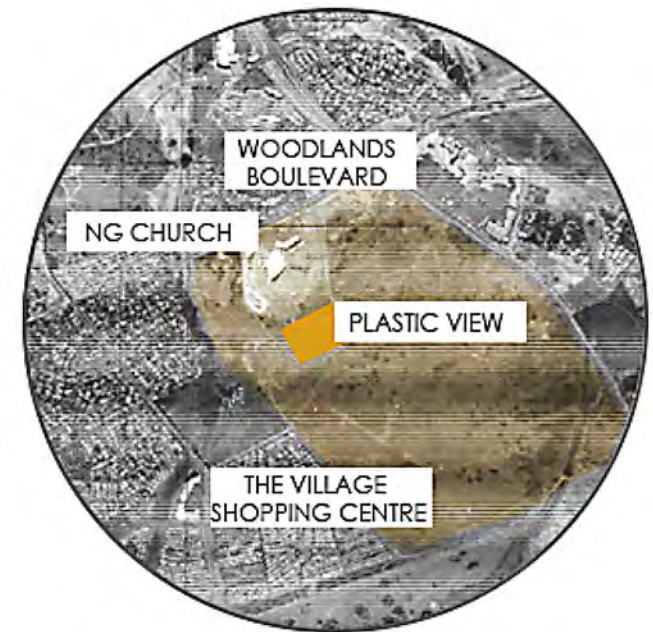
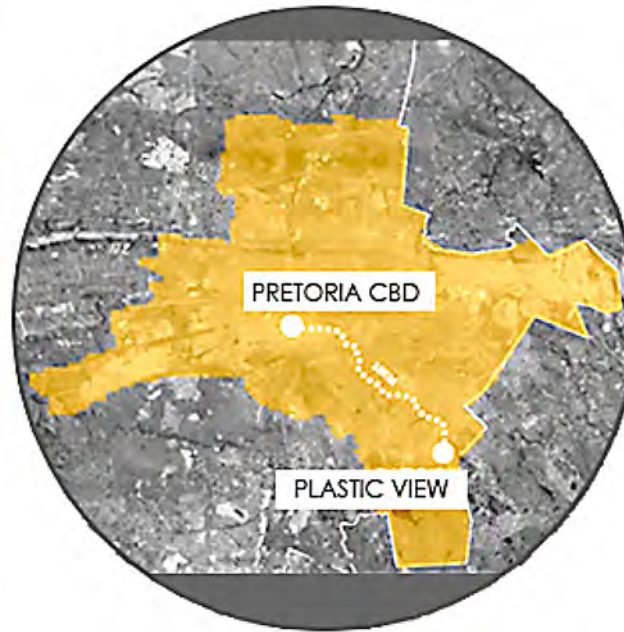
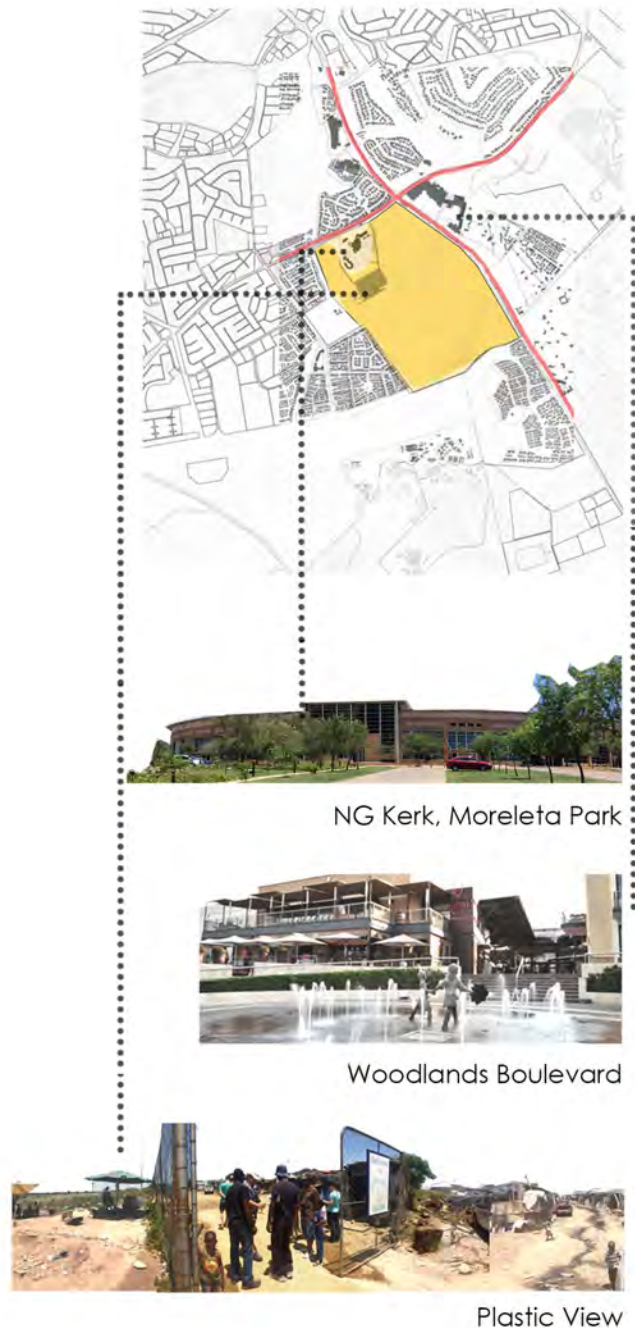


Figure 3. Site Locality Illustration (Author 2016)
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1. AN INTRODUCTION TO SITE



NG Kerk, Moreleta Park

Woodlands Boulevard

Plastic View

The focus site for the research put forward in this dissertation is the informal settlement of Woodlane Village, more commonly known as Plastic View, the name initially given to the community when they first began to occupy a vacant piece of land in Moreleta Park, in Pretoria East (Dredge 2013:18).

Evidence of the origins of Plastic View can be found to date back to 2001. From this time until 2009, the settlement began to grow organically on the vacant piece of land between Woodlands Boulevard and the Moreleta Park Gemeente (Dredge 2013:2). During this time, the community experienced a number of aggressive attacks and threats which resulted in many serious injuries (Dredge 2013: 14). As is common with most informal settlements, this community was constantly at risk of eviction by local police forces and the municipality, a pressure which was heightened by the surrounding land property value market and gated estates (Dredge 2013: 14-17).

In an attempt to avoid drawing attention to themselves and reduce their risk of eviction, the community initially sought shelter in amongst the vegetation on this piece of land rather than erecting informal housing (Dredge 2013: 2, 13).

A local NPO, Tswelopele Step by Step, founded by Denise and Colin Dredge in 2003, recognised this community and the threats they were being exposed to and began to offer support and resources to the community of Plastic View (Dredge 2013:2).

Due to this support and the persistence of this settlement, the establishment of temporary informal shelters then began to take place in 2005 (Dredge 2013: 13). In 2009, after numerous violent and unlawful attacks on the community, Tswelopele made it possible to better support and protect the community by re-organising the settlement into a consolidated and contained area adjacent to the Moreleta Park Gemeente's boundary fence (Dredge 2013: 18). This is what is formally referred to today as the settlement of Woodlane Village (Dredge 2013:18). (Note: Despite this formally given name, this dissertation will still refer to the settlement as its more commonly known name, Plastic View).

Figure 4. A contextual introduction to Plastic View's locality



Figure 5. Elevational context images (UP Arch Hons 2016).



2008



2016

In March 2015, when the municipality threatened to sell the property on which Plastic View is found for development at a public auction, Tswelopele contacted Lawyers for Human Rights and initiated a court case against the government to stop this sale (National 2015).

Together with Lawyers for Human Rights, the residents of Plastic View won this court case and halted the sale of the land that they are currently occupying (Mudzuli 2015). Despite this progression, government has still not recognised this settlement in terms of service provision and access to amenities (Oeloefse 2014), which is a direct contradiction of the principles laid out in the Bill of Rights (Chapter Two of the Constitution of South Africa 1997: 5-20). Whilst a number of residents in the surrounding gated communities are opposed to this settlement (People opposed to Plastic view and Cemetery view facebook group, n.d.), the community of Plastic View continues to receive support and resources from Tswelopele and a number of programmes based out of the Moreleta Park Gemeente (Dredge 2013: 24). These programmes include a primary school which is funded by the Pure Hope Foundation and provides education and feeding schemes up until Grade Four on the Church grounds, as well as a skills and development training programme in order to help community members gain domestic help experience, also based on the church's grounds (UP Arch (MProf) 2016).

As a result of the above context, one can see that the community of Plastic View exists in a very controversial situation as an island amongst the larger urban fabric in which it is found, wanting to be supported by a portion of our society, whilst being wished away by another portion.

Figure 6. Development of settlement from its establishment in 2008, to its present day confinement. Author 2016.

A. RESEARCH AND MAPPING

In order to better understand the community and the contested site on which it is found, the urban research question for the UP Arch M(Prof) research group focusing on this site began with understanding the history of urban settlement patterns in South Africa and how this has informed the current settlement patterns present within our urban context today. The importance of this research, emphasised in the theories put forward by Alexander (1964), was to understand how these spatial patterns and principles may be used as viable precedents in the development of sustainable cities, where settlements such as Plastic View would be incorporated into the larger urban context.

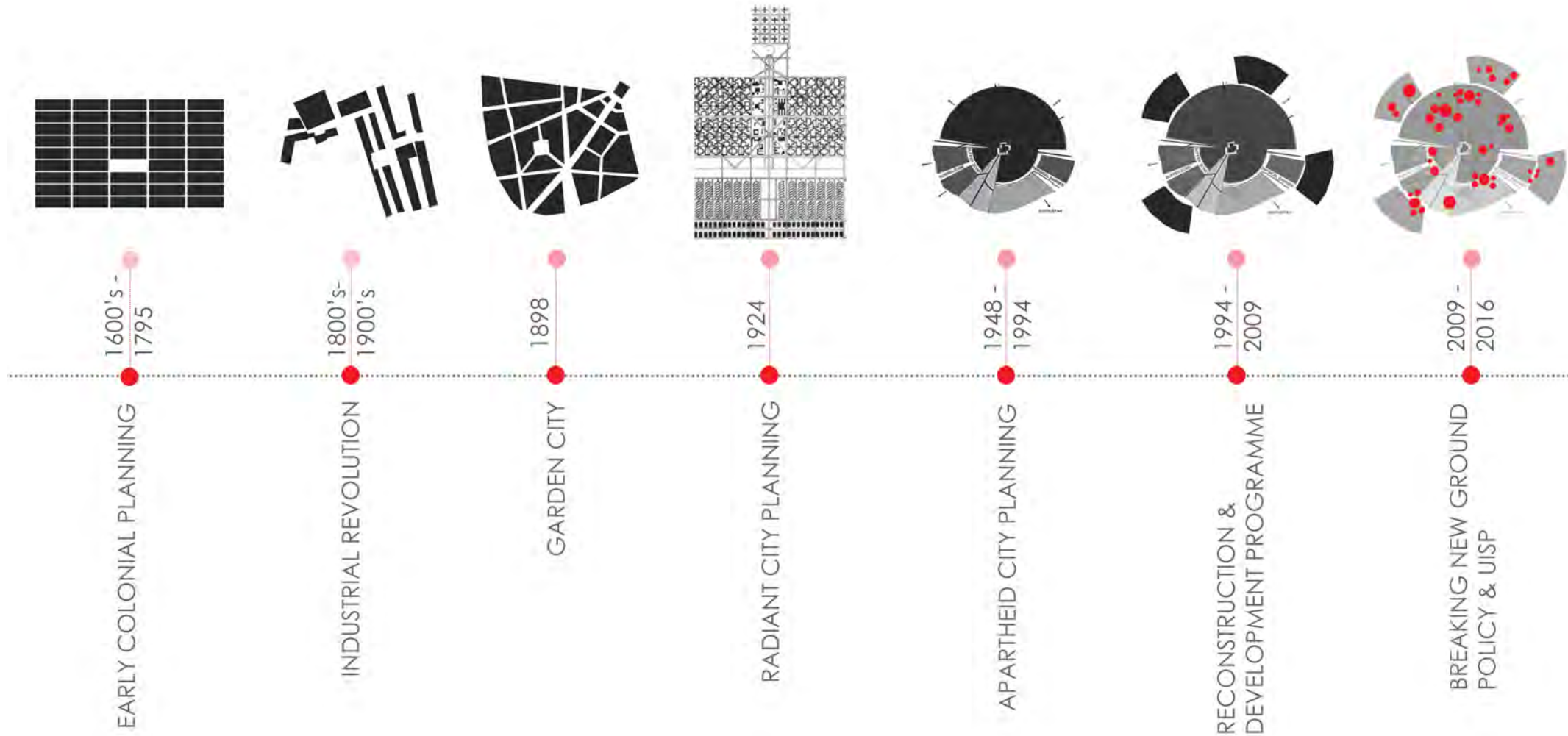


Figure 7. Timeline of urban planning approaches in South Africa (UP MArch (Prof) 2016).

Breaking New Ground Policy Principles:

- Multicultural communities
- Upgrading all informal settlements by 2015
- Sustainable housing solutions
- Access to basic needs and amenities
- Promoting densification and integration
- Creating economic opportunities

Results in Cosmo City

- Segregated communities
- Informal activity happening- backyard shacks
- Standard RDP model not sustainable
- Access to basic needs and amenities is limited

The most recent and influential informants on the research bias is that of the Democratic Constitutional Law of South Africa, specifically the Bill of Rights in Chapter Two of this constitution (SA 1997: 5-20), and the Breaking New Ground policy (2004) put forward by the South African government as a reaction to the Apartheid era of urban planning. A number of secondary informants include other South African Governmental policies, such as the Upgrading Informal Settlements Programme (UISP) (Fieuw 2014) and the National Development Plan for the 2030 vision (NDP) (SA 2012).

Within the constitution and policies stated above, the common theme is the recognition of South Africa's fragmented and complex urban environments, and the response towards creating more cohesive, multi cultural, sustainable communities where all residents of South Africa have the right of equal access to basic amenities such as food, health and education (SA 1997: 5-20). Despite the promising principles put forward by the South African government in these policies, the spatial implementation of this into the South African society is not yet evident. For example, in the case of Cosmo City, all the principles stated in the Breaking New Ground Policy were considered in the planning stages, yet the result is a segregated community where the unsustainable Reconstruction and Development Programme (RDP) model has been implemented. As the main issue of unemployment was not dealt with in this development, the emergence of informal backyard housing solutions which generate an extra income for the unemployed within the community has occurred, and access to the basic amenities of food, education and health is limited (Myambo 2014).

Further evidence of the lack of implementation of these policies was highlighted when mapping conducted by the UP Architecture department's MProf research group showed the number of informal settlements springing up around areas of opportunity within the urban fabric, see page opposite (UP Arch (MProf) 2016). For example, more specific to site location, the development of the Menlyn area and its resulting effects on the surrounding areas, specifically along Garsfontein road. This corridor brings with it many employment opportunities, however due to the deficiency in the provision of low cost housing and services, communities employed in these areas have taken to setting up informal housing instead.

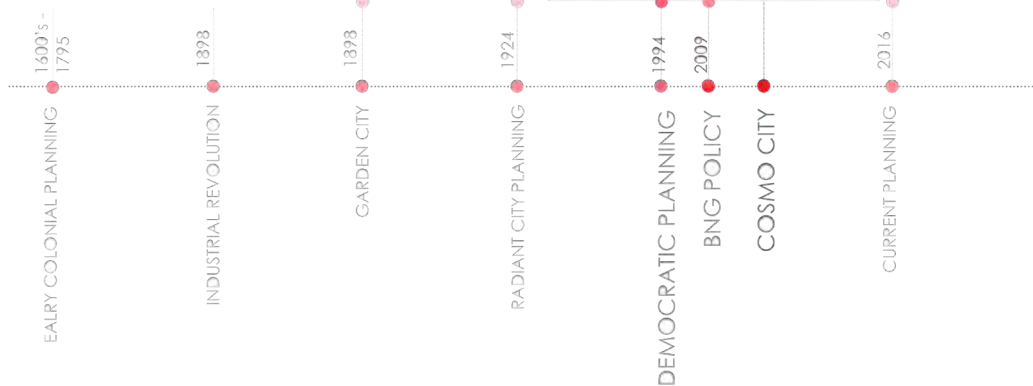
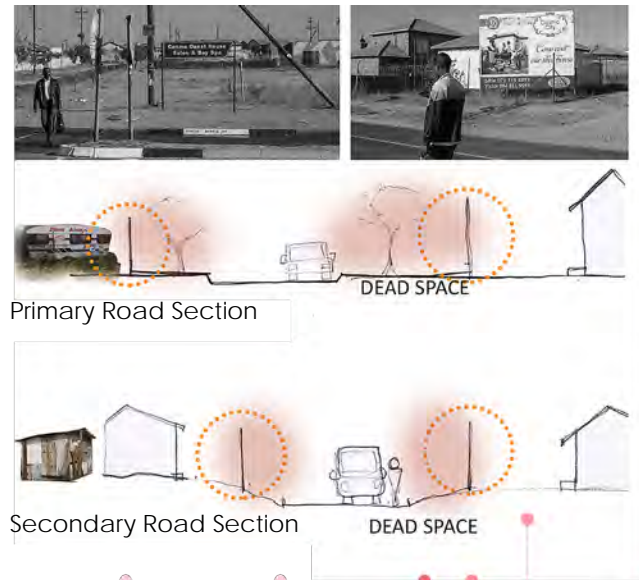


Figure 8. Cosmo City precedent study (Challenges of implementing BNG Policy 2013).

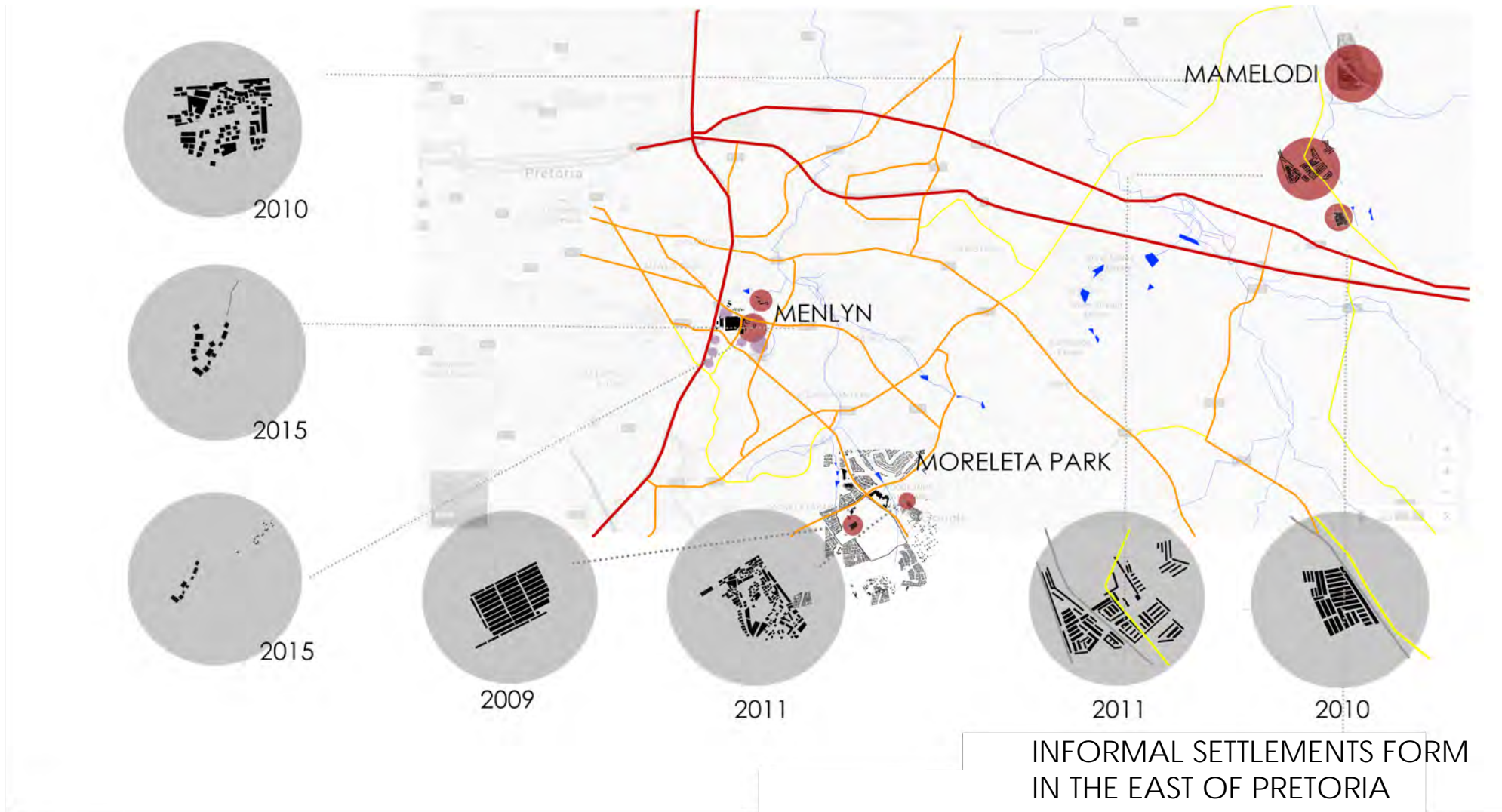


Figure 9. This illustration depicts the density, size and location of the informal settlements in Pretoria East mapped by the UP Arch M(Prof) research group 2016 to support the arguments made on the previous page (UP MArch(Prof) 2016).

**PROPOSED TRANSPORT
INFRASTRUCTRE**

Proposed realignment of the K54 road
as a major sub regional road

Proposed Gautrain extension to run
between Mamelodi and Moreleta Park

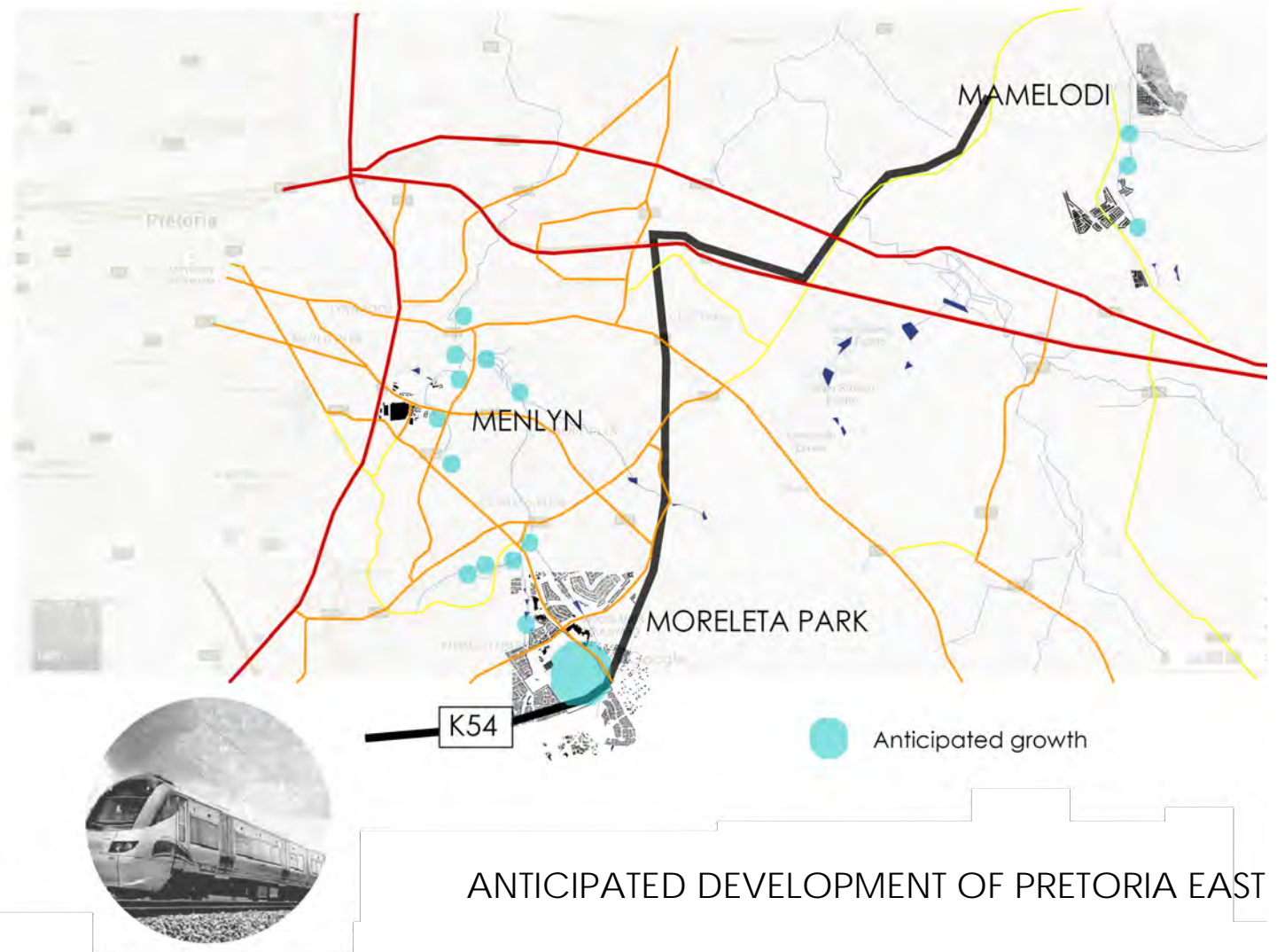
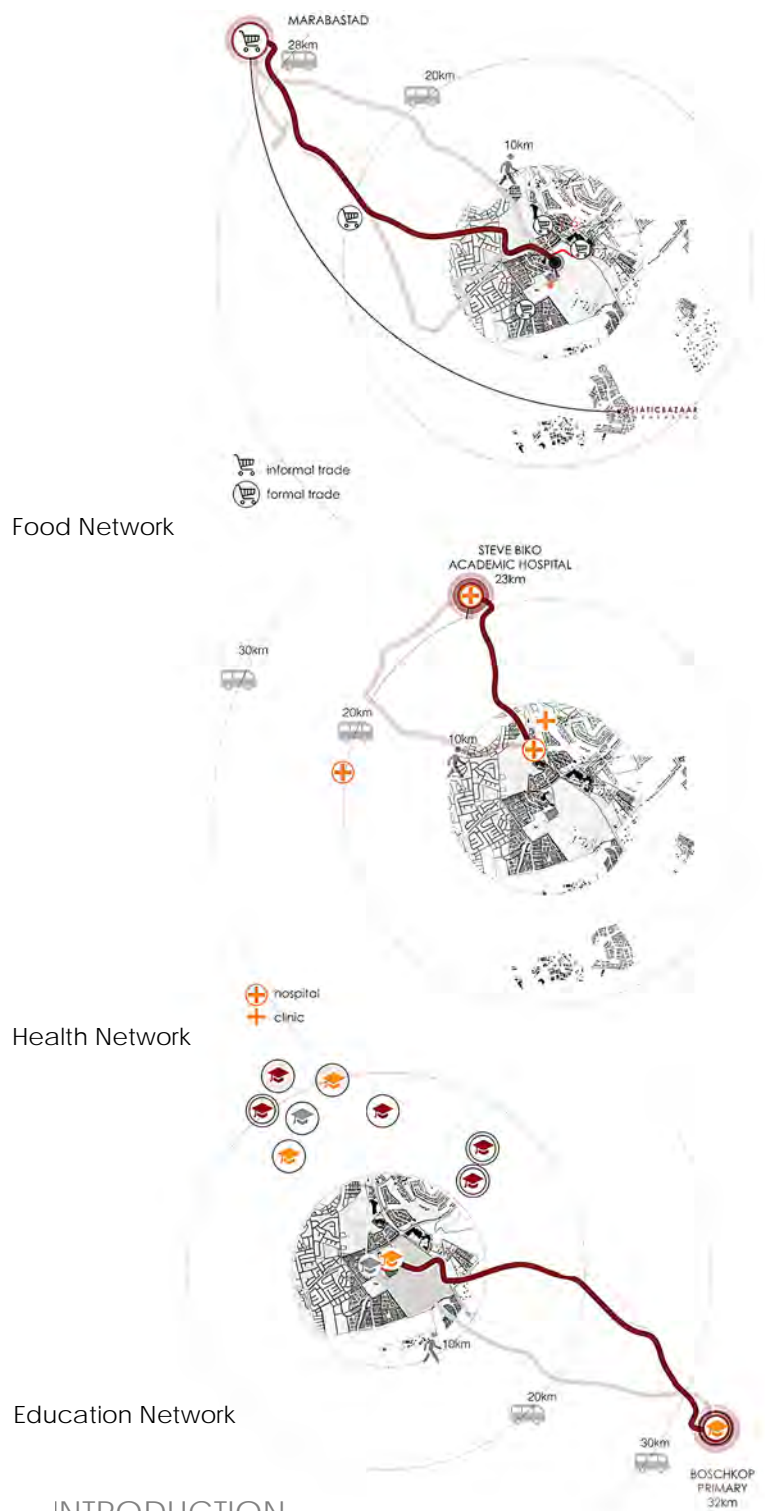


Figure 10. Illustration depicting the anticipated development of Pretoria East (UP MArch (Prof) 2016).



With the establishment of these informal settlements along Garsfontein road, as well as the future proposals for the development of this area, such as further growth of the Menlyn economic centre; the new K54 access road, and the extension of the Gautrain route through Pretoria East to Mamelodi, this corridor is seen as a significant area of urbanisation for the future development of Pretoria. The situation of Plastic View within this corridor thus makes it a significant area of research for the future of Pretoria. In keeping with the principles put forward in the Bill of Rights, the Breaking New Ground Policy and on a more global scale, the United Nations (UN) Universal Declaration of Human Rights (2015), one of the mapping exercises conducted in alliance with the BArch (Hons) research group also working on this site, was the mapping of the context and access to basic amenities situated around the Plastic View site.

In order to achieve this mapping, the research process was initiated by the division of work into a number of sub focus research topics, namely; infrastructure, economic nodes, environmental mapping, cultural asset base, social capital, density, financial profile of the surrounding areas and food sovereignty. This mapping was conducted on both a macro scale for the context around Plastic View as well as a micro scale within the Plastic View settlement itself. The initial stages of the research process involved a desktop research approach which then informed the investigations conducted through a number of site visits and interviews with the Plastic View community members in order to better understand the community's access to food, health and education within the area. Access to these basic amenities was considered through both the public and private sectors of service provision.

The results of this mapping show that although access to food, health and education from the Plastic View site is easily accessible within the private sector, accessibility to these amenities in the public sector is limited, as illustrated in the images opposite.

Figure 11. Mapping of access to basic amenities from site (UP MArch (Prof) 2016).

This documentation proves that despite the pro-humane intentions stated in the principles laid out in government documents and policies, the actual spatial implementation of these principles is seen to be lacking in many areas of our society, such as is the case of the community of Plastic View above (UP Arch (MProf) 2016). This situation concluded that the most prominent urban issue in the case of Plastic View is that the site is as an island of contestation within the fragmented urban fabric in which it is found. A fragmented urban fabric which is made up of a number of broken service provision networks across both the private and public sectors of our society.

Therefore, the urban intention of the MArch(Prof) research group working on the Plastic View site, is to propose an urban vision which spatially supports the intentions laid out in policies such as Breaking New Ground, in order to stitch this fragmented urban network and minimise the gap between public and private sector service provision within our urban society, transforming Plastic View from a site of contestation, into a site of conciliation.



Figure 12. Urban Vision Conceptual Image (UP Arch (MProf) 2016)

B. THEORY AND FRAMEWORK

In order to translate this urban intention into an urban vision which improves the spatial implementation of principles put forward by the current governmental policies, the MArch(Prof) research group adopted an approach which has recognised the need for a paradigm shift in terms of the planning procedures conducted in the South African urban context.

The current neo liberal approach to urban planning (Wright 2013), seen as a reaction to the apartheid era, attempted to initiate policies that include principles of equality, however the lack of spatial implementation of these principles, for example in cases such as Cosmo City, has done little to correct the great spatial inequalities in our society. One reason for this is that despite the suggestion of equality and social justice, this neo liberal approach is governed by a market oriented mentality, which means that an individual's right to the city is often dependent on their claim of ownership to property which is determined by their socio-economic status. Therefore the suggestion is to move from a neo liberal approach to urban implementation, to that of an ecological world view.

Theorists such as Salat (2011) and Steyn (2005), have adopted such an ecological approach and have published a number of principles which became highly influential on the urban conceptual vision and approach to this dissertation. One of the most prominent of these principles includes Salat's (2011) description where the structure of the urban fabric is seen as being similar to that of a leaf, providing resilience through multiconnectivity and interconnected network systems (Salat 2011:18). Salat (2011) advocates that the advantage of viewing the city in such a manner, i.e. as a living system which is never static, suggests that it is adaptable, therefore ensuring its sustainability (Salat 2011: 399). In order to achieve this Salat (2011: 400-401) suggests, through a number of precedent studies, the following characteristics; streetscapes becoming a stage for activity which create fluctuating energy nodes within the urban context, high density, mixed use communities, pedestrian and bicycle oriented environments, the provision of public space, self sufficient districts made up of heterogenous communities and a strong recognition of the existing conditions on site.

An example of these principles being exercised in a local context is Thorntree View, in Soshanguve, by Holm Jordaan Architects (GWASstudio U3 2007). In this precedent, the urban planning focused on strengthening the existing networks by providing community specific spaces. The proposal saw the project not as an isolated entity, but rather as an additional node that responds to its surrounding context and connects to the existing nodes of energy. This was achieved through heterogenous, mixed density communities which focused a high concentration of energy and density along activity corridors through the proposal. The sensitive use of public space and building footprints were used to

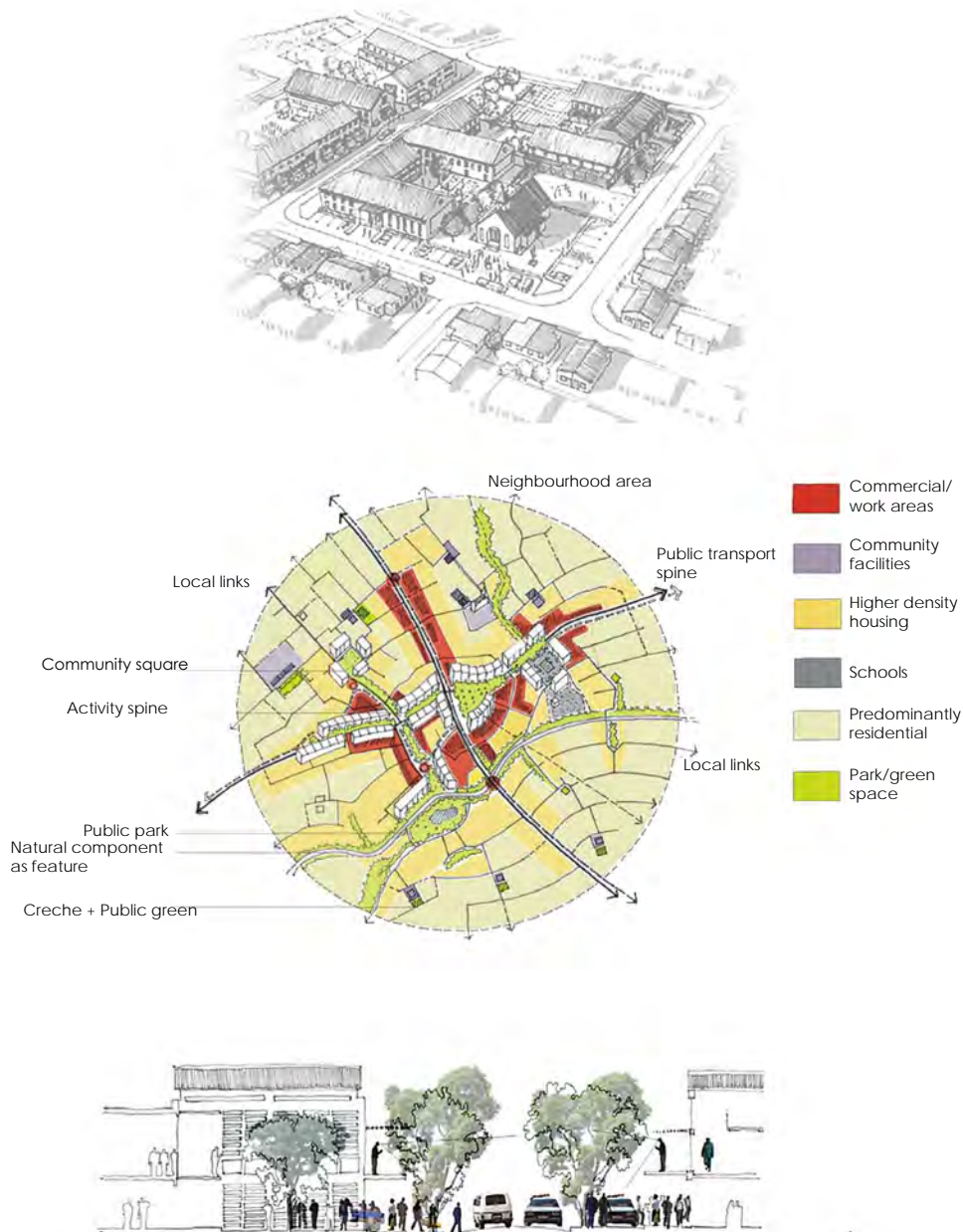


Figure 13. Thorntree view precedent images (GWASstudio 2007).

SUSTAINABLE URBAN TRANSFORMATIONS

1. Heterogenous communities, mixed densities

2. Pedestrian & bicycle oriented streets. Green space & public spaces

3. Streetscapes become activity corridors throughout the site. Boulevard typology

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

SERGE SALAT

Architect, Designer
and Urban Planner

1. Street layouts a 2. Street layouts b

3. Proposed intersections a 4. Proposed intersections b

5. Resilient urban fabric taking the structure of a leaf

6. Urban layout aims to connect all networks

GERALD STEYN

Architectural
Professor at TUT

1. Medium sized compact cities

2. Urban villages in superblocks

3. Mixed use main streets

4. Appropriate boundaries & streets

5. Medium density, robust with courtyards

6. Small scale & local/self help and semi-skilled

Figure 14. Urban theoretical informants (UP Arch (MProf) 2016) Individual sources from left to right (GWASstudio 2007), (Salat 2011) & (Steyn 2005).

define and support existing community activities (GWASstudio U3 2007). Steyn (2005), gives a more locally appropriate slant to this view. Having conducted research in Mamelodi, Steyn (2005) states that due to urban sprawl and spatial and social fragmentation, our urban fabric has become unsustainable (Steyn 2005: 1). Steyn's response to this observation concludes that although a sustainable African neighbourhood would certainly differ from a European one in terms of character and appearance, such as the ones Salat considers, the basic ordering principles and characteristics would essentially be the same (Steyn 2005: 2), namely compact, walkable, mixed use environments with a high level of economic self sufficiency, with access to amenities being available within a walkable distance (Steyn 2005: 3-5).

Using these principles as basic informants for the conceptual urban vision, the framework proposal for this dissertation was then initiated by considering an existing, formal framework proposal for the development of the Plastic View site by StudioMAS Architects (StudioMas 2008). By viewing this formal proposal through the lens of the theoretical approaches listed above, specifically focusing on accessibility, heterogeneity and consideration for the existing conditions on site, the MArch Prof research group critically assessed the proposal and slightly altered areas within it accordingly in order to reach the urban vision used in this dissertation. The result of this is shown below.



Main Access Roads

Hierarchy of Density

Relocation of Plastic View

Recreational Spaces

Municipal Proposal for Stormwater Drains

Municipal Proposal for Water Supply

Municipal Proposal for Sewerage System

Proposed Energy Nodes- Interventions

Figure 15. Urban framework explained (UP MArch (Prof) 2016).

The provision of basic amenities was also considered for the urban vision. Using Salat (2011) and Steyn's (2005) theories, the image below depicts the proposed provision of these basic amenities across and around the site, the main guiding principle for this provision being the proximity of these amenities within walking distance from the current site of Plastic View and the surrounding communities.

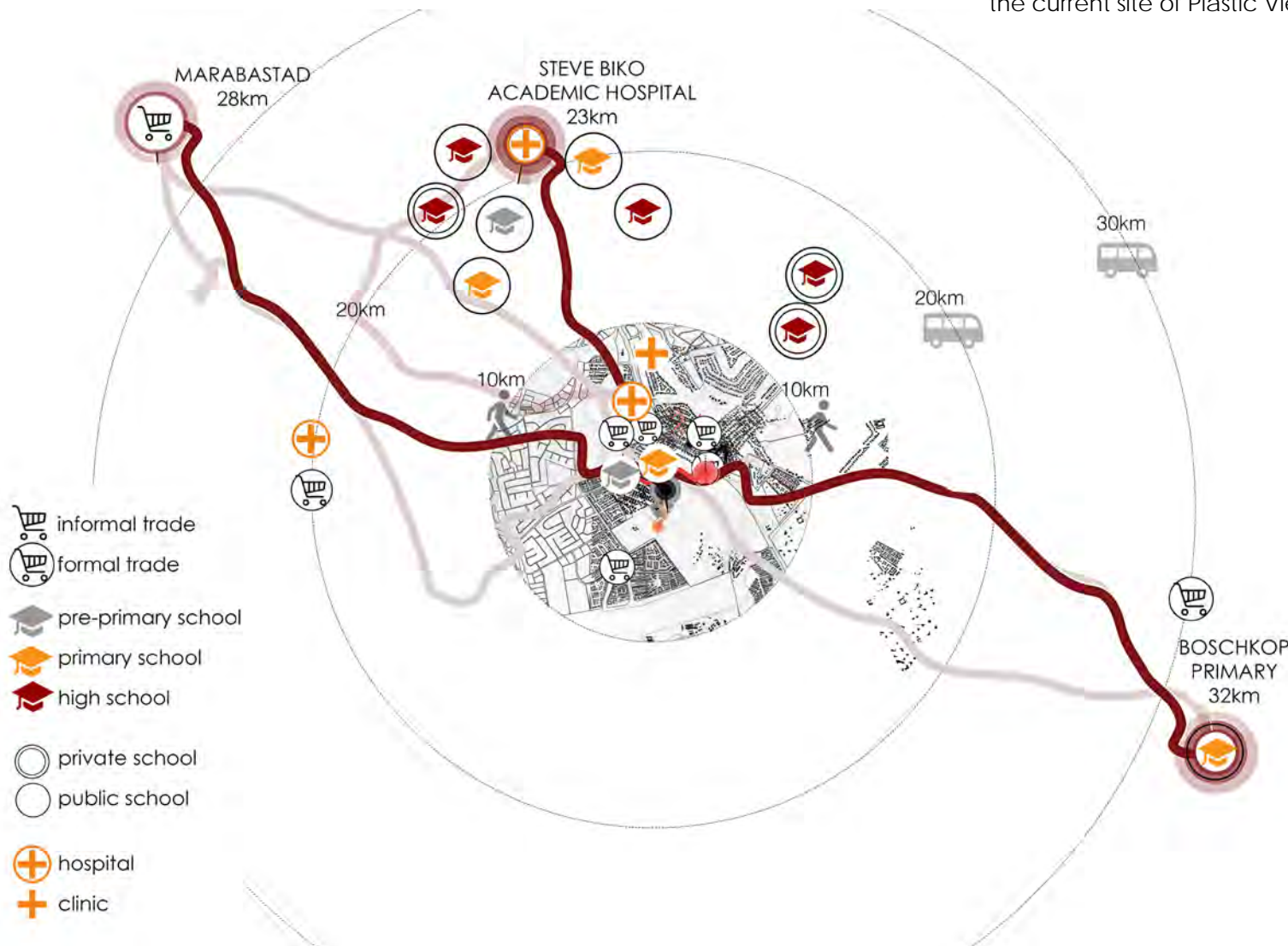


Figure 16. Proposed basic amenities in the urban framework (UP MArch (Prof) 2016).



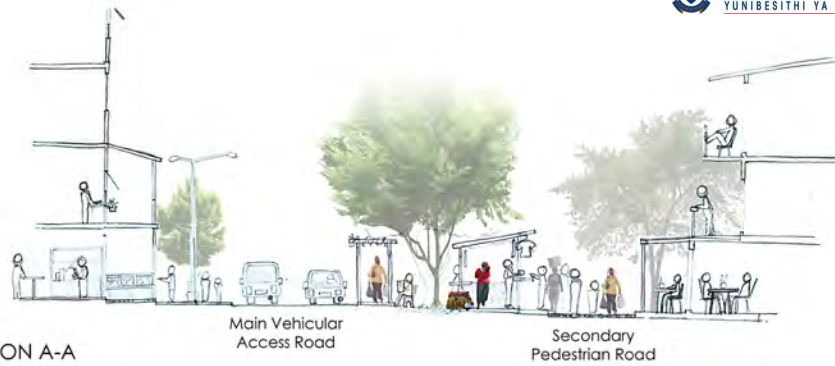
Due to the vast scale of the site, the group's focus on site is on developing the high activity access boulevards across the site, which connect the high energy nodes of activity on either side of the site. These access roads are envisioned as becoming high density, mixed use activity corridors through the site which aim to encourage a distribution of the existing energy onto and across the proposed framework on site.

Figure 17. Current energy diagram across site versus proposed energy diagram in vision (UP MArch (Prof) 2016).



The current community of Plastic View will be catered for within this urban framework through the provision of low income housing, including the municipality's current proposal of moving the community to another developed site just across Garsfontein Road, to the North East of the site (Tlhabye 2015). The access roads consist of a vehicular oriented road, as well as a secondary parallel pedestrian oriented road in order to introduce the compact, accessible and walkable aspects to the vision as Salat (2011) and Steyn (2005) suggest. It is from these main access roads that the individual dissertation proposals then branch off of, contributing to the mixed density, heterogeneity and energy of these boulevards. In addition to this, the individual proposals, influenced by the study of South African policies and constitution, also have a strong focus on the accessibility of basic service amenities to the community found within this framework.

Figure 18. Site plan displaying proposed dissertation sites (UP MArch (Prof) 2016).



SECTION A-A
Main Access Road and Promenade



SECTION B-B
Secondary Road

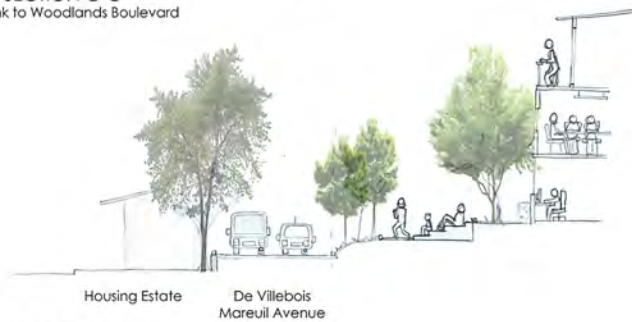


SECTION C-C
Taxi Rank to Woodlands Boulevard



VIBRANT MAIN ROAD

PUBLIC EDGE CONDITIONS



SECTION D-D
Northern Edge of Site

Figure 19. Conceptual images of the proposed urban framework (UP MArch (Prof) 2016).



CHAPTER ONE

1. Research Dissertation Proposal
 - 1.1 Urban Issue
 - 1.2 A Critical Reflection on the South African Healthcare Model
 - 1.3 A Brief History of the Primary Healthcare system in South Africa
 - 1.3.1 Pholela Primary Healthcare Model
 - 1.3.2 Apartheid
 - 1.3.3 Reaction to Apartheid
 - 1.3.4 Democracy
 - 1.3.5 Current State of the Problem
 - 1.4 Architectural Issue- The Healing Power of Place
 - 1.4.1 Precedent Study
 - 1.4.2 Critical Reflection
 - 1.5 Project Intentions

Figure c. Young child (Author 2016)

1. RESEARCH DISSERTATION PROPOSAL

THE BILL OF RIGHTS STATES THAT EQUAL ACCESS TO HEALTHCARE IS THE CONSTITUTIONAL RIGHT OF ALL PEOPLE LIVING IN SOUTH AFRICA (SA:11, 1997). HOWEVER WITH THE CURRENT HEALTHCARE MODEL BEING MADE UP OF A DIVIDED PUBLIC AND PRIVATE SECTOR, GROSS INEQUALITIES IN TERMS OF ACCESS TO HEALTHCARE HAVE BECOME A FAMILIAR OCCURRENCE IN THE WAY OUR SOCIETY FUNCTIONS AND AS A RESULT, THE STATEMENT ABOVE IS NOT A REALITY FOR MANY COMMUNITIES.

1.1 URBAN ISSUE

As previously mentioned, the larger urban issue considered in the urban vision, is that the site exists as an island of contestation amongst the fragmented urban fabric of broken service provision networks across both the private and public sectors in which it is found. Branching off from this larger urban issue, the individual proposal discussed in this dissertation specifically deals with the inequality of access to healthcare in the public sector in the vicinity of Plastic View.

The community of Plastic View are constantly exposed to situations which threaten their health and safety. Open flames often result in burns on some of the younger residents of the community (Andersen 2016), and cultural tensions within the tightly packed community often result in violent fights and sometimes death (UP Arch (Hons) 2016). However, access to reliable health care to treat injuries caused by these incidents is limited. The research process, as explained in greater detail previously, resulted in a collaborative mapping effort between the University of Pretoria's Architecture Department Honours and Masters year groups. This process produced documented evidence of the healthcare delivery services within the vicinity of Plastic View. This mapping is shown in the illustration opposite.



Figure 20. Mapping of healthcare facilities in the area and those visited by Plastic View residents (UP MArch (Prof) 2016).



From this mapping one is able to see that the healthcare delivery services within the vicinity are predominantly only accessible to private healthcare users, with the nearest private hospital being the Netcare Pretoria East hospital, within 30 minutes walking time from the current Plastic View site. The nearest public healthcare facilities are the Steve Biko Academic Hospital which is situated over twenty kilometres away from Plastic View, and the Pretorius Park Clinic, which is situated just over thirty minutes walk away from Plastic View.

Pretorius Park is a small scale clinic which primarily provides HIV and TB treatment however upon arrival, the user is met with the stereotypical frustrations of the generic public clinic experience in South Africa: long queues and waiting periods as well as inconvenient opening hours. Therefore in the event of an after hour emergency, members of the community of Plastic View need to travel to the Steve Biko Academic Hospital for healthcare provision (UP Arch (Hons) 2016). This mapping evidence became one of the informants for the urban issue proposed by the individual component of this dissertation, namely how one may minimise the gap between the provision of healthcare service delivery facilities in both the public and private sectors of our society.

The research within this dissertation supports this by then considering, from a top down approach, the gaps in the present healthcare model and, from a bottom up approach, independent programmes such as the Community Oriented Primary Care (COPC) programme (Marcus & Hugo 2013), and how these two approaches may be merged in order to stitch the gaps present in primary healthcare provision within our urban context, in order to move closer towards a *Health for All* (Kautzky & Tollman 2009:26).

Figure 21. Context photo. (Author 2016)



1.2 A CRITICAL REFLECTION ON THE SOUTH AFRICAN HEALTHCARE MODEL

Despite the same expenditure related to both the private and public healthcare sectors, the public sector has to serve 84% of our population, whereas the private sector only serves 16% (Bam et al 2013). As a result, 4 200 public healthcare facilities are available to serve this 84% of the South African population, which means that there are 13 718 patients per public clinic. This exceeds the World Health Organisation's recommended figure of 10 000 patients per clinic (SA 2012). As a result of this 37% excess (Du Trevou 2014: 22), these facilities have become over burdened, underfunded and under resourced, lacking the necessary infrastructure required to support this large percentage of our country's population. These stereotypical characteristics mean that many patients do not receive the medical attention they may require which is a direct violation of their constitutional right. The private health sector is also not without its problems as patients often end up being over serviced and having to pay for unnecessary consultations. The cause of these situations became evident in a literature study which highlighted that the common issue seen across both the public and private sectors in South Africa is with the primary healthcare service provision. The importance of a resolved primary care provision system is evident in a particular study which compared countries at the same level of economic development. It showed that those whose healthcare is organised around the tenets of primary healthcare proved to have better health outcomes from the same investment (Voce et al 2014: 46). As a result both government, from a top down approach and independent organisations, from a bottom up approach, have begun to consider how to make the statement set about in the Bill of Rights a viable reality by considering how to re-engineer the South African healthcare model. This poses an interesting question to the architectural profession of how one can then spatially support the re-engineered healthcare model being proposed.

Figure 22. Context photo. (Author 2016)

1.3 A BRIEF HISTORY OF THE PRIMARY HEALTHCARE SYSTEM IN SOUTH AFRICA

Since the memorable statement of Health for All was made at the Alma Ata health conference in 1978, health care systems worldwide have been revisited in the hopes of making this statement a reality (Kautzky & Tollman 2009:26). In spite of being a pioneer in many healthcare models, such as the Pholela Health Care (Kautzky & Tollman 2009:26) model, South Africa is only just embarking on their journey towards this goal. Although there have been numerous attempts to address the division between public and private sector health care post-1994, with the most recent being the National Health Insurance Green Paper (National Department of Health 2015), a great inconsistency is still evident between the two health service sectors. In order to understand what has led to this grossly biased system, the following text shall critically analyse the development of primary healthcare provision in South Africa.

1.3.1 PHOLELA PRIMARY HEALTHCARE MODEL

In the 1940s, Dr Sidney Kark set up the Pholela Health care model in the rural homelands of KwaZulu Natal. This model became the global forerunner for Community Oriented Primary Care (COPC) (Pillay 2011: 1). The unit was set up in order to provide both a preventative and curative healthcare facility model which could be used as a precedent for both rural and urban facilities. This model made use of population-based investigations which then informed the provision of health services at the facility and incorporated health education and health promotion as essential elements of the healthcare delivery system. Its purpose was to emphasise the provision of holistic health care, rather than simply medical care. As a result, Pholela provided an example of one of the first working models of COPC in practice (Tollman, Kark & Kark 1997: 217). This model became very influential on the larger healthcare policies and models of its time with the idea of health becoming accessible to all. However before it could take full effect on reforming the South African healthcare model, the National Party rose to power, and the well known spatial separation and racial segregation policies meant that the healthcare resources and policies became biased towards a minority provision healthcare approach (Kautzky & Tollman 2009: 19). As a result, the COPC movement in South Africa had collapsed by 1960 and the 44 facilities which were created were forced to close. This resulted in over 20 years of innovative, community-based research, training and health systems development being lost. However countries such as USA, Iran, Thailand, Malaysia and Kenya had already started to see the value in this model and started to implement it into their healthcare systems (Roemer 1991: 156).

1940s

1960-1980

1980-1990

1994-2015

2016

1.3.2 APARTHEID

The introduction of the policies brought about by the apartheid era introduced two developments which proved to be particularly damaging to the country's health care and systems development. This was the racial fragmentation of health services and the deregulation of the health sector (Tollman & Pick 2002). Within the townships created by Apartheid policies, further racial segregation into minority ethnic groups meant that the already undermined, stretched resources and facilities became even more insufficient and as a result, health care services to this section of society worsened. Simultaneously on the other side of the fence, the economic downturn and pressures exerted on a already heavily taxed white minority population by the private sector and medical industry, caused the government to deregulate the health care sector (Kautzky & Tollman 2009: 21). After this, the privatisation of health care led to the rapid expansion of hospital-based curative services and facilities. This intensified the already severe rural / urban discrepancies in terms of resources and personnel distribution and raised the financial barriers to service access, further disadvantaging lower-income groups (Kautzky & Tollman 2009: 21). The volatile political era did not help the situation. The Soweto uprisings in 1976 caused many medical staff employed in public hospitals and facilities in townships such as this, to resign due to safety concerns. This placed an even heavier burden on already under-resourced facilities (Kautzky & Tollman 2009: 22). With the killing of Steve Biko in police detention in 1977 and the torture and murder of Dr Neil Aggett in 1982, health and health care services became increasingly politicised (McClellan & Jenkins 2003: 77-95). However, despite being the darkest period of South African history, the apartheid era witnessed the rekindling of a number of COPC principles in a variety of grass-roots initiatives. International missionaries and NGOs in the country recognised the value and resilience of the Pholela model and set up a number of health care facilities in the vulnerable under serviced township areas. An example of such a centre, pioneered in the 1970s by Erika Sutter of Elim Hospital, was the care-group movement, which involved hundreds and later thousands of volunteer village women. It began by targeting the eye condition of trachoma, after which efforts spread to infectious disease and, more broadly, issues of nutrition and income generation (Sutter & Maphorogo 2001: 47-49).

1940s

1960-1980

1980-1990

1994-2015

2016

1940s

1960-1980

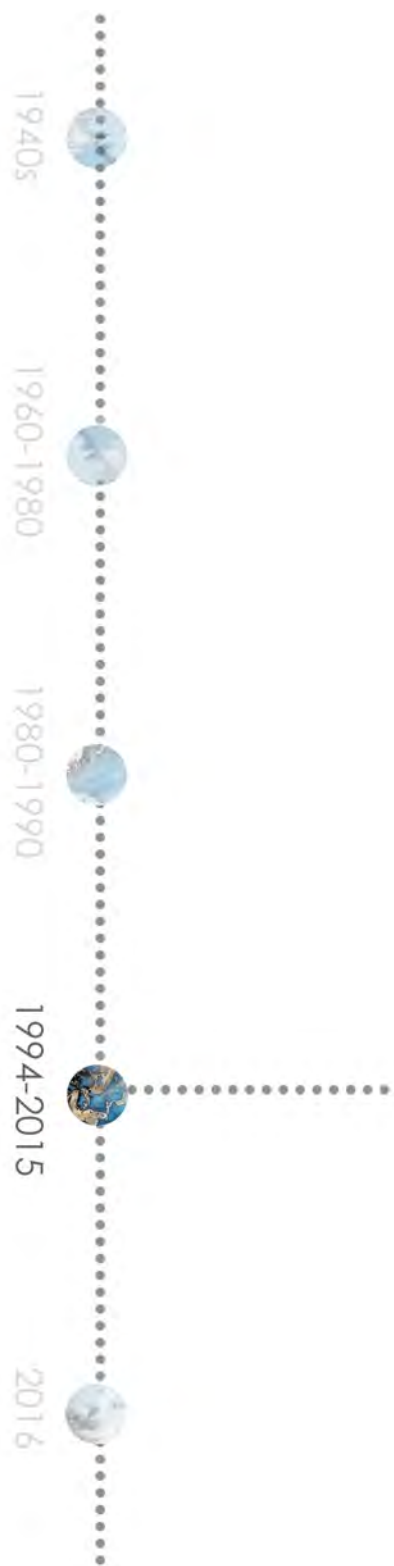
1980-1990

1994-2015

2016

1.3.3 REACTION TO APARTHEID

Inspired by Alma Ata and in fierce opposition to apartheid and the homeland health services, a range of organisations and individuals were organised in the 1980s to develop and promote a national primary healthcare strategy for South Africa. One of these was the National Progressive Primary Health Care Network (NPPHCN). This organisation called for the implementation of progressive primary healthcare in South Africa, and suggested basing it on four key principles: commitment to socio-economic development; community accountability; concerned health worker practice; and comprehensive care (Kautzky & Tollman 2009: 22). This organisation became important as it provided a critical platform whereby government policies could be openly challenged. In the late 1980s and early 1990s, members of the National Department of Health who belonged to this NPPHCN attempted to implement principles of the COPC into government health policy. However due to the apartheid mindset still being a stronghold, little was achieved (Tollman & Pick 2002).



1.3.4 DEMOCRACY

After the advent of democracy in 1994, the South African constitution recognised the past inequalities in terms of access to healthcare, and as a result, the Bill of Rights, Section 27 was established (SA 1997). As a result, a range of pro-equity policies and programmes was initiated throughout the public sector in order to make healthcare an equally available service to all. With many motivated members of the primary healthcare movement in the new National Department of Health, and a relatively clear policy direction detailed in the White Paper on the Transformation of the Health System, formally endorsed by Parliament in 1997 (Kautzky & Tollman 2009: 23), there was great enthusiasm for the transformation of the national health system. However the translation of these policies into practice proved to be difficult. In review of this, more policies such as the Breaking New Ground Policy (SA 2004), and the National Health Insurance (NHI) Green Paper (SA NDoH 2015), still promoting equal access to healthcare, have been endorsed by the government in order to revise the implementation of these principles (Kautzky & Tollman 2009: 23).

1.3.5 CURRENT STATE OF THE PROBLEM

The main purpose of the NHI Green paper was to eliminate the current tiered healthcare system where those with the greatest need were given the least access to healthcare provision and had the poorest health outcomes in our society (SA NDoH 2015: 1). This paper set out a number of guidelines in order to reform our national health model, however the one that relates back to the main issue within the South African healthcare model is the need to re-engineer the South African primary healthcare system (SA NDoH 1997:5). From a top down approach, the National Health Insurance (NHI) Policy uses countries such as Brazil's healthcare provision system as a precedent (Binge 2010). In the latest review of this policy, three possible streams for the provision of this primary healthcare are suggested, namely district based clinical specialist teams (DBCST), school based primary healthcare services and municipal ward based primary healthcare agents. Below is an image depicting the restructured healthcare model proposed in the National Health Insurance Policy Paper (SA NDoH 1997:37).

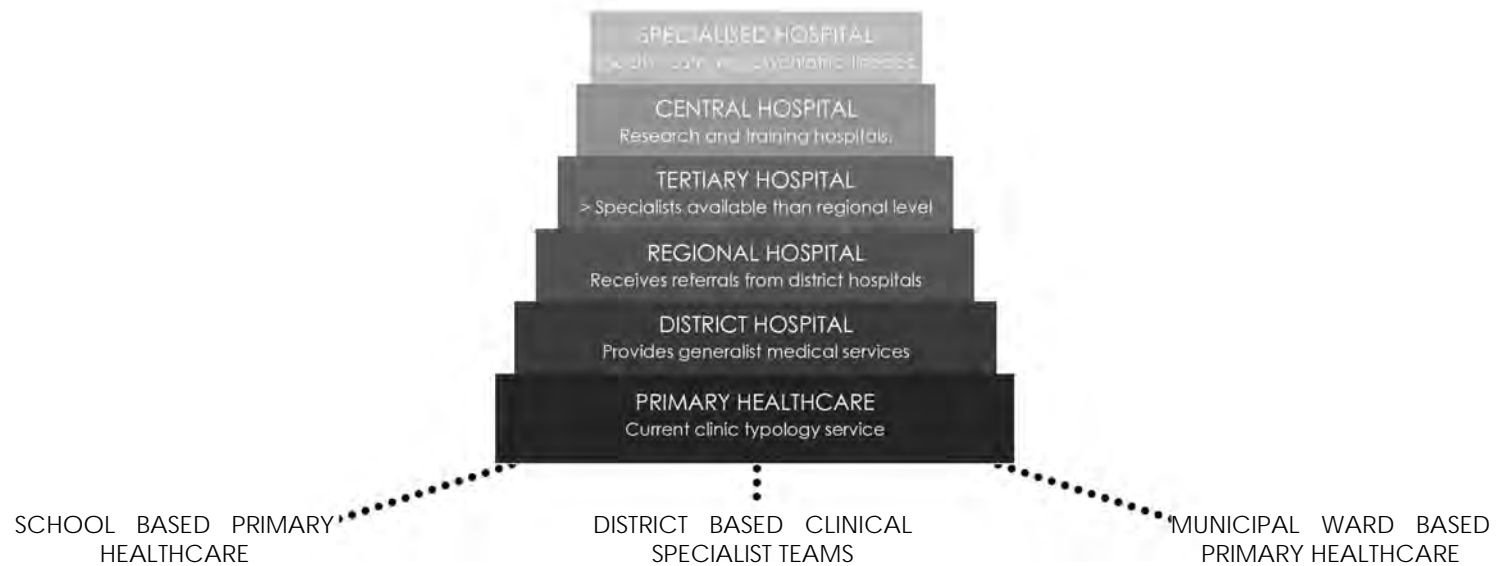
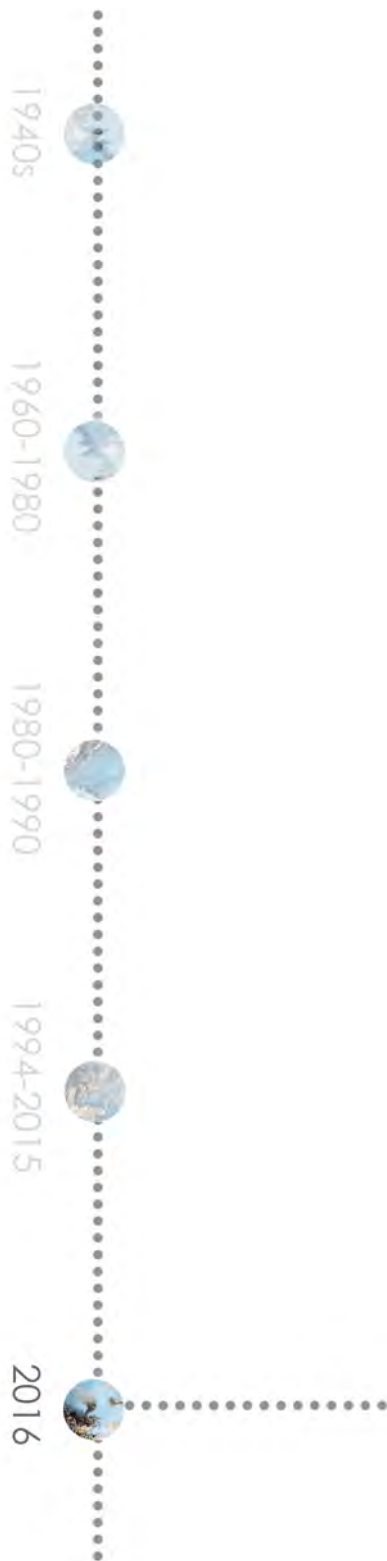


Figure 23. Proposed restructured model put forward by the National Health Insurance Green Policy Paper (Author 2016).

1940s



1960-1980



1980-1990



1994-2015



2016



Of these three streams, the concept behind the DBCSTs, whether it be on a more institutional, centralised level, possesses the most similarities to the ideas put forward in the Pholela healthcare model. In order to delimit the field of research and for the purposes of comparison, this dissertation will focus on the concept of district based clinical specialist teams (DBCST) which provide clinical support to local communities. The aim of these DBCST's is to provide integrated working practices between general practitioners and hospital based specialists (SA NDoH 2015: 18). The medical professions which make up these teams are identified in the policy document and are seen as a standard pattern throughout all district teams, despite any specific needs of the health profile of the district in which it is found. The focus of these DBCSTs is more biased towards a curative approach as opposed to a preventative approach (SA NDoH 2015: 18).

The 2008 World Health Report of the World Health Organisation (WHO), detailed three trends that undermine the improvement of health outcomes globally, one of these trends being hospital centrism, where there is a stronger curative focus than there is a preventative process (NDoH 1997:6). Therefore, having seen evidence of the successes and persistence of the concepts put forward by the Pholela healthcare model throughout the timeline discussed previously and considering the WHO report above, in order for these DBCSTs to become a part of a successfully re-engineered primary healthcare system, the driving concepts behind them should again adopt similar principles to that of the Pholela healthcare model. That is to say, a largely de-centralised healthcare model which makes use of population-based investigations to inform the provision of health services at a primary care facility. This model also encourages a holistic health care system, avoiding hospital centrism, by promoting a more preventative approach to healthcare through the incorporation of health education and health promotion in its system (Kautzky & Tollman 2009: 18). These concepts become evident in an independent, bottom up programme, the Community Oriented Primary Care programme (COPC), which involves the community in the delivery of healthcare (Marcus 2014).

One of the advantages which this programme provides over the proposed district health specialist teams, is the use of confirmed indications of needs from the community at hand in order to inform an appropriate provision of health services applicable to that specific community. The continuous monitoring and data recording of the health requirements of the community, by community members themselves, allows for the service provision to be updated according to the changing profile of disease which in turn, allows for a better health service provision. This model also allows for the preventative aspect of healthcare through education and promotion of health such as healthy eating and basic hygiene (Marcus 2014).

However, considering this system critically, one can see that at present, its independence severs it from the district and sub-district health facility development model proposed in the policy document. It may be more worthwhile to consider it as a supporting programme to the larger healthcare model, rather than a separate entity. In other words, considering a facility or programme which bridges the gap between the principles put forward by the COPC model and those put forward by the DBCST in order to improve the provision of holistic healthcare to vulnerable, low income communities within our society.

1.4 ARCHITECTURAL ISSUE- THE HEALING POWER OF PLACE

The World Health Organisation defines health as not only being free from disease or infirmity, but rather a state of complete physical, mental and social well-being (WHO 2003). Therefore the mental and emotional well being of the users also needs to be considered in this re-engineered primary health care facility. Research shows that architecture can play an important role in accommodating this statement by assisting the healing process and promoting the well being of the users (Dijkstra 2009:15).

Using the concept of the healing power of place and space (1995), Claire Cooper Marcus and Marni Barnes conducted research and investigations into the consideration of the emotional and spiritual well being of patients in healthcare facilities. The results of this research showed that this mental state of well being plays an important role in a patient's healing process. Including spaces in the design of healthcare facilities which are sensitive towards the emotional and spiritual aspect of patients helps to reduce stress and pain levels, boosting one's immune system in a way that allows one's own body, together with other treatments, to heal (Franklin 2012). The research also showed that this complete state of physical, mental and social well-being is not only important for the patients, but also for the other predominant user group of healthcare facilities, namely the medical staff (Franklin 2012). Interviews with medical staff, also conducted by Cooper Marcus and Barnes (1995), showed that when the medical staff of these healthcare facilities felt very stressed, they used restorative areas such as outdoor gardens just as much as the patients did for emotional and mental upliftment (Franklin 2012).

Historically healthcare facilities were provided with spaces where such an holistic state of well being for all users was considered. The earliest evidence of this recognition was found almost five thousand years ago by the holistic healers that practiced traditional medicine in China and India (American Holistic Health Association 2016). Both these practices recognised the importance of emotional and spiritual well being in the process of physical healing and used the concept of nature and herbal medicine as an influence (AHHA 2016). During this time, and for many years to follow, healthcare was practiced out of spiritual temples (Yi Shi Za Zhi 2002: 102-107). This idea of healing being closely associated with spirituality continued into the early years of Christianity where the church's charity ethos expanded into caring for the sick as well as for the vulnerable in society (Mann Wall 1998: 1). This ethos accompanied the growth of the monastic orders during the Middle Ages where wards, added onto medieval monastic cloister gardens, were seen to provide comfort and spiritual sustenance on top of healthcare (Mann Wall 1998:1). These establishments were seen to play an important role in civic life and many settlements were set up around them (Burpee 2008:1).

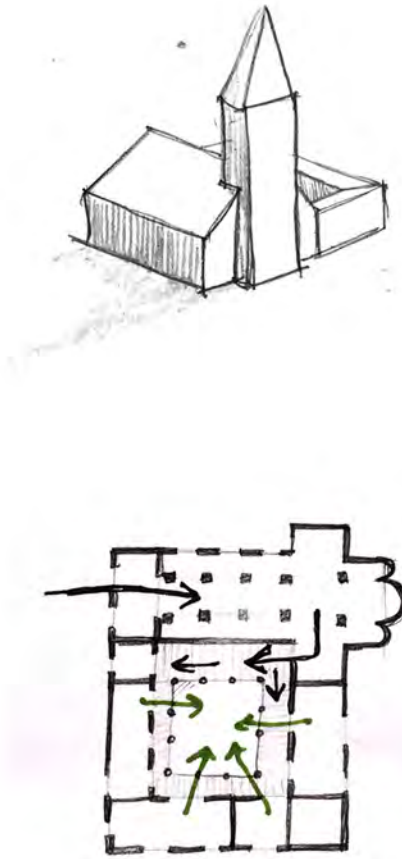


Figure 24. Diagram of monastic cloister layout (Author 2016).

The early stages of the Renaissance era saw the establishment of universities in Italy and Germany which became centers for the education of medical practitioners (Mann Wall 1998:1). This education in medical and surgical treatment became important in the way the sick were cared for and so hospitals developed into medicalised rather than religious spaces that were focused on catering for the physical aspect of healthcare more than the emotional and spiritual aspects (Mann Wall 1998:1).

The late 1700s saw a re-evaluation of this hospital form in order to create a standard hospital typology. This re-evaluation revisited the holistic aspect of healthcare by recognising that clean air and hygienic conditions are important agents in the healing process (Burpee 2008: 1). However, this realisation was once again lost after the outbreak of a number of wars which caused a higher demand for physical healthcare provision. In 1854, during the Crimean war, Florence Nightingale became witness to this neglect and set about trying to reassert the holistic idea of healthcare (Biography.comEditors 2016). Nightingale trained nurses in the importance of a patient's access to natural lighting, air, landscape, dietary awareness, entertainment and stimulation in the healing process. The implementation of such principles into the hospital which she was working in during this time resulted in a sanitary environment that reduced the hospital's deaths by two thirds (Burpee 2008:2). This led to her publishing Notes on Hospitals (1863) which explained how to run civilian hospitals properly. This publication influenced hospital design for the next hundred years (Burpee 2008: 2). The result of this influence was a pavilion design which provided adequate access to natural light and air, efficient circulation and humanistic principles for all users of the facility (Burpee 2008:2).

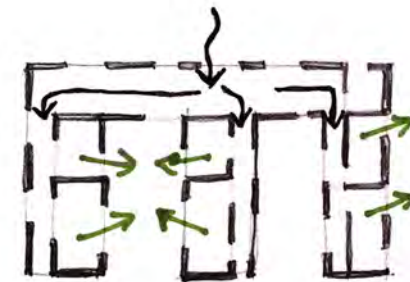
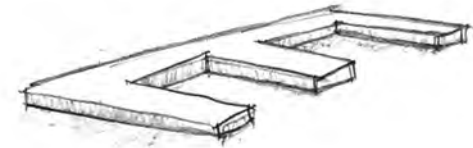


Figure 25. Diagram of Nightingale's pavilion layout (Author 2016).

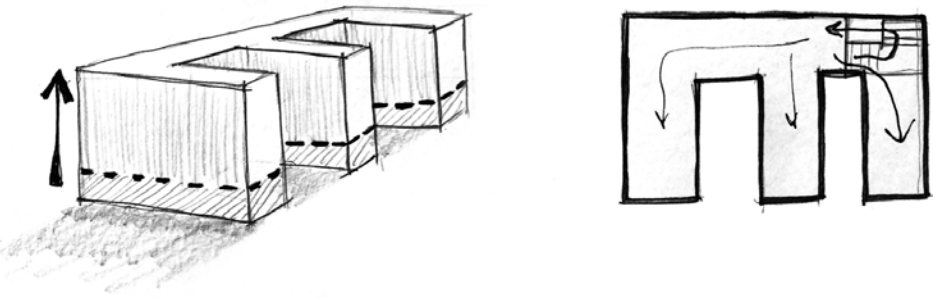


Figure 26. Diagram of industrialised machine like healthcare design (Author 2016).

Following another hospital boom after World War Two, these concepts put forward by Nightingale (1863) for hospital design were replaced with deep span, multi floor block buildings which could accommodate more patients with the sole focus of physical healthcare. The advancement in building technology aided this development by allowing for longer span structures, mechanically ventilated spaces and vertical circulation with elevators (Burpee 2008:2). This typology consisted of confusing circulation patterns and a perspective of hospitals being a well tuned machine rather than a holistic healing facility which also considers the emotional and spiritual factors for the patients, staff and visitors of the facility (Ulrich 2002: 2).

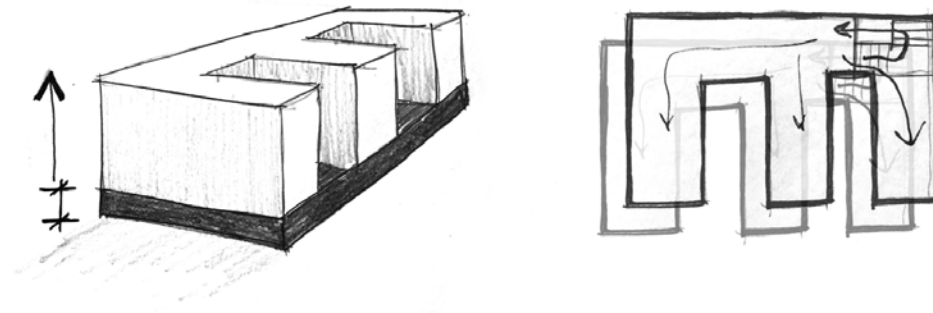


Figure 27. Diagram of the progression of the industrialised machine design (Author 2016).

Since the time of its inception, this model has become larger and taller, further limiting aspects of natural light, air and outdoor views which Nightingale (1863) found to be essential in the healing process, and designers and builders have maximised this machine like efficiency of hospitals without evaluating its effects on human health (Ulrich 2002:2).

The spatial manifestation of such principles is evident in the healthcare models often seen in current South African healthcare facilities. Here, rather than promoting the emotional and spiritual healing effects, physical healthcare provision is offered at the expense of healthcare facilities being characterised by fear, anxiety, stress and uncertainty (Dijkstra 2009:11). For example, from a top down approach, despite the National Health Insurance's proposed programmatic restructurings, one can see the spatial manifestations of the current governmental healthcare facilities that are in existence today. The sole function of such facilities relies on the efficient delivery of curative healthcare treatment for the physical aspect of healthcare with little respect for the emotional and spiritual effects of the spaces on the users (Cooper Marcus 2005).

For example, in terms of provision for the community of Plastic View, observations were made by the author during a site visit in order to explore the Steve Biko Academic Hospital. This hospital, established in 2007, is a tertiary health care facility intended to provide specialised and highly specialised services to patients referred to the institution by their local clinic (Gauteng Province Health Department 2016).

Parking is scarce for the size of this institutional facility and sometimes patients have to wait in a vehicular queue on the road outside, or park their car far away and walk in. Upon arrival at this hospital, patients are made to enter through an uncomfortable and unwelcoming security check point threshold. If patients are unable to pass this point, or would prefer to wait outside until their appointment, they are made to wait outside on hard wooden benches which are positioned parallel to and facing the movement of other visitors entering the facility. This situation doesn't allow for any privacy or quiet spaces for the waiting patients and also causes some congestion during the busy opening hours (Author's observations 2016).

The first entry point into the hospital facility consists of a deep space where already the evidence of natural daylighting and ventilation have been forgotten in the space. This has resulted in a dark and stuffy entrance space. The choice of finishes on the hospital surfaces does not help to alleviate this dark and depressing feeling as every surface is painted in shades of grey and brown. The internal waiting area, tucked into the corner of the entry space, is packed with patients waiting to attend their appointments on more hard wooden benches.

The little natural ventilation supplying this internal waiting area is tainted with the smell of cigarette smoke from the smoking area attached to the adjacent hospital cafe (Author's observations 2016). After passing this waiting area in order to gain access to the rest of the facility, the user is met with the generic hospital corridor typology with harsh artificial lighting and the same dreary colour finishes which continue throughout the building (Author's observations 2016). These initial observations made during the progression through the entry spaces to the

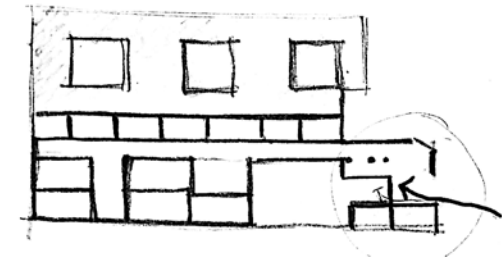
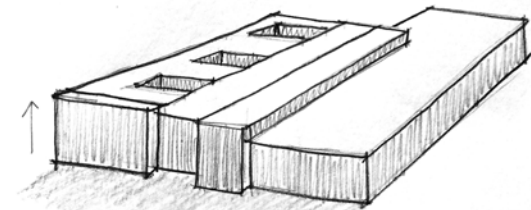


Figure 28. Diagram of Steve Biko Academic Hospital layout. Exhibiting similar principles to figure 20 (Author 2016).

hospital immediately show the lack of awareness for the emotional and spiritual affects of the spaces on the users. Instead, the spaces induce the same anxious, uncomfortable feelings felt induced by so many other such facilities in the South African society (Author's observations 2016). The same can be said for the mental and emotional effects on the medical staff who work at this facility as they are constantly exposed to this environment. There are however, programmes in South Africa such as the previously discussed COPC programme, which attempt to address these negative spatial characteristics.

What this process presents as a development, is the consideration for the holistic state of well being of the community. From this bottom up approach, healthcare provision is taken to the community by community health workers with the intention of providing a more preventative aspect of healthcare that supports the activities already in existence in the community (Marcus 2014). This action of the community being supported and visited in the comfort of their own homes begins to initiate positive emotional responses towards health care provision as it becomes a comforting and familiar, rather than anxious experience.

However, despite this advancement in the consideration of the patient spatial experience, little spatial regard is given to the holistic state of well being of the health workers and medical staff conducting the household visits. The facilities used as a base for these health workers are often found operating out of temporary health outposts or existing clinics in the area, as is the case in the informal settlement of Alaska in Mamelodi (UP Arch (Hons) 2015). Therefore these posts may be seen to exhibit similar spatial consequences to that of the current clinic typologies in South Africa. Another such example which is more contextually suitable to the location of Plastic View, is the Pretorius Park Clinic. This clinic, like many others in South Africa, is an under resourced facility made up of spaces that receive little natural lighting and ventilation. Some of the consultation rooms in this facility are found on the inside of the building and therefore don't even have access to a window. The staff facilities which the health workers would also make use of, such as tea rooms and ablutions, are limited in size and offer little consideration to the mental well being of the medical staff servicing the community. For example the seating options available in these tea rooms and the lack of designated outdoor/relaxation spaces.

From the examples shown above, one can see that the current healthcare provision programmes and facilities do not provide for the holistic state of well being of all users of the space. In order to assist in creating such a situation, an intermediate scale facility between the two approaches discussed above is suggested; namely, a place of holistic healing which provides physical healthcare support, as well as mental and social healing to all users of the space. In order to achieve this, the investigation proposes not only confining healthcare to a specific facility, but rather spreading healthcare and healing further into the community by using preventative healthcare to support community activities. Iain Louw (2006) theorises that considering such an interaction will produce a design with a new set of spatial relations that provide a unique fit of user community with site, need, and resource (Louw 2006:48). A characteristic which would allow for a place of healing that facilitates a hybrid form of co-existence between the community and the generic healthcare typology (Louw 2006:45). As many successful forms of co-existence are evidenced to be built through relationships of respect and recognition and are often widely understood as being related to social inclusion and social integration (Berns & Fitzduff 2007: 2), this dissertation proposes a health care facility which consists of community oriented, socially inclusive spaces, rather than simply a destination for physical healthcare treatment. Examples of the re-examination of this typical hospital block form in order to provide for what is suggested above, already began to occur in Europe in the 1980s, and has more recently become a question of research in South Africa as well (Burpee 2008:3).

Figure 29. Context Photo (Author 2016)

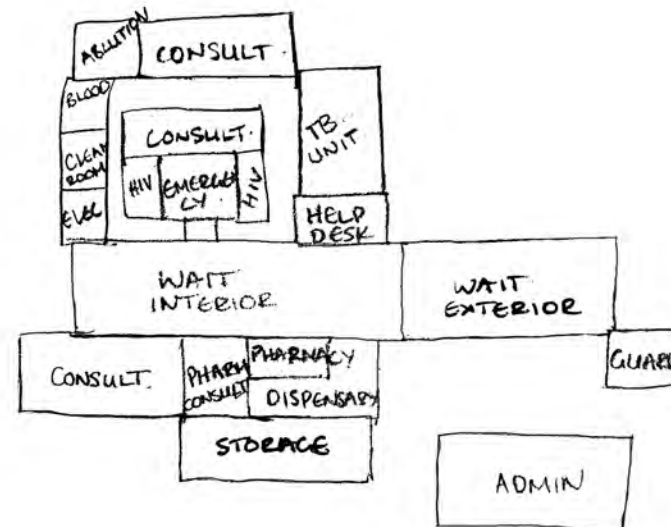
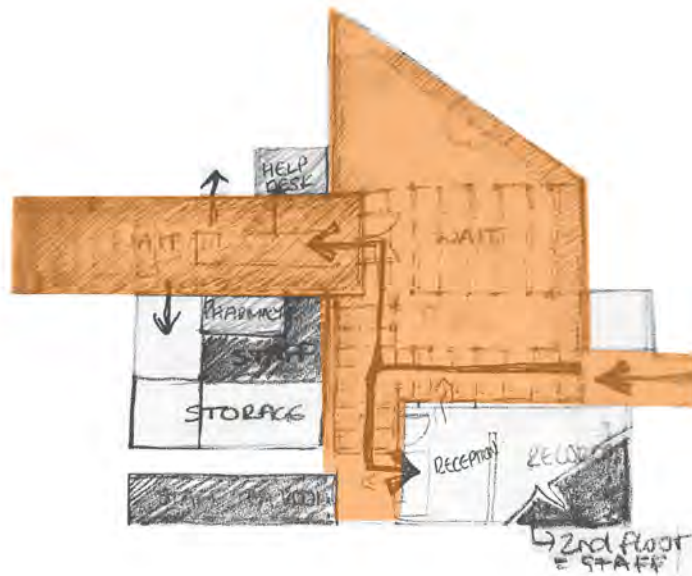
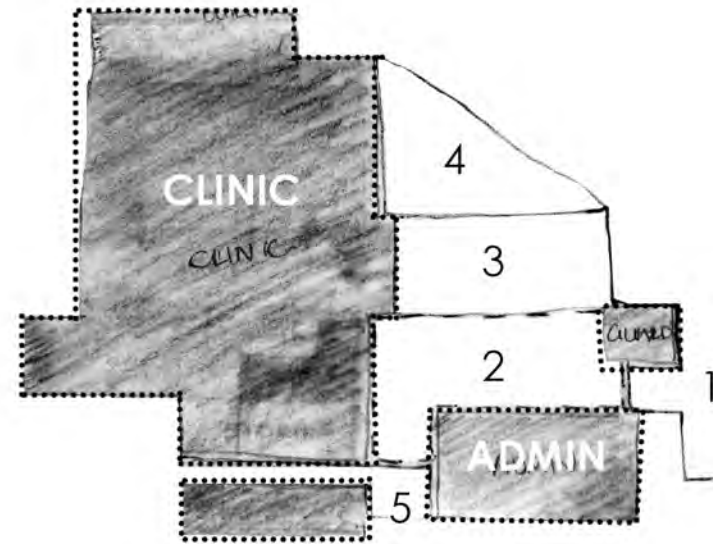
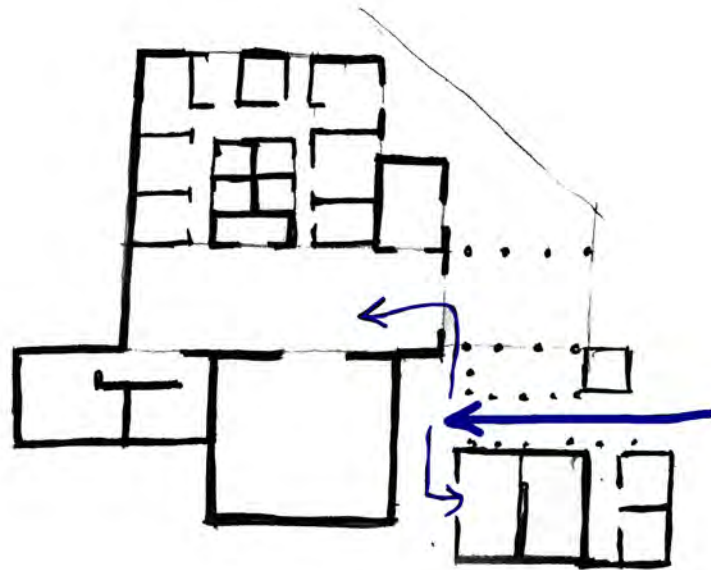


Figure 30. Diagrams of Pretorius Park Clinic layout, showing circulation and flow, hierarchy of courtyards, public vs staff space and organisational layout (moving clockwise from top left)(Author 2016).



1.4.1 PRECEDENT STUDY

The Department of Health in the Western Cape has begun to implement a strategy for a number of healthcare facilities resonating with the intentions and concepts discussed above. These healthcare facilities reassess and challenge previous healthcare facility typologies in under privileged communities in the province where access to primary care is restricted, through the provision of Community Health Centres and, more lately, Community Day Centres (Constable 2015:41). Examples of such facilities include the Hermanus Community Day Centre and the Du Noon Community Health Centre.

The Hermanus Community Day Centre, located in Hermanus in the Western Cape, was designed by Gallagher Lourens Architects (GLA) and was opened to the public in January 2015 (Barker 2015). The intention behind the facility was to challenge the legacy of poor healthcare facilities as well as alleviating the consequences of the spatial legacy left behind by the apartheid era (Barker 2015). In order to achieve this, the architects' intention was to design a healthcare facility which created comfortable, protected, healthy and emotionally uplifting spaces to encourage positive interaction between the users and the facility (Barker 2015).

Figure 31. Images of Hermanus Community Day Centre by Gallagher Lourens Architects (Lourens 2015).



The Du Noon Community Day Centre, found in Milnerton in Cape Town, was designed by Martin Kruger Associates and was officially opened in December 2014 (Barker 2015). The key design considerations that drove the architects' approach to the project was the facility's connection to the public realm, the public future of the building and the hierarchical order of public spaces in order to determine the facility's layout (Barker 2015). These considerations led to a design that boasts people centered spaces made up of diverse public halls and small courtyard gardens which are broken up by corridors that act as light sources and waiting spaces (Barker 2015). A number of spatial thresholds helped to organise the internal functions of the facility whilst simultaneously providing a sense of public to private hierarchy and sense of security (Barker 2015).

Figure 32. Images of Du Noon Community Day Centre by Martin Kruger and Associates (Kruger 2015).

Both these facilities adopt a preventative rather than curative approach to health care and allow the users' needs to lie at the core of the functionality and architectural design of the building (Constable 2015:41). The design and construction of these health centres, facilitated by the Department of Transport and Public Works (DTPW) feature a number of prominent principles (Barker 2015) which became valuable guiding principles for the beginning stages of the design development process.

What is evident in both designs is the intention to not only create a physically healing environment, but also comfortable, emotionally and spiritually uplifting spaces through user centred designs: A direct contrast to most current healthcare facilities in the South African context.

1.4.2 CRITICAL REFLECTION

Whilst these examples show advancements in healthcare facility design by considering the users' needs and comforts as important informants they are, at present, still solely a centre for the provision of healthcare. Therefore, this dissertation intends to build on the potential of these preceding design principles through proposing a multi-functional healthcare community support centre which facilitates a holistic state of well being by considering the users' emotional responses and interactions with the facility as well. The importance of considering this human experience and interaction in the design process is highlighted by Heidegger (1971) in his essay *Building, Dwelling, Thinking* (Sharr 2007: 2-3). In this writing, Heidegger emphasises that the consideration of such principles increases the value of the meaning of spaces and creates a productive mutually dependent relationship between the building and its users (Sharr 2007: 36). Therefore, in order to enrich the value and meaning of the spaces in the facility, this dissertation considers how the community may further intensify this relationship between space and experience by increasing the user interaction with public spaces such as the waiting areas, public entrance threshold and the facility's facades (Sharr 2007:3).

For example, in both the Hermanus and Du Noon health centres, the public waiting spaces situated on the street edges which act as a threshold into the facility, are seen to possess the sole purpose of a waiting area. Whilst design consideration was given to the sensory comfort of these spaces, they may be seen to be separate entities to the emotional experiences and qualities of their inhabitation (Sharr 2007: 2) as they possess no further interaction or meaning past this purpose. The hard seating options provided and the position of this seating does not encourage interaction between patients or passerby pedestrian traffic. To achieve this intensified user interaction, the dissertation intends to include additional programmes into these public interface spaces, such as healthy eating and health education programmes, which strengthen the preventative aspect of the design and also provide apt opportunities for the reintegration of the making of space with the activities and qualities of its inhabitation (Sharr 2007:3). The aim of these added programmes is also to further physically intensify the relationship between the street edge and public entrance threshold into the facility, in other words, blurring the edges between street edge and entrance threshold, encouraging further possibility for larger community interaction with the healthcare facility.

Figure 33. Context photo (Author 2016)

1.5 PROJECT INTENTIONS

Therefore, the intention behind this dissertation is to stitch the gaps in primary healthcare provision within our urban context by re-evaluating the typical healthcare facility typology, which has developed into more of a machine like efficient building that gives little consideration for the mental and social well being of the users.

In order to achieve this, the possibility of the de-centralised COPC model supporting the larger healthcare model is suggested so as to make healthcare a more accessible amenity to all.

In order to do so, this dissertation aims to investigate the possibility of a spatial engagement of the community in an accessible healthcare facility that facilitates both a healthcare provision aspect, as well as a healthcare outsource base.

Using the principles laid out in the Pholela and COPC healthcare models, the project intends to adopt a primarily preventative attitude to healthcare which exists as a spatial intermediate between the facilities proposed in the top down and bottom up approaches. The pause areas or waiting areas located within the site are seen as places of manifestation for this preventative approach through programmes such as healthy eating, health awareness and health education.



Figure 34. Context photo (Author 2016)



CHAPTER TWO

2. Design Concept, Programme and Theoretical Informants

2.1 Concept

2.2 Programme and Client

2.3 Theoretical Informants

Figure d. Older man (Author 2016)

2. DESIGN CONCEPT, PROGRAMME & THEORETICAL INFORMANTS

2.1 CONCEPT

As highlighted in the previous chapter of this dissertation, one can see that the current healthcare facilities in the South African context are grossly inadequate in terms of both service provision and accessibility to holistic healthcare for all members of society. Therefore the main investigation behind this dissertation is into an alternative health care facility design which investigates overcoming these inequalities in order to make holistic healthcare more accessible to all.

Considering the issues laid out in the first chapter of the dissertation, the main conceptual driver began with the investigation into a hybrid form of co-existence between the spatial organisation and scale of the current proposed top down approach and the existing bottom up approach towards health care. The intention behind this being to investigate the spatial manifestation of an intermediate scale holistic healthcare provision facility which becomes both a base for care givers to be visited by the community, as well as a dispersion point from which health workers can carry out visits to the community.

Using the Pholela health care model as a precedent, the intention is for this facility to adopt a primarily preventative approach to health care so as to better support the holistic well being of the community whilst also offering a supporting small scale curative aspect when needed (Kautzky & Tollman 2009: 18). When referring to the holistic well being of the community, this is not only seen to encompass the holistic well being of the patients visiting the facility, but also the staff working at the facility as well as the larger community interacting with the public areas of the facility.

Another important driving concept for this dissertation is to investigate a health care facility which considers the design's spatial effects on the mental and emotional well being of all its users and observers (Cooper Marcus 2005). This is intended to encourage a preventative approach to holistic well being rather than simply replicating a machine oriented facility made up of insensitive inhumane spaces solely intended for medical health care delivery. In other words, adopting a shift in focus from delivering curative health services to a more patient-centred one that encourages health promotion, prevention and community involvement.

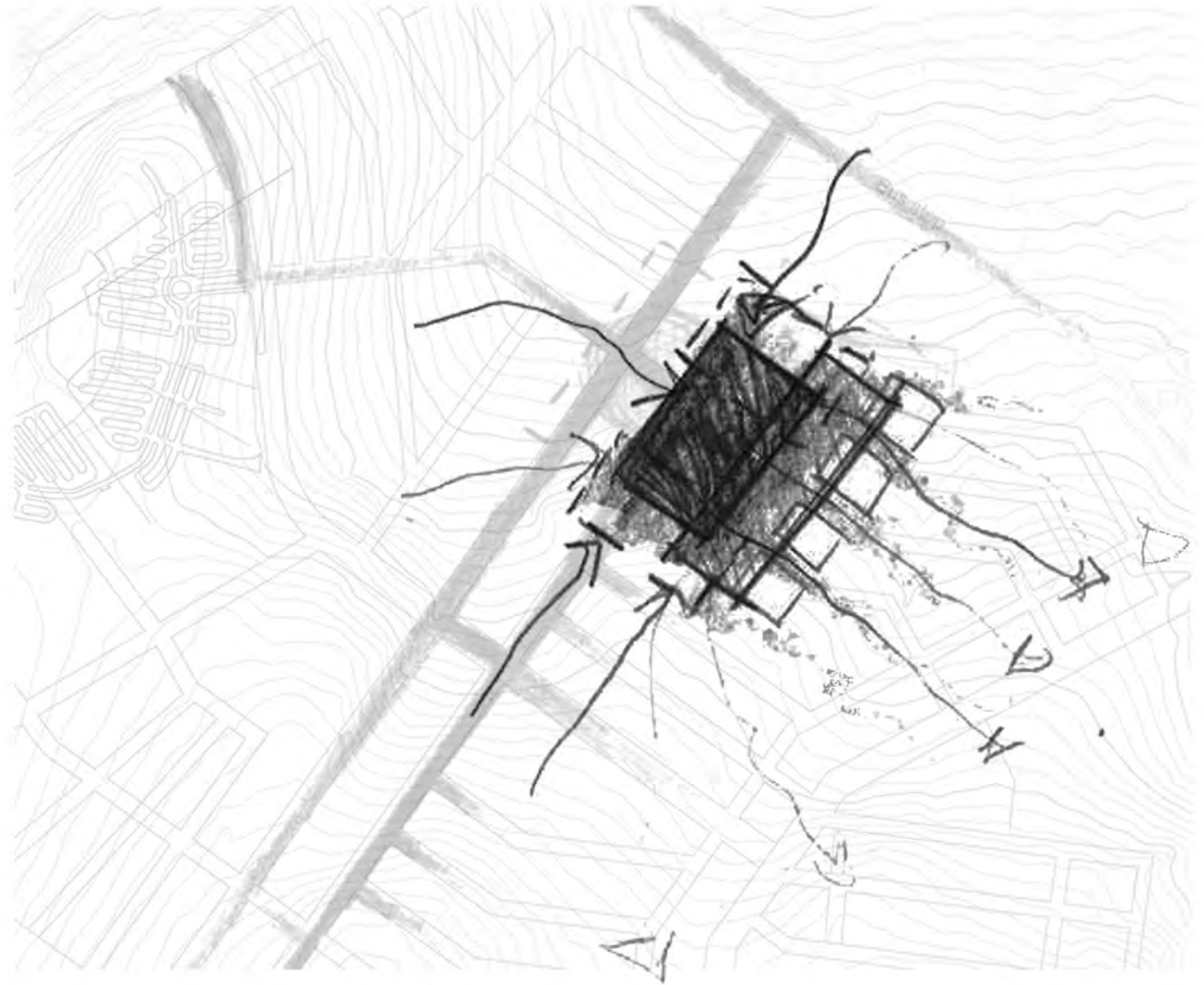
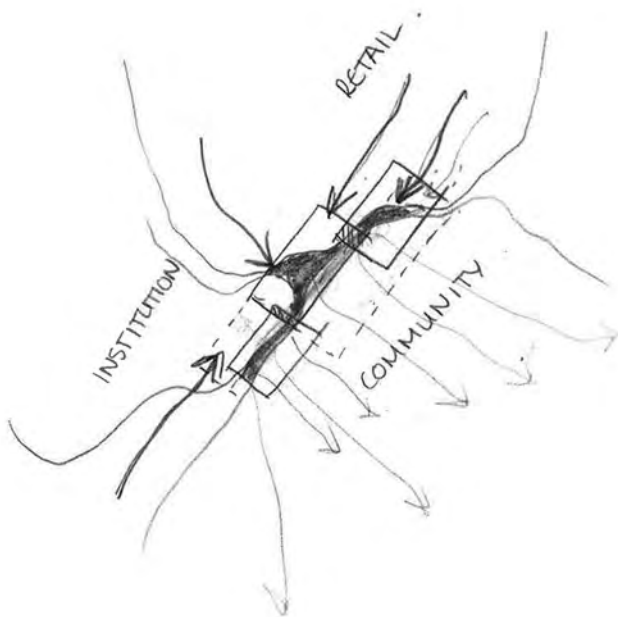


Figure 35. Diagrams illustrating conceptual intentions (Author 2016).

2.2 PROGRAMME AND CLIENT

In order to implement this concept, the evaluation of the users which would be directly engaging with the facility and the refinement of the programme that they would be engaging with, was first considered. This evaluation concluded that the primary users of the facility's spaces include the medical staff, facility staff, patients, visitors as well as the larger community passing by the facility during their daily commute. In order to specify the programmatic functions of the facility, the focus on a primarily preventative health care approach with a small scale supporting curative aspect was refined.

So as to accommodate both these preventative and curative aspects of health care, the programme is suggested to be divided up over three main stages of health care attention, namely; immediate care/attention, intermediate care/ attention as well as long term care or support.

The immediate care or attention is catered for in the clinic typology sector of the design. A national health profile survey conducted by the National Department of Health, informed the illnesses/issues catered for by the clinical programme which includes a mother and child care unit, chronic illnesses consultation rooms, an injury and trauma unit and an infectious diseases ward (NDoH 2015:19).

The other two stages of care may be seen as the preventative approaches to health care in the programme. The intermediate care is seen to be provided by the COPC community health workers who conduct household visits into the surrounding community, and provide healthcare education and training to the community. Their offices, as well as the training spaces and community meeting rooms are suggested as the more public interface area of the programme. This public interface includes other public spaces which double up as waiting areas in some instances, and are seen as a comfortable engaging environments from which other activities promoting the preventative aspects of long term healthcare, such as healthy eating, are based. For example, the inclusion of a vegetable garden to the northern corner of the site which softens the site's street edge to the adjacent pedestrian boulevard.

The main intention behind the inclusion of this garden is to expose the passers-by to the process of growing and harvesting healthy fresh vegetables. It also acts as a supply chain to the kitchen facility found adjacent to it. This kitchen is anticipated as a shared activity which engages with the public realm through the pedestrian boulevard and with the health care facility itself. Another aspect to this long term care stage is manifested in the residential aspect of the programme, which allows for the rehabilitation of trauma or abuse victims of the community. Therefore, the programme for the research project may be summarised as a community healthcare support centre with the client being the community of the Plastic View precinct, including the health care facility staff.

Conceptual Accommodation Schedule:

A. Community Interface:

-COPC healthworker's office	x1 open plan
-Community meeting rooms	x5
-Community training rooms	x4
-Residential units for abused patients	x3
-Residential unit for nurse/warden	x1
-Public restaurant & kitchen	x1
-Vegetable garden	x1
-Ablutions	x8 (4;4)
-Waste disposal	x1

B. Clinic:

-HIV/TB consultation rooms	x4
-Mother and child consultation rooms	x4
-Chronic diseases consultation rooms	x3
-Emergency ward with after hours access	x3
-Records	x1
-Reception	x1
-Help desk	x1
-Pharmacy	x2 outlets
-Ablutions	x5

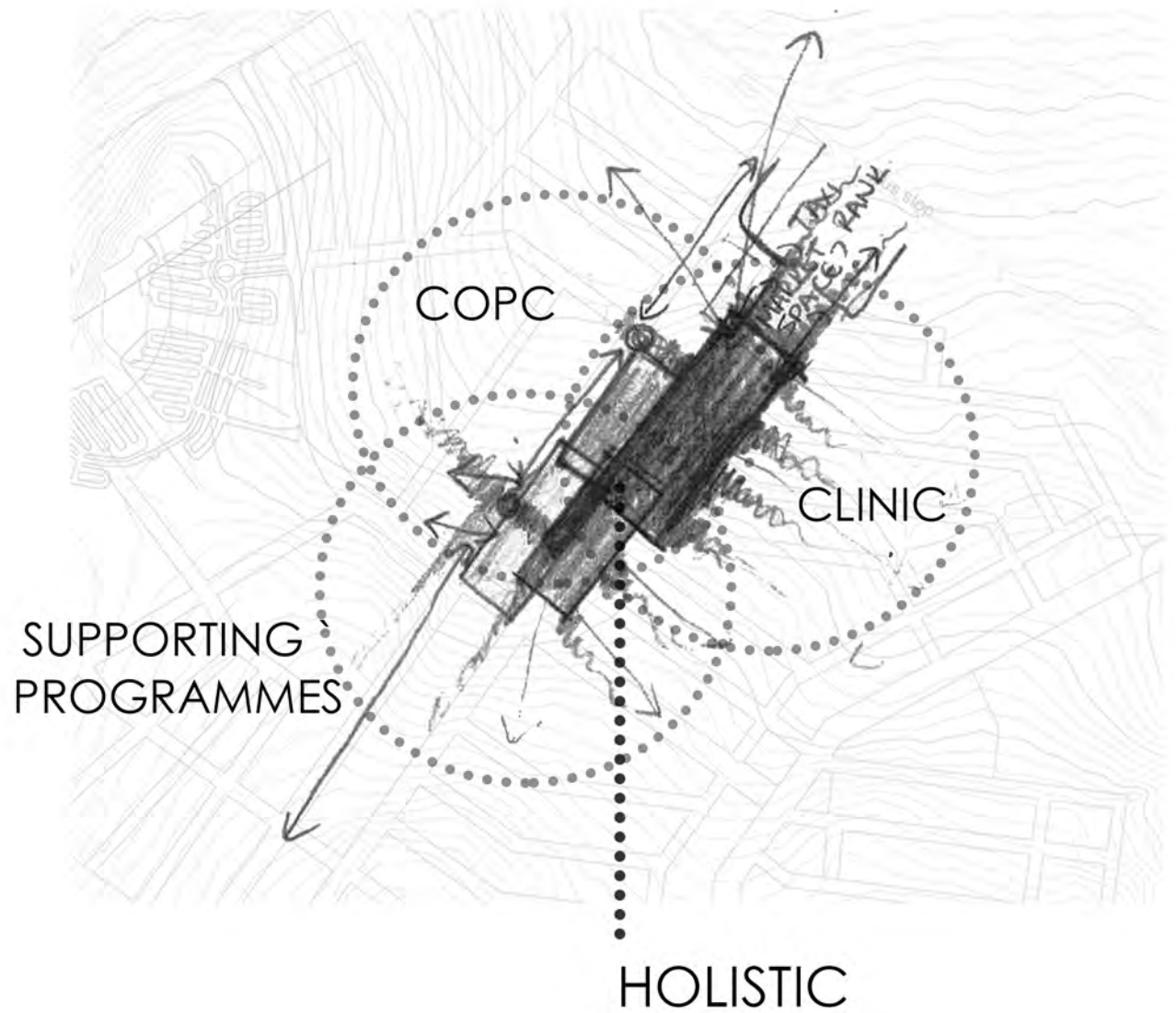
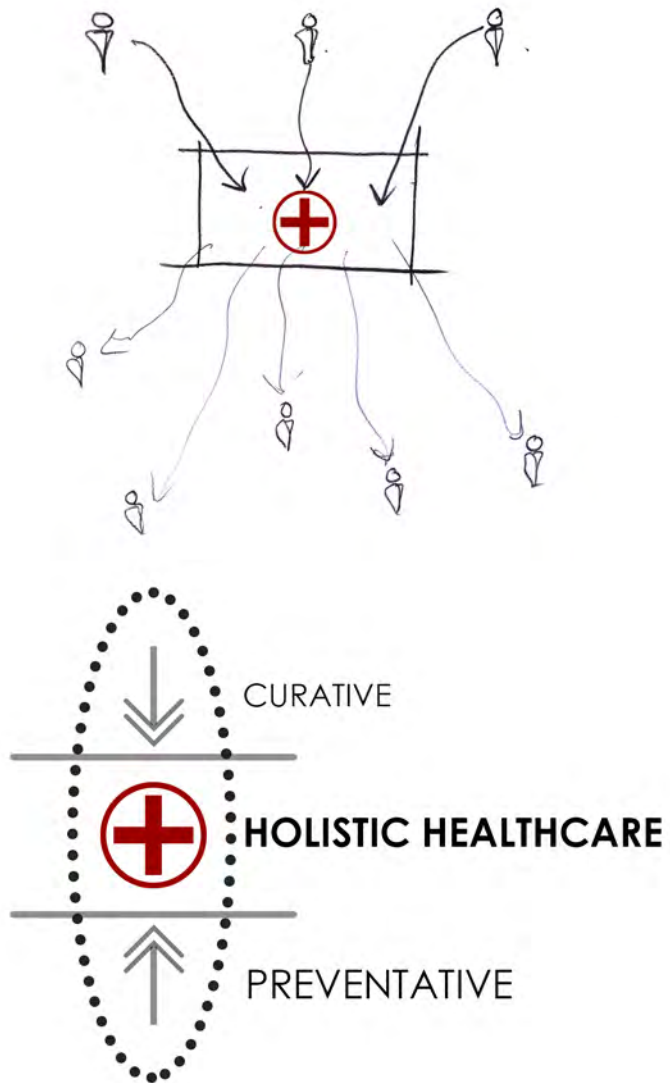


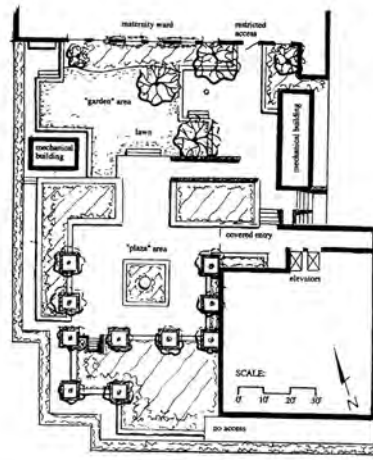
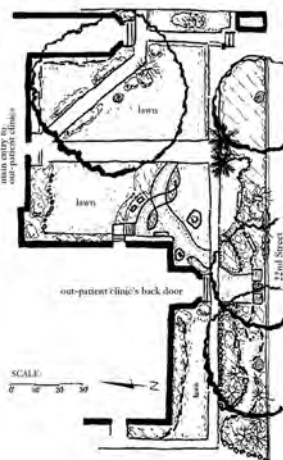
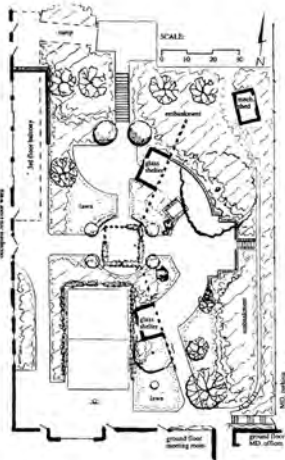
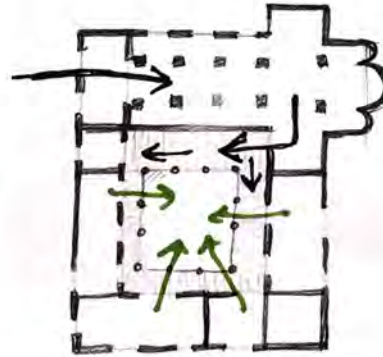
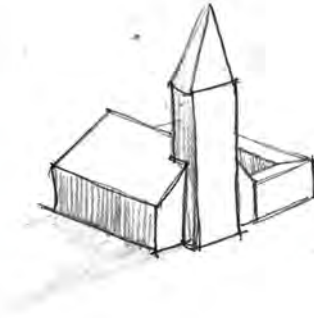
Figure 36. Diagrams illustrating programmatic intentions (Author 2016).

2.3 THEORETICAL INFORMANTS

As explained thus far, one of the main conceptual informants for this dissertation is the consideration for the holistic well being of all the users of the facility as well as the larger community on the Plastic View precinct. As the facility programme is aimed to deal with the preventative and curative aspects of physical health care, the main purpose of the theoretical drivers was to inform the architecture of the facility to focus on the mental and emotional effects that a space can have on the users' well being. This dissertation delimits the investigation to two main theoretical approaches which focus on considering all user groups of the health care facility, namely the interior users as well as the pedestrians passing the outside of the building.

The first theoretical driver focuses on the holistic well being of the interior users of the facility, and deals with the previously mentioned concept of the healing power of place and space, as explored by theorists such as Ulrich (1993), Cooper Marcus (1995) and Sternberg (2013). This concept was first explored by Roger Ulrich (1993) through a number of strict experimental controls and quantified health outcomes in order to demonstrate the health benefits of just overlooking a garden, or natural area in improving the well being of patients, family members and staff of health care facilities (Ulrich 2002: 1). The purpose of this research was to raise awareness about the unacceptable conditions which the current day health care facility presents with regard to the lack of provision for the mental and emotional effects that these spaces have on the well being of the users (Franklin 2012).

Ulrich's (1993) argument emphasises that despite the intense stress caused by illness and traumatic experiences at health care facilities, little attention is given to creating calming environments that would address the emotional needs of patients and staff (Ulrich 2002: 2). This argument was strongly supported by developments made in mind-body medical science (Ulrich 2002: 2) where scientific evidence recorded that an area of the human brain responds to beautiful views, generally landscapes and nature, by releasing a set of endorphins into the body (Sternberg 2013). These endorphins are responsible for reducing negative emotions such as anger, anxiety and pain by promoting positive feelings such as relaxation and a sense of calm, which promotes mental well being and in turn, physical healing (Cooper Marcus & Barnes 1995: 2).



The work of landscape architects, Cooper Marcus and Barnes (1995), further expanded on the physical manifestation of Ulrich's (1993) theories by studying several hospital designs in Northern California which incorporate gardens and courtyards. The physical layout and daily use of the hospital gardens in these facilities was documented through observational studies and interviews with patients as well as staff members of the facilities (Cooper Marcus & Barnes 1995: 2). The results of these case studies produced unequivocal evidence of the therapeutic possibilities introduced by the inclusion of gardens and courtyards in health care facility design, not only for the patients, but also for the mental upliftment of the health care facility staff (Franklin 2012).

For example, the hospital patient recovery was recorded as being much faster when patients were able to look out at vegetation rather than surrounding buildings (Cooper Marcus & Barnes 1995: 2) and interviews with staff members showed that the garden spaces were used as a positive place of escape to help them cope with their stressful work shifts (Ulrich 2002: 6).

By considering the different aspects of these facilities which made them into such successful healing spaces, Cooper Marcus and Barnes (1995) then suggest a set of design standards for health care facilities in order to reduce stress and promote mental and emotional well being of the users, namely; the inclusion of landscaped grounds and courtyards, a human scale sensitive entrance, locational and way finding elements, plaza/public space and healing gardens/viewing gardens within the facility design (Cooper Marcus & Barnes 1995: 11-21). These standards were then used as a conceptual design precedent for the start of the design development process, specifically focusing on the connection between interior spaces of the facility and the surrounding natural landscape in order to promote the mental well being of both the visitors and the staff.

Figure 37. Diagrams showing Cooper Marcus and Barnes (1995) theories and their relation to the historical context on the left (Author 2016).

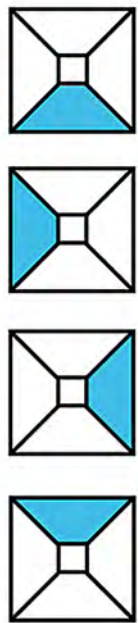


Figure 38. The sidewalk explained as a room (Bloomberg et al 2013:9,60).

The second theoretical driver considered as an important informant in the design process considers the holistic well being of the larger community interacting with the exterior of the facility.

As explained previously, the streets surrounding the facility are intended to be pedestrianised and therefore, for the sake of the following explanation, may be viewed as large sidewalks. Walking down these sidewalks may be seen as a healthy event in itself as it is a form of physical exertion, however the mental and visual stimulation of the facility's facades becomes important in impacting on the emotional well being of the community members walking past (Bloomberg et al 2013: 11).

The text *Active Design: Shaping the Sidewalk Experience* (2013), investigates a number of case studies where these visual and mental stimulations are explored. This text suggests, with reference to many theories put forward by well known urban designers such as Jan Gehl (2010) and Jane Jacobs (1961), what may be incorporated in order to create comfortable, enticing sidewalk experiences (Bloomberg et al 2013: 11) which provide opportunities for social interaction and community engagement with their context (Bloomberg et al 2013: 21).

In order to explain the sidewalk and what elements may be incorporated to achieve the latter, this text conceptualises the sidewalk as a room, where the wall plane is created by the adjacent building facades, the floor plane is created by the ground surface and the roof plane is created by the sky/ overhead elements such as trees (Bloomberg et al 2013: 8).



Through the use of case studies and examples, the text explores each of these planes and how they may be designed in order to encourage mental and visual stimulation and enhance the sidewalk experience (Bloomberg et al 2013: 46-65). Whilst all of these planes are seen to add to the sensual experiences of the passers-by, the information most influential on this dissertation's design development, was the investigation of the wall plane in informing the interaction of the health care facility with the passing pedestrians. Following what this text suggests, the first step in analysing this wall plane involves the consideration of the human scale. According to the average height and visual access of a pedestrian, the two lower floors of any building are seen as the portion of the facade which the community interacts with the most (Bloomberg et al 2013: 33).

Figure 39. The sidewalk explained as a room, using the senses (Bloomberg et al 2013:9,60).



Therefore complexity, vertical elements and continuous variety are suggested for these two levels in order to heighten the visual stimulation effect of the facade and break down the length and rhythm of a long sidewalk vista, as well as breaking down the building mass to a pedestrian scale (Bloomberg et al 2013: 31). This may be achieved through the inclusion of elements such as awnings, balconies, signage, planters, seating, stoops and architectural detailing (Bloomberg et al 2013: 62). The degree of transparency and visual hierarchy of the facade also becomes important in informing this visual stimulation and mental interaction with the sidewalk as it entices passers-by with the activities taking place in the interior of the building whilst balconies and awnings affect the overhead plane of this space and what may be visible above (Bloomberg et al 2013: 60). Intermediate transparency, in other words not completely transparent but not completely closed off, has been proven to be the most engaging for the particular scale that this dissertation is dealing with (Bloomberg et al 2013: 31).

This suggestion of different facade depths, transparency and textures was taken into consideration together with the recognition of what programmes were taking place within the facility in order to inform what should and should not be visually accessible to the public. For example, as one of the programmes suggested is health education, the concept of transparency was incorporated into the visual access to this education in order to raise awareness of health care education. In order to further improve the passers-by experience of the building facade, this text also suggests encouraging pedestrian interaction by providing places to sit or to stop and talk, creating entrances that are recessed or pushed out onto the sidewalk and the introduction of the occasional stoop and planter (Bloomberg et al 2013: 31). The recognition of the role that all these layers and elements play in shaping the sensual experience of the pedestrians walking past the facility, became an important informant in the way that the facades of the design were handled going forward.

Figure 40. Context photo (Author 2016)



CHAPTER THREE

- 3. An Introduction to Site Specifics
 - 3.1 Site Location and Justification
 - 3.2 Site Specifics

Figure e. Typical residential structure in Plastic View (Author 2016)

3. AN INTRODUCTION TO SITE SPECIFICS

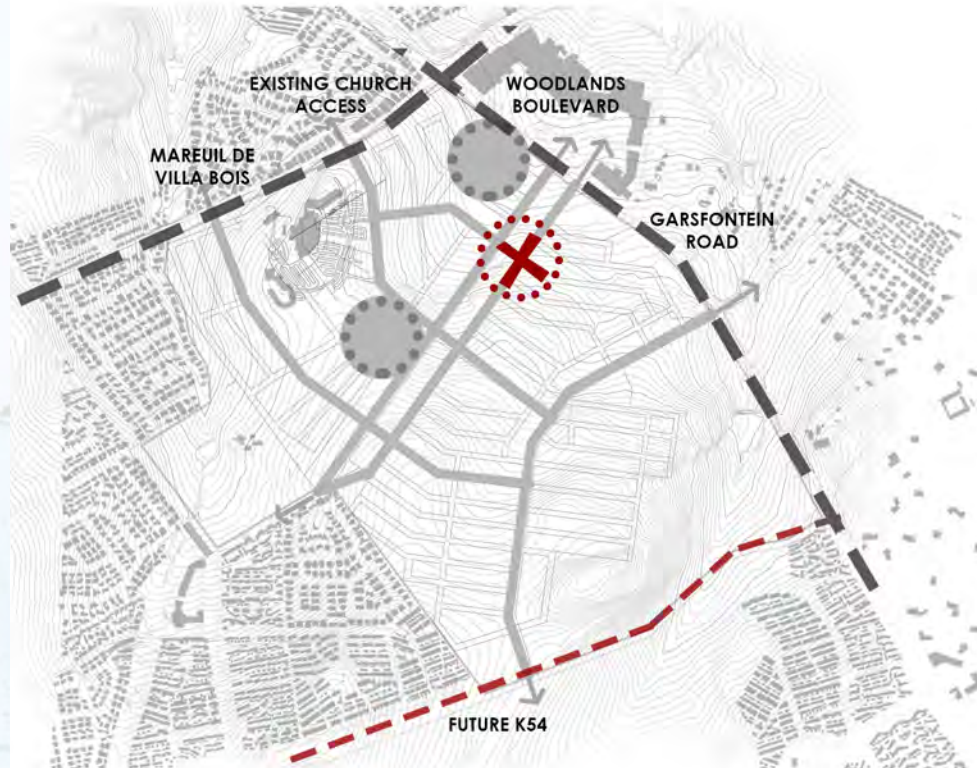


Figure 41. Site Location in context of the larger urban framework (Author 2016).

3.1 SITE LOCATION AND JUSTIFICATION

As evidenced in earlier chapters of this dissertation, health care at present is not an easily accessible amenity to the community of Plastic View. Therefore, together with the research potential of the site justified previously, the choice of site is seen to make health care a more easily accessible amenity to all in this area.

As mentioned in the urban vision chapter of this dissertation, all the individual research proposals on the Plastic View precinct branch off from the main access boulevards across the site. The reason for this is to build on the envisioned energy spine which this boulevard is intended to create.

To further strengthen this idea, Salat's (2011) theories on creating successful resilient cities show that basic amenities such as healthcare provision, should be found within accessible walking distances throughout the urban fabric (Salat 2011: 400-401).

Therefore, in order to enable such opportunities, the site for this dissertation is situated along the line which roughly demarcates the middle of the proposed framework, making it an equally visual and physical accessible amenity to the community on site. This situation is shown opposite, with the location of the other basic amenities, namely food and education, also shown in grey.

The proposed programme and client base for this intervention suggests the need for a large amount of community interaction and pedestrian traffic. Based on what the framework anticipates, the choice of site location is seen to allow for this as it is based on an intersectional access node between the vehicular and pedestrian boulevards, with a drop off point being found on the vehicular route. This intersectional position suggests the site as a dispersion point of commuters into the residential part of the framework, in other words, a desire line of movement for the community during their daily commutes. Based on the anticipations of the urban framework, this suggests convenient accessibility to the facility from this route. This position also advocates the opportunity for the engagement of the community with the facility by providing the additional healthy eating and health education activities suggested for the programme.



Figure 42. Urban edge conditions around proposed site, with activity and intersectional node illustrated (Author 2016).

The site location is also found as a transitional space between the larger scale retail/ commercial oriented part of the framework, and the smaller scale residential part of the framework. This position supports the ideas laid out in the architectural issue as it provides a convenient point for an intermediate scale facility which the community may visit to receive healthcare, and a convenient point for the healthworkers to disperse from in order to conduct households visits within the community.

The urban vision for the northern edge condition of this site location suggests a slower traffic movement area with less activity, as it is situated away from the main intersectional node and pedestrian drop off point. However, it is still situated on an access road into the residential area and so is not seen as a corner without any activity. This situation provides the conditions for a more private aspect of the programme, namely the healthcare facility which the community visits in order to receive medical attention.

3.2 SITE SPECIFICS

Due to the lack of infrastructure and built fabric on the larger precinct, the conditions of the surrounding context for this proposed site were informed by a set of guidelines laid out in the urban vision, which created a number of informants for the design to respond to. As discussed in the introduction chapter of this dissertation, these guidelines were informed by the framework proposed by StudioMAS, as well as the group's theoretical stand points which were influenced by Salat (2011) and Steyn (2005).

To the north west of the site, the area cornered by Garsfontein Road and De Villa Bois Mareuil was zoned as a high density/ mixed use typology consisting of a variation of three to five storey buildings intended to accommodate formal retail and office environments. This high density area is bordered to the south by the main vehicular access road across the precinct which connects Garsfontein road to the residential area on the Western edge of the precinct. A pedestrianised island hosting one-two storey infrastructure buildings is intended to accommodate informal retail activities and also to act as a buffer between this vehicular access road and the pedestrian boulevard running parallel to it. The anticipation is for the community to filter from the vehicular access road through these retail activities, onto the pedestrian boulevard. This pedestrian boulevard runs along the north west border of the dissertation's proposed site with an intersectional road connecting it to the vehicular access road via a drop off point on the north western corner of the site.

The buildings surrounding the proposed site on the north east, south west and south east of the site, are zoned to be two-three storey medium density live work units which gradually transforms into one-two storey low density residential living units towards the southern end of the precinct. All access roads envisioned from this pedestrian boulevard into these residential areas, are anticipated to be predominantly pedestrian oriented.

In order to inform the aforementioned building footprints, the urban vision uses the theories put forward by Alexander's *A Pattern Language* (1964). Influenced by the thinking in this text, a study was undertaken into the footprint patterns currently existing in a number of informal settlements; namely Alaska in Mamelodi (UP Arch (Hons) 2011-2015), Slovo Park in Johannesburg (UP Arch (Hons) 2010-2013) and in Plastic View itself. The process undertaken in this study consisted of the analysis of a number of programme specific settlement resolutions, specifically considering how these programmes then informed the relationship between the street edge and building. These situations were analysed through both plans and sections and included; modal intersections, private edges, public edges, pedestrian oriented retail, vehicular oriented retail, formal and informal trade and recreational spaces. These situations are illustrated on the following page.



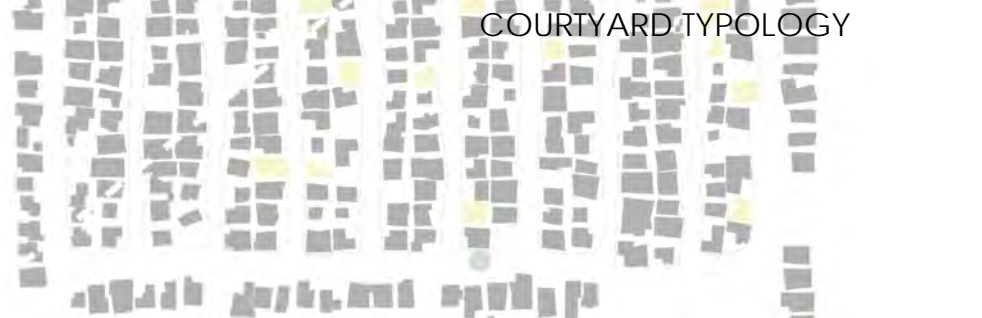
STREET NEIGHBOURHOOD TYPOLOGY



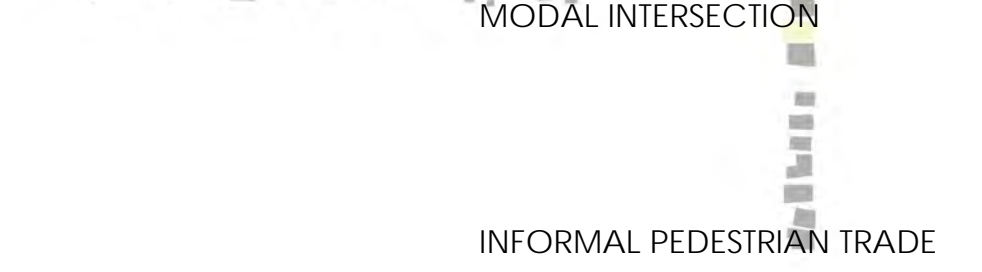
MULTI FUNCTIONAL RESIDENCES



COURTYARD TYPOLOGY



MODAL INTERSECTION



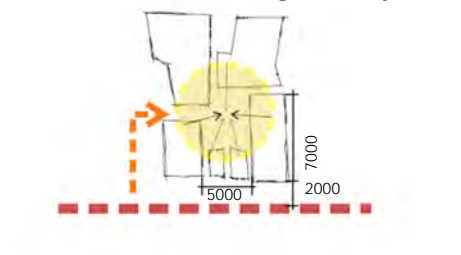
INFORMAL PEDESTRIAN TRADE



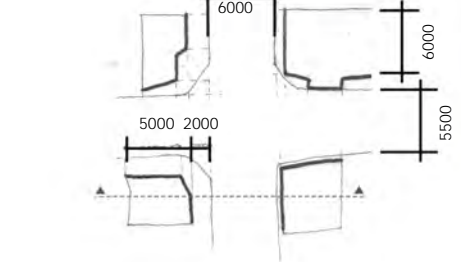
Mixed use each with different levels of street interaction. Residential entrance situated away from busy intersections



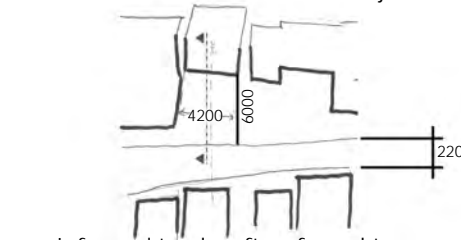
Residential structures often host additional entrepreneurial activities, these are set back from the street forming a courtyard that presents an opportunity for social interaction



Residences face onto a communal courtyard that allows for social activity and passive security



Informal trade often found adjacent to nodal intersections



Informal trade often found to encroach on pedestrian roads

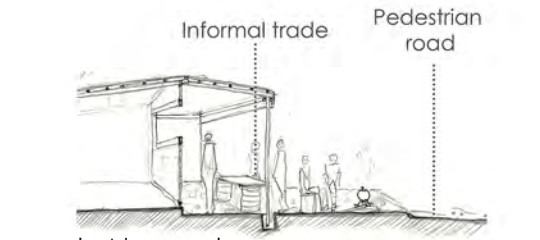
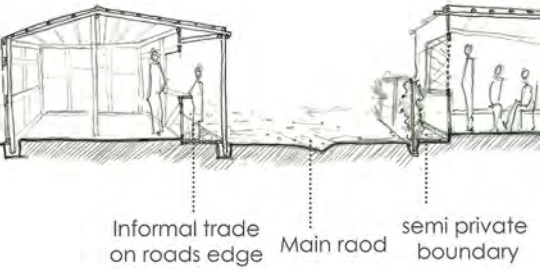
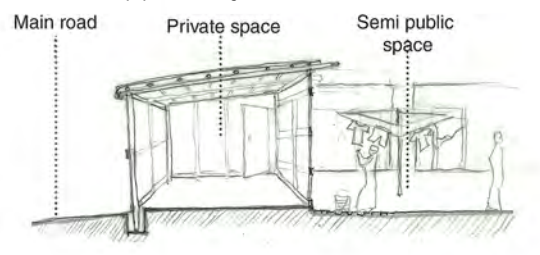
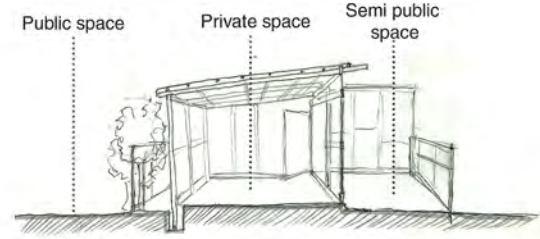
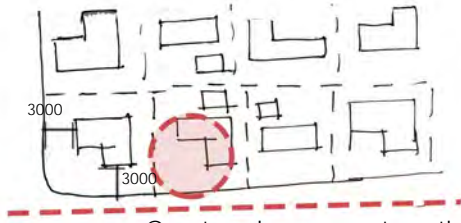
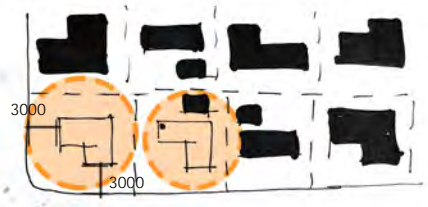
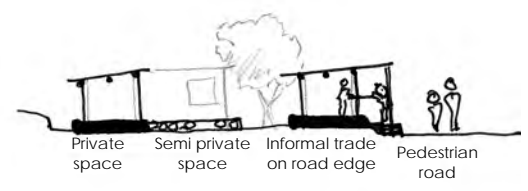
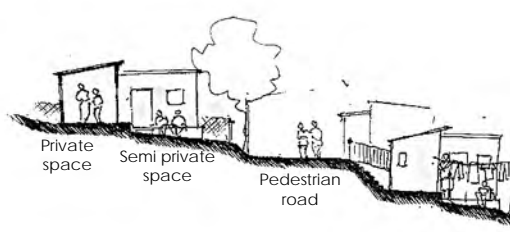
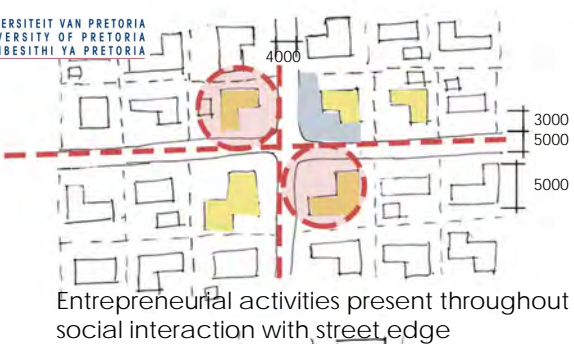


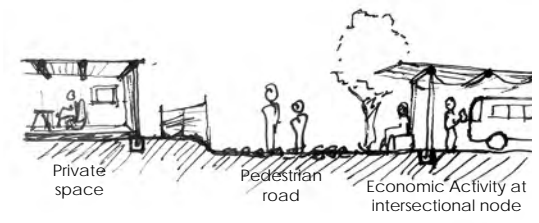
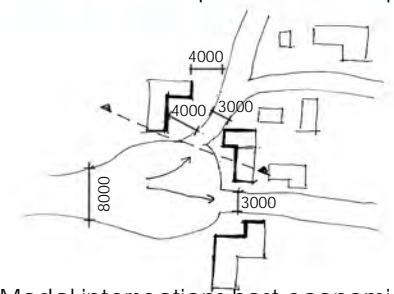
Figure 43. Plastic View typology study (IIP Arch M(Prof) Research 2016).



COURTYARD TYPOLOGY-PLINTH AS SOCIAL SPACE

Courtyard space acts as threshold to residential structures. The presence of a plinth creates a platform for social activity with the street edge

MODAL INTERSECTION



INFORMAL PEDESTRIAN TRADE

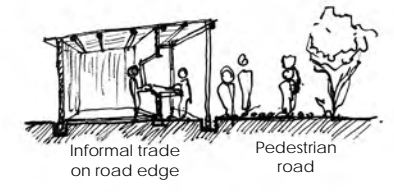
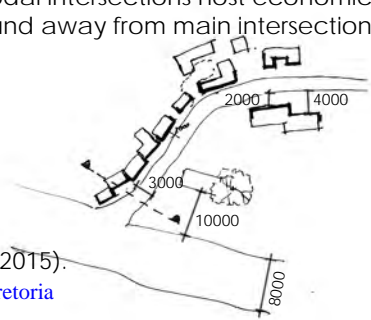
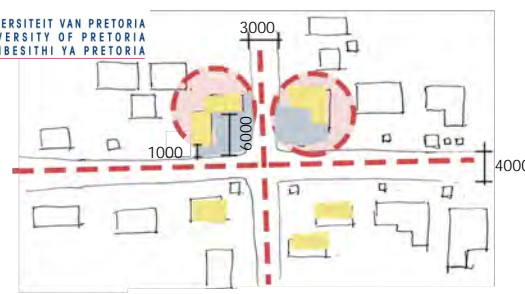


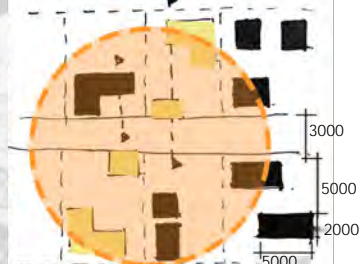
Figure 44. Alaska typology study. (UP Arch Hons Research 2015).



STREET NEIGHBOURHOOD-TYOPOLOGY



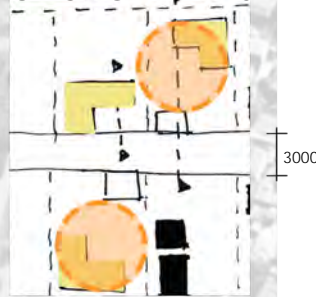
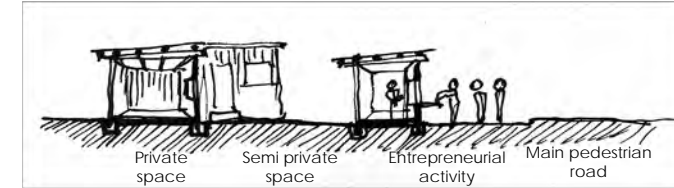
Mixed use each with different levels of street interaction.



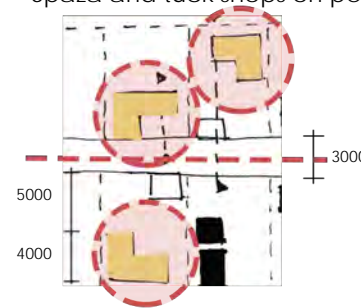
MULTI FUNCTIONAL RESIDENCES



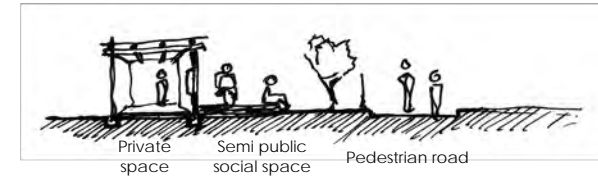
Spaza and tuck shops on pedestrian movement routes, some create social spaces



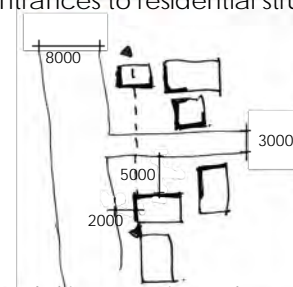
COURTYARD TYPOLOGY



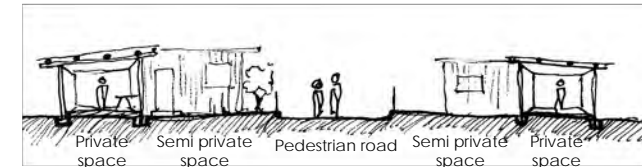
Entrances to residential structures through a courtyard threshold



MODAL INTERSECTION



Modal intersections play an important role in the community. Structures are set back to create social spaces



INFORMAL PEDESTRIAN TRADE

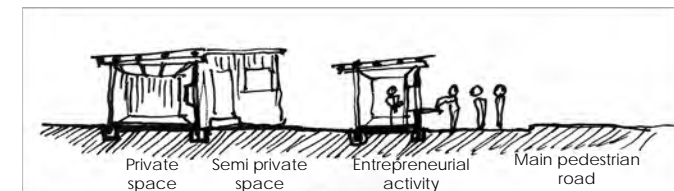
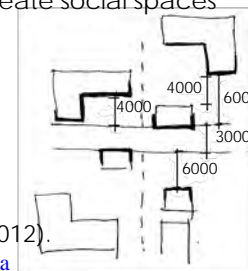


Figure 45. Slovo Park typology study. (UP Arch Hons Research 2012).

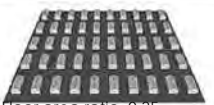





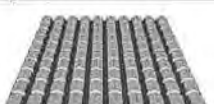





	DETACHED	STACKED	PERIMETER
50 du/ha	 <p>Floor area ratio: 0.25 Coverage 25% Height: 1</p>	 <p>Floor area ratio: 0.25 Coverage 7% Height: 4</p>	 <p>Floor area ratio: 0.25 Coverage 8% Height: 4</p>
70 du/ha	 <p>Floor area ratio: 0.35 Coverage 35% Height: 1</p>	 <p>Floor area ratio: 0.35 Coverage 9% Height: 4</p>	 <p>Floor area ratio: 0.35 Coverage 12% Height: 4</p>
100 du/ha	 <p>Floor area ratio: 0.5 Coverage 50% Height: 1</p>	 <p>Floor area ratio: 0.5 Coverage 12% Height: 4</p>	 <p>Floor area ratio: 0.5 Coverage 16% Height: 4</p>
120 du/ha	 <p>Floor area ratio: 0.6 Coverage 60% Height: 1</p>	 <p>Floor area ratio: 0.6 Coverage 15% Height: 4</p>	 <p>Floor area ratio: 0.6 Coverage 16% Height: 4</p>

Figure 46. CSIR density parameters (CSIR 2011:4).



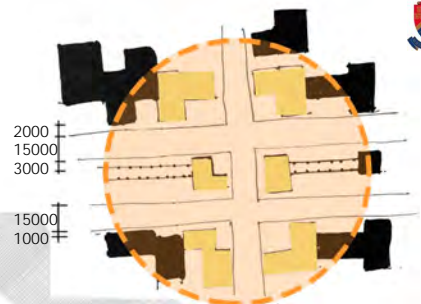
Figure 47. Urban edge conditions around proposed site (Author 2016).

Based on the anticipated programmes intended on site, the results of these situational studies were then used as informants for the urban edges around this dissertation's proposed site.

For example, retail based on the vehicular access boulevard is found to be much closer to the road side than it is on the pedestrian boulevard. This allows pedestrians to wander along the boulevard and take in the retail options available from a distance whilst vehicles moving at a faster pace are able to catch glimpses of retail activities placed closer to the roadside.

As was often the case in these settlements, residential buildings become multi functional spaces housing both retail and residential activities, evident in the live work units proposed by the framework. The retail aspect is seen as the public interface of this building and is situated directly on the street, whilst the residential aspect is found in the more private realm, which in the case of the urban vision and the multi storey typology indicated, is found raised above the street. The intention behind this situation being to encourage constant activity of people entering and exiting the building which strengthens the passive surveillance of the street. Entrances to solely residential buildings are set back from the main thoroughfare, and make use of a public square or courtyard that acts as a primary threshold to the building entrance. This threshold may be seen to service a number of residential blocks in some cases. This courtyard typology is also used to access more private business or retail activities. The use of planters and vegetation may also be used to create a threshold, as seen in some residential back of house situations in the aforementioned case studies.

In order to achieve the anticipated density on site, the urban vision needed to specify the footprint size of these surrounding residential and retail blocks. A document developed by the CSIR (2011) which specifies a number of principles regarding the spatial implications of low, medium high density housing gradients and various floor area ratios was used in order to guide this design decision (CSIR 2011: 4). According to this document, an area of high density occupation, as is specified for the areas near the chosen site, would consist of 120 dwellings/ha (du/ha) with each unit covering the minimum living unit area of 50m² (CSIR 2011:4). Therefore, in order to achieve this figure at a floor area ratio of 0.6, the residential block footprint sizes would be at an area of 200m²/block (UP Arch MArch (Prof) 2016). This average footprint size would also then allow for larger unit sizes for larger families occupation as well as single units in the residential block design of the urban vision.



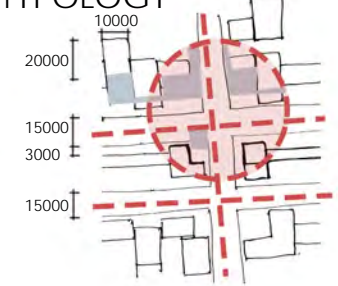
STREET NEIGHBOURHOOD TYPOLOGY



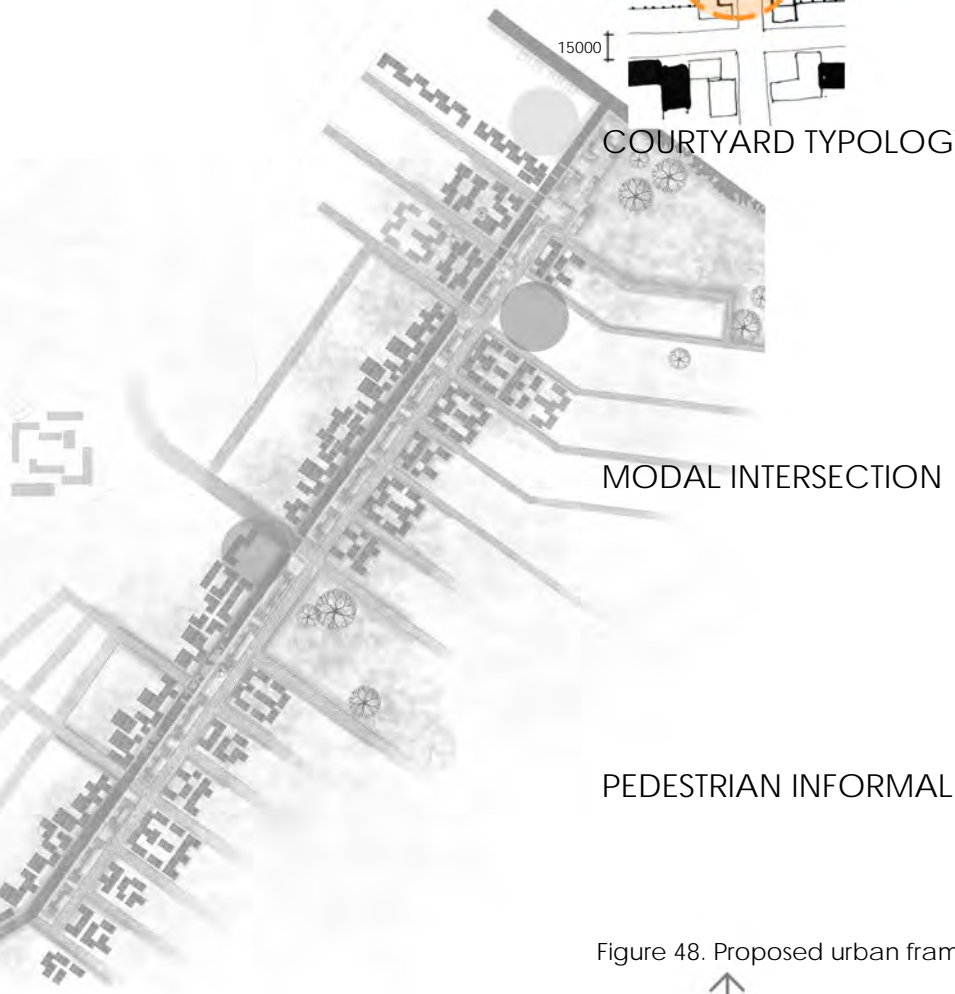
Mixed use, mixed density streetscapes



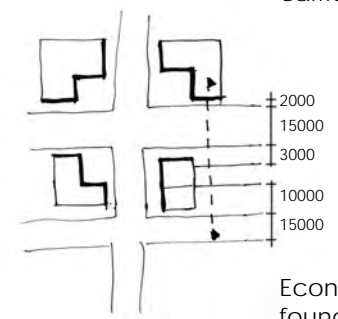
COURTYARD TYPOLOGY



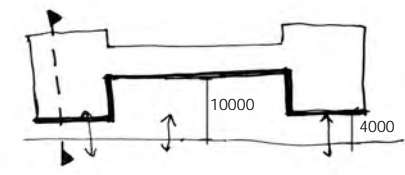
The courtyard typology seen in the informal settlements was carried through into the framework



MODAL INTERSECTION



Economic activities situated around courtyard social spaces are found at modal intersections



PEDESTRIAN INFORMAL TRADE

Pedestrian informal trade situations are set back from the movement routes which create social spaces adjacent to stalls



Figure 48. Proposed urban framework typologies. (UP Arch M(Prof) Research 2016).





CHAPTER FOUR

- 4. Design Development
 - 4.1 Site Analysis
 - 4.2 Conceptual Development
 - 4.2.1 Conceptual Development Re-evaluation
 - 4.3.1 Architectural Typology Case Studies
 - 4.3.2 Organisational Case Studies
 - 4.3.3 Access, Circulation and Flow
 - 4.3.4 Facade Development
 - 4.3.5 Mid-Year Review Design Evaluation

Figure f. Conceptual Sketch (Author 2016)

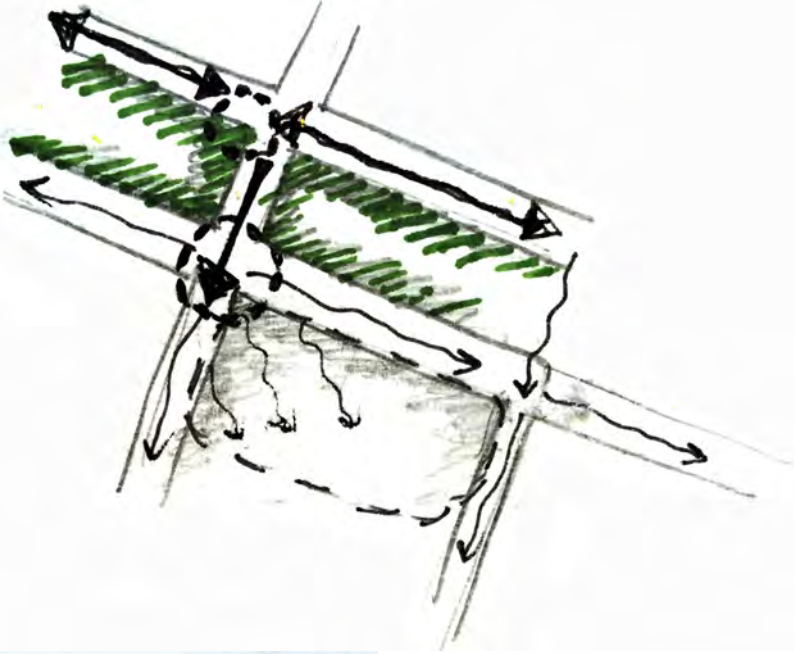


Figure 49. Activity around proposed site (Author 2016).

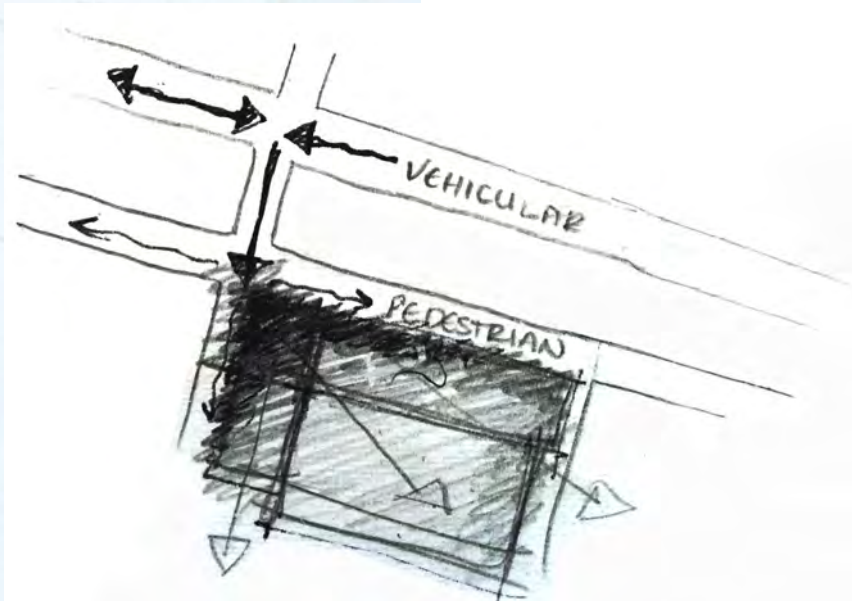


Figure 50. Public to private zoning on site (Author 2016).

4.1 SITE ANALYSIS

In order to apply the concept and refined programme to the chosen site, an analysis of the site and its surrounding context informed by the urban vision was then conducted. As discussed previously, community engagement in supporting preventative health care provision and community interaction with the facility are considered to be very important informants on the design. Therefore, in order to start this analysis, the site was investigated according to the anticipated pedestrian traffic in and around the site.

The vehicular access road and parallel pedestrian boulevard across the precinct is anticipated to be the heaviest influx of pedestrian movement, with the busiest area around the chosen site being the intersection between these two access roads. The direct line of movement from this point is anticipated to be the secondary route while the other roads splitting from this point are anticipated to be the tertiary roads.

The results of this investigation helped to establish the site into a zoned hierarchy of most public to most private areas of the site. The results of these two investigations then informed possible routes of access from the surrounding context in terms of hierarchy of flow, as well as the programmatic arrangement of the design. A number of other analyses were done on the site which are shown on the following page.

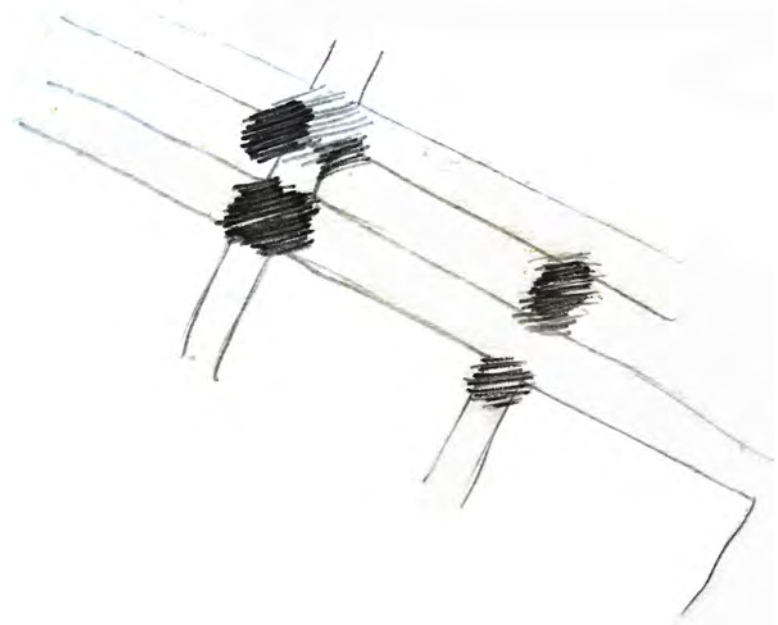
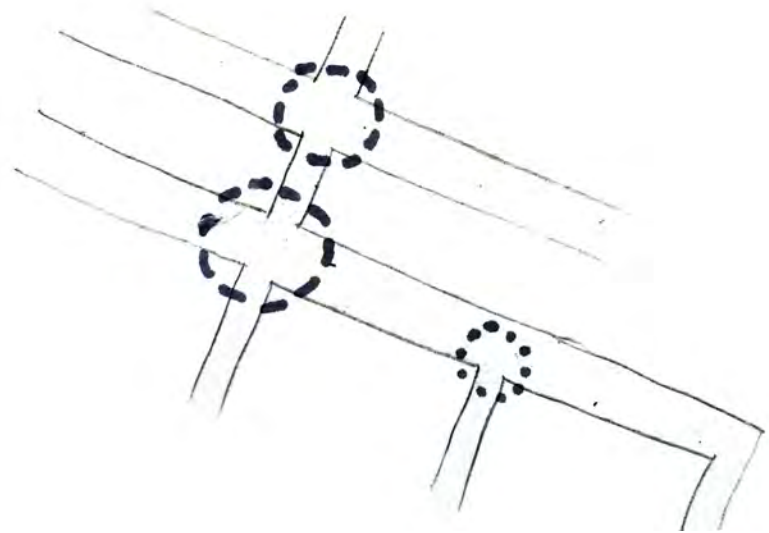
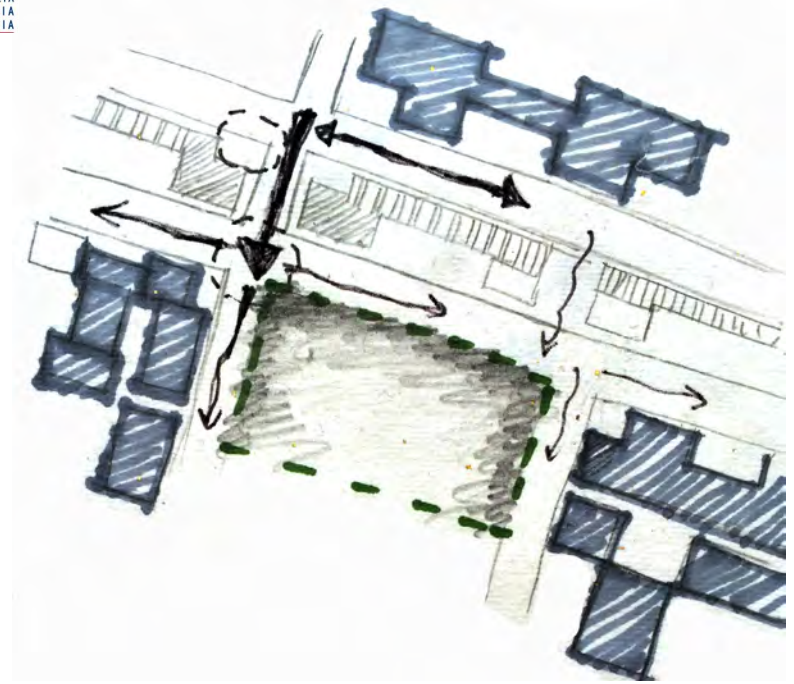
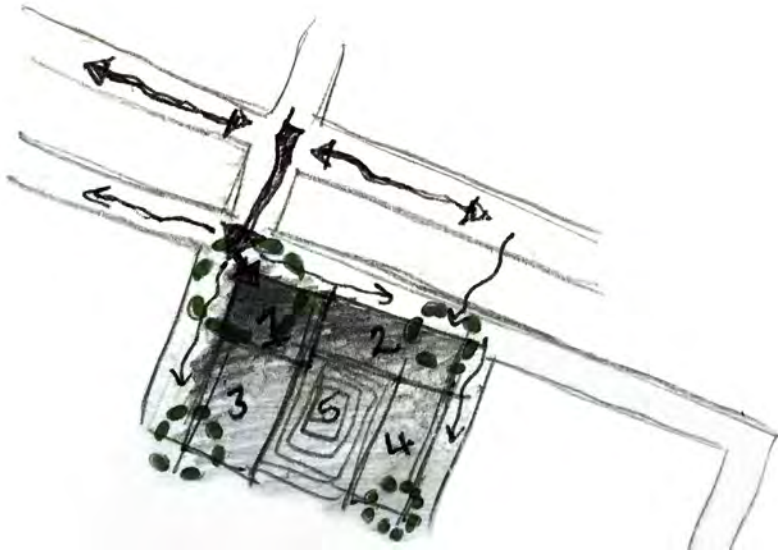


Figure 51. Site analysis drawings. Clockwise from top left; hierarchy and access; built versus open space; intersections and nodes (Author 2016).

4.2 CONCEPTUAL DEVELOPMENT

The start of the conceptual design development process was a very literal translation of the initial conceptual intentions into form. Using the conceptual investigation of the co-existence between the institutionalised top down and community driven bottom up approaches, the design was initially conceived as a de-centralised model consisting of a main fixed curative healthcare provision facility, supported by smaller preventative oriented field outposts which the COPC programme was based out of. The layout of these components was then envisioned as a literal dispersion of healthcare activity concentration from the site location, infiltrating into the finest urban fabric of the precinct.

The purpose of this intention being to satisfy the aforementioned concept of engaged citizenship of preventative healthcare in the health care delivery process. This concept was then further enforced by the initial conceptual design forms taking the shape of important iconic elements in the community, in order to also become a visual actor in the community's everyday lives, subconsciously suggesting the importance of health care.

This approach was presented to a panel of external examiners in the concept crit evaluations in April.

4.2.1 CONCEPTUAL DEVELOPMENT RE-EVALUATION

The criticism received on this approach during the April evaluation was that the approach to form was too literal a translation of the concept and therefore the intentions laid out in the dissertation thus far were not evident in the form proposed. Instead, the form was reading as a large scale curative hospital type facility that was overpowering the other programmes suggested. Therefore the resulting design was simply reflecting another high tech facility which the community would only visit when physically unwell, rather than the previously suggested holistic health care facility made up of more humane and emotionally sensitive environments intended to welcome community engagement.

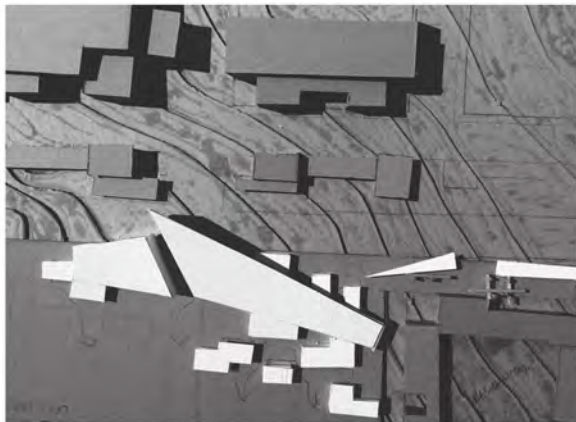
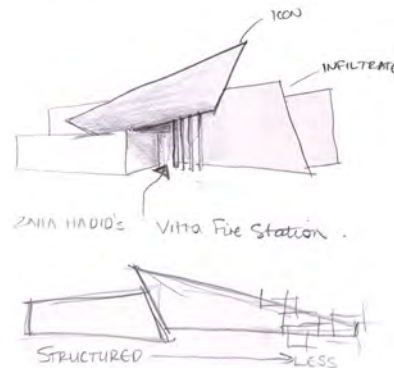
In conclusion, the feedback given advised a refined programmatic response to the issues and conceptual intentions laid out above; specifically considering the scale, size and extent of the programme, and to re-consider the holistic well being of the users interacting with these spaces.



De-centralised system, dispersion into community



Iconic structure in society



Conceptual model presented in April

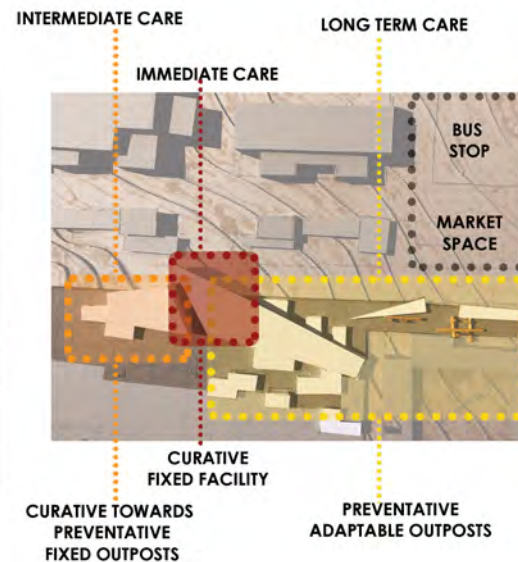


Figure 52. Conceptual development model and sketch process (Author 2016).

As the conceptual intentions and issues still remain a valid influence in the dissertation, the design process following on from this then consisted of a number of precedent studies of facilities with intentions similar to those laid out previously, in order to understand their architectural result. The preference at this point, and from this point onwards, being towards a smaller scale clinic solution rather than a hospital typology.

4.3.1 ARCHITECTURAL TYPOLOGY CASE STUDIES

As a starting point for this precedent study, the design development process reconsidered the aspect of holistic well being of all users of the spaces. Specifically looking at examples which resonate with the architectural issues discussed in the previous chapter of this dissertation. The two most prominent local examples which also incorporate the aspects of a connection to nature and the landscape in order to assist the healing process, being the Hermanus and Du Noon Community day centres, as discussed previously.

These case studies incorporate similar design principles which became highly influential on the layout approach to the floor plan of the design. To begin with, both case studies acknowledge the surrounding context and public realm by extending these spaces into the building. This becomes an important ordering principle on informing the approach and clarity of progression from public to private through the design. The programmatic appropriation of a public space as an entrance threshold announces both buildings as a public facility and it is from this space that the functional progression through the building starts (Barker, 2015). Users enter the building through this space and into a primary circulation route , which then branches off into wings hosting different areas of functionality (Barker, 2015). These functional areas are then privately arranged around individual courtyards which let in light and ventilation into the interior spaces (Barker, 2015) and provide that connection to nature which Cooper Marcus (1995) and Ulrich (1993) have proven to be a vital part of the healing process.

The result of this approach to the case studies informed the initial sketch floor plans. However due to the complexity of the arrangement of the programmes involved in healthcare facilities, another precedent study was conducted in order to inform the organisational layout and hierarchical flow of the users through the space.

4.3.2 ORGANISATIONAL CASE STUDIES

The intention behind this study was to analyse a number of design considerations and their resulting form in order to better inform the regulations involved in the clinical aspect of the research proposal. These include; the circulation and flow of the public through the facility, the provision of public versus staff oriented spaces, the analysis of built space versus courtyard space and the hierarchical order of these courtyards. The Hermanus Community Day Centre, and the Du Noon Community Day Centre were used again in this case study and were then compared to the contextual case study, the Pretorius Park Clinic.

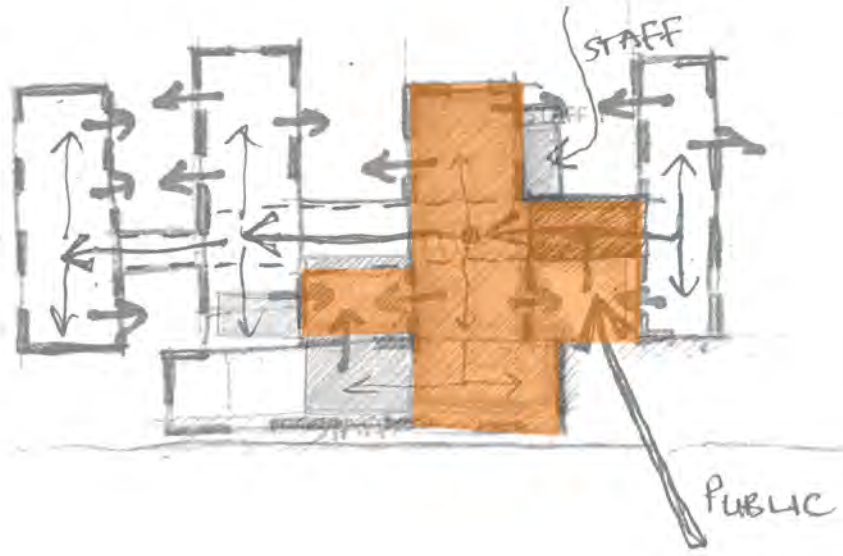
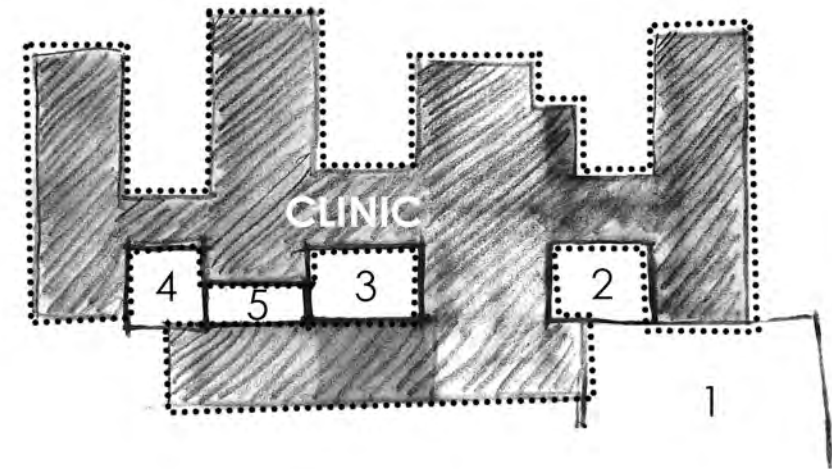
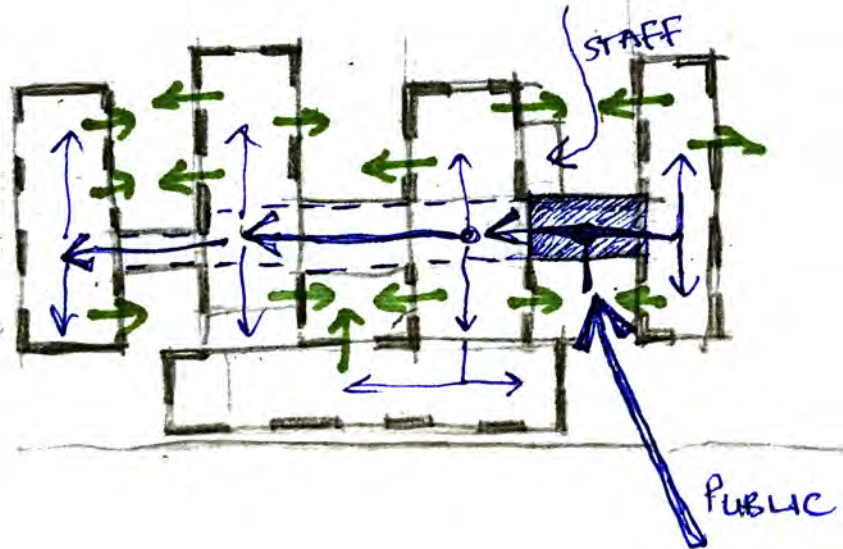


Figure 53. Diagrams of Hermanus Community Day Centre clinic layout, showing circulation and flow, hierarchy of courtyards, public vs staff space and organisational layout (moving clockwise). Author 2016.

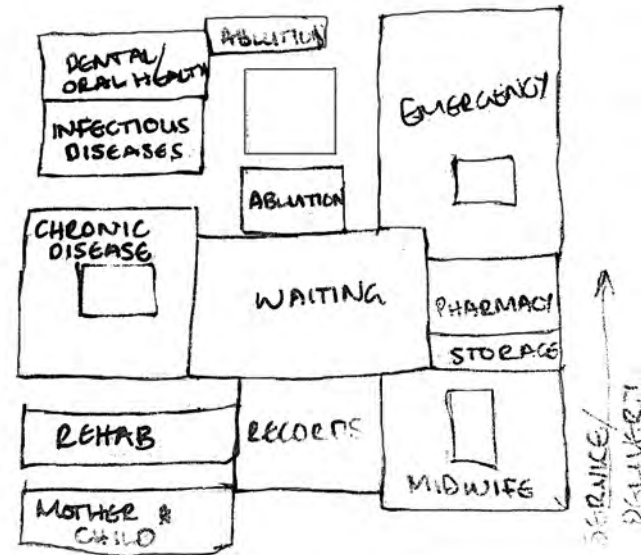
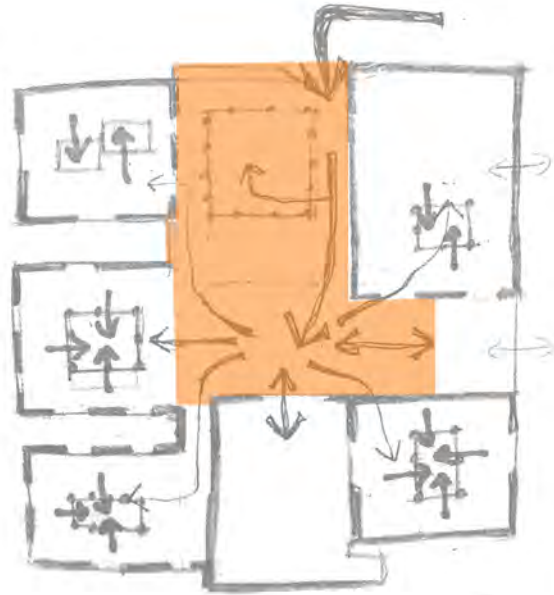
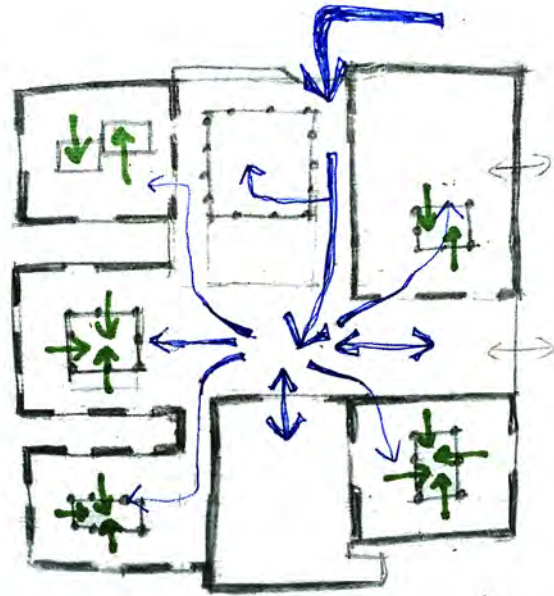


Figure 54. Diagrams of Du Noon Community Day Centre clinic layout, showing circulation and flow, hierarchy of courtyards, public vs staff space and organisational layout (moving clockwise). Author 2016.

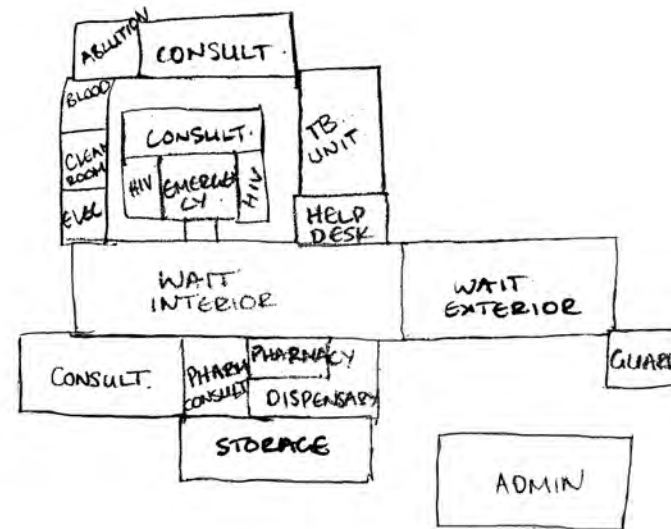
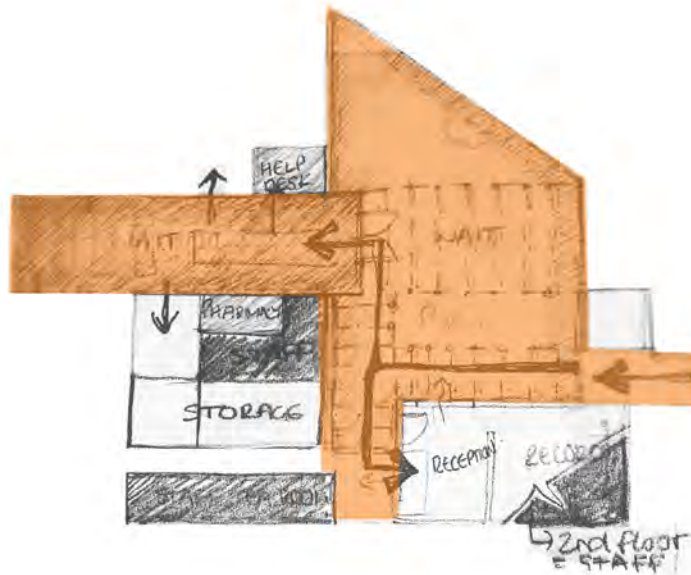
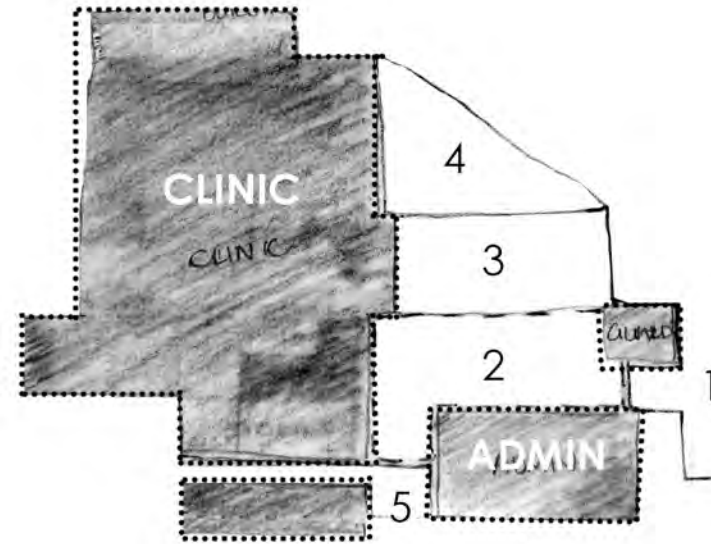
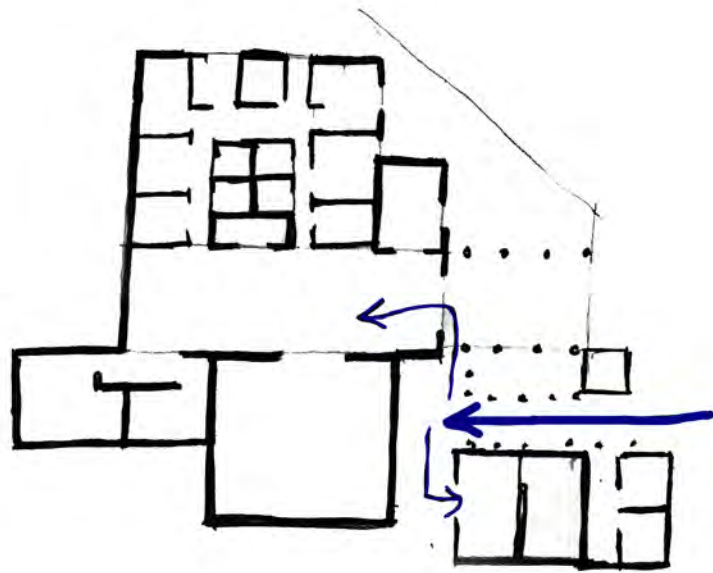


Figure 55. Diagrams of Pretorius Park Clinic layout, showing circulation and flow, hierarchy of courtyards, public vs staff space and organisational layout (moving clockwise from top left)(Author 2016).

Due to a number of rules and regulations regarding the mandatory procedures undertaken in South African clinic designs, all three case studies exhibited similar programmatic organisational arrangements. This organisational arrangement is seen to be summarised below.

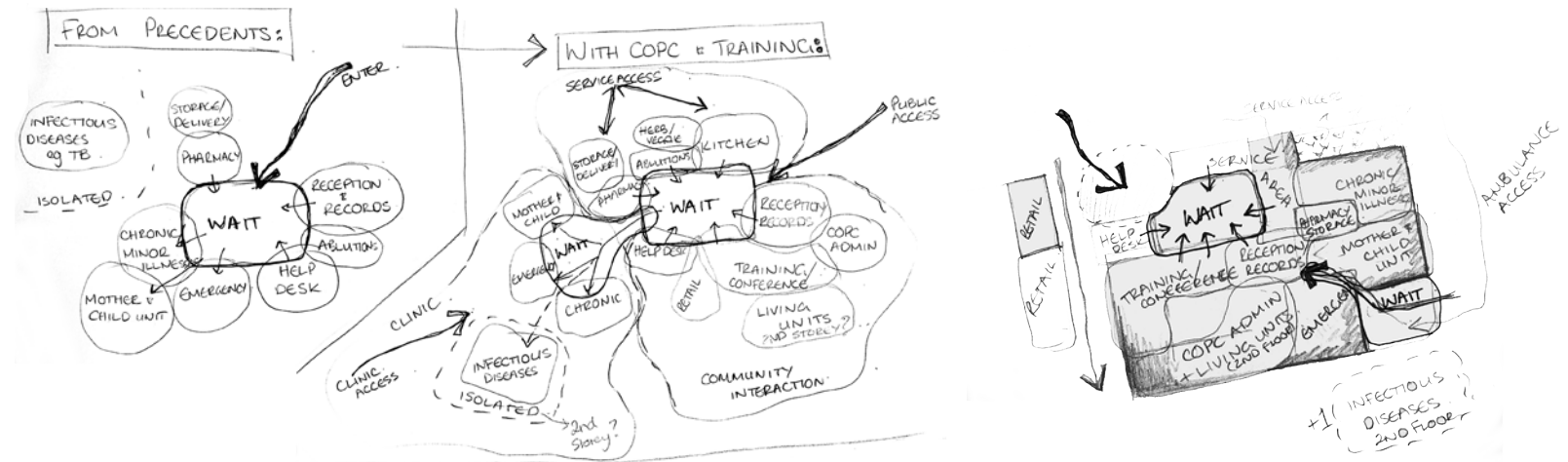
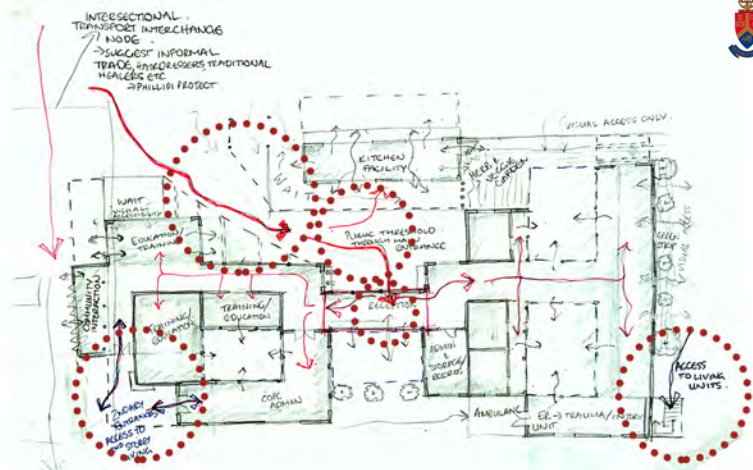
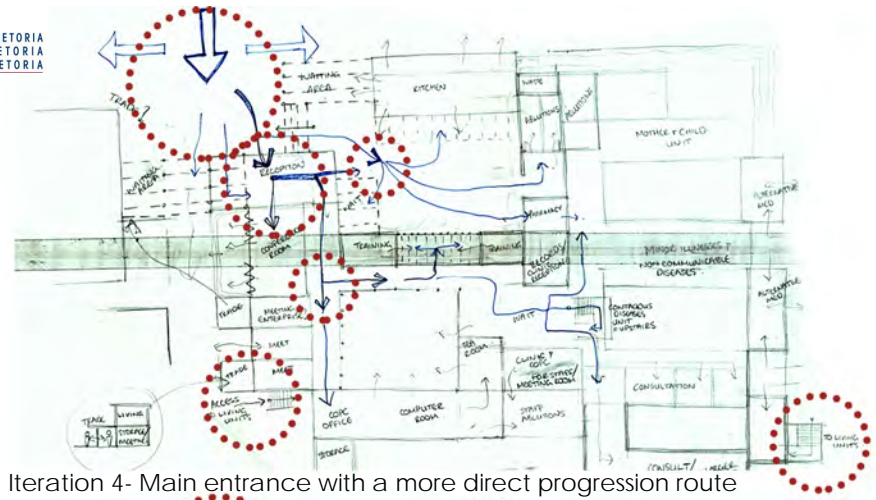


Figure 56. Bubble diagrams showing organisational analysis of precedent studies and the application of this in the design process (Author 2016).

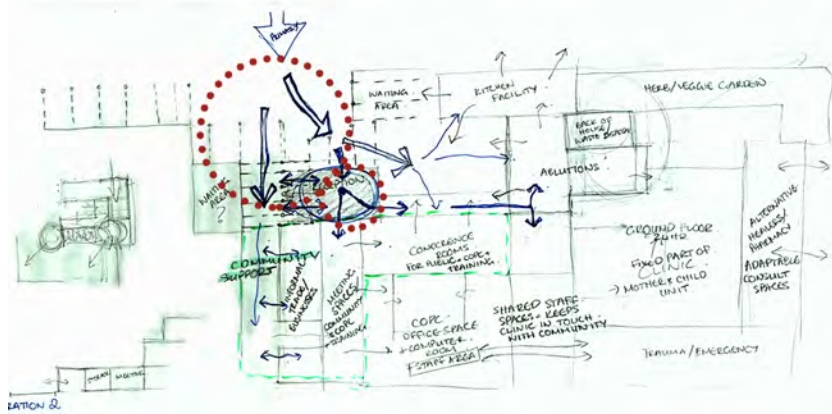
This observation was then used as a precedent to advise on the programmatic layout of the revised design in order to ensure that the flow of users in the facility adheres to a certain process that follows the administrative procedures required by the South African medical facilities. However this was considered in such a way so as not to undermine the critical approach adopted in this dissertation. A number of explorations were then carried out on this revised programmatic layout in order to investigate possible access points into the facility as well as an exploration into the hierarchy of flow from the surrounding context into the facility.



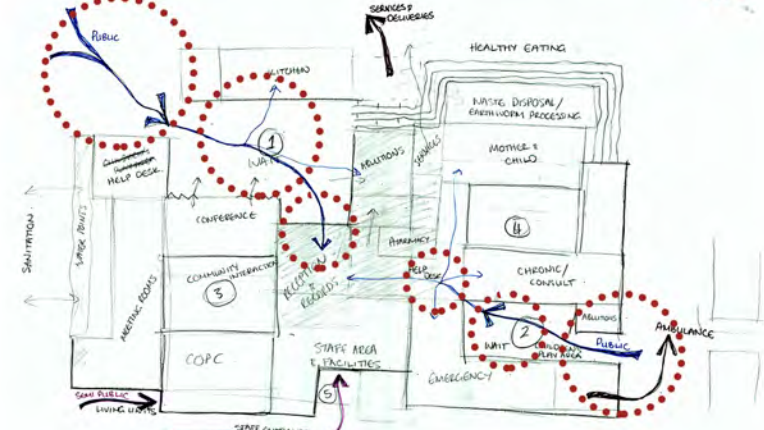
Iteration 1-One main public entrance, secondary entrances



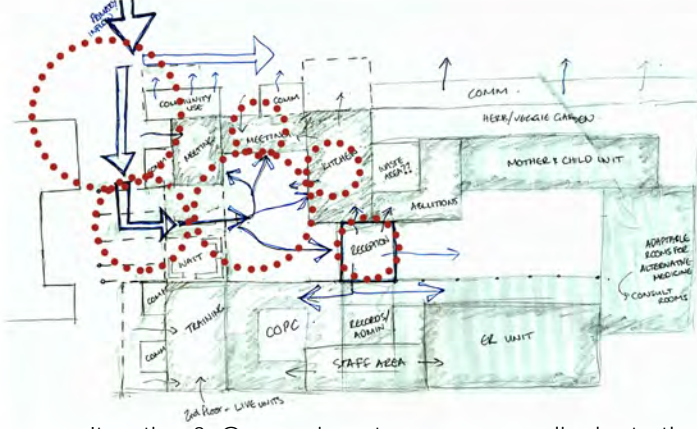
Iteration 4- Main entrance with a more direct progression route



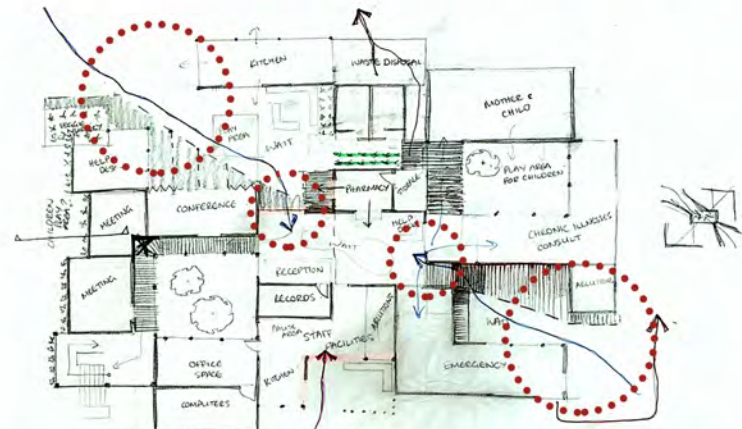
Iteration 2- One main entrance from the corner



Iteration 5- Two main entrance points from either side



Iteration 3- One main entrance perpendicular to the street



Iteration 6- More refined two main entrance points

Figure 57. Exploration process into different access points into the facility (Author 2016).

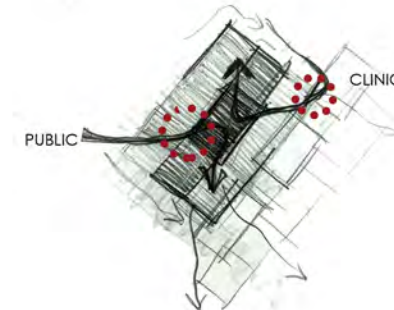
As the busiest corner of the precinct is anticipated to be the North West corner of the facility, connecting with the adjacent pedestrian boulevard, the decided access point to the facility is anticipated to be the most successful from this corner. Borrowing from the architectural typology studies conducted, this access route is designed to happen through a large public square that will act as an extension of the public pedestrian boulevard.

4.3.3 ACCESS, CIRCULATION AND FLOW

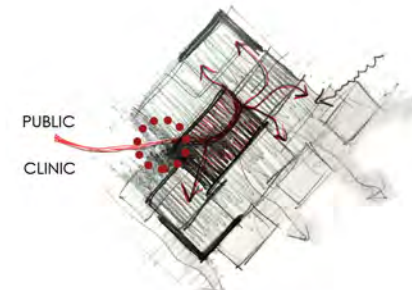
From this accessible public square, a primary route of circulation through one main entrance into the facility, to both the educational and training side as well as the clinical side, was initially proposed. This proposal was then iterated in order to explore the possibility of two separate entrances into the facility, one for the general public accessing the educational/training side of the facility, and another entrance on the opposite corner of the site in order to provide a more private access point to the clinic side of the facility. After applying the organisational clinical layout research described previously, the latter iteration proved to be an inappropriate method of dealing with the flow and the clinical procedure process that had to be undergone by the users through the clinic, for example the collection and return of records and collection of pharmaceutical medicines after appointments. The introduction of a secondary square adjacent to this second access point was also seen to detract from the intention of a primary route of circulation through one main public square, as well as decreasing security and control in terms of who is and isn't able to access the clinic.



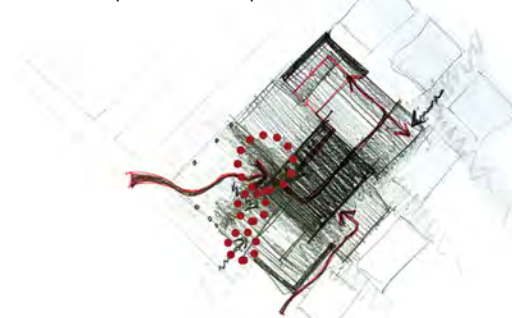
Initial concept diagram



Iteration 1- Two main entrances for clinic and public presented an issue of security and access control.



Iteration 2- One main entrance point for clinic and public. Presented an issue of separation between staff rest spaces and public view.



Iteration 3- One main entrance point for clinic with external public entrance points for education and training.

Figure 58. Diagrammatic representation of iteration process (Author 2016).

4.3.4 FACADE DEVELOPMENT

At this stage of the design process, the research component of the dissertation concurrently introduced the concept of the holistic well being of users of health care facilities and the effects that space and architecture may have on the mental and emotional well being of the users. This discovery highlighted the fact that little consideration had been given to the design of the facades and the interior spaces themselves up until this point. Therefore, the design process followed an investigation into how these facades may be designed in order to create positive emotional and mental responses to both users of the facility, as well as the general community passing by the outside of the facility.

Using the principles laid out in the research conducted by Claire Cooper Marcus (1995) and the text *Active Design: Shaping the Sidewalk Experience* (2013) as a starting point for this design investigation, a number of vignette sketches and sections showing the relationship between the interior and exterior of the facility and the experience of the facades was explored. The intention behind these sketches was to investigate the possible transparency of the facility, from both the interior and exterior perspective, and if there was an opportunity for any possible interaction of the exterior users with the facility itself, such as interactive facades etc. The interior environmental quality was also considered in these sketches. These sketches were then tested through a phased model exploration process whereby each facade was developed and explored and then tested against the design as a whole. This process proved to be a turning point in the design and was the first attempt at defining an appropriate language for such a context. The result of the design process at this stage was then presented to a number of external examiners during the June evaluation.

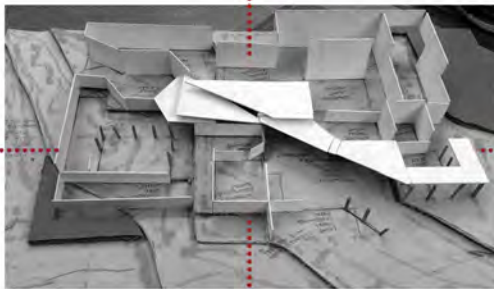


Figure 59. Facade development process through model explorations (Author 2016).

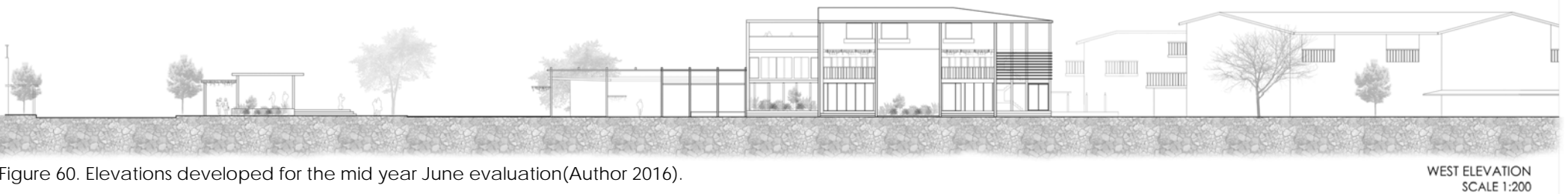
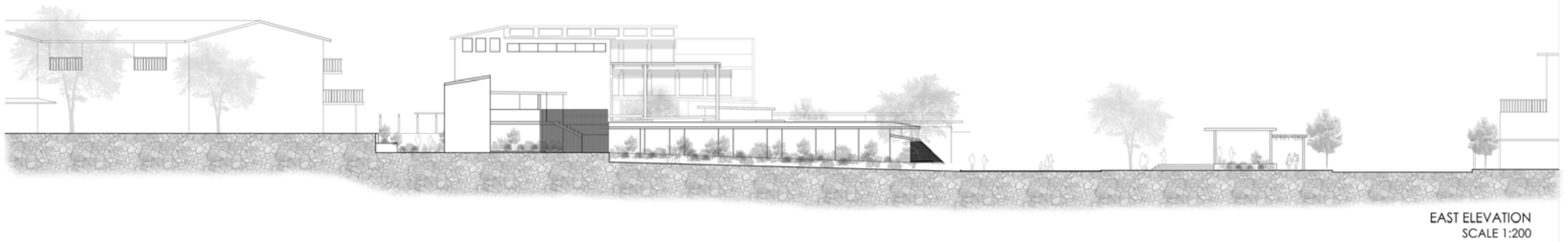
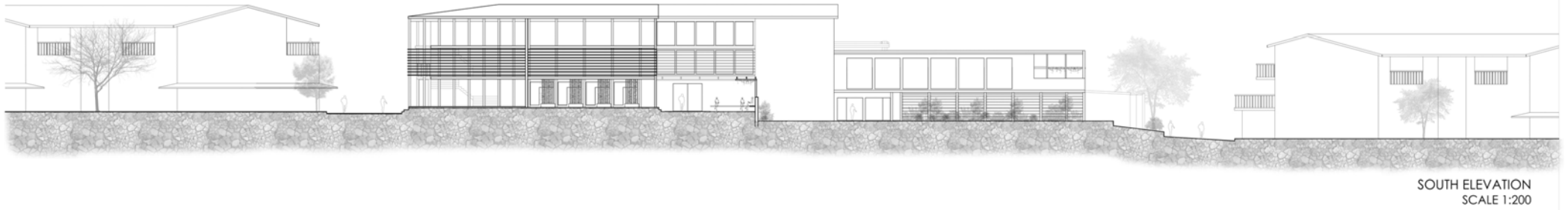
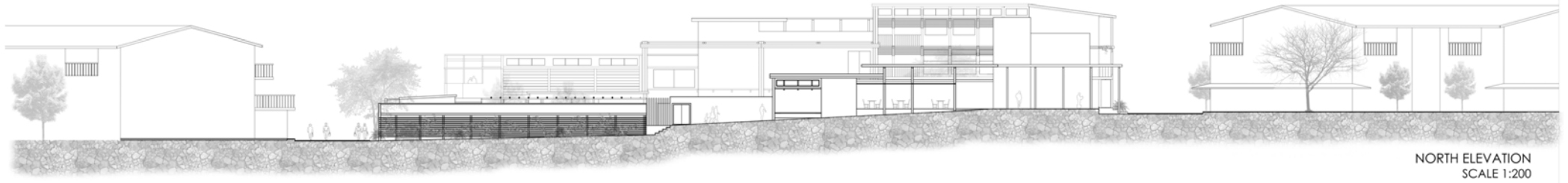
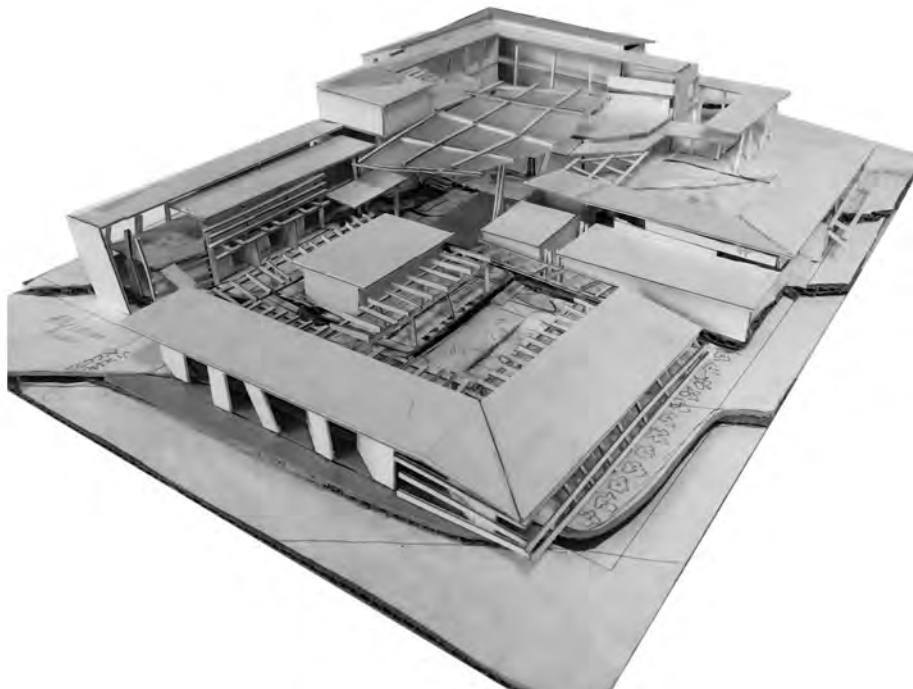


Figure 60. Elevations developed for the mid year June evaluation(Author 2016).



4.3.5 MID-YEAR REVIEW DESIGN EVALUATION

The comments made during the June mid-year review concluded that whilst the planning of the circulation and flow of spaces throughout the design was seemingly well arranged, the resulting facade design lended itself to a more institutional personality than what the argument of the design was attempting to portray. The advice given during this session recommended further exploration into the possibilities that materiality, textures, wall thicknesses, light exploration etc. may contribute to the design in order to overcome this institutional feel and promote a more positive mental and emotional health care facility experience. This advice was taken forward into the second semester and was intended to be explored together with research conducted into sustainability and technification of the design. Specifically the role that materiality, structure, textures and transparency may play in the role of controlling the quality of interior environments within the facility.

Figure 61. Model presented for the mid year June evaluation(Author 2016).

CHAPTER FIVE

- 5. Design Refinement
 - 5.1 Defining an Architectural Language
 - 5.2 Precedent Studies
 - 5.2.1 Baragwanath Transport Interchange and Traders Market, Johannesburg
 - 5.2.2 The Metro Mall Taxi Rank, Johannesburg
 - 5.2.3 Thusong Service Centre, Khayelitsha
 - 5.2.4 Hermanus Community Day Centre, Hermanus
 - 5.2.5 Plastic View Architectural Language

Figure g. Contextual photo in Plastic View (Author 2016)

5. DESIGN REFINEMENT

In review of the mid-year evaluation, a number of aspects to the dissertation were considered in order to further refine the project design before investigating the technical and sustainable aspects to the project. The first consideration reviewed the accommodation schedule and specific utilities required to adhere to the mandatory procedures specified by national healthcare facility standards and regulations, for example, room sizes in order to sufficiently accommodate the procedures undertaken within each room; pharmaceutical delivery space requirements and service utilities requirements (CSIR 2013). This investigation was informed by the principles laid out in the IUSS Health Facility Guides: Primary Healthcare Facilities (CSIR 2013), which were considered critically so as to fit in with the argument and approach laid out in the previous chapters.

Refined Accommodation Schedule:

A. Community Interface:

-COPC healthworker's office	112 m ²
-Community meeting rooms	42 m ² x3
-Openable meeting/conference room	78m ² x1
-Community training rooms	42m ² x5
-Residential units for abused patients	42m ² x3
-Reception area for community activities	42m ² x1
-Residential unit for nurse/warden	50m ² x1
-Public restaurant & kitchen	132m ² x1
-Vegetable garden	112m ² x1
-Ablutions	70m ² x8
-Staff Ablutions	30 m ² x4
-Staff change room with shower	35 m ² x1
-Organic waste disposal	30m ² x1

B. Clinic:

-HIV/TB consultation rooms	16 m ² x1
-HIV/TB training consultation rooms	19 m ² x3
-HIV/TB sub waiting area	24 m ² x1
-Mother and child consultation rooms	16 m ² x2
-Mother and child training consultation rooms	19 m ² x2
-Mother and child sub waiting room	24 m ² x1
-Chronic diseases consultation rooms	20 m ² x3
-Chronic diseases sub waiting room	50 m ² x2
-Emergency ward and holding room	20 m ² x3
-Emergency ward sub waiting room	32 m ² x1
-Reception for emergency ward	12 m ² x1
-Drug room for emergency ward	6 m ² x1
-Dirty utility/clinical disposal room	54 m ² x1
-Storage rooms	18 m ² x2
-X ray room and Plaster of paris room	42 m ² x1
-Vitals room	24 m ² x2
-Records & records return	36 m ² x1
-Reception	12 m ² x1
-Help desk	23 m ² x1
-Vegetable sales area	22 m ² x1
-Pharmacy; clinic and public outlets	50 m ² x2
-Pharmacy store	60 m ² x1
-Clinical supply delivery zone	64 m ² x1
-Ablutions	42 m ² x5

The second, and most important consideration which was reviewed after the comments received in June, was the architectural language of the project. As mentioned previously, these comments suggested that at this stage, the language of the proposal was not successfully conveying the intentions and concepts laid out in the initial argument on a spatial level. Therefore the focus of the design development and refinement shifted towards defining a language which corrected this issue.

5.1 DEFINING AN ARCHITECTURAL LANGUAGE

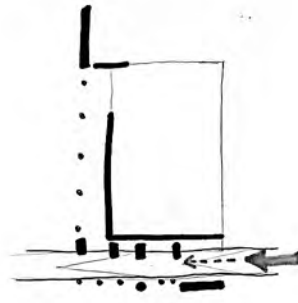
As explained previously, the initial approach to defining an architectural language for the facility was influenced by the principles put forward by Cooper Marcus and Barnes (2005) and the text *Active Design: Shaping the Sidewalk Experience* (2013).

As the result of this approach did not lend itself to the intentions of this dissertation, it was decided that this language should be enriched by a similar method of analysis that was used to define the aforementioned building footprints laid out in the urban vision. This method of analysis, influenced by theories suggested by Alexander (1964), Salat (2011) and Steyn (2005) involved using the spatial principles found in informal settlements as precedents for design (see chapter three). The intention in this instance however, was to apply these theories not only to the architectural language used in the existing built context of Plastic View, but also to the architectural language used in several other local urban public projects.

In order to make sense of these precedent studies, the research process looked to the theories put forward in Juan Pablo Bonta's book *Architecture and its Interpretation: A Study of Expressive Systems in Architecture* (1979) which defines the role of an architectural language in design, and how it is established and interpreted within society. These precedent studies were then analysed in the same way as Bonta considers a number of case studies in his book (Bonta 1979: 63).

5.2 PRECEDENT STUDIES

The street edges and facades of this proposal were seen as the main area of concern for this re-imagined language, and so these precedent studies were analysed with the specific aim of considering resolution of edges and public interface in order to conclude an understanding of the architectural language used in each precedent.



5.2.1 BARAGWANATH TRANSPORT INTERCHANGE AND TRADERS MARKET, JOHANNESBURG.

Ludwig Hansen Architects and Urban Designers. 2003-2008.

The north western facade of this project was specifically chosen to be analysed as it exhibits a strong pedestrian movement edge adjacent to a busy vehicular road.

What was noted in this case was that the roof appears to be the element that ties all the other forms together. A solid vertical element that is similar in nature to the other vertical elements on this facade, but contrasting in width is then responsible for announcing the entrance/start of the corner of the building under this roof element. This facade of vertical elements then appears to be layered with a secondary horizontal line behind the columns which appear to humanise the scale of these columns on one edge.

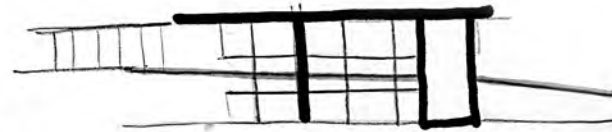
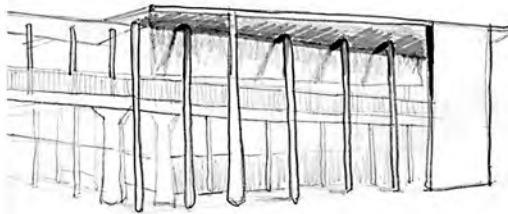
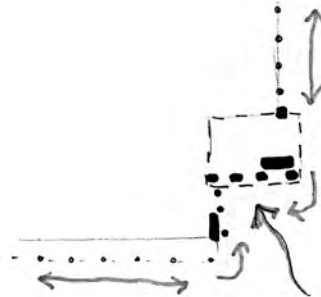


Figure 62. Bara Taxi rank architectural language analysis drawings (Author 2016).



5.2.2 THE METRO MALL TAXI RANK, JOHANNESBURG.

Ludwig Hansen Architects and Urban Designers. 2000-2001.

As this project was done by the same architectural firm as the previous case study, a couple of similarities in terms of language is recognisable between the two. For example, the entrance to the mall is emphasised and highlighted by a contrasting feature element on the facade and the corner to this entrance is framed by wider vertical element that portrays a similar language to the other vertical elements on either facade. This case study also makes use of a layered facade along the public movement edges. This edge, made up of closely spaced vertical elements is bound together by an overhang that introduces a strong horizontal line responsible for humanising the scale of this edge.

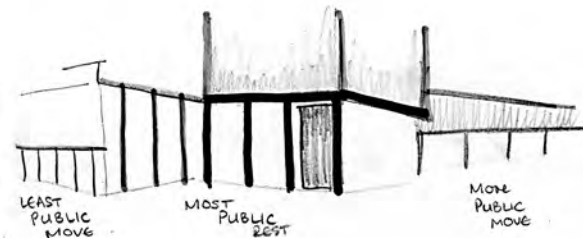
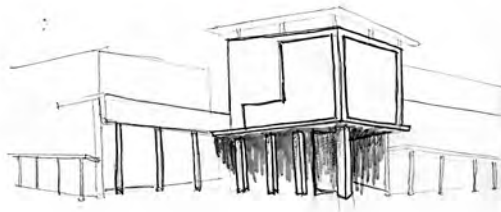
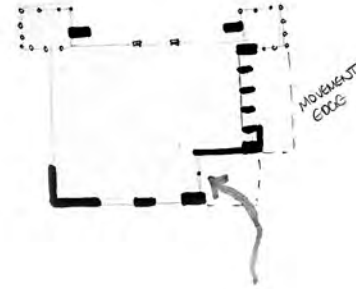


Figure 63. Metro Mall architectural language analysis drawings (Author 2016).



5.2.3 THUSONG SERVICE CENTRE, KHAYELITSHA. Makeka Design Lab. 2008.

What was noticed in this project was the emphasis given to framing each facade as a separate entity, in other words, contrasting forms within a system in order to develop a language (Bonta 1979:123). The language used on each of these facades then suggests the functionality of that facade, such as the service facade which differs in nature to the public entrance facade.

Similarly to the previous two case studies, this public entrance facade highlights the main entrance using a solid concrete section that sits in contrast to the remaining glazed sections of the facade, and an overhang over the entrance suggests a space of arrival.

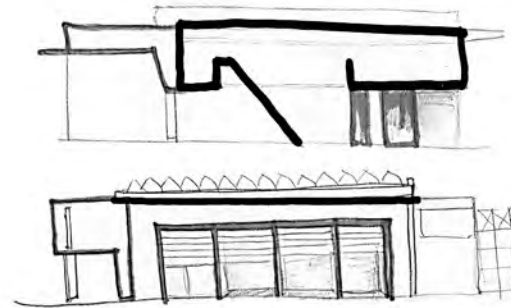


Figure 64. Thusong service centre architectural language analysis drawings (Author 2016).



5.2.4 HERMANUS COMMUNITY DAY CENTRE, HERMANUS. Gallagher Lourens, 2015.

This case study was chosen in order to analyse the language of a facility which exhibits similar principles to those stated in the concept and arguments of this dissertation. While the aesthetic of the building suggests robustness and functionality, the human scale is again emphasised by a strong horizontal line hosting finer vertical elements within it. And as is found in the other case studies above, the entrance space is immediately recognisable as being in contrast to the other elements found on the same facade.

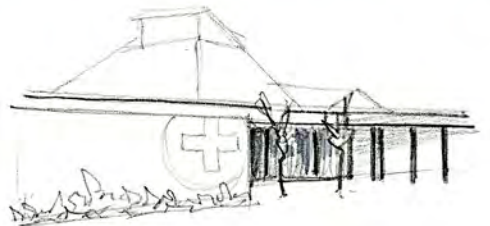


Figure 65. Hermanus community day centre architectural language analysis drawings (Author 2016).

5.2.5 PLASTIC VIEW ARCHITECTURAL LANGUAGE

In this case study, the language is informed by the structural system used in the structures. This structural system, populated with infill wall panels, then alternates between being hidden or exposed. The degree of social interaction between the structure and the street is dependent on its function, as illustrated in previous analytical diagrams (see page 53).

Having made the above observations, the following informants were introduced into the design in order to arrive at a more appropriate architectural language. These informants include; firstly, the use of horizontal and vertical lines in order to define the functionality of specific edges for example, horizontal emphasis with finer vertical elements will reflect a pedestrian quality due to definition of a human scale. Secondly, important entrances are to be highlighted and emphasised by contrasting the entrance space to other elements on the same facade, also these entrances are to suggest a place of arrival through the incorporation of a porch typology. Thirdly, service cores are to be consolidated and stereotomic in nature, and lastly, the corners of the design are to be defined by stronger elements that appear to frame and contain each facade which reflect their different functionalities.

The structure of the building is then intended to reflect the architectural language present in Plastic View, which is discussed in the following chapter.

These informants were then investigated on both plan and elevation and iterated a number of times in order to refine the language of the project.

These iterations are shown on the following pages together with the original iteration of the elevations from the mid year evaluation.



Figure 66. Floor plan investigations as a part of the elevational development process (Author 2016).

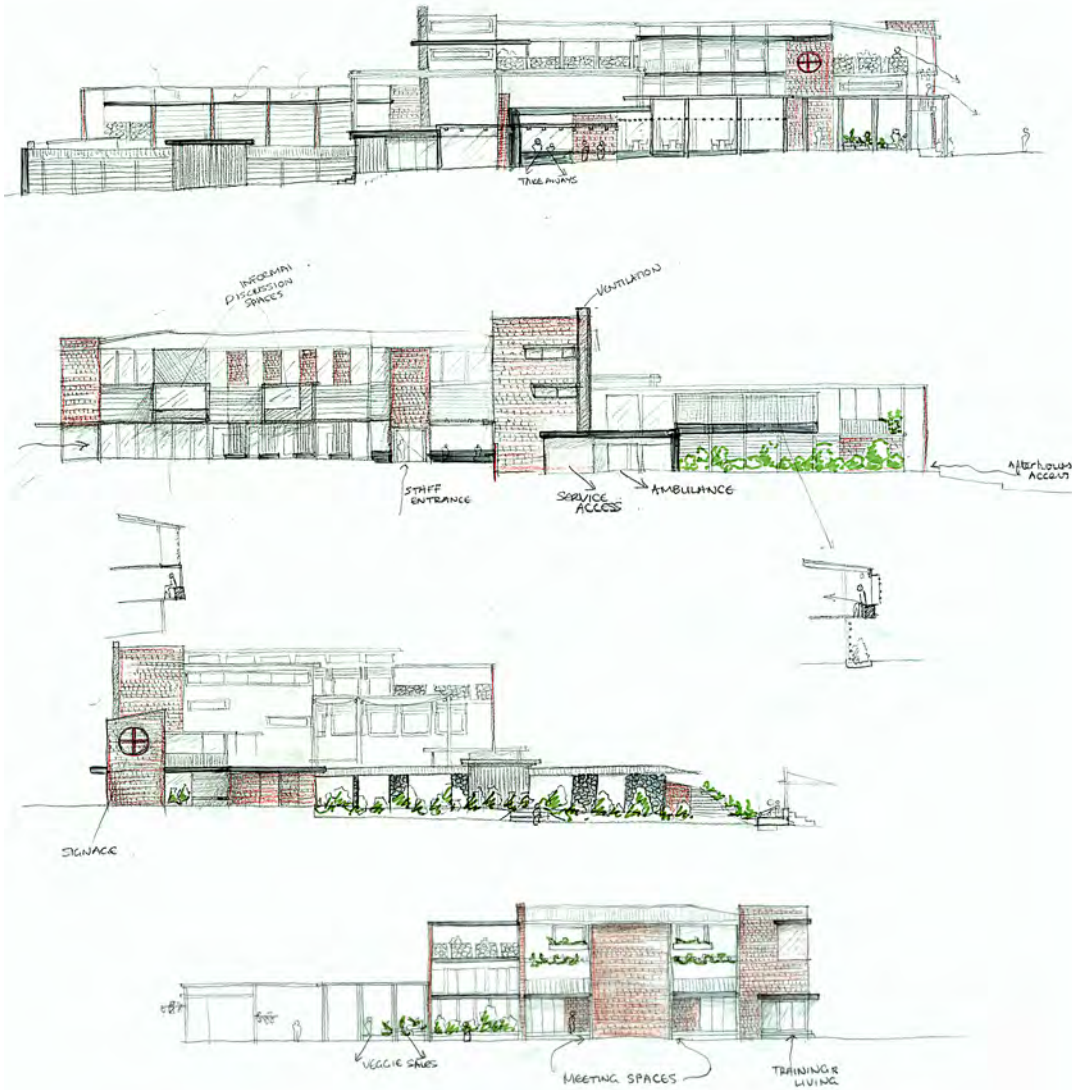


Figure 67. Elevation language iteration 1. Investigating the effect of materiality and texture when applied to the elevations put forward in the June evaluation (Author 2016).

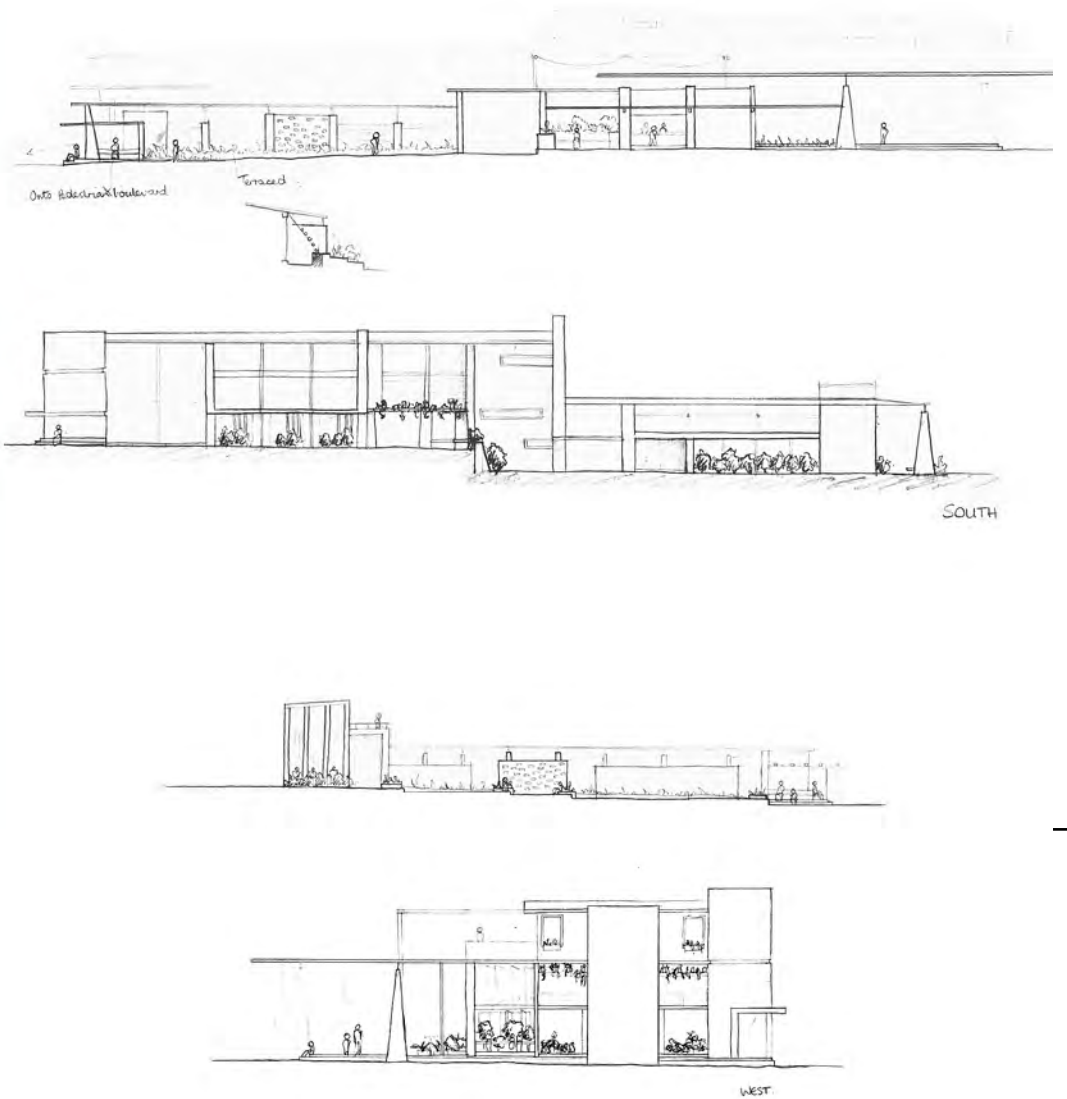
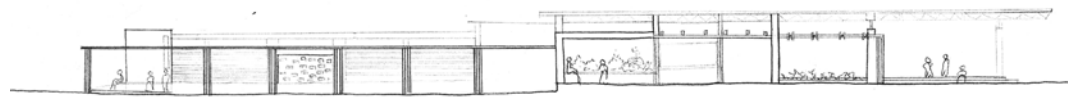


Figure 68. Elevation language iteration 2. First attempt at redefining an architectural language for the facility after conducting the aforementioned precedent study (Author 2016).



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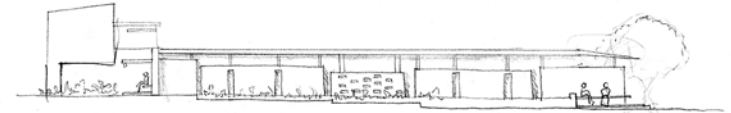
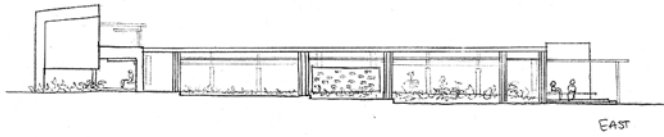
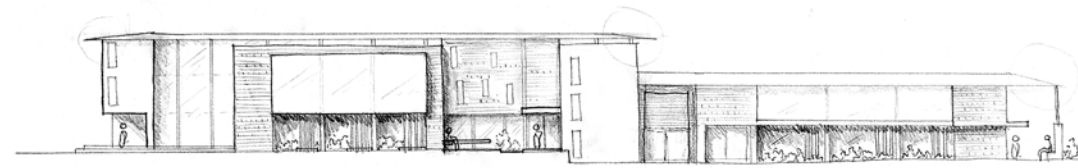
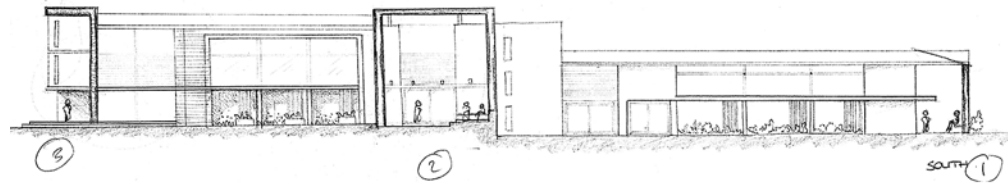


Figure 69. Elevational language iteration 3. Refining the architectural language of the facility presented in iteration 2 after conducting the aforementioned precedent study (Author 2016).

Figure 70. Elevational language iteration 4. Final proposed architectural language before applying the technical and sustainable lenses to the dissertation (Author 2016).



CHAPTER SIX

- 6. Technological Investigation
 - 6.1 Tectonic Concept
 - 6.2 Structural Intention
 - 6.3 Tectonic Intention
 - 6.4 Sectional Development

Figure h. Contextual photo in Plastic View (Author 2016)

6. TECHNOLOGICAL INVESTIGATION

6.1 TECTONIC CONCEPT

In chapter one of this dissertation, the argument and project intentions discussed the proposal of a primary healthcare facility that makes use of a smaller scale bottom up approach to healthcare in supporting the larger scale top down approach to healthcare. Keeping in mind the critical analysis and intentions of these arguments, the tectonic concept aims to follow on from this by considering a mediation between the tectonics used in each of these approaches. In other words, a mediation between the technology that resulted in the machine like efficient building typologies that are constructed with large spans and industrial materials that come across as very imposing and institutional in nature, and the smaller scale, more intimate and low key space making principles used in clinics and COPC outposts which are more human scale in nature.

6.2 STRUCTURAL INTENTION

In order to implement such a concept and simultaneously support the arguments put forward in the previous chapter regarding architectural language, the research process intends to utilise the built fabric present in Plastic View as a precedent in order to suggest a contextually appropriate structural system. The key characteristics summarised from this precedent study are as follows; the presence of a structural system that supports a mono-pitch roofing system, infill walling panels that define space and which alternate between the exposing and hiding the structural system.

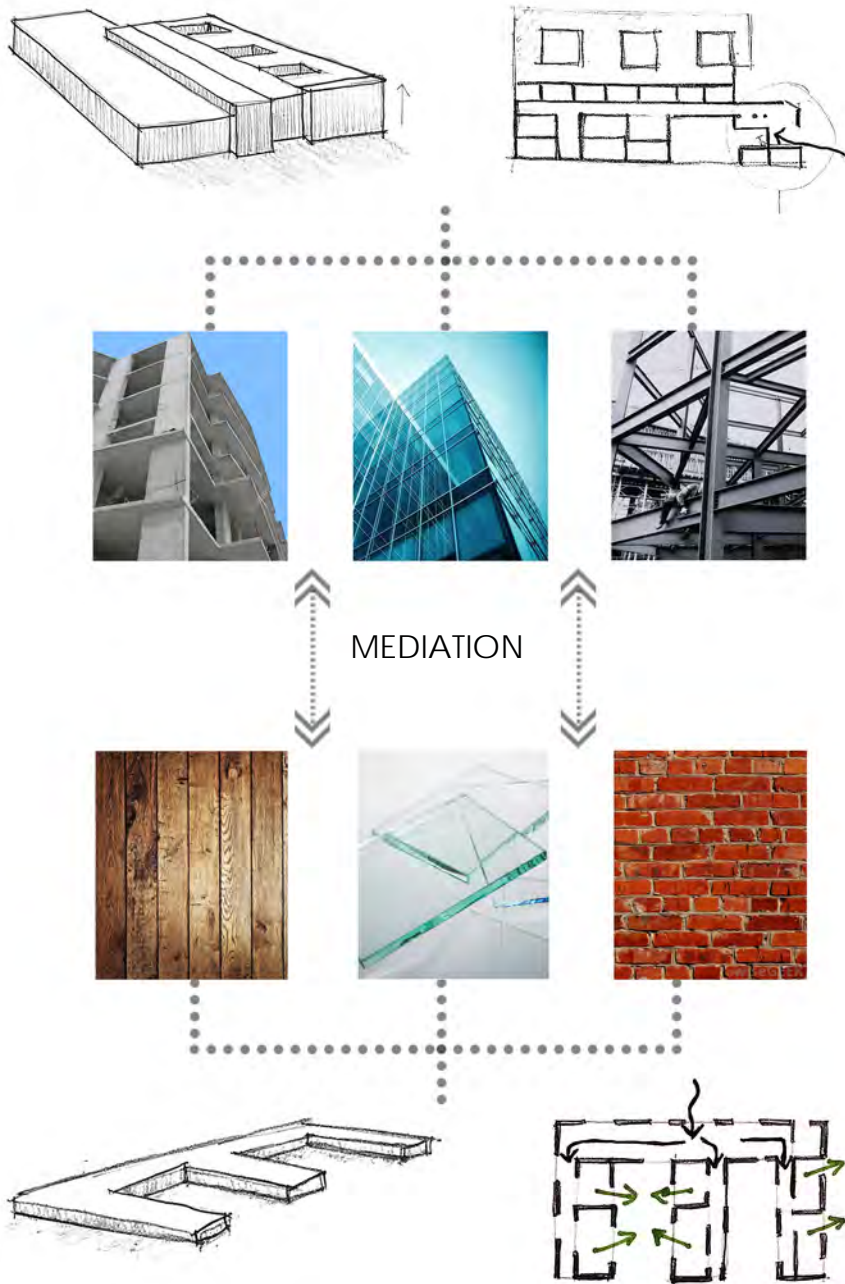


Figure 71. Illustration of tectonic concept (Author 2016).

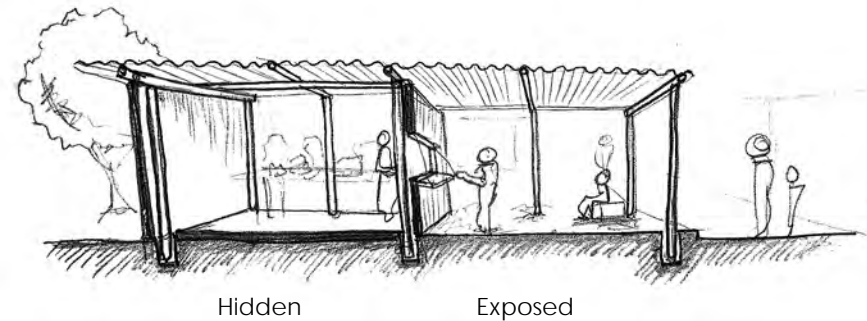
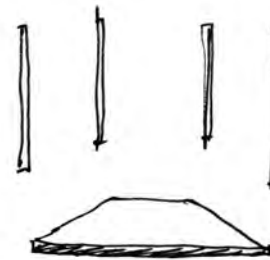
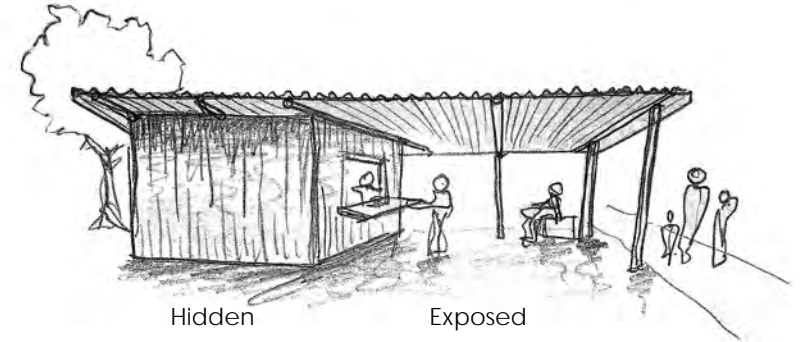
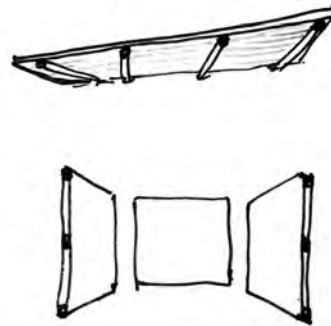
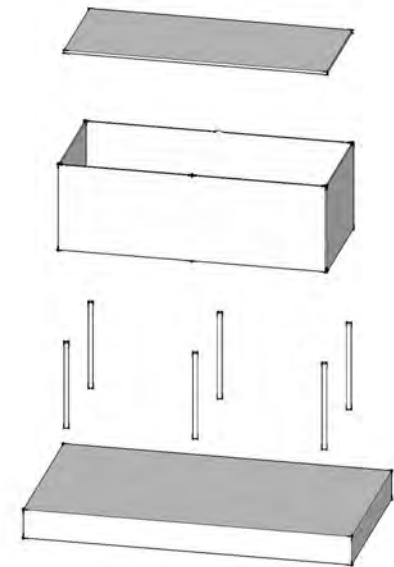
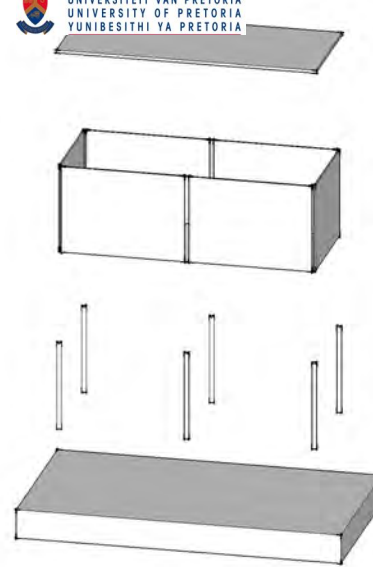


Figure 72. Plastic View architectural language analysis images (Author 2016).

6.3 TECTONIC INTENTION

The result of this concept and intention, led to the following approach to the tectonics of the facility.

Firstly, all ground floor walls are intended to be made of brick, which in some areas in the facility acts as load bearing brick. The intention behind this is to incorporate the humanised, low key and more intimate scale aesthetic to the areas of the building which the public have the most interaction with. It is also a hard wearing material for such a high traffic area.

Secondly, in order to reflect the technology used in high tech, machine like efficient hospital typologies and to support the proposed height and span of these spaces, a steel structural system was then chosen for the areas of the facility that consist of two to three storeys. Whilst the infill for this structural system is brick on the ground floor, the first and second level spaces are defined by lightweight non structural walling panels, both internally and externally. This structural system then alternates between being hidden and exposed.

Thirdly, the roof is also intended to reflect the current vernacular of Plastic View, which is defined by a simply constructed mono-pitch roof, made up of steel rafters and purlins and a steel roof sheeting material.

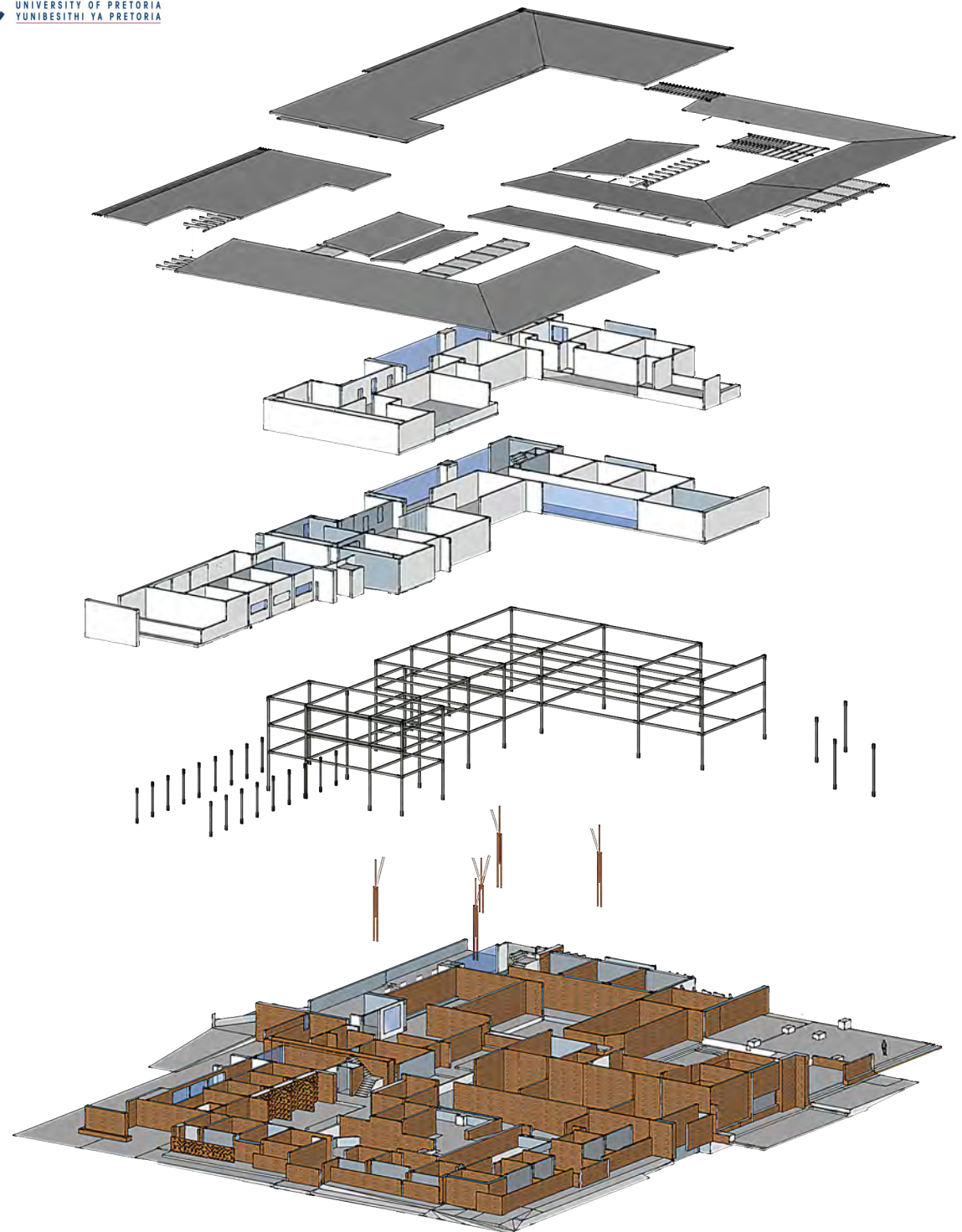
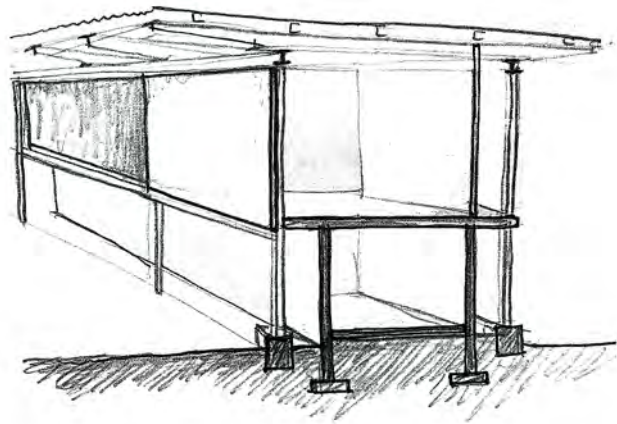


Figure 73. Illustration of tectonic intention and exploded structure (Author 2016).

6.4 SECTIONAL DEVELOPMENT

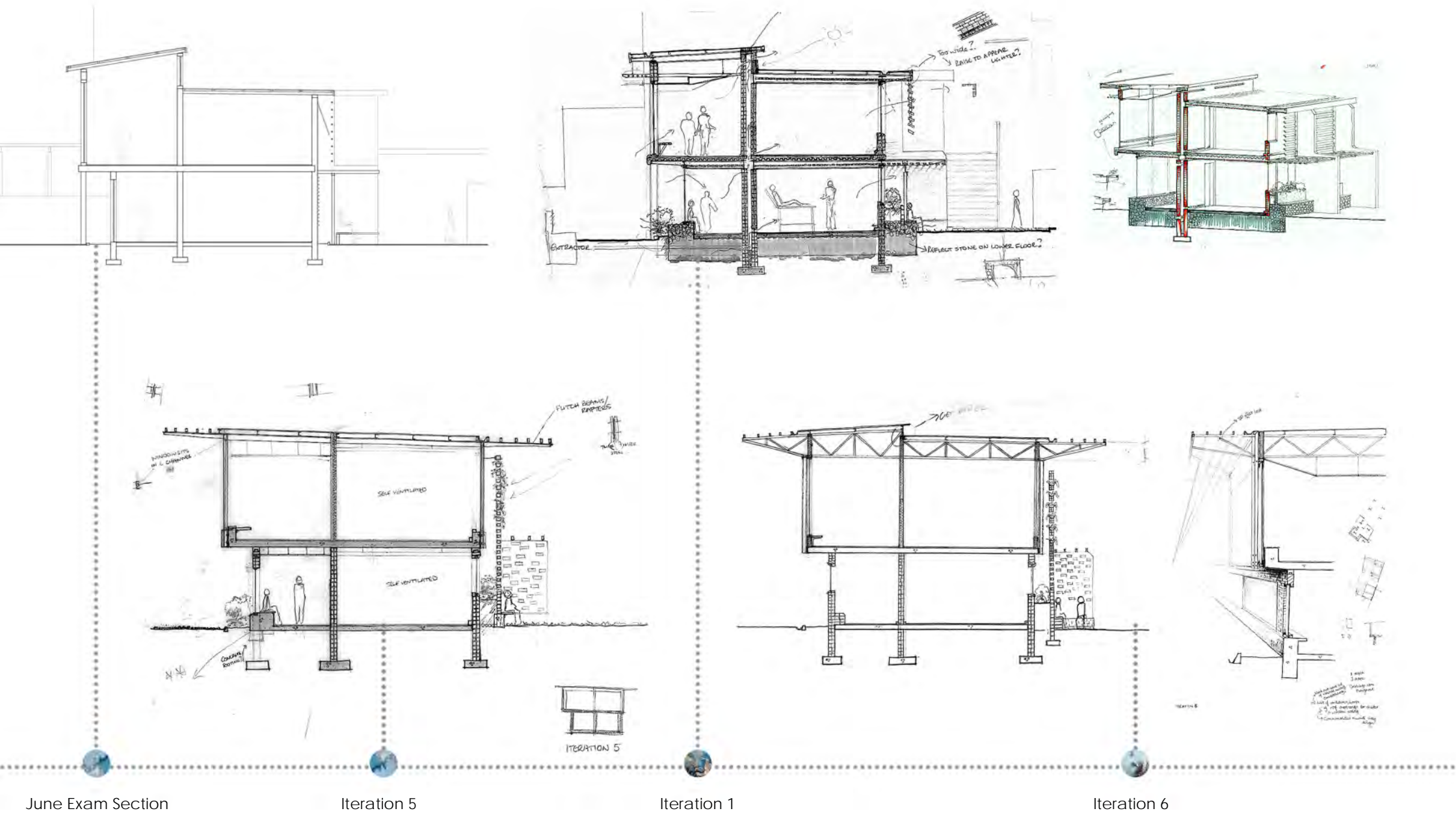
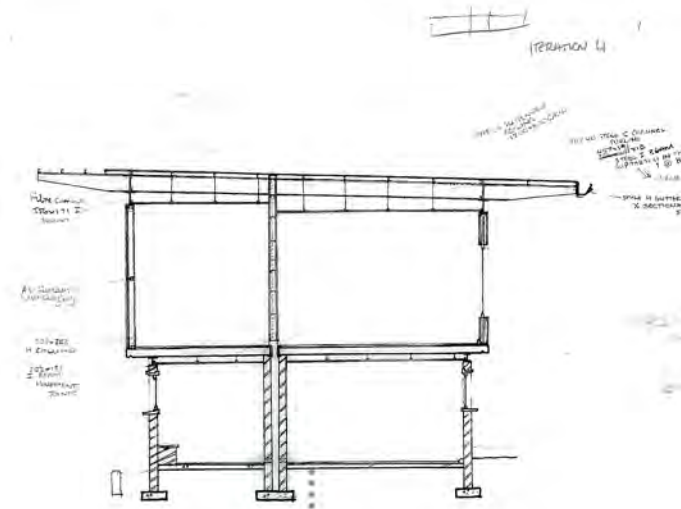
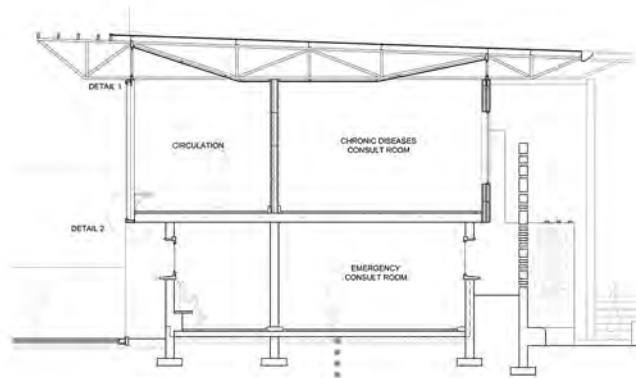
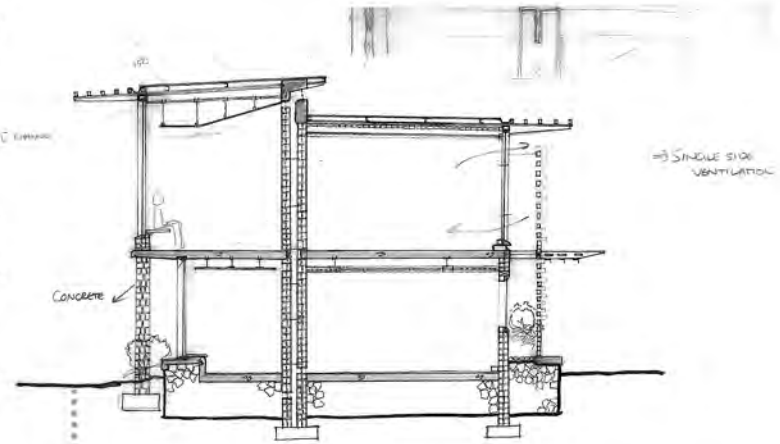
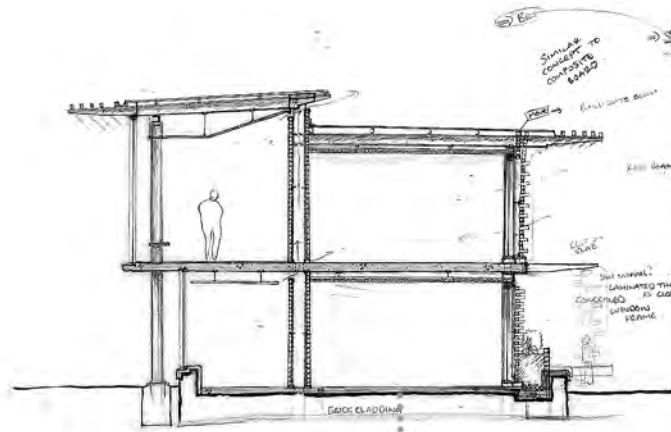
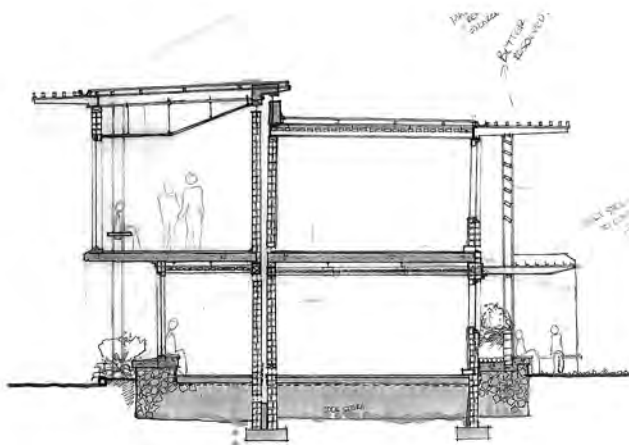


Figure 74. Sectional development (Author 2016).



Iteration 2

Iteration 7-
Presented at Tech
crit in September

Iteration 3

Iteration 4

Iteration 8



CHAPTER SEVEN

- 7. Passive Systems
 - 7.1 Urban Framework
 - 7.1.1 Stormwater Catchment
 - 7.1.2 Biodigesters
 - 7.2 Passive Systems in the Facility

Figure i. Contextual photo in Plastic View (Author 2016)

7. PASSIVE SYSTEMS

7.1 URBAN FRAMEWORK

The approach to passive systems in the scheme may be seen as an extension of the arguments laid out in developing an appropriate structural and architectural language for the facility, whereby the processes and situations present in Plastic View were used as informants for the proposals put forward in this dissertation. The most notable of these informants being the collaborative collection and distribution of resources amongst the community.

Due to the anticipated size and population of the development on the larger site precinct, this concept proved to be a viable solution to the distribution of resources within the urban framework. As a result, a number of sustainable systems were considered as a part of the larger urban framework which each individual project on the precinct could then tap into. These systems include rainwater harvesting along the pedestrian and vehicular roads, and a number of biodigesters connected to public ablutions along the island separating the two access roads.

7.1.1 STORMWATER CATCHMENT

As there is a significant slope on the site and the vehicular and pedestrian access roads proposed span 1.4 km across the site, a significant opportunity for catchment of the stormwater runoff from these roads was realised for the urban framework. In order to accommodate this, 3 different underground catchment tanks are proposed across the site. These tanks are situated next to the project sites and in some cases, may also store runoff from the projects themselves. These tanks are seen as a part of the same water piping system and so any overflow from one may be used to fill the remaining tanks on site. Rainwater harvesting from the healthcare facility's roofs and courtyards is also seen to support the water consumption of the healthcare facility with smaller secondary water tanks situated within the facility's precinct. The grey water from the facility and public ablutions is proposed as being recycled in order to flush the toilets and water gardens within the facility's grounds.

The total water demand for the facility was estimated to be 10 000L/day, while the total water demand for the public ablutions surrounding the site is estimated to be 5 000L/day. Refer to excel spreadsheet in annex for water budget and tank sizes.

7.1.2 BIODIGESTERS

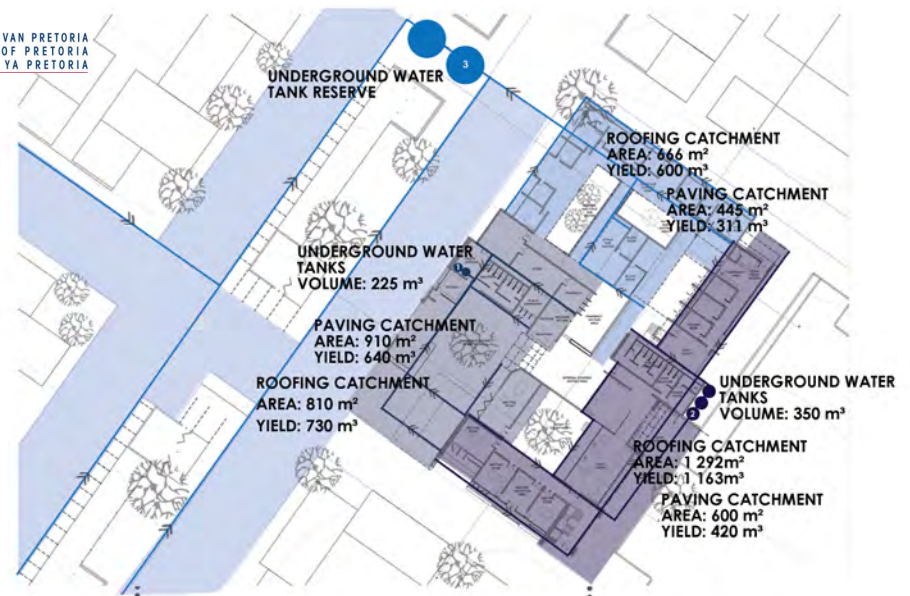
As the island intended to act as a buffer between the pedestrian and vehicular roads is anticipated to host a lot of commercial and pedestrian activity, a number of public ablutions are proposed at intermittent intervals on this island throughout the framework. These public ablutions are then connected to underground biodigester plants which would use of the waste produced in these ablutions in order to produce electrical energy to run lights and appliances, and heat to warm water for individual research projects on the site. The excess energy may then be used to support surrounding residential units if possible. The ablutions found in the healthcare facility supply the nearest biodigester to the facility with waste matter for energy production.

The average amount of waste going into the biodigester daily and the subsequent amount of gas this would produce was first calculated. The assumption was then made that 1m³ of gas would produce 9kWh and as a result, it was calculated that the biodigesters will produce 329KWh/day, of which 40% may be used for electricity, and the other 60% for heating water etc (Mudzuli 2015: 19).

The total electrical demand for the clinical facility is 73.5 kWh/day. Therefore the biodigester facility will be able to support the proposed design as well as supply a number of surrounding residences with electricity.



Rainwater harvesting system for site area near the facility



Rainwater harvesting from the facility

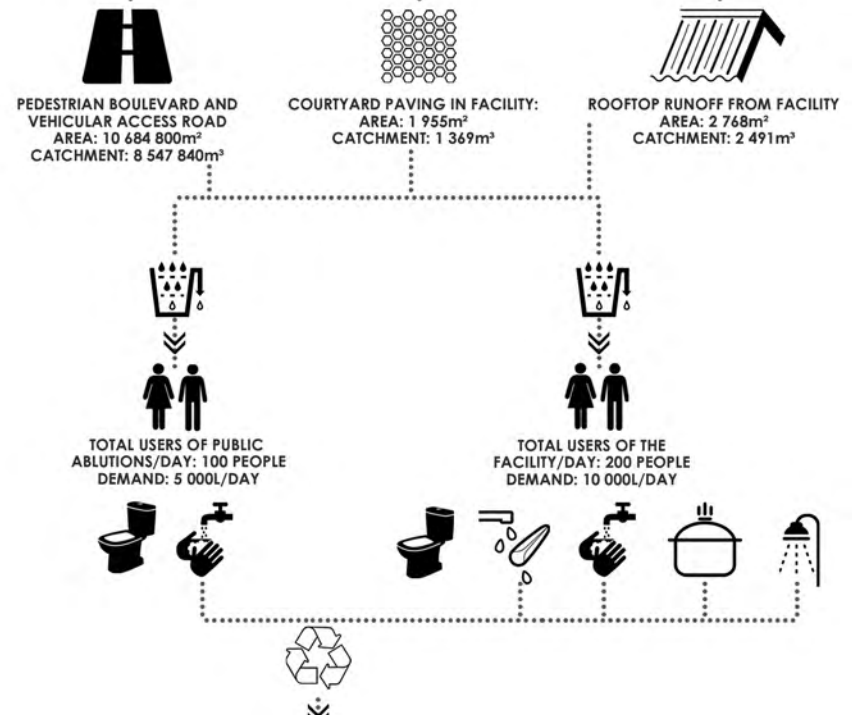


Figure 75. Rainwater harvesting system on site (Author 2016).

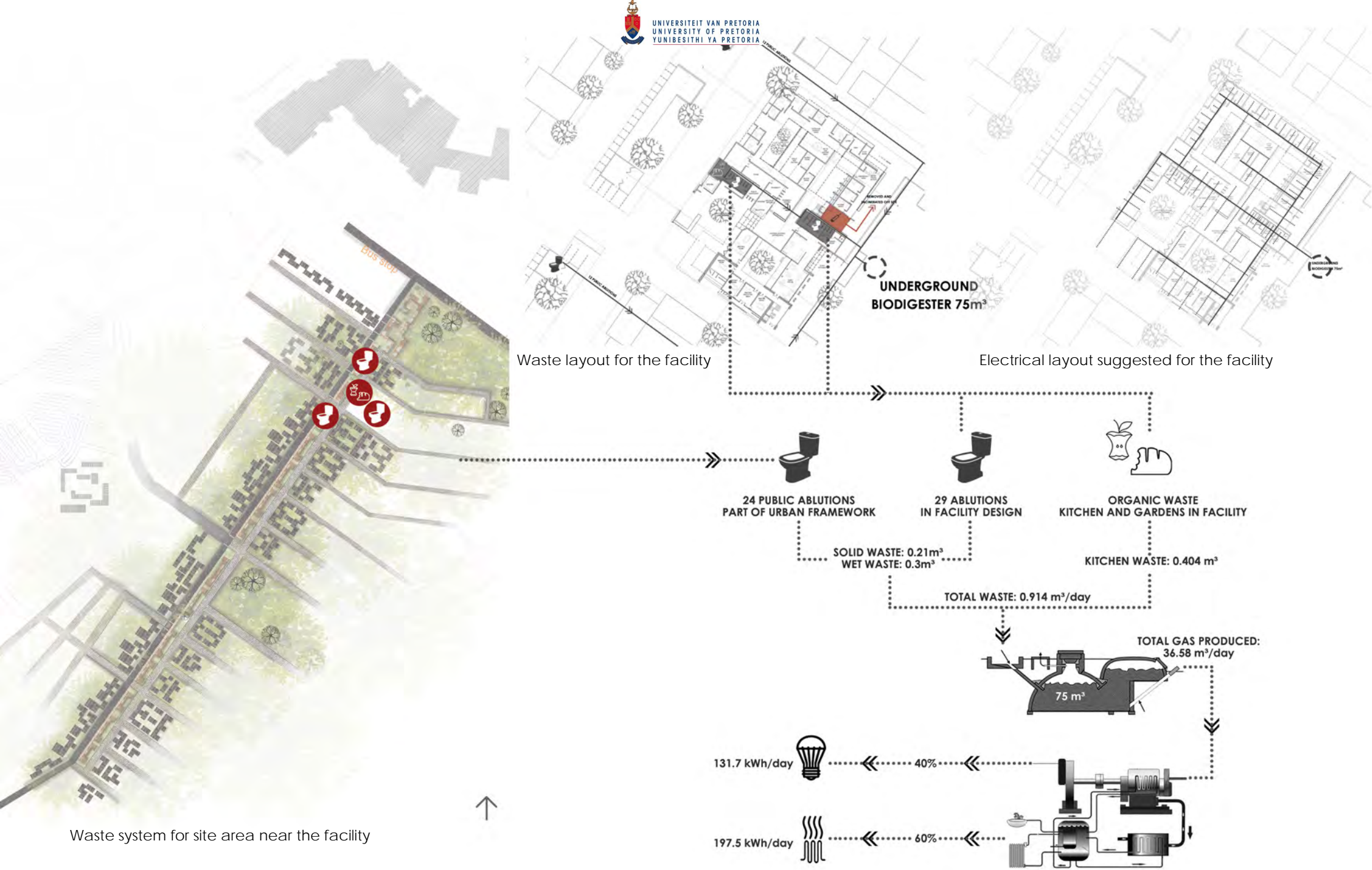


Figure 76. Biodigester system and electrical layout on site (Author 2016).

7.2 PASSIVE SYSTEMS IN THE FACILITY

As argued throughout this dissertation, incorporating as much of the natural context into the facility as possible is important in assisting the mental and emotional well being of the users of the facility. This argument is intended to be represented through bringing in as much natural ventilation and daylighting into the facility as possible. Due to the minimal sizes of rooms throughout the facility, simple passive systems are suggested for these aspects. These are illustrated on the following pages.

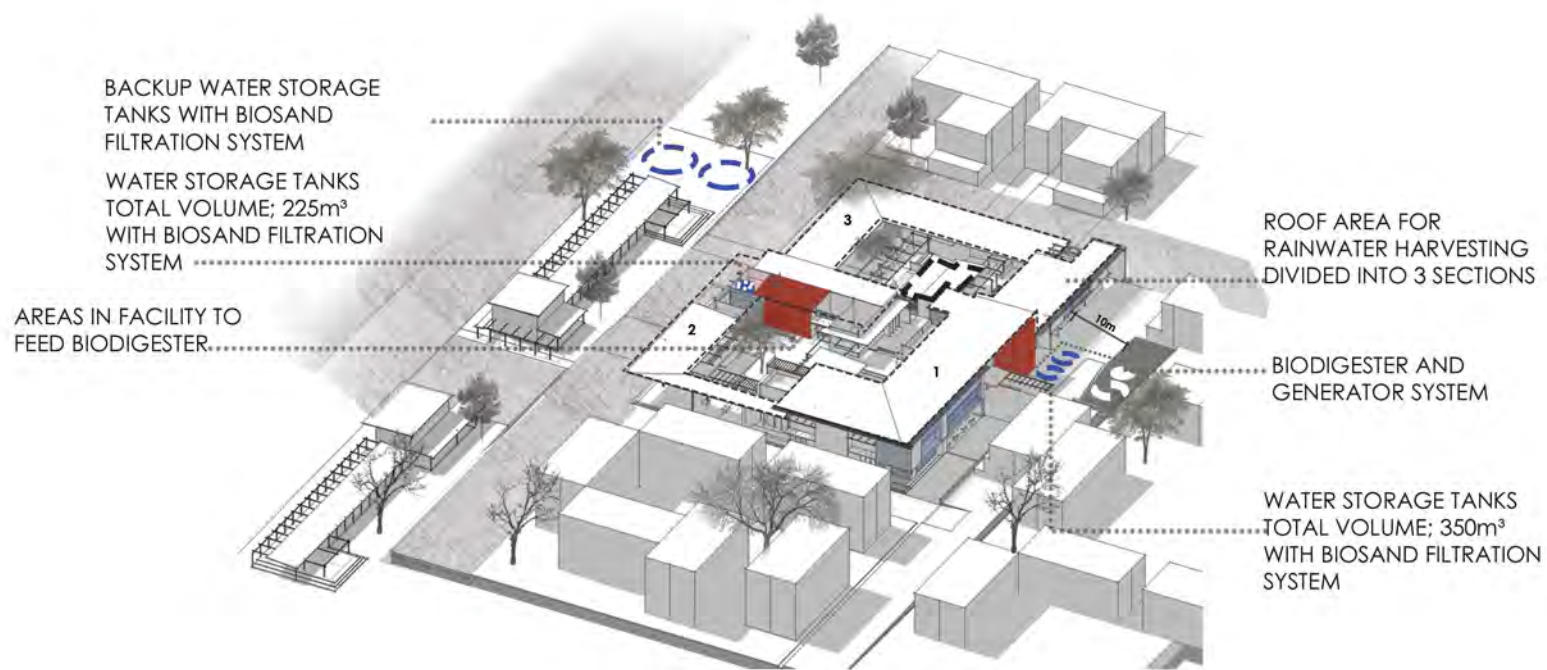
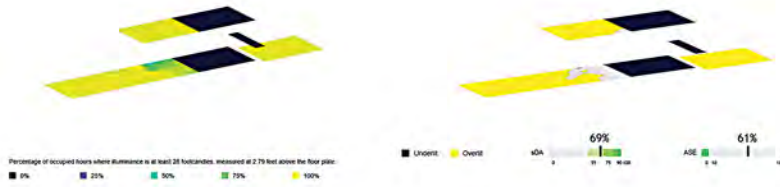
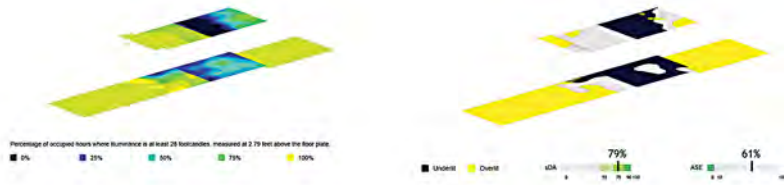


Figure 77. Diagram illustrating passive systems in facility (Author 2016).

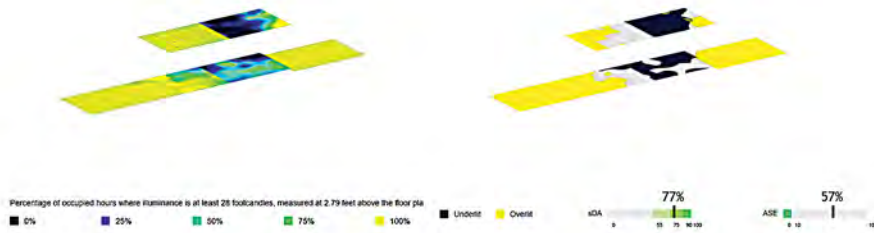
Iteration 1



Iteration 2



Iteration 3



Iteration 4

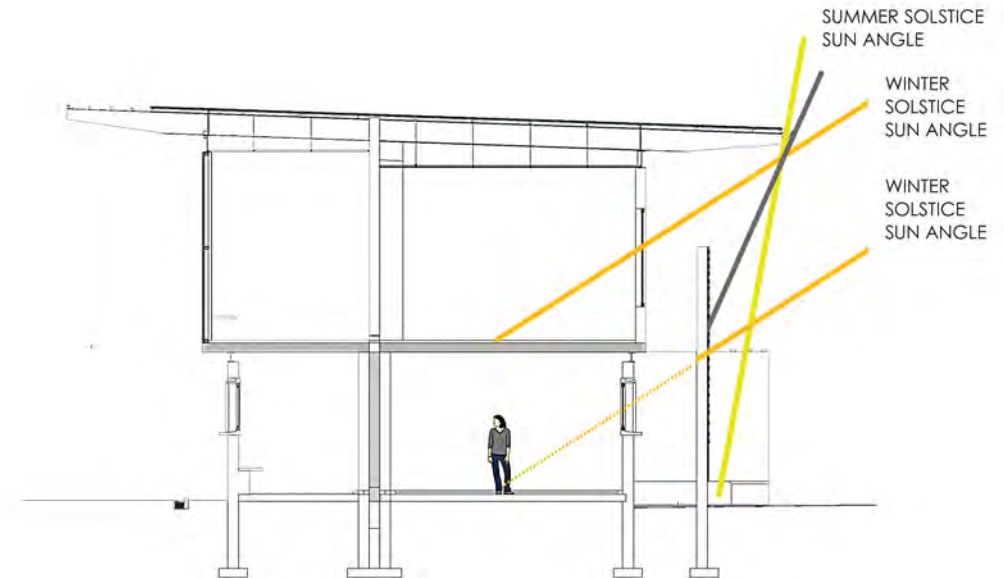
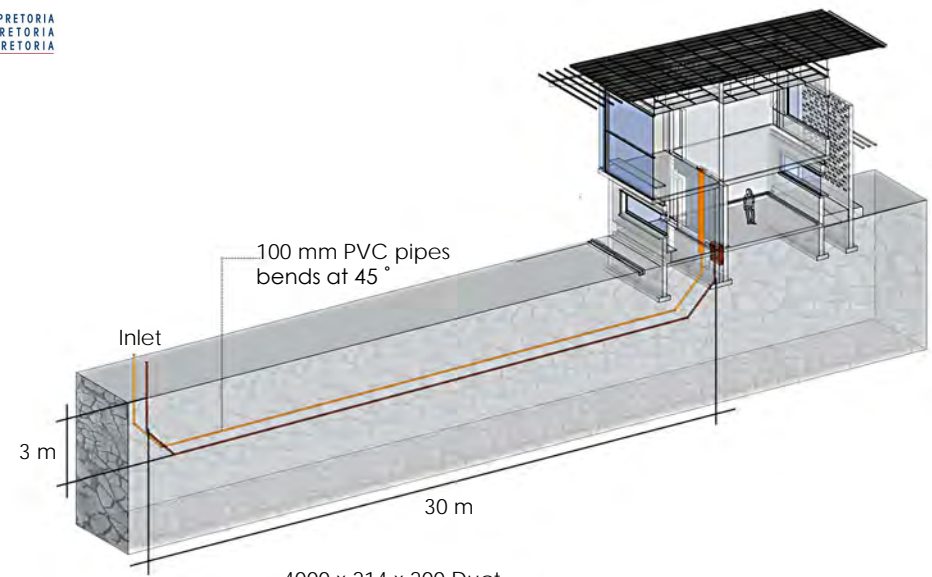
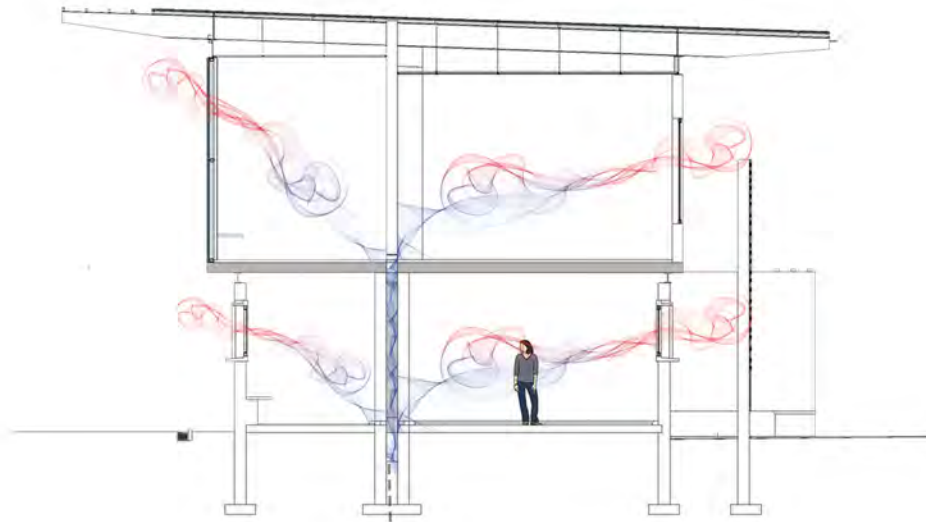
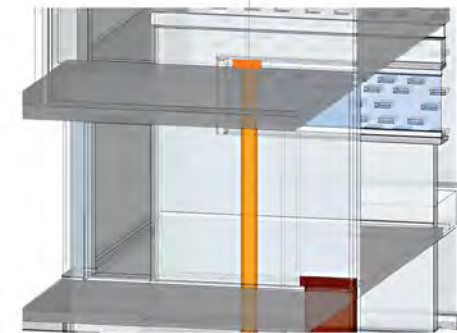


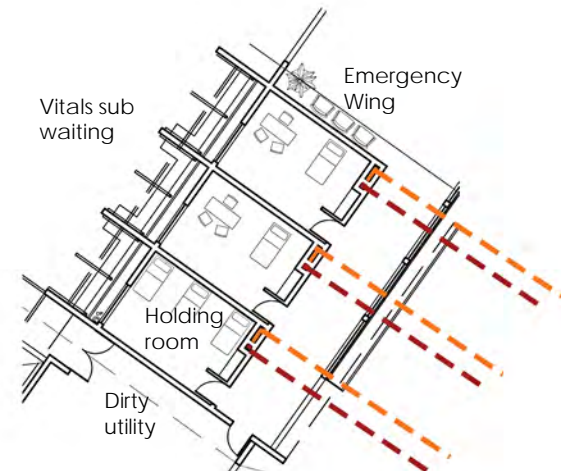
Figure 78. Daylighting iterations and investigations through detailed section (Author 2016).



4000 x 214 x 200 Duct
to feed upper levels



865 x 214 x 730 Duct
to feed lower level



Principle used for calculating the duct size required to adequately ventilate the required spaces.
(ASHRAE 2011)

Equation: Quantity of air (l/s) = $\frac{\text{Vol. of habitable space} \times \text{Air change rate/person}}{\text{Floor area/person}}$

Air change rate for consultation rooms: 11.5 l/s (ASHRAE 2011: 3)

(Note: As no consultation room was listed, the space with a similar health environmental quality was chosen for this calculation, namely a pharmacy prep room)

- | | |
|---|---|
| 1. Consultation room on Ground Floor level:
Quantity of air (l/s) = $62 \text{ m}^3 \times 11.5 \text{ l/s}$
10.6 m^2
Quantity of air (l/s) = 67.3 l/s
$= 0.0673 \text{ m}^3/\text{s}$
Therefore Duct Size =
865 deep x 214 wide x 365 long | 2. Consultation room on First Floor level:
Quantity of air (l/s) = $89 \text{ m}^3 \times 11.5 \text{ l/s}$
12.5 m^2
Quantity of air (l/s) = 81.9 l/s
$= 0.0819 \text{ m}^3/\text{s}$
Therefore Duct Size =
4000 deep x 214 wide x 100 long |
|---|---|

3. As the duct needs to serve the circulation space as well, which is half the width of the consultation rooms calculated above; the duct size for these spaces together may be seen to be 1.5 times the amount calculated in the equations above.

Therefore: Duct size for the first floor level = 4000 deep x 214 wide x 200 long
Duct size for the ground floor level = 865 deep x 214 wide x 730 long

Figure 79. Earth pipe ventilation system in clinic section of the facility (Author 2016).



CONCLUSION

In conclusion, this dissertation intended to highlight the great disparities that exist between public and private healthcare delivery sectors in this country despite healthcare being a constitutional right for all people living in South Africa. The overarching research question aimed to investigate how primary healthcare delivery may be reconsidered in order to make healthcare a more accessible amenity to all. However, the solution to this proved to be a much larger programmatic issue than what could be investigated in this dissertation, and so the research process focused in on what is currently being proposed from a governmental approach and from a community driven approach, in order to understand how architecture may then be used to spatially support these proposals.

In order to achieve this, a number of valuable precedent studies into past and present healthcare models, both programmatic and spatial were undertaken. These precedent studies highlighted the importance and advantages of a largely preventative approach to healthcare, where health is defined as not only being free from disease or infirmity, but rather a complete state of mental, physical and social well being. Another important result from these studies was the preference for a de-centralised model as opposed to a hospital centric model in order to effectively spread resources across the healthcare delivery sector. This is what informed the approach adopted throughout the project, namely the consideration of how this de-centralised preventative approach to healthcare may be used to support the larger healthcare model.

The resulting project aimed to reconsider the way healthcare facilities are currently being designed in South Africa, in order to create a physical environment which assists, rather than inhibits the healing process and where healthcare awareness is taken out into the surrounding community, not only provided within the facility walls. The project was considered as a spatial intermediate between the top down and bottom up approaches where not only the visitors to the facility were considered, but also the larger community as a whole passing by the facility in order to design a holistic healing environment for the community at large. Historical healthcare models, and the existing built context and space making principles present in Plastic View and other informal settlements, proved to be viable precedents in informing the architectural language of the project, resulting in a more intimate architecture for the facility.

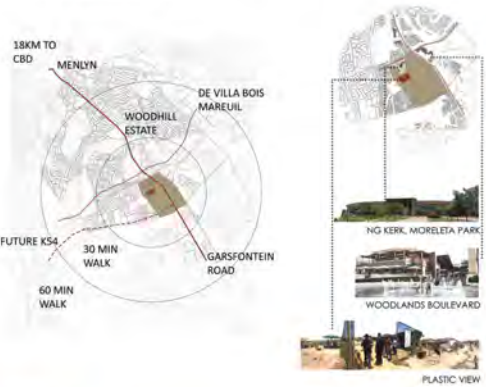
The main conclusions drawn from the research process in this dissertation, are that the current healthcare models evident in the South African context, are not currently providing an environment that is conducive to healing. Instead, these facilities provide machine like efficient, inhumane environments with the sole aim of delivering curative healthcare often under strained resources which, in poorer communities such as Plastic View, has been proven to make people less healthy.

If this is to change in order to make holistic healthcare a more accessible amenity to all, this model needs to be re-interpreted in order to return to a model which considers the dignity and experience of the user by adopting a primarily preventative approach to healthcare, supplemented by a small scale curative aspect, in order to introduce facilities that are designed to promote healing.

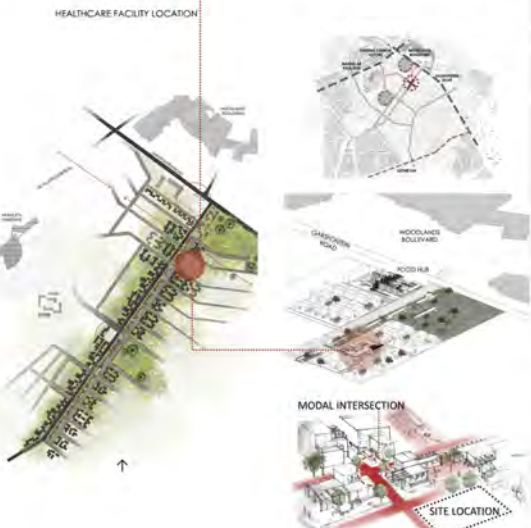
FINAL EXAM IMAGES

CONTEXT & SITE LOCATION

AS THE SITE EXISTS TODAY

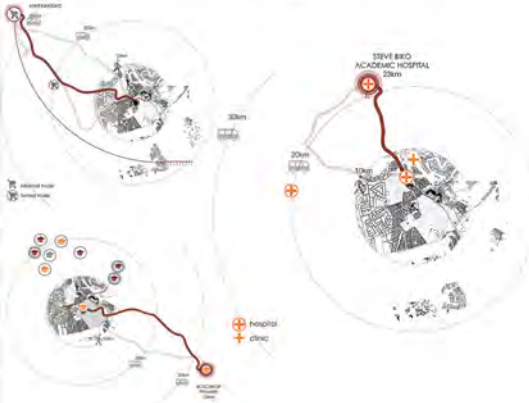


THE PROPOSED CONCEPTUAL DEVELOPMENT OF THE SITE



ISSUES

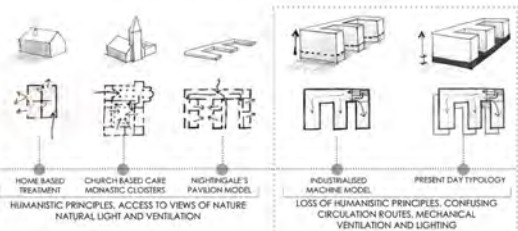
GENERAL ISSUE: ACCESS TO BASIC AMENITIES



URBAN ISSUE: THE FRAGMENTED URBAN FABRIC AND SOCIO-ECONOMIC DIVIDE



ARCHITECTURAL ISSUE: THE ROLE OF ARCHITECTURE IN THE HEALING PROCESS



VS

INTENTIONS

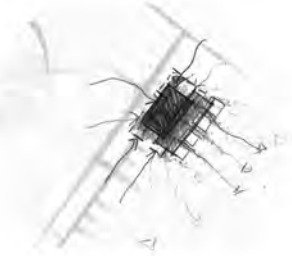
URBAN INTENTION: STITCHING THE URBAN FABRIC AND OVERCOMING THE SOCIO-ECONOMIC DIVIDE



GENERAL INTENTION: IMPROVE ACCESS TO BASIC AMENITIES

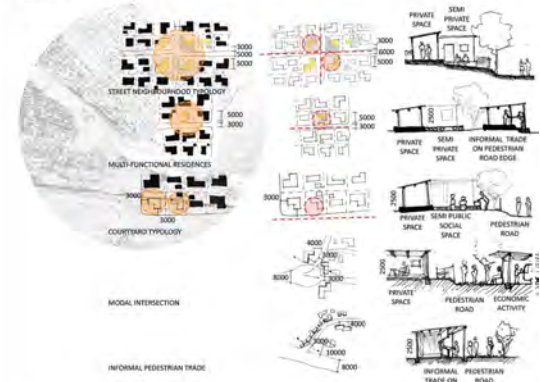


ARCHITECTURAL INTENTION: A HOLISTIC HEALING FACILITY

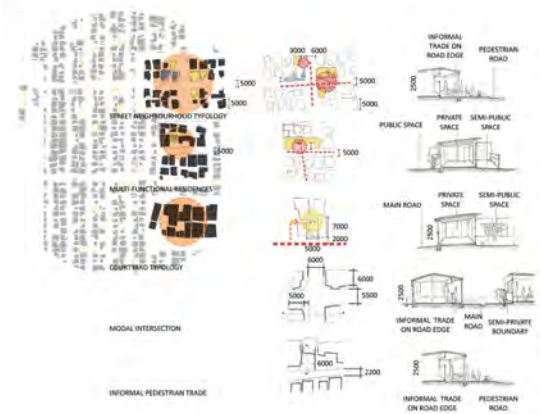


SPATIAL PRECEDENTS

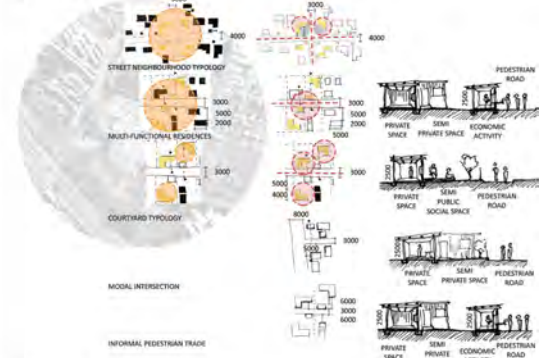
ALASKA



PLASTIC VIEW



SLOVO PARK



CONCLUSIONS



Figure 80. Final exam presentation pages (Author 2016).

STRUCTURAL PRECEDENT



BUILT EXAMPLES IN PLASTIC VIEW



EXPOSED



HIDDEN



STRUCTURE EXPLODED



HIDDEN EXPOSED



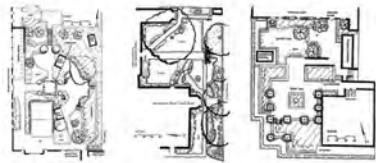
CONCLUSIONS



THEORY



THE HEALING POWER OF PLACE AND SPACE



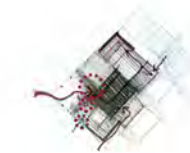
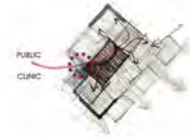
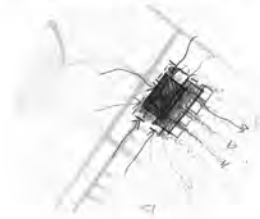
THE SIDEWALK EXPERIENCE



CONCLUSIONS



DIAGRAMMATIC DEVELOPMENT



EXPLANATORY DIAGRAMS

MOVEMENT AND ACCESS



WAYFINDING

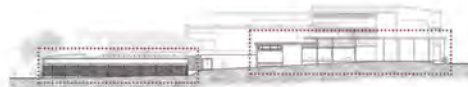


PUBLIC AND PRIVATE THRESHOLDS





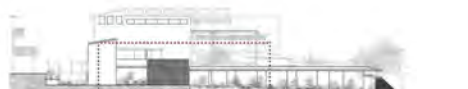
THESE INTENTIONS WERE FULLY ACTIVE FACILITY IN THE PUBLIC REALM WHERE POSSIBLE, AND A COMMUNITY AND USER ORIENTED APPROACH TO PREVENTATIVE HEALTHCARE, FOR VISITORS TO THE FACILITY AS WELL AS THE LARGER COMMUNITY.



THE NORTHERN FACADE IS THE MOST INTERACTIVE WITH THE PUBLIC PASSING BY AND SITUATED ADJACENT TO THE PEDESTRIAN BOULEVARD ACROSS THE SITE THEREFORE ALL RESEARCH CONCLUSIONS WERE CONSIDERED IN THIS ITERATION. DESPITE THESE INTENTIONS, THE RESULT IN THIS ITERATION WAS A VERY UNWELCOMING, NON-INTERACTIVE FACADE.



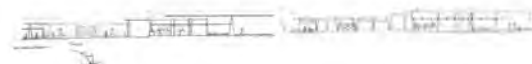
THIS FACADE WAS INTENDED TO SCREEN THE USERS FROM THE SERVICE SIDE OF THE FACILITY. IT IS THE LEAST INTERACTIVE WITH THE PUBLIC PASSING BY. THE RESULT IN THIS ITERATION PRODUCED A VERY REPETITIVE FACADE WHICH DID NOT SUPPORT THE INITIAL INTENTIONS OF THE PROJECT.



THIS FACADE SCREENS THE SEMI PRIVATE CLINIC ACTIVITIES FROM THE QUIETER PEDESTRIAN STREET ADJACENT TO IT. THEREFORE A NUMBER OF THRESHOLDS AND EXPERIENCES WERE CONSIDERED FOR BOTH THE INHABITANTS OF THE FACILITY AND THE PASSERBYS. THE RESULT AGAIN WAS A VERY INSTITUTIONAL, REPETITIVE FACADE.



THIS FACADE IS THE NEXT MOST INTERACTIVE WITH THE PUBLIC PASSING BY AND ENTERING THE BUILDING AND SO THE SIDEWALK EXPERIENCE WAS A VERY INFLUENTIAL DESIGN GUIDANCE IN THIS INSTANCE. THE RESULT HOWEVER DID NOT SUPPORT THESE INTENTIONS.



THESE WERE THEN ITERATED BY CONSIDERING THE STRUCTURAL PRECEDENT CONCLUSIONS FROM PLASTIC VIEW IN THE FACADE DESIGN. HERE THE STRUCTURE ALTERNATES BETWEEN BEING HIDDEN AND EXPOSED



THIS PROCESS WAS UNDERTAKEN FOR EVERY FACADE OF THE FACILITY.



THE PURPOSE OF THIS WAS TO BETTER RELATE THE DESIGN TO THE INITIAL INTENTIONS OF THE DISSERTATION.



THESE INTENTIONS WERE A FULLY ACTIVE FACILITY IN THE PUBLIC REALM WHERE POSSIBLE, AND A COMMUNITY AND USER ORIENTED APPROACH TO PREVENTATIVE HEALTHCARE, FOR VISITORS TO THE FACILITY AS WELL AS THE LARGER COMMUNITY.



ON THE NORTHERN FACADE THE PUBLIC ENTRANCE AREA OF THE FACILITY BECAME MORE WELCOMING, INTERACTIVE AND VISUALLY ACCESSIBLE. THE CLINIC SIDE OF THE FACADE PROVIDES THE NECESSARY PRIVACY WHILST ALSO PROVIDING A VISUALLY INTERACTIVE FACADE FOR THE PUBLIC PASSING BY.



THE SOUTHERN FACADE STILL SCREENS THE USERS FROM THE SERVICE AREA OF THE FACILITY HOWEVER THE OVERLAY OF STRUCTURE BEING HIDDEN AND EXPOSED PRODUCED A LESS REPETITIVE AND INSTITUTIONAL AESTHETIC.



BY EXPLORING A NUMBER OF DIFFERENT APPROACHES TO THRESHOLDS AND SIDEWALK EXPERIENCE, THIS FACADE HIGHLIGHTS THE NECESSARY ELEMENTS TO BE RECOGNISED BY THE PUBLIC WHILST PROVIDING THE NECESSARY PRIVACY FOR THE CLINIC SIDE OF THE FACADE.



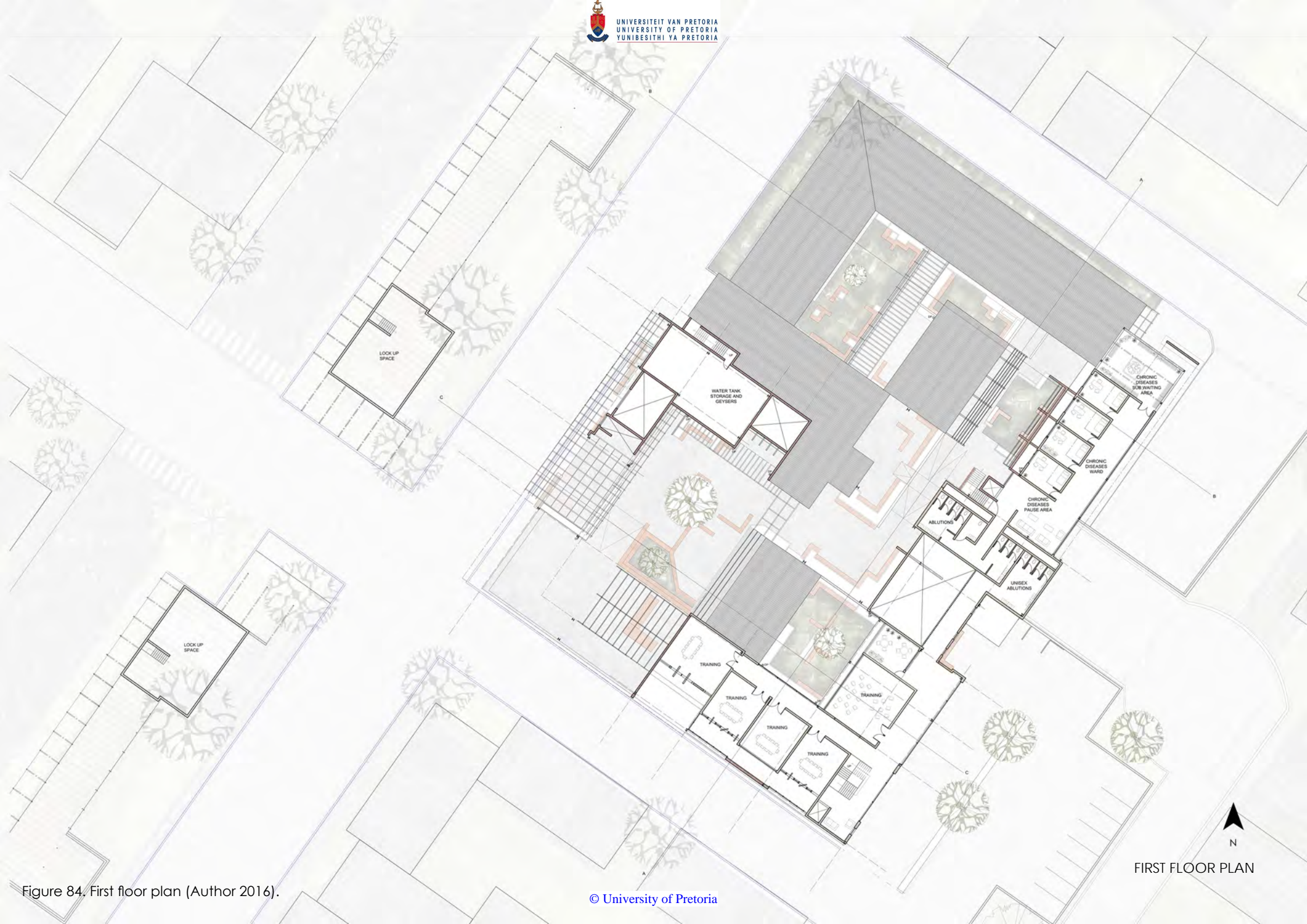
THE CONSIDERATION OF VISUAL AND PHYSICAL EASE OF ACCESS BY THE PUBLIC PASSING BY ON THIS FACADE LED TO THE DEVELOPMENT OF A FACADE WHICH LENDS ITSELF TO THE INITIAL INTENTIONS OF THE DISSERTATION.





GROUND FLOOR PLAN

Figure 83. Ground floor plan (Author 2016).



FIRST FLOOR PLAN

Figure 84. First floor plan (Author 2016).



SECOND FLOOR PLAN

Figure 85. Second floor plan (Author 2016).



Figure 86. Section A-A (Author 2016).



SECTION A-A



Figure 87. Section B-B (Author 2016).



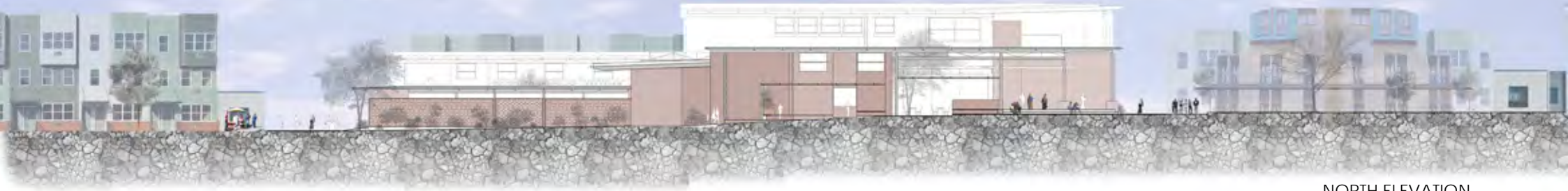
SECTION B-B



Figure 88. Section C-C (Author 2016).



SECTION C-C



NORTH ELEVATION



SOUTH ELEVATION



EAST ELEVATION



WEST ELEVATION

Figure 89. Elevations (Author 2016).

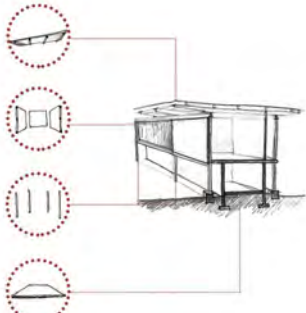
TECTONIC & STRUCTURAL INTENTION

WALL SECTION

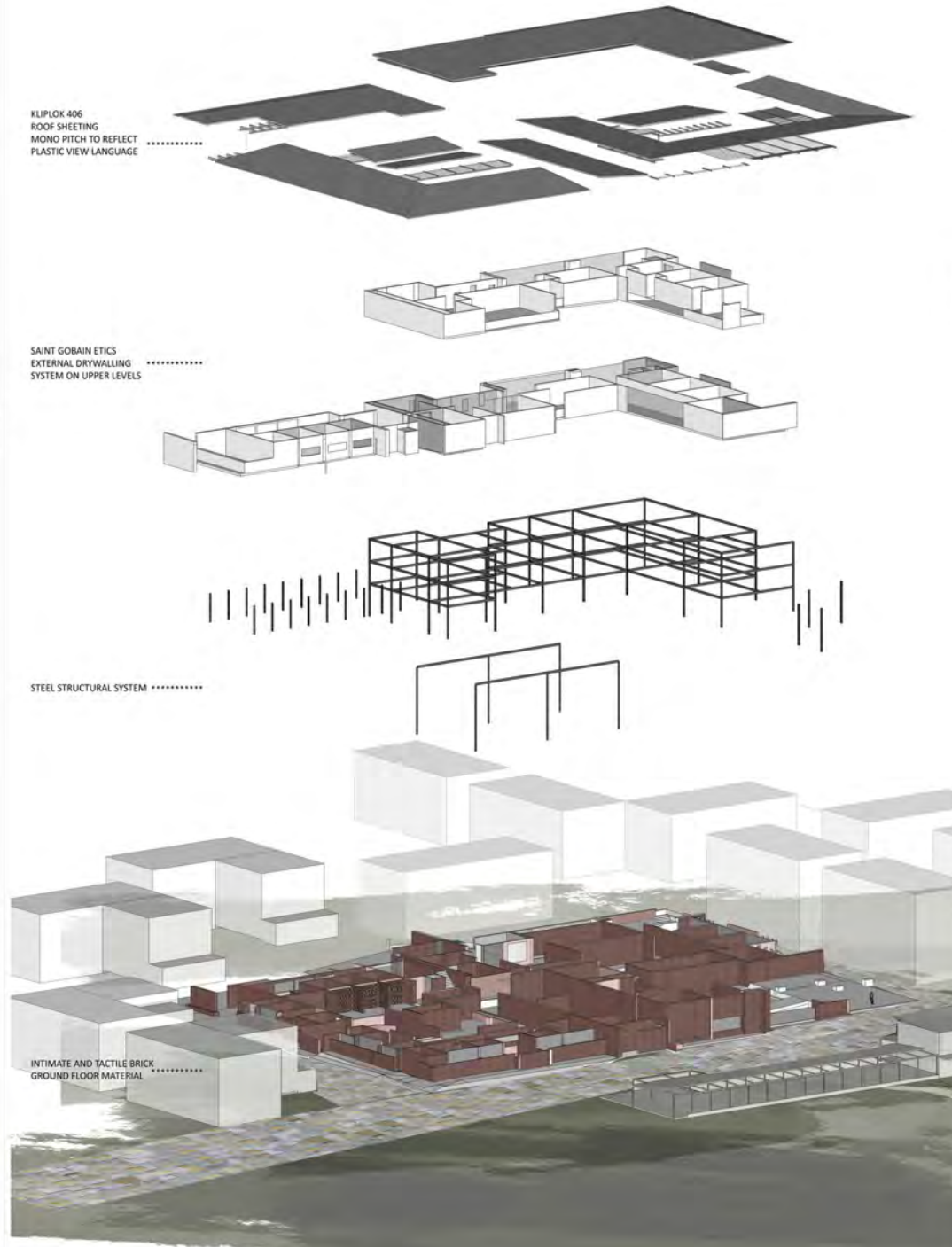
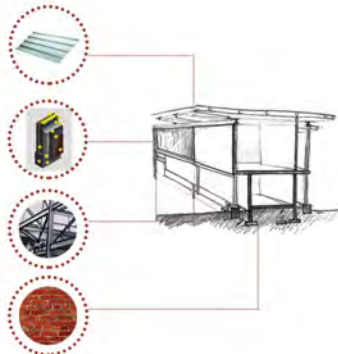
TECTONIC CONCEPT



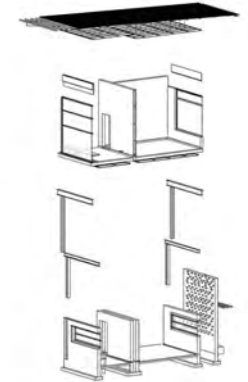
STRUCTURAL INTENTION



TECTONIC INTENTION



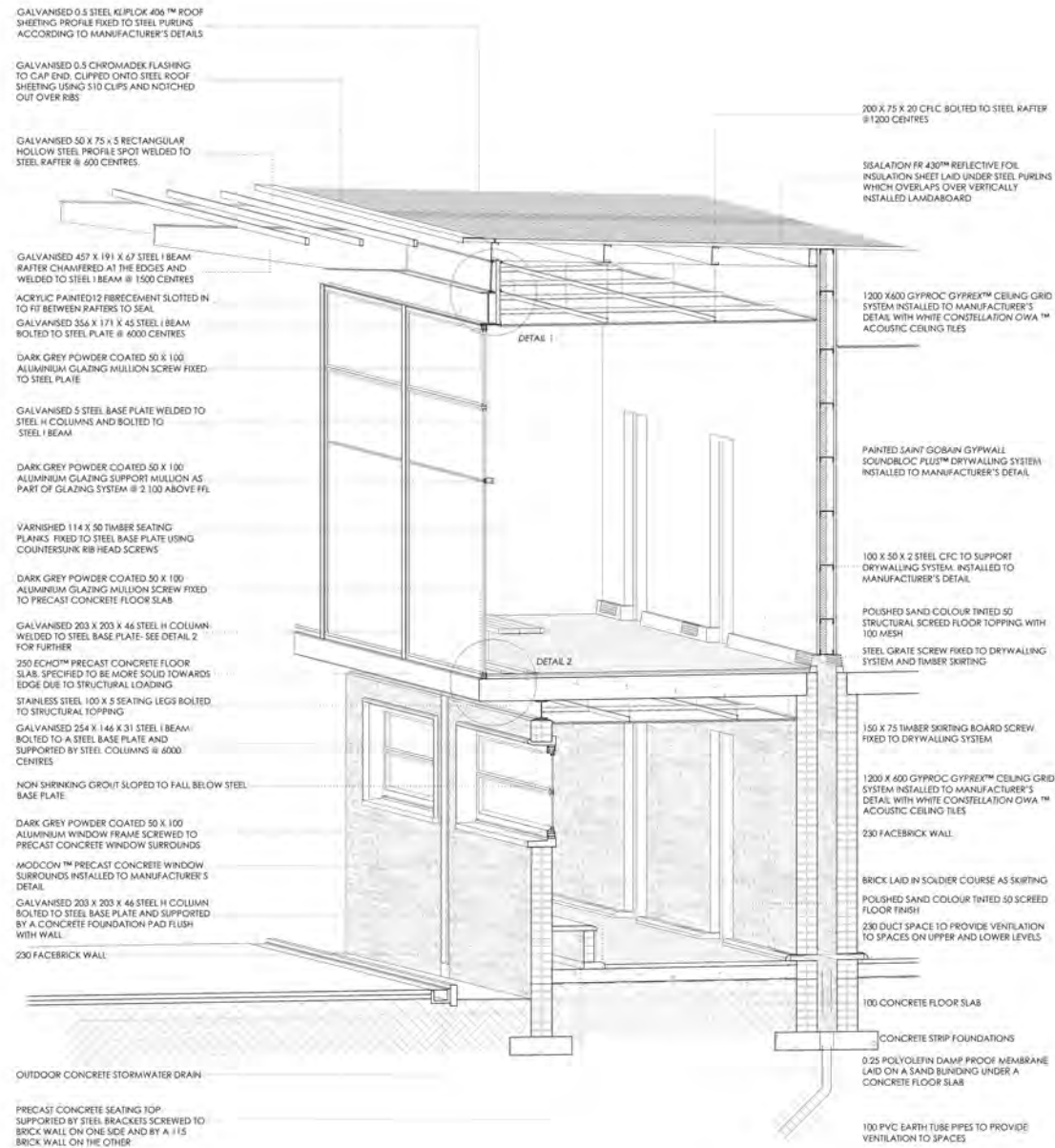
SECTION THROUGH CHRONIC DISEASES AND EMERGENCY WING



STRUCTURE



INFILL



PERSPECTIVE WALL SECTION
SCALE 1:20

118 Figure 91. Perspective Wall Section (Author 2016).

GALVANISED 0.5 STEEL KLIPLOK 406™ ROOF SHEETING PROFILE FIXED TO STEEL PURLINS ACCORDING TO MANUFACTURER'S DETAILS

GALVANISED 0.5 CHROMADEK FLASHING TO CAP END, CLIPPED ONTO STEEL ROOF SHEETING USING S10 CLIPS AND NOTCHED OUT OVER RIBS

STEEL RAFTER

GALVANISED 200 X 75 X 20 CFLC BOLTED TO STEEL RAFTER @ 1200 CENTRES

ACRYLIC PAINTED 12 FIBRECEMENT SLOTTED IN TO FIT BETWEEN RAFTERS TO SEAL

GALVANISED 10 X 10 SOLID STEEL SECTION SPOT WELDED TO STEEL RAFTER FLANGE

GALVANISED 25 X 25 CF STEEL ANGLE SECTION SPOT WELDED TO STEEL RAFTER FLANGE

GALVANISED 356 X 171 X 45 STEEL I BEAM BOLTED TO STEEL PLATES ABOVE AND BELOW @ 6000 CENTRES

GALVANISED 5 STEEL BASE PLATE BOLTED TO STEEL H COLUMNS AND STEEL I BEAM

MATT BLACK POWDER COATED 50 X 100 ALUMINIUM GLAZING MULLION SCREW FIXED TO STEEL PLATE

GALVANISED 203 X 203 X 3500 STEEL H COLUMN, BOLTED TO STEEL BASE PLATE AND CONCRETE FLOOR SLAB @ 6000 CENTRES

POLYCLOSURE FIXED TO SEAL

SISALATION FR 430™ REFLECTIVE FOIL INSULATION SHEET LAID UNDER STEEL PURLINS WHICH OVERLAPS OVER VERTICALLY INSTALLED LAMDABOARD

25 X 25 CF STEEL ANGLE SECTION SPOT WELDED TO STEEL RAFTER FLANGE

10 X 10 SOLID STEEL SECTION SPOT WELDED TO STEEL RAFTER FLANGE

40 X 40 STEEL L WELDED TO STEEL RAFTER

25 X 25 CF STEEL ANGLE SECTION SPOT WELDED TO STEEL RAFTER AND SCREW FIXED TO LAMDABOARD

50 LAMDABOARD INSULATION SCREW FIXED TO STEEL ANGLES AND PURLIN

GALVANISED 50 X 25 CF STEEL UNEQUAL ANGLE SCREW FIXED TO STEEL UNEQUAL ANGLE

GALVANISED 50 X 25 CF STEEL UNEQUAL ANGLE SPOT WELDED TO STEEL BASE PLATE

1200 X 600 GYPROC GYPREX™ CEILING GRID SYSTEM INSTALLED TO MANUFACTURER'S DETAIL WITH WHITE CONSTELLATION OWA™ ACOUSTIC CEILING TILES

GALVANISED 203 X 203 X 46 STEEL H COLUMN
BOLTED TO STEEL BASE PLATE AND PRECAST
CONCRETE FLOOR

MATT BLACK POWDER COATED 50 X 100
ALUMINIUM GLAZING MULLION SCREW
FIXED TO CONCRETE FLOOR SLAB

GALVANISED STEEL BASE PLATE TO SUPPORT
STEEL COLUMN, FIXED WITH ANCHOR
THREADS THAT ARE DRILLED INTO PRECAST
CONCRETE FLOOR SLAB AND EPOXY FILLED

250 ECHO™ PRECAST CONCRETE FLOOR
SLAB. SPECIFIED TO BE MORE SOLID TOWARDS
EDGE DUE TO STRUCTURAL LOADING

POLISHED SAND COLOUR TINTED 50
STRUCTURAL SCREED FLOOR TOPPING WITH
100 MESH

GALVANISED 254 X 146 X 31 STEEL I BEAM
BOLTED TO A STEEL BASE PLATE AND
STEEL COLUMNS @ 6000 CENTRES

NON SHRINKING GROUT SLOPED TO FALL BELOW STEEL
BASE PLATE

1200 X 600 GYPROC GYPREX™
SUSPENDED CEILING SYSTEM, WITH
ALUMINIUM SHADOW SECTION TO
MANUFACTURER'S DETAIL

230 BRICK INFILL WALL

VARNISHED 114 X 50 TIMBER SEATING
PLANKS FIXED TO STEEL BASE PLATE USING
COUNTERSUNK RIB-HEAD SCREWS

STAINLESS STEEL SEATING LEGS BOLTED TO
STRUCTURAL TOPPING

DRIP JOINT

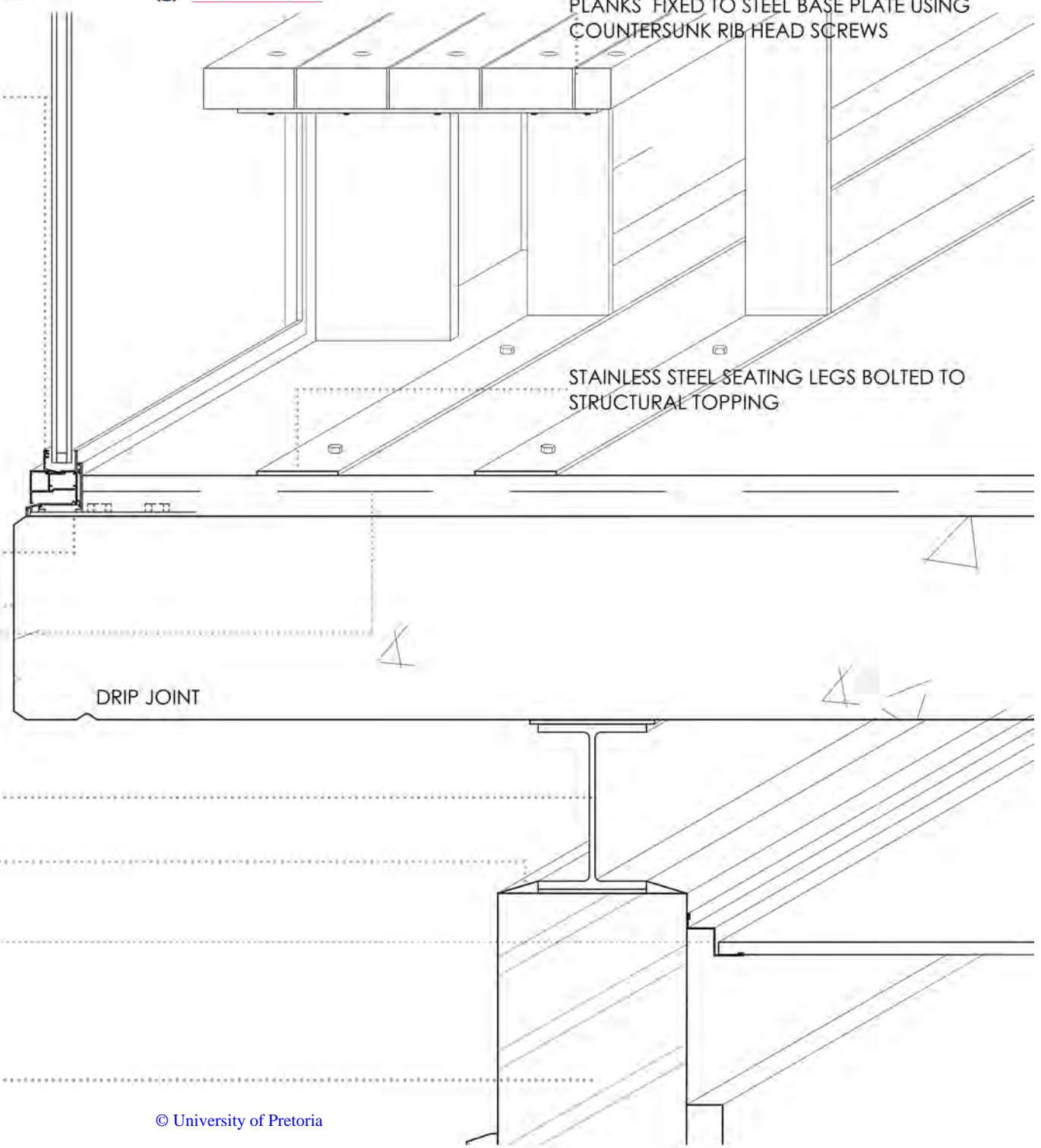
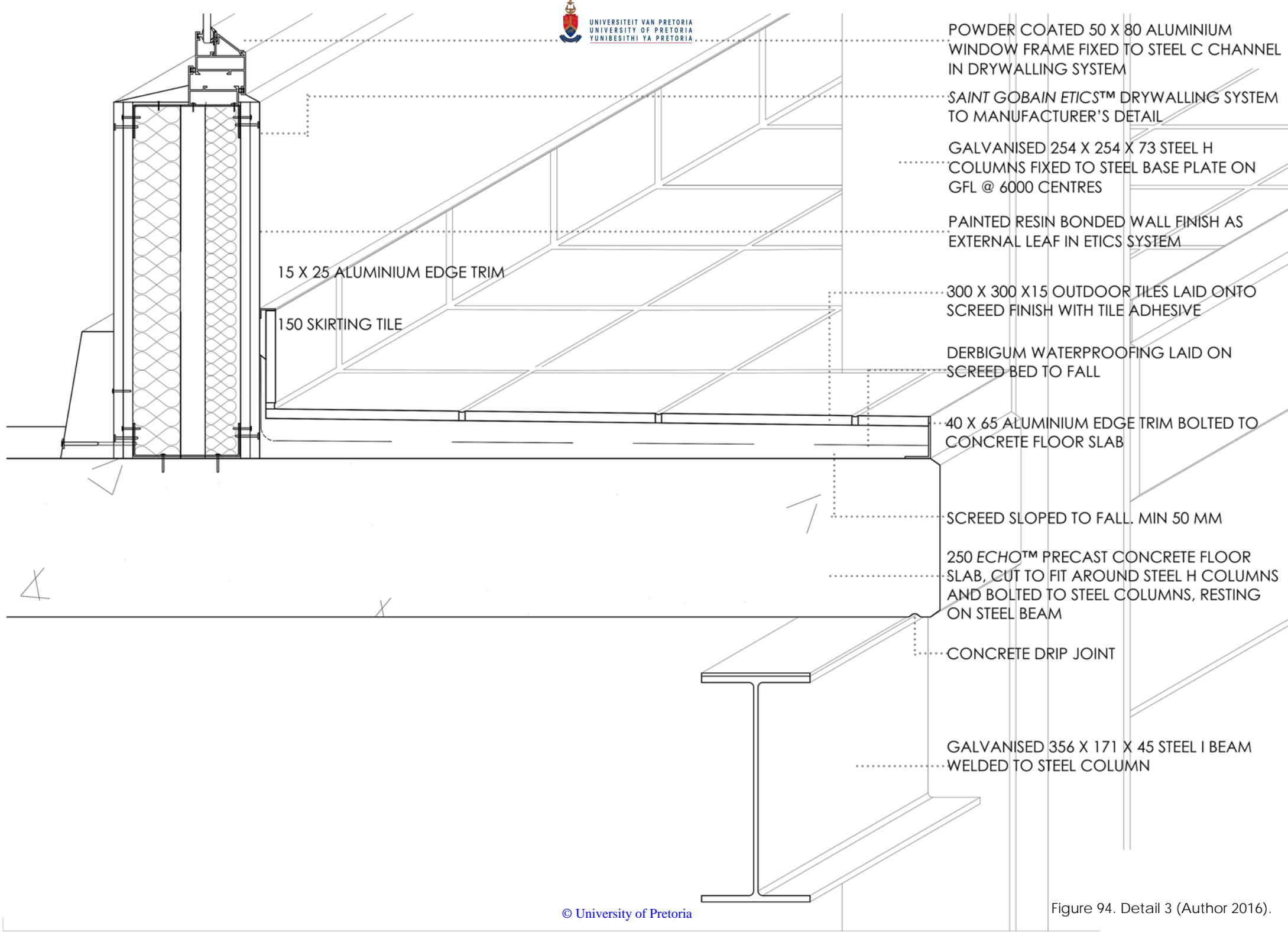


Figure 93. Detail 2 (Author 2016).



POWDER COATED 50 X 80 ALUMINIUM WINDOW FRAME FIXED TO STEEL C CHANNEL IN DRYWALLING SYSTEM

SAINT GOBAIN ETICS™ DRYWALLING SYSTEM TO MANUFACTURER'S DETAIL

GALVANISED 254 X 254 X 73 STEEL H COLUMNS FIXED TO STEEL BASE PLATE ON GFL @ 6000 CENTRES

PAINTED RESIN BONDED WALL FINISH AS EXTERNAL LEAF IN ETICS SYSTEM

15 X 25 ALUMINIUM EDGE TRIM

150 SKIRTING TILE

300 X 300 X 15 OUTDOOR TILES LAID ONTO SCREED FINISH WITH TILE ADHESIVE

DERBIGUM WATERPROOFING LAID ON SCREED BED TO FALL

40 X 65 ALUMINIUM EDGE TRIM BOLTED TO CONCRETE FLOOR SLAB

SCREED SLOPED TO FALL. MIN 50 MM

250 ECHO™ PRECAST CONCRETE FLOOR SLAB, CUT TO FIT AROUND STEEL H COLUMNS AND BOLTED TO STEEL COLUMNS, RESTING ON STEEL BEAM

CONCRETE DRIP JOINT

GALVANISED 356 X 171 X 45 STEEL I BEAM WELDED TO STEEL COLUMN

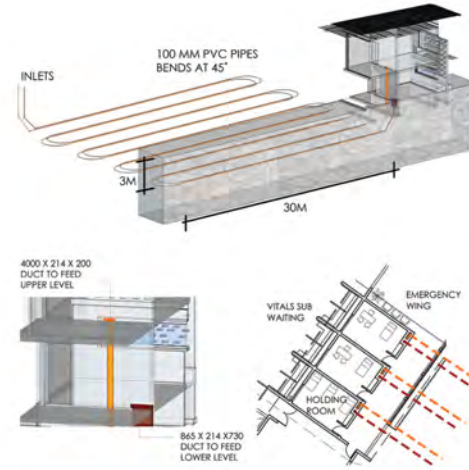
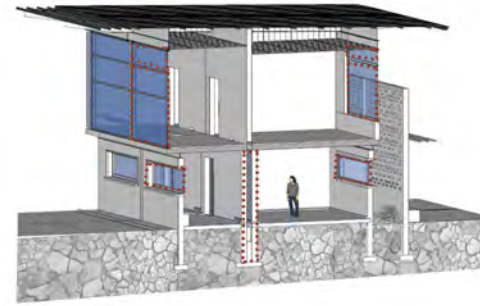
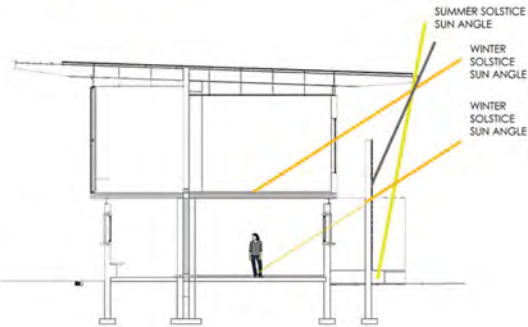
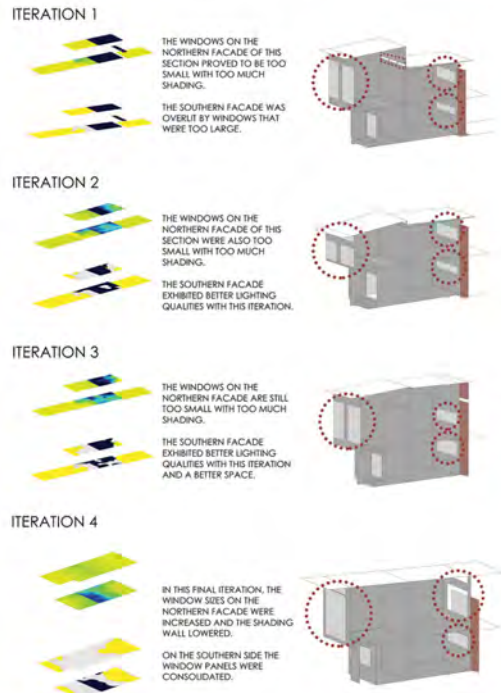
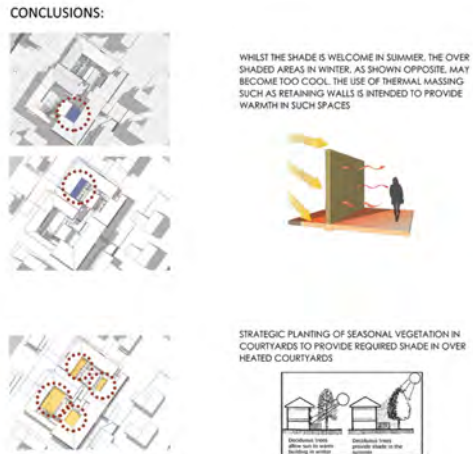
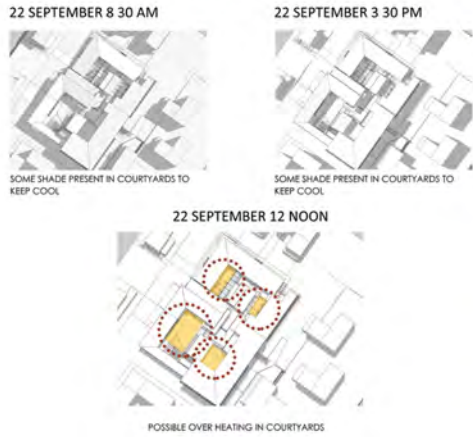
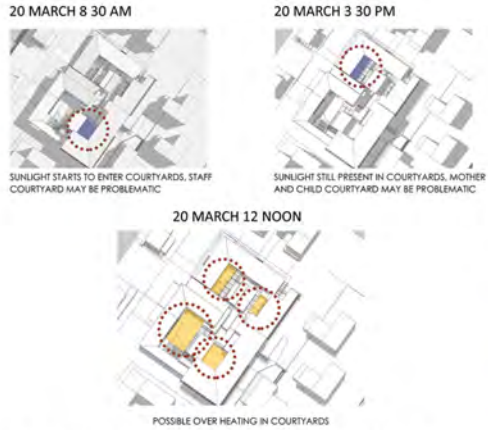
SOLAR STUDY

DAYLIGHTING



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

VENTILATION



Principle used for calculating the duct size required to adequately ventilate the required spaces. (ASHRAE 2011)

Equation: Quantity of air (litres) Vol. of habitable space x Air change rate/person Floor occupation

Air change rate for consultation rooms: 11.5 l/s (ASHRAE 2011: 3)

(Note: As no consultation room was fitted, the space with a similar health, environmental quality was chosen for this calculation, namely a primary prep room)

1. Consultation room on Ground floor level: Quantity of air (litres) = 47.3 l/s
therefore Duct Size = 865 deep x 214 wide x 365 long

2. Consultation room on first floor level: Quantity of air (litres) = 81.9 l/s
therefore Duct Size = 4000 deep x 214 wide x 100 long

3. As the duct needs to serve the circulation space as well, which is half the width of the consultation rooms calculated above, the duct size for these spaces together may be seen to be 1.5 times the amount calculated in the equations above.

Therefore: Duct size for the first floor level = 4000 deep x 214 wide x 200 long
Duct size for the ground floor level = 865 deep x 214 wide x 700 long

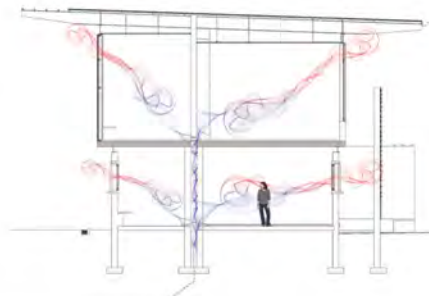


Figure 95. Final exam presentation pages (Author 2016).

FRAMEWORK SYSTEMS

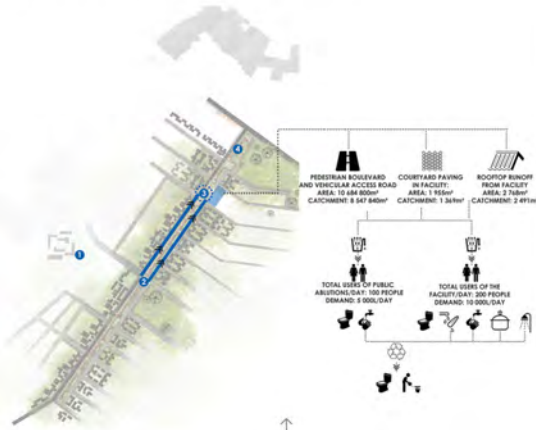
PRECEDENT: COLLABORATIVE SHARING OF RESOURCES AS PRESENT IN PLASTIC VIEW



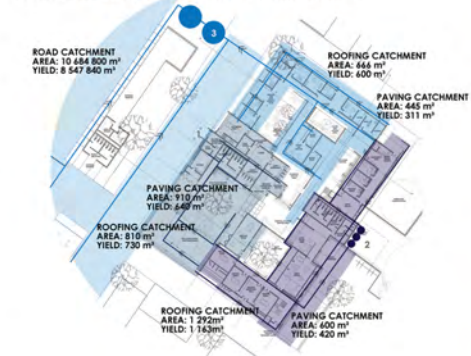
FACILITY SYSTEM



WATER COLLECTION AND SYSTEMS AT PRECINCT SCALE



WATER COLLECTION AND SYSTEMS AT BUILDING SCALE



WASTE COLLECTION AND ELECTRICITY PRODUCTION SYSTEMS AT PRECINCT SCALE



WASTE COLLECTION AND ELECTRICITY PRODUCTION SYSTEMS AND LAYOUT AT BUILDING SCALE



Figure 96. Final exam presentation pages (Author 2016).



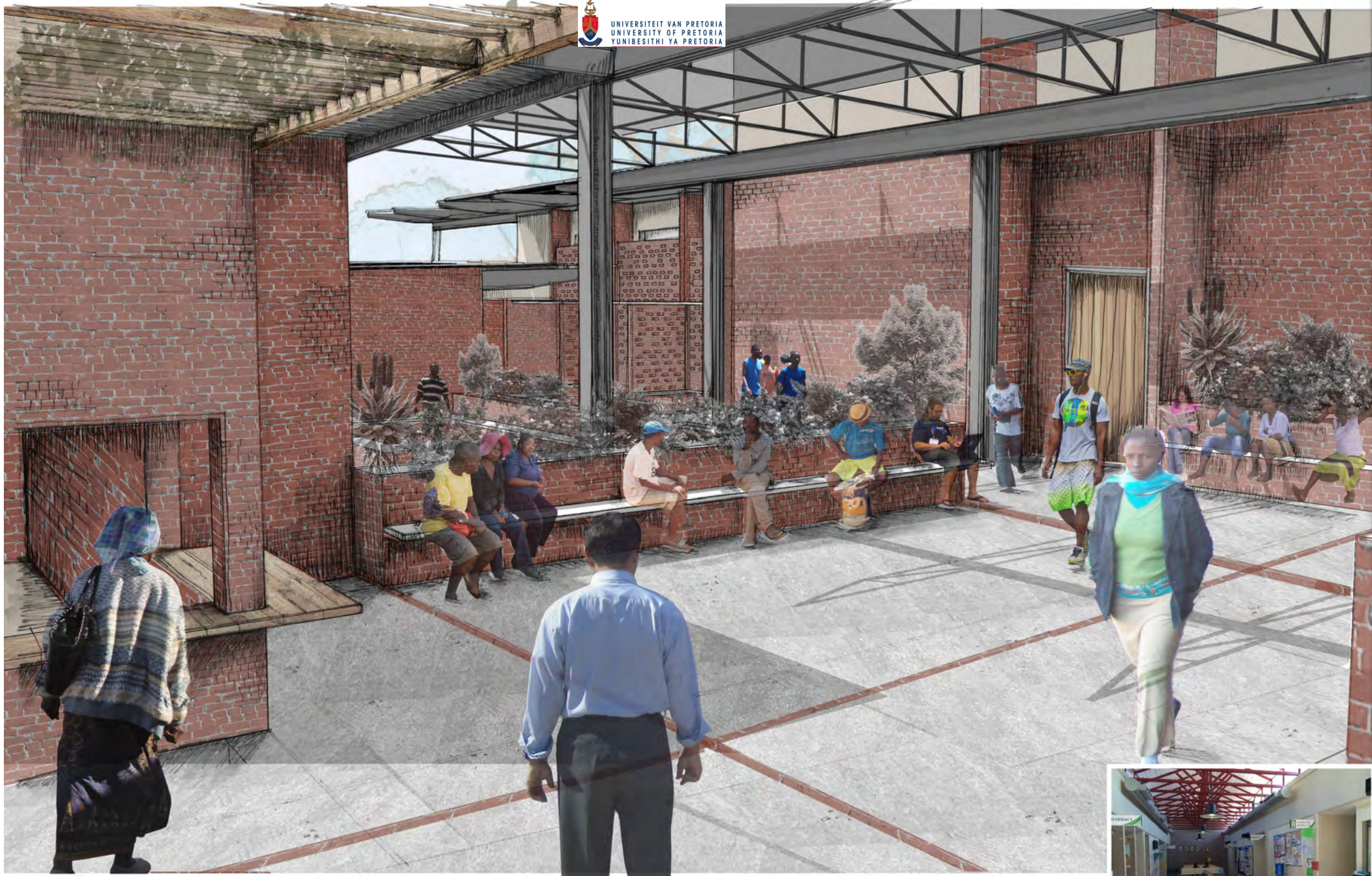
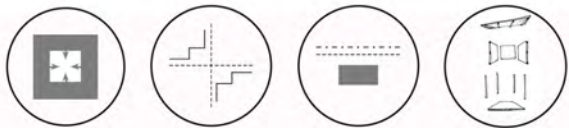
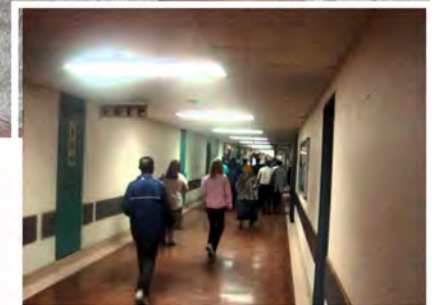


Figure 98. Perspective of Main Covered Public Waiting Area (Author 2016).



126
Figure 99. Perspective of Vitals Sub Waiting Courtyard (Author 2016).

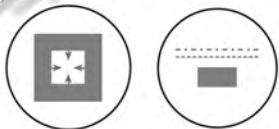
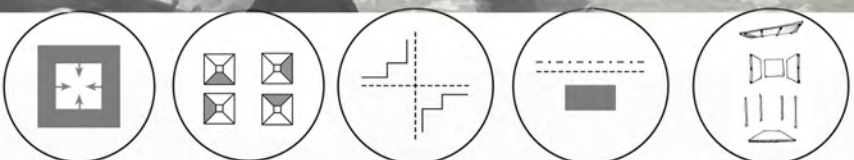


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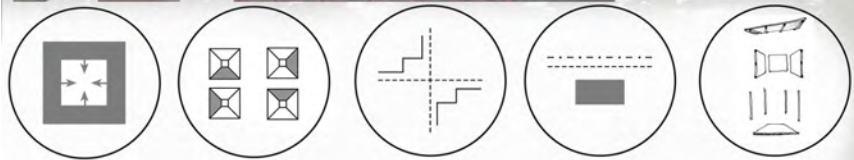


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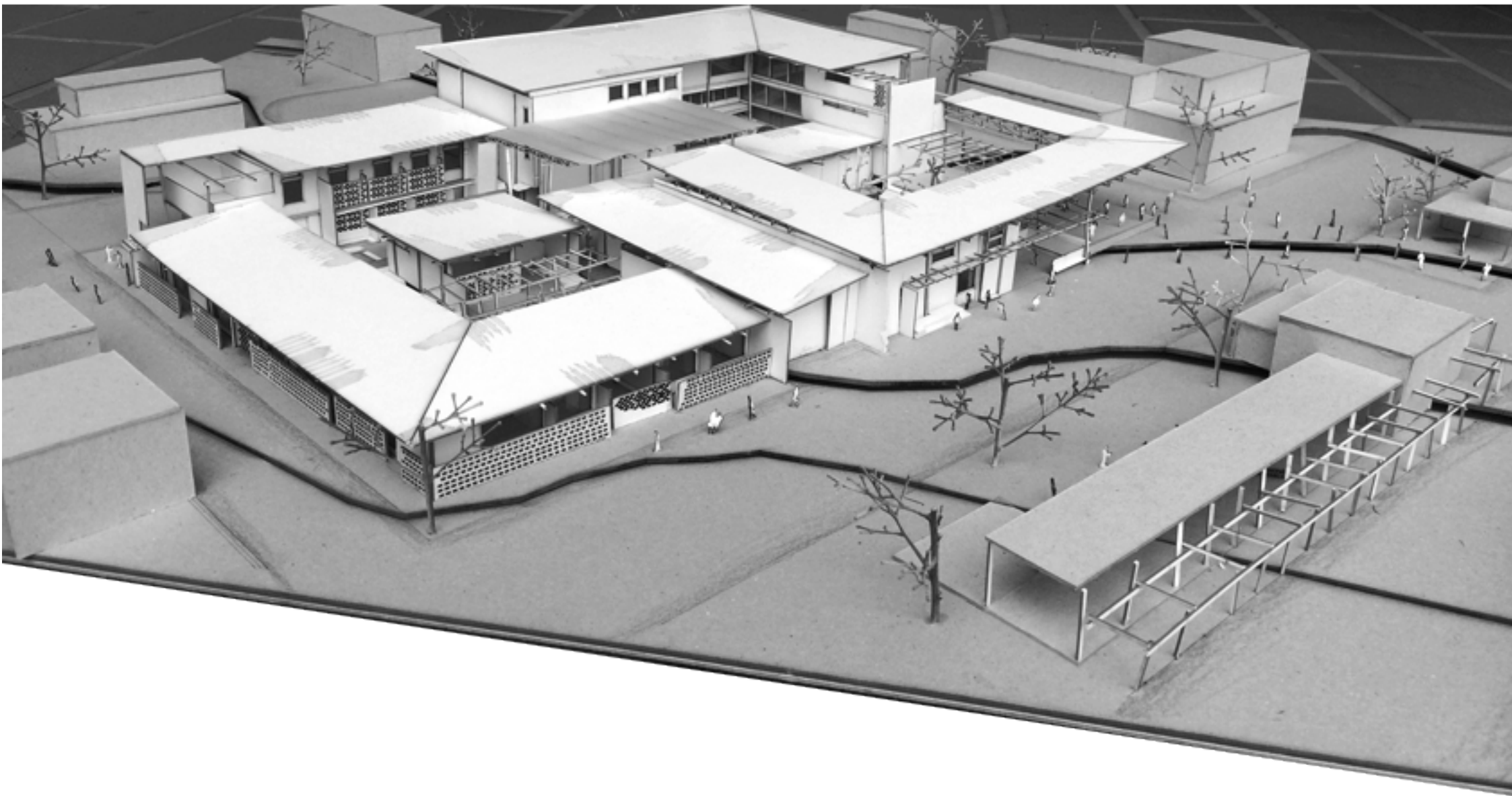


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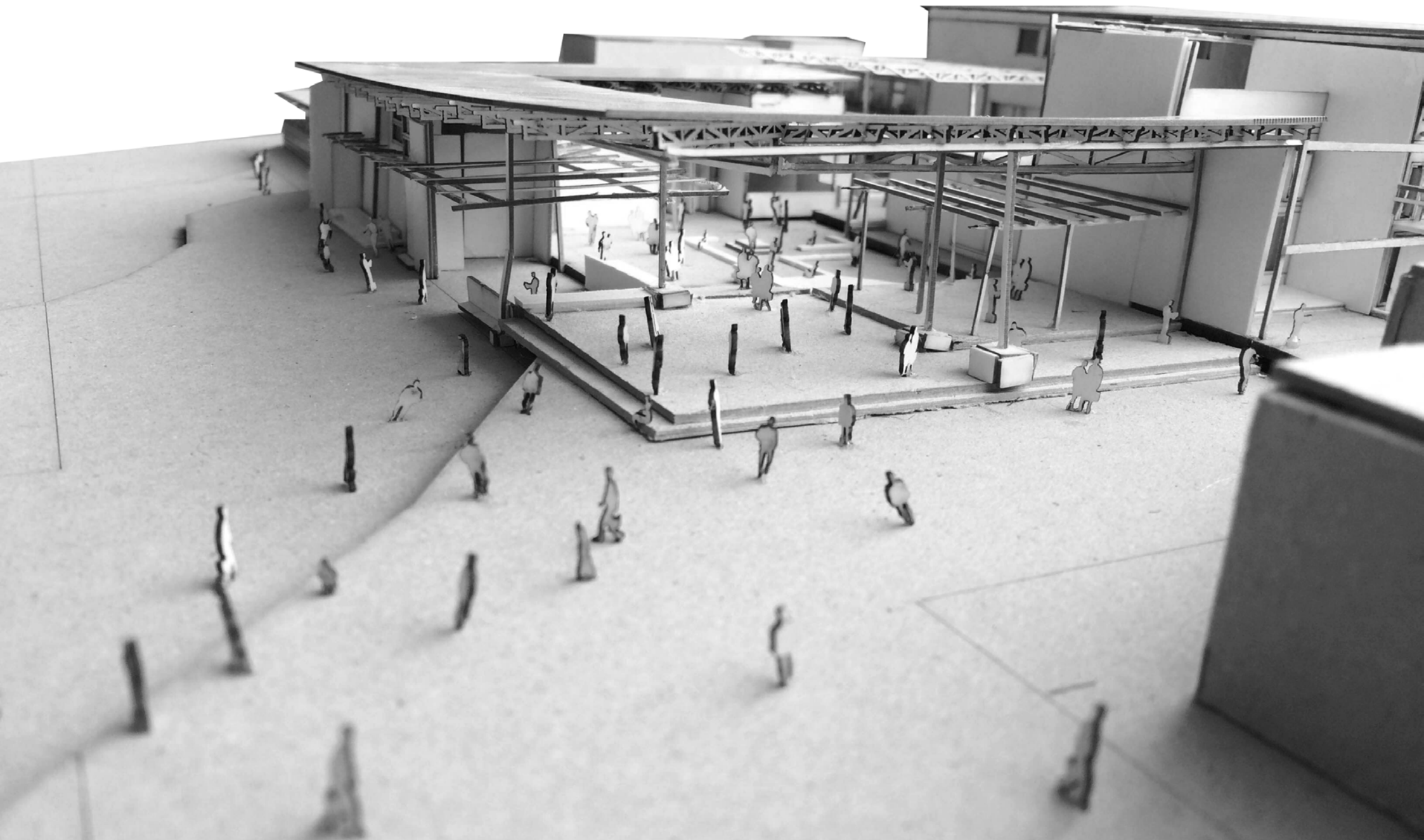


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APPENDIX

Item/Appliance	Power draw per item (W)	Amount of appliances:	Total Power draw (W)	Average hours run time per week:	Total hours run time per week:	Watt-Hours per week:
Computer screen	30	2	60	40	40	2400
Computer server	400	2	800	40	40	32000
Laser Jet Printer	500	2	1000	5	5	5000
Alarm System	40	2	80	84	84	6720
Wifi router	6	1	6	40	40	240
Cordless Phone	2	6	12	20	20	240
Laptop	60	30	1800	40	40	72000
Kettle	2000	2	4000	10	10	40000
Microwave	1000	2	2000	4	4	8000
Bar Fridge	77	1	77	56	56	4312
Fridge	400	1	400	56	56	22400
Freezer	400	1	400	56	56	22400
UV Water Purification System	45	2	90	50	50	4500
Cellphone Charger	28	15	420	15	15	6160
Washing Machine	2300	1	2300	8	8	18400
Projector	410	10	4100	10	10	41000
Solar Geyser	0	2	0	20	20	0
Incandescent Light Bulbs	60	7	420	84	84	35280
LED Lights ER Section	8	6	48	84	84	4000
LED Lights	8	74	640	7	7	4480
Stove Oven	3000	1	3000	35	35	105000
					Total watt hours /week:	434532

	Average W/hours per day
Appliances	62076
Lighting	0

	TOTAL Wh/day	62076
	TOTAL kWh/day	62,076

WATER MANAGEMENT MODEL

A WATER RESOURCE INFORMATION (YIELD, m³)

A1 RAIN WATER HARVESTING DATA

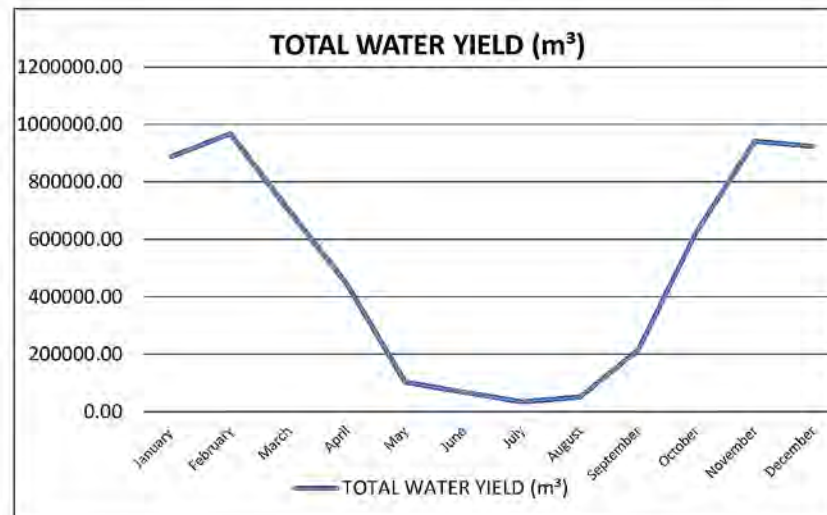
DESCRIPTION	AREA (m ²)	RUNOFF COEFF. (C)
Roof structures	2768	0.9
Paving A	1955	0.7
Paving B	10684800	0.8
Lawn	385	0.1
Other	0	0
TOTAL AREA (A)	10689908.00	
WEIGHTED C		0.80

A3 TOTAL WATER YIELD

MONTH	AVE RAINFALL, P (m)	CATCHMENT YIELD (m ³) (Yield = PxAxC)	ALTERNATIVE WATER SOURCE (m ³)	TOTAL WATER YIELD (m ³)
January	0.10	887670.43	0.20	887670.63
February	0.11	967201.59	0.20	967201.79
March	0.08	701242.53	0.20	701242.73
April	0.05	444690.39	0.20	444690.59
May	0.01	102620.86	0.20	102621.06
June	0.01	68413.91	0.20	68414.11
July	0.00	34206.95	0.20	34207.15
August	0.01	51310.43	0.20	51310.63
September	0.03	213793.46	0.20	213793.66
October	0.07	624276.89	0.20	624277.09
November	0.11	940691.20	0.20	940691.40
December	0.11	923587.73	0.20	923587.93
ANNUAL AVE.	0.70	5959706.35	2.40	5959708.75

A2 RECYCLED / ALTERNATIVE WATER SOURCE

MONTH	Grey Water		No Source		TOTAL / MONTH (m ³)
	WEEKLY YIELD (m ³)	MONTHLY YIELD (m ³)	WEEKLY YIELD (m ³)	MONTHLY YIELD (m ³)	
January	0.05	0.20	0	0.00	0.20
February	0.05	0.20	0	0.00	0.20
March	0.05	0.20	0	0.00	0.20
April	0.05	0.20	0	0.00	0.20
May	0.05	0.20	0	0.00	0.20
June	0.05	0.20	0	0.00	0.20
July	0.05	0.20	0	0.00	0.20
August	0.05	0.20	0	0.00	0.20
September	0.05	0.20	0	0.00	0.20
October	0.05	0.20	0	0.00	0.20
November	0.05	0.20	0	0.00	0.20
December	0.05	0.20	0	0.00	0.20
ANNUAL AVE.		2.40		0.00	2.40



B WATER DEMAND

B1 LANDSCAPE IRRIGATION DEMAND (m³)

DESCRIPTION:	LAWN (m ²):	385	AGRI (m ²):	76.55	PLANTING (m ²):	67.8	TOTAL MONTHLY IRR. DEMAND (m ³)
MONTH	WEEKLY IRR. (m)	MONTHLY DEMAND (m ³)	WEEKLY IRR. (m)	MONTHLY DEMAND (m ³)	WEEKLY IRR. (m)	MONTHLY DEMAND (m ³)	
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0
May	0.01	15.4	0.025	7.655	0.005	1.356	24.411
June	0.01	15.4	0.025	7.655	0.005	1.356	24.411
July	0.01	15.4	0.025	7.655	0.005	1.356	24.411
August	0.02	30.8	0.025	7.655	0.005	1.356	39.811
September	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
ANNUAL TOTAL		77		30.62		5.424	113.044

B2 DOMESTIC / ALT DEMAND

MONTH	PERSONS	WATER/ CAPITA/ DAY (l)	DOMESTIC DEMAND (m ³ /month)
January	165	50	255.75
February	165	50	231
March	165	50	255.75
April	165	50	247.5
May	165	50	255.75
June	165	50	247.5
July	165	50	255.75
August	165	50	255.75
September	165	50	247.5
October	165	50	255.75
November	165	50	247.5
December	165	50	255.75
ANNUAL TOTAL			3011.25

B3 EVAPORATION LOSS (For 'open' reservoirs)

35mm - 45mm/week in summer

B4 TOTAL WATER LOSS & DEMAND

MONTH	EVAPORATION RATE (m/week)	EVAPORATION RATE (m/month)	TOTAL LOSS (m ³ /month)
January	0.04	0.16	0
February	0.035	0.14	0
March	0.025	0.1	0
April	0.02	0.08	0
May	0.015	0.06	0
June	0.01	0.04	0
July	0.01	0.04	0
August	0.02	0.08	0
September	0.03	0.12	0
October	0.035	0.14	0
November	0.035	0.14	0
December	0.04	0.16	0
ANNUAL TOTAL	0.32	1.26	0.00



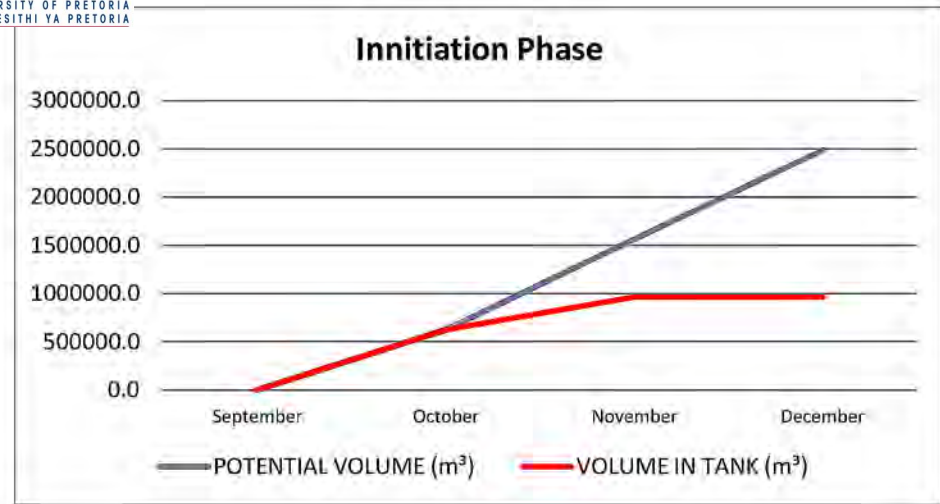
MONTH	TOTAL DEMAND (m ³ /month)
January	255.75
February	231.00
March	255.75
April	247.50
May	280.16
June	271.91
July	280.16
August	295.56
September	247.50
October	255.75
November	247.50
December	255.75
ANNUAL TOTAL	3124.294

C WATER BUDGET

TANK CAPACITY (m ³):	967000
MIN VOLUME (m ³):	1434.5

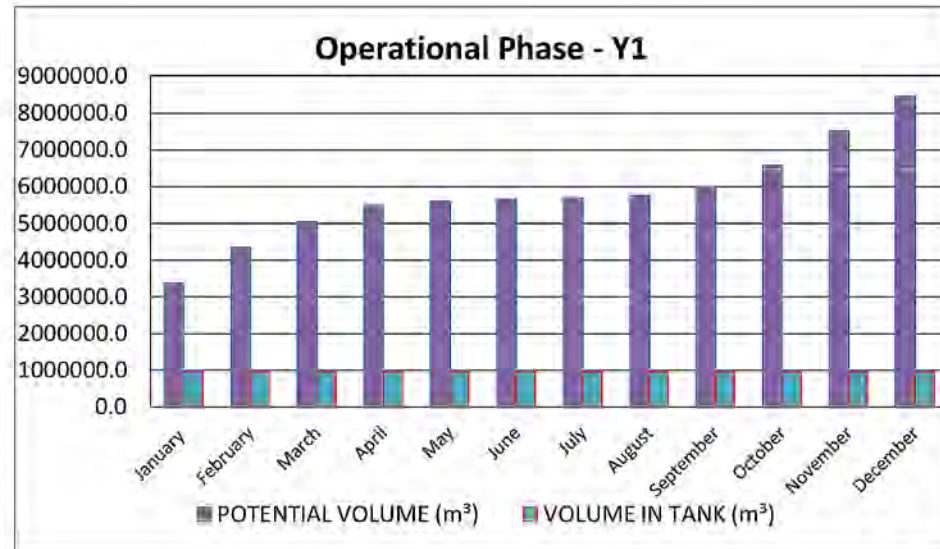
C1 WATER BUDGET INNIATION PHASE

MONTH	YIELD (m ³ /month)	DEMAND (m ³ /month)	MONTHLY BALANCE	POTENTIAL VOLUME (m ³)	VOLUME IN TANK (m ³)
September	213793.7	247.5	213546.2	0.0	0.0
October	624277.1	255.8	624021.3	624021.3	624021.3
November	940691.4	247.5	940443.9	1564465.2	967000.0
December	923587.9	255.8	923332.2	2487797.4	967000.0
2702350.1		1006.5	2701343.6		



C2 WATER BUDGET YEAR 1

MONTH	YIELD (m ³ /month)	DEMAND (m ³ /month)	MONTHLY BALANCE	POTENTIAL VOLUME (m ³)	VOLUME IN TANK (m ³)
January	887670.6	255.8	887414.9	3375212.3	967000.0
February	967201.8	231.0	966970.8	4342183.1	967000.0
March	701242.7	255.8	700987.0	5043170.1	967000.0
April	444690.6	247.5	444443.1	5487613.2	967000.0
May	102621.1	280.2	102340.9	5589954.0	967000.0
June	68414.1	271.9	68142.2	5658096.2	967000.0
July	34207.2	280.2	33927.0	5692023.2	967000.0
August	51310.6	295.6	51015.1	5743038.3	967000.0
September	213793.7	247.5	213546.2	5956584.5	967000.0
October	624277.1	255.8	624021.3	6580605.8	967000.0
November	940691.4	247.5	940443.9	7521049.7	967000.0
December	923587.9	255.8	923332.2	8444381.9	967000.0
ANNUAL AVE.	5959708.8	3124.3	5956584.5		



SB SBAT REPORT

4.0

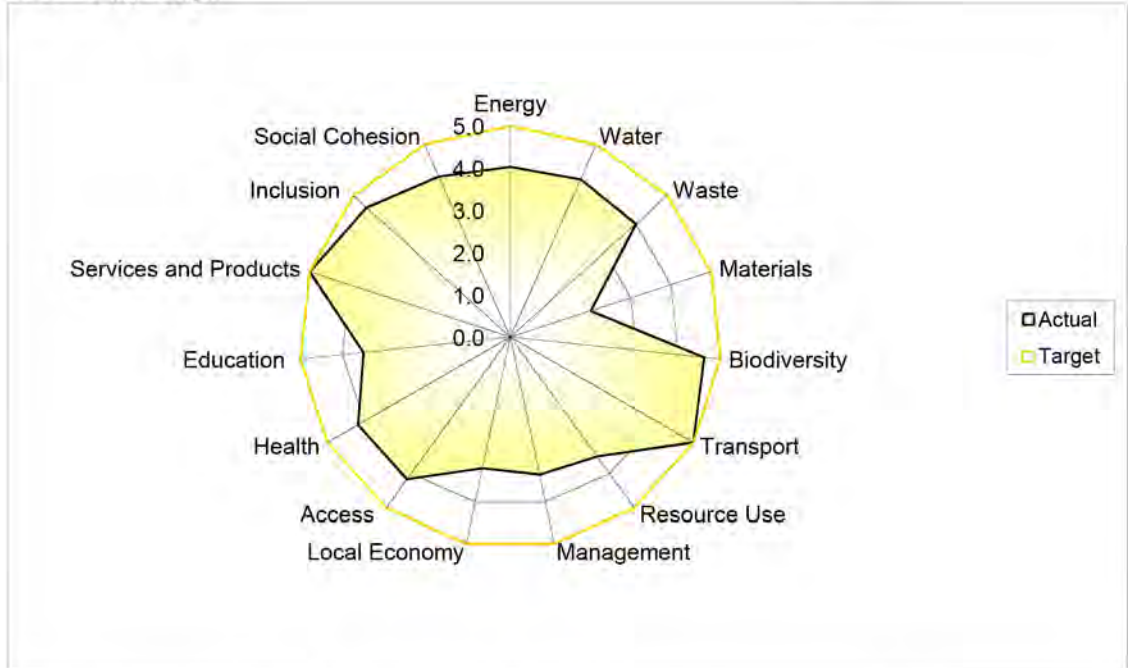
SB1 Project

	0
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SB2 Address

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SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance

	Score
Environmental	3.7
Economic	3.8
Social	4.3
SBAT Rating	4.0

SB5 EF and HDI Factors

	Score
EF Factor	4.0
HDI Factor	3.9

SB6 Targets

	Percentage
Environmental	75
Economic	77
Social	86

SB7 Self Assessment: Information supplied and confirmed by

Name	Michelle Whitaker	Date	20/10/2016
Signature			