



# *The Forgotten*

*[By-products of the daily exodus]*

An architectural exploration of the creation of collective memory space in the informal settlement of Phomolong, specifically for the remaining community networks of Neonates and Elderly dependents.

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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.

Ursula Kotzè  
2015

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*Submitted to fulfil part of the requirements for the degree Magister in Architecture (Professional),  
Department of Architecture,  
Faculty of Engineering, the Built Environment and Information technology,  
University of Pretoria, 2015*

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*With special thanks to:*

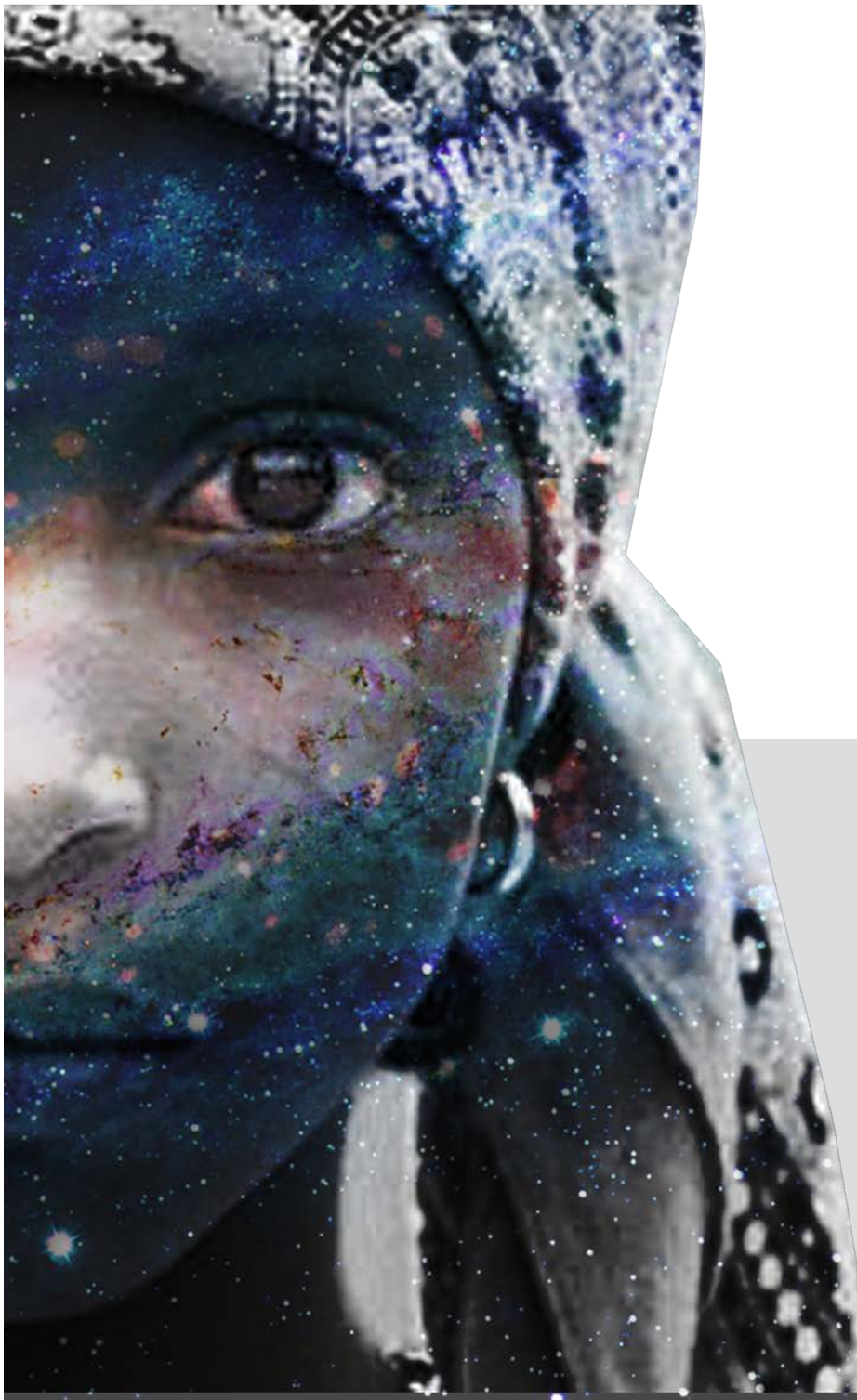
*Dr. Carin Combrinck and Dr. Arthur Barker,  
for all your guidance.*

*Dr. Carin Combrink for helping me cross the  
language barrier by proof reading and editing.*

*Nick Randall, who walked every step with me  
through the unknown.*

*My parents, Elma and Koos Kotzè, for making  
my dream a reality and believing in me always.*

*And my Lord, for giving me strength, resilience  
and passion.*



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## Abstrak

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Hierdie skripsie ondersoek die potensiaal van argitektuur as 'n geheue genererende voorwerp en die verkenning van verhaal as 'n ontwerp genereerder.

Verhaal word as 'n instrument vir die ontwerper vir waarnemings wat gemaak is tydens terrein besoeke. Dit help die ontwerper om die omgewing te interpreteer en daardeur gedompel in die omstandighede te word om sodoende die terrein te definieer, beide in terme van sy informaliteit asook gebrek aan pragmatiese geskiedenis.

Die gebruikers word die primêre invloede en genereerders in terme van beide program en vorm, om sodoende 'n gemeenskaplike na-gedenktenis en plek vir die vergete netwerke van Phomolong, in Mamelodi, Tshwane, te skep

Die rede om ontwerp op hierdie manier te genereer is om toepaslik te reageer op gebruikers se behoeftes, die skaal van die konteks, sowel as om toe te laat vir die verdere ontwikkeling van die gebruikers.  
Deur die aanspraak en bespreking van die kwessies rondom plekloosheid, die gebrek aan identiteit en ruimte vir n kollektiewe nagedagtenis, in die eens tydelike plek van Phomolong in Mamelodi.

Figure 1 : *The Universal Child, Collage, Author (2015)*

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## Abstract

This dissertation investigates the potential of architecture as a memory device and the exploration of narrative as a design generator.

Narrative is used as a tool for the designer to interpret observations made during site visits and thereby become immersed in the conditions that define the site, both in terms of its informal nature and lack of pragmatic history.

The users become the primary influences and generators of both programme and form, to create a collective memory and place for the forgotten networks of Phomolong in Mamelodi, Tshwane.

The intention of generating design in this way is to respond appropriately to users' needs, the scale of the context, as well as to allow for further development of these users. By addressing and discussing the issues of placelessness, lack of identity and collective memory space, in the once temporary place of Phomolong in Mamelodi.

Figure 2 : *The Realist Elder, Collage, Author (2015)*



Amorphous space	<ul style="list-style-type: none"> <li>- <i>without a clearly defined shape or form</i></li> <li><i>Interpreted in the text to describe a region of land between the informal community of Phomolong and Greenview station.</i></li> </ul>	Earthbound	<ul style="list-style-type: none"> <li>- <i>restricted to the earth (also see monolithic)</i></li> <li><i>Interpreted in text to express the grounded networks in the community and the restriction caused by their environment.</i></li> </ul>
Biophilia	<ul style="list-style-type: none"> <li>- <i>an innate affinity of human beings with the natural world.</i></li> </ul>	Ecotone	<ul style="list-style-type: none"> <li>- <i>a region of transition between two biological communities, often a place of diversity.</i></li> <li><i>Interpreted in the text as a region where two social networks meet.</i></li> </ul>
Cultural memory	<ul style="list-style-type: none"> <li>- <i>engenders the spirit which defines a culture through a group's collective experiences.</i></li> </ul>	Ephemeral	<ul style="list-style-type: none"> <li>- <i>transient in nature</i></li> <li><i>Expressed through the use of light tectonic architectural elements to convey the idea of movement and rising above the mundane environment.</i></li> </ul>
Catharsis	<ul style="list-style-type: none"> <li>- <i>The process of releasing and thereby providing relief from, strong or repressed emotions. Interpreted in text through Biophilic Architecture as a form of release from the surrounding context, a space to escape from the mundane.</i></li> </ul>	Existential knowledge	<ul style="list-style-type: none"> <li>- <i>Interpreted in text as knowledge gained through life experiences.</i></li> </ul>
Early Childhood Development	<ul style="list-style-type: none"> <li>- <i>the period from birth to eight years old, these years lay the foundation for subsequent learning</i></li> </ul>		



Feminine Space - often been noted to be more orientated towards emotional care and healing

the Forgotten - a term given by the Author which refers to the networks of people who do not migrate daily to and from Phomolong for work, but stay behind, a reference to 'out of sight, out of mind'.

Islands of Activity - refers to pockets of high activity which are fenced off from the rest of the community.

Matriarchal space - Interpreted in text as a space goverend by women who are the caretakers and providers, a caring and nurturing space.

Neonates - infants, in need of constant care and supervision.

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Figure 3 : *Faceless masses*, Collage, Author (2015)

### 1.1 Narrative introduction

*The following introduction relates to observations made by the author during site visits and informal interviews. The narrative was used as a method of internalising the context and to allow the author to become immersed in the conditions which influence the everyday of the users.*

Every day the *great migration* takes place, the daily exodus of the working class. Feet tread the sometimes dry and dusty, sometimes muddy and slippery road to the train station.

Passers-by greet and buy blue-boiled eggs, *aromatted* on their way to becoming another statistic in the throngs of people using public transport across the country.

Mothers greet their children and run off to miss the greatest part of their child's day. They remain behind, watching as her face melts into a mess of faceless people. There is an entire community that is left behind and from 6am to 6pm the children and unemployed become the *Forgotten*.

Conflict of interest and no cohesion is the order of the day in the fragmented and schizophrenic place called home by so many.

# 1

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## Introduction

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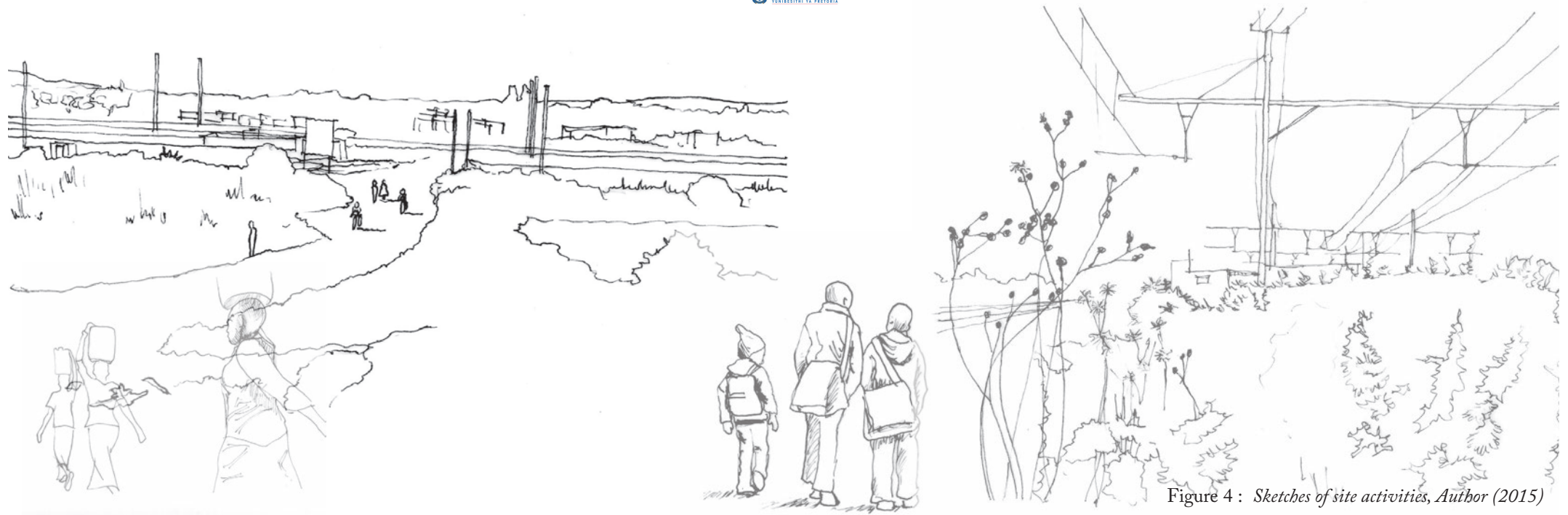


Figure 4 : Sketches of site activities, Author (2015)

## 1.2 Normative position

Users activate a space.

*Design must focus on the nature of the void between the built form and, in particular, the interface that mediates between the public and private domains (Ewing 2015).*

Designers have the ability to notice lost opportunities and to synthesize how a myriad of divergent elements could lend themselves to creating platforms for users to activate space (Parvin 2013).

These opportunities are often found in intangible, marginalised spaces. The notion of re-establishing the presence of users' intrigues and the possibility of new, interactive, enriching spaces drives innovation.

Space becomes activated when human interaction is considered as a platform to build from, on all scales, including economically and communally, catered for through architectural intervention.



Figure 5 : Site location, Author (2015)

### 1.3.1 General issues

It seems in Phomolong that those that remain behind, remain lost. Those left behind while others make the daily trek to work, add no value to the community or to themselves. They become economic pariahs. They move on the peripheries of the fine grained scale of their residential context, trapped in their sphere.

*Children living in poverty are extremely vulnerable and often discriminated against and isolated (Atmore 2012).*

As sure as the morning sun, they move in monotonous circles, rarely changing from day to day, circles that seldom interact or merge. The networks remaining in Phomolong on a daily basis have become stagnant.

*Poor architectural design impoverishes the built environment... impacting quality of life, denying a sense of place and perpetuating a loss of identity, while manifesting in fragmented and inherently unsustainable communities (Aliyu and Ebohon 2014).*

This stagnation presents little chance of growth, for those who need it most.

### 1.3.2 General intention

The intention is to create opportunities for social spheres to overlap and merge. This would be done to create a friction of positive growth through cohesive interaction, promoting new typologies, producing a unique identity of place.

It is intended that the overlapping of these social spheres will nurture greater communal cohesion, attempting to remove the label of non-place from Phomolong, thereby creating a hub of growth for those looking to define themselves.

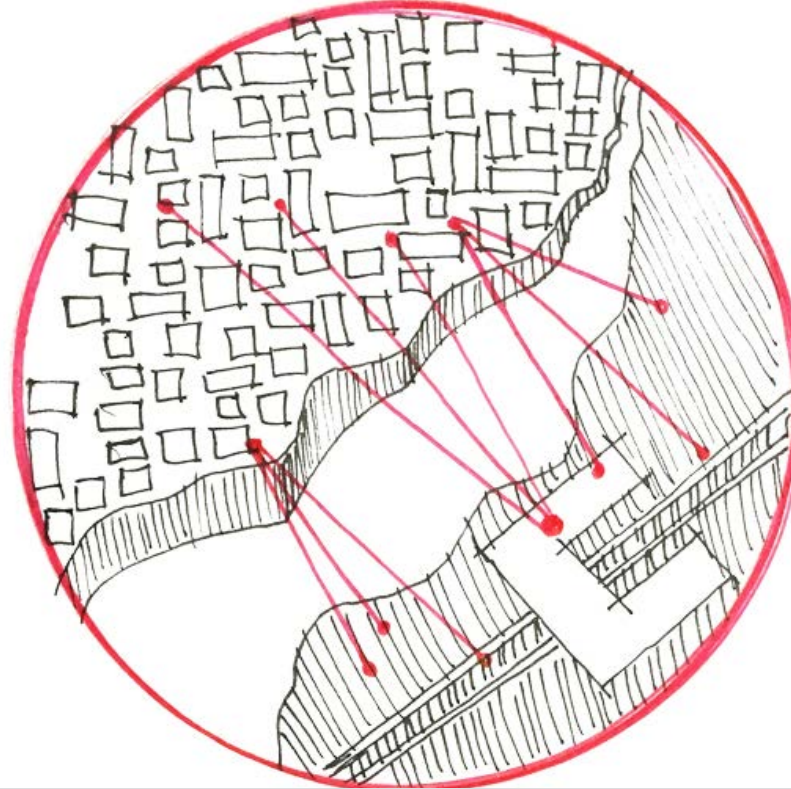


Figure 6 : *Reconnecting Phomolong to Greenview station - The Amorphous space, Author (2015)*

### 1.4.1 Urban Issue

Although there are spaces where the fine grain is intricately woven and *ecotones*<sup>1</sup> overlap, there is a lack of understanding between scales.

While the grain of Phomolong could be compared to scattered dust, the transportation nodes around it dominate the skyline. This lack of understanding between the fine and coarse grain, allows for non-place to thrive, thus making anything outside of the community apparently inaccessible to the forgotten remnants of the daily dwellers.

*Edge and core are separate and unique fields of activity, except for moments of catalytic communication (Pendleton-Jullian 2009).*

A translation is needed, a blending of barriers. Where friction once was, opportunity can be found, through the incorporation of all the involved parties.

*We define Cultures of thinking as places in which a group's collective, as well as individual thinking, is valued, visible and actively promoted as part of the regular, day-to-day experience of all group members (Ritchhart 2015).*

<sup>1</sup> Noticeably different ecologies interacting to form a more vibrant, resilient environment (Pendleton-Jullian 2009)





Figure 7 : *Reconnecting Informality to Formality - The Amorphous space, Author (2015)*

### 1.4.2 *Urban intention*

The economic island of Phomolong needs to reconnect itself to its greater context. This could be achieved through the community taking ownership of their own space. The driver for this would be the use of a *mnemonic system*<sup>1</sup> of space, addressing the intimidating gap between the varying scales of the surrounding fabric.

This can be incorporated by using typologies or activities which are known elements, and merging these elements with contemporary typologies.

*The mental image of the physical environment contributes to the emotional well-being and mental stability of the individual and it helps organize and retrieve socially related memories and values (Ekman, 2013).*

<sup>1</sup> *A system of reminders for the retention of a group history and ideals (Ekman, 2013)*



Figure 8 : *Architectural issue - The Typology of informality, Author (2015)*

## 1.5 *Architectural issue*

Plots form tiny spaces, each with its own interpretation of what a fence looks like. Almost vexingly these fenced off plots form L-shapes with an open space towards the street edge, public, yet controlled. Within these small snippets of space, informal crèches have found their origins in the communal homes of the elderly. Sleeping quarters have been shrunk to substitute as classrooms. The structure never grows, but soon it houses nearly 70 children daily, from 6am to 6pm.

While the sun is out, children are kept in. Their perceptions become closed, dark and humid. Their understanding of life, dull and restricted. Those children lucky enough to greet the sun, do so from under the veil of washed laundry, or in the shade of precast long-drops.

*A significant number of children do not have access to adequate sanitation facilities, thereby making use of unventilated pit latrines, buckets and/or open land.*

*Inadequate sanitation results in young children becoming susceptible to a range of illnesses and diseases that compromise their health and nutritional status.*

*(Atmore 2012)*

These re-appropriated spaces lack facility and infrastructure to promote positive educational interaction, and are even further withdrawn from the rest of the forgotten community.

*It is clear that income poverty is closely connected to poor health, limited access to education, nutrition, healthcare services and safe environments. (Atmore 2012).*

Crèches have become islands of activity within left behind space.

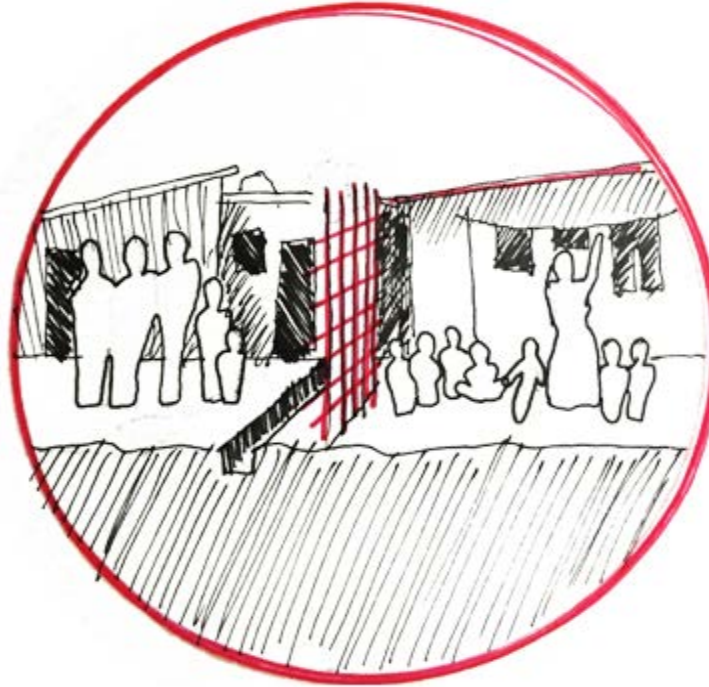


Figure 9 : *Architectural issue – Islands of activity behind fences,*  
*Author (2015)*

## 1.6 *Problem statement*

The current crèche typologies are islands of activity that do not promote social interaction, or healthy spaces for child development. The intermediate spaces have become territorial and uninviting.

This is partially due to the lack of infrastructure and partially due to the lack of a collective memory and sense of individual or communal identity within place.

*Owned spaces refer to a process by which communities feel concerned about and responsible for their immediate and daily environment (Ewing 2015).*

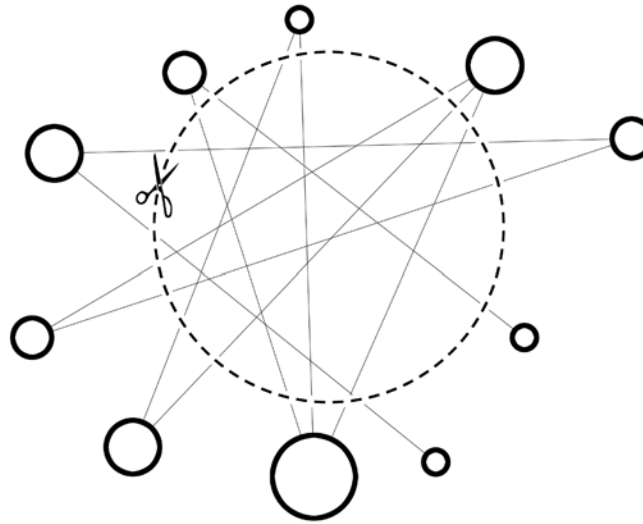


Figure 10 : *Disconnected Networks, Diagram, N.Randall (2015)*

### 1.7.1 Research question

How can architecture aid the process of creating a collective social memory for the remaining networks of the neonates and elderly dependents (this network is seen as a whole, where the caregivers interact with the children, children interact with children and caregivers with other caregivers), through questioning the current introverted social spheres in the existing environment of Phomolong.

*The overlapping of detachment; to enhance connectivity  
(Salingaros and Mehaffy 2006).*

The detached networks that are being considered, create the opportunity for a strengthened collective to be formed, hence enhancing connectivity within Phomolong.

### 1.7.2 Sub questions

How does placemaking differ from space?

*What characteristics of place encourage the attachment of memories?  
(Treib and Lyndon 2009).*

What is the role of architecture as a mediator and translator between culture, tradition and education?

*Investigating the process in which children's educational spaces integrate with community life through an extroverted educational approach  
(Maritz 2012).*

### 1.7.3 Hypothesis

Architecture has the potential to facilitate the process of re-seeding growth and becoming a hybrid typology that encourages the collective memory of the networks remaining in Phomolong through manifestation of place.

### 1.8 Project intention

*Great learning happens in groups, collaboration is the stuff of growth  
(Robinson 2010)*

There are daily routines and rituals that are taken for granted, time consuming practices that fill up the day. These rituals are the activities which can make the in-between spaces become destinations. Architecture has the ability to facilitate these ritual activities and create a common platform where the monotonous can become a celebrated and dynamic point of interaction. To become a point of culmination and dispersal, that feeds back into the community. The project intention is to create a common ground for daily activity to become a celebrated event.

*We do not only exist in spatial reality we also inhabit cultural, mental and temporal realities (Treib and Pallasmaa 2009).*

Thus the investigation focusses on architecture as a social system, as opposed to architecture as an object. Creating ownership of place for the economically left-behind, eventually serving as a platform from which memories can be formed: To find a gap in the self-made fence.

## 1.9 *Research Methodology*

Through unstructured interviews and physical observations information can be gathered about the situation of the proposed users, to be able to react appropriately to the architectural issue. Due to political unrest and service disputes within Mamelodi and Phomolong, a thorough integrated and bottom-up approach was not possible throughout the investigation of the dissertation.

Three site visits were undertaken.

The first site visit was taken along the train tracks and towards the site office of the Greenview station. Walking along the peripheries of the informal settlement and on the edges of the landfill, yet not entering. The construction workers at the station ushered us towards the site office. After our group entered the site office, the site manager gave us the contact details of the South African National Civic Organisation (SANCO) appointed community leader of Phomolong, stating very clearly that we are not to enter the settlement nor the landfill without a guide.

On our group's second site visit we met with three community leaders. They met us at the University of Pretoria Mamelodi Campus and walked with us on the west-ern edge of the settlement. This was mainly due to the community leaders showing a great interest in the proposed crèches. The community leaders took us to all the crèches and expressed great concern for the lack of sanitation and the problems considering feeding and lack of space. They expressed that the crèches were over-populated especially after the removal of four crèches that were located in the area in front of the train station. Therefore many children were being looked after by family members. The community leaders took us to all the remaining crèches and expressed that there had been recent fatalities at the crèches due to malnutrition and a lack of health care facilities in the area as well as the caretaker's lack of knowledge of how to handle emergency situations.

During the visit to the last crèche our group and the community leaders were approached by a politically orientated group of people. They misinterpreted us being there and after escorting us from the settlement clearly stated that if we should enter the settlement again, with community leaders or not, that our safety could not be guaranteed.

The third site visit was to the landfill with a PhD candidate in anthropology, who has been studying the networks within the landfill. No further site visits were conducted into the settlement.

The project intention will be further strengthened through a literature study of theories concerning similar situations and precedent studies and conveyed through a narrative supported by deductive reasoning and memory from the site visits.

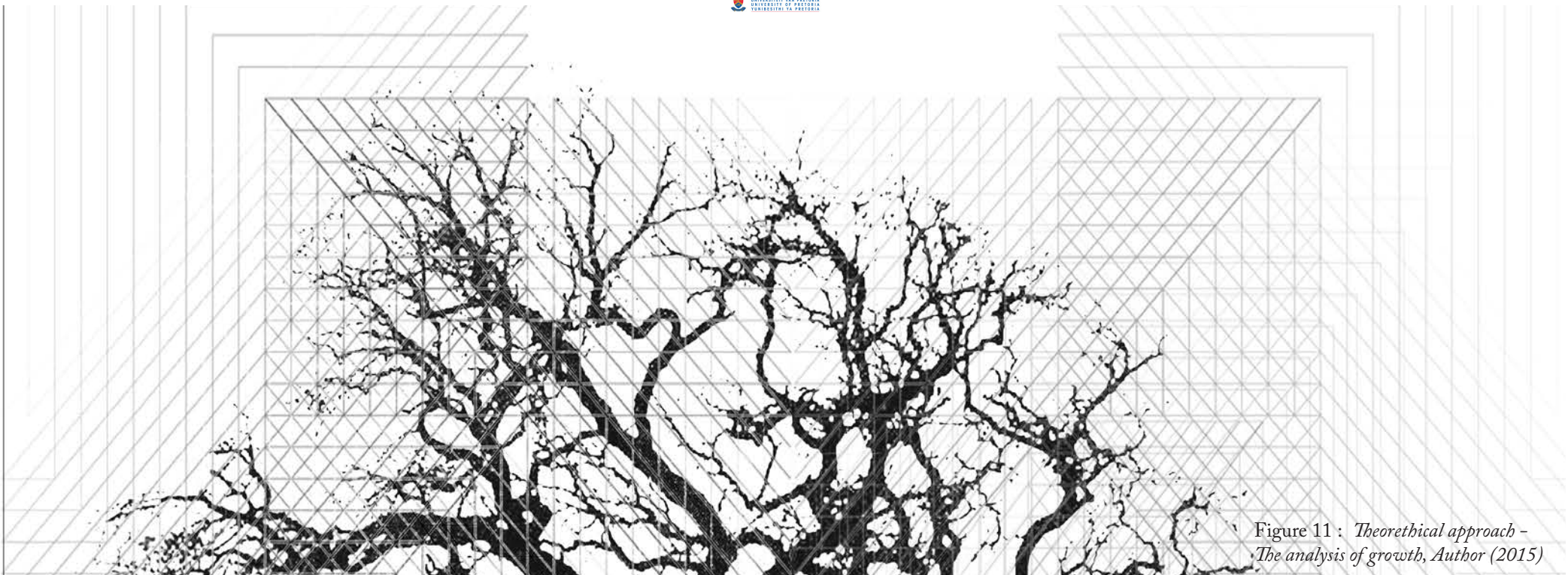


Figure 11 : *Theoretical approach - The analysis of growth, Author (2015)*

## 1.10 *Theoretical Approach*

The residual deposits of memory<sup>1</sup> and sense of place becomes preserved and visible to all who cross its path. Memory not only exists in spatial reality, but inhabits and manifests itself, established through the creation of an awareness of the surroundings (*Treib and Pallasmaa 2009*).

Memory spreads its fingers like branches, projecting its experiences, externalising what is contained. This is a method of expression through physical space and architecture.

*Architectural structures... domesticate space for human occupation by turning anonymous, uniform and limitless space into distinct places of human significance (Treib and Pallasmaa 2009).*

The anonymous space, the barren-scape as unclaimed land to the north of what one day will be Greenview station, becomes a place of communal significance. A place of reminiscence, which articulates the user's experience and inspires the imagination, forming identity from memory. This is a method by which architecture can influence its context and the users that interact with it. To create a point of reflection, a shelter for the day-dreamer.

The physical manifestation of a place for the *Forgotten* combats the cognitive effects of a cultural amnesia.

*It is the capacity for being held in the mind that allows places to accrue significances that are both intimate and public (Treib and Lyndon 2009).*

Thus, by increasing interaction of mutually beneficial programmes being hosted in the proposed intervention, the social system in and around the structure gains communal significance.

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<sup>1</sup> Memories brought along from other origins and cultures (*Treib and Pallasmaa 2009*)



*The spatial framework of memory is the dynamic spatial and conceptual construct in memory of physical places (Ekman 2013).*

The creation of memories could be aided through the use of spatial tools and the built environment. This would be done to address the migratory state of non-place and through these theories strengthen the architectural intervention, thereby creating an intuitively recognisable place for the networks which are left behind every day.

*Elements of the public realm usually carry many initiatives, palimpsests of imaginations that have been brought to the site and invested there (Treib and Lyndon 2009).*

A series of social systems has the possibility to strengthen the collective, forming a social palimpsest of different users interacting within different thresholds.



Figure 12 : *Communal Schizophrenia - wants vs needs*,  
N. Randall (2015)

### 1.11 Programme

The proposed programme will aim to create place for the *Forgotten* through the manifestation of spatial memory (as discussed in the theoretical approach section) and a celebration of daily existing rituals.

The network of the neonates and aged dependents are the primary focus of the proposed programme. The exaggeration of an existing social ecotone (the overlapping of two social spheres) allows for the possibility of creating enriching, social and didactic spaces for those currently spatially lost within their own communal home.

As expressed during the site visits by the SANCO community leaders, a space for children whose parents do not have the funds to send them to the existing day-care facilities is of great importance to the community. A cultivation space where elders can produce fruit and vegetables to feed the children being raised communally, would aid the issues of malnutrition surrounding the existing crèche facilities. It would be proposed that surplus produce could be provided to the existing crèches in Phomolong or sold as extra income to passers-by on their way to transportation nodes such as the Greenview Station just south of the marginalised settlement. This provides a healthy community initiative that can reinforce the collective memory of space and reclaim ownership by the *Forgotten*.

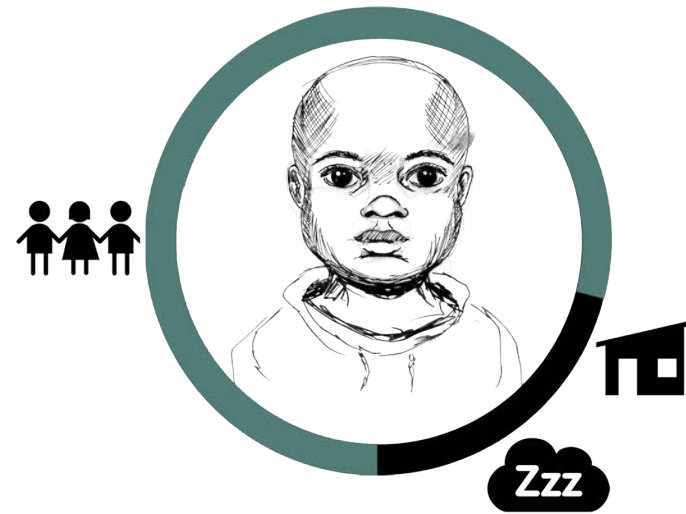


Figure 13 : *Neonates and their daily rituals, Author (2015)*

### *The Neonate*

Curious and eager to play, learn and achieve. They are hardly aware of the fact that it is 5h30am and that it is still dark outside when they greet their mothers. Too little space for too many kids, but other than being watched by an older sibling or playing at their mothers feet as she does the laundry, in the dawn of their lives, these small spheres are what they know.

*It is clear that early childhood development is very important in laying the foundation for a successful academic path especially for those children living in underprivileged circumstances (UNICEF, 2009) . (Atmore, 2012)*

### *1.12 Client*

Through the process of observation, during the site visits and constructing the narrative as a memory device, the following characters became apparent. It also became apparent that the role of the caretaker and elderly dependent often merge to become one and the same.

Expanding the range of developmental activities through the built environment has the opportunity to help form the early developmental years of children. This could be achieved by the structure offering a wider range of perspectives to the children through varying levels of observation and interaction.



Figure 14 : *Mothers and their daily rituals, Author (2015)*

### *The Caretaker*

A kind heart with too much to give, but not enough space or resources to accommodate each child that crosses her path. She gladly sleeps in the makeshift office space to open a new classroom. From 6am to 6pm, she is mother to 66+ children, but some days there isn't enough pap and if one child coughs, they all soon follow in a choir.

*84 percent of young children do not have access to formal ECD provision and rely on their parents or primary caregivers for stimulation and development. (UNICEF 2007)*

Caretakers often do not have the required education to be able to teach and stimulate the children they take care of.



Figure 15 : *Elders and their daily rituals, Author (2015)*

### *The Elderly Dependent*

She runs the household, she sweeps and washes until her frail fingers are prunes. Yet except for these tasks and looking after the children, she is also another mouth to feed if hungry, another body to heal when sick. Moving in her monotonous sphere of activities, in the twilight of her life.

*The burden of care of young children who have ill or dead mothers falls on the elderly, especially grandmothers. 38.2 percent of young children are living in households where a grandparent or a great-grandparent is the head of household. (UNICEF 2007)*

From these characters, the overlapping social networks of the Neonates and the Elderly Dependents have been established as the Primary clients for the proposed programme, the introduction of an NGO would be proposed to become the Secondary client.



Figure 16 : *Aerial Photograph of site, N. Randall (2015)*

# 2

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## Context

### 2.1 Narrative Introduction

Day-in and day-out, the working class migrate to and from Phomolong, yet there are those who remain; the *Forgotten*. An amalgamation of groups who live in the cracks of the fragmented community, who have the potential of becoming the binding agents for a pot once shattered.

Within these deposits, an accumulation of different networks have started to take root and the combination of these components has become clay-like. A sticky, fine-grained earth, which is unstable to build on, but also, has the potential to become a beautiful and fragile ceramic, or a solid and stable form of masonry.

Yet with all the different characters at play, incoherence takes place; the friction of interests and intentions might lead to the shattering of this fragile equilibrium.

The exponential increase of the gaps in the dry and fragmented surface, through the lack of basic services and infrastructure, add to the moment of critical mass or boiling point within the community. Once again it is the *Forgotten* community who is constantly faced with these cracks, impacting on their quality of life, denying them a sense of place and cultivating a loss of identity.

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- 2.8 *The city imagined*
- 2.9.1 *Urban framework approach*

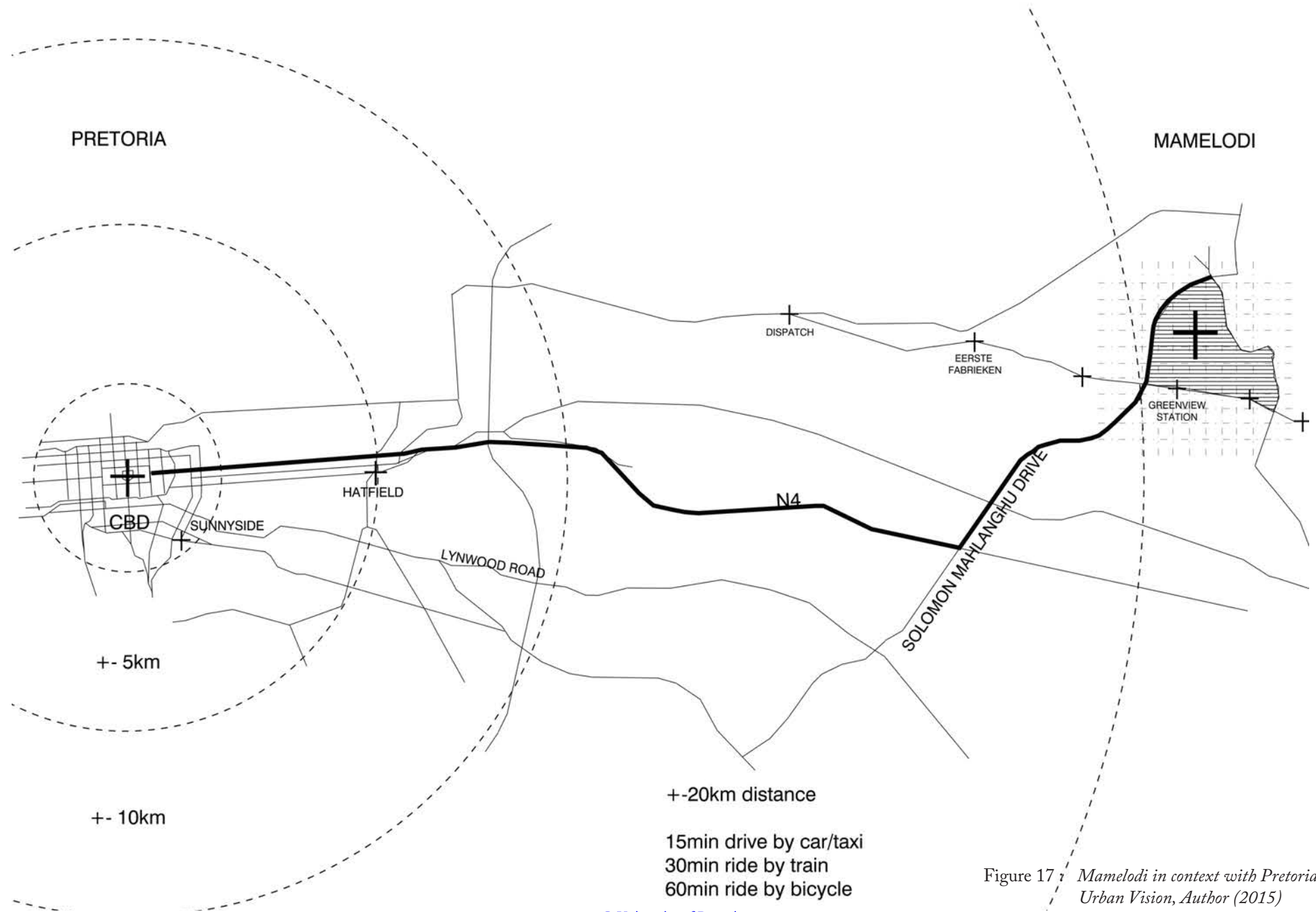


Figure 17 Mamelodi in context with Pretoria, Urban Vision, Author (2015)



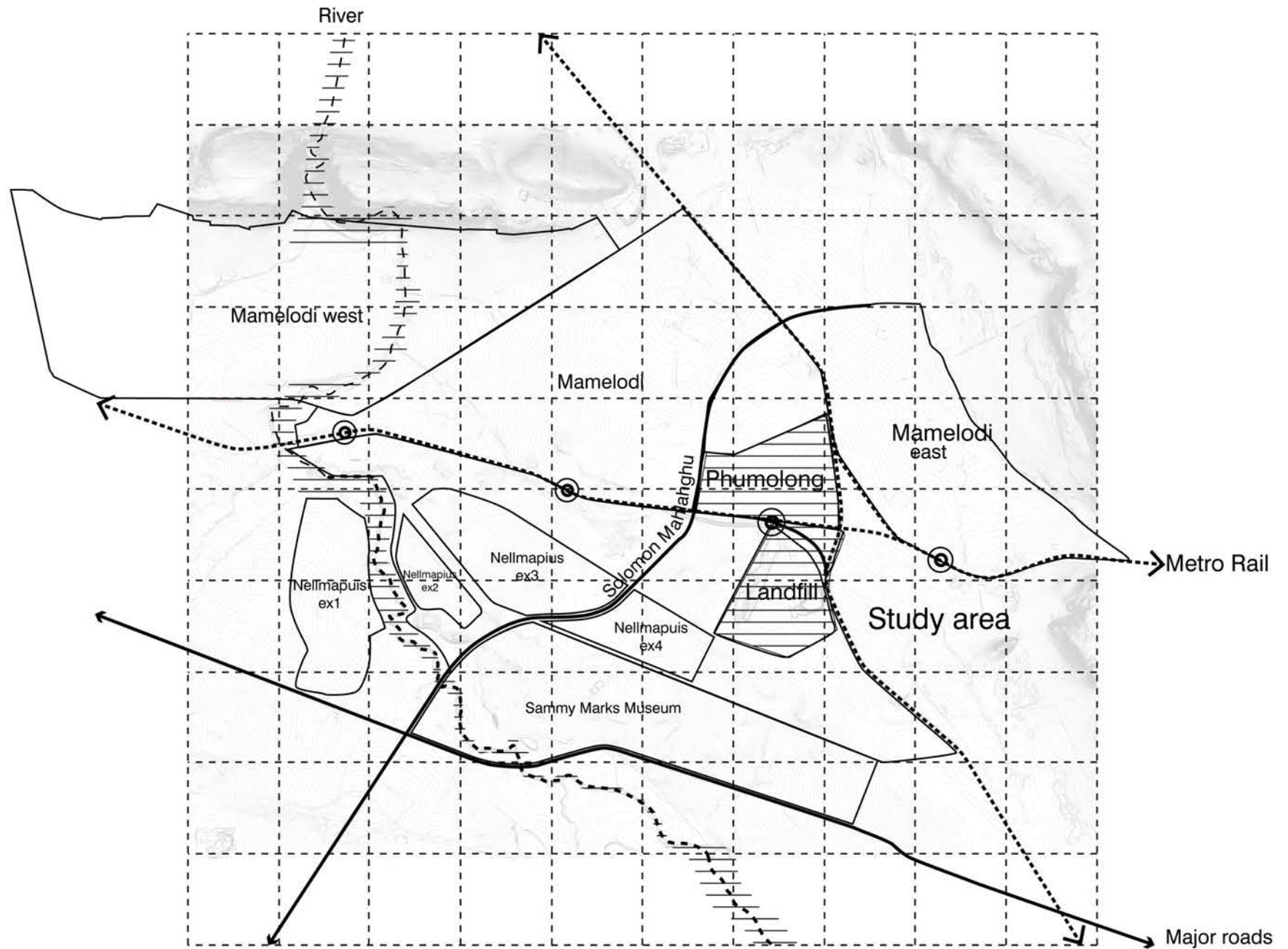


Figure 18 : *Mamelodi as greater context, Urban Vision, Author (2015)*

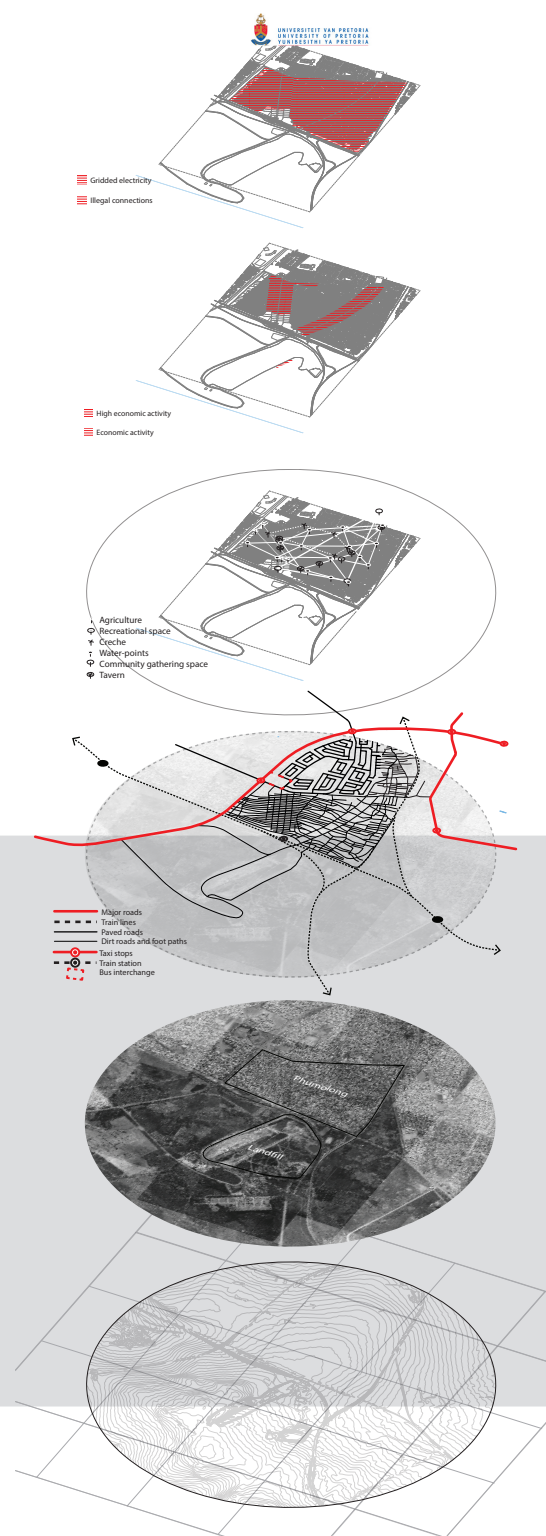


Figure 19 : *Overlay of Mapping diagrams, Urban Vision, K. Freimond (2015)*

The separated township of Mamelodi has a history of being borne from need. Physical devices of colonialism can be seen in and around the context of Mamelodi, in the spatial separation, barriers and limited access (*Lynch 1981*).

The dense deposits of people who occupy the central community of Phomolong experience placelessness more severely than other formalized areas of Mamelodi.

The urban and economic conditions between Pretoria and Mamelodi (situated 20km east of Pretoria central) on a broader scale, has become greatly polarised in terms of infrastructure and sanitation, yet economical and urban development in both areas continue to grow (*Graafland 2012*).

*Commonly, these colonial settlements are bipolar cities.... Old and new, crowded and extensive, disorderly and orderly, poor and rich, native and foreign (Lynch 1981).*

*Society, as its history unfolds, can make an existing heterotopia function in a very different fashion; for each heterotopia has a precise and determined function within a society and the same heterotopia can, according to the synchrony of the culture in which it occurs, have one function or another (Foucault 1984).*

Society consists of different dimensions and to formulate an adequate architectural response the different dimensions (such as economic, technological, political, social and cultural) should be understood and integrated, as well as the changing conditions surrounding these dimensions (*Graafland 2012*).

City as Memory // 01

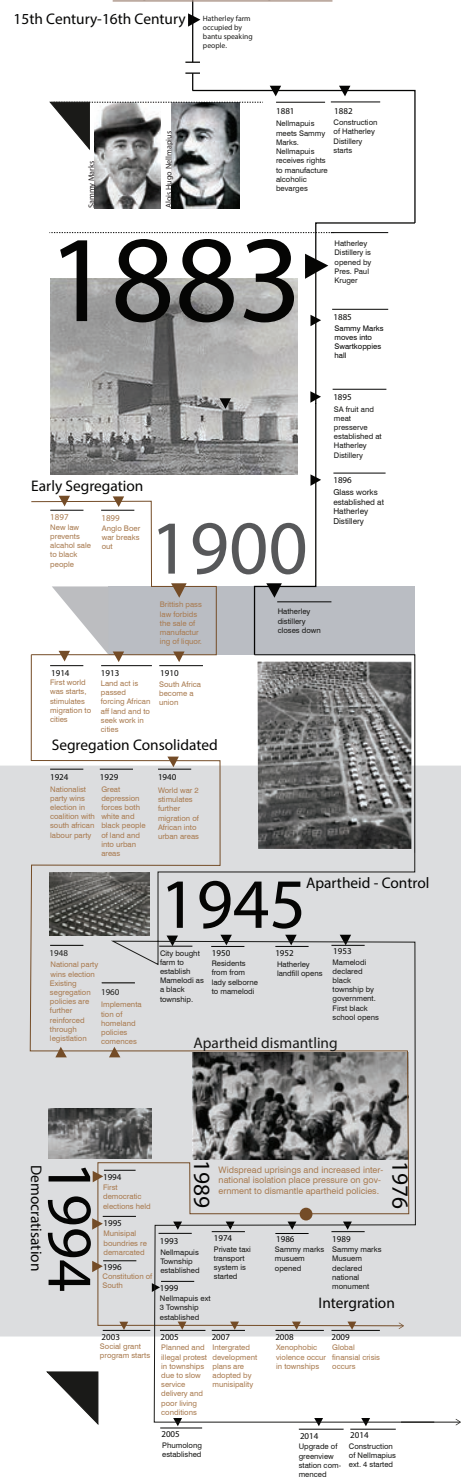
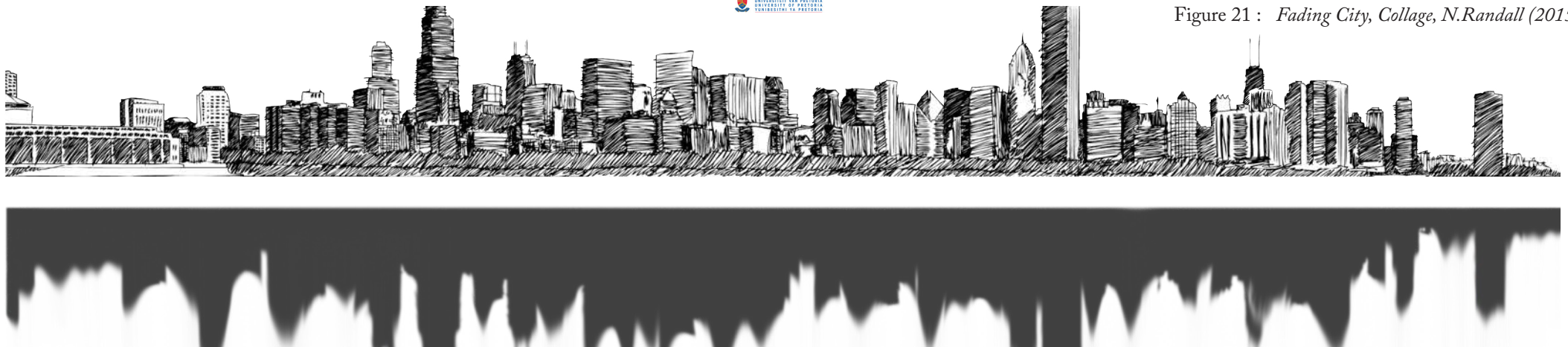


Figure 20 : Historical Timeline, Urban Vision, K. Freimond (2015)



## 2.2 *The city as memory*

*In architectural discourse we are predisposed to evaluating the relative success or failure of a built work solely on its formal, spatial, or aesthetic qualities that is to say, the purely architectural. Herman Hertzberger, however, reminds us that too often the relationship between the building and the story behind it (...) is missing (1999 7). (Carter, n.d.)*

This story begins as a slowly fading memory, from Bantu Nomads settling on the Hatherly farm in the 14th century. The historic Hatherley farm also saw one of Pretoria's first industrial movements, Eerste Fabrieke. The Hatherley distillery was built in 1883, by Sammy Marks and Alois Hugo Nellmapius, however it closed down due to a law prohibiting the sale and manufacturing of alcohol in 1900, after the South African war (*Nieuwoudt 2012*), adding to a separate temporal layer of the common physical palimpsest (*Lester 2009*).

*In the context of humanitarian architecture - particularly that within development projects - this issue is of paramount importance. By story we mean the process the ways in which an architect or design team work with the intended inhabitants or users of a given project (Carter, n.d.).*

During 1945, the city of Pretoria bought the Hatherly farm and established it as a black township (*Walker 1991*). From this, the township of Mamelodi was born. Soon after the transaction, segregation laws were implemented and people were relocated from Lady Selbourne to Mamelodi. By 1953 the first black school and the Hatherly landfill was opened. Originally the landfill was meant to be far away from human settlements. With the ever expanding Mamelodi, however, we now see a large informal settlement, Phomolong, to the north of Hatherley landfill, was established in the early 2000's.

After 1994 people flocked to the city from rural areas, and in 2005, Phomolong was established as a temporary solution to the housing crisis. Poor service delivery, riots and xenophobic attacks are still contextual constants in the present state of Phomolong (*Lester 2009*).

These memories all add to the strata of the study area.

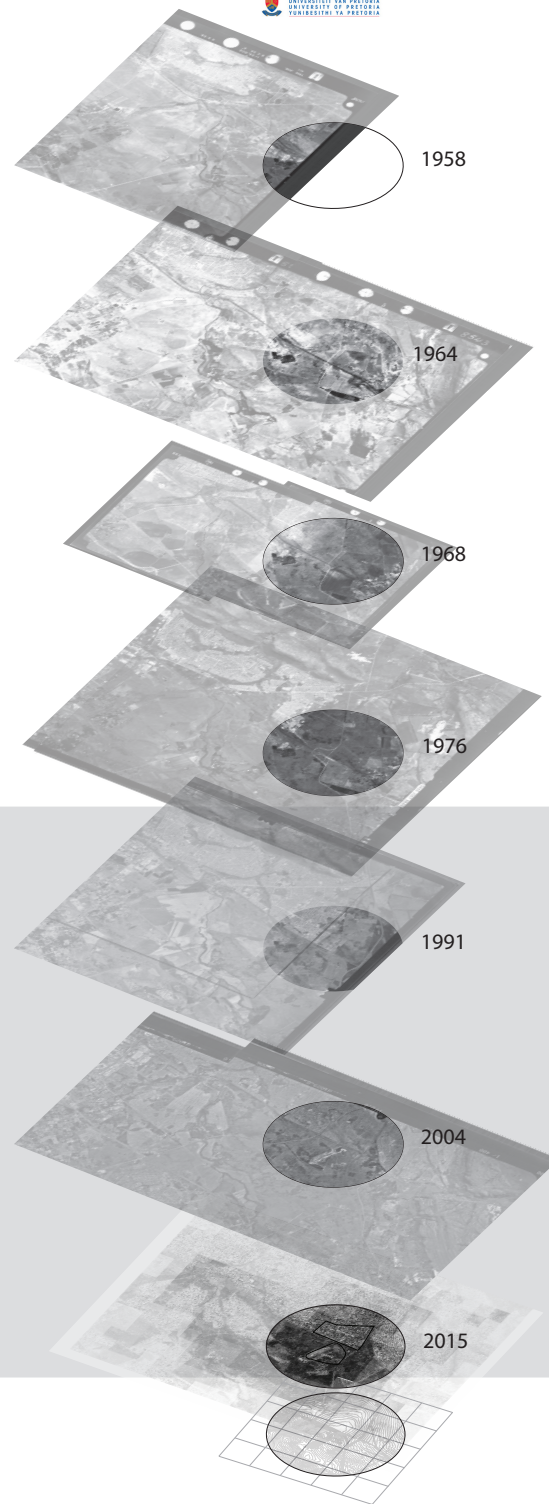


Figure 22 : *Overlay of Aerial photo's, Urban Vision, K. Freimond (2015)*

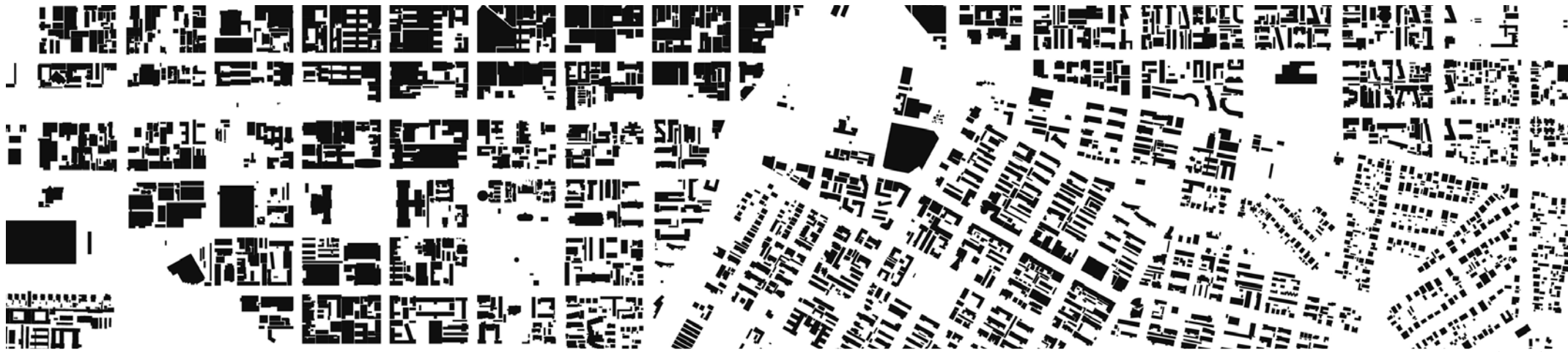


Figure 23 : Nolly map of Pretoria CBD, Diagram, N.Randall (2015)

### 2.3 The city as data

*The Mamelodi economy is relatively small and is predominantly vested in general government services, financial and business services, manufacturing, trade and transport and communication. Transport is predominantly vested in the rail network, taxi and bus industry. Light industrial activities also occur in the area with emphasis on motor related and building industry activities. Overall, the local economy is strongly supported by the informal trade sector – as evident from the high representation of informal activities distributed and concentrated at specific points throughout the area. (Tshwane Metropolitan Municipality, 2014)*

According to the Census of 2011, Mamelodi stretches over 49.19km<sup>2</sup> with 110 703 households, and 334 577 people. The most commonly spoken language is Sepedi and the average monthly income per household is less than R3000.00. Phomolong, in which the study area falls, was established in 2005 and houses 27 164 people over a space of 6.07km<sup>2</sup>, all of which who live in shacks. In the region of Mamelodi, there are 12 schools, 10 clinics, 2 police stations and 1 university, none of which are located in the area of Phomolong (Census 2011).

*Residents of Mamelodi are largely transit dependent (Tshwane Metropolitan Municipality, 2014).* Hence the development of the Greenview station was undertaken by the Passenger Rail Agency of SA (PRASA) and this investment leads to the possibilities of further development to take place around the new train station.



Figure 24 : Photographs taken during a site visit, showing pedestrian view of Phomolong, Urban Vision, K. Freimoth and M. Mkizi (2015)

### 2.4.1 SWOT Analysis

*Within this broader landscape of socially motivated architecture exists the particular situation of the development project, which is largely a post-war and post-colonial phenomenon. This is not to suggest that projects aimed at helping the poor did not exist prior to the second world war, but rather that the era of development (Esteva 1992 6), in the truest sense, did not begin until the late 1940s (Carter, n.d.).*

To come to a greater understanding of the context of Phomolong, a *SWOT analysis* was done. This was based on the observations during one of the site visits and from issues derived from the informal interviews with the SANCO community leaders. The *SWOT analysis* formed part of a collective urban vision proposal. The collective group focussed on the greater area of Phomolong and the Hatherley landfill as the study area.



### *Strengths*

The boundaries of Phomolong are well defined, by Solomon Mahlanghu road on the Western edge and the rail tracks on the Southern side, controlling the patterns of growth. To the west, Solomon Mahlanghu forms an almost impassable barrier, while the train tracks to the south serve as both a hindrance and an asset. It is in spite of this that Phomolong's location is its greatest asset, it finds itself centrally located, surrounded by opportunities on all sides. This central location translates into a high volume of people, moving their way through the community toward faster, more efficient transportation. Along the main movement routes, informal trade has developed and shows the possibility of further development to take place.

### *Opportunities*

Because of its current state, Phomolong has opportunity for large scale improvements through small catalytic interventions such as landmarks, lighting, increase in passive surveillance and formalisation of pedestrian routes. This is in referral to a similar approach as the Violence Prevention through Urban Upgrading (VPUU) (VPUU 2014) in Kayelitsha, Cape Town. This was one of the lenses through which the urban vision was approached. It is hoped that this development would then in turn lead to the stabilisation as well as growth of economic structures, allowing the community to disseminate their own future, rather than thrusting an exterior perspective of formalisation on the community.

### *Weaknesses*

Phomolong experiences peak times of activity and a lack of municipal infrastructure, such as waste removal, refuse disposal and grid electricity. This was established through the mapping exercises undertaken during site visits as well as *Census 2011*. There is also a lack of civic space and public facilities such as public ablutions, poor water drainage of the clay-like soil conditions as well as the smell from the landfill, intrude on public spaces. Illegal dumping as well as pit toilets are in abundance which leads to an overall lack in sanitation and hygienic environment.

### *Threats*

According to the *Census of 2011*, 5146 crimes were reported in Mamelodi, hence it can be deduced that general safety is an issue (*Census, 2011*). Due to the unstable soil conditions, shacks are often flooded, alluding to possible construction issues. The illegal dumping and proximity of the landfill have added to an ever growing number of pests about the streets.



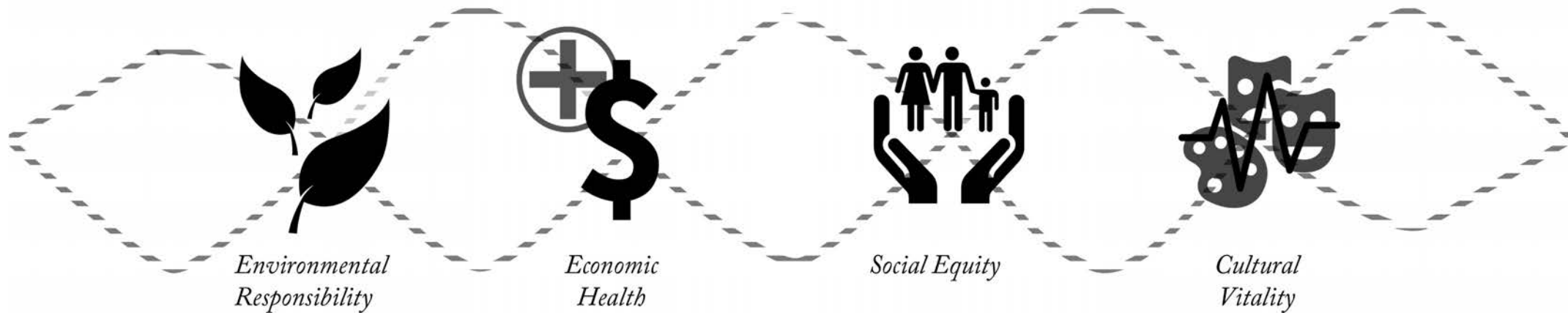


Figure 26 : *Aerial Photograph of site, N. Randall (2015)*

### 2.4.2 Conclusion

From these observations, the following community needs were deduced:

- Running and potable water which is available on the residential plots, but not at public spaces, should be established.
- Electricity is a problem, with illegal pirating of electricity off the grid; therefore an alternative should be investigated.
- After typological studies had been done, a secure and safe shelter alternative should be proposed.
- There is a lack of recreational space, public ablutions at transport points and public laundry facilities. Similarly, four crèches were removed during the mass eviction of October 2014 (This can be seen on Google Earth images, and was referred to by an employee on the Greenview Station construction site, however, no documented proof has been found) creating a lack of space for children to be looked after within the community.

In response to the above mentioned community needs, a sustainable approach to all design interventions in the new imagined context was proposed. The interventions are to strive to make allowance for the four pillars of sustainability.

The four pillars include Environmental Responsibility, Social Equity, Economic Health, and Cultural Vitality (*sustainablekingston.ca 2015*).

These four pillars are seen as drivers for interventions and help with the deduction of appropriate design responses, to create resilient and sustainable structures and interventions. These pillars not only help to develop a sustainable environment but also a sustainable and integrated community structure (*sustainableantigonish.ca, 2015*).

*Sustainability is an economic, social, and ecological concept. It is intended to be a means of configuring civilisation and human activity so that society and its members are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and planning and acting for the ability to maintain these ideals in definitely (Schutte, 2008).*

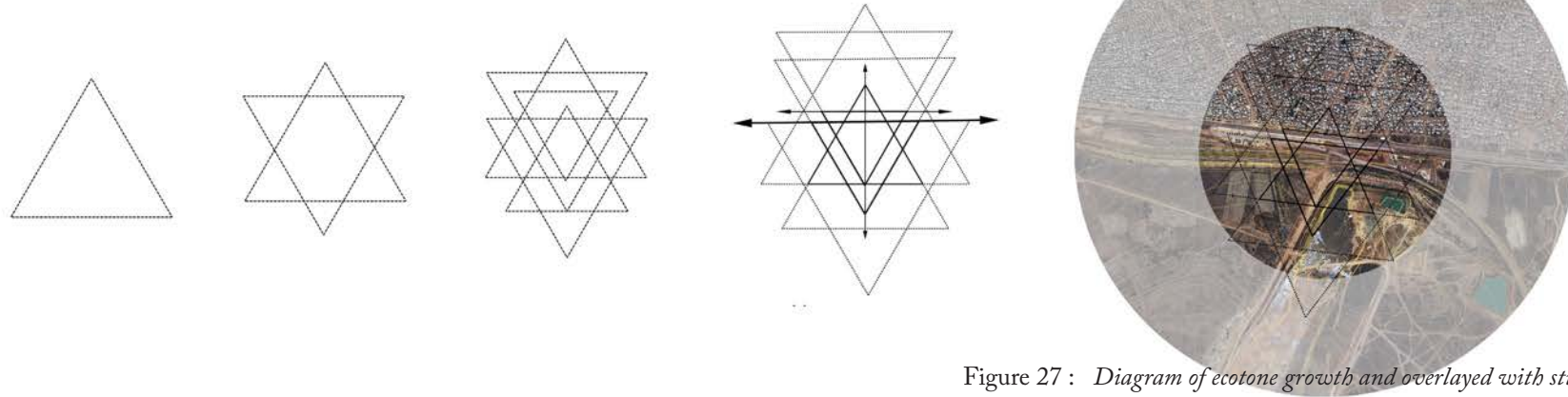


Figure 27 : *Diagram of ecotone growth and overlaid with study area, Author (2015)*

## 2.5 The ecotone at Greenview

An *ecotone* is defined as

*Ecological zones where two distinct ecosystems overlap or grade into one another, they contain an abundance of diverse species and a complex set of exchange dynamics (Pendelton-Jullian 2009).*

Taking a closer look at the severe boundary created by the railway tracks, we find that it has become a lifeless edge, despite the high levels of activity it sees on a daily basis. In this transitional zone, communities and networks overlap and start to grind into one another, blurring the edges, but at the same time amplifying certain traits of each opposing element. These networks allow for the opportunity of the strengthening of these social systems through architecture and the housing of these interactions.

*They are areas of disturbance, catalysed by the differences in the two ecosystems, and they are often zones of conflict as well (Pendelton-Jullian, 2009).*

By applying the theory of *ecotones* to social ecologies rather than biological ecologies, the crossing becomes a disturbed and tense space, owned by none but used by all: A heterogeneous space in tension due to its lack of ownership being taken.

*The implication within all these discussions is that work at the edge is unfettered and unencumbered by the inertia of core activity. It is more open to radically transformative and innovative forces and processes. These forces and processes, if tapped into, can re-shape and transform the core, something that the core will not do under its own constraints and conditions—under the shear inertia of its own historical operations. In these discussions edge and core are separate and unique fields of activity—discrete in their operations except for moments of catalytic communication (Pendelton-Jullian, 2009).*

These spaces of high activity can then be seen as the nodes where intervention should take place, formalising the interactions to promote further growth.

### 2.6.1 *The Community*

One thunderstorm later and the gravel roads have quenched their thirst. People try to navigate the puddles and women are doing laundry while the sun is out. Her child is playing around her feet and enjoying the sludge slipping through those little fingers.

The tightly knit typologies are like a mesh that misleads one's perception of distance and proximity. There is only one beacon, the *Apollo* light, the meeting place. You would hear the time and place of the next community meeting, from the back of a 'bakkie' through a megaphone. The sound reverberating from the corrugated metal sheets, used as walls by so many.

In this space, throngs of entrepreneurs own established shops, lining the main link to the train station. The train station has become a symbol of hope; the promise of further development has reignited the community's resilience to their current forgotten state.

*Over the course of fifty odd years it has become clear that development projects are most successful when they are low-cost and small in scale, when they respond to the needs of a specific target group and involve the beneficiaries themselves in the planning and implementation process (Smillie 1991: 114 in Carter n.d.).*

*Decisions are cumulative, leaving a strong legacy for each successive generation of inhabitants (Lynch 1981).*



### The Community Leader

He is welcoming & kind,  
known & respected.  
He speaks for them, yet consults  
& listens to their grievances.

His greatest wish is that no one  
should go to bed hungry, yet  
this is the reality...  
His greatest want is for this  
generation to have it easier than  
the previous.

Yet not all agree & where these  
two opposing social ecotones  
meet, friction is paramount.



### The Nyaope Kids

They are the prowlers in the  
streets, the shadows in the night,  
driven by their strong desire  
for more...

Their actions are desperate &  
lead to vandalism of the existing  
infrastructure.

Mothers worry & fathers warn  
against,  
yet they are the occupants of  
unoccupied space. They move on  
the peripheries, the fringes between  
non-place & place.

Slowly going nowhere & increasing  
in numbers, becoming a perpetual  
anomaly.



### The Guerilla Gatherers:

He sees the value in what others  
see as scrap. To him a carpet becomes  
insulation and a tyre has the  
potential to become sandals.

Yet his roof leaks & he is cold in  
winter, for there is no one in the  
vicinity who is willing to buy what  
he has scavenged & the depot  
owner pays less than the effort it had  
taken. Rummaging through the  
landfill, abiding by the rules of the  
hierarchy & extracting valuable  
objects.

At heart an entrepreneur but labeled  
as an opportunist.



### The Neonates:

Curious & eager to play, learn &  
achieve. They are hardly aware  
of the fact that it is 5h30am & still  
dark outside, when they greet their  
mothers.

Too little space for too many kids,  
but other than being watched by  
an older sibling or playing at their  
mothers feet as she does the laundry,  
this is what they know.

Figure 28 : *Diagram of ecotone growth and overlaid with study area, Author (2015)*

## 2.6.2 *The characters at play*

*The current investigation takes the position that humanitarian architecture can only be successful – by which we mean ecologically, economically and culturally sustainable – if it the process is participatory and involves community organization (Carter, n.d.).*

Phomolong comprises of a few main characters, who construct the community into territorial divisions. This is a complex situation which can be observed yet not fully understood. Focussing on where these characters interact and connect (*ecotones*) was the aim of the investigation of the social systems.

*A highly decentralized decision process, in which the immediate users of a place make the decisions about its form, is a powerful ideal. It reinforces their sense of competence, and seems more likely to result in a well fitted environment, than if they are excluded (Lynch, 1981).*

Yet within this condition of diversity (people from Limpopo, Mpumalanga and other provinces, residing together), a loop has developed. Going about their daily ritual activities, in an environment which is simultaneously changing (growth in populous and inhabitants) and regressing (municipal infrastructure is not maintained nor advanced to suit the growth).

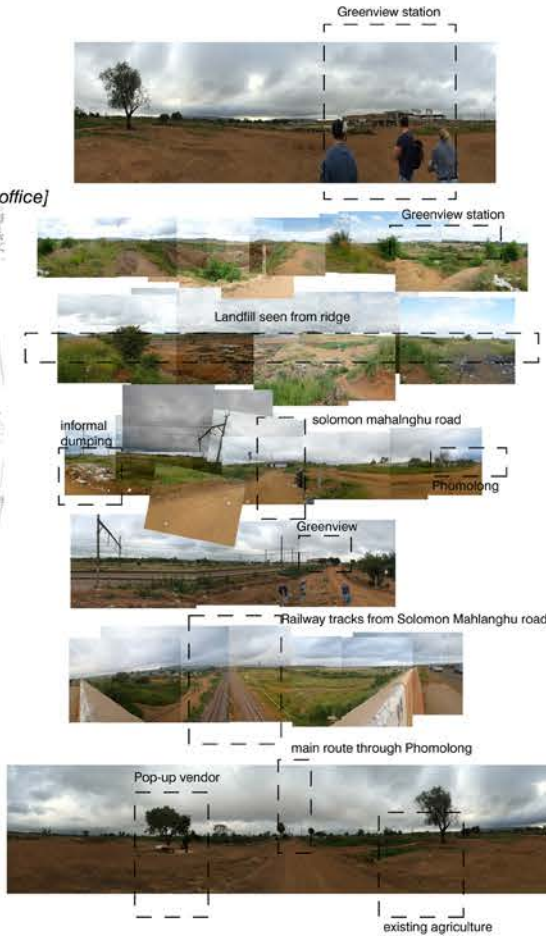
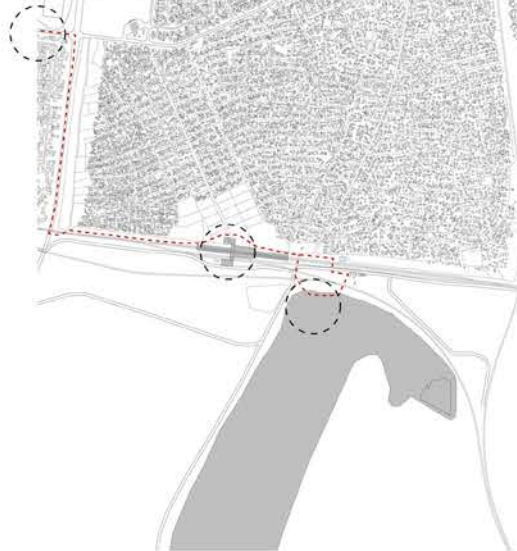
Within the existence of an interdependence upon each other, such as the situation of the child caretakers, a platform of stagnation (no progression in education) in their current communal situation is established. We find the children who are tended to by unskilled or aged dependents, without the necessary training to provide the needed development for this new generation (UNICEF 2007) As well as the gatherers, there are guerrilla (not following the norm of working for money, but rather harvesting from the landfill) employees, who raid the landfill, in search of objects of value to sustain their livelihoods.

Together these groups are stuck in a vicious cycle; where the undeveloped child leads to an unskilled dependent and becomes an addition to the guerrilla employees.

*Since a good start in life is critical to the physical, intellectual and emotional development of every individual, poverty in early childhood can prove to be a handicap for life. Poverty denies children their rights to basic education, primary health care, adequate nutrition and safe water and sanitation. Poor children are likely to pass poverty onto their children when they grow up, perpetuating the poverty cycle (UNICEF 2007).*

# Visits and Routes

## Route 1: The Peripheries [University of Pretoria Mamelodi Campus - Greenview station site office]



## Route 2: The Community [Community leader assisted site visit]

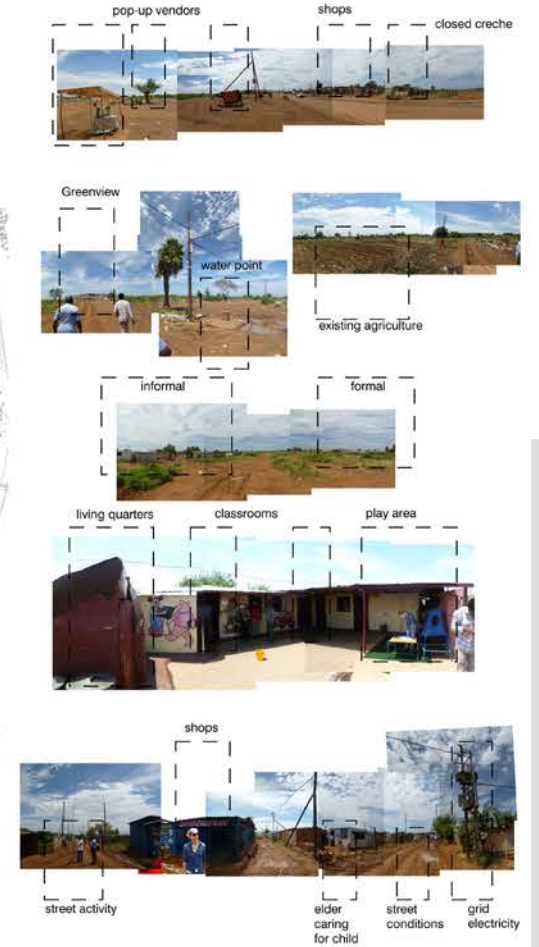
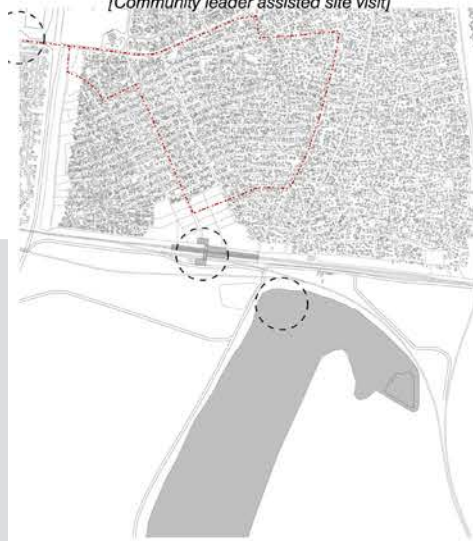


Figure 29 : Routes taken during site visits with photographs, Urban Vision, Author (2015)



## 2.7 *Existing tissue of site*

The existing state of Phomolong is due to a mass eviction of households in October 2014, surrounding the Northern edge of the new Greenview train station upgrade. This has left an open and desolate space, where few people interact with the space, except for people travelling to and from the train station. There are also pop-up vendors inhabiting the space, selling food to passers-by. The Southern edge is divided from the community by the railway tracks and a man-made ditch. Yet an informal soccer field has been created on the Southern side and people (mostly gatherers) cross the tracks to the landfill. People were seen jogging up and down the landfill cap for exercise.

The new train station is of a scale which amplifies the small scale of the informal settlement shacks, separated by the monumental open piece of land between the two entities.

*This problem of the human site or living space is not simply that of knowing whether there will be enough space for men in the world but also that of knowing what relations of propinquity, what type of storage, circulation, marking, and classification of human elements should be adopted in a given situation in order to achieve a given end. Our epoch is one in which space takes for us the form of relations among sites (Foucault, 1984).*

Foucault's statement can be interpreted in that it is the in-between spaces, the links between activities and rituals that lends a place its character. Hence the interpretation of these in-between spaces through architecture has the possibility of formalising the series of social systems to strengthen the collective idea of a place.

## VPUU lense

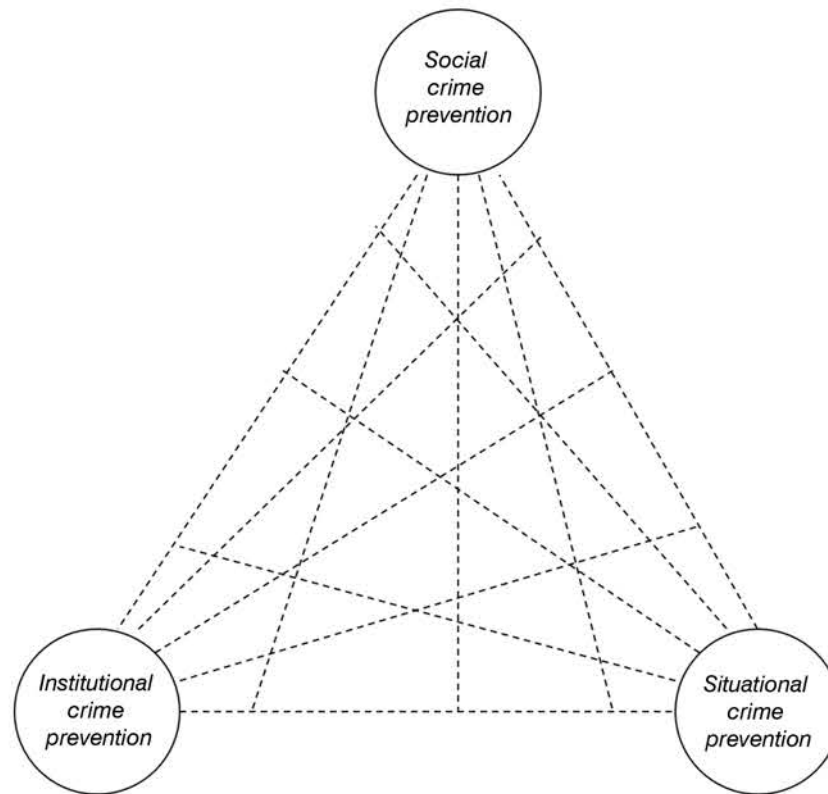


Figure 30 : VPUU strategy, VPUU (2015)

## 2.8 *The city imagined*

The proposed urban vision looked at the *Violence Prevention through Urban Upgrading* model as a precedent to incorporate a similar methodology into the design approach (*VPUU 2014*).

### *VPUU analysis*

The Violence Prevention through Urban Upgrading was a dual initiative between The City of Cape Town and the German Development Bank. The project is located in Khayelitsha, Cape Town, South Africa, and was implemented from 2006–2014. The project consists of an urban planning strategy that focussed on activity nodes along main pedestrian routes to and from transport nodes. This created an activity spine with increased passive surveillance and safety through social engagement on a 24 hour basis (*VPUU 2014*).

The project spans over 4 neighbourhoods thus reaching out to almost 20 000 people.

The VPUU has a very clear approach and methodology, following a set of principles to support a participatory design approach, which allows residents to take ownership of the proposed interventions (*VPUU 2014*).

The VPUU methodology focuses on analytical and statistical data for a baseline survey; a prioritisation process with community members to deduce which interventions should be ranked from most important to least important. These two elements helped to develop a strategy which informs individual interventions. The interventions were developed in cooperation with resident bodies. Implementation also focused on using local resources and skills (*VPUU 2014*).

A key focus of VPUU is to create well managed and maintained spaces from the start. The model of intervention is based on an integrated approach between social and institutional dimensions to improve the socio-economic situation.

Their strategy matrix consists of the following divisions (*VPUU 2014*).

- Prevention focusses on Lifelong learning and includes Early Childhood Development, schools and employment and income generating economic development.
- Cohesion which focusses on the community social capital includes community mobilisation, community delivery of services and urban management.
- Protection focusses on community policing, and includes spatial planning, public safety as well as the legal and justice aspects of activities.
- Research and development, focusses on facts, and includes programme planning, information sharing and research and capacity building.

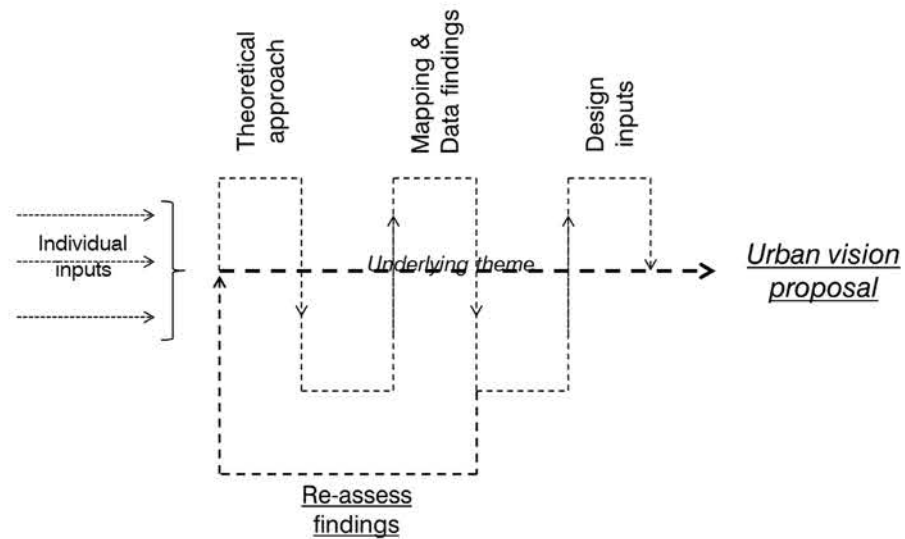


Figure 31 : *Urban Vision Methodology diagram, Author (2015)*

### 2.9.1 *Urban framework approach*

*It proposes that when community participation is facilitated as sensitively as a delightful work of architecture, it has the ability to become a catalyst for further growth and improvement far beyond the initial scope of a design project (Carter, n.d.).*

Through the generation of a collective group proposal, the opportunity for development was established on the northern and southern edges. By reinforcing spaces where social and typological ecotones overlap, new places for the remaining community are created. Existing main routes between the transportation nerve center, (Solomon Mahlanghu road) consists of a bus terminus and informal taxi rank, and Greenview station, are formalized and exaggerated. This is to facilitate public movement through the enhancement of existing networks. Taverns, grocers and informal shops are found in close proximity to one another, as well as social networks which overlap, were considered as main informants.

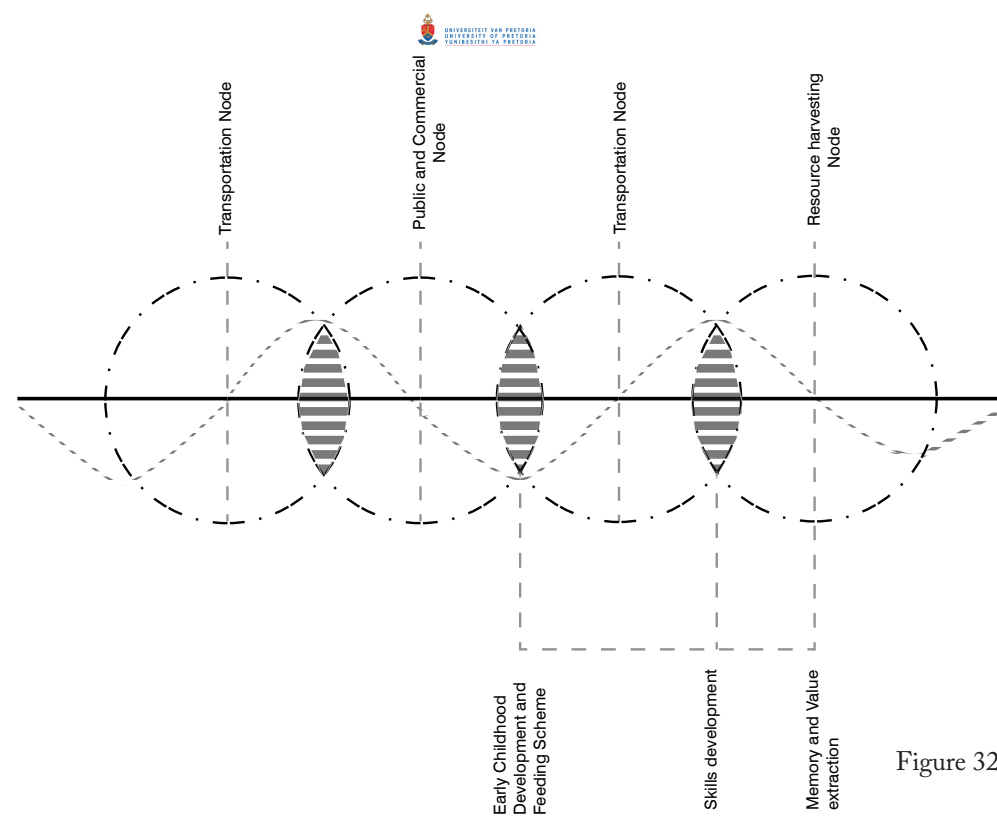


Figure 32 : *Urban Vision Methodology for proposed interventions, diagram, Author (2015)*

The urban proposal focusses on the increase of *passive surveillance* (VPUU 2014) through the densification around existing public and residential squares, as well as open visual links and the introduction of functional landmarks. Proposing that the squares have 24 hour multi-functional programmes, within the new defined precincts (commercial-, civic-, and production precinct). This should promote diverse users entering passively controlled spaces, which increases safety for children and women in these spaces.

The unhindered movement to and from the station is promoted through the amplified activity spines. The proposed sites for further intervention will focus on strengthening the link between the landfill and Phomolong. To promote further development on the southern side of the railway, a recreational precinct was considered. The two green areas are proposed to become *Bamboo Balcooa* plantations. This would introduce a new sustainable resource for construction within the community.

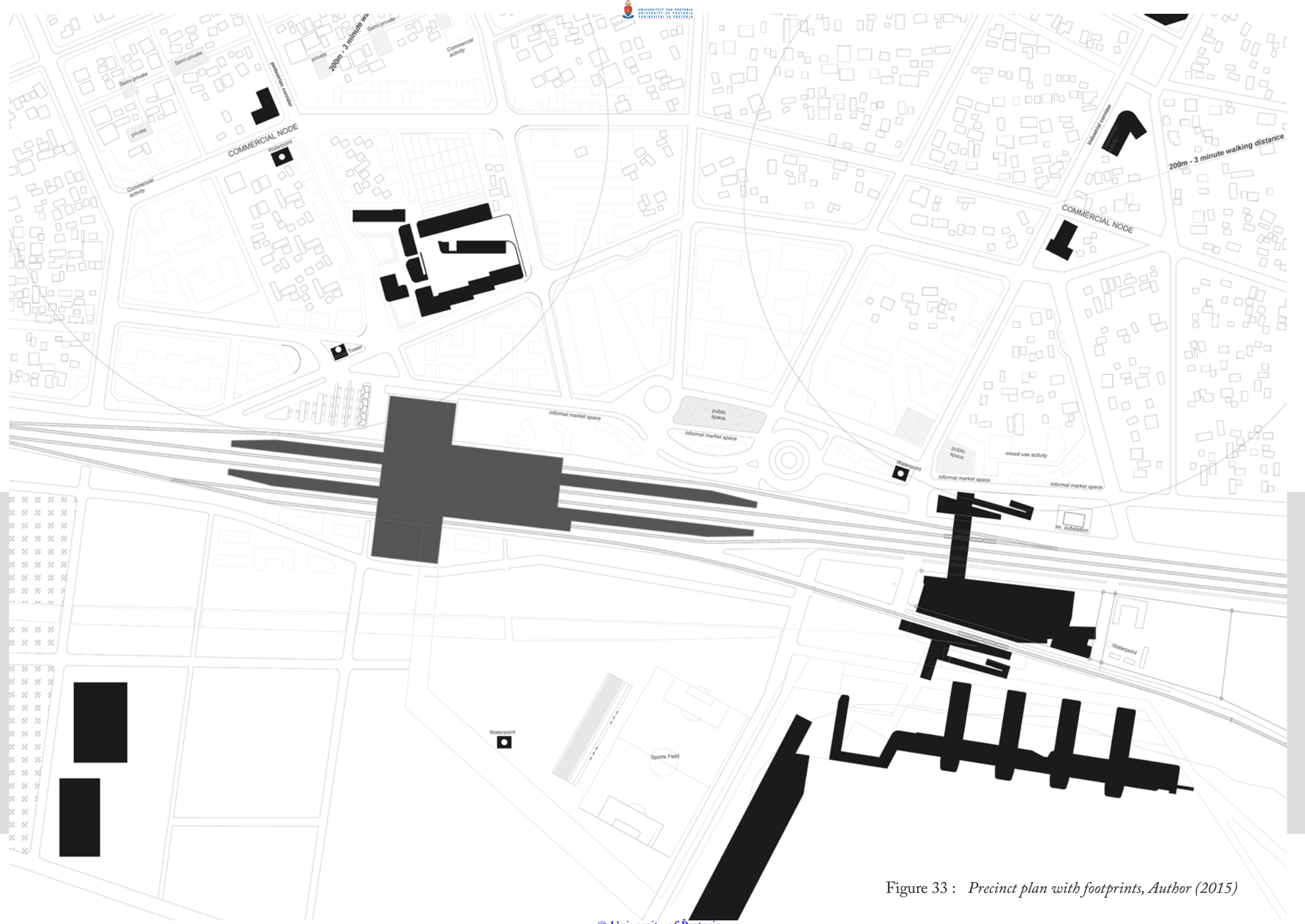
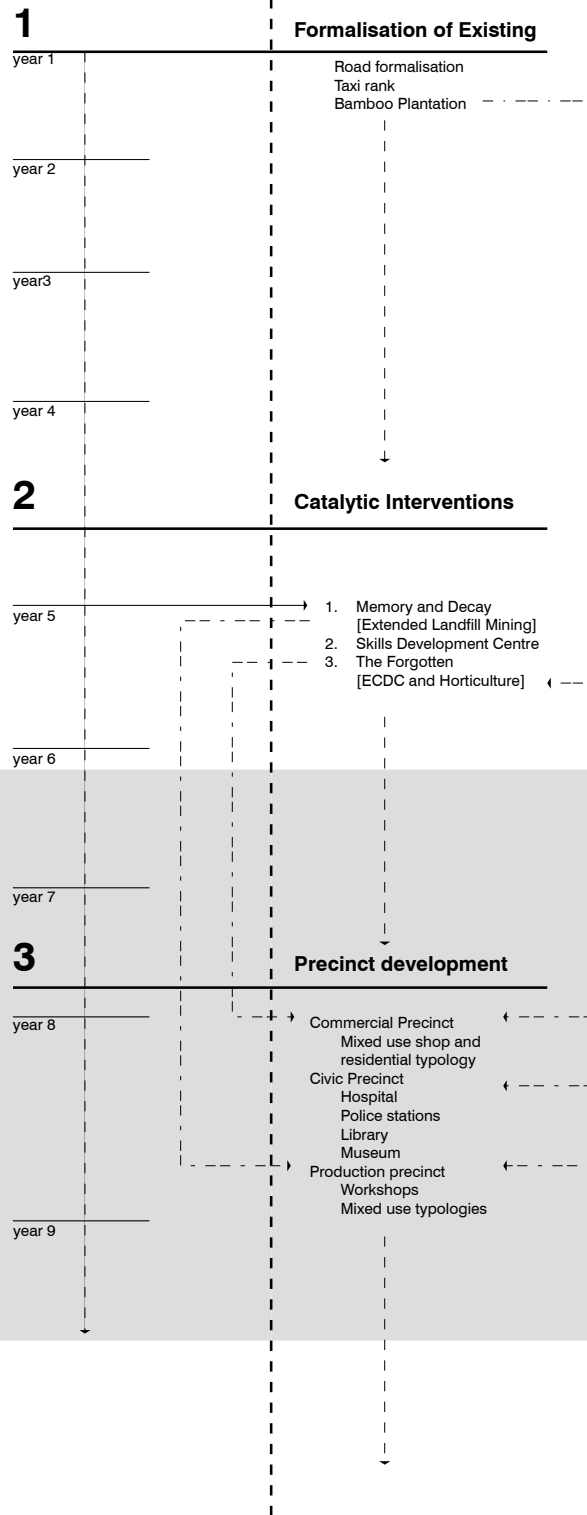


Figure 33 : *Precinct plan with footprints, Author (2015)*



**BAMBOO PLANTING AND HARVESTING STRATEGY:**

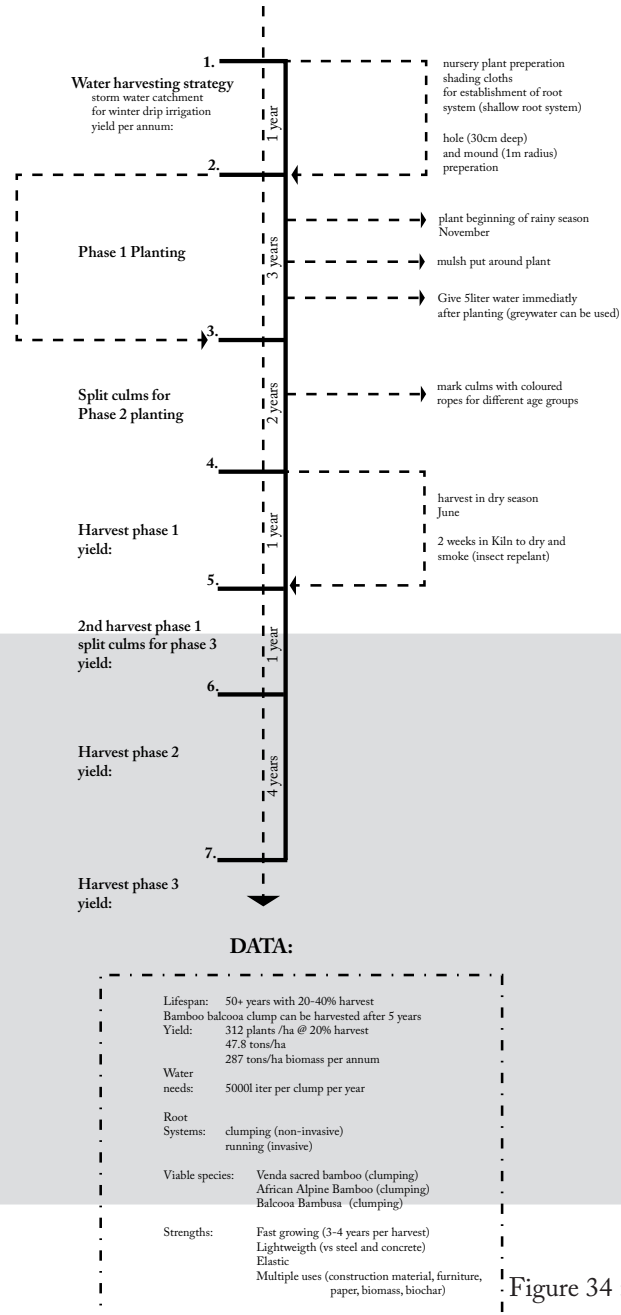


Figure 34 : Urban Phasing, Diagram, Author (2015)



Figure 35 : *Fleeting and long term memory, Author (2015)*



### *3.1 Introduction to theory*

This chapter investigates the underlying themes within the proposal, used as a tool for understanding the intricately woven texture and palimpsest of the context and its networks.

The theoretical readings and premise also influenced and strengthened the architectural intentions and responses.

# 3

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## *Theory*

- 3.1 Introduction to Theory*
- 3.2 Theory*
- 3.3 Collective Cultural Memory*
- 3.4 Existential Knowledge*
- 3.5 Dormant Potentials*
- 3.6 Biophilia*
- 3.7 Matriarchal Space*
- 3.8 Conceptual and Theoretical Conclusion*



Figure 36 : *Knowledge through observation, Collage, Author (2015)*

### 3.2 Theory

As stated by Pallasmaa in *The eyes of the skin architecture and the senses* (2005), architecture has become mono-functional in that it mainly communicates with users through a visual medium, whilst if architecture were created in a manner which allows for communication with all senses, it starts to simulate the body. Architecture can extend its memories into knowledge and adapt to multiple experiences. Hence creating allowance for a broader, more diverse user-scape to interact with space. Thus the experience of the inherent qualities of a new living and embodied architecture, as a form of existential knowledge.

Through the consideration of multiple senses within deliberated space, architecture has the ability to teach and create a platform through which the daily user, along with their ritual activities could engage with their environment. By experiencing architecture on a multi-sensory level, the user's body and their activities becomes an integrated extension of the original design intention (Pallasmaa 2005).

Existential knowledge allows for the unconscious perception and participation of the user to breathe life into traditionally static structures. This becomes apparent in the ability to grasp the *genius loci* (Norberg-Schulz, 1984) of the space without prior knowledge, and freedom of exploring the detail through nothing more than basic instinct.



Figure 37 : *Knowledge through participation, Collage, Author (2015)*

Interaction plays a crucial part in communication, culture and survival. A place that does not stimulate or enrich the user, adds no more value than the most basic of shelters.

*It domesticates limitless space and endless time to be tolerated, inhabited and understood by humankind (Palasmaa 2012).*

Hence architecture that acknowledges all senses and users, becomes accessible to all types of users, educated or uneducated, aware or unaware. Catering for the needs of the programme and users on an intimate level, the architecture becomes open to critical reflection or catharsis on a physical and cognitive level, through the creation of integrated and allocated space for the collective memory of the community.

The proposed space of intervention becomes a system, consisting of multiple elements where users can gather what they require from it.



Figure 38 : *Knowledge through experience, Collage, Author (2015)*

### 3.3 *Collective Cultural Memory*

The question concerning the lack of a collective memory, the clean slate, clean, but stippled in the collective memories of individuals, unbound, comes about. The growing body of residents of Phomolong are living for a possible reality, not investing in their immediate environment. This is related to the stories told by community members, who say they send money back to their 'real homes', meaning the places of their origin. This is partially because of their reminiscence to the memory of their place of origin, as sedimentary deposits.

*Nothing is more permanent than the temporary (A.E. Stallings 2012).*

More than anything it seems that the memory of the collective, of place needs to take root, sprouting from the clean slate, defining the temporary state as something having ownership. Memory follows on from itself in succession, using the previous instalment to inform the next, the connection between the existing and the possible needs to be realised in order for those memories to form a future.

*How people define their own spaces and experience them is important in constructing identities (Rendell, Penner and Borden 2000).*



Figure 39 : *Knowledge of the collective mind, Collage, Author (2015)*

The physical manifestation of the collective (non-)memory, one which begins to address the cultural amnesia currently burdening Phomolong, would need to appeal to a variety of users, a dichotomy of needs, it would need to be a device for integration, an ecotone. It is a place that is recognisable, a place where people have taken ownership, a place where knowledge and nurture can be passed on, bridging the intergenerational gap.

*In so doing, it maintains vital connections with our biological and cultural past, the soil of genetic and mythical knowledge (Pallasmaa 2010).*

In the proposed programme the controlled interaction with the context of Phomolong and its inhabitants in a safe environment will be emphasized for children and elderly women. This is to promote development of senses and skills by using intimate social structures, such as nurturing networks and spaces. The constant presence of activity and ritual creates a stimulating and enriching environment for all within certain space. Activities become synonymous with this proposed place, helping to establish a sense of identity.

*In earlier modes of life, the intimate contact with work, production, materials, climate and the ever-varying phenomena of nature provided ample sensory interaction with the world of physical causalities (Pallasmaa 2010).*

### 3.4 *Existential Knowledge*

*Young children learn through interaction with their physical, social, and cultural environments.... Among the most critical design considerations are the amount and organisation of both indoor and outdoor areas. Research studies confirm that limited space and poorly organised space negatively affect child and staff behaviours. (AECD 1996: 1 in Moore 2001)*

Existential knowledge is gained through experiences that develop into natural reactions or skills based on specific situations. *The built environment is a cultural artefact. It is shaped by human intention and intervention (Rendell, Penner and Borden 2000).*

Learning at a mother's feet through observing and interacting in a certain daily ritual, imparts the skills to apply the same ritual, eventually becomes inherent within memory. As Moore (2001) states that the environment we grow up in has an impact on our development and behaviour.

*The ability to touch, smell and taste everything that is observed teaches valuable tactile lessons, as well as seeing the potential and value that is extracted from the harvested and cultivated products, the children developing in their exposure to stimulation, all add to the user's existential knowledge (Pallasmaa 2010).*

Hence thoughts should not be separated from the physical environment, for it is an intertwined part of development.

The idea of architecture and learning, being lived, rather than being intellectually understood comes about.

*Bell Hooks looks at the role of space, both real and metaphorical, in shaping us as human beings in terms of lived experience and aspiration (Rendell, Penner and Borden 2000).*

The creation of a natural and enriching space within structure, where teaching happens through observance, while also enticing multiple senses, through the use of participation.

*The quality of the physical planned and designed environment of early childhood centres has an impact specifically on cognitive and social developmental behaviours (Moore, 1986, 1987 in Moore, 2001)*

These spaces help to manifest the existential knowledge of place and the investment of time from multiple users, adds to the collective repository of memories, bridging the intergenerational gap. The knowledge becomes inherent to the space rather than the people who are temporary.

### 3.5 *Dormant Potential*

*In Small Is Beautiful, Schumacher states that development does not start with goods [a category which includes buildings]; it starts with people and their education, organisation, and discipline (Schumacher 1973:140 in Carter, n.d.)*

As Schumacher states, context and the built environment is not always an adequate method of evaluating development. From the eyes of the uninformed, informal settlements can seem chaotic; never understanding what it is to truly experience such contexts, due to lack of exposure and often the spark of development is brought about by external forces, instituting change without casting a discerning eye.

Dormant potential refers to multiple situations; the site, the community, the children and the materials chosen. Portraying the mentioned potentials allows for the experience and inspiration of the memories of each user to come to a point of cultivation, in a collective space, from where it can be dispersed again through active participation.

*Architects do not invent architectural realities; they rather reveal what exists and what are the natural potentials of the given condition, or what the given situation calls for (Pallasmaa 2010).*

The daily ritual and culture surrounding labour and investing physically into a product creates a sense of gratification and speaks to a universal culture. It is seen throughout Phomolong that there is a need to cultivate beauty around the derelict spaces called home. This is often done through the creation of a garden in the small open spaces surrounding a shack.

*What distinguishes us in our humanity is the fact that we inhabit relatively permanent worlds that precede our birth and outlast our death, binding generations in a historical continuum (Harrison 2008).*

Mankind has the inherent compulsion of manifesting their presence within a place, through creating space. Be this through the creation of a basic shelter or an intricately planned and steadily grown town or city. By addressing the relationship and method of communication between the man-made and nature through architecture; *as concepts they interact in a dialectical fashion, to condition the way we approach nature and what we build (Crowe 1995).*

The need to create one's own environment or to add and change the one an individual may find themselves in is influenced and shaped by the past (Crowe 1995). The human race has become removed from nature and thereby lost a large body of knowledge, a previously intimate, visceral understanding of the world.

### 3.6 *Biophilia*

*Biophilia is the study of the human response to the natural environment and the relationship between humans and natural systems, which is, in its simplest form, a sense of place (Griffin 2004) (Newman 2013).*

In a context where there is a lack of natural space for children to play and learn, and a lack of sense of ownership, the simultaneous exposure to a growing natural environment that is cultivated and nurturing could promote positive spaces for the remaining community networks of Phomolong.

*There are no different kinds of architecture, only different situations which deserve different solutions so that human physical and psychological needs can be satisfied, Norberg-Schulz (1979) said in the preface to his book *Genius loci* (Těšitel, Kušová and Bartoš 2001).*

Considering that the site is located in a predominantly public realm, it allows sufficient opportunity to merge the private and public spheres through the integration of a natural environment that the community could benefit from.

*The hypothesis is that this affiliation leads to positive responses in terms of human performance and health – even emotional states (Griffin, 2004).*

The addition of the natural environment also has the possibility of becoming a metaphor for the community, of the establishing of their roots and growing as a collective to sustain their fellow community members and family. The collective space could promote the establishing of a collective memory forming, where anyone in need of catharsis or critical reflection could come and reminisce, extracting value from the existential knowledge embedded in their surrounds: Adding value to their everyday experiences of daily rituals and activities, through the creation of place making through the use of biophilic design attributes.





Figure 40 : *A gap in the fence, Collage, Author (2015)*

*These biophilic design attributes include: The use of dynamic and diffuse daylight, the ability to have frequent, spontaneous and repeated, contact with nature throughout, and between buildings, the use of local, natural materials, a connection between interior and exterior surfaces, natural ventilation, a direct physical connection to nature from interior spaces, and direct visual access to nature from interior spaces (Griffin 2004).*

The benefits of biophilic design attributes are that the inclusion of natural materials and plants aid passive cooling and heating. Biophilic design also improves biodiversity and the health of users that come in contact with it (Newman 2013). Early exposure to natural environments aids development of children by creating intuitive responses to natural situations.

*Like many other higher species, human being is not born as an accomplished being. It is formed by the environment at the ontogenetic level. Thus, the landscape accomplishes human phenotype, personality, identity and the existential feeling of belonging somewhere (Šimajs 1995; LibrovaÁ 1988). That is why humans need to live in the landscape, mainly at the young age, and to communicate with the nature in a non-verbal way (Těšitel, Kušová and Bartoš 2001).*

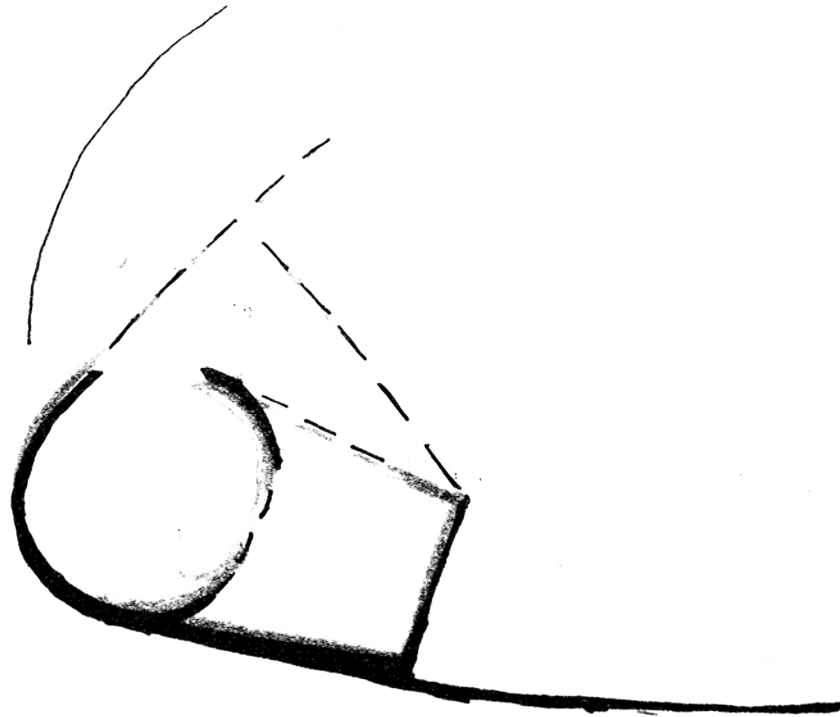


Figure 41 : *The matriarch, Diagram, Author (2015)*

### 3.7 *Matriarchal space*

*Young children need quality childcare to develop their innate potential and prepare for formal education. Quality care provides nurturing relationships, a mentally stimulating environment and basic health and safety (UNICEF 2007).*

During a concept workshop during February 2015, at the University of Pretoria, it came to the fore that the proposed programme of a food production scheme and early childhood development centre, leads to considerations of how thresholds and permeability should be addressed through the design.

It was also noted that the scheme has the essence and intentions of a matriarch, taking care of all who enter the peripheries and inner sanctum.

*Space is not a prior condition of something else, but rather an outcome, the product of an activity, and so it necessarily has a temporal condition (Colomina and Bloomer 1992).*

In the consideration of the programme the designed spaces should have certain traits that are characterised by the activities that take place at certain points. A day-care centre has the ideology of a caring environment, where children have freedom to develop and explore, whilst being watched by the elderly women, which is an existing network.

*In being exclusively identified with the home, women are associated with traits of nurturance, subjectivity, emotionalism (Rendell, Penner and Borden 2000).*

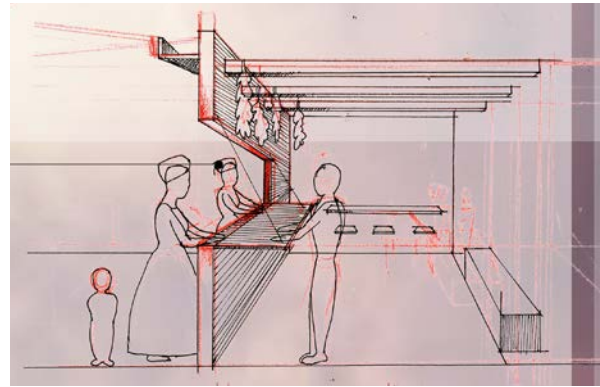
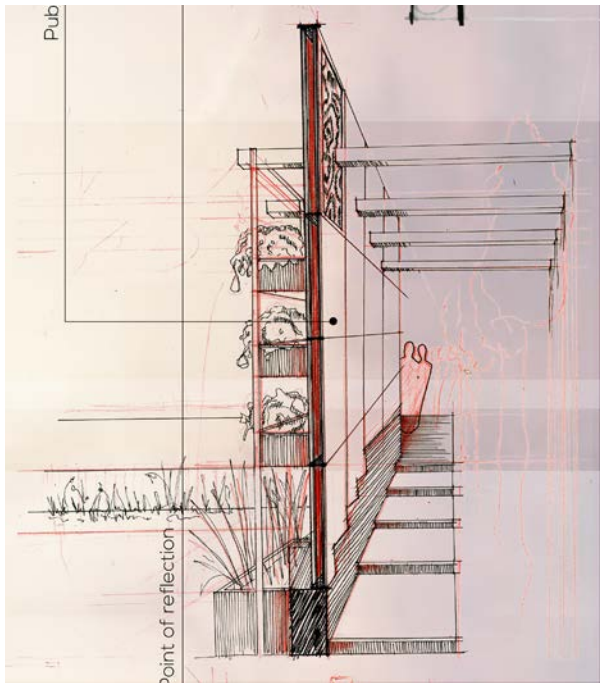
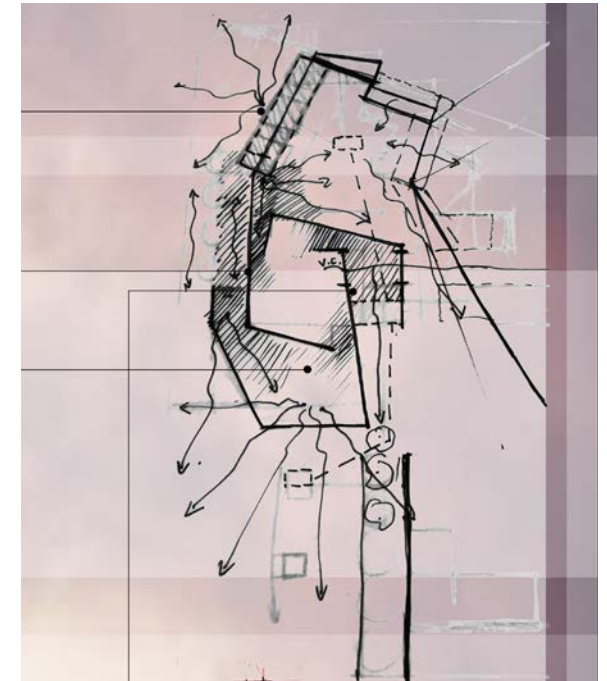


Figure 42 : *How thin can a barrier be?*, Sketch, Author (2015)

Figure 43 : *The Barrier between private and public realms*, Sketch, Author (2015)

Figure 44 : *Points of culmination and dispersal*, Diagram, Author (2015)



Certain aspects of a home environment would thus be incorporated into the scheme, like communal dining facilities and classrooms with the possibility of opening up into spaces where cultivation and harvesting takes place. The intimate spaces therefore should have an essence of feminine care attached to it.

*Spaces can enhance or restrict, nurture or impoverish (Rendell, Penner and Borden 2000).*

*Feminine spaces* have often been noted to be more orientated towards emotional care and healing, open to all in need of catharsis, as opposed to the patriarchal design rules, of set and strong thresholds, with many layers before being allowed to enter the inner sanctum. *Feminine space* can be described as domesticated space. Therefore how the space communicates with the public and urban spheres becomes of utmost importance. The specific social networks of the elderly dependents and neonates are in need of a space specifically designed for their social needs where they can flourish and build a collective identity for present and future generations.

*In defining the dialectical relationship between society and space, ... space is socially produced, but that space is also a condition of social production (Rendell, Penner and Borden 2000).*



Figure 45 : *Blurred and out of reach, Collage, Author (2015)*

### 3.8 *Conceptual and Theoretical Conclusion*

*A meaningful environment is necessary and essential to a meaningful existence (Rendell, Penner and Borden 2000).*

When all is barren, what remains except for children's laughter, willing, hardworking hands and nurturing hearts?  
 The dormant potential of seeds, in need of water to grow.

Humans cannot thrive in isolation from one another; the need for knowledge to be passed on and to create a better future for the next generation is an inherent quality in all. It is often observed in biological systems, that where two networks overlap and intertwine, the most dynamic developments take place; this is referred to as an ecotone. The same can be said of where social networks meet; either a point of friction or a point of intense stimulation is borne from the existential knowledge of both networks.

The unearthing of the dormant potentials of a place and its users, becomes a place of cultivation. The feasibility of place becomes recognised for its possibility of legacy as an enriching and enabling space, inherently linked to the participation of its users.

*Lefebvre suggests that social production of space works through three different, yet interactive processes 'spatial practice' (material or functional space), 'representations of space' (space as codified language), and 'representational space' (the lived everyday experience of space). (Rendell, Penner and Borden 2000).*

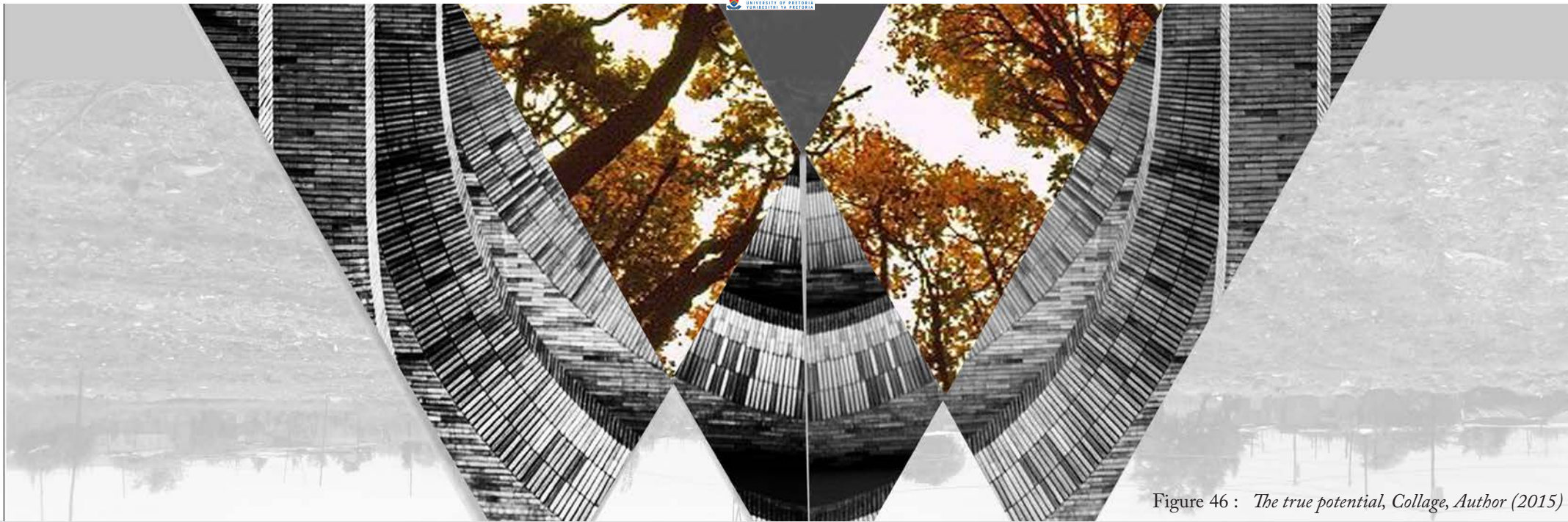


Figure 46 : *The true potential, Collage, Author (2015)*

Amorphous space has the potential to become defined through external influences, as well as what the space externalizes. Becoming a cornucopia of influences in itself, which empowers the user; a repository that decreases dependency through the strengthening of the collective.

*It is now also known that higher quality preschool education particularly in the social and cognitive spheres occurs when the architecture is appropriate (eg, Moore, 1986, 1987). In short, the quality of preschool education is in part related to the quality of the architecturally planned and designed physical environment (Moore 2001).*

Such a space has a warm embrace, accepting and without prejudice, but also guards and protects against harmful elements at its inner sanctum. A sanctuary to those, who are most in need of a place to call their own, to use as they need, in a sedated environment.

*As material culture, space is not innate and inert, measured geometrically, but an integral and changing part of daily life, intimately bound up in social and personal rituals and activities (Rendell, Penner and Borden 2000).*

Amorphous space becomes characterized through the addition of significance on a human scale. Adding value on an intimate and public level; the social palimpsest informing and moulding the legacy through daily interaction and rituals.

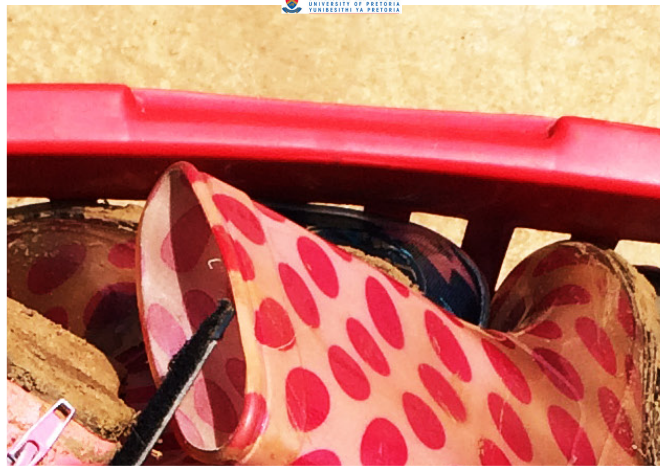
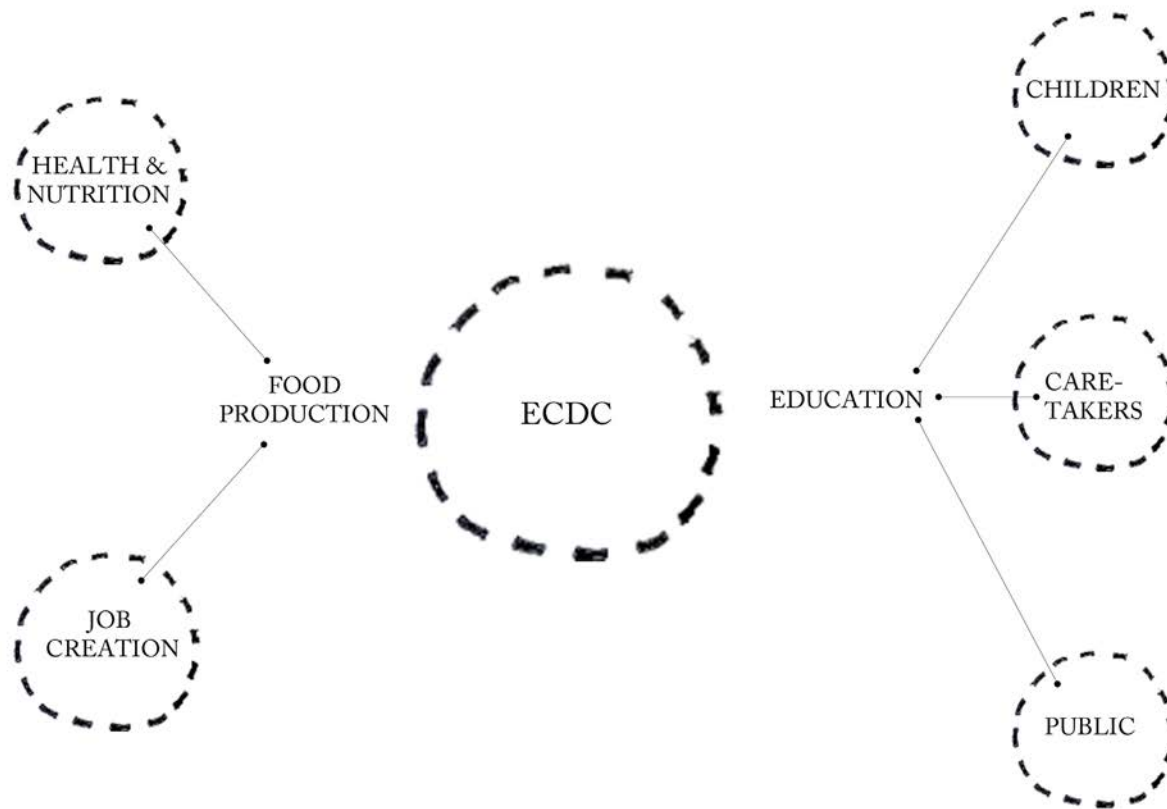


Figure 47 : *Children's shoes at creche, Photograph, M. Mkizi (2015)*



# 4

## Programme

- 4.1 *African Childrens Feeding Scheme*
- 4.2 *Early Childhood Development*
- 4.3 *Schedule of accommodation of day-care facilities*

Figure 48 : *Schedule of accommodation, Diagram, Author (2015)*

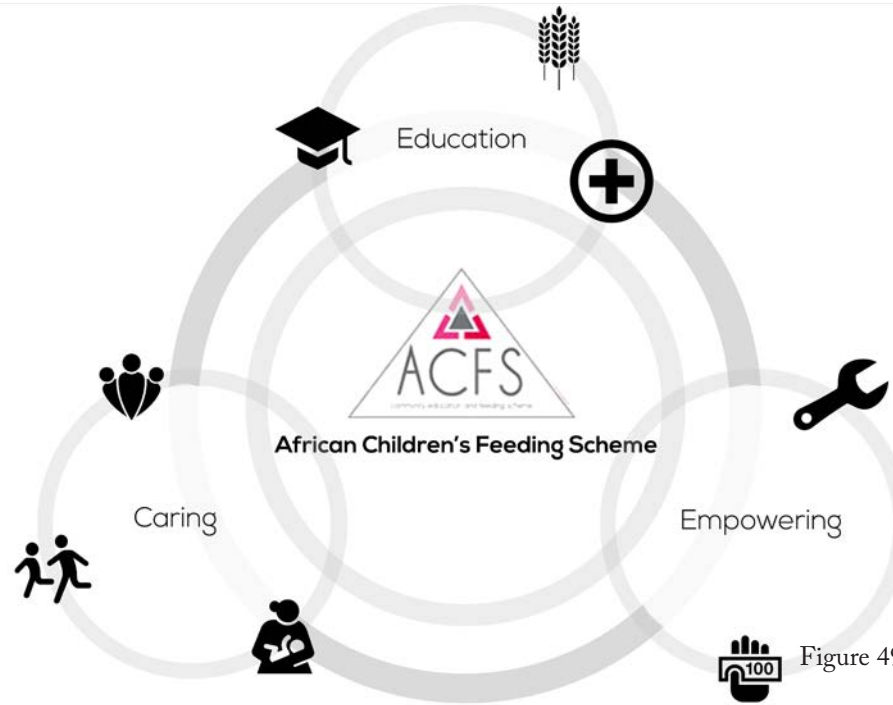


Figure 49 : *African Children's Feeding Scheme approach, Diagram, Author (2015)*

#### 4.1 African Childrens Feeding Scheme

*It was not until the 1990s that the tide began to change in significant terms, signalled by a shift away from government to government funding and toward more partnership-based and government to NGO funding. The significance of this has two primary characteristics the first is a realization that working with smaller organizations is more efficient and far more effective – an issue first raised by E. F. Schumacher in 1973; and the second is that communities and the organizations that they participate in must be a part of the process in order for any project to have the ability to improve people's lives (Carter 2008).*

The *African Children's Feeding Scheme (ACFS)*, focuses on educating remaining community members in health, nutrition and how to cultivate a personal vegetable garden. Through the development and participation of community members and their skills, dependents of others have the opportunity to help sustain their families. The selling of surplus produce is also encouraged by the ACFS to promote financial independence. This creates a positive environment which is both caring and nurturing at its core. Hence all parties receive a sense of gratification and achievement. The ACFS found its origin in the provision of food to scholars, and has a history of providing health assessments at schools (*ACFS 2015*).



Besides for the cultivation skills development, the ACFS also educate women on how to prepare nutritional meals, as well as hosting literacy classes and other skills development courses (*ACFS 2015*). Currently the ACFS is active in Soweto, Thembisa and Alexandria, but there is no base in Mamelodi (*ACFS 2015*). Having established, through the site visits of Phomolong, that there is the self-organized potential of the existing network of the elderly dependents looking after children as a communal caretaker, as well as the lack of nutritional meals that are given to the children at these informal day-care centres, the identified *NGO (ACFS)* would be an ideal support system to help establish the existing network further.

The addition of the *NGO* as well as the further incorporation of a day-care centre to the ACFS scheme reinforces their ideals of education in a caring and nurturing environment. This would also serve as an addition to a multi-functional space, which serves multiple networks throughout the week and weekends.

*By taking Hertzberger's advice we can explore the story behind the architecture and in so doing arrive at a better processes that engage the organizational deminsion to delivery meaningful projects to those living on society's margins (Carter 2008).*



## 4.2 Early Childhood Development

*Early childhood development (ECD), as defined in the Children's Act (No. 38 of 2005), means the process of emotional, cognitive, sensory, spiritual, moral, physical, social and communication development of children from birth to school-going age (Roper 2014).*

*The national Department of Education defines early childhood development (ECD) as "The Processes by which children from birth to nine years of age grow and thrive physically, mentally, Emotionally, morally and socially" (Atmore 2012).*

Early Childhood development plays an important role in a child's early years, yet it is often seen in poverty stricken communities that the children do not have access to the necessary education, stimulation or facilities. These types of facilities accommodate a stimulating environment, as well as caring and nurturing the children as users.

*An ECD Centre, according to the Department of Social Development Guidelines for ECD May 2006, refers to "Any building or premises maintained or used, whether or not for gain, for the admission, protection and temporary or partial care of more than six children away from their parents." Depending on registration, an ECD centre can admit babies, toddlers and/or pre-school aged children. The term ECD centre can refer to crèche, day care centre for young children, a playgroup, a pre-school, after school care etc. ECD centres are sometimes referred to as ECD sites (Roper 2014).*



Figure 50 : *Current creche situations in Phomolong, Collage, Author (2015)*

It is important for communities to be aware of how important the early years of a child's life are, and that the investment into those years can help children become responsible and socially beneficial adults.

*Community-based early childhood development (ECD) organisations make a significant contribution to the development of children who might otherwise go without care and stimulation in South Africa (Roper 2014).*

Hence an investment in the education of toddlers and pre-schoolers becomes inherently an investment into the community. Early Childhood Development is a key point in the bridging of the intergenerational gap and poverty. The education of socially responsible adults, promotes the chance of creating a better future for the next generation.

*Early childhood development (ECD) is a critical component for breaking the cycle of poverty and inequality, particularly among this most vulnerable young population. Evidence shows that interventions for children under age 5 that promote resilience and help soften adverse childhood experiences through secure attachment to a caregiver also support positive brain development, social and emotional development, and contribute to positive future health outcomes (PEPFAR 2015).*

The built environment has the ability to create the awareness of how important these ECD sites are and children become the catalysts for change. As well as catering for basic needs services (as well as basic rights) such as clean water, sanitary infrastructure and access to education.

*Infrastructure in the ECD setting includes the building, grounds, learning equipment and learning materials (Atmore 2012).*

The Built environment becomes the advocate for the children's rights in an environment where daily survival is the only constant.

*Early childhood development services refer to ALL services that promote or support the development of young children. This includes infrastructural provisions, social security, birth registration, health services, day care and educational stimulation in centres, home and community based centres (Roper, 2014).*

As with Maslow's pyramid, if a person is constantly fighting for the basic needs like shelter, food and water, the person cannot excel to the next level of the pyramid; hence through catering for these basic needs at the ECDC, children experience the freedom to discover the rest of the pyramid, towards self-actualisation.

*Providing appropriate cognitive stimulation, nutrition, care and health services during this critical development period result in increased primary school enrolment, enhanced school performance, lower repetition and drop-out rates, reductions in juvenile crime rates, reduced remedial education costs and improved economic and social productivity in adulthood. These benefits produce significant social, education and economic returns to society far outweighing the returns on other forms of human capital investment (Atmore, 2012).*

The crèches that were visited in Phomolong were not only brimming at the edges with the amount of children that were being accommodated, but the crèches charged between R350-R600 per child per month (this was seen on laminated posters at most crèches visited). Considering that most people living in Phomolong earn minimum wages (R3000 per month according to *Census 2011*), enrolment into a crèche for your child makes an enormous difference to the financial situation of the parent(s) and siblings lifestyle. Hence many children grow up at home under the care of an older sibling or family member, seldom integrating with other children their own age.

*Children who have not attended a crèche at all are usually unable to socialise with other children, cannot answer questions from the teacher, cannot talk to an adult, are unfamiliar with the learning process or unable to identify shapes and numbers, and are unable to listen to other children, or ask questions. In addition, the physical development of the child is also important and a child who has jumped, run, used hoops, climbed jungle gyms and moved to music is more coordinated and has the fine motor control needed for learning to read and write (Roper 2014).*

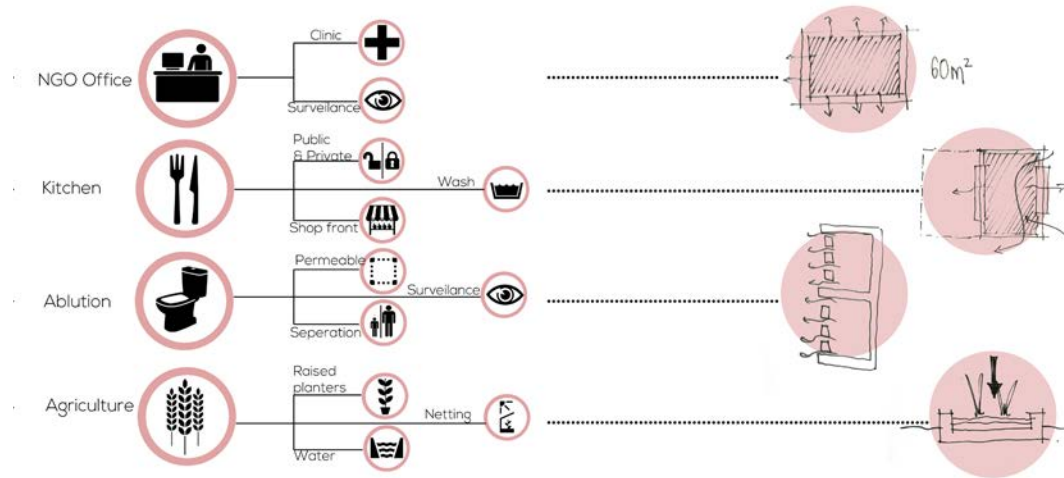


Figure 51 : *Schedule of accommodation and needs interpreted through diagrams, Author (2015)*

### 4.3 Schedule of accommodation needs of a Day-care centre

The NBRI report on Pre-primary school designs aimed to assist architects and gives a broad overview of the workings of nursery schools in order to enable the designer with a better understanding of the programme and all its requirements. It is mentioned multiple times that the designer should have an understanding of the activity patterns to create the most appropriate response, as well as the influence the structure has on the young users of the space in terms of their daily exploration and experiences. These spaces should complement the children's investigative nature as well be stimulating for their social, physical and cognitive development (NBRI, 1977).

During 1938 in Britain the government took great responsibility in the design and management of nursery schools, including the medical and nutritional care that each child receives on a daily basis. Seeing as this was during the Great Depression years, responsibility was taken for children whose parents could not provide all the necessary care. Thus the nursery school designs incorporated daily check-ups by nurses, feeding schemes and kitchens, and washrooms where children could receive a bath if they did not have access to hygienic facilities at home (Wright and Gardner-Medwin 1938).

These were similar conditions to those seen in Phomolong, Mamelodi.

Nursery schools were categorized as:

*Facilities which were under private management; taking children from 2 to 5; keeping them all day from 8h30 to 18h00; supplying a midday meal; organized in groups of 35 children looked after by one teacher and a helper (Wright and Gardner-Medwin 1938).*

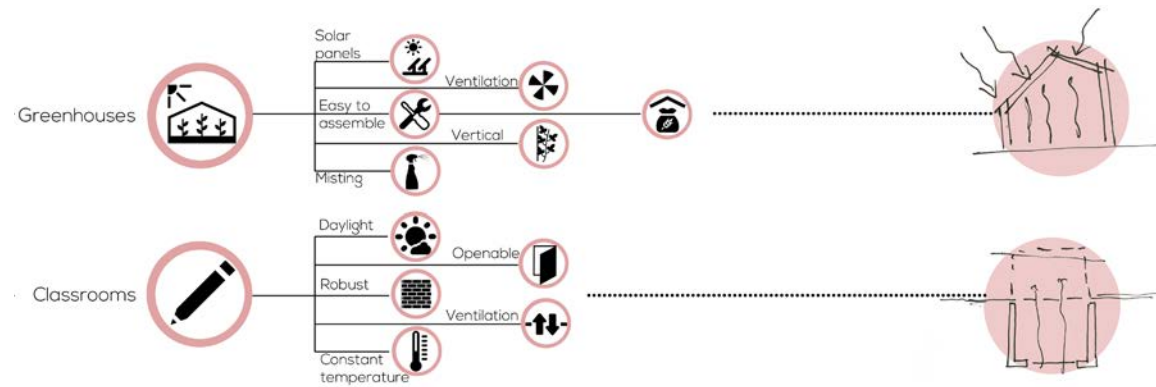


Figure 52 : *Schedule of accommodation and needs interpreted through diagrams, Author (2015)*

Nursery schools aim at the supervision and healthy development of children between the age of 2 and 5 years old, on physical, mental and health level. From the age of 2 children start to learn self-reliance and enjoy exploring and social interaction of children at a similar age (*Wright and Gardner-Medwin 1938*).

- Routine plays an important role, throughout all activities supervision is needed but with freedom of exploration in a controlled environment.
- The various activities include check-up's from the nurse to evaluate the overall health of the child, homeroom activities and free play would continue until breakfast time.
- It is encouraged for the child to help in cleaning up his/her dishes.
- Outside play areas should have a great area that is covered, for in case of bad weather, this should have a non-slip surface, with a sand-pit. Inside play is split into activities, such as creative and musical play and instructive play.
- The creative play area should consider a washable floor finish and multiple mediums to explore. The music room should preferably have large storage and acoustic panelling.
- All classrooms and activity rooms should preferably open up towards the covered play area or have the possibility of expanding in area as to occupy more children if the activity needs more space.
- A quiet room with books and cozy atmosphere is appropriate for both storytelling as well as nap times. Storage for blankets would be needed, as well as a laundry facility. (*Wright and Gardner-Medwin 1938*)
- The site of choice should also adhere to certain prerequisites such as easy access and within walking distance (taken as 500m) (*NBRI 1977*); it should be separated from major traffic routes.
- Generosity of space for children to run and play as well as trees for shade and climbing is proposed. The desirable maximum of children per group is 30.

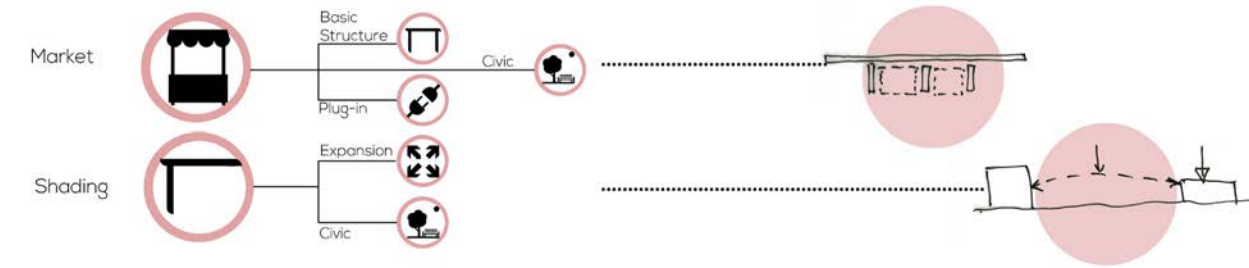


Figure 53 : *Schedule of accommodation and needs interpreted through diagrams, Author (2015)*

Entrance areas should be welcoming and control access through surveillance. Circulation routes should incorporate cloakrooms and lockers for children to keep personal items and extra clothes in case of an accident. Bathrooms should also be on the circulation routes for children who need to be washed (Wright and Gardner-Medwin, 1938).

It is proposed that all two classrooms should share a lavatory between them with *1 water closet for every 10 children*. The W.C's and hand wash basins should be at an appropriate scale for the children to use and the lavatory should have a viewing panel from the classroom for the teacher to observe if help is needed. Windows should have sills at a maximum of 550mm above floor level so children can view outdoors. (NBRI, 1977)

The NBRI describes the different design conditions of activity spaces as follows

1. Wet and noisy – creative centre (hub of school)
2. Dry and noisy – music centre
3. Dry and less noisy – dolls and instructive play area
4. Dry and quiet – book centre



Physical requirements to accommodate the necessary activities, is proposed to be 3m<sup>2</sup> per child for playroom space. The atmosphere should be domestic and secure whilst differences in ceiling and floor levels are described as interesting spatial defining elements (NBRI, 1977).

- *These guidelines specifically state (but are not limited to) that the ECD centre should*
- *be clean and safe- all precautions are taken to protect children and centre staff from physical, emotional, and social harm, preventing any risk of fire, accidents, or other hazards;*
- *have at least 1.5m<sup>2</sup> of indoor space per child;*
- *have at least 2m<sup>2</sup> of outdoor space per child;*
- *be disability friendly;*
- *be weatherproof and well ventilated;*
- *have a separate area for any food preparation;*
- *have safe and hygienic toilet facilities available to children and centre staff (Atmore 2012)*

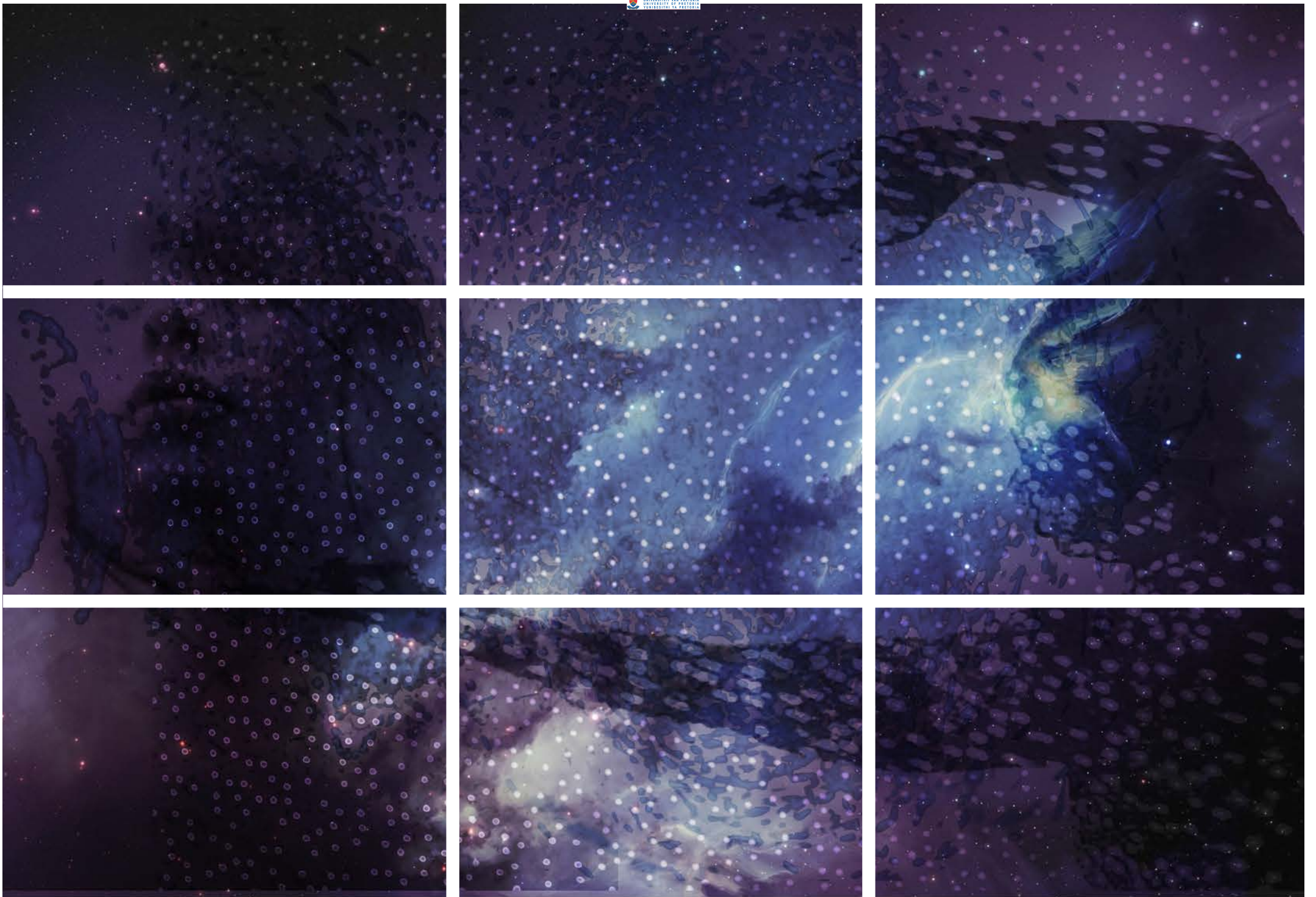


Figure 54 : *The passing on of knowledge, Collage, Author (2015)*

# 5

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## *5.1 Introduction*

Current trends in African architecture range from the new perspectives taken by multiple designers, and mostly the change of their overall approach to design. These new approaches can be found from an urban scale to the very intimate housing structures.

The approach towards the precedents studies was to look at designs and then critically analyze the approach and the designs relevance to the proposed project in Mamelodi.

## *Precedent Studies*

- 5.1 Introduction*
- 5.2 Urban Insights*
- 5.3 Informants*
- 5.4 Social Architecture*
- 5.5.1 Precedent 1 – Contextually relevant*
- 5.5.2 Precedent 2 – Community participation*
- 5.5.3 Precedent 3 – Programmatic appropriate response*



Figure 55 : *The DNA of a fragmented society, Collage, Author (2015)*

## 5.2 Urban insight

Simone (*Graafland 2012:45-47*) states that the physicality of the African city represents the fragmentive state seen between its social networks. The city becomes an expression of the intangible collective of the masses. This is due to a lack of an overarching *institutional logic or public discourse, capable of tying its heterogeneous residents together in some conviction of common belonging or reference* (*Graafland 2012:45-47*).

Hence the city has become a patchwork of decay and renewal, Simone (*Graafland 2012:45-47*) therefore argues that urbanism should be concerned with the creation of platforms where different social networks can engage with one another. And that these platforms would assist in the forming of the city's identity.

*It concerns how connections are built across cities in ways that circumvent the dominant histories, frameworks and policies* (*Graafland 2012:45-47*).

When the process towards the outcome becomes celebrated rather than focusing purely on the outcome, allowance for greater enquiry towards sustainable development is made (*Pieterse in Graafland 2012*).

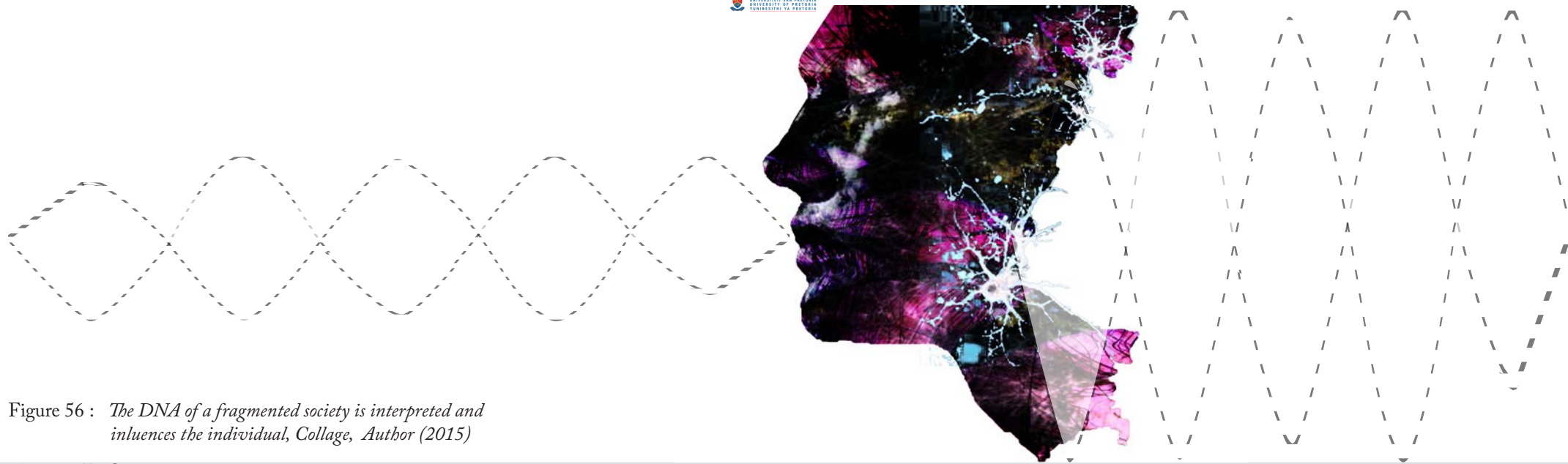


Figure 56 : *The DNA of a fragmented society is interpreted and influences the individual, Collage, Author (2015)*

### 5.3 Informants

Lokko states that there are three issues that influence the Built environment in Africa

- The role culture plays in helping a society make sense of itself and its place in the world.
- The observations relating to place; and what forms place rather than space.
- *And, the role of education as a mediator and translator between culture and tradition, helping us to question our relationship to urban culture and development (Lokko in Graafland 2012).*

Lokko expresses that *culture is a process rather than a fixed unchanging state and part of its unique character is its ability to shape, shift and transform itself and the society (Lokko in Graafland 2012).*

Other informants include the question of built heritage, as argued by Lagae (*Graafland 2012*), built heritage is the relationship between memory and heritage. Significance can become attached to any entity which has become symbolic to a community (*Nora 1984*).

*Lipstadt reminds us of the spatiality of memory and the need to address not only the tangible but also the intangible aspects of built form (Graafland 2012).* These culturally significant structures have the ability to take up new meaning over time in the same manner which culture can adapt. Hence adaptability of space to suit a cultural and communal need becomes influential when designing.

*Memory takes root only half in the folds of the brain half is in the concrete streets we have lived along – Lionel Abrahams (1928–2004)*

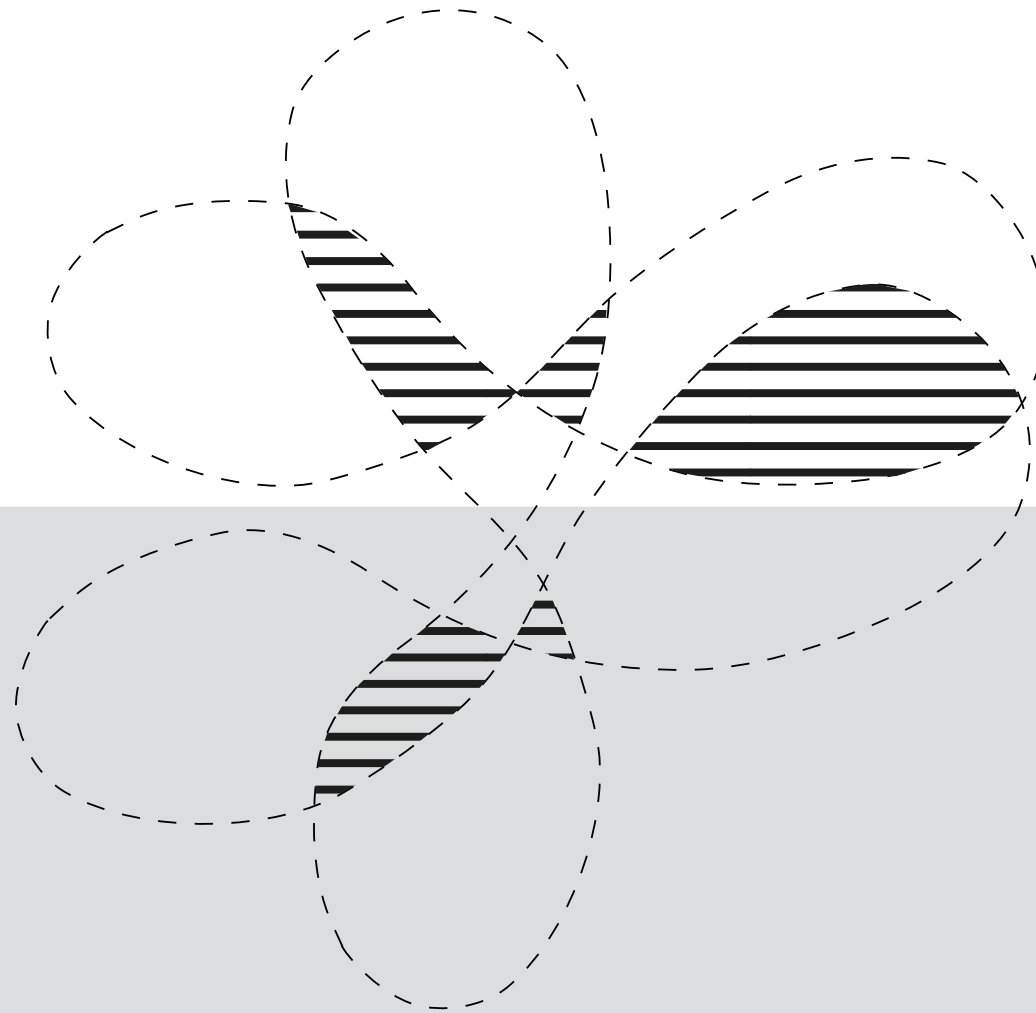


Figure 57 : *Social Networks overlap and share a collective ,  
Diagram, Author (2015)*

#### 5.4 *Social architecture*

New design approaches and the success of these designs are greatly due to their contextual responses. *Public and housing designs have started to recognize the formal, physical and embodied space of their users (Graafland 2012:143).*

Social architecture responds to the temporal condition of process. Process includes research and community participation. This shift in the architectural paradigm was greatly due to social transformation. Theoretical ideas around alternative settlements such as *Turner, Kroll, Habraken and Hertzberger (late 1960's)* have been reinterpreted to suit the South African context.

Once again the similarities between architecture and culture can be drawn. Both have shifting boundaries.

Habraken argued that *Open Building* was founded in the *conviction that individual responsibility for one's own environment represents an essential precondition for environmental health (Bosma, Hoogstraten and Vos 2000).*

This argument became interpreted in a manner that architecture should become the supportive structure as opposed to the controlling element. This could be achieved through the accommodation of social space within a structure, which inherently hands over the control of the space to the influencing users. The users then have the capacity to alter the reality of the space as they need. Thus making allowance for a clear distinction to be made between institutional space and communal space through programme (*Graafland 2012*).





*Precedents considered for contextually considerate approaches:*



Figure 58 : *Thusong Service Centre (Khayelitsha), Photograph, Makeka Design Lab (2008) Acting as a catalyst for growth in the context*



Figure 59 : *Khayelitsha Service Centres And Pay Points, Photograph, Piet Louw Architects (2015) Providing for public interaction.*



Figure 60 : *Street view of Red Location Museum, Photograph, Architectural Record (2012)*

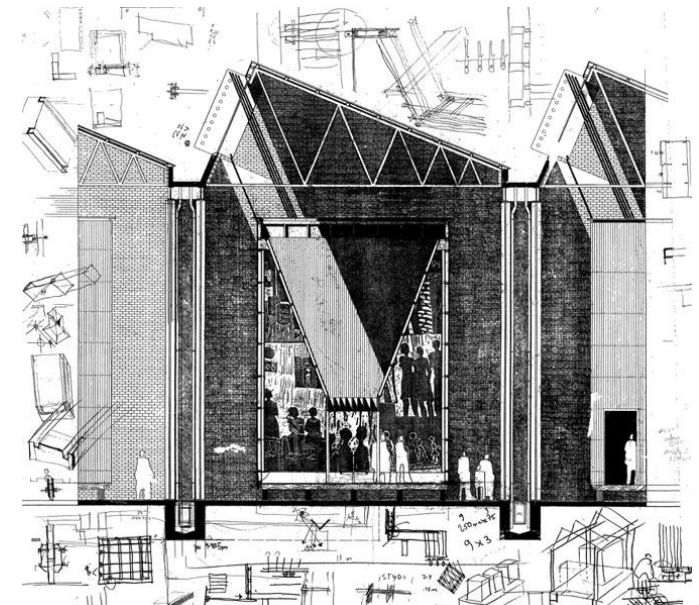


Figure 61 : *Memory Box Working Section, Drawing, Noero Architects (2005)*

### 5.5.1 Precedent 1 - Contextually relevant

Red Location Cultural Precinct	
Architects	Noero Wolff Architects
Location	New Brighton, Port Elizabeth, South Africa
Date	Since 1998 after winning a competition in 1992
Client	Nelson Mandela Metropolitan Municipality
Programme	Cultural centre and precinct.

The project was developed to have a phased approach. During the first phase, “The museum of Struggle” was constructed and opened in 2006. Phase 2 and 3 consists of an Art gallery, Library and archive, of which the construction was finished in 2011. The fourth phase will host a Performing arts centre and School for the Performing arts. The complex will also house 210 new living units for people working within the precinct (Eicker 2012) (Lepik et al. 2013).

The civic structures were designed in a manner which allows them to be as close as possible to the streets to activate the public realm, whilst visitors and locals can move through the site. Certain elements of the structures spill outdoors. The intention thereof is to allow people to take ownership of the street, especially as commercial and social growth escalates (Lepik et al. 2013). To reinforce the precincts connection to the social context, the fine grain is incorporated and facilitated within the formal design context. Noero responded to the residential scale by articulating his buildings with pergola structures and arcades that reach out to their neighbors while serving as thresholds to the larger civic spaces inside (Eicker 2012).

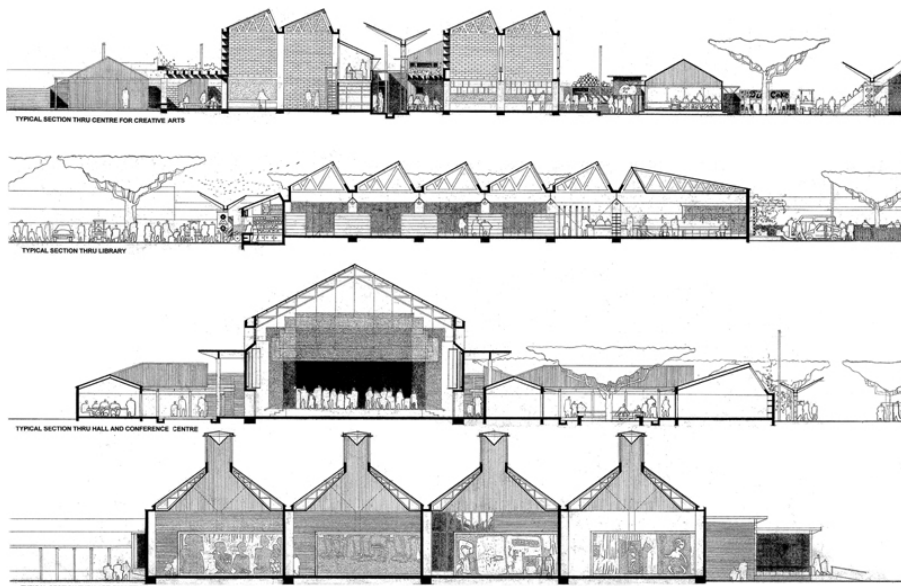


Figure 62 : *Museum Sections, Drawing, Noero Architects (2005)*

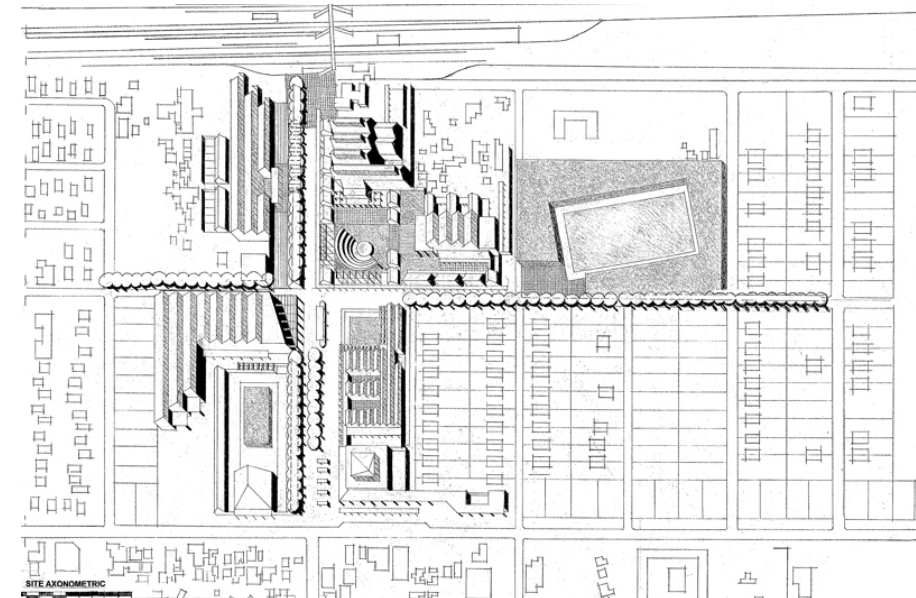


Figure 63 : *Precinct Site Axonometric, Drawing, Noero Architects (2005)*

Planned next to the New Brighton railway Station, the area has a rich industrial heritage. These contextual elements are acknowledged in the design through the saw-tooth roofs, which echoes that of the surrounding factories. The context is also recognized through the material pallet of concrete blocks, galvanized roof sheets and steel frame windows. (Lepik et al. 2013).

Noero states that, *The language and form are explicit yet simultaneously ambiguous, using pragmatic measures like volume and the quality of light to express the various purposes of the spaces. As well as, To create architecture, particularly social architecture within complex communities, you need to properly understand the processes and relationships (Eicker 2012).*

The complexity of the design allows for the mixing of the formal and the informal, very successfully. And the intention is to serve as an example of the potential future of Africa. The civic structures acknowledge the pedestrian user through the articulation of threshold spaces, allowing a new society to rise from the old (Eicker 2012) (Lepik et al. 2013).

This precedent relates to the thesis, through its contextually appropriate response, as well as its recognition of cultural history. Through recognising the complex network of social relationships the project attempted to create a place which acknowledges *The Forgotten* of the New Brighton community.

The project was considered within a greater framework and vision and became a symbol of change to come. The greater framework aids in the development of a collective memory being established, which grows from the dormant potentials of the existing fabric and its history.



*Precedents considered for community  
participative design:*



Figure 64 : *Eerste Treetjies Community Centre, Photograph, CS Studio Architects (1990)*  
*Investing in the community to catalyze growth*



Figure 65 : *Nyanga Bathhouse, Photograph, Piet Louw Architects (2015)*



Figure 66 : *Gugulethu Central Meat Market, Photograph, CS Studio Architects (1998)*  
*Strengthening an existing social network.*



Figure 67 : *Contextual Perspective, Photograph, CS Studio Architects (2010)*

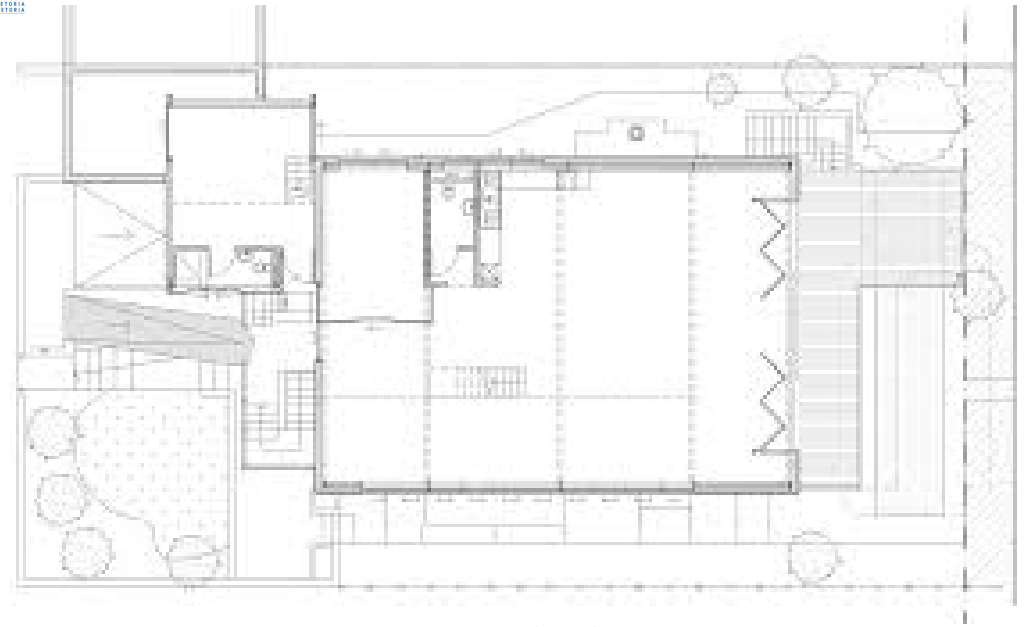


Figure 68 : *Plan, Drawing, CS Studio Architects (2010)*

### 5.5.2 Precedent 2 - Community participation

Dawid Klaaste Multi-Purpose Centre  
 Architect CS Studio Architects  
 Location Laingsburg, Western Cape  
 Date 2002-2005

The site was chosen after a process of community consultation. The main intention was to transform the existing structures on the site into a dynamic environment, which would lure locals as well as travelers (*Dawid Klaaste Multi Purpose Centre 2010*).

The concept development was derived of a series of design meetings with the community. Other considerations included the rich environment (Fauna and flora), the windmill as a symbol and landmark in the Karoo and the train passing through.

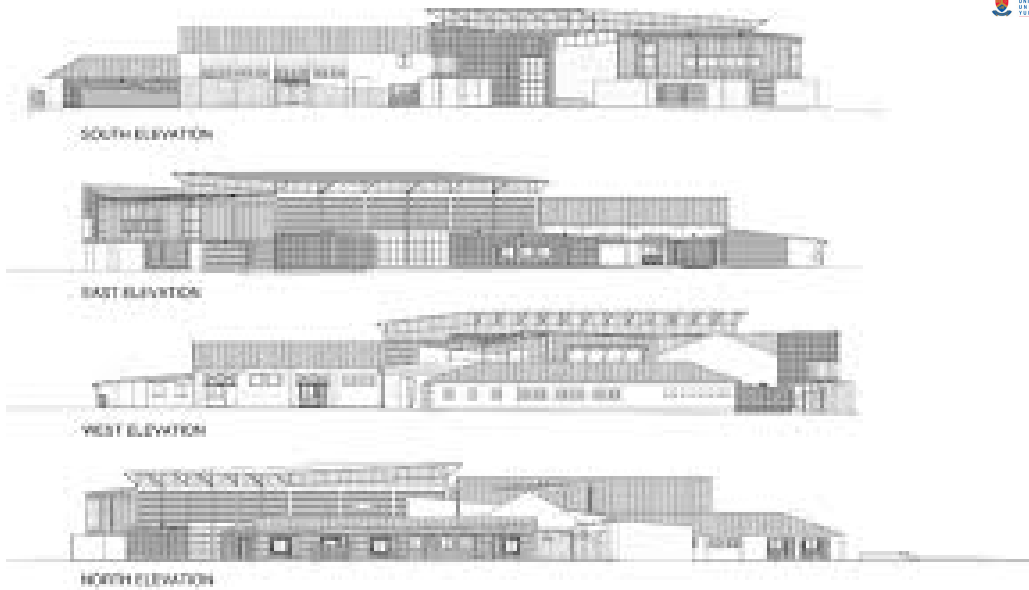


Figure 69 : *Elevations, Drawing, CS Studio Architects (2010)*



Figure 70 : *Site Plan, Drawing, CS Studio Architects (2010)*

The incorporation of locally trained and skilled people as well as the teaching of new construction techniques to locals played a great role in the construction process as well as the design considerations taken. The existing shack structures on the site were repurposed and local construction resources were used to respond sustainably (*Dawid Klaaste Multi Purpose Centre 2010*).

The precedent recognised the important role that nature and the landscape plays for the community and their identity. Thus the precedent relates back to the concept of Biophilic design addressed in the proposed project. The precedent also showed relevance in its approach to design through the incorporation of local skills and community participation to realise the outcome.

This relates to the theoretical premise of the passing on of existential knowledge. New skills and techniques learned during construction will inherently be passed on and the collective knowledge pool will extend there from.





*Precedents considered for programmatically appropriate responses:*

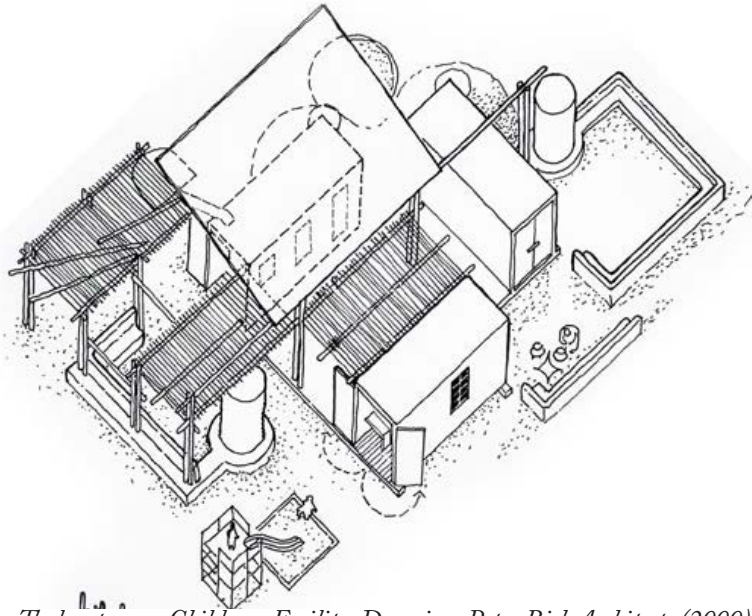


Figure 71 : *Thulumtswana Childrens Facility, Drawing, Peter Rich Architects (2000)*



Figure 72 : *Wesbank Primary School, Photograph, CS Studio Architects (2000)*



Figure 73 : *St. Gobain Social Gain Award, Perspective, Kate Otten Architects (2015)*



Figure 74 : *Street Entrance, Photograph, Noero Architects (2002)*

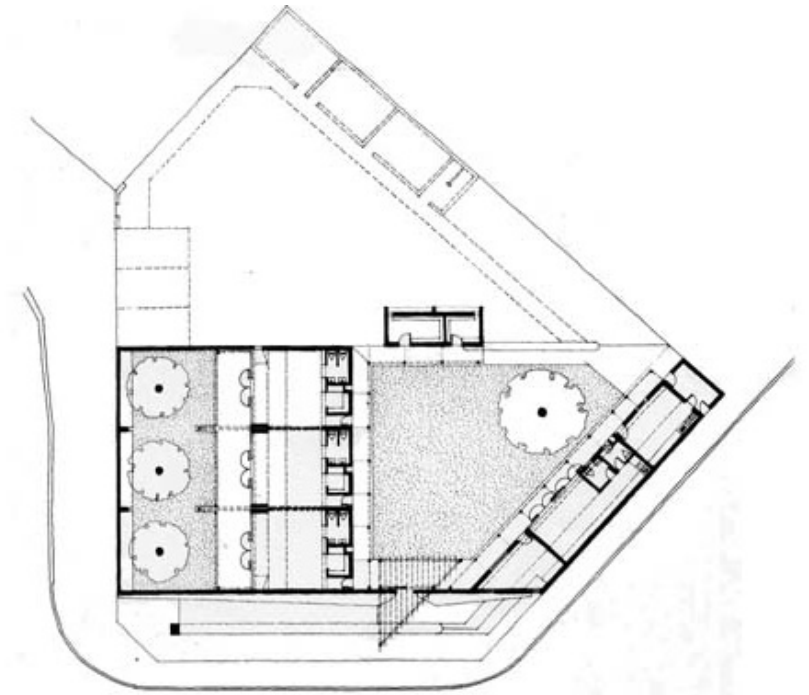


Figure 75 : *Site Plan, Drawing, Noero Architects (2002)*

### 5.5.3 Precedent 3 - Programmatic appropriate response

Delft Daycare Centres I and II  
 Architects Noero Architects  
 Location Delft, Cape Town  
 Date 2002

#### *Spatial Layering*

A set of spaces mediate between the street and the more private spaces. Hence the centres are part of the public and private realms. Lined with seats and partially roofed on the street edge, the centres form part of the public spheres of the community. Anyone from the neighborhood can utilize these spaces. As well as vertical elements becoming landmarks within the community (*Noero-architects 2002*).

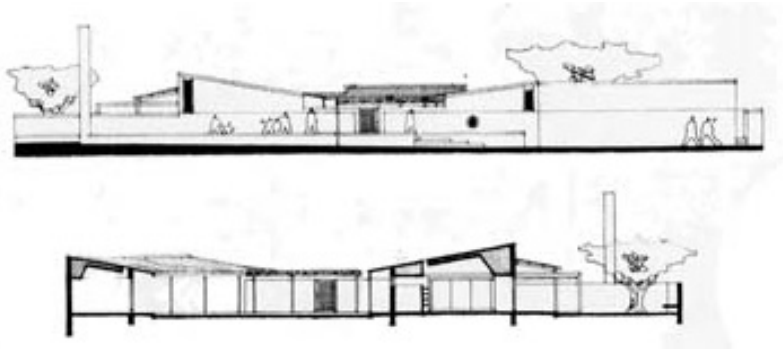


Figure 76 : *Elevation and Section, Drawing, Noero Architects (2002)*

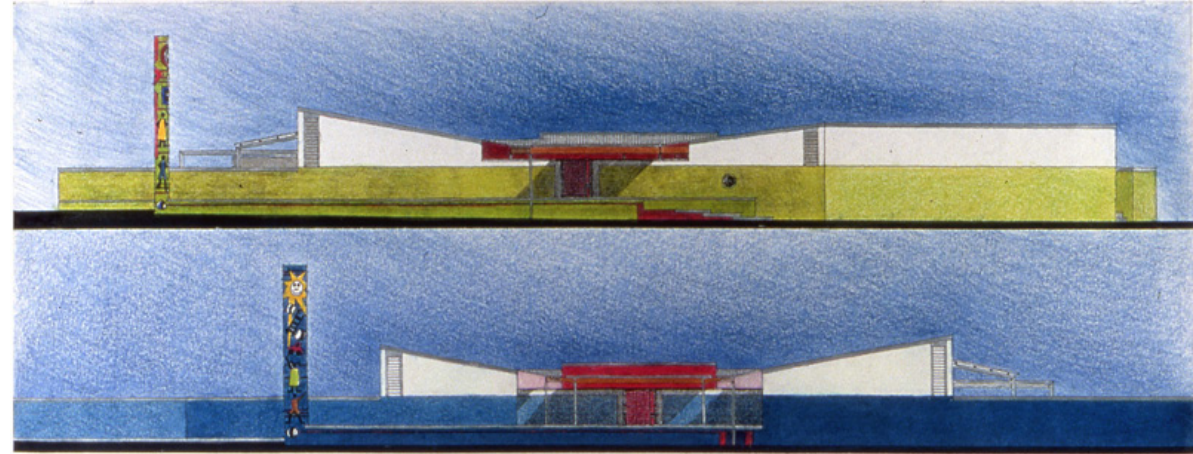


Figure 77 : *Rendered Elevations, Drawing, Noero Architects (2002)*

### *Resourcefulness*

Achieving the maximum ends with the minimum means. Hence modesty in finishing and design was considered as an appropriate response with conventional details for ease of construction (*Noeroarchitects 2002*).

This precedent was successful in its address towards the public condition and is relevant for its programmatic appropriate response. It is a place of nurture devided from the rest of the outside world. It has a very strong security line and except for seating, does not provide much for public users. It is removed from its context and addressed the context through the use of a wall, as well as using the argument of modest finishes, whilst the project could have showed similar promise to the community as The Red Location Museum.

Thus, except for the creation of a daycare on a public interface, the project does not add to the greater collective community nor the empowerment of the collective, as opposed to the individual.



Figure 78 : *An intricately woven extension of being, Collage, Author (2015)*

# 6

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## *Design Development*

- 6.1 *Introduction to Design*
- 6.2 *Reflection*
- 6.3 *Other Considerations*
- 6.4.1 *Design Iteration 01*
- 6.4.2 *Design iteration 02*
- 6.4.3 *Design Iteration 03*
- 6.4.4 *Design iteration 04*
- 6.5 *Conclusion*

*[Sample from “The Great Dictator” (1940) movie – Charlie Chaplin:]*

*Don't give yourselves to these unnatural men-  
Machine men with machine minds and machine hearts!  
You are not machines, you are not cattle, you are men!  
You, the people, have the power to make this life free and beautiful,  
To make this life a wonderful adventure!*

### *6.1 Introduction to Design*

The role of the architect in these conditions are to celebrate and reveal the potential that already exists, and through that realise what is called for in the situation. The strength of architecture in the informal context lies in its ability to empower and aid in the development of others.

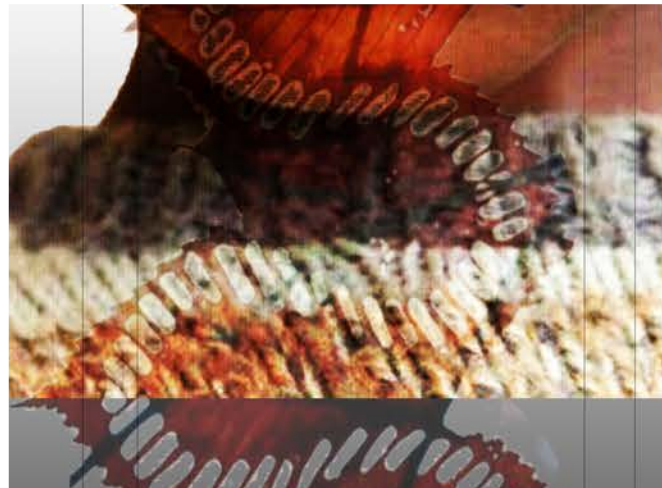
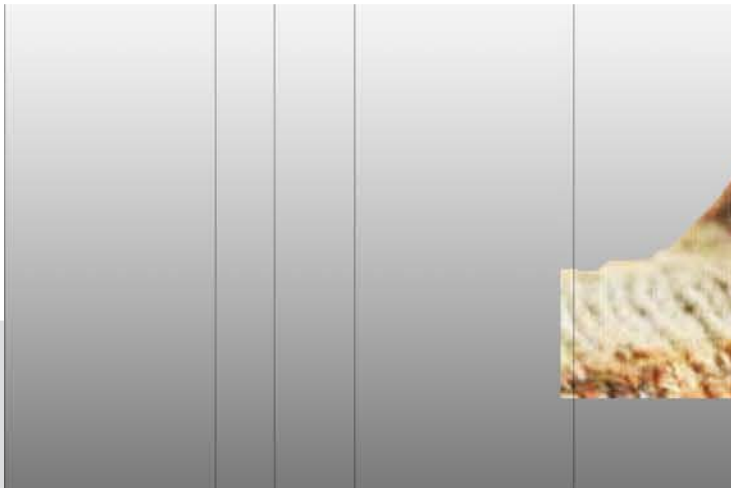
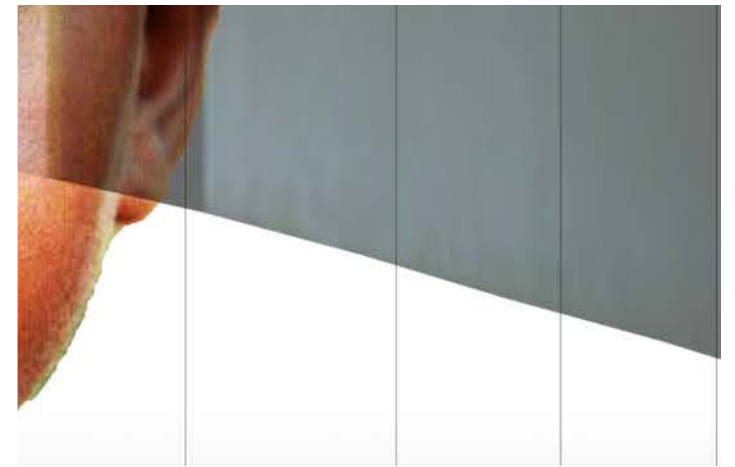
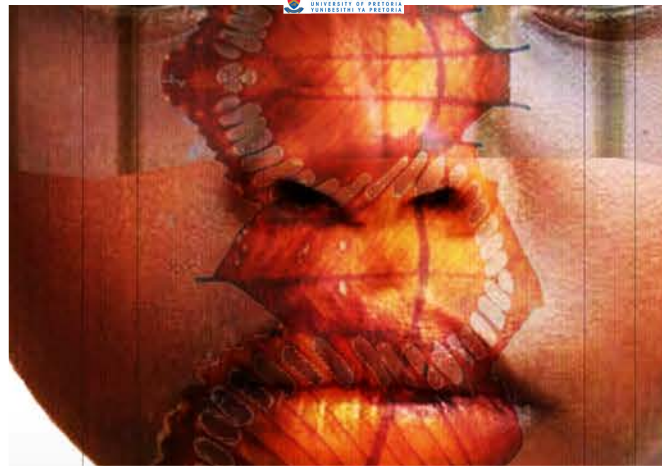




Figure 79 : *Parti development, Drawings and models, Author (2015)*

## 6.2 Reflection:

*The proposed design developed as a response to various informants, as discussed in earlier chapters, namely:*

- The lack of place for the remaining networks of children and elderly dependents
- The amorphous space between Greenview station and Phomolong settlement
- The daily ritual of the working class migrating to and from the train station
- A place for the community to share their collective thoughts and memories, and the passing on of existential knowledge to younger generations.
- The highly active and public route between the informal settlement and the train station.
- A lack of formal institutions for children, as expressed by the community leaders, during an informal interview.
- And the informal horticulture seen scattered throughout the informal settlement.
- **Most importantly, the creation of a place of belonging for The Forgotten children and elders of Phomolong. A place which they could call their own and share a collective memory.**

### 6.3 *Other considerations included:*

How can architecture become a system of empowerment?

The experience of an architectural space is strongly influenced by how we arrive in it. Hence a series of levels for different areas of interaction and surveillance were explored from the entrance points into the proposed spaces. The barrier between the public and private realms blurred to accommodate a larger variety of users. The intermediate spaces and the experience of the pedestrians upon the series of thresholds were considered through level changes. This adds to the different experiences and announcements of thresholds. Overhead planes in the form of shading structures and pergolas announce the main circulation routes.





Figure 80 : *The Nature of the Mind, Diagram, N.Randall (2015)*

The design attempts to convey the re-establishing of the connection of humanity with nature. This is proposed through exposure to how fresh produce is grown and cultivated. This was attempted through varying platforms of observance and engagement. The senses become enticed through the child's freedom to smell, feel, see and taste what is being cultivated around them.

The design has undergone numerous iterations, each iteration through a different theoretical and pragmatic lens, in search of the perfect equilibrium of space serving vastly differing age groups. This approach was greatly due to the contextual development. As well as coming to terms with how the conceptual and realistic issues around the programmatic response should react and be proposed.

Different lenses were applied, such as ground manipulation, the concept of the matriarchal space and a series of thresholds. All the different applications led to the design either being overly complex or overly simplistic in its result. The ground floor level of the proposal was heavily explored because of the overlaying of different functions and places of interaction. It was only through the technical investigation regarding materiality choice that the design started to grow three dimensionally and volumetrically.

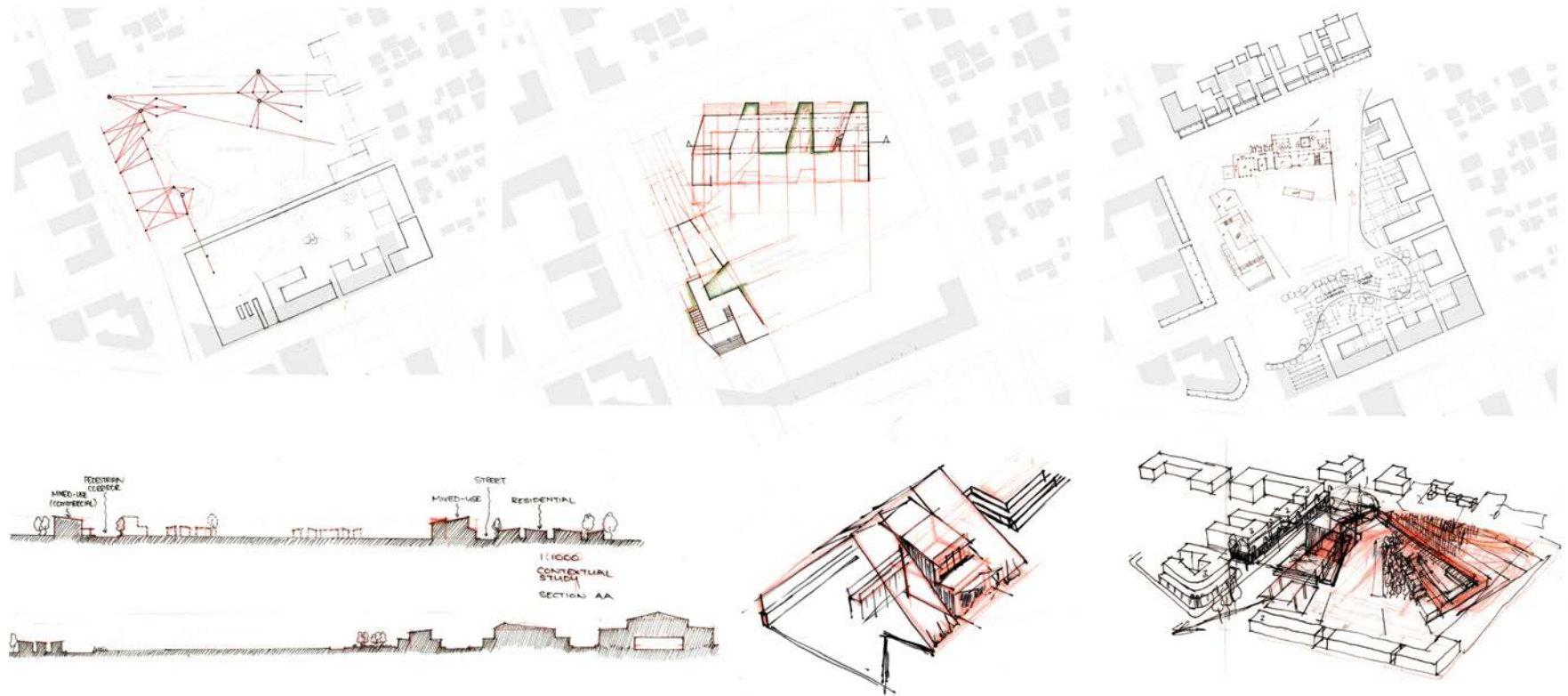


Figure 81 : *Design Development in Context, Author (2015)*

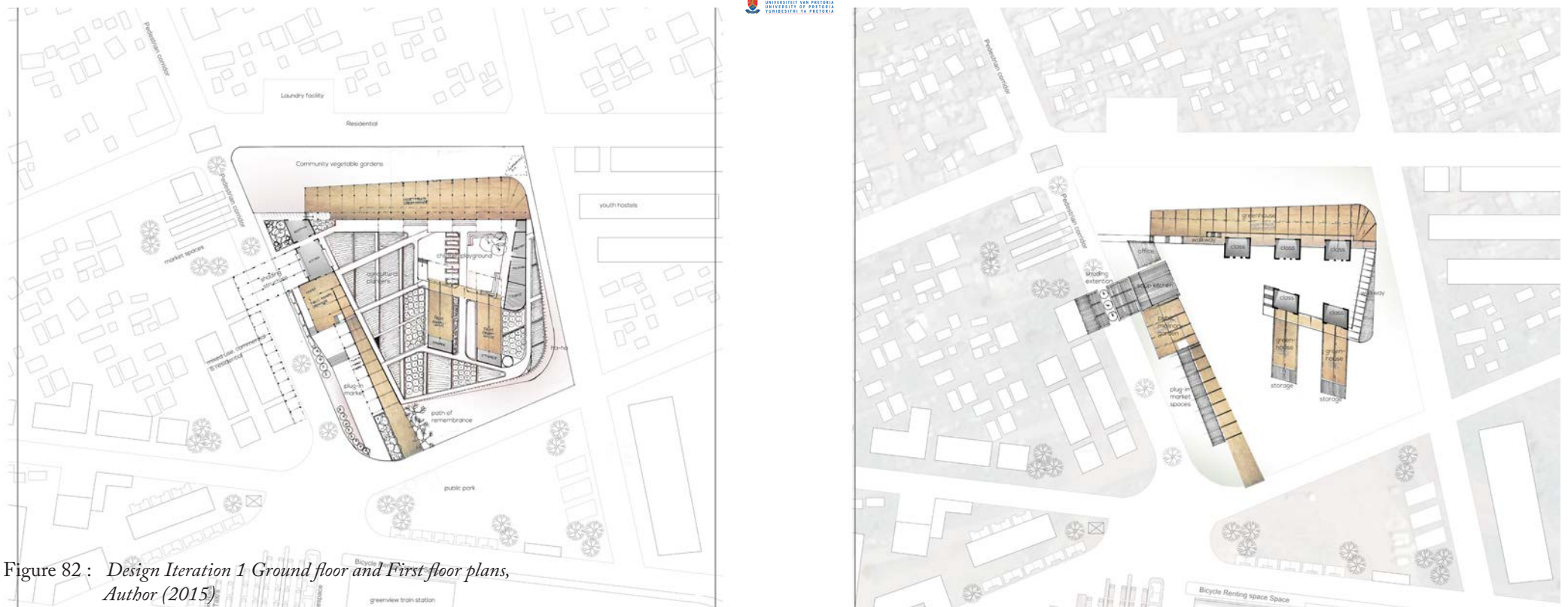


Figure 82 : *Design Iteration 1 Ground floor and First floor plans, Author (2015)*

### 6.4.1 Design iteration 1:

The design focused largely on the resolution of the public interface on the Western edge of the site. From a human scale market interface the structure grew to a landmark scale, and then reverted back to a human scale. The kitchen on the public edge was the main space where ecotones could overlap spreading over the road, to link the formalised shops on the other side to the kitchen area.

The design focused on the collective space where Catharsis could take place, a greenhouse structure on the Western edge with a pool of reflection, introducing the concept of Biophilia to the public, with a route of remembrance which would exit into the public park.

The Western edge showed control but however lacked permeability. There was a lack of attention paid to the permanent users, the children and the elderly caretakers and their daily rituals and routes.

The design considered a control point and the public realm as one leg of the design and the crèche as another leg of the design, separating the two. There was however a lack of control over the edges and response to context.

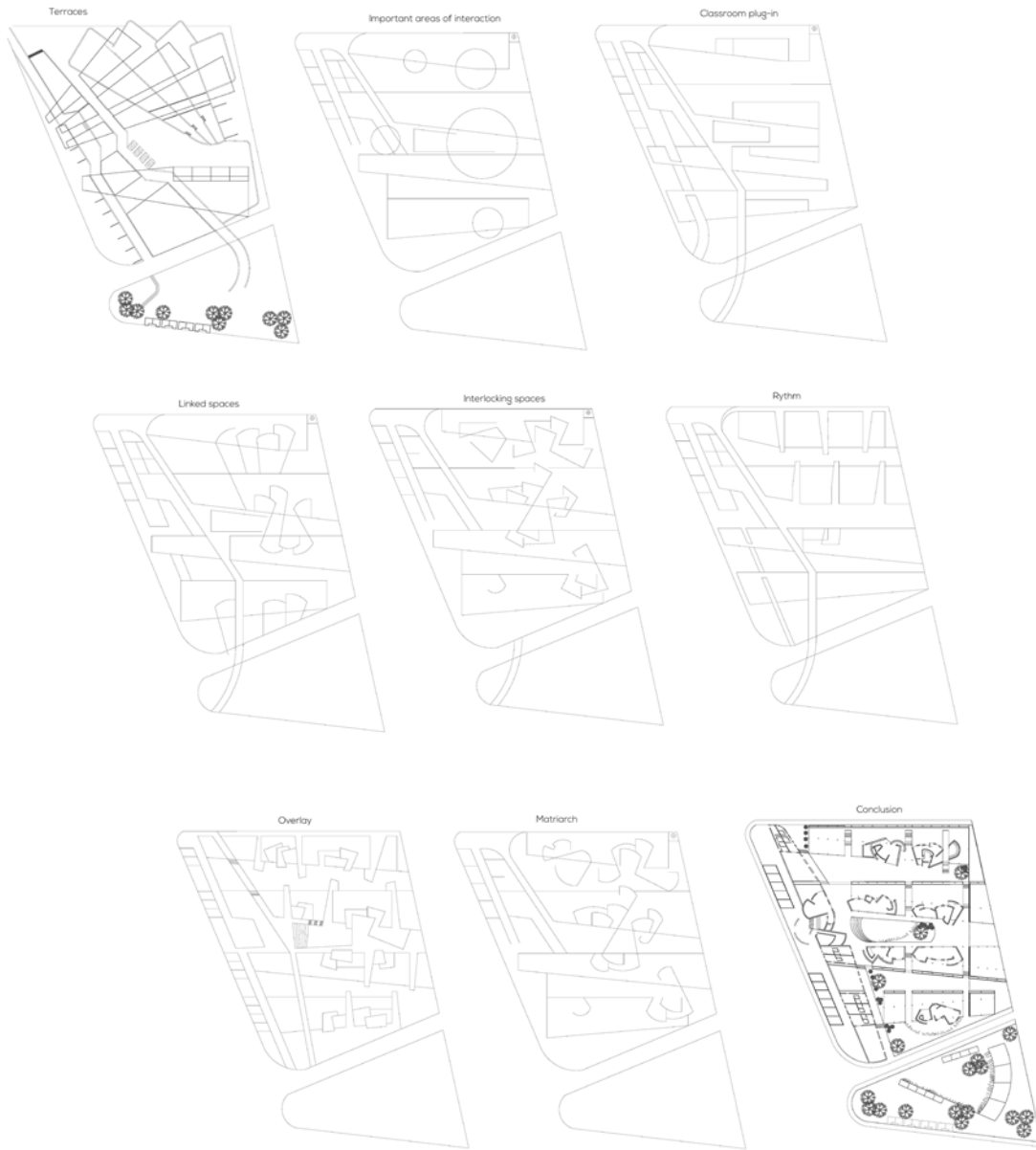
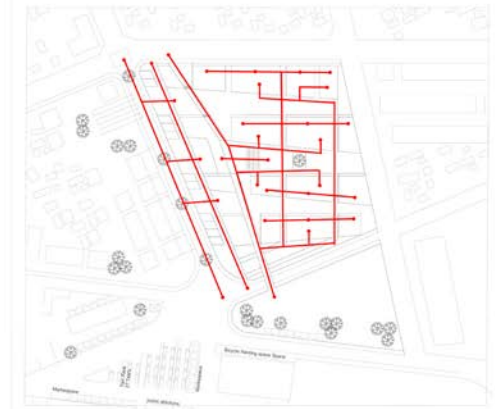


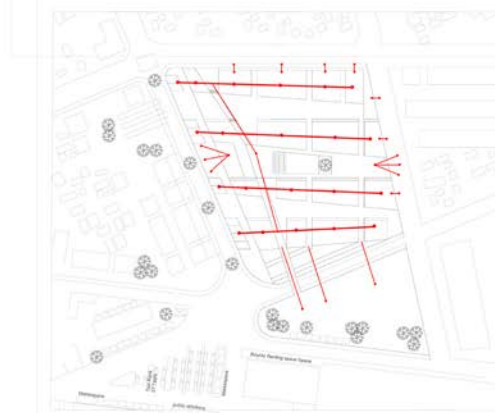
Figure 83 : *Development diagrams, Author (2015)*



movement



threshold spaces



externalisation of intention

Figure 84 : *Movement diagrams, Author (2015)*



Figure 85 : *Green and Educational spaces on site, Author (2015)*

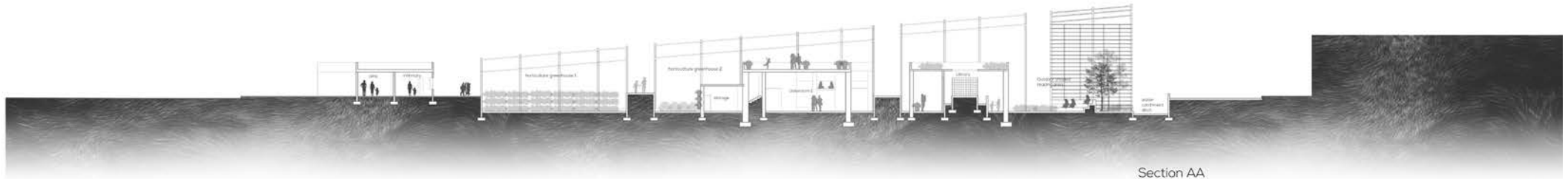
#### 6.4.2 *Design iteration 2:*

The design tried to further develop the matriarchal space, yet it lacked control and spaces were too dispersed for children to be able to navigate successfully.

The proposed classrooms, offered interesting spaces for the children and were inserted into the greenhouse structures as a method of introducing the children to natural spaces, which made it a forced and uncomfortable solution, with no clear hierarchy of space.

The exaggerated greenhouse structures were dominating and foreign. The circular structures were merely extrusions of the plan and were not designed volumetrically.

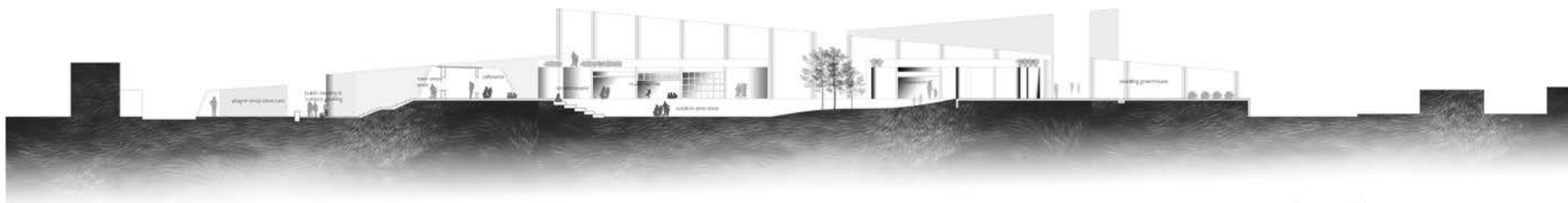
The Western edge allowed for interesting social ecotone activity, by creating a courtyard space next to the kitchen, where collective activities could take place, but lacked thresholds and human scale consideration.



Section AA  
West-East through Library  
1:200



Section BB  
North-South through classrooms  
1:200



Section CC  
West-East through play area  
1:200

Figure 86 : *Sections of Design Iteration 2, Author (2015)*

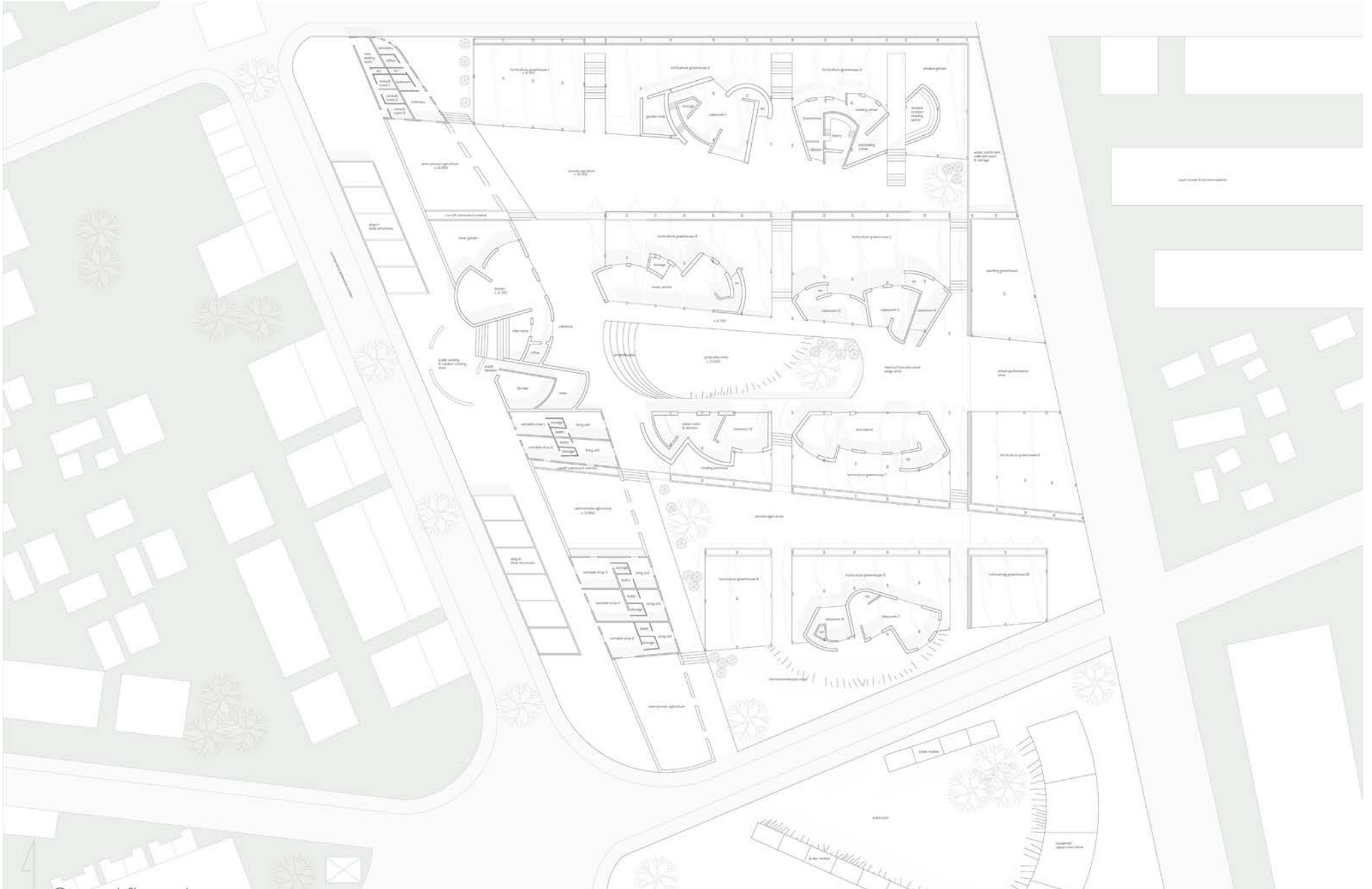


Figure 87 : Ground floor plan of Design Iteration 2, Author (2015)

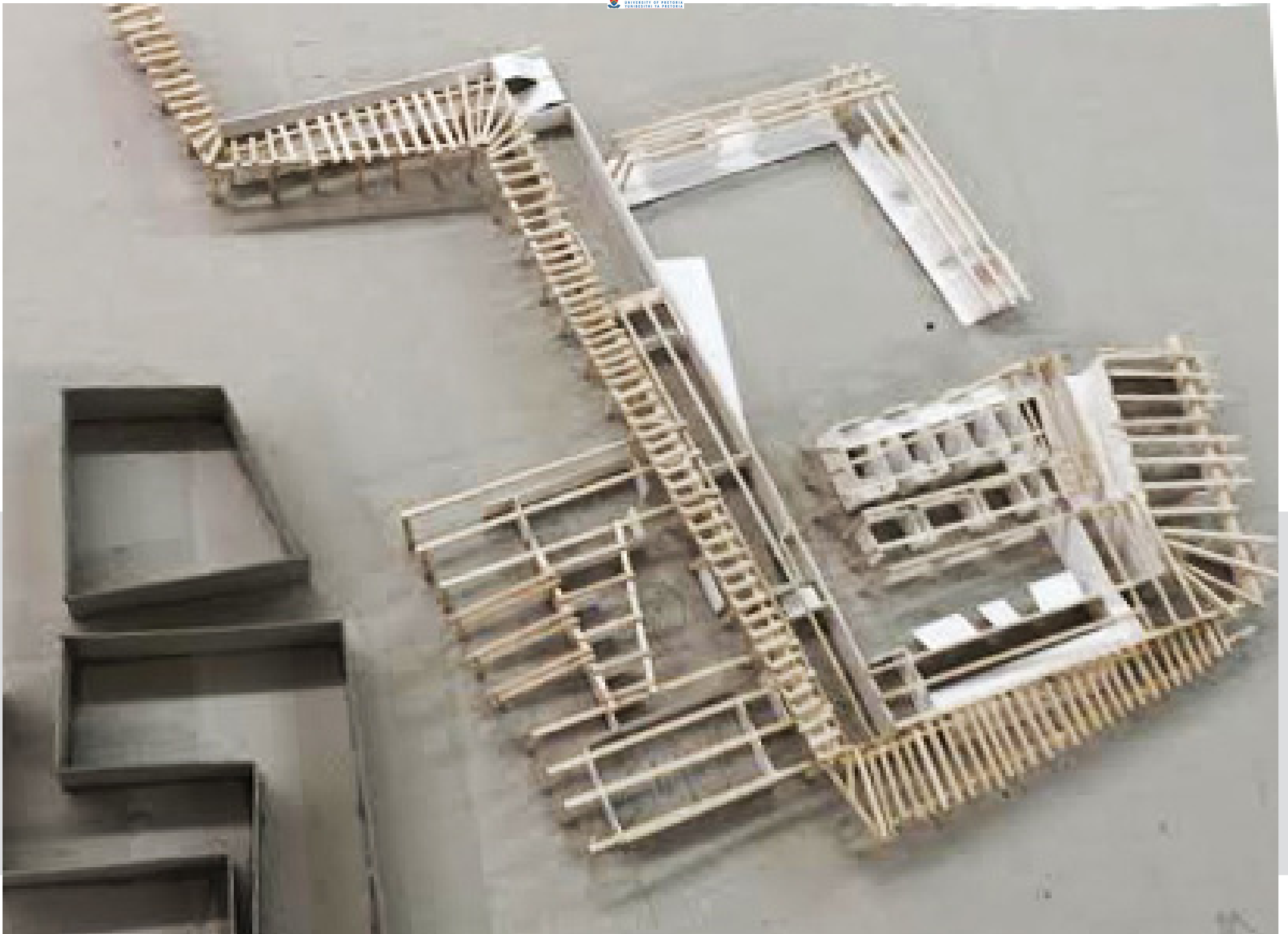


Figure 88 : *Model of Design Iteration 3, Author (2015)*



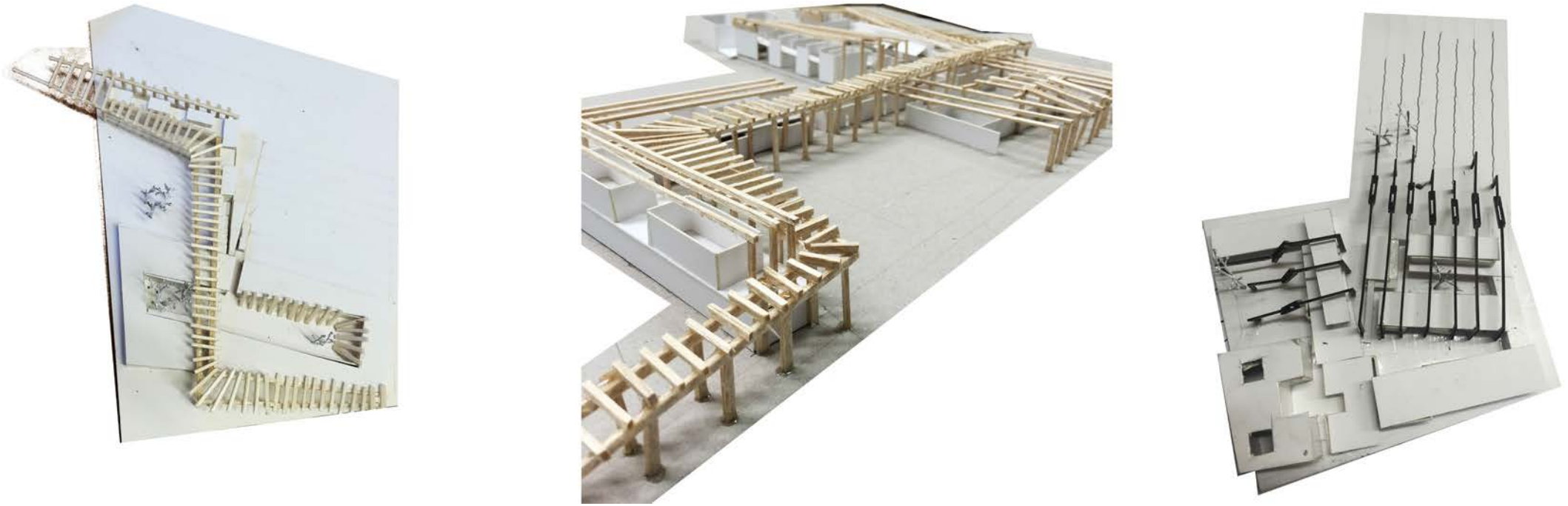


Figure 89 : *Model of Design Iteration 3, Author (2015)*

### 6.4.3 *Design iteration 3:*

During this iteration, the proposed context was adapted and the movement through space became the main driver of the design. The investigation led to the different thresholds and social spaces, thus the definition between Public, semi-private and private realm started to become more controlled. The design started to consider architecture as a flow of social systems creating ecotones and the public square started to become more controlled.

Access and control from the public to private realms still needed greater consideration as well as certain placements of programmes were not appropriate. And the design became very removed the Biophilic concept, with very small play areas for the children. The design also lacked ground manipulation and level changes to emphasize threshold activity. This led to the structure as a very static object instead of a living system adding to the social collective.



Figure 90 : Ground floor plan, Design Iteration 3, Author (2015)



Figure 91 : *First floor plan, Design Iteration 3, Author (2015)*

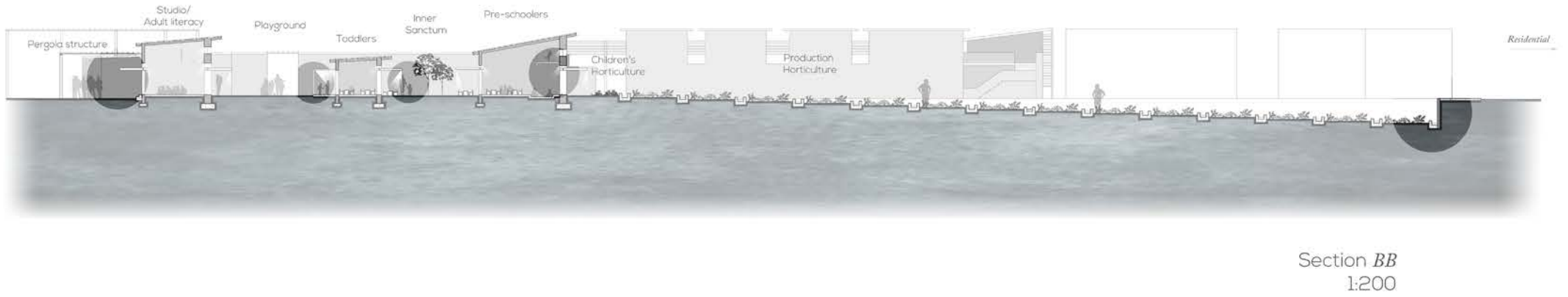
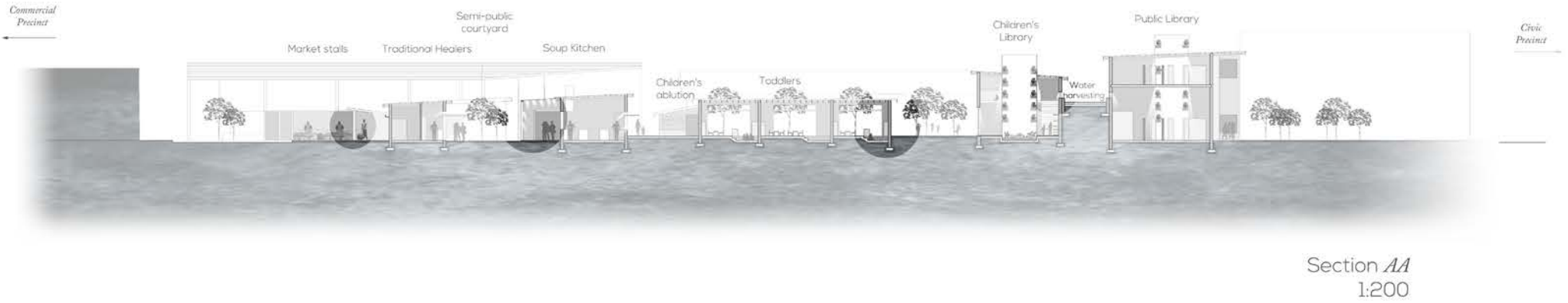


Figure 92 : Sections, Design Iteration 3, Author (2015)

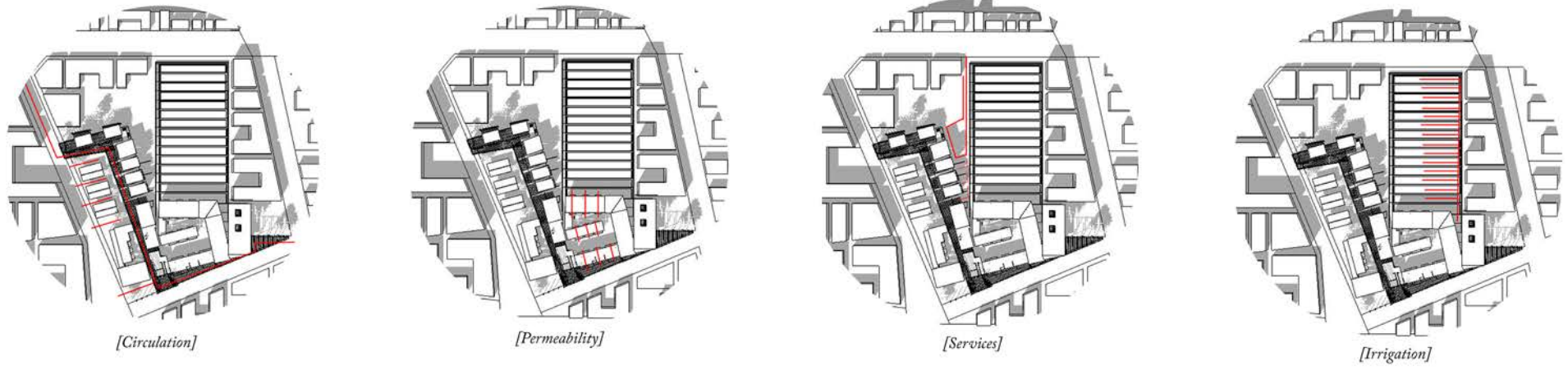


Figure 93 : *Movement Diagrams, Design Iteration 3, Author (2015)*

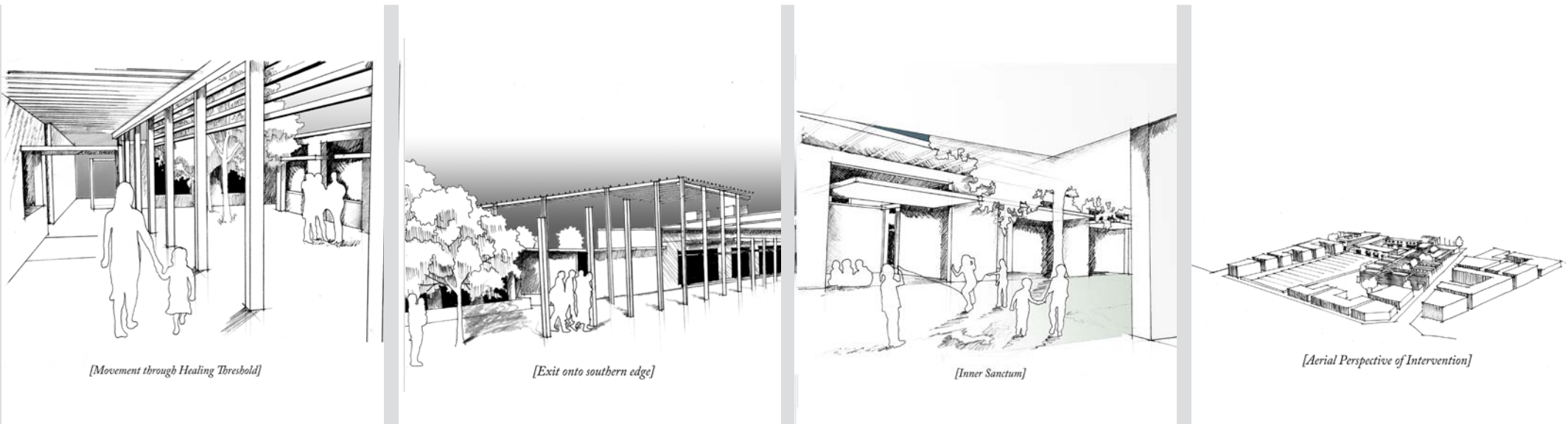


Figure 94 : *Perspectives, Design Iteration 3, Author (2015)*



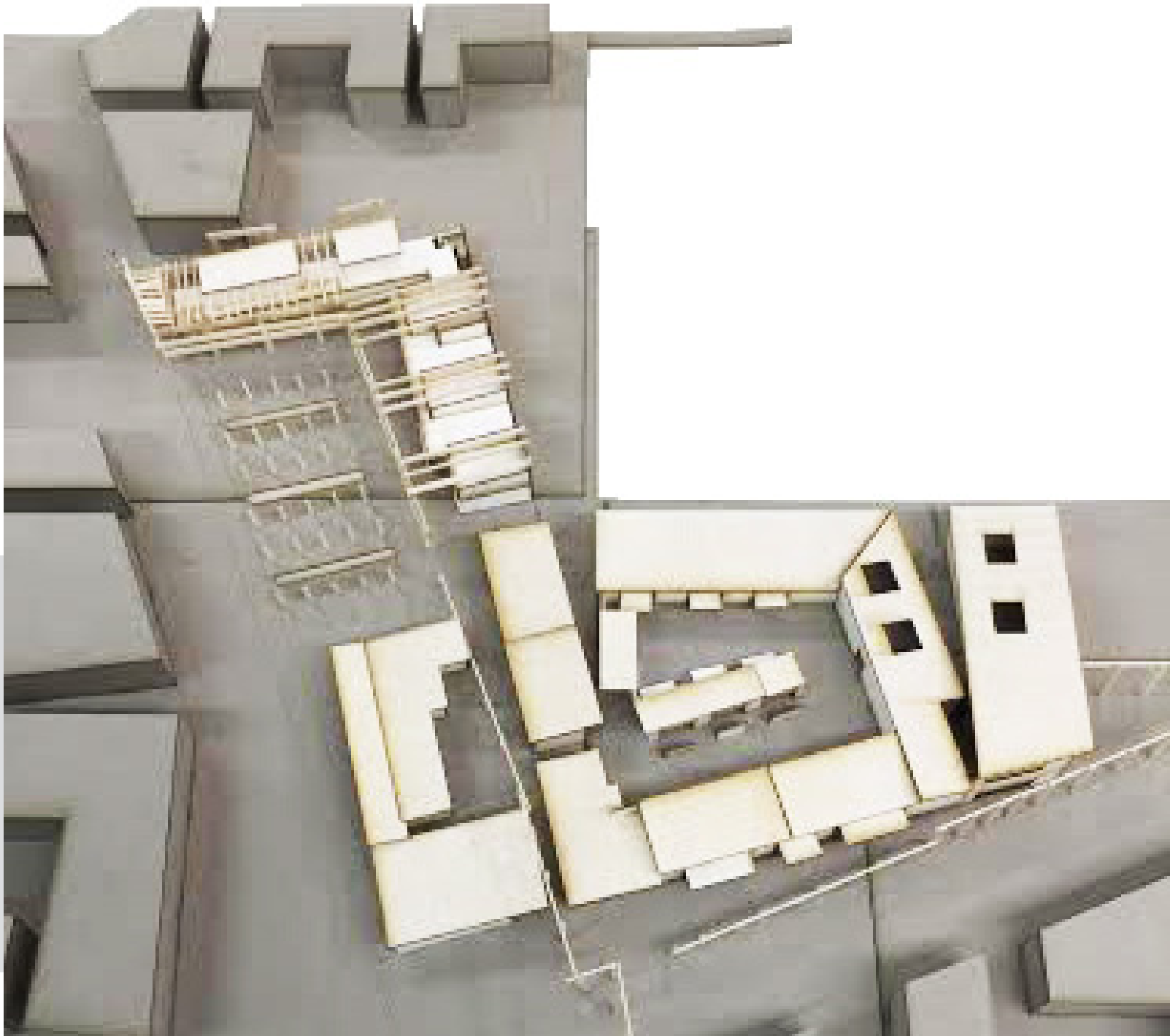


Figure 95 : *Model, Design Iteration 3, Author (2015)*



Figure 96 : Ground floor plan, Design Iteration 4, Author (2015)



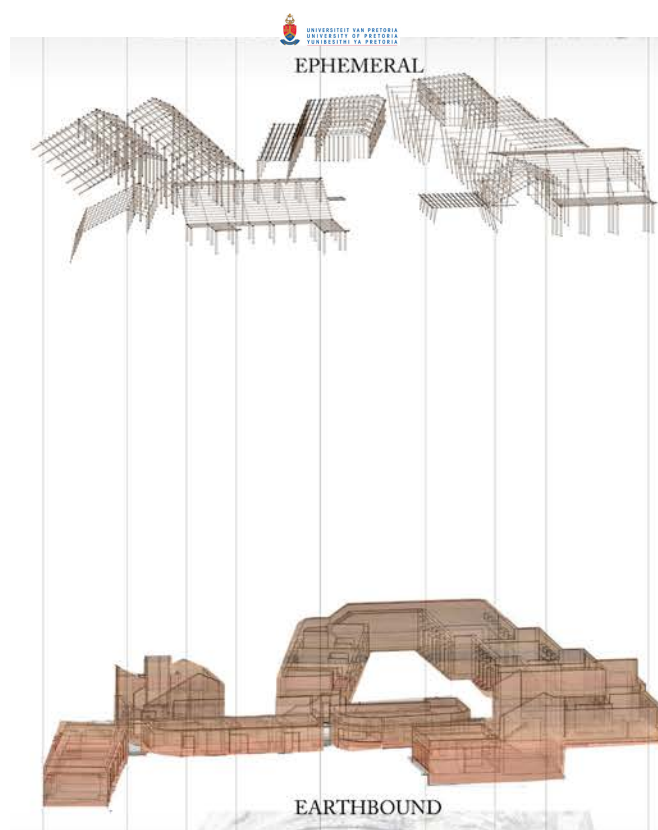


Figure 97 : *Exploded Axonometric of main elements, Design Iteration 4, Author (2015)*

#### 6.4.4 *Design iteration 4:*

The proposed design addresses the lack of a collective memory space for the community, through the creation of a public square which is surrounded by formalized shops and public services.

A new meeting place with enough resonance (memory) of the types of shops surrounding the previous meeting space (the Apollo light). The square becomes the public interface of the scheme. Areas of passive surveillance include the shop owners, and the kitchen area from the public space. The public user's route becomes a celebrated edge condition, where one can buy fresh produce, commute and interact with other residents on a daily basis. Hence a communal place is created, which has the possibility to strengthen the collective memory.

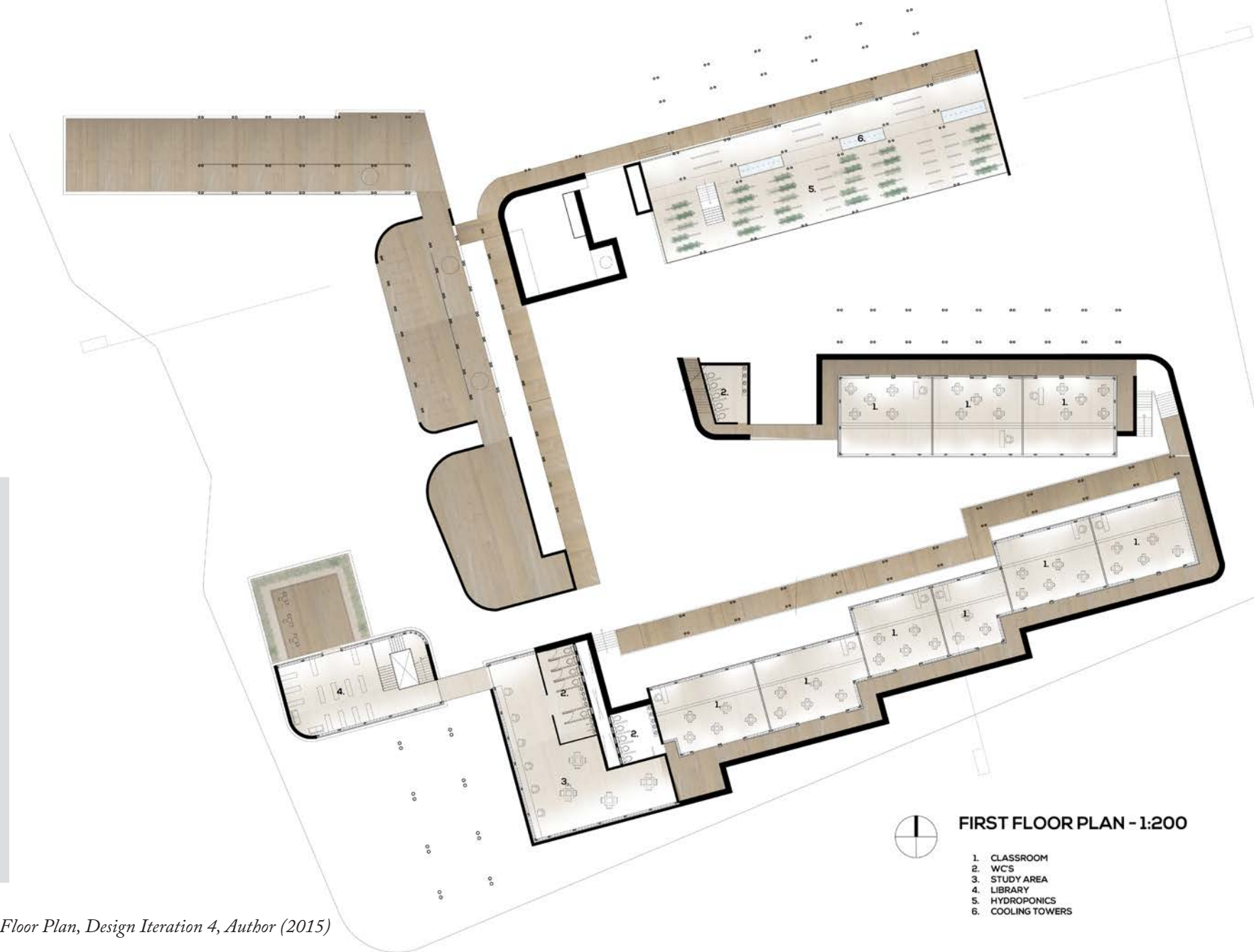


Figure 98 : *First Floor Plan, Design Iteration 4, Author (2015)*

Mothers would enter the proposed structure into a smaller square, surrounded by a Toy Library, Administration block and the Nurse's rooms. And mothers would exit again on route to the train station. Therefore the different ecotone for the semi-private space became clearly defined.

Children enter the structure through the same route as the mothers but then go through the last threshold into the nurture space. Passing the nurse, for a daily check-up and entering into the children's realm. The Private realm developed more with more space for children to play and a better connection to the Public realms became apparent.

The Kitchen is directly connected to the horticulture fields and greenhouse, with a dual public and private interface. It is proposed that children receive two meals a day and that surplus produce and food gets sold to the public, this adds to the public becoming aware of the growth and cultivation cycle on a tangible level.

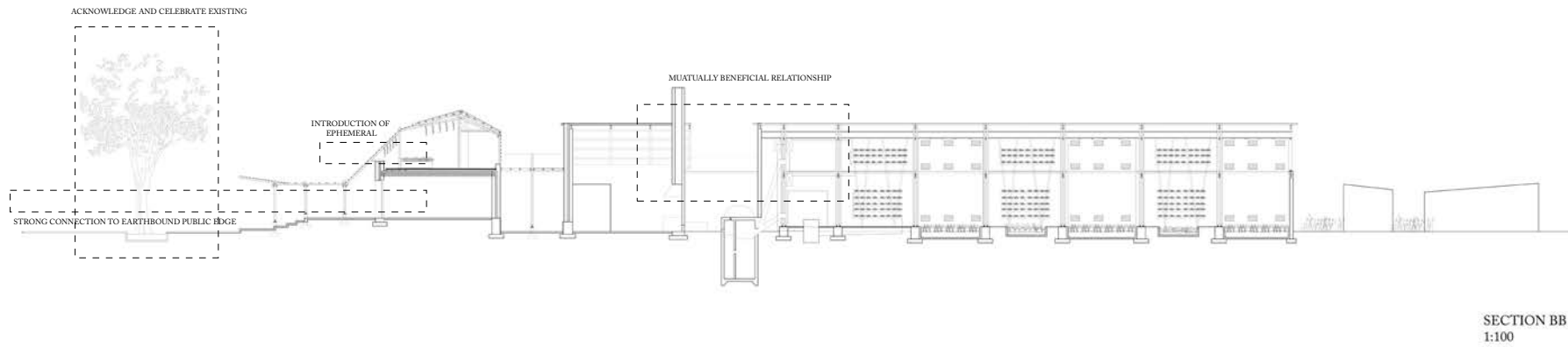
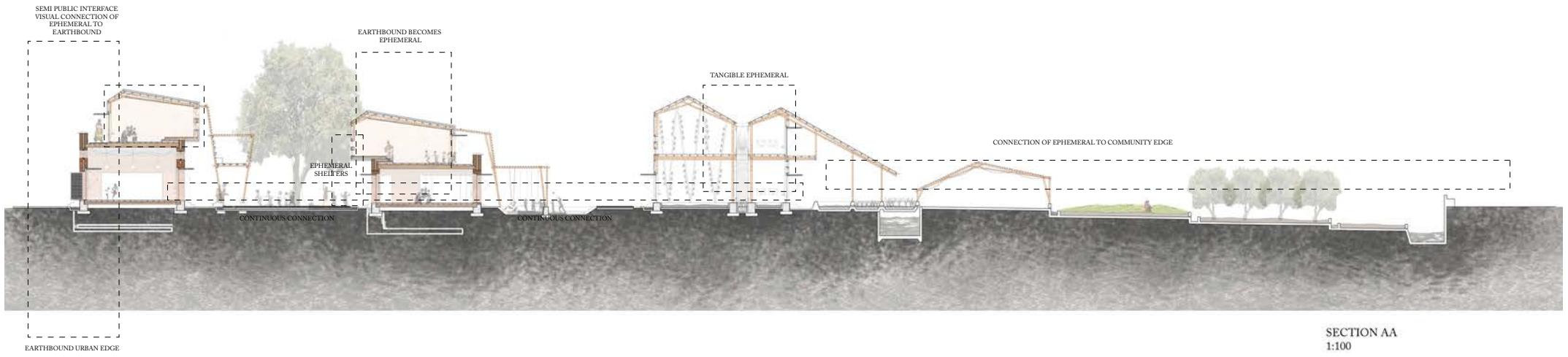


Figure 99 : Sections, Design Iteration 4, Author (2015)

The kindergarten design is a series of different classroom and courtyard conditions, which relate to one another through materiality and recognizable attributes. The design grows from the urban edge on the southern side, towards a more natural space on the Northern edge. Ramps and walkways lead children to and from the different classrooms. This allowed for spontaneous connections of human to nature to develop. Thus the definition between nurture and natural spaces.

This allows children to experience the spaces from different perspectives. Children get to experience the urban edge from a safe space and to interact with the horticulture through participation. This allows for the passing of existential knowledge through observation and participation. The classroom placements were influenced by the different age categories of the users. The toddlers placed in the middle classrooms, able to exit and run around at any time whilst being watched by teachers.



Figure 100 : *Perspective of Public Square, Design Iteration 4, Author (2015)*

The Earthbound ground floor, allows children to experience soil in a different state, and the lighter ephemeral first floor, seemingly floating above. The light and dynamic ephemeral structure, the inverse of the monolithic and static earthbound structure. The ephemeral condition relates to the growth out of the current condition and the possibilities of the imagination spreading its branches.

Circulation spaces and thresholds are articulated to allow for the external spaces to become extensions of the interior spaces. Doors also serve as secondary thresholds, shading devices or light-shelves. The different conditions of the roof was also explored, becoming more than the sheltering element. The roofs become a landscape of its own, as an extension of the light structure, flowing down towards the ground, acknowledging the sky and the ground. The use of the roof in this way allowed for it to become a structural element for the ramps, or an extension of the playground and shading for the horticulture. The roof aids in the creation of human scale intermediate spaces between the external and the Earthbound.



Figure 101 : *Perspective of Entrance to Daycare, Design Iteration 4, Author (2015)*



## 6.5 *Conclusion to Design:*

Informants are all around us. The opportunities present themselves when one sees past the diversions of chaos. Peer into the essence of the composition of place, and acknowledge it. Make the binding agent's beauty and intrigue visible to all. Thereby residual deposits start to merge and integrate with their surroundings, becoming part of what had already been. The reintroduction to different states of the Earthbound condition acknowledging the transient nature of the surroundings, thereby becomes an extension of Biophilia through architecture. Natural materials in new conditions, celebrating their flawed characteristics.

By celebrating the ordinary it becomes extraordinary. And through the participation of the celebration a cultural manifestation takes ownership, acknowledging the existence of *The Forgotten* and thereby establishing a sense of belonging.

The *Forgotten*, become co-creators and participants in the place-making, and thereby they start to cultivate a cultural collective memory of skills and knowledge to pass on. This also allows for different levels of social ecotones to overlap and to form dynamic didactic spaces which nurture and develop the surrounding on a human scale.



Figure 102 : *The Nature of the Mind II*, Collage,  
Author (2015)

# 7

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## *Technical Investigation*

- 7.1 *Technical concept*
- 7.2 *Structural Intention*
- 7.3 *Technological Intention*
- 7.4 *Material choices and characteristics*
  - 7.4.1 *Rammed Earth*
  - 7.4.2 *Bamboo*
  - 7.4.3 *Bamboo Experience*
- 7.5 *System and service response*
  - 7.5.1 *Hydroponics*
  - 7.5.2 *Biodigester*

*A great building must begin with the immeasurable, must go through measurable means when it is being designed, and in the end must be unmeasured.*  
*Louis Kahn (1901-1974)*

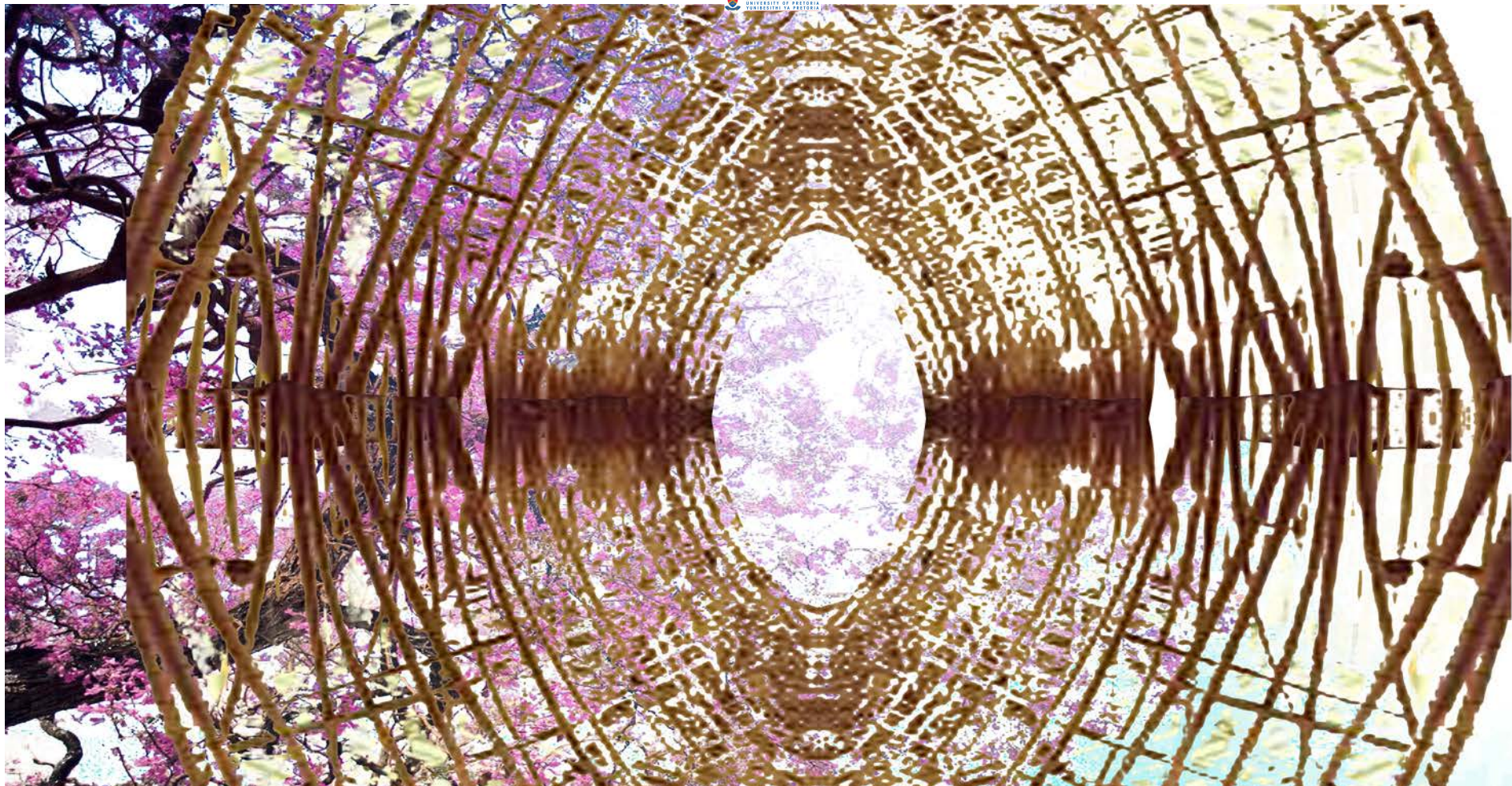


Figure 103 : *The Nature of the Architecture* , Collage, Author (2015)

### 7.1 *Technical concept:*

The technical concept was seen as an extension of the design concept. In the society of Phomolong, the communities have become earthbound by their social, cultural and economic situations. The scheme needed to reflect how the upliftment of the earthbound to the ephemeral could be achieved through architecture. Thus biophilic design attributes were introduced into the scheme. Biophilia is the reintroduction of man to nature through architecture. The biophilic lens helped to address social, cultural, economic and ecological resilience, through passive design. Passive design such as natural ventilation, daylight and natural and organic materials are promoted. This allows the structure to become an extension of the landscape and nature.

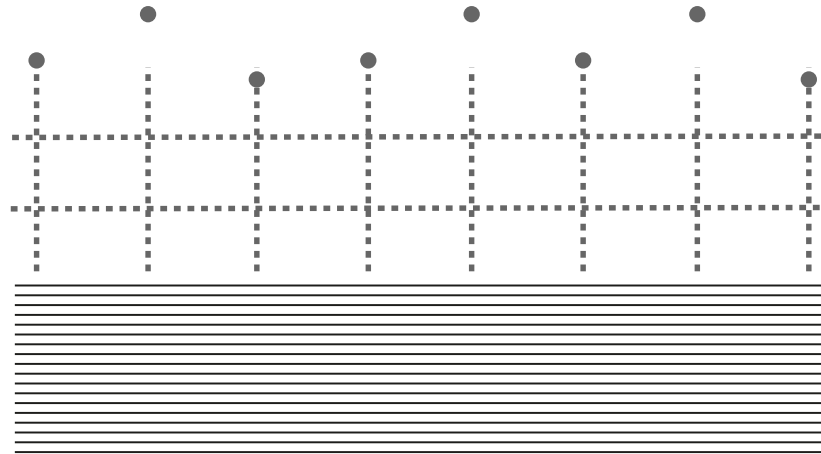
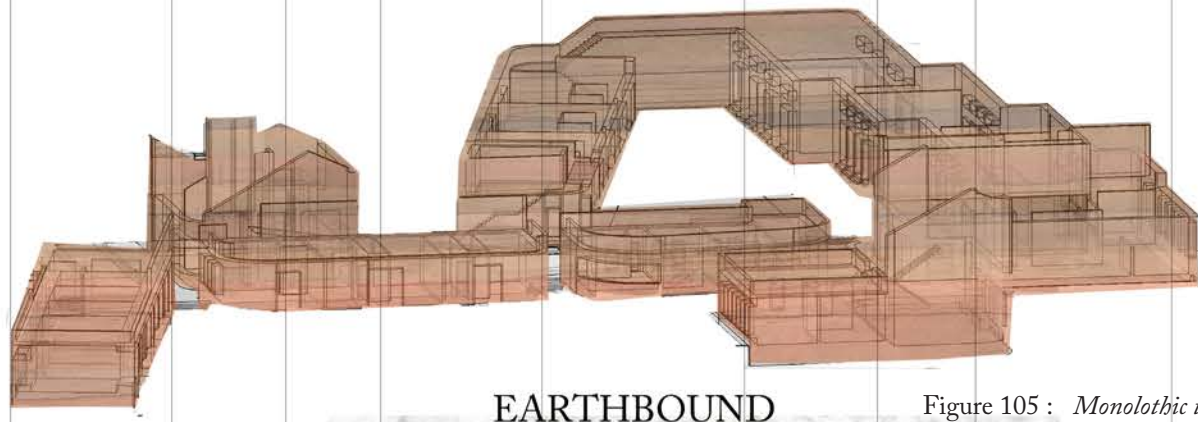
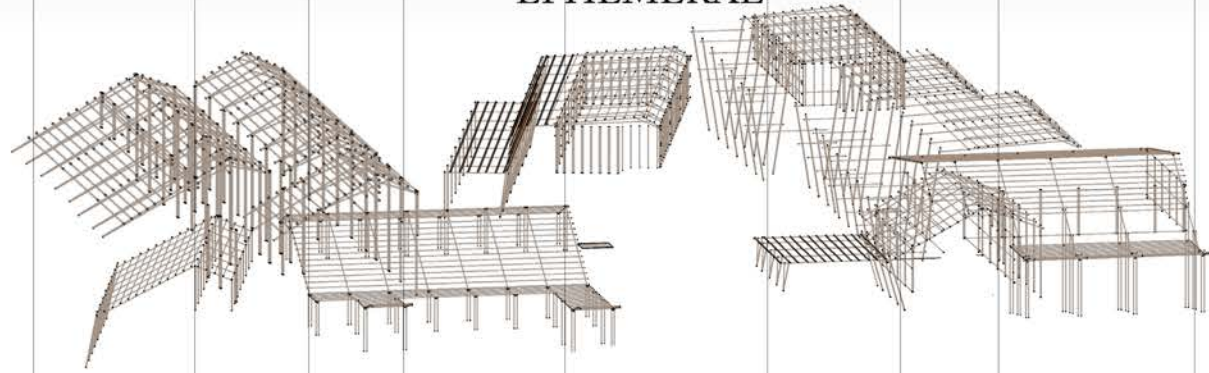


Figure 104 : *Monolithic to Transience , Diagram, Author (2015)*

## 7.2 *Structural intention:*

The structural intention was to create a safe place (Early Childhood Development Centre) along a highly public edge. The structure should meet the ground and become an extension of it. A lightweight material is proposed for the first floor, to allow the structure to merge with the sky. This symbolises how the community grows from their existing surroundings into a transient nature, to create a place which manifests a cultural identity where children can learn from the passing on of existential knowledge.

# EPHEMERAL



# EARTHBOUND

Figure 105 : *Monolithic to Ephemeral, Diagram, Author (2015)*



Figure 106 : *1:20 Model exploration , Author (2015)*

### 7.3 *Technological intention:*

As an extension of the concept rammed earth and Bamboo Balcooa were chosen. The Bamboo is proposed to be planted along green strips in the greater urban vision of the scheme. This would introduce new skills and material available to the community. The exploration of the materials and their characteristics become combined to create different conditions and spaces. Looking at the connection between the man-made and natural elements, and natural to natural elements, the fixing of the materials was explored on detail level, to also express the concept.

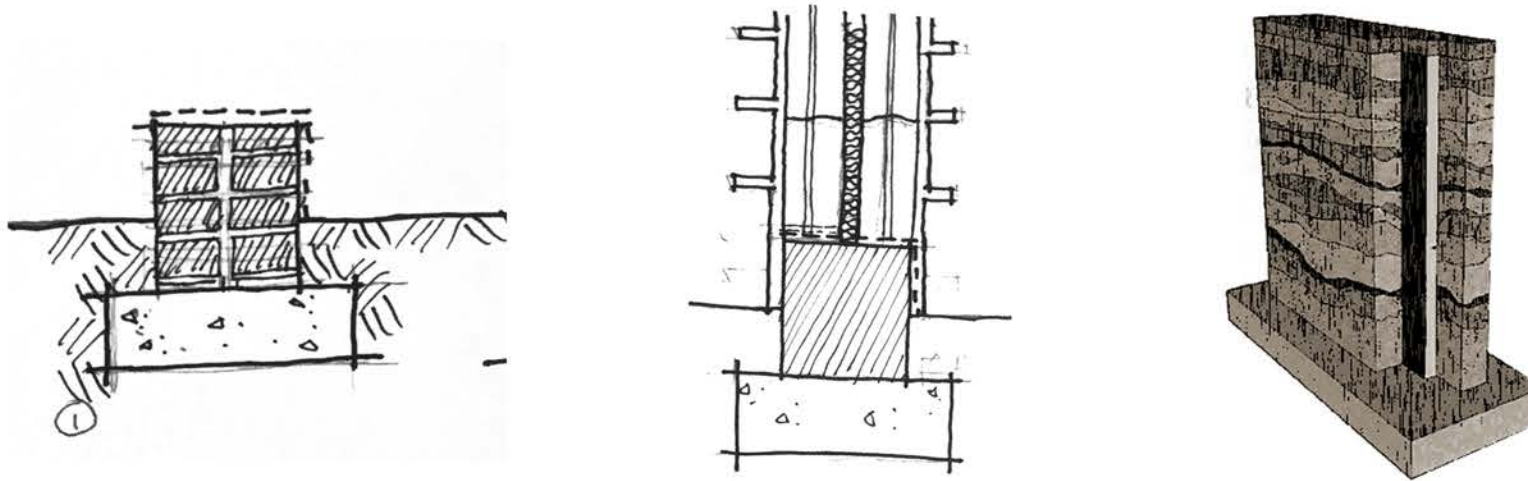


Figure 107 : *Rammed Earth investigation, Sketches, Author (2015)*

#### 7.4.1 *Rammed Earth:*

Rammed earth is a mixture of sand, gravel, clay and concrete. Rammed earth construction has a long history of being used especially during economically challenging times.

Rammed earth has many advantages, including its high thermal mass, low embodied energy, temperature regulation, fire resistance, strength and load bearing qualities and pest deterrence (*Edmonds 2015*). The addition of Portland cement (6-10%) (adding to surface hardness), damp proof course and concrete or masonry footings and plinths and the addition of water based silicon water repellent, adds to the durability and low maintenance of rammed earth walls (*Madehow.com 2015*).

With the silane/siloxane aqueous based waterproofing admixture (*Techdry.com 2015*) minimises water penetration and eliminates using external waterproofing coatings and future surface maintenance the rammed earth walls do not need any added finishes, but could be plastered and painted similar to any other masonry wall (*Motherearthnews.com 2015*). Electrical conduits and other services can be built into the walls with proper planning during the design process (*Earthstructuresgroup.com 2015*).

Steel reinforcement is often used in the foundations and walls for extra strength. Plywood is usually used as formwork and can be used on other sites as well.



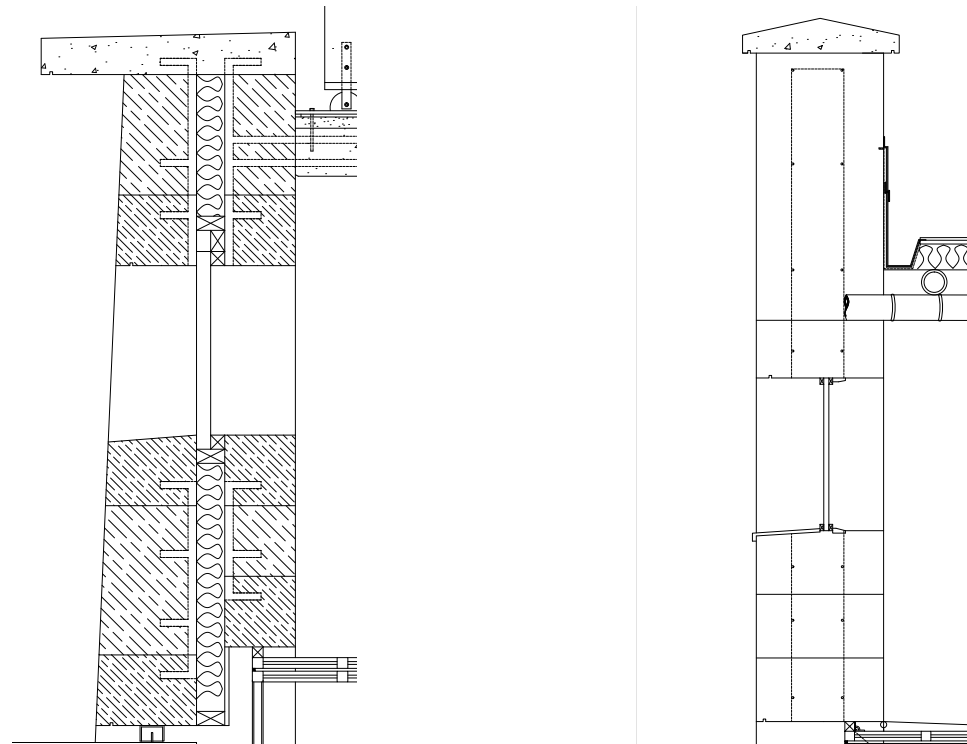


Figure 108 : *Rammed Earth investigation, Details,*  
*Author (2015)*

Three types of construction methods are used in modern day practice (*Rammed earth constructions 2015*):

- Stabilised rammed earth, with 300-400mm thick walls.
- Insulated stabilized earth wall panels, where the walls are 400mm thick with 50mm insulation (usually Styrofoam panels). This is ideally used for Western facing walls requiring a higher R-value.
- Elevated stabilized earth wall panels of 300mm thick and are similar to precast concrete panels, which can be elevated into difficult locations (*Rammed earth constructions 2015*).

Precautions to take when working with rammed earth:

- The base of the wall should be raised a minimum of 50mm above the Natural ground level.
- If insulation is used a weep hole should be provided to prevent condensation of the insulation material.
- The top surfaces of the wall require capping.
- A rock drain should be provided for water back splash from the pavement.
- If a sealant isn't used a minimum overhang of 300mm should be provided.

Construction method:

1. Foundation footing and brick plinth is constructed.
2. DPC placed between brick plinth and first layer of rammed earth wall.
3. A reinforced plywood frame is constructed.
4. A layer of moist earth is poured in.
5. The layer gets compressed and compacted.
6. The next layer gets poured in.
7. Puddled earth lintels are placed at window and door heights.
8. A standard size concrete capping with a drip is placed on a puddled earth lintel.

Rammed earth and Bamboo both have a history of being a traditional and alternative method of construction, and the combination of the two materials can be seen as a reinterpretation of the traditional Wattle-an-Daub construction.

Rammed earth is used in the design to convey the concept of the Earthbound. A monolithic element to withstand the changing context and giving rise to the Ephemeral light tectonic Bamboo structure on the first floor level. Both elements add to the creation of a unique place for the *Forgotten* and marginalised networks in Phomolong. An ode to their collective memory.

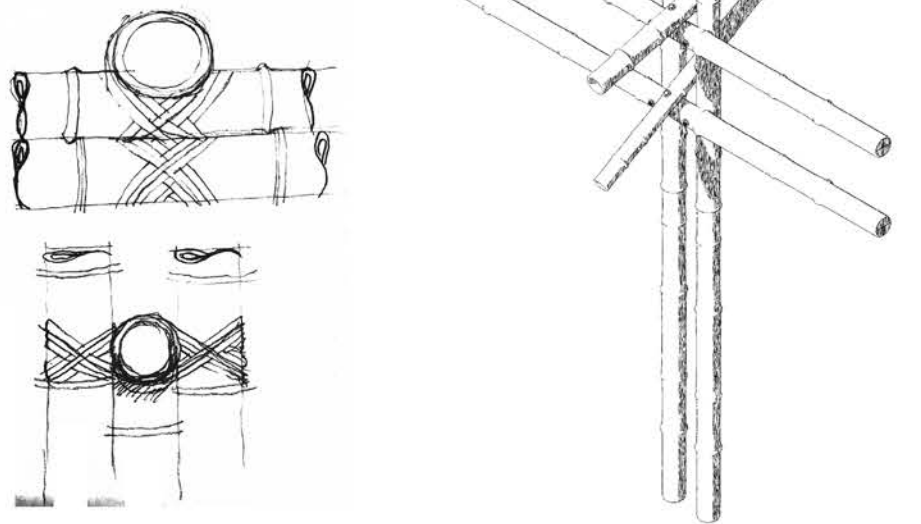


Figure 109 : *Bamboo lashed joints investigation, Sketches, Author (2015)*

#### 7.4.2 Bamboo:

Bamboo is the world's fastest and strongest growing woody plant (*Afribam 2015*). Bamboo is classified as a grass species (*de Vos 2010*). Bamboo is proposed as a rural development and climate change mitigation crop for Phomolong.

Types of bamboo viable for South Africa:

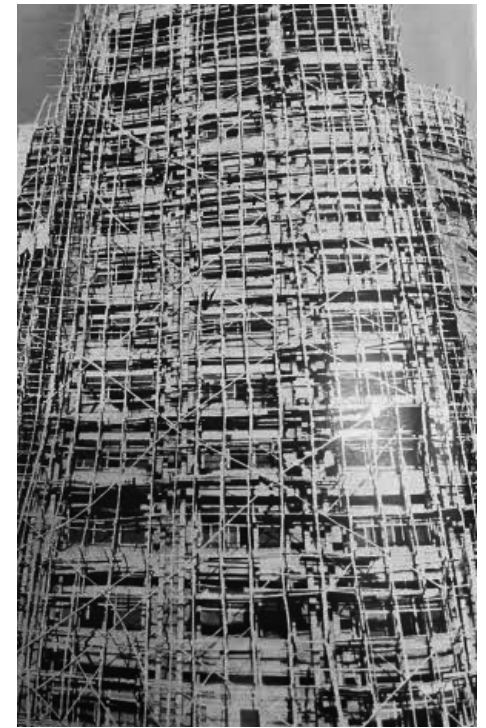
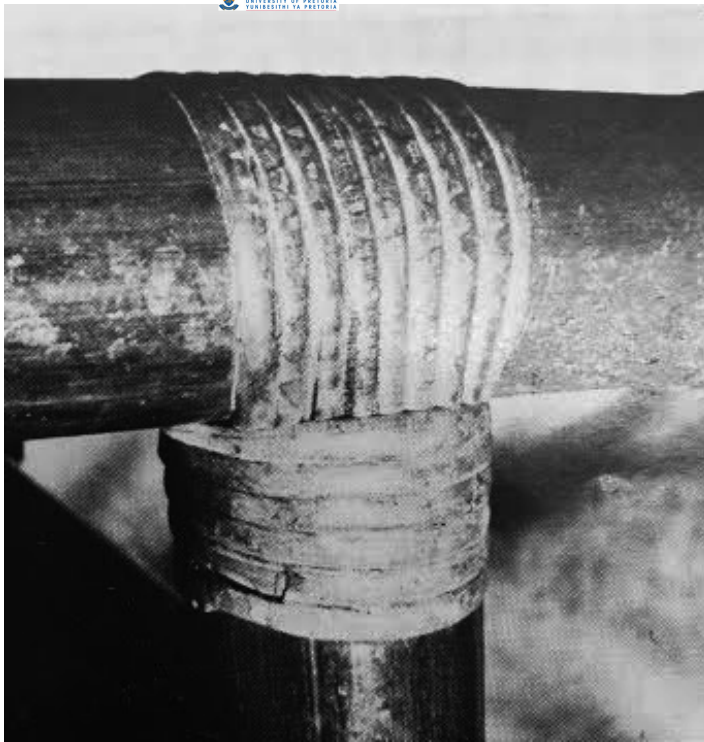
*Only one species, Thamnocalamus tessellatus, is truly indigenous to South Africa (it grows in the high Drakensberg) (UP Repository 2014).*

Sacred Venda bamboo:

*The Venda people grow Oxytenanthera abyssinica for ceremonial purposes, this species is appropriately named the Holy Venda bamboo and is thought to have been introduced by the ancestors of the Venda from further north in Africa. (UP Repository 2014).*

Bamboo Balcooa (*Afribam 2015*): Erect with very thick walls  
 Height of 15–20m  
 Diameter of 15–20cm  
 Average weight (dried) 30kg

African alpine bamboo: Commonly found in Ethiopia and Kenya (*Afribam 2015*).



### *Potential of Bamboo in South Africa:*

The South African climate requires Bamboo plants to first be hardened to the conditions, before it can be planted (*Sutton 2013*). Hence a strategy of the seedlings developing in greenhouses for an incubation period, then being moved outside under shading nets and then they are able to be planted in normal conditions. These tissue cultured bamboos develop a well-developed root system for planting elsewhere and have a greater chance of surviving in the natural conditions due to their exposure to the climate at different stages. The hardened plants then allow for a greater yield per hectare due to their better field establishment.

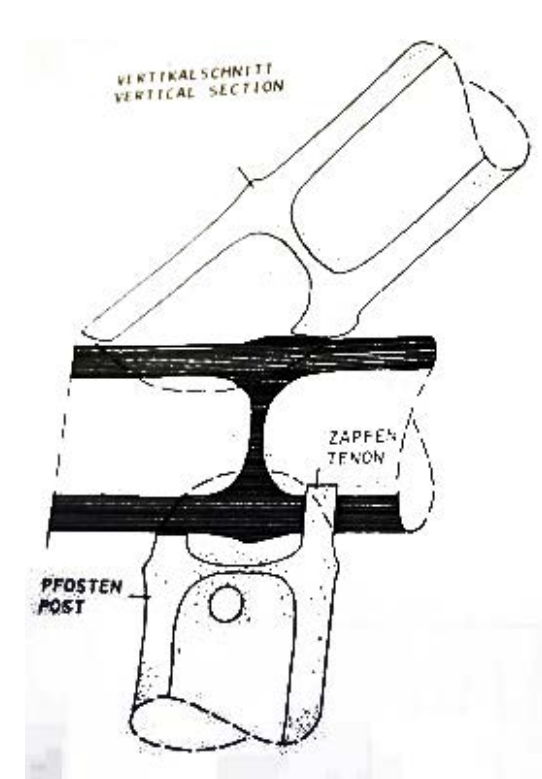
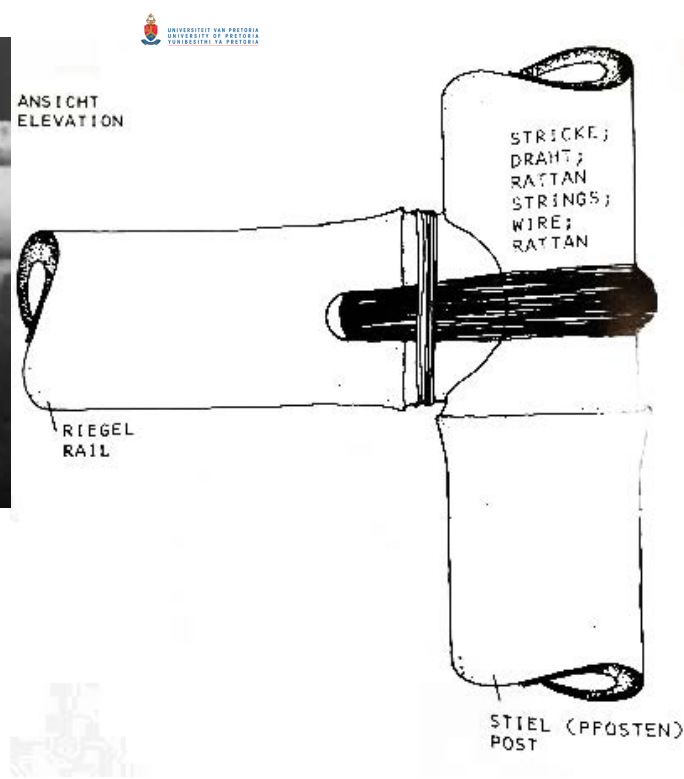
Currently there are Bamboo plantations in the Eastern Cape and in Leandra in Mpumalanga (*Sutton 2013*).

Bamboo is a good substitute for timber, due to its versatility and the speed at which the plan regrows (4 years as opposed to 8 to 15 year tree life cycle.) Bamboo culms grow their full height and girth within 3-4 months, yet take 3 years to mature and start to decay after 5 years. Bamboo culms can be continually harvested annually for the duration of the plant's life span of 40 to 120 years (*Afribam 2015*).

Bamboo can be used for construction, furniture, and paper pulp, charcoal and can be processed to become laminate bamboo used for floors and structural beams as well as the bamboo shoots being edible (*Afribam 2015*).



Figure 110 : *Bamboo lashed joints, Photograph, Dunkleberg (1985)*  
 Figure 111 : *Bamboo lashed joints, Photograph, Dunkleberg (1985)*  
 Figure 112 : *Bamboo Scaffolding, Photograph, Dunkleberg (1985)*  
 Figure 113 : *Bamboo lashed joints, Photograph, Dunkleberg (1985)*  
 Figure 114 : *Bamboo lashed joints, Detail, Dunkleberg (1985)*  
 Figure 115 : *Bamboo lashed joints, Detail, Dunkleberg (1985)*



### *Bamboo advantages over tree species:*

Bamboo biomass and carbon production and retention are higher, and produce 35% more oxygen when compared to wood (*Blumrick 2014*). Bamboo has a dense root system (60cm deep) which is anchored in topsoil and does not impact the lower water table; hence it is very effective for erosion control (*Janssen 2000*). The rapid growth enables the absorption of surplus nitrogen, phosphorous and heavy metals found in sewage and polluted water.

Bamboo mulch is extremely rich in moisture and nutrients; together with the rapid decomposition of the material it adds an enriching layer to its surrounding soil conditions (*Afribam 2015*). Bamboo yields 6 times more biomass than pine, and is classified as one of the strongest building materials, due to its high tensile strength (28 000 psi) the equivalent of mild steel. If used as firewood it burns longer and creates less ash than hardwood (*Afribam 2015*).

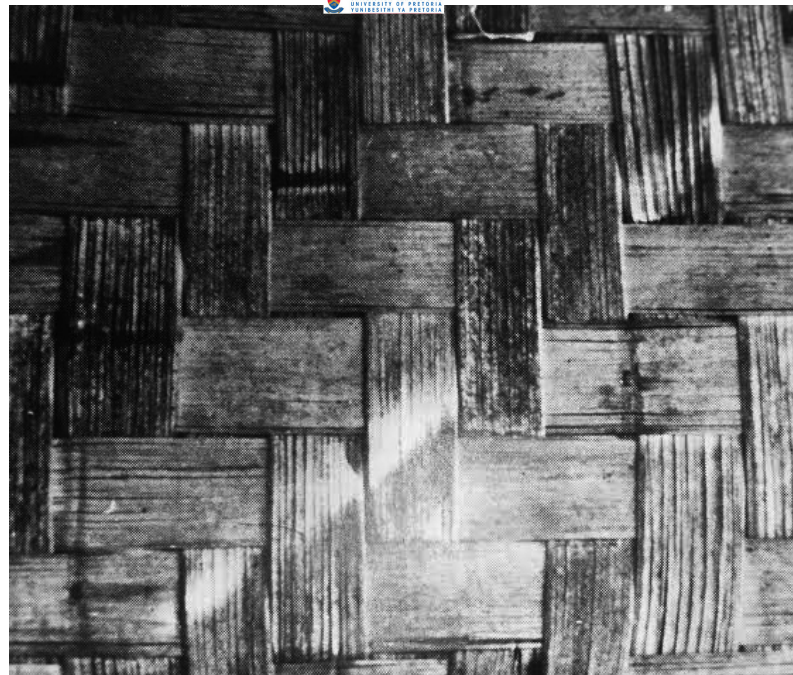


Figure 116 : *Woven bamboo, Photograph, Dunkleberg (1985)*

### *Composition of material:*

Bamboo has long fibers, which adds to the tensile strength. It is highly elastic and can be formed during growth or before being dried. The hollow cores add to the lightness of the material, making it easy for a person to carry it (Afribam 2015).

Uses:

Plant

- Soil stabilizer
- Soil remediation
- Cultivation of marginal lands.
- Wind breaker, sound and visual screens.

Material:

- Wood, paper and chemical industry.
- Construction
- Furniture, weaving and carving
- Food industry
- Charcoal
- Laminated Bamboo (Lambo)

### *Bamboo facts:*

- *Tensile Strength: with members of the same weight, bamboo has a tensile strength of almost  $200 \text{ kN/mm}^2$  where steel only has a tensile strength of  $150 \text{ kN/mm}^2$  (Davey, 2010).*
- *Allowable Force: with members of the same weight, bamboo has a allowable force of 25.6 KN and steel 27.6 KN (Davey, 2010).*
- *Can substitute steel: bamboo can replace steel (and timber) completely as scaffolding, trusses or space frames. Current research and design indicate that multistory buildings with only bamboo as vertical structural element can reach up to 3 levels, or 12–15 meters (Davey, 2010).*



Figure 117 : *Harvested Bamboo week 1, Photograph, Author (2015)*

Figure 118 : *Harvested Bamboo week 2, Photograph, Author (2015)*

### *Harvesting and planting data:*

The clumping root systems seen in Bamboo Balcooa allows for an average of 5 culms per clump after 6 years. This gives average 1500–2500 culms per hectare per year to be harvested (*Afribam 2015*).

### *Bamboo as an Energy Crop:*

The heating power of bamboo is 4600cal/g, thus it can be used for power generation, cooking (charcoal) and heating (*Blumrick 2014*). Because of the high biomass yield, biomass gasification and biofuels are a possibility.

Optimal soil conditions and climate can yield 30 Tons/ha annually. Thus 1 ha can provide fuel for 55 households. Afribam has initiated collaboration with NGO's to promote Bamboo education in rural development because of its possibilities as a resource. As a utility crop bamboo has the highest potential to deliver a sustainable balance between habitat and community (*Blumrick 2014*).



Figure 119 : *Harvesting Bamboo, Collection of Photographs, Author (2015)*

### 7.4.3 *Personal experience with harvesting Bamboo:*

On October 3 2015, the author went to a farm in Mpumalanga on the Highveld, where a cluster of Bamboo has been growing. Standing unhindered with no recollection from the owner of the farm as to who might have planted it. The cluster of Bamboo stood at about 12m in height, tapering towards the top. Fallen leaves had formed mulch around the stems.

Through observation it was derived that the Bamboo had a clumping root system with about 7 culms per clump. A range of tools were used and the following was found:

Panga's and hatchets work best for quick felling of the culms, however, a saw gave a cleaner cut, for the panga and hatchet caused the bamboo to splinter on impact, causing the loss of about 30cm of material each time. Branches were easily removed with the panga with no damage done to the proposed structural culm.

It must be noted that the felling of the Bamboo was done with unskilled labor and the skills were easily learned. As well as that if Bamboo is harvested safety goggles and gloves would be proposed to be used (from the recent experience).





Figure 120 : *Harvesting Bamboo, Collection of Photographs, Author (2015)*

For ease of transport the culms were cleaned and cut into 3m segments. It was still easy to carry 3 culms per person, and was found to be lightweight. The greener culms, were heavier, and it is speculated that this is due to a higher moisture content. There were also dried culms on the site, and it was experienced that these culms were lighter to carry but more difficult to cut, they were harder. The bamboo culms have a thick inner wall of about 15mm and the nodal diaphragms were solid. After transport the culms ends were placed in a plastic container with water for 2 days. This was to prevent splitting because of the dry circumstances in the Highveld. One culm was left outside in the sun to see the impact upon it. After one day in direct sunlight the culm had started to burst and crack from node to node.

After 2 days in the water, the culms are to be moved to an enclosed garage structure which gets Western sun and is thus extremely warm. The culms are to be packed on pallets raised from the ground, and misted once a day for a week to help the drying process to not happen too rapidly. The culms will also be sawn neatly before being stacked for drying. After 2 weeks of drying the culms will be treated with a varnish and then used for details and examples during the final presentation and examination.

The impromptu harvesting experience, helped greatly for the authors understanding of the material.

# BAMBOO PLANTING AND HARVESTING STRATEGY:

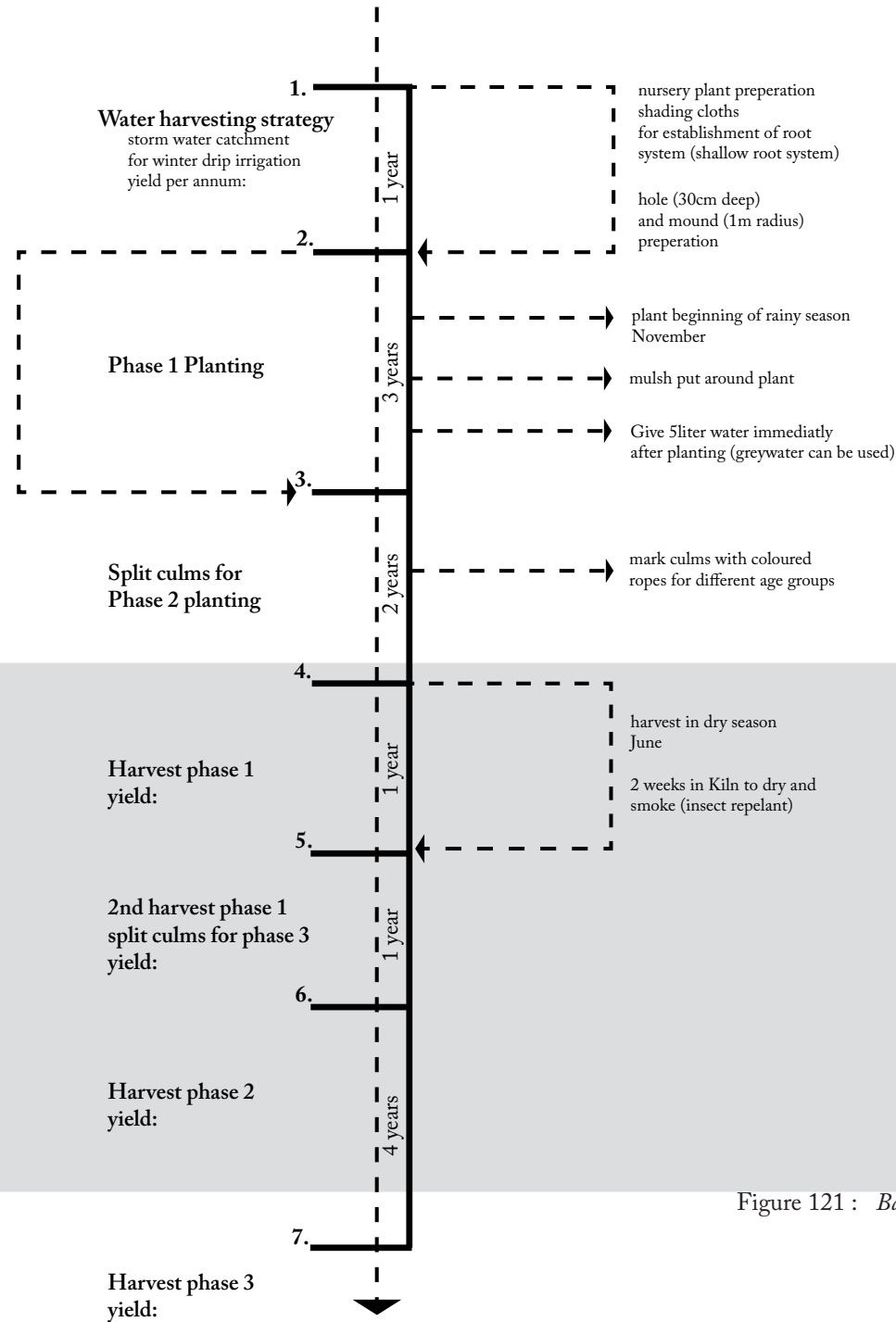


Figure 121 : *Bamboo Planting Strategy , Diagram, Author (2015)*



Figure 122 : 1:20 Model exploration , Author (2015)

### *Investigation justification:*

The proposed design will make use of a variant of Bamboo joinery. Proposing traditional and contemporary methods of joinery to be used, it was important for the Author to experiment with the material in real life to gain an understanding of the material and its characteristics.

Secondly, the Author has no previous experience in these types of construction and it is beneficial to be able to prove that unskilled labour can easily be taught the above mentioned methods of construction and harvesting techniques to be able to use in the context of Phomolong.

The different types of joinery also relate back to the tectonic concept of how man-made and natural elements (contemporary method) are joined as well as how natural and natural elements are joined (traditional method).

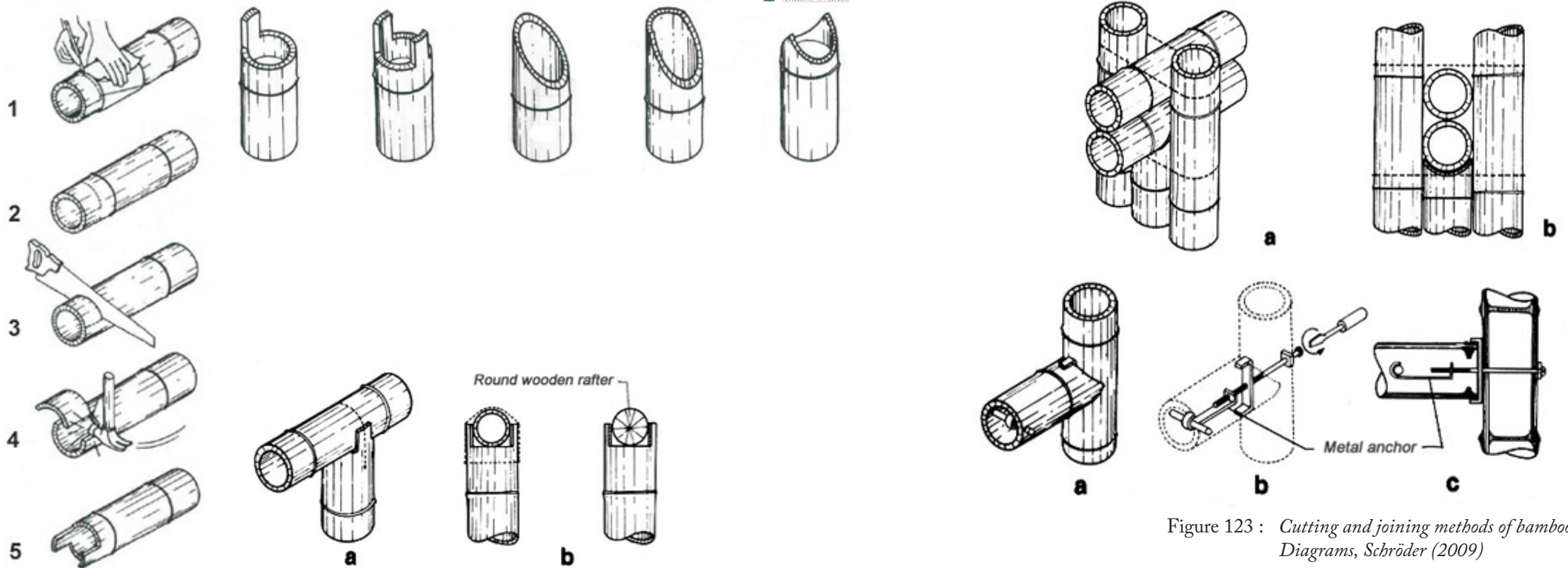


Figure 123 : *Cutting and joining methods of bamboo ,  
Diagrams, Schröder (2009)*

### *Traditional methods of joining Bamboo connections:*

Traditionally and in modern scaffolding technology, Bamboo would be joined through the use of string, wire or rattan with lashed joints.

Bamboo skin can also be used as string and the advantage of the use of Bamboo string is that it has the same expansion ratio as the Bamboo culms. Thus it shrinks and expands in unison with the rest of the joints. Bamboo string would be wetted and then tied, when the string dries it shrinks and tightens the joints further. The bamboo lashing has the same strength as zinc wire.

Bamboo or timber pegs are also used for as a joining method, where a hole is drilled and the peg inserted to prohibit any movement, this method might cause splitting of the culm.

If there is cut into the Bamboo culm it must be between two nodes and not cut into a node directly, this would influence the structural integrity of the material.

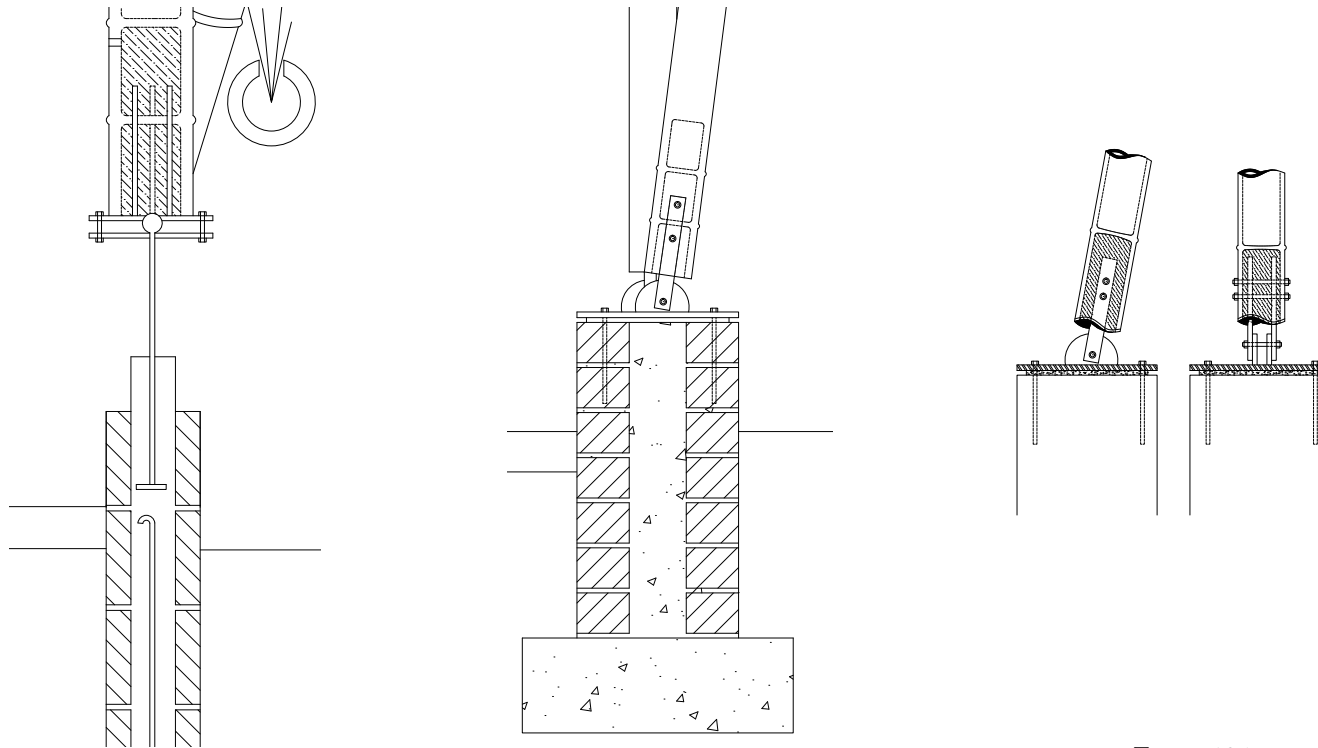


Figure 124: *Bamboo detail development*, Author (2015)

### *Contemporary methods of joining Bamboo connections:*

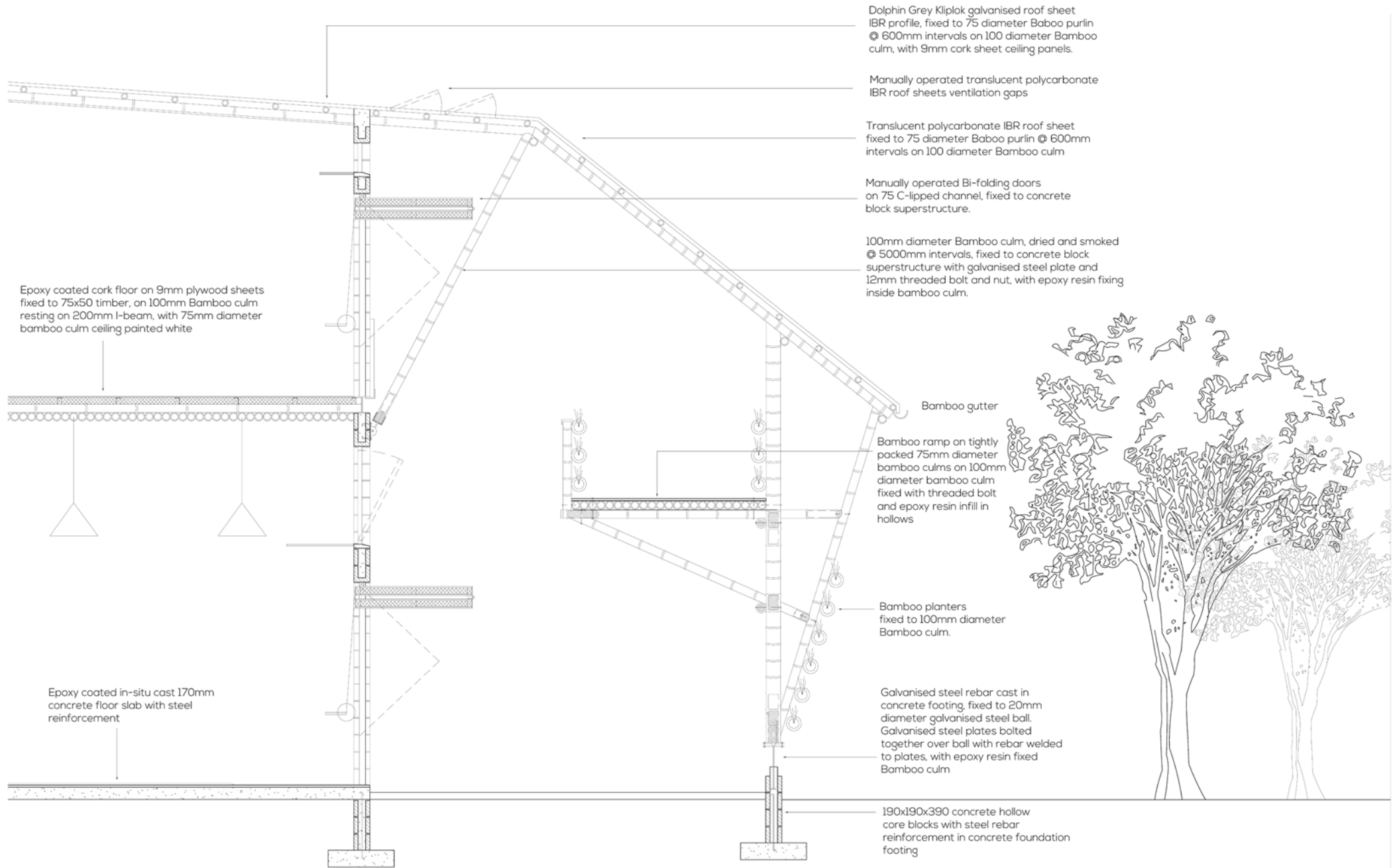
In contemporary Bamboo construction, modern techniques such as steel bolts and mortar infill is used for example : *Threaded bolt tightened with mortar and Steel mounting link with mortared bolt* as used in the ZERI Pavilion 2000 (Bamboo Connections 2002)

These techniques have certain considerations which might influence the structural integrity of the material.

If a hole is drilled it should not be drilled straight through the culm, always mark the holes and drill from opposite sides of the culm (Schröder 2009). Splintering often happens when the drill passes from the interior towards the exterior of the culm.

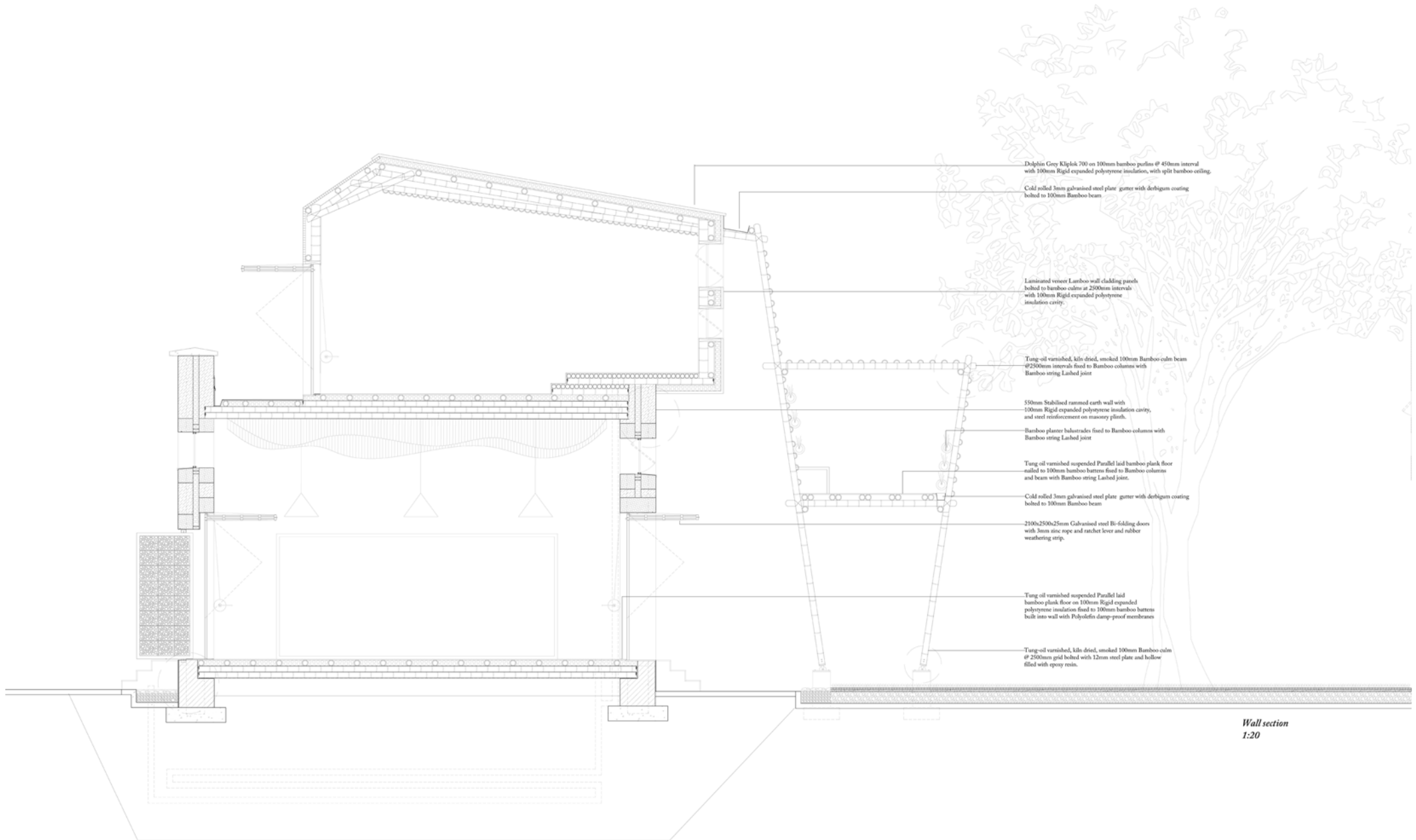
Mortar is often used as an infill for the hollow core between two nodes where the joint is, for example where a threaded steel rod is placed. Mortar however has a high alkalinity and this will eat away at the organic material of the Bamboo (Minke 2012).

Thus an alternative to stabilise the rod in the hollow core is proposed, such as an epoxy resin or expanding urethane foam. This adds the extra stability in the core for the steel rods or bolts.



Wall Section  
1:20

Figure 125 : 1:20 Section development , Author (2015)



Wall section  
1:20

Figure 126 : 1:20 Section development, Author (2015)

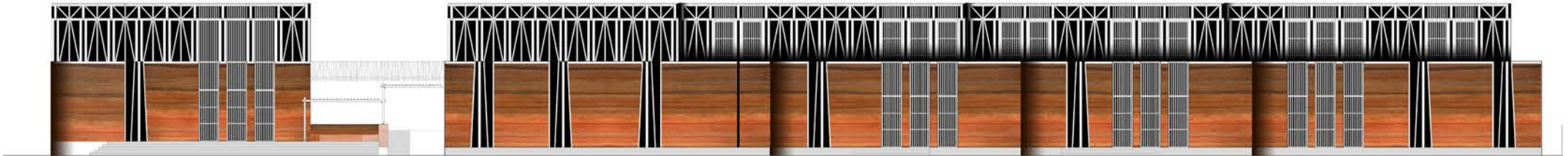
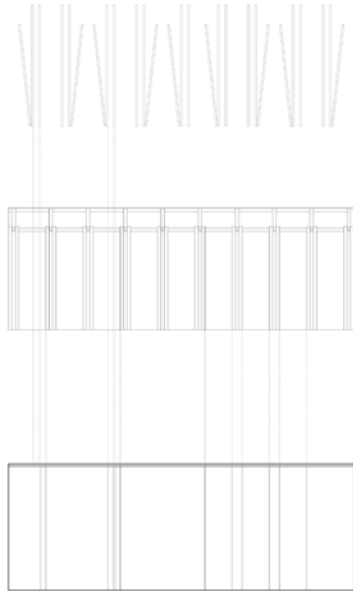


Figure 127 : *Elevation development , Author (2015)*



### *Elevation development and iterations:*



The exploration of the elevation was found to be of great value in the design process, yet only became possible after a greater understanding of the materials had been achieved. This allowed the designer to explore the monolithic condition of the rammed earth walls and how the structural rhythm of the Bamboo related to the monolithic through door and window openings.

**Rhythm A:** The structural bamboo elements, representing the light tectonic classrooms of the ephemeral on the first floor, consists of 150mm diameter bamboo culms spaced at 1200mm intervals. This was applied to the monolithic Rhythm C to determine openings.

**Rhythm B:** 75mm Bamboo culms to act as extra bracing and celebrate the dynamic vertical qualities of Bamboo as a material. The spacings inbetween again informed the window and glazed openings of the Monolithic Rhythm C.

Diagonal slits are proposed to be relief elements to announce a change in programme of the internal spaces.



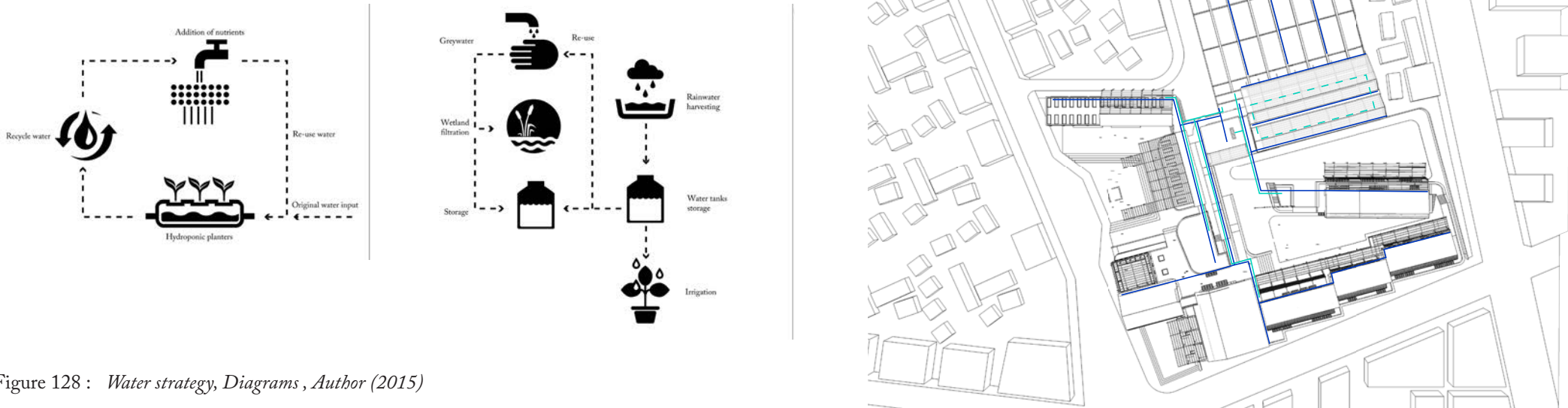


Figure 128 : *Water strategy, Diagrams , Author (2015)*

### 7.5.1 Hydroponics:

*Hydroponics is a branch of agriculture where plants are grown without the use of soil (Full Bloom Hydroponics 2015).*

The use of Hydroponics and water harvesting strategy, is to aid in the introduction of Biophilic design and to reduce the project and it's users dependency on the municipal water supply.

Nutrients are dissolved in water and plant roots are in contact with the solution. Plant root systems are supported by alternative mediums to soil, such as Rockwool or Perlite (*Full Bloom Hydroponics 2015*). Thus the plant root systems come into contact with more oxygen and nutrients, improving the growth rate (by 25%), quantity (by 30%) and growth quality of the plants (*Turner 2015*).

Because the plants are grown in a closed system, evaporation and loss of water is less than water used for soil planted crops (*Turner 2015*).

The proposed system to be used in the project would make use of the Nutrient Film Technique. NFT has a continuous flow of nutrient solution over the plant roots. The planters are at a slight incline to make use of gravity for flow to take place (*Simply Hydro 2015*).

Considerations when working with hydroponic systems: (*Turner 2015*)

- It is recommended that the nutrient solution in the reservoir gets changed every 2 to 3 weeks.
- The water temperature should be regulated through heating or cooling.
- The nutrient solution should be aerated with use of an air pump.
- The pH balance of the nutrient solution must be regulated (*Full Bloom Hydroponics 2015*).

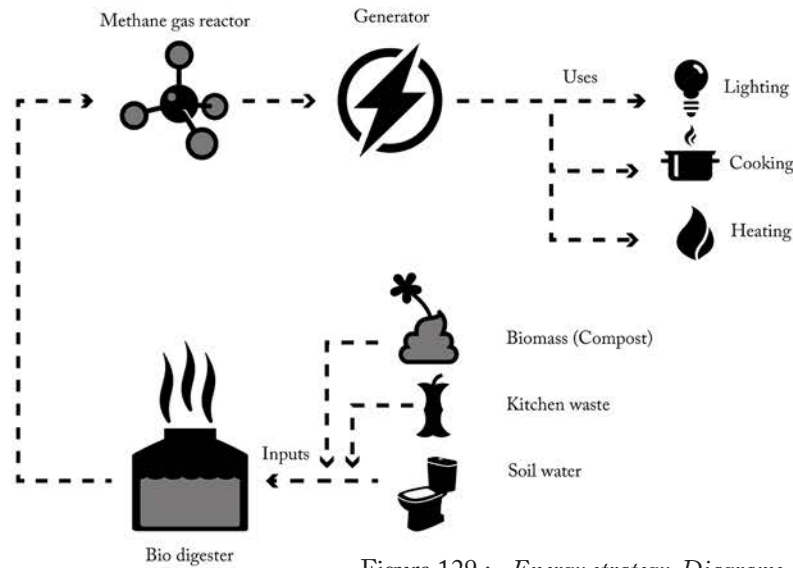
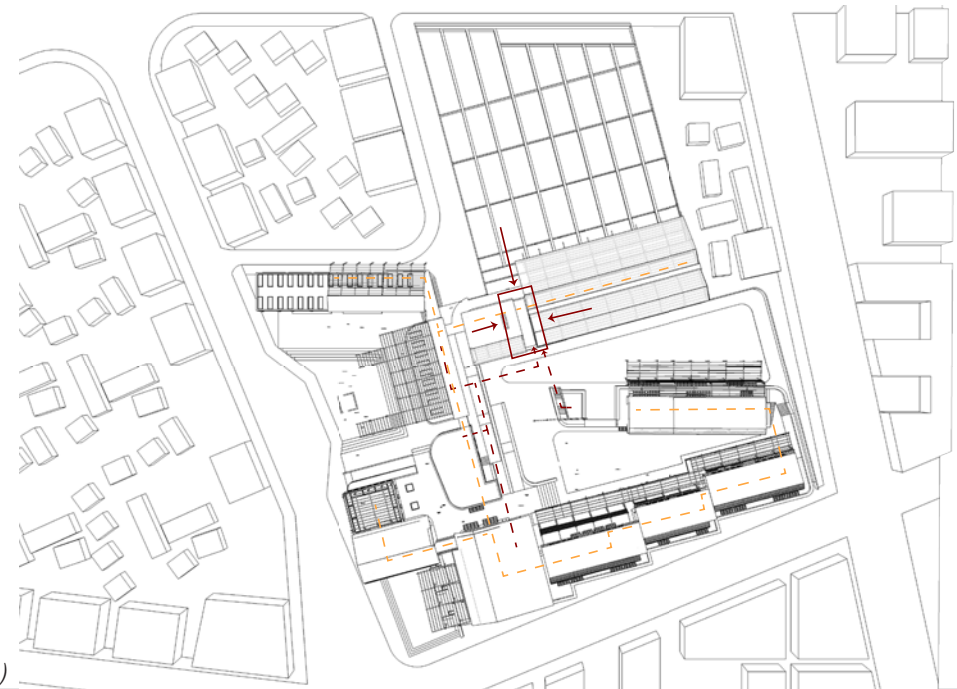


Figure 129 : *Energy strategy, Diagrams , Author (2015)*



### 7.5.2 Biodigester:

Biodigesters allow for a self-sustaining alternative energy generating process, which would empower the users by reducing their dependency on grid electricity. Thus adding to the layer of a sustainable and empowering structure in the context of Phomolong.

Biodigesters decompose organic material through the use of bacteria in an anaerobic environment. The process produces a mixture of methane and carbon dioxide, called biogas. Biogas can be used as a renewable energy source, as well as bi-products which are produced can be used as fertilizer (SRC.sk.ca 2015)(Simgas 2015).

Biodigesters can be fed any organic material including sewage water, though some materials have a higher biomass quantity which releases more energy during decomposition (SRC.sk.ca 2015) (Simgas 2015).

Biogas can be used in a methane generator to generate electricity for cooking and heating, allowing for a sustainable alternative to grid electricity (SRC.sk.ca 2015) (Simgas 2015).



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*Final Presentation*

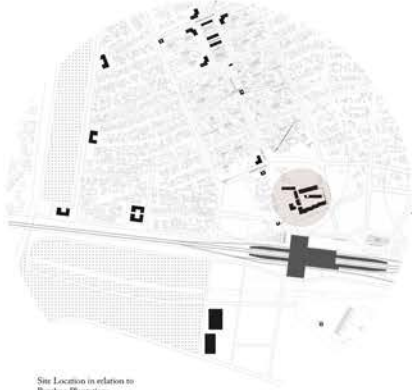


Context and Site Location

Networks

Issues

Intentions



Site Location in relation to Bamboo Plantations



The daily exodus: The faceless masses



Networks that are left behind



Create a place for the Collective



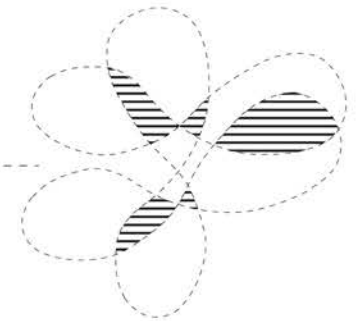
Site Location in relation to Greenview Station



Network Identification: The 3 generations



The disconnection between the formal and informal



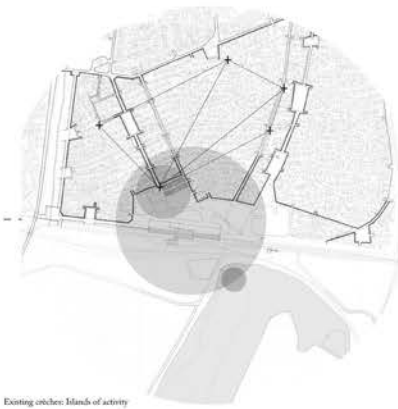
Make allowance for different social economies and networks to overlap, reconnecting the community



Existing fabric of site



The Forgotten: Children and Elderly dependents



Existing niches: Islands of activity

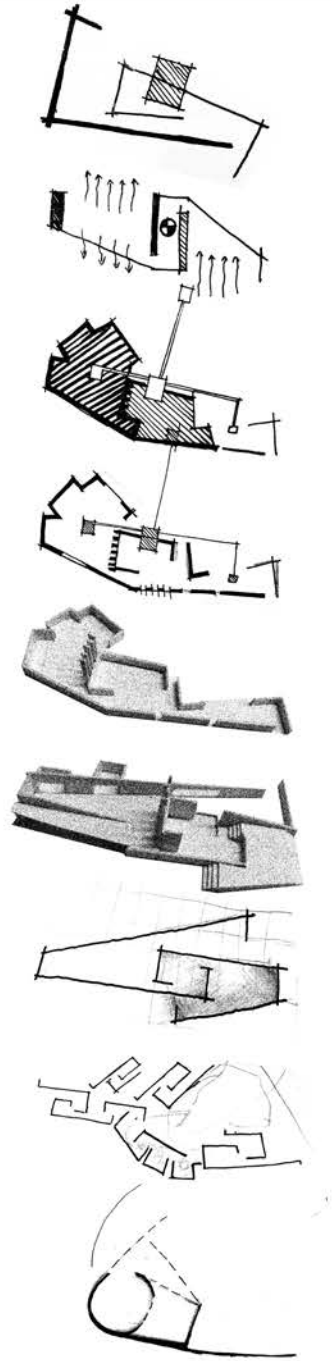


Finding a gap in the self-made fence





Diagrammatic development and approach



Existential knowledge as an approach



Existential knowledge through listening

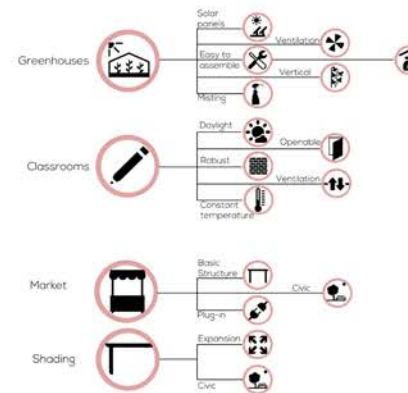
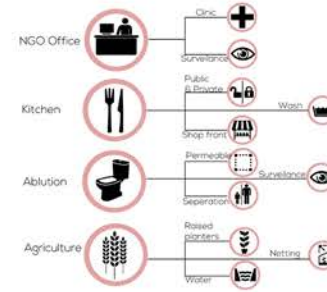


Existential knowledge through observation

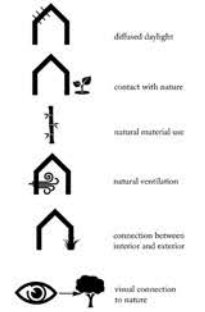


Existential knowledge through participation

Programmatic approach



Biophilic and sustainable approach

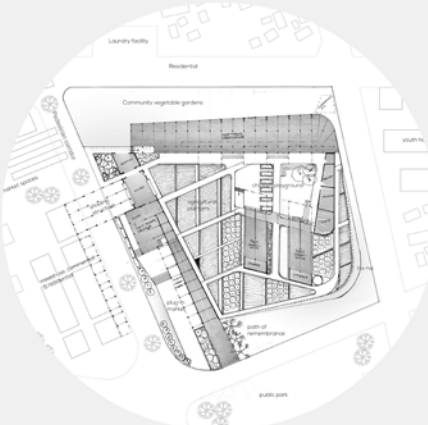




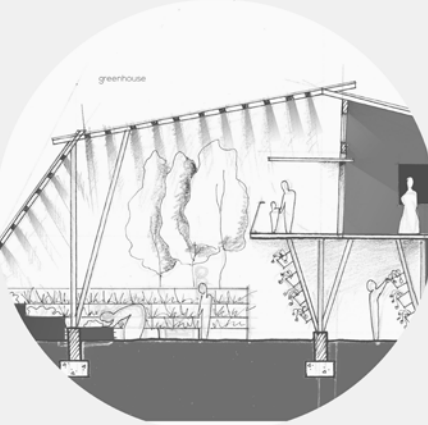
### Design Iteration 1



Movement and spatial intention diagrams



Ground floor plan



Section

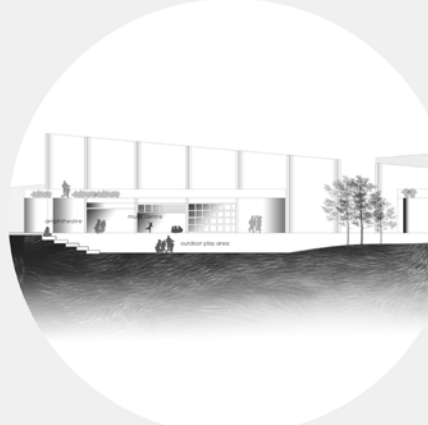
### Design Iteration 2



Movement and spatial intention diagrams



Ground floor plan



Section

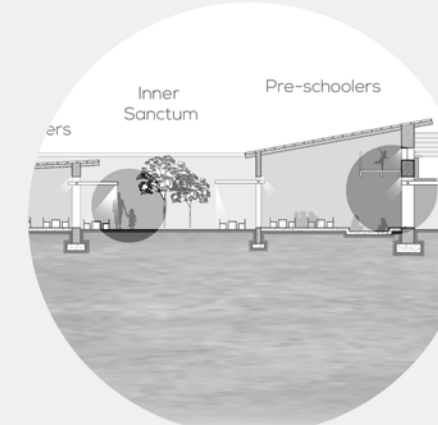
### Design Iteration 3



Movement and spatial intention diagrams

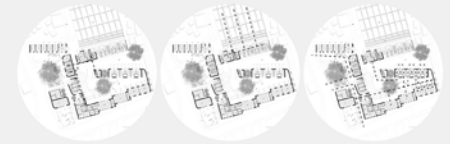


Ground floor plan



Section

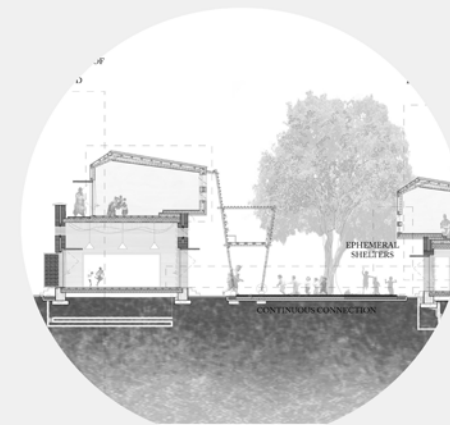
### Design Iteration 4



Movement and spatial intention diagrams



Ground floor plan



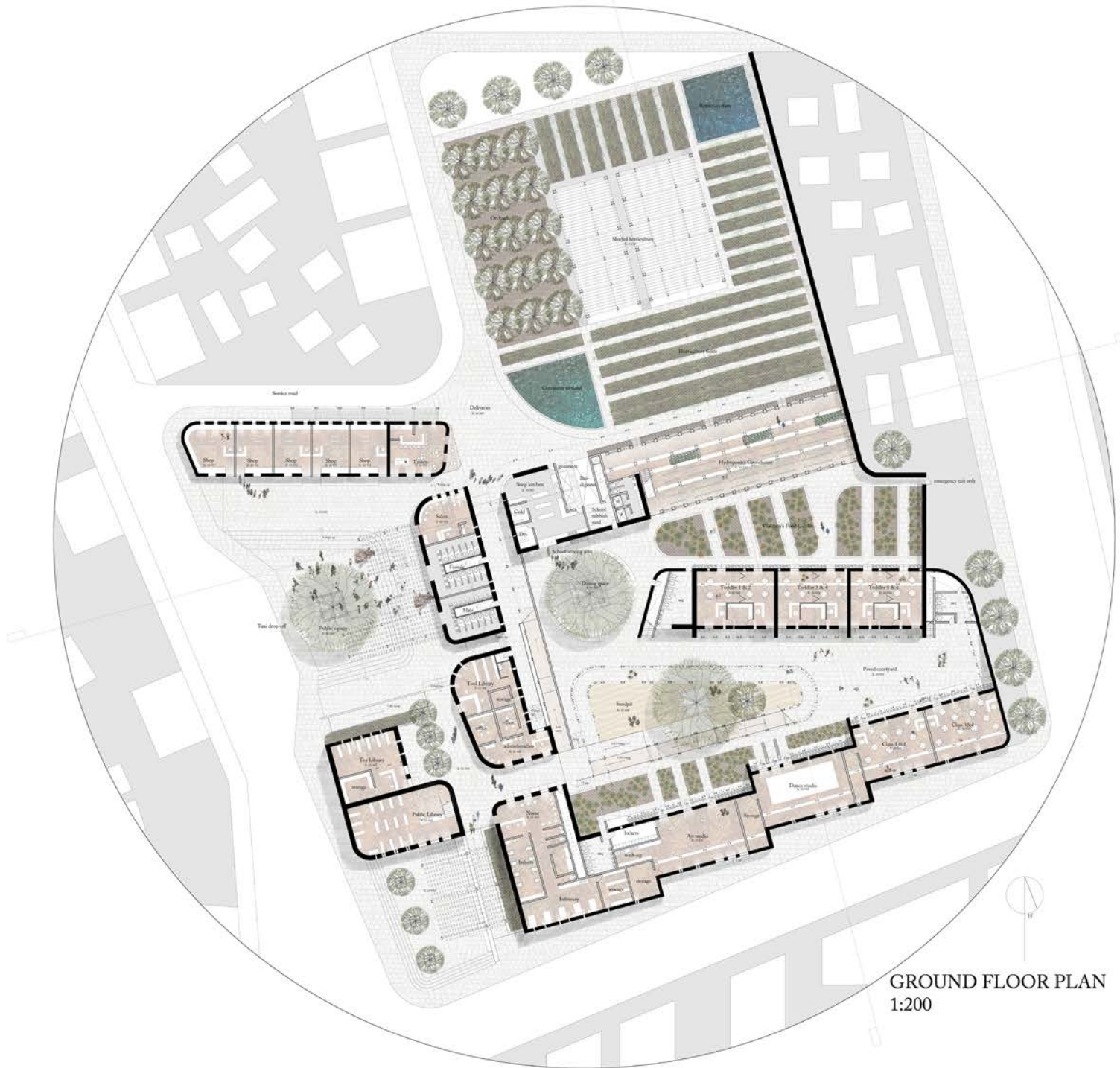
Section

The design focused on the collective space where Carthian could take place, a greenhouse structure on the Western edge with a pool of reflection, introducing the concept of Biophilia to the public, with a route of remembrance which would exit into the public park. The Western edge allowed control but however lacked permeability. There was a lack of attention paid to the permanent uses, the children and the elderly caretakers and their daily rituals and routines. The design considered a control point and the public realm as one leg of the design and the crèche as another leg of the design, separating the two. There was however a lack of control over the edges and response to context.

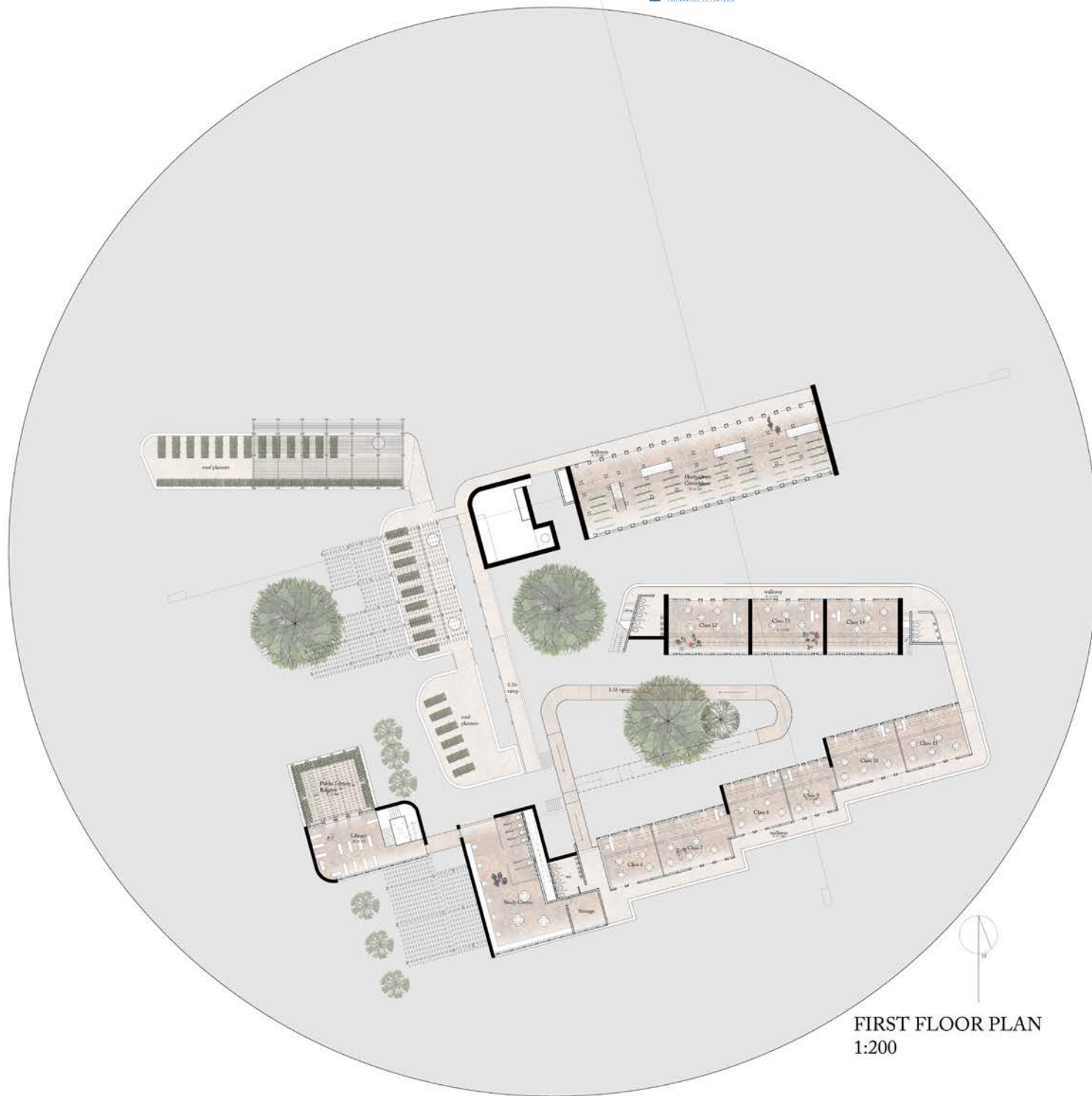
The design tried to further develop the matriarchal space, yet it lacked control and spaces were too dispersed for children to be able to navigate successfully. The proposed classrooms, offered interesting spaces for the children and were inserted into the greenhouse structures as a method of introducing the children to natural spaces, which made it a forced and uncomfortable solution, with no clear hierarchy of space. The exaggerated greenhouse structures were dominating and foreign. The circular structures were merely extrusions of the plan and were not designed volumetrically.

During this iteration, the proposed context was adapted and the movement through space became the main driver of the design. The investigation led to the different thresholds and social spaces, thus the definition between Public, semi-private and private realm started to become more controlled. The design started to consider architecture as a flow of social systems creating economies and the public square started to become more controlled.

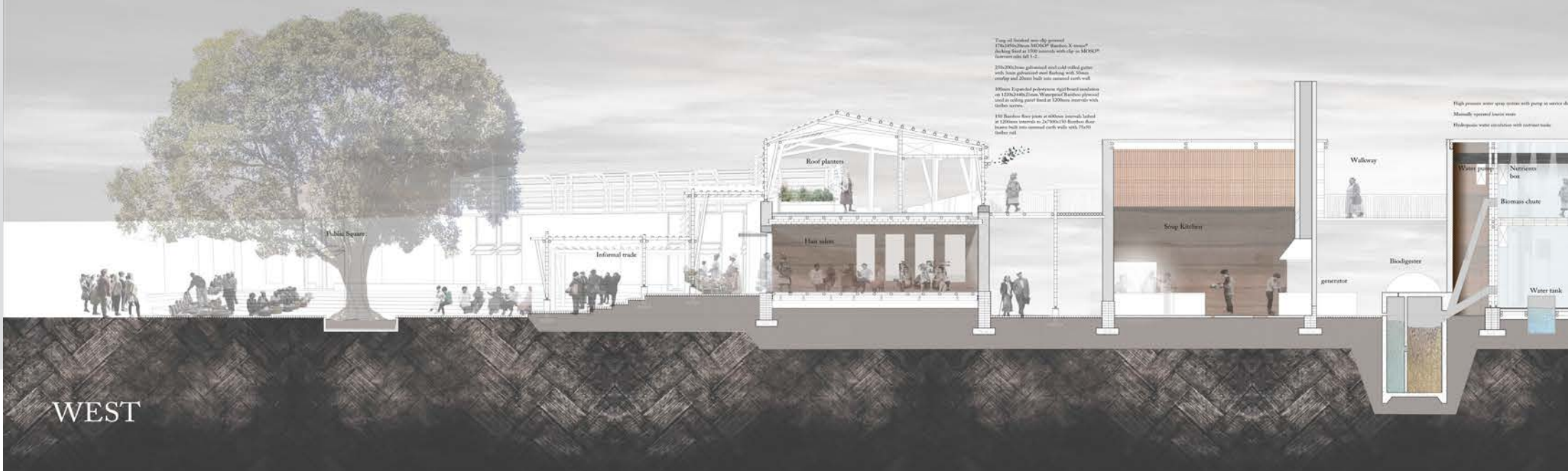
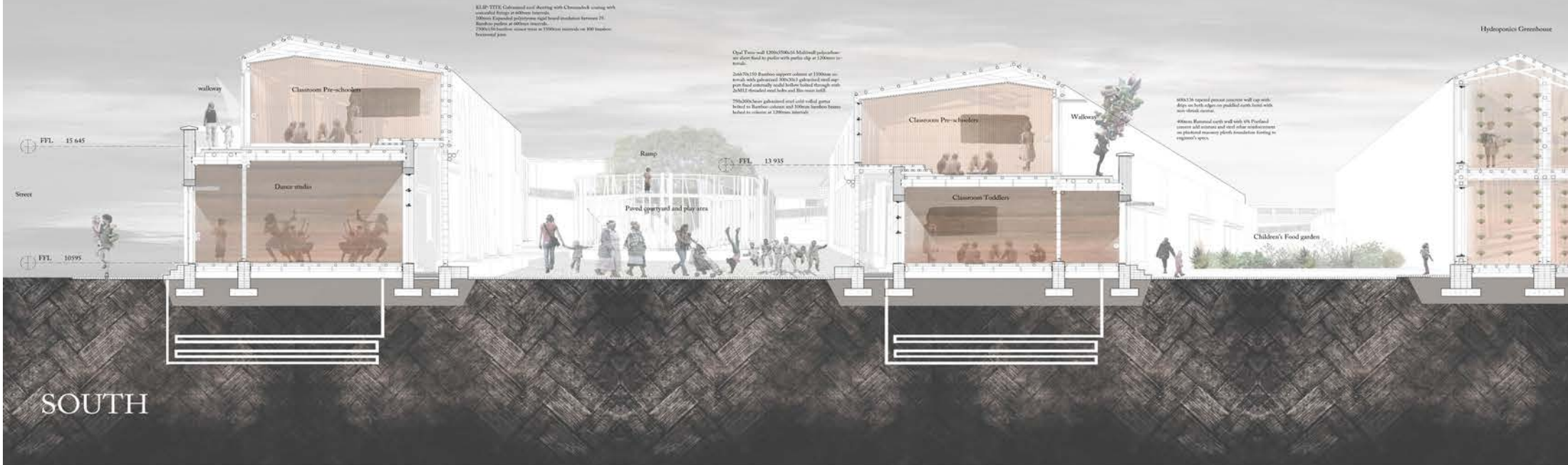
A new meeting place with enough resonance (memory) of the types of shops surrounding the previous meeting space (the Apollo light). The square becomes the public interface of the scheme. Areas of passive surveillance include the shop owners, and the kitchen area from the public space. The public user's route becomes a celebrated edge condition, where one can buy fresh produce, converse and interact with other residents on a daily basis. Hence a communal place is created, which has the possibility to strengthen the collective memory.

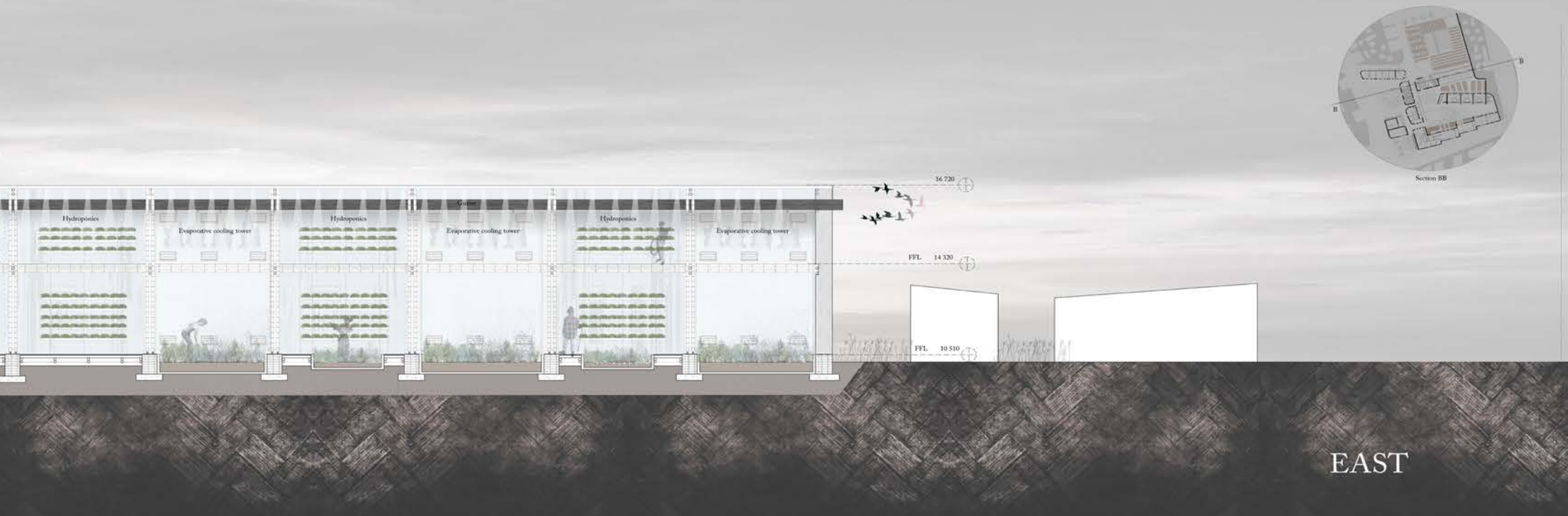
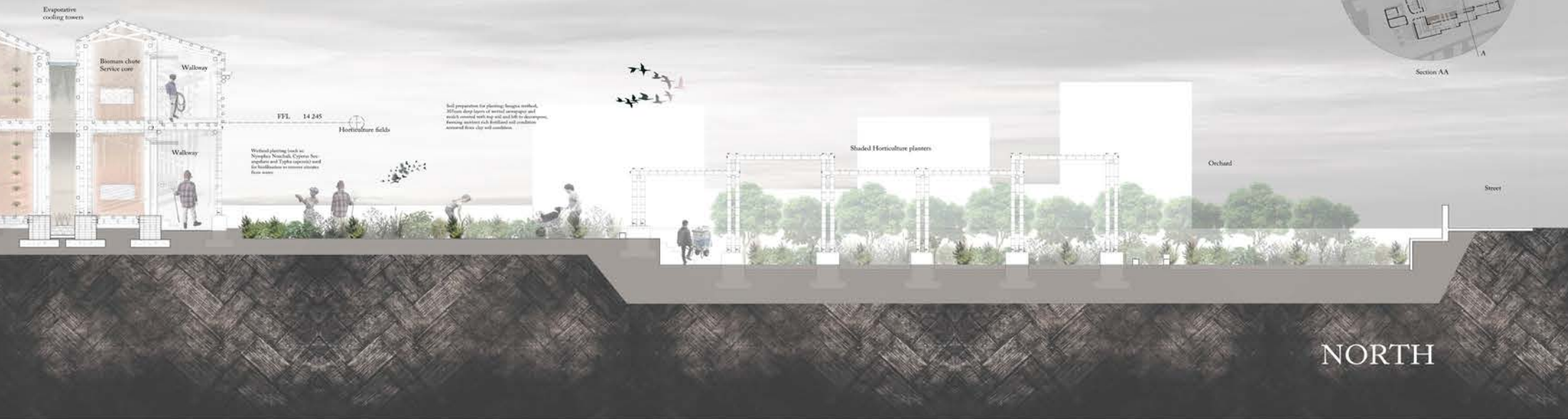


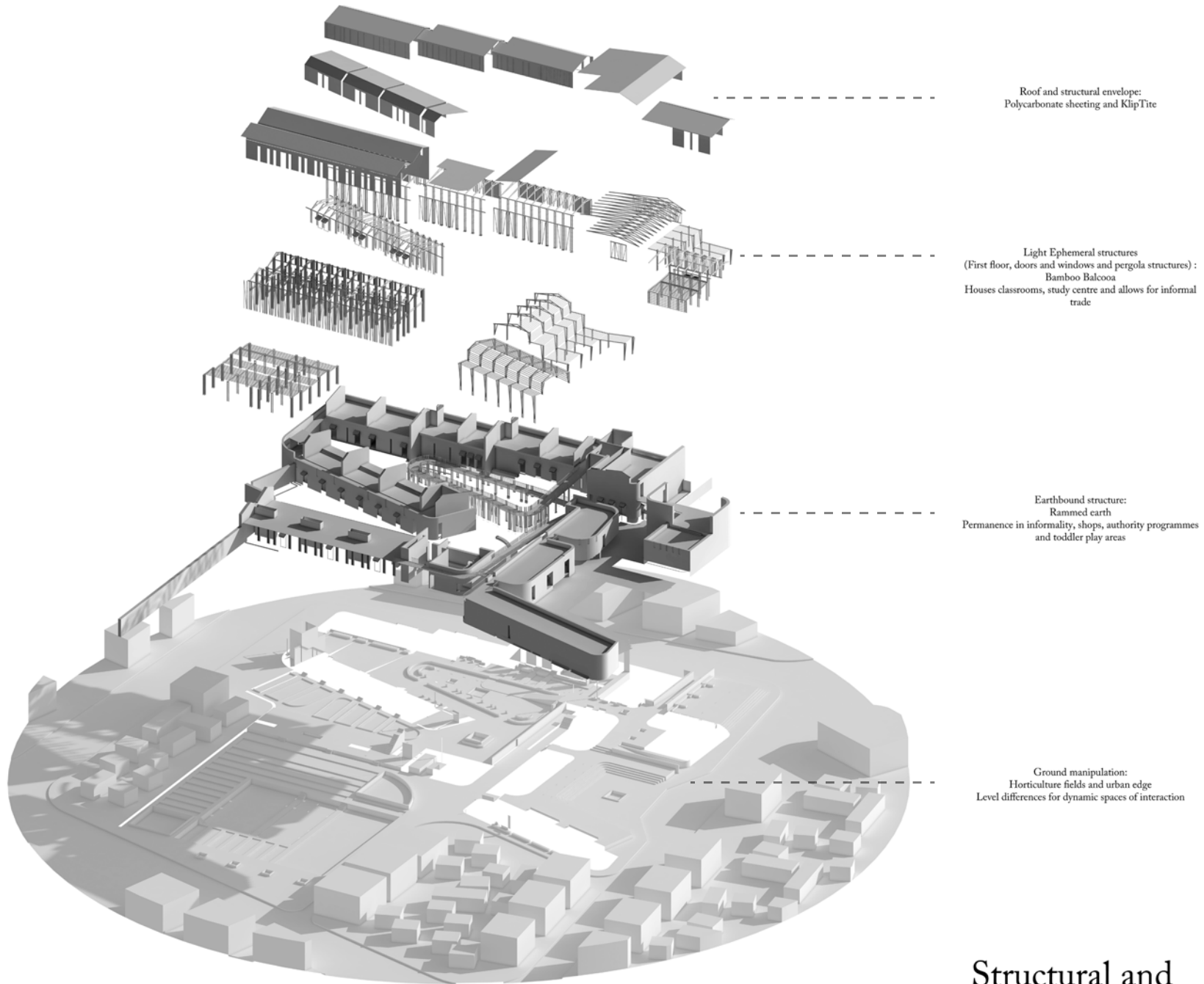
GROUND FLOOR PLAN  
1:200



FIRST FLOOR PLAN  
1:200

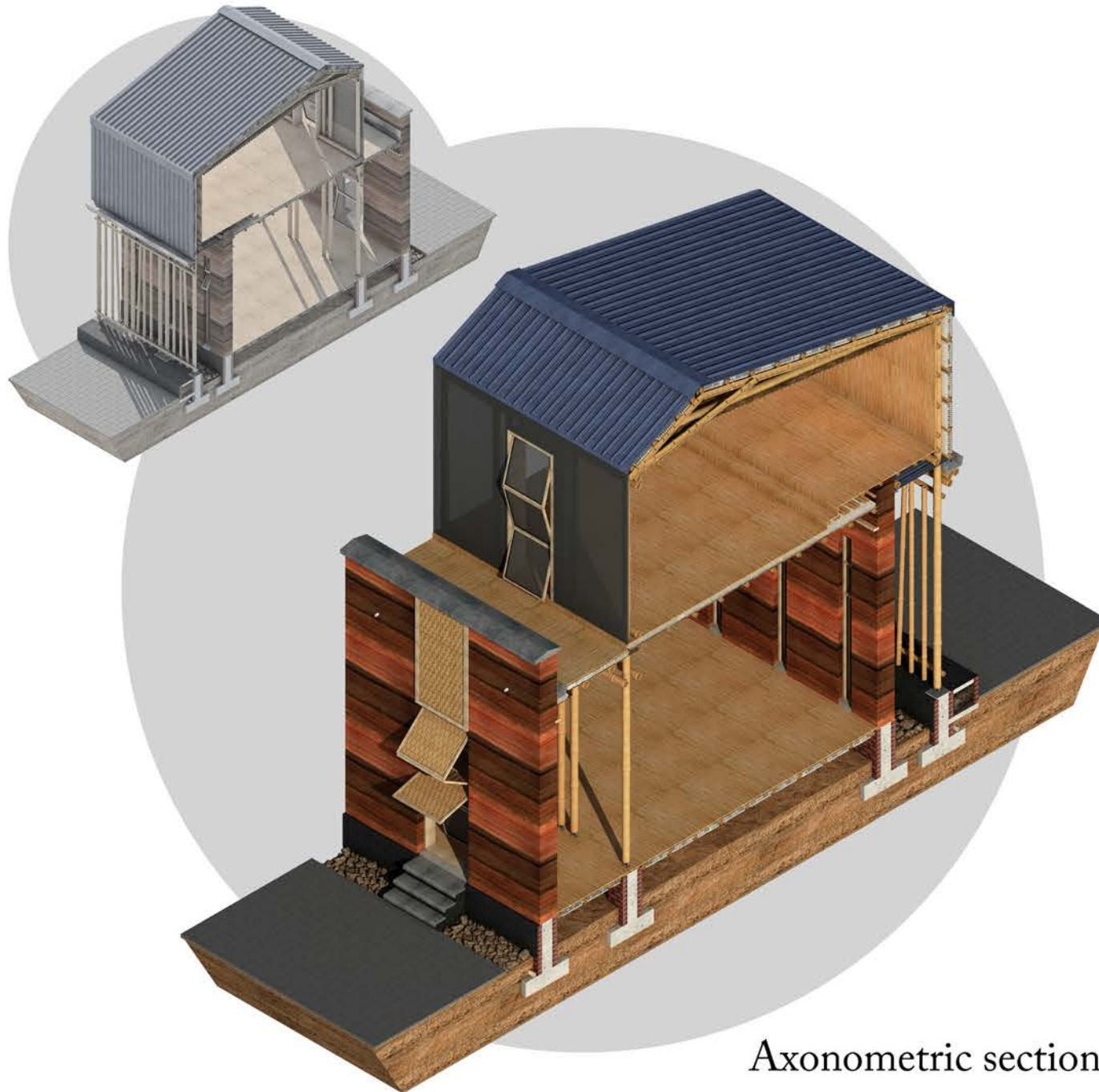




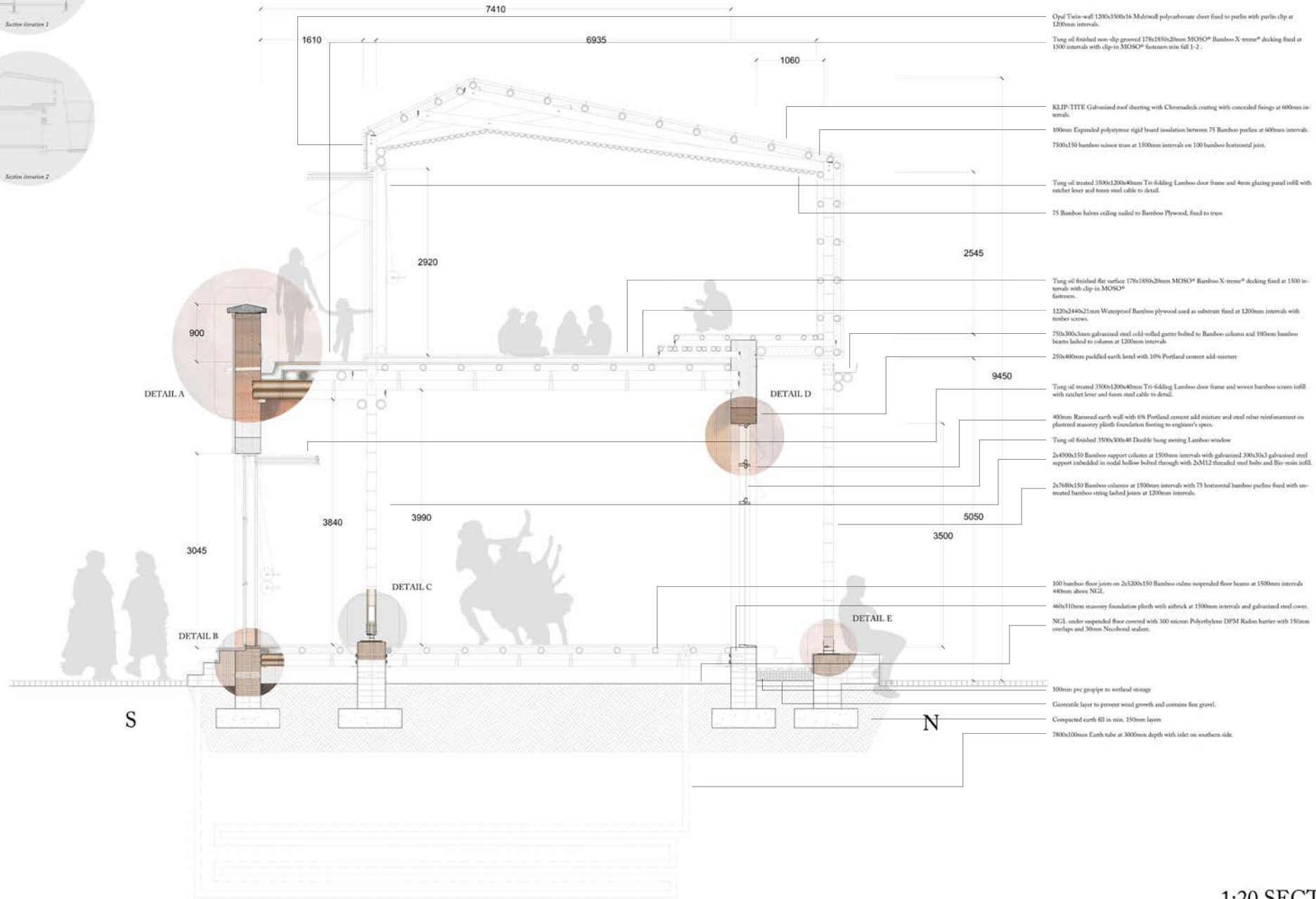
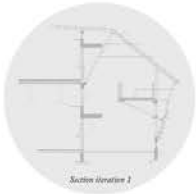


## Structural and programmatic layering





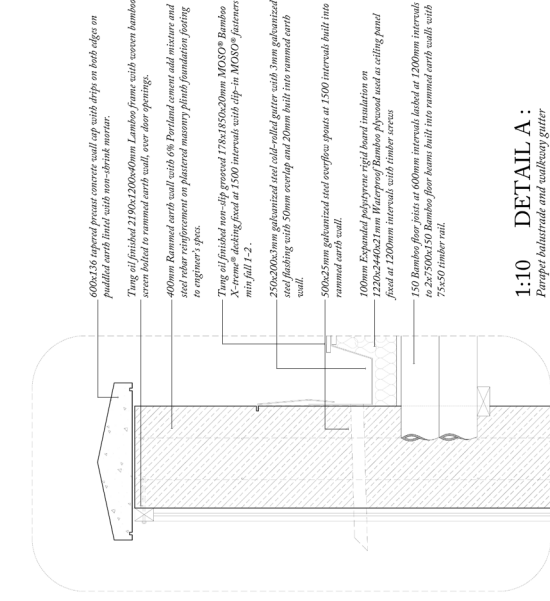
Axonometric section



**General Specifications:**  
 All Bamboo used to be of species Bamboo Rakosa, Kils dried and smoked with steel cable ties factored around open ends of culms for reinforcement and to prevent splitting. Open ends to be sealed with Entropy Resin or SuperSap.  
 Harvested stormwater collected from surface and roof runoff cleaned through wetland filtration.

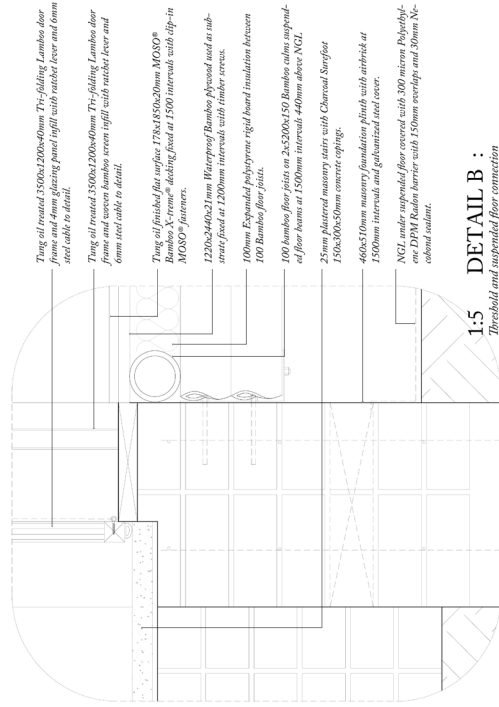
- Opal Twix-wall 1200x350x16 Multiswall polycarbonate sheet fixed to purlin with purlin clip at 1200mm intervals.
- Tung oil finished non-slip grooved 178x185x20mm MOSO® Bamboo X-treme® decking fixed at 1500 intervals with clip-in MOSO® fasteners min fall 1:2.
- KLP-TITE Galvanized roof sheeting with Chromadeck coating with concealed fixings at 600mm intervals.
- 100mm Expanded polystyrene rigid board insulation between 75 Bamboo purlins at 600mm intervals.
- 7500x150 bamboo scissor truss at 1500mm intervals on 100 bamboo horizontal joint.
- Tung oil treated 3500x1200x40mm Tri-folding Lamboo door frame and 4mm glazing panel infill with ratchet lever and 6mm steel cable to detail.
- 75 Bamboo habes ceiling nailed to Bamboo Plywood, fixed to truss.
- Tung oil finished flat surface 178x185x20mm MOSO® Bamboo X-treme® decking fixed at 1500 intervals with clip-in MOSO® fasteners.
- 1220x2440x21mm Waterproof Bamboo plywood used as substrate fixed at 1200mm intervals with timber screws.
- 750x300x3mm galvanized steel cold-rolled gutter bolted to Bamboo column and 100mm bamboo beams lashed to column at 1200mm intervals.
- 250x400mm puddled earth level with 10% Portland cement add-mixture.
- Tung oil treated 3500x1200x40mm Tri-folding Lamboo door frame and woven bamboo screen infill with ratchet lever and 6mm steel cable to detail.
- 400mm Rammed earth wall with 6% Portland cement add mixture and steel rebar reinforcement on plastered masonry plinth foundation footing to engineer's specs.
- Tung oil finished 3500x300x40 Double hung awning Lamboo window.
- 2x4500x150 Bamboo support column at 1500mm intervals with galvanized 300x50x3 galvanized steel support imbedded in nodal hollow bolted through with 2xM12 threaded steel bolts and 8x-rein infill.
- 2x7680x150 Bamboo columns at 1500mm intervals with 75 horizontal bamboo purlins fixed with untreated bamboo string lashed joints at 1200mm intervals.
- 100 bamboo floor joists on 2x5200x150 Bamboo culms suspended floor beams at 1500mm intervals 440mm above NGL.
- 460x310mm masonry foundation plinth with airbrick at 1500mm intervals and galvanized steel covers.
- NGL under suspended floor covered with 300 micron Polyethylene DPM Radon barrier with 150mm overlaps and 30mm Neobond sealant.
- 100mm pvc geotextile to wetland storage.
- Geotextile layer to prevent weed growth and contains fine gravel.
- Compacted earth fill in min. 150mm layers.
- 7800x100mm Earth tube at 3000mm depth with inlet on southern side.

1:20 SECTION



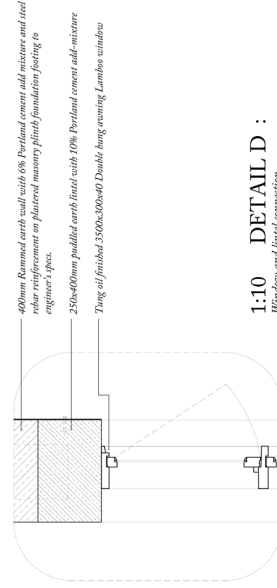
- 600x150 tapered precast concrete wall cap with strips on both edges on pulldown earth finish with non-slip deck finish.
- Tung oil finished 2100x1200x40mm Lambo frame with woven bamboo screen bolted to rammed earth wall, over door openings.
- 400mm Rammed earth wall with 6% Portland cement add mixture and steel reinforcement on plastered masonry plinth foundation footing to engineer's spec.
- Tung oil finished non-slip grooved 178x1850x20mm MOSO® Bamboo X-treme® decking fixed at 1500 intervals with slip-in MOSO® joistners in full 1-2.
- 250x200x5mm galvanized steel cold-rolled gutter with 3mm galvanized steel flashing with 50mm overlap and 20mm built into rammed earth wall.
- 500x25mm galvanized steel roofline spouts at 1500 intervals built into rammed earth wall.
- 100mm Expanded polystyrene rigid foam insulation on 1200x240x21mm Walf of Bamboe plywood deck and ceiling panel fixed at 1200mm intervals with timber struts.
- 150 Bamboe floor joists at 600mm intervals lashed at 1200mm intervals to 2x500x150 Bamboe floor beams built into rammed earth wall with 75x50 timber rail.

**1:10 DETAIL A :**  
Parapet balustrade and walkway gutter



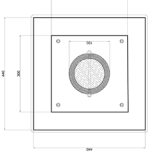
- Tung oil treated 3500x1200x40mm Tri-folding Lambo door frame with stainless steel hinge with rubber feet and 6mm steel cable to detail.
- Tung oil treated 3500x1200x40mm Tri-folding Lambo floor frame and woven bamboo screen rigid with rubber feet and 6mm steel cable to detail.
- Tung oil finished flat surface 178x1850x20mm MOSO® Bamboe X-treme® decking fixed at 1500 intervals with slip-in MOSO® joistners.
- 1200x240x21mm Waterproof Bamboe Plywood used as substrate fixed at 1200mm intervals with timber struts.
- 100mm Expanded polystyrene rigid foam insulation between 100 Bamboe floor joists.
- 100 Bamboe floor joists on 2x500x150 Bamboe culms suspended of floor beams at 1500mm intervals 400mm above NGL.
- 25mm plastered masonry walls with Charcoal Surfcoat 150x300x50mm concrete coping.
- 460x510mm masonry foundation plinth with atride at 1500mm intervals and galvanized steel cover.
- NGL under suspended floor covered with 300 micron Polyethylene DPM Radon barrier with 150mm overlap and 30mm Neocoland isolant.

**1:5 DETAIL B :**  
Threshold and suspended floor connection

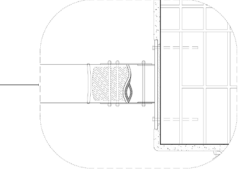


- 400mm Rammed earth wall with 6% Portland cement add mixture and steel rebar reinforcement on plastered masonry plinth foundation footing to engineer's spec.
- 250x400mm pulldown earth lintel with 10% Portland cement add mixture
- Tung oil finished 3500x300x40 Double long opening Lambo window

**1:10 DETAIL D :**  
Window and lintel connection



2x760x150 Bamboe upper column at 1500mm intervals with galvanized 300x300x galvanized steel upper fixed externally metal hollow bolted through with 2xM12 threaded steel bolts and Bit-resin infill.



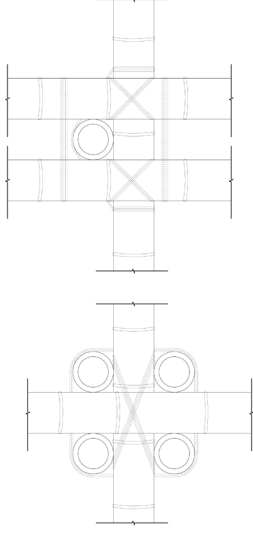
2x760x150 Bamboe upper column at 1500mm intervals with galvanized 300x300x galvanized steel upper fixed externally metal hollow bolted through with 2xM12 threaded steel bolts and Bit-resin infill.

**1:10 DETAIL E :**  
External column jointing with pivot

**1:10 DETAIL C :**  
Internal fixed column jointing

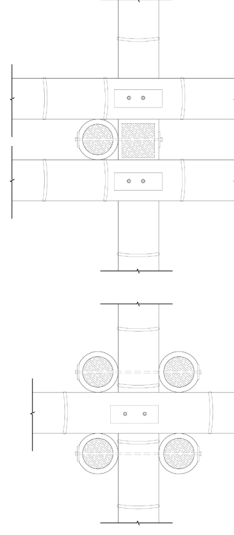
**General specification:**  
All open joints to have steel cable tie or similar reinforcement to prevent splitting

Typical materials used for lashing of joints:  
Kedars, bamboo fibre string and zinc or galvanized steel wire



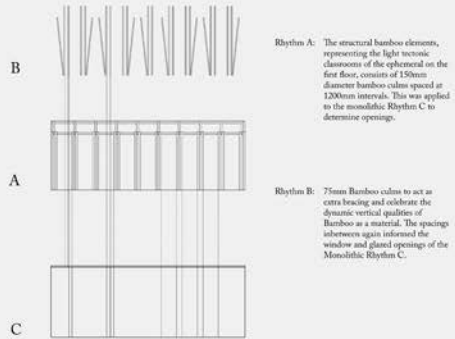
**1:10 DETAIL F :**  
Typical lashed joint between column and floor beam

Alternatives to epoxy resin as infill for internal hollows:  
Poly-urethane foam  
Bit-resin (Starb based)  
Water table inserts  
PVC pipe inserts



**1:10 DETAIL G :**  
Bolted column and floor beam connection

## Elevation design



## Calculations



Costs of construction											
Component	QTY	Material	Unit	Rate	Subcontractor	Rate	Quantity	Rate	Subcontractor	Rate	Quantity
Foundation	1000	Concrete	m <sup>3</sup>	1500							
Structure	1000	Concrete	m <sup>3</sup>	1500							
Roofing	1000	Concrete	m <sup>3</sup>	1500							
Windows	1000	Concrete	m <sup>3</sup>	1500							
Doors	1000	Concrete	m <sup>3</sup>	1500							
Plumbing	1000	Concrete	m <sup>3</sup>	1500							
Electrical	1000	Concrete	m <sup>3</sup>	1500							
Painting	1000	Concrete	m <sup>3</sup>	1500							
Landscaping	1000	Concrete	m <sup>3</sup>	1500							
Site work	1000	Concrete	m <sup>3</sup>	1500							
Professional fees	1000	Concrete	m <sup>3</sup>	1500							
Contingency	1000	Concrete	m <sup>3</sup>	1500							
Subtotal	1000	Concrete	m <sup>3</sup>	1500							
Tax	1000	Concrete	m <sup>3</sup>	1500							
Total	1000	Concrete	m <sup>3</sup>	1500							



Energy needs				
Appliance	Power	Hours per day	Watts per hour	Watts per day
Refrigerator	150	24	3600	86400
Freezer	150	24	3600	86400
Washing machine	150	1	3600	3600
Dishwasher	150	1	3600	3600
Water pump	150	1	3600	3600
Lighting	150	10	3600	36000
TV	150	1	3600	3600
Computer	150	1	3600	3600
Water pump	150	1	3600	3600
Total				203520
Watts per day				203520
Watts per month				6105600



	Target from previous month	Mean point	Greywater used	Greywater point	Agriculture	Left over in tank
January	0	577.3	131	131	222	124
February	345.1	586.3	160.5	160.5	160.5	244.3
March	316.2	616.9	139	139	161	306.9
April	550.3	271.9	131	131	131.4	309.5
May	1022.5	18.5	131	131	131.4	361.6
June	967.6	49.2	131	131	131.4	361.7
July	881.2	24.4	131	131	131	294.7
August	382.7	64.8	131	131	131.4	420.7
September	679.9	190.5	131	131	131.2	387
October	602	349.4	131	131	131.2	357.4
November	767.4	541.7	131	131	212.9	554.5
December	1099.2	345.1	131	131	222	346.1

Table size: 100xL

### Rammed earth:

**Data:**

Mixture of sand, gravel, clay and concrete. (stabilised rammed earth)  
250mm rammed earth, 100mm insulation, 250mm rammed earth wall has a combined R-value of 3.2 m<sup>2</sup>K/W

**Precautions to take when working with rammed earth:**

- Rammed earth wall should be built on a plinth at a min. of 225mm above the NGL.
- Steel reinforcement should be used
- A weep hole should be provided for the cavity insulation
- a min. 300mm overhang should be provided for the external wall face
- A rock drain should be provided for water back splash from the pavement

**Construction method:**

1. Foundation footing and brick plinth is constructed
2. DPC placed between brick plinth and first layer of earth.
3. A reinforced plywood frame is constructed.
4. A layer of moist earth mixture is poured in.
5. The layer gets compressed and compacted.
6. Next layer is poured and compacted.
7. Puddled earth lintels are placed at window height.
8. A standard size concrete capping with a drip is placed on a puddled earth lintel.



### Polycarbonate sheeting:

Perspex® Polygal (Multiwall Polycarbonate)

**Data:**

- Lets in natural light
- Thermal properties provide insulation, saving on electricity
- Can withstand harsh weather
- Creates a sense of openness and flow while maintaining stability and strength
- Durable and flexible (allows cold bending)
- Available as sheets or as a system solution
- Polycarbonate Glazing accessories also available to compliment the Multiwall sheeting
- Can be screen printed directly onto the sheet allowing limitless options for creating unique spaces
- UV protected to withstand harsh African climate
- 10 year warranty
- Polycarbonate is self-extinguishing



### Bamboo Traditional:

**Data:**

Bamboo Baloca  
Diameter between 100 - 200mm  
Height of 15-20 meters  
Hollow cores divided by diaphragms on nodal intersections  
Tensile strength of mild steel

Needs to be dried and smoked for external resin to become distasteful to insects  
Culms should not be in direct contact with ground.  
Cut below nodes and openings should be reinforced and sealed to prohibit splitting.  
Bamboo stalk strings used to tie bamboo culms to one another.  
Bamboo pegs used as 'bolts'  
Waterproofing is lime wash  
Wet bamboo stalk string, tie around culms and as it dries the string will shrink and tighten, string as same strength as zinc cord.

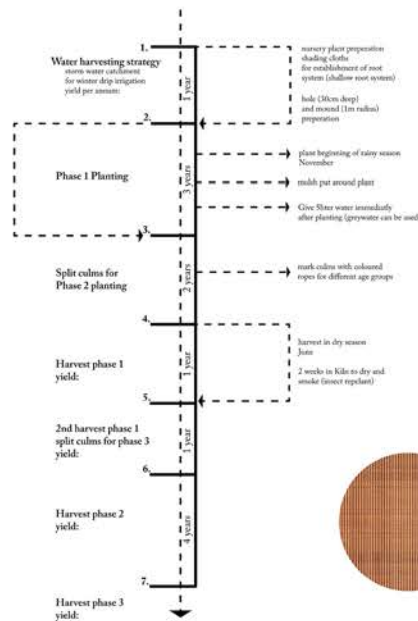


### Bamboo contemporary:

Contemporary connections often incorporate threaded bolts.  
To stabilise the bolt in the hollow core, it is common practice to fill the hollow with mortar. The alkalinity of mortar however eats away at organic material over time.  
Thus an epoxy resin is a better option.

To prevent the cut edge from splitting the epoxy resin will seal and plug the open end.

Other options are galvanised steel caps or cable ties.

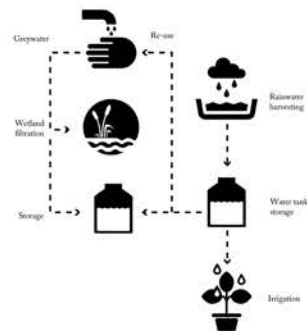
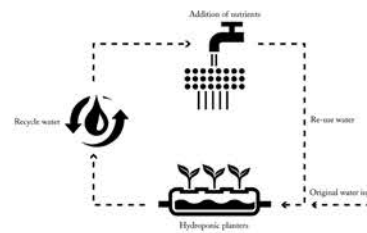
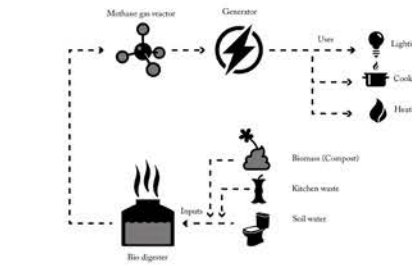
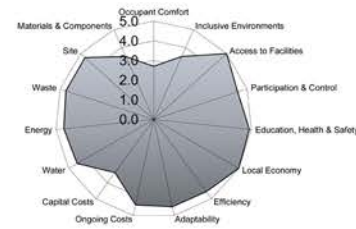


**DATA:**

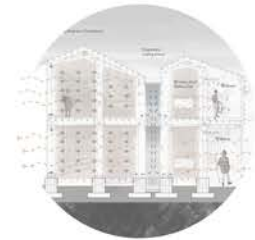
Lifespan:	50+ years with 20-40% harvest
Bamboo baloca clamp can be harvested after:	5 years
Yield:	312 plants/ha @ 20% harvest 473 tms/ha 267 tms/ha biomass per annum
Water needs:	50000 liter per clamp per year
Root Systems:	clumping (non-invasive) running (invasive)
Viable species:	Viola sacred bamboo (clumping) African Alpine Bamboo (clumping) Baloca Bamboo (clumping)
Strength:	Fast growing (1-4 years per harvest) Lightweight (vs steel and concrete) Elastic Multiple uses (construction material, furniture, paper, biomass, biochar)



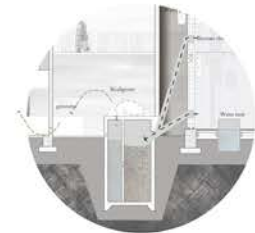
### System strategies:



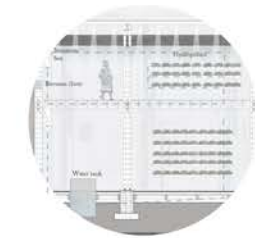
### System application:



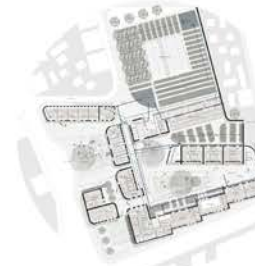
Natural ventilation assisted with evaporative cooling towers



Biogas digester fed with biomass from greenhouse producing methane gas for generator



Recycling of water for hydroponic culture through addition of nutrients



stormwater and roof water runoff and grey-water harvested in wellhead used for irrigation

*View of Horticulture fields  
and Grey water treatment pond*



*Entrance to Kindergarten*



# *Children's dining courtyard*





*Public Square Daily activities*



# Hydroponics Greenhouse



*Public Library balcony*



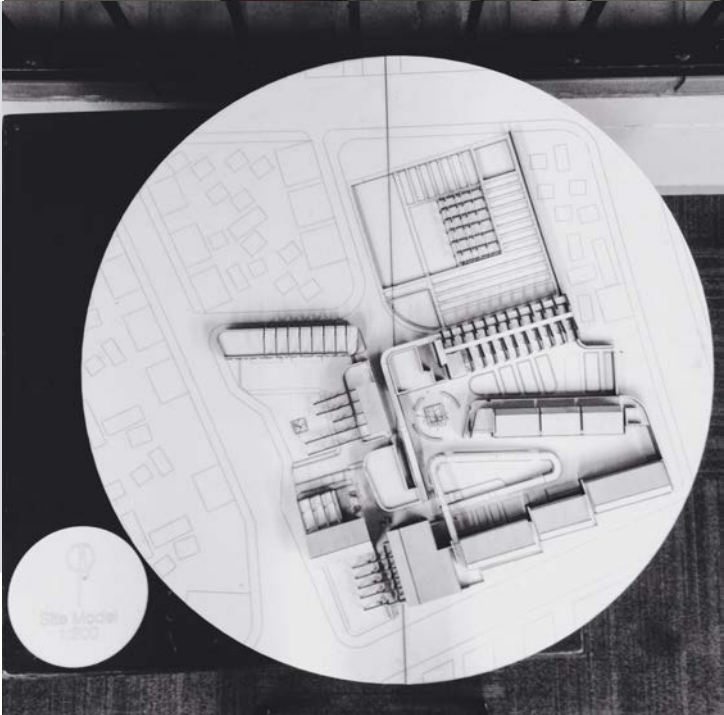
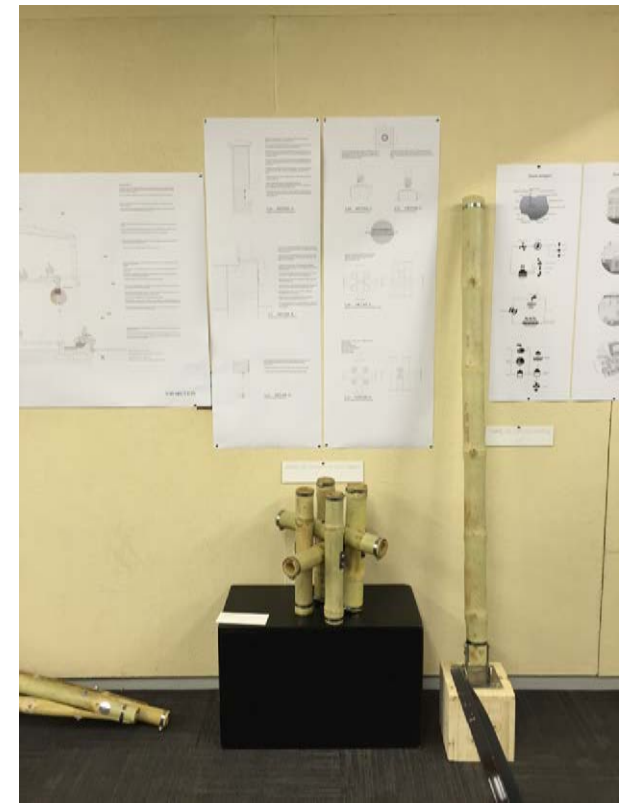
*Children's Courtyard with Sandpit*



*Planters on roof of shops*







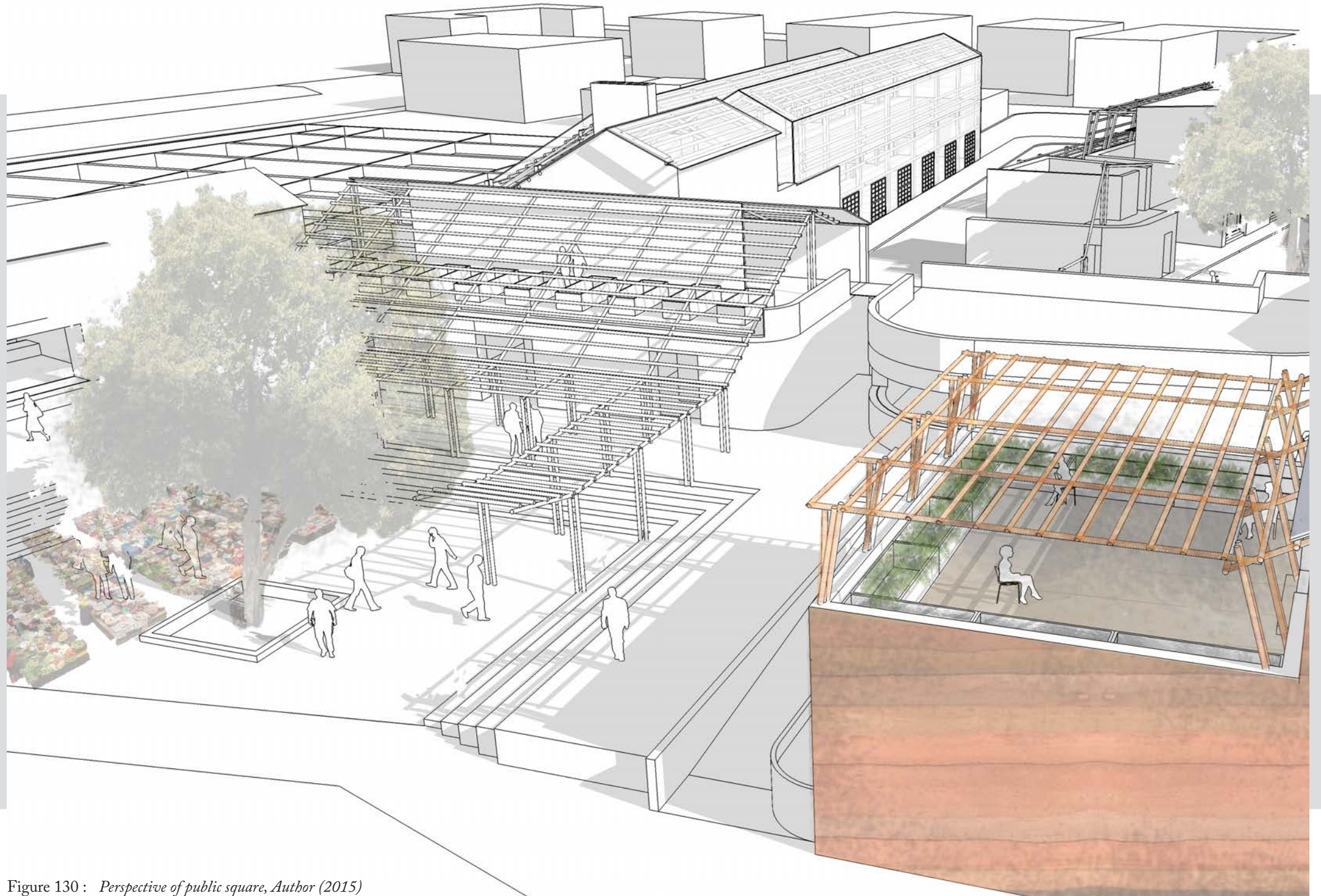


Figure 130 : *Perspective of public square, Author (2015)*



## *Conclusion*

This dissertation was an enquiry into how architecture could aid in the re-seeding of growth of a collective cultural memory, through the creation of a place for the Forgotten networks of Phomolong. This is one of the amorphous spaces in the greater Mamelodi, which experiences the effects of the daily migration of the working class, leaving behind a network of elderly dependents and children. Through the use of a mnemonic system of social spaces, the blurring of the public and private realms aided in the architecture becoming a social system rather than an object which is removed from the collective. The proposed Early Childhood Development centre acknowledges the Forgotten networks and the daily trek of commuters, creating a centralized space from which dispersal takes place. Thereby promoting a dynamic public interface, which enhances the overlapping of social ecotones and the creation of a repository for the collective cultural activity.

The design of the proposed building allowed for an exploration of architecture where social ecotones, nurturing spaces and collective thresholds were the main drivers. It has been established that architecture could provide a platform of reintroducing man to nature through biophilic design attributes and thereby cultivating spaces which promote social activity in the amorphous area. These positive environmental changes are rooted in the physical aspects of the projects spaces on a human scale and materiality choices, creating allowance for the Forgotten networks to become co-creators of their immediate environment, thereby creating a place of empowerment for them. Consequently, every aspect of the architecture, including the construction of the space, places emphasis on the earthbound conditions and the possibility of transition taking place through the passing on of existential knowledge, skills and thereby growth of the collective.

The theoretical premise of place for the collective through mnemonic and ecotone systems, as well as the precedents investigated, indicate that social spaces, activity generators, collective interest (well-being of children) and food production could be layered to create a place for the daily rituals to become a celebrated and dynamic event. The hierarchy and transition of spaces from one another allows the users to understand, on a human scale where thresholds differ and where the public and private realms are divided. The process of growth and cultivation is a visible element which is fed back into the community and aids in the concept of collective growth and biophilia. The result is a layered compilation of different social spaces that are all related either directly or visually, thereby acknowledging the co-dependence of the collective. The building therefore operates as a social system and threshold of different programmes that would normally be separated from each other. The awareness of changing spaces and materiality reminds the users of the process of growth and transformation.

The spaces become a beacon for the collective of transition and growth. Activated by place making, food production and the education of children, the design becomes an interface between the commuters and the Forgotten. A space of Catharsis where all can bring and take from it what is needed. For the children it is a stimulating and interactive environment, for the Elderly a space of empowerment and for the public a space of acknowledgement of their daily rituals. Through the creation of architecture, acknowledging the economic health, social equity, cultural vitality and environmental responsibility of the Forgotten networks of Phomolong.

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## *Appendix*

<i>Table 1:</i>	<i>Schedule of accommodation</i>
<i>Table 2:</i>	<i>Water calculations</i>
<i>Table 3:</i>	<i>Energy calculations</i>
<i>Table 4:</i>	<i>SBAT rating</i>

schedule of accommodation data									
programme	m <sup>2</sup>	Building classification	Sans 10400	users according to Sans	wc needs male	wc needs female	wc needs children	productive m <sup>2</sup>	kg yield/m <sup>2</sup> /day
Formal shops	131	F2	1 person/10 <sup>2</sup> m <sup>2</sup>	13					
Public space	310	A1	1 person/1 <sup>2</sup> m <sup>2</sup>	310	4wc 7uri 6 hwb	11wc 6hwb			
Tavern	53	F2	1 person/10 <sup>2</sup> m <sup>2</sup>	5	seen as shopping complex				
Hairdresser	41	F2	1 person/10 <sup>2</sup> m <sup>2</sup>	4	seen as shopping complex				
Admin	110			4	1wc 1hwb				
Kitchen	76			7					
Hydroponics	621			5				486	1458 <i>(Davey (2010) states hydroponics can yield 3kg/m<sup>2</sup>/day )</i>
Daycare	1241	A3	1 person/5 <sup>2</sup> m <sup>2</sup>	248	<i>NBRI (1977) states 1 wc per 10 children</i>		25 wc 25hwb		
Library	323	C2	1 person/20 <sup>2</sup> m <sup>2</sup>	16	1wc 2 uri 2 hwb	3 wc 2 hwb			
Agriculture	1776			10				1776	12 <i>(Shand (2013) states that 36m<sup>2</sup> can produce 88kg/a)</i>
Nurse and infirmary	168			5	2wc 2hwb 1 bath				
Toy Library	71	C2	1 person/20 <sup>2</sup> m <sup>2</sup>	4	seen as shopping complex				
public toilets	72.6			provided	6wc 10 uri 7 hwb	12wc 7hwb			
tot	4993.6			631					1470
									70, Min personal intake of
									vegetables per day 0.4kg
									3675 <i>Shand (2013)</i>
									people can receive daily intake
									248 children and 28 staff (110.4kg per day)
									can receive food and surplus be sold

	Surplus from previous month	Rain yield	Greywater used	Greywater yield	Agriculture demand	Left over in tank
January	0	571.3	178	178	222.2	349.1
February	349.1	566.3	160.8	160.8	190.7	724.7
March	724.7	418.6	178	178	187	956.3
April	956.3	221.6	172	172	157.4	1020.5
May	1020.5	98.5	178	178	157.4	961.6
June	961.6	49.2	172	172	129.6	881.2
July	881.2	24.6	178	178	111.1	794.7
August	794.7	14.8	178	178	129.6	679.9
September	679.9	108.3	172	172	185.2	603
October	603	349.6	178	178	185.2	767.4
November	767.4	541.7	172	172	212.9	1096.2
December	1096.2	541.7	178	178	222.2	1415.7

Tank size 1500L

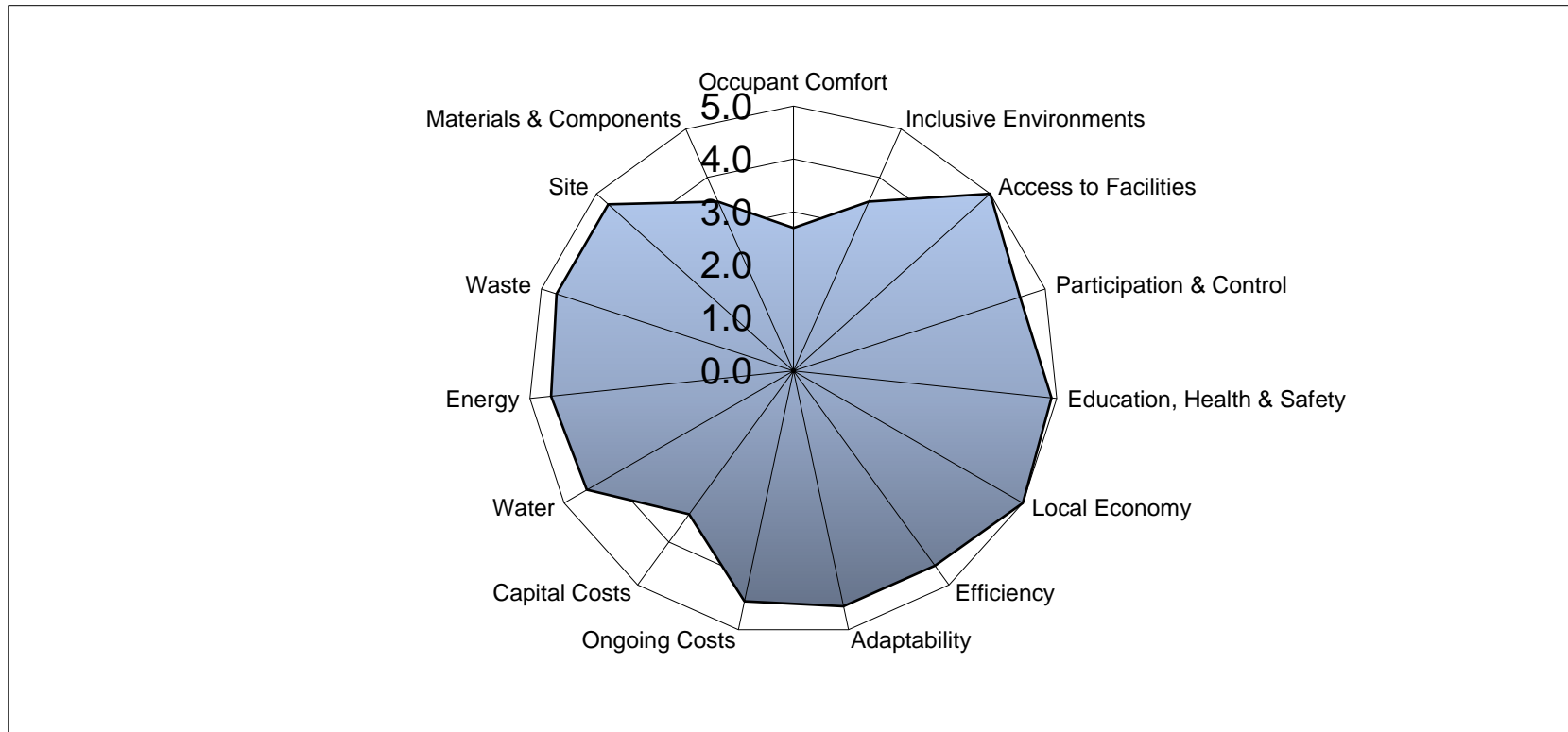
Catchment surface	Area (m2)	Runoff coefficient	Area of catchment weighted
Roof	2002.6	0.9	1802.34
Paving	3902.8	0.8	3122.24
Grasslands	0	0.36	0
Roads	0	0.75	0
Arena			0
<b>Total</b>			<b>4924.58</b>

energy needs					
appliance	amount	watts per appliance	hours per day	kwh usage per day	
geyser	3	2000	3	18	
lights CFL (18)	200	18	8	28.8	
stove plate	16	1500	5	120	
dishwasher	1	2500	0.9	2.25	
washing machine	1	3000	2.25	6.75	
kettle	4	1900	1.8	13.68	
refridgerator	3	250	2	1.5	
freezer	2	105	4	0.84	
computer	5	134	8	5.36	
water pump	2	1000	1	2	
				199.18	total kwh usage per day
				28554.8	kwh biogas produced per day
				28355.6	surplus



# SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

PROJECT		ASSESSMENT	
Project title:	The Forgotten: By-products of the daily exodus	Date:	10/19/2015
Location:	Phomolong, ext. 6 Mamelodi	Undertaken by:	Ursula Kotze
Building type:	Early childhood development centre and feeding scheme	Company / organisation:	UP Architecture dept.
Internal area (m2):	636	Telephone:	Fax:
Number of users:	0	Email:	<a href="mailto:ursulakotze@gmail.com">ursulakotze@gmail.com</a>



**Social** 4.1

**Economic** 4.4

**Environmental** 4.4

**Overall** 4.3

**Classification** Excellent