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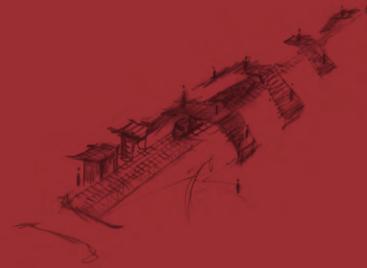
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PLATFORMS of ENGAGEMENT



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This dissertation's core lies in a participative design/build project, held in Slovo Park, Gauteng 2010. Undertaken as a post graduate module, the process of engagement, research, design and construction laid foundation towards critical stance for this dissertation. *(see Illus: 26)*

The Slovo Park Project was followed by a field research trip. The trip was arranged by the author to gain a radical understanding of how contemporary architecturally recognized buildings functioned in the developing context and whether they truly engaged with their environments beyond the building process. *(Appendix Illus: 27, page 174)*

These research projects then set the foundation for the departure point of this dissertation, an exploration into what a truly appropriate architectural intervention in a developing context can be.

The South African population has been experiencing an unprecedented rate of urbanization that has left government bodies struggling to meet the qualitative and the infrastructural demands of the emergent sector in undeveloped areas. **(Todes et al, 2007: 14)**

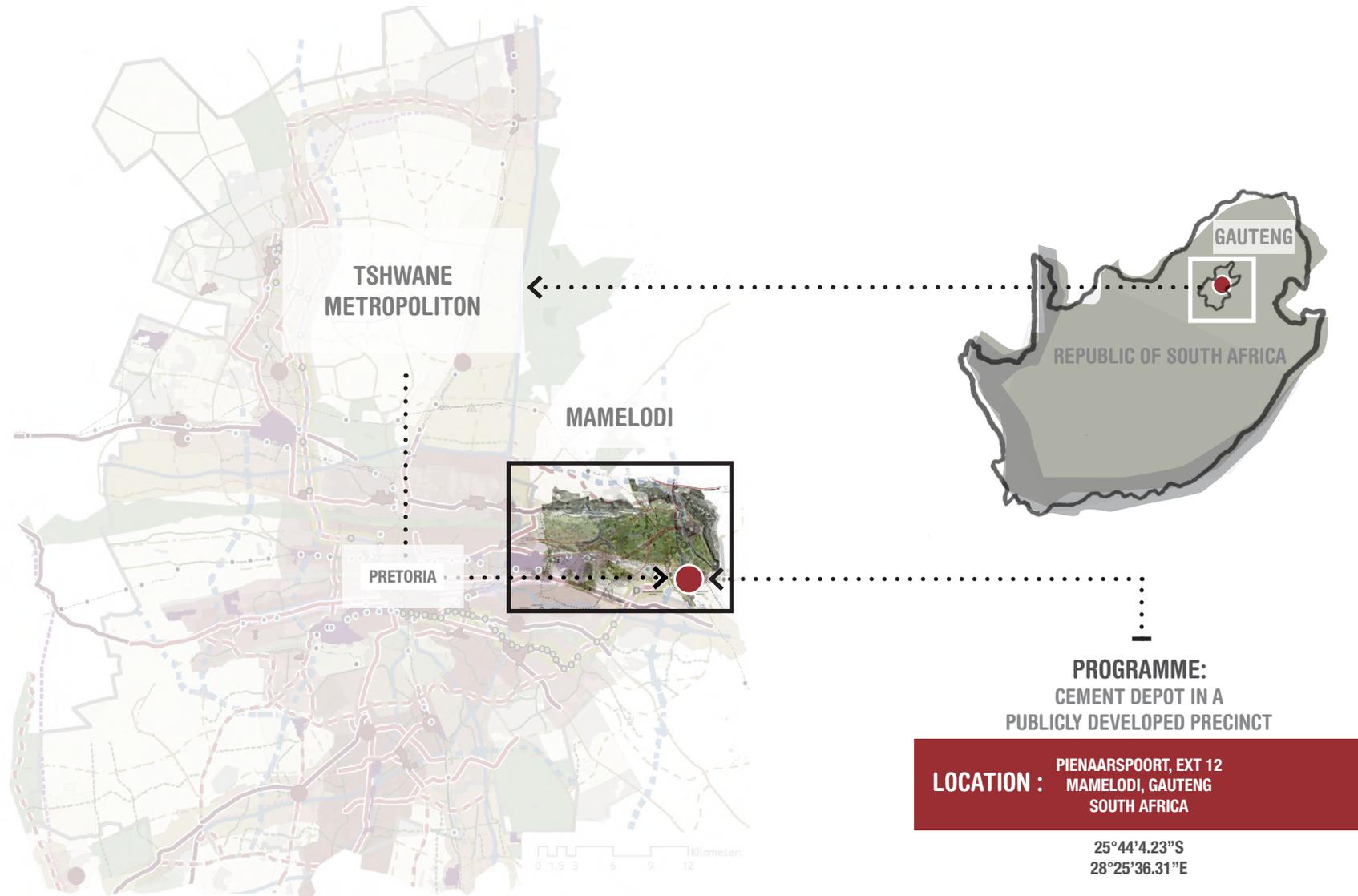
This dissertation aims to focus on the intensive networks found in these developing areas of vulnerability that display strong cohesion due to activities surrounding the production process. The premise presented is that in order to intervene architecturally with these networks, designers should critically engage these networks through participative processes of research, design and ideally construction.

Through the authors own process of engagement, several key Architectural principles for an intervention emerge. Primarily the concept that a built intervention in a vulnerable settlement should first seek to associate itself with a network for its initial survival, and then aim to exist in a symbiotic relationship with this network through a mutually beneficial relationship.

A context specific intervention programme is thus proposed based on the process of engagement, and guided by the observed genius of the site.

What emerges is a piece of architectural infrastructure that aims to facilitate ground-up-growth, while guiding larger scale development. This unit of growth allows network members to take ownership through a self-build building and control system.

This 'Infra-ecture' piece is then hypothetically placed on-site, and a small section of the larger development is explored Architecturally with an identified network as user.



Illus: 2 Location and Programme of Dissertation (Author, 2010)

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GLOSSARY OF TERMS

COMMUNITY - In this dissertation the notion of the community has been replaced by concept of the relationships between people and place within an intangible network.

CRITICAL ACTIVISM - term describing the academic stance on social issues that require objective and productive activist attitude.

GROWN/GROWTH - used in place of development or structural construction. The term growth implies a more organic process of development.

GROUP AREAS ACT - The mandate law segregating the people of South Africa into areas by race, enforced by the government during Apartheid.

NETWORKS - dissertational term used to replace the relationships that currently define 'community'.

RDP HOMES- Reconstruction and Development Programme Government subsidized housing

RESILIENCE - the term indicative to the ability to survive and bounce back from adversity in any form; political, natural social etc. (Hamdi, 2010; 54)

SELF-BUILD/SELF-BUILT - Structures built by inhabitants of permanent materials (bricks, steel or concrete)

SOCIAL CAPITAL - networks and alliances and neighborhoods not easily visible. through quantitative methods of analysis. (Hamdi, pg 80, 2010)

STALLETJIE - roadside stand selling vegetables, cigarettes, airtime e.t.c

MOKHUKU/SHACK/ZOZO - Term to describe temporary housing made from sheet metal or any other 'temporary' material.

URBANIZATION - process of transition from a rural to a more urban society. Statistically, urbanization reflects an increasing proportion of the population living in settlements defined as urban, primarily through rural-to-urban migration.

URBAN GROWTH - increase in the number of people who live in towns and cities, measured either in relative or absolute terms. (UN,2007;6)

URBAN TRANSITION - passage from a predominantly rural to a predominantly urban society. (UN,2007;6)

VULNERABILITY - term used to describing defenselessness, insecurity and exposure to risk, shocks and stress.

Vulnerability stands out as recurrent concerns of people living in poverty which professional definitions of poverty overlook. (Hamdi, 92;2010)

PLAGIARISM DECLARATION

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

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

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

Signature:_____

Jhono Bennett

Chapter 1: Establishing the Platform

‘WE CANNOT CLAIM THAT AS CURRENTLY FORMULATED, THE BULK OF ARCHITECTURE IS IN ANY WAY REPRESENTATIVE OF THE CURRENT STATE OF KNOWLEDGE. THE CHALLENGE IS TO DEVELOP NEW WAYS OF THINKING ABOUT CULTURE, TECHNOLOGY AND THE PROFESSION, NOT MERELY ‘SOFT’ KNOWLEDGE, NOT CLOSED, OBJECTIVE, ABSOLUTE AND OVER DETERMINED, BUT SUBJECTIVE, SITUATIONAL, OPEN AND CONDITIONED BY RECEPTION.

STANLEY MATHEWS

(Mathews;2007;67)

Illus: 3 A new RDP scheme being handed over in Mamelodi, an example of the fluxual dynamics of South Africa’s current Context (Author, 2011)

1.0.1 THE SOUTH AFRICAN DEVELOPMENTAL LANDSCAPE

Noleen Murray, in *Contemporary South African Architecture in a Landscape of Transition*, writes of the current South African paradigm where landscapes in the cities, townships, towns, farmlands and rural homeland spaces are merging, as South African society ‘opens up’ to globalizing forces. (Deckler et al,2006;5)

This condition of ‘opening up’ is fuelling the unprecedented rate of urbanization within the cultures, economic classes and race that are currently intermixing in ways not contextually experienced before.

The effects, both positive and negative, of this exodus are seen not only by the temporal mobile population deemed ‘informal’, but within all divisions of South African Society.

This postcolonial spatial layout of South Africa is considered in the same post modern condition as almost anywhere in the globalizing world where poverty and wealth are becoming increasingly polarized. (Watson, 34; 2001)

These emerging publics are competing with old for resources and access to urban facilities that are in Vanessa Watson’s terms *“More divided than ever”*. Watson,33; 2001

The large gaps that exist between these economic classes contain risk factors that extend beyond social degradation and poor quality of environment, but threaten environmental and health sectors.

1.1 A NEW ROLE FOR THE SPATIAL DISCIPLINES

Thorsten Deckler argues that South African cities have become sites of debate for critical engagement of the re-configuring and remixing of identities – racial, gender, spatial and more. (Deckler Et Al,2006;9)

Within this debate Architectural interventions are expected to be more responsive, more responsible and consider more than ever their effects on future resources both tangible and intangible.

The debate shifts the focus away from built structures as iconic objects of architecture, to issues of structure supporting culture and identity within the social political context in which these structures are made and used.

According to Murray, there no longer appears to be space for the idealistic visionary projects that previously characterized the modernist approach to architecture. (Murray et al, 2007;24)

1.2 ENVIRONMENTS OF FLEXIBILITY AND FLUIDITY

Within a developing context, spatial professionals are now expected to design buildings in spaces that are by traditional definitions considered ‘fluid’ – as is the case of informal settlements, housing, or socially programmed houses through apartheid segregation and the like. (Deckler et al,2006,8)

In reference to these areas of fluxual development, Murray comments that it is impossible to ignore the ways in which architecture continues to give form to what Foucault calls the spaces of ‘Heterotopia’.

These Heterotopic spaces are seen in the simultaneously mythic and real spaces that remain exclusionary, ‘privileged’ and spaces of that are under utilized – those of ‘deviation’. (Deckler et al,2006: 6)

In order to engage with and understand these spaces of deviation and exclusion an approach that goes against ‘business as usual’ is required.

An alternative set of parameters that define a brief is needed to break this paradigm.



Illus: 4 Mamelodi residents moving temporary home to make way for RDP (Author, 2011)

1.3 A CRITICAL STANCE

In order to determine these parameters a critical and informed stance on the current social developmental issues is needed by spatial professionals.

Quilian Riano, the founder of DSGN AGNC (Design Agency), writes of his encounters inactivism in architecture. He notes the 'anxiety' around the notion, but explains how at its roots, this stance on design stems from modernism. (Riano, 2010)

He explains in his work how designers like Teddy Cruz, Marjetica Potrc, the late Sam Mockbee, Urban Think-Tank, and Elemental Do-Tank have learned the lessons from the earlier efforts and seem to be rethinking the meaning of activism.

Similar ideas in practice are seen locally in groups such as 26'10 South Architects, Harbor & Associates, Asiye eTafuleni, ARC Architects (Cape Town) and FEDUP to name a few.

The types of projects and methods employed by these groups, locally and internationally, have begun to reveal what Riano is terming, 'an emerging movement of *Critical Activists*'. (Riano, 2010)

The most important attribute that can be found among these groups is the desire to architecturalize these conditions with active designs that rely on genuine inhabitant participation.

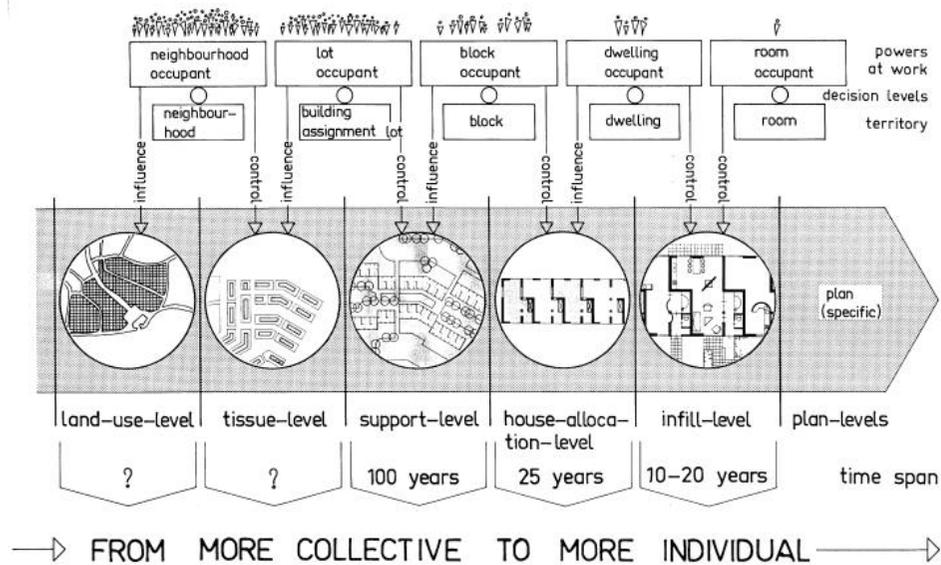
1.4 SUPPORT AND INFILL

What can be noted from the architecturalized products of these spatial professionals was an undercurrent concept in their work, classifiable under the contemporary design term of 'support and infill' architecture and planning.

This term, stemming from John Habraken's 1972 publication of *Supports: An Alternative to Housing in London*, outlines a strong conceptual notion embracing participatory and systematic processes of design and construction that is currently one of the more appropriate techniques with regard to critical engagement with developing contexts. (see Illus: 6)



Illus: 5 The author involved in a process of critical engagement in Slovo Park (Author, 2010)



Illus: 6 **Frame and infill hierarchies as described by Habraken** (Habraken, 2011: http://www.habraken.com/html/downloads/type_as_a_social_agreement.pdf)

*Ignorance is liberating
Start where you can: never say can't
Imagine first: reason later
Be reflective: waste time
Embrace serendipity: get muddled
Play games, serious games
Challenge consensus
Look for multipliers
Work backwards: move forwards
Feel good*

Illus: 7 **Poem of participation ethos by Nabeel Hamdi** (Hamdi, 2010)

1.5 CRITICAL ENGAGEMENT AS A STARTING POINT

Noleen Murray states that within this debate the scope of spatial professionals has extended beyond traditional tools of the spatial disciplines and now includes addressing the subjectively described 'messy' field of engagement by professionals in the spatial disciplines. (Murray et al, 2007: 23)

Within the current unprecedented growth rate in the peri-urban areas, spatial strategies that embrace participative and critical design will have to adapt to the increasing rural movement to metropolitan areas.

Through this critical engagement professionals can begin to address the aforementioned issues from the grass roots levels and tap into one of developmental process's more difficult to harness, but more powerful, resources described by Nabeel Hamdi as *Social Capital*. (see Illus: 7)

1.6 POTENTIAL IN SOCIAL CAPITAL

The resource of social capital is possibly one of the most under-utilized assets in the South African development context, displayed in the collective energy that can be seen in the rapid growth of South Africa's planned and unplanned settlements.

The problems faced nationally today will only be solved with the energy of the human collective represented by individuals on-site.

1.7 POINT OF DEPARTURE

This dissertation aims to engage with the inherent social capital that exists within the cohesive networks in the developing context of Mamelodi, Gauteng.

Through a process of engagement, a review of strengths, weaknesses and opportunities will lay the foundation towards designing an intervention that will seek to exist in balance with its contextual network.

The aim being that an Architectural Intervention can be designed to not only engage with such a network, but through a symbiotic relationship enhance both the building and its host network.

1.8 DISSERTATION OVERVIEW

CHAPTER 1 - The dissertation process begins as an investigation into what defines the term 'community' in the developmental context of South Africa.

CHAPTER 2 - The concept of participation in design/research is explored and a process of participation is defined.

CHAPTER 3 - The participatory research is illustrated, followed by a set of key findings in terms of network strengths, weakness and opportunities. This process also revealed the core themes of the context, to be used for the intervention.

A niche intervention is then defined.

CHAPTER 4 - An overview of 3 precedent studies followed by a summarized look at the history of 'frame and infill' buildings.

CHAPTER 5 - A thorough analysis of the context, its future plans and the dissertation framework, in which the end design is situated.

CHAPTER 6 - The on-site research, analysis and conceptual exploration is combined to determine the nature of the intervention and how it should function in its context.

A unit of growth is designed.

CHAPTER 7 - The unit of growth is then tested against the findings from the previous chapters and hypothetically 'grown' on-site. A focussed look at the architectural manifestation of the unit with the initial host user is then explored further.

CHAPTER 8 - The technical resolution of the unit and the architectural manifestation of its growth is further explained and quantified.

CHAPTER 9 - A conclusion is drawn and reflected upon. This chapter contains the background to further research, analysis and project possibilities.

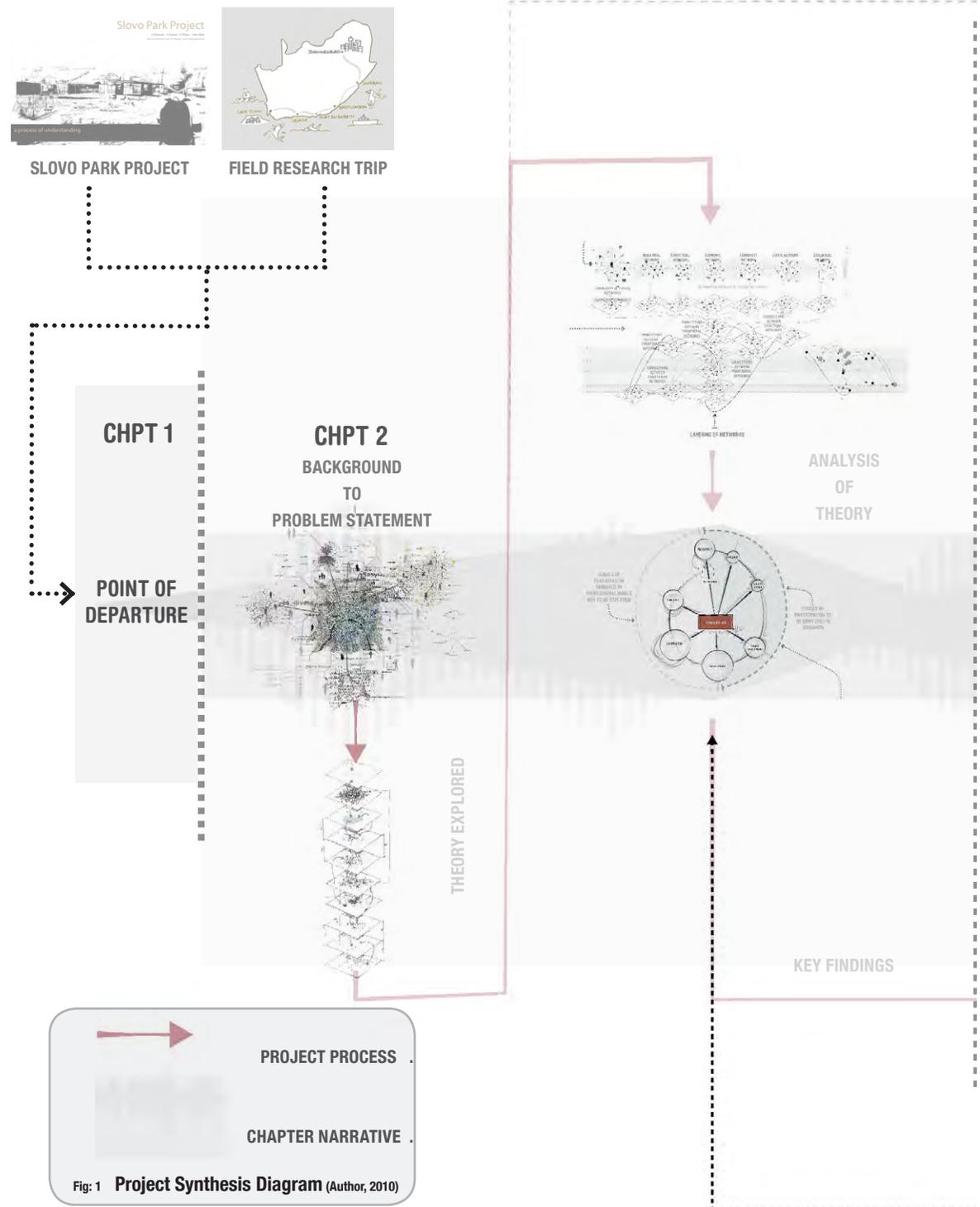
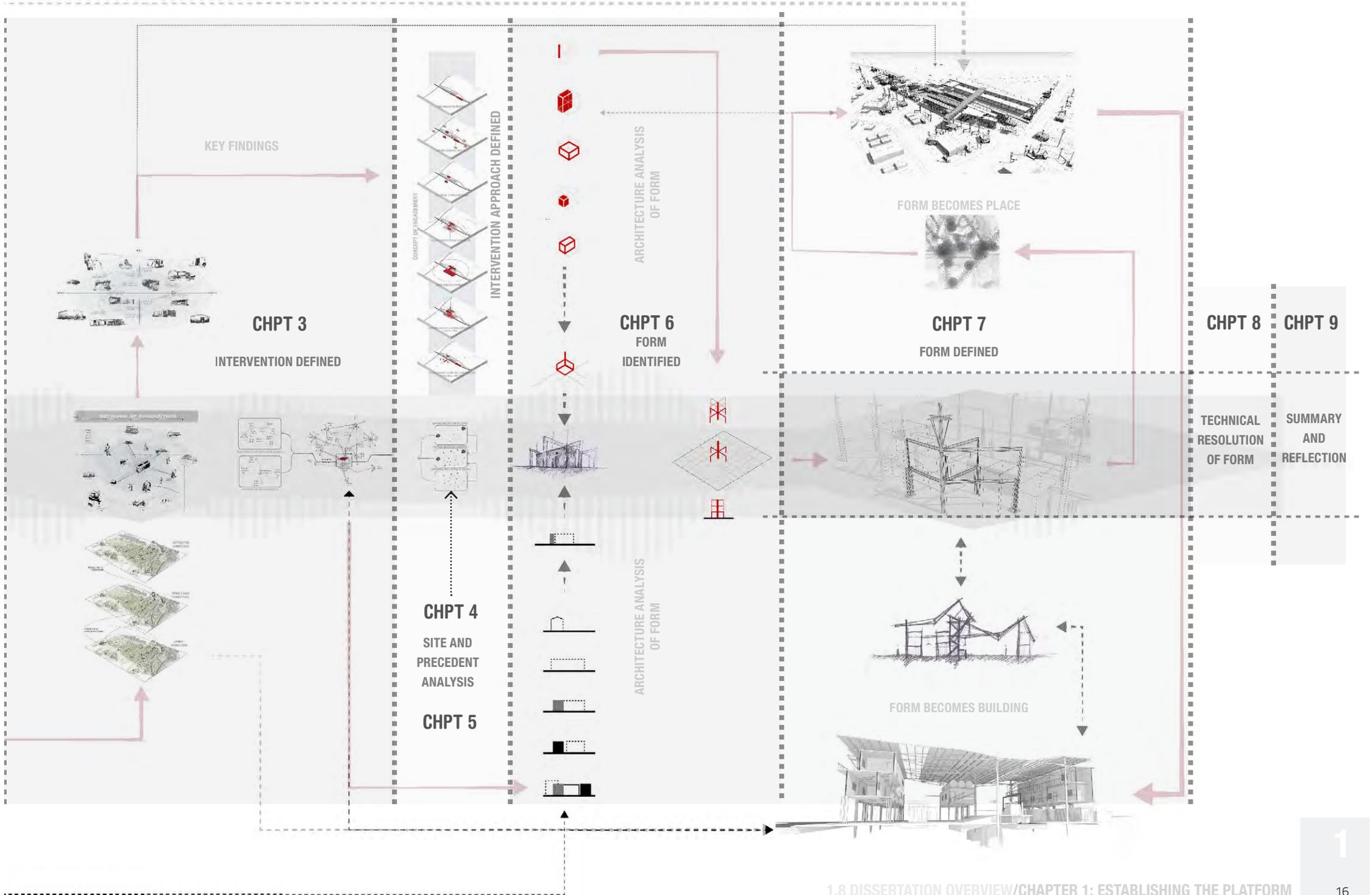


Fig: 1 Project Synthesis Diagram (Author, 2010)



PART 1: PATTERNS OF URBAN GROWTH

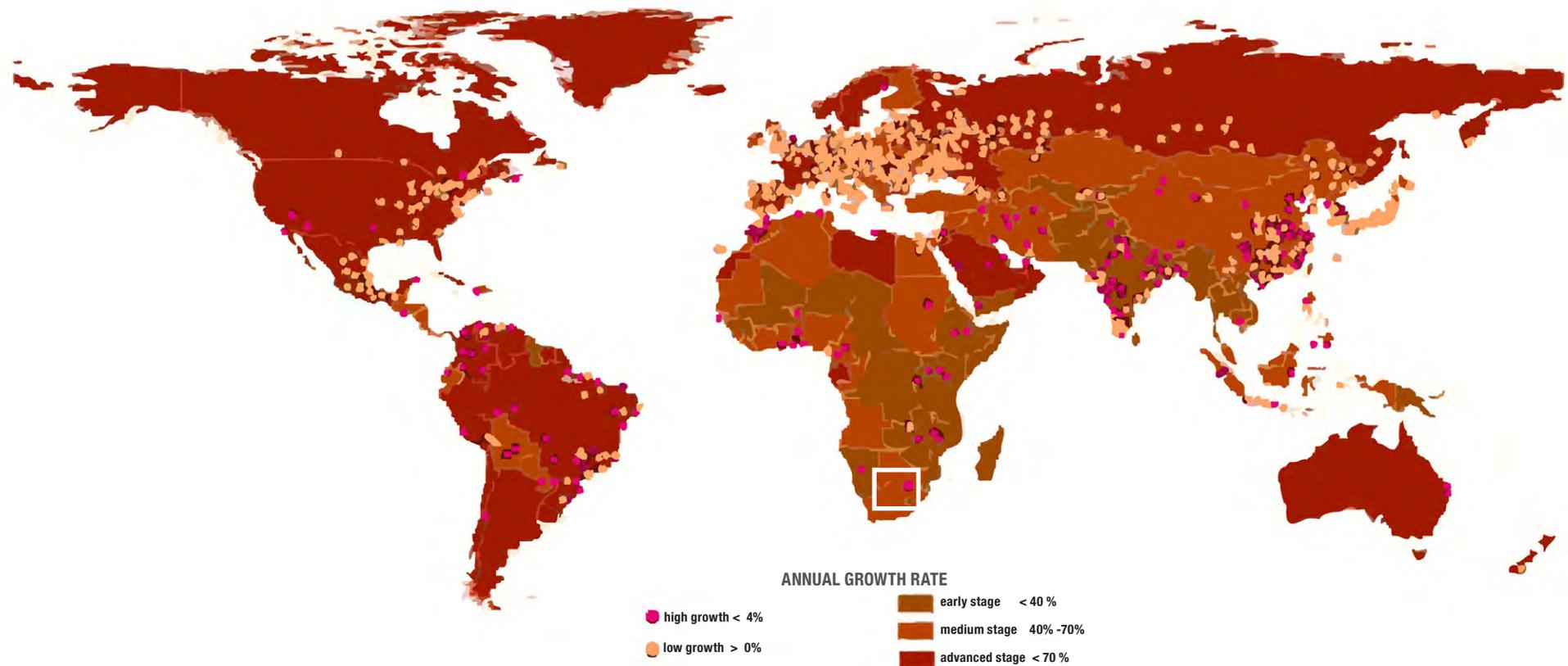
The year 2008 marked the point in human history where more than half the world's population, 3.3 billion people, was estimated to be living in urban areas - this figure is forecasted to be at 5 billion by 2030. (United Nations, 2007: vi)

The effects of this unprecedented rate of urbanization is particularly seen in developing continents of Africa and Asia, where the population is expected to double between 2010 and 2030.

Urbanization is inevitable; and while urbanization is considered both a positive and negative occurrence, unplanned urbanization is taking a huge toll on human health and the quality of the environment.

Urbanization contributes to social, ecological and economic instability in many countries. A sixth of the earth's population are homeless and live in crowded tenements, boarding houses or settlements. (Atterhwaite, 2007: 3)

Yet no country in the industrial age has ever achieved significant economic growth without urbanization. Cities concentrate poverty but they also represent the best hope of escaping it. (United Nations, 2007: vi)



Illus: 10 Diagram depicting the global rates of urbanization (Nordregio, 2011: www.nordregio.nw)

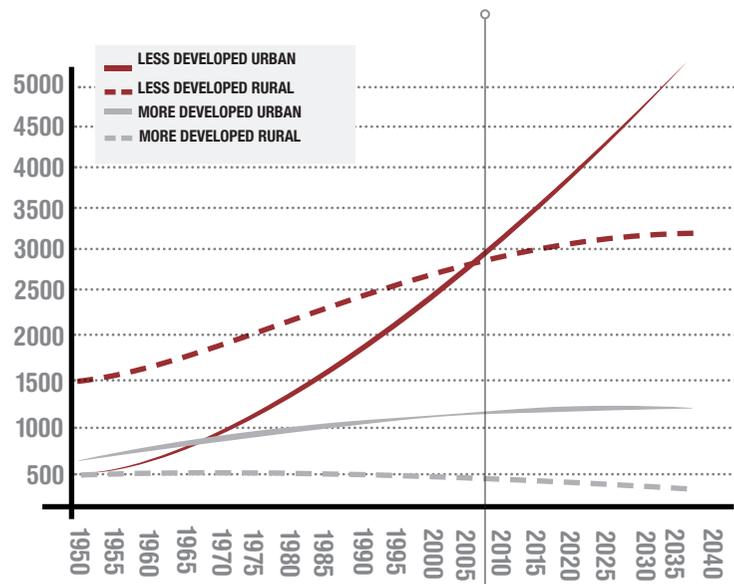


Fig: 2 Urban and rural population by development regions in millions (UN, 2007: 23)

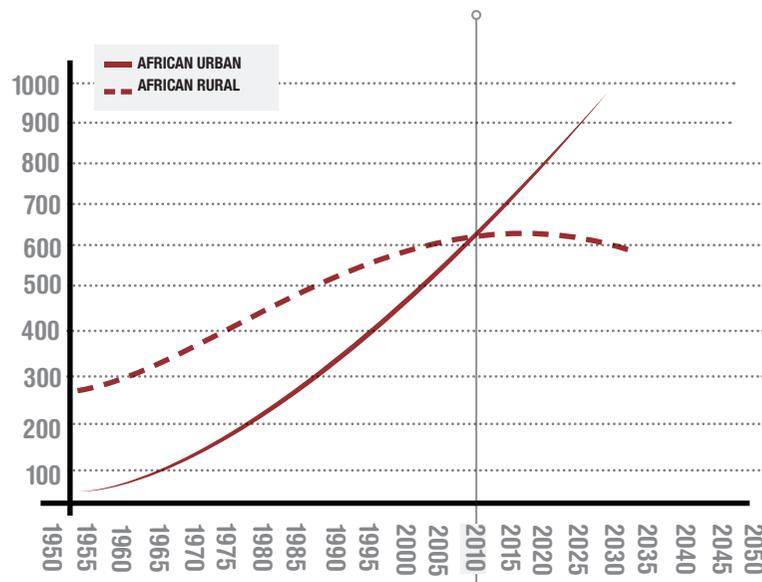


Fig: 3 Urban and rural population by major region in million (UN, 2007:34)

2.1.1 URBANIZATION DEFINED

Urbanization is defined as the movement of people from rural to urban areas with population growth increasing through this urban migration (UN, 2006: 34),

Generally, it takes place when people leave rural areas in search of better economic, health or social opportunities.

Rural-to-urban migration is just one of the three drivers of urbanization, accounting for about 25 per cent of urban population growth.

The other two factors are natural population increases and the reclassification of rural areas into urban ones. (UN, 2007:65)

2.1.2 TRENDS OF URBANIZATION

The first wave of modern transitions began in Europe and North America in the early 18th century. These regions experienced the first demographic transition, the first industrialization and the first wave of urbanization. (UN,2007:7)

This first wave was a comparatively slow process in contrast to the past half-century, where less developed regions of the world have begun a similar transition of urbanization. (see Fig: 2)

Within both waves, population growth combined with economic changes to fuel the demographic, economic and urban transitions.

The second wave is considerably larger and much faster than the first, with the speed and size being made greater by global improvements in medical and public health technology. (UN,2006:34)

According to the *United Nations World Report of 2007* the overall rate of urban growth has consistently declined in most developed world regions and rapidly increased in the developing sectors of the globe. (UN,2007:13) (see Illus: 10)

The rapid growth of this second wave has major implications for cities in poorer countries. The need for urban infrastructure will be more rapidly and effectively required than during the first wave of global urbanization. (UN,2007:7) (see Fig: 3)

2.1.3 SOUTH AFRICA'S FLUXUAL URBANIZATION

The Population Reference Bureau, in its annual World Population Data Sheet for 2008, estimated that 59% of the South Africa's population is urbanized. (Stats SA, 2009:8)

This is ahead of the global curve of 49%, and well ahead of Sub-Saharan Africa at 35%. (Roux, 2009:8)

The definition of Urban and Rural settlements in South Africa is made difficult by the large number of dense settlements that were created in rural areas by processes of resettlement, displacement and so-called 'betterment planning' under Apartheid policy.

The distinction between rural and urban areas is seen to be very artificial, yet needed by compartmentalized ideas, planning efforts and data. (Roux, 2009: 14)

Since the abolition of the Group Areas Act (see Definitions: (page x)) in 1991, South Africa has been experiencing an increase in the urban population, as people mainly from the rural and the previously disadvantaged outlying areas move to urban areas.

(Cox & Hermson, 2004; 28)

Statistics South Africa's 2009 midyear population estimates state that more than 60% of the population now lives in urban centres. (Stats SA, 2009: 56) (see Fig: 5)

One in six of this growing sector in the South African population was counted to be living in informal housing in 2003, with 25% of this total occurring in Gauteng. (Stats SA, 2009:78)

2.1.4 CAUSE OF CURRENT FLUX IN URBANIZATION

The infamous Influx Control, Group Areas Acts enforced during the apartheid regime and associated pass laws resulted in an enforced impermanence in the urbanization process of the Black population. (see Fig: 5)

The inept regulations resulted in inadequate planning in urban areas as well as a division of urban settlements into sprawling peri-urban areas. (Roux, 2009:14)

Apartheid spatial planning marginalized a large proportion of the country's population by locating them far away from social and economic opportunities in homeland areas. (Roux, 2009:ii)

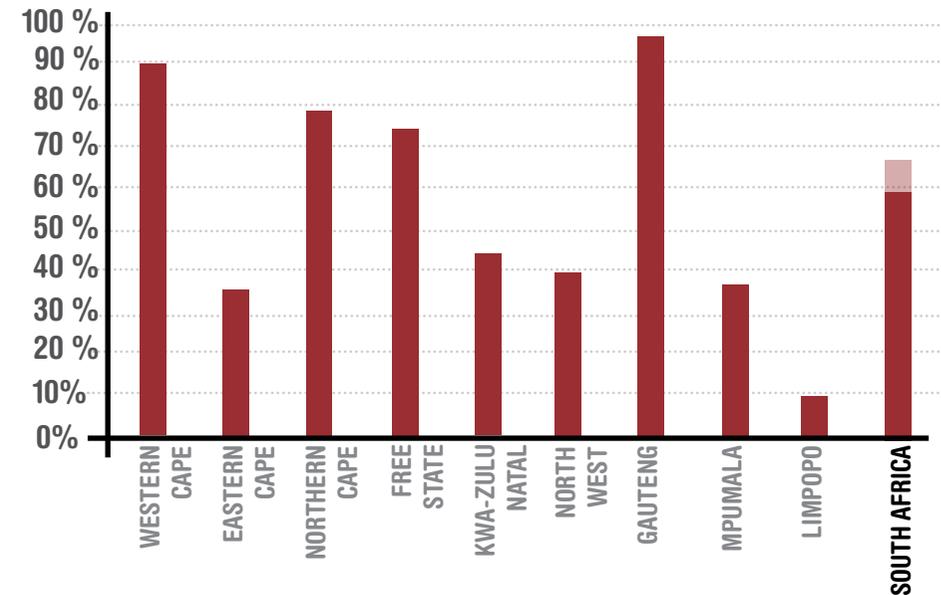


Fig: 4 Urbanization per province in South Africa (Kok & Collinson, 2006: 24)

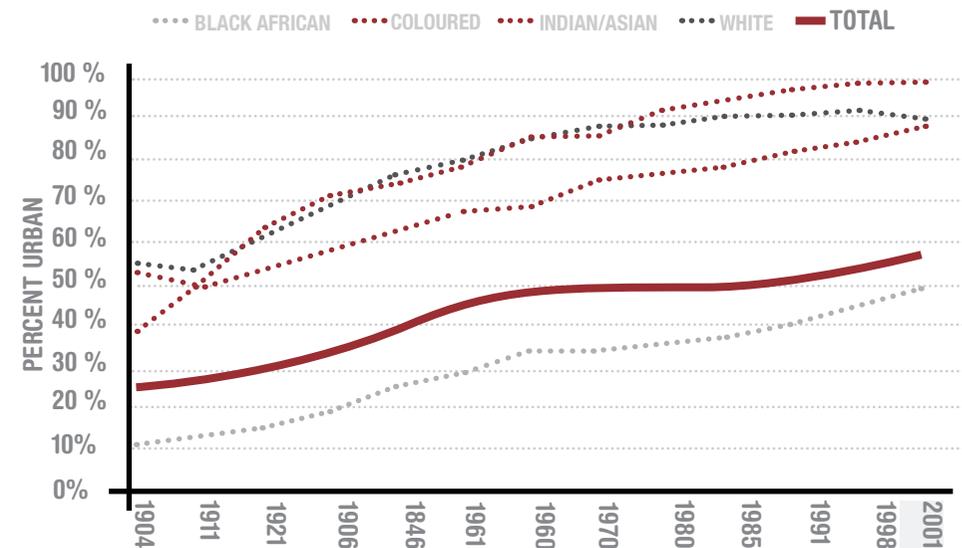


Fig: 5 Rates of urbanisation for the last century in South Africa (Kok & Collinson, 2006: 22)

2.1.5 NEGATIVE EFFECTS OF URBANIZATION

Metropolitan areas continue to be the fastest growing sector of the South African population. These metropolitan areas draw the most migrants, followed by secondary towns, while rural areas are experiencing a net loss of migrants. (Kok & Collinson, 2006: 26)

Large numbers are moving into local smaller towns, dense peri-urban or even rural settlements that offer the promise of access to housing and services, although relatively weak economies makes finding employment very unlikely. (Roux, 2009: i)

Combined with the modern mass migration to these growing settlements due to urbanization, the metropolitan bodies are struggling to adequately service these developing peri-urban areas. (Cox & Hermson, 2004: 14)

The local municipalities are often unable to deal with the large demand. Urban areas, the fastest growth in population and households, are the least able areas to keep pace with growing needs. (Roux, 2009: i)

The need for such affordable housing in the inner CBD, and economic disparities around transport and job availability breed conditions of vulnerability. (Kok & Collinson, 2006: 26)

2.1.6 POSITIVE EFFECTS OF URBANIZATION

Urban migration patterns within urbanization have far-reaching effects on the social, economic and environmental conditions of the migrant population. (Roux, 2009: iv)

This migration can be described as a response to a structural dis-equilibria between, and within, sectors of the economy.

This disjuncture within migration groups is created by the deepening and widening inequality in income and opportunities within South Africa and between its neighbours.

However, it should be noted that migration is often a central component of households' livelihood strategies, and that it not only offers hope for the future, but could play a vital role in redressing past imbalances. (Roux, 2009: iv)

2.1.7 GOVERNMENTAL RESPONSE TO URBANIZATION

The current population and development paradigm follows the 1998 Population Policy, which places population at the centre of development, as both the driving force and ultimate beneficiary. (Roux, 2009: iii)

According to the Population Policy, development is seen as a process of enlarging people's choices with a view to creating an enabling environment for them to enjoy long, healthy and creative lives.

The National Spatial Development Perspective was created to address the legacy of apartheid-based spatial planning and carries with it the potential to alter future migration streams and the urbanization prospects for the country.

When the ANC was elected in 1994, one of the stated objectives was to improve housing development which resulted in the Reconstruction and Development Programme (RDP).

The programme began building dwellings to house the urban poor, which by 2009 numbered 2.3 million. Despite this, the programme's inability to keep up with demand fuels the continuing need for informal development. (Todes et al, 2007: 8)

The Government's position on planning and delivery of aid in these settlements has been met with a myriad of issues, the key problems being addressed by the changing stance on development policy since the 1994 elections.

Planning and delivery has tended to focus on providing new or upgraded infrastructure. This has led to an under-emphasis on ongoing management of assets, basic service delivery, and addressing the problems that arise at a local level with service breakdowns and by-law enforcement. (GAPP, 2010: 87)

The cost of replacing infrastructure of once vibrant districts is considerably higher than maintaining existing assets.

In response municipalities have begun developing programmes to specifically address the lack of appropriate management systems and resources in a localized area that can in turn begin retaining capital asset value. (GAPP, 2010: 89)

PART 2: POPULATION OF NETWORKS - NOT 'COMMUNITY'

Currently designers use methods taught in the schools of architecture, employing 'models' and 'typologies' as a means of setting up precedents in stereotypes or categories. (Murray et al, 2007: 3)

This oversimplification of the complex energies within social capital has the potential to undermine the future of development in South Africa.

William J Mitchell's 2003 essay on his role in the networks and boundaries of his existence lay the first point in the re-conceptualisation of the contemporary community as an organic network made up of many layers, connected in undefinable ways.

"I consist of a biological core surrounded by extended, construct systems of boundaries and networks. These boundaries and network structures are topological and functional duals of each other. The boundaries define a space of containers and places, while the networks establish a space of links and flows. Walls, fences, and skins divide; paths, pipes, and wires connect..." (Sykes et al [Mitchell], 2010:232)

Greg Crysler argues that we cannot consider cities as bounded domains, but rather as interconnected urban networks. (Crysler, 2003;1) John Habraken describes these networks in the built environment as levels existing in different hierarchies.

Although he refers more to tangible networks of mobility and infrastructure, the human habitation infil forms the bonding agent between these disparate elements. (Habraken, 2008: 85) To support this notion, Crysler explains that the categories of nation, city, architecture and building cannot be understood as separate entities: they exist as simultaneous and overlapping conditions. (Crysler, 2003;1)

With the proliferation of networks and our increasing dependence upon them, there has been a gradual inversion of the relationship between the barriers and links. Within the discipline of Architecture in South Africa, design consciousness is most often spoken of in regard to ideas of 'humanism'.

Whereby human values found in communities are identified and categorized into stable 'design informants'; culture and identity are reduced to 'values', domesticated and easily translated into spatial forms. (Deckler et al,2006; 9).

2.2.1 ENGAGING WITH AN UNFAMILIAR NETWORK

If we consider that urban landscapes are not simply just the urban fabric of the tangible, but a hybrid of relationships between people and the landscape, it could be said that what constitutes the abstraction of the city are layers of networks each containing complex relationships between each other. (Crysler, 2003;2)

But as Mitchel observed *'..I am a connecting creature who must always separate and who cannot connect without separating...'*(Sykes et al,2010 [Mitchell];232)

As a component of these networks one is intimately involved with the flows of energy and matter of one's immediate intensive network. One is aware of the ramifications of change when it occurs within that immediate network, while changes to the wider extensive network are less tangible.

One can engage with a network on an organic level. When this network is seen to be organic, the process of engagement can be one of mutual respect and ultimately deeper understanding. This understanding will be used to form the basis from which a design intervention will be identified.



Illus: 11 Example of a Network of Cohesion, A group of Women workers in Protest (UN, 2007)

2.2.2 DEFINITIONS OF COHESION IN 'COMMUNITY'

In the co-edited publication of *Desire Lines*, Noeleen Murray questions; Who exactly is 'The Community' in South Africa? (Murray Et Al, 2007: 54)

This generic phrase is thrown around in defense against any decision or non decision in developmental areas.

Within the Southern African context it is particularly difficult to define a group of people sharing an area of settlement as a community. This question alludes to the stereotypical definitions of 'communities' and lays the foundation to forming an approach to engage with such a 'community'.

Traditionally a 'community' has been defined as a group of interacting people living in a common location. (Kelder[Thornton], 2008:56)

In human communities intent, belief, resources, preferences, needs, risks, and a number of other conditions may be present and common, affecting the identity of the participants and their degree of cohesiveness. (Kelder[Thornton],2008: 56)

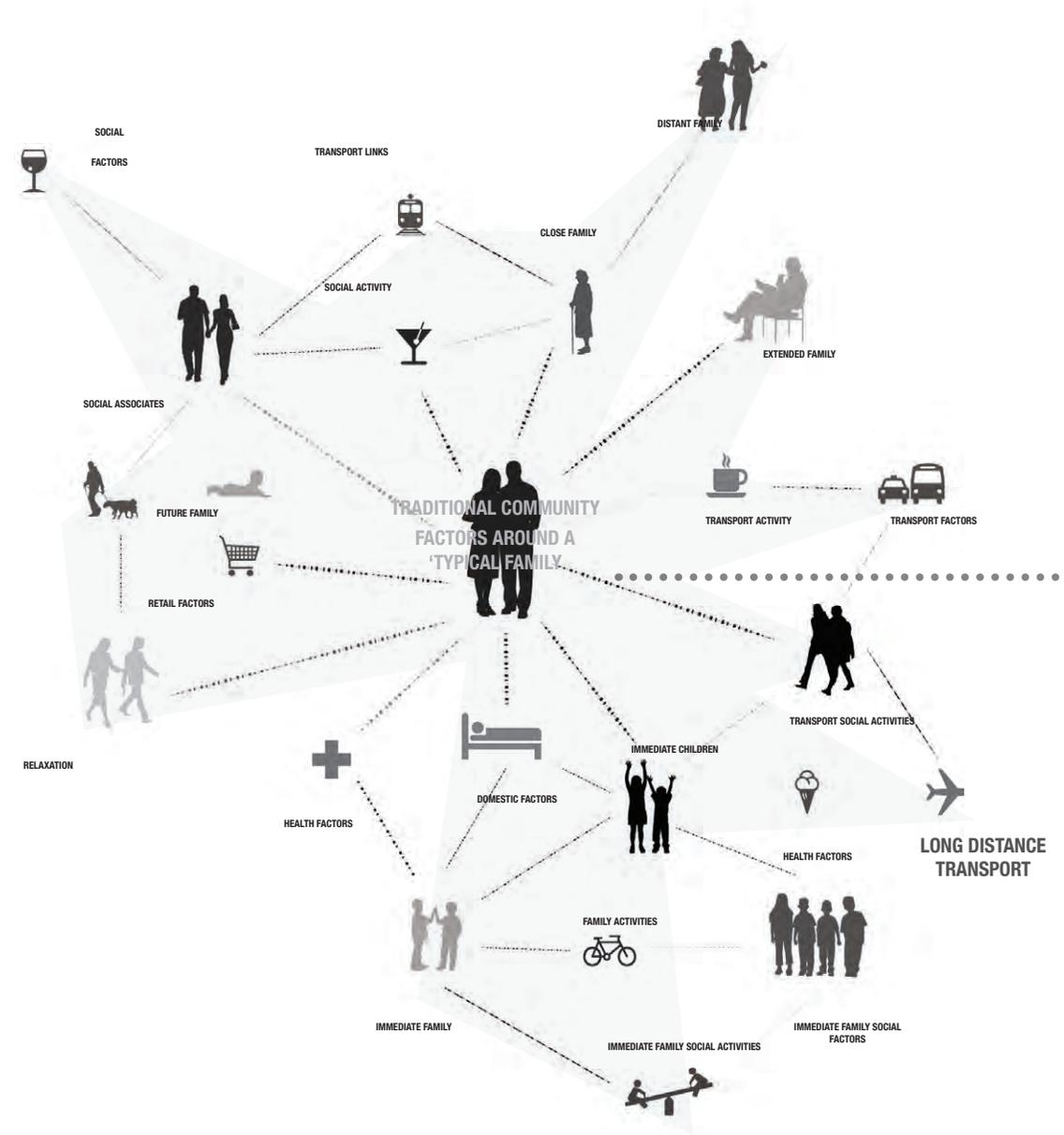
The word 'community' is often used to refer to a group that is organized around common values and is attributed with social cohesion within a shared geographical location, generally in social units larger than a household.

Sarah Thornton offers that a community suggests a more permanent population, often aligned to a neighborhood, of which family is a key part. (Kelder[Thornton], 2010: 78)

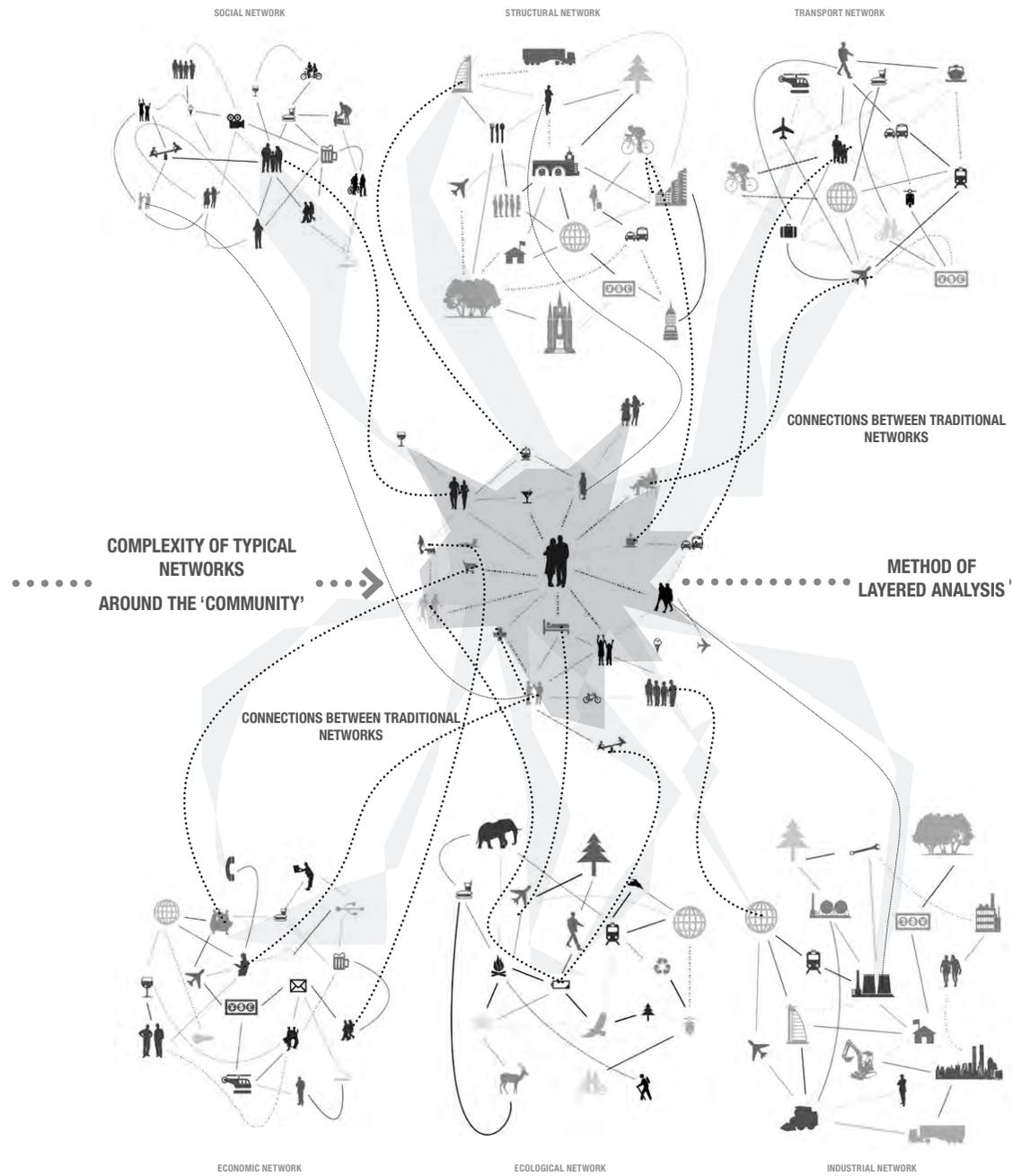
Although settlement groups are easily defined as communities by virtue of their proximity to each other, this is not always the case, as houses might revolve immediately around family but are actually much more connected to disparate groups, cultural divisions or family beyond their immediate settlement, as well being highly mobile and temporary in their nature. (see Illus: 13)

Beyond the immediate familiar connections within a typical family's boundaries the tangible and intangible networks of larger systems play a more concise role in their existence than their immediate context. (see Illus: 15)

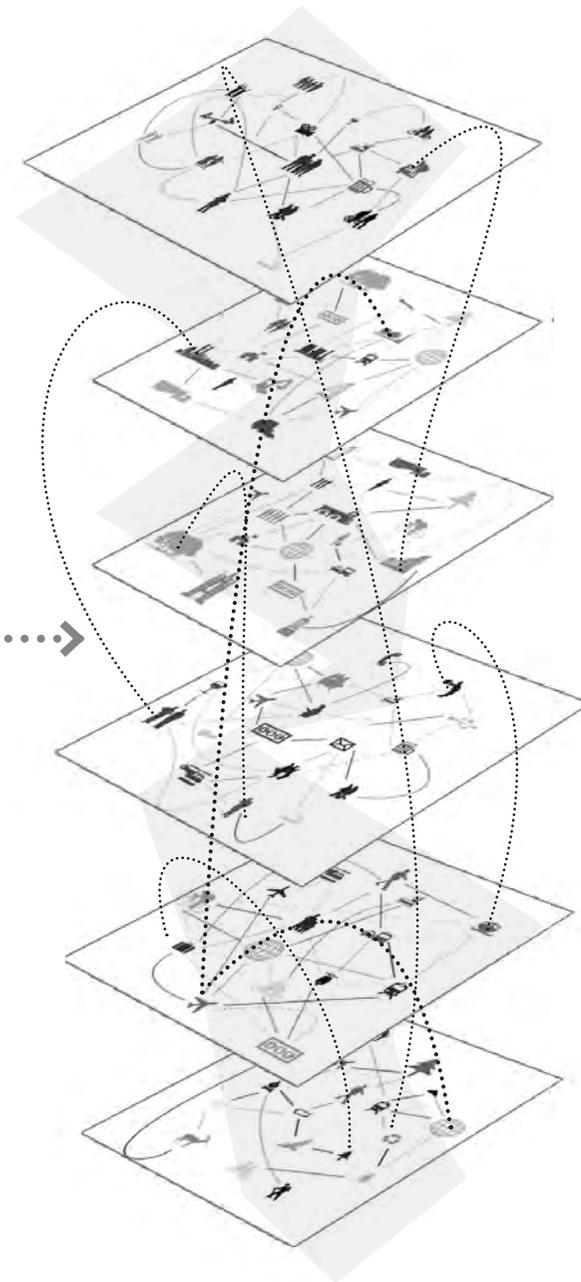
In order to garner an understanding of the relationships within a settlement the effects of the larger tangible and the intangible networks depicted in (see Illus: 15) should be considered.



Illus: 13 Diagram depicting the connections within a family network (Author, 2011)



Illus: 14 Diagram depicting networks around family network (Author, 2011)



Illus: 15 Layering of networks to gain better understanding of the connections (Author, 2011)

2.2.3 NEED FOR RE DEFINITION

From the aforementioned points it can be said that the definitions around 'community' do not appropriately capture the true nature of the relationships between intangible and tangible factors within the current urban landscape.

(see Illus: 15) aims to exemplify that a simplification of the relationships cannot describe or sufficiently capture the nature of the relationship between the factors in layered intangible/tangible relationships. The connections considered in the larger context become more complex and possibly undefinable.

These relationships pertain more towards a type of network. A network of intangible relationships between the individuals and the objects and actions within the intangible network.

This description of classifying social groups by what connects them, begins to offer a clearer definition of the relationship between the individuals and the objects within these networks.

By overlaying these networks, (see Illus: 16), a more complex and holistic view is offered of the intricacy of the relationships between the layers within the network and the factors that capture the nature around a family network.

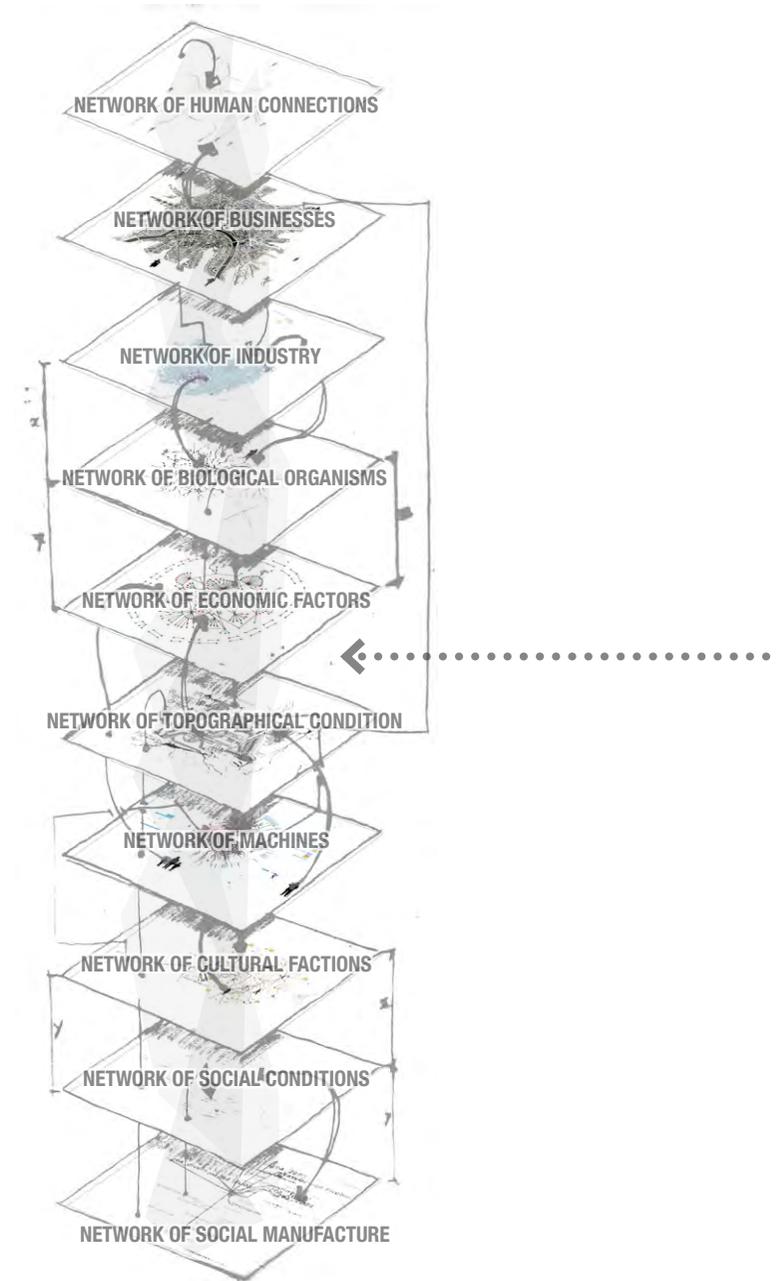
2.2.4 CONCEPT FOR RE DEFINITION

The term 'community' in biological terms, describes a group of interacting organisms sharing a specific location. (Cannon, 2011: 312) The biological metaphor of community alludes to a more appropriate description of what one could possibly describe as 'community'.

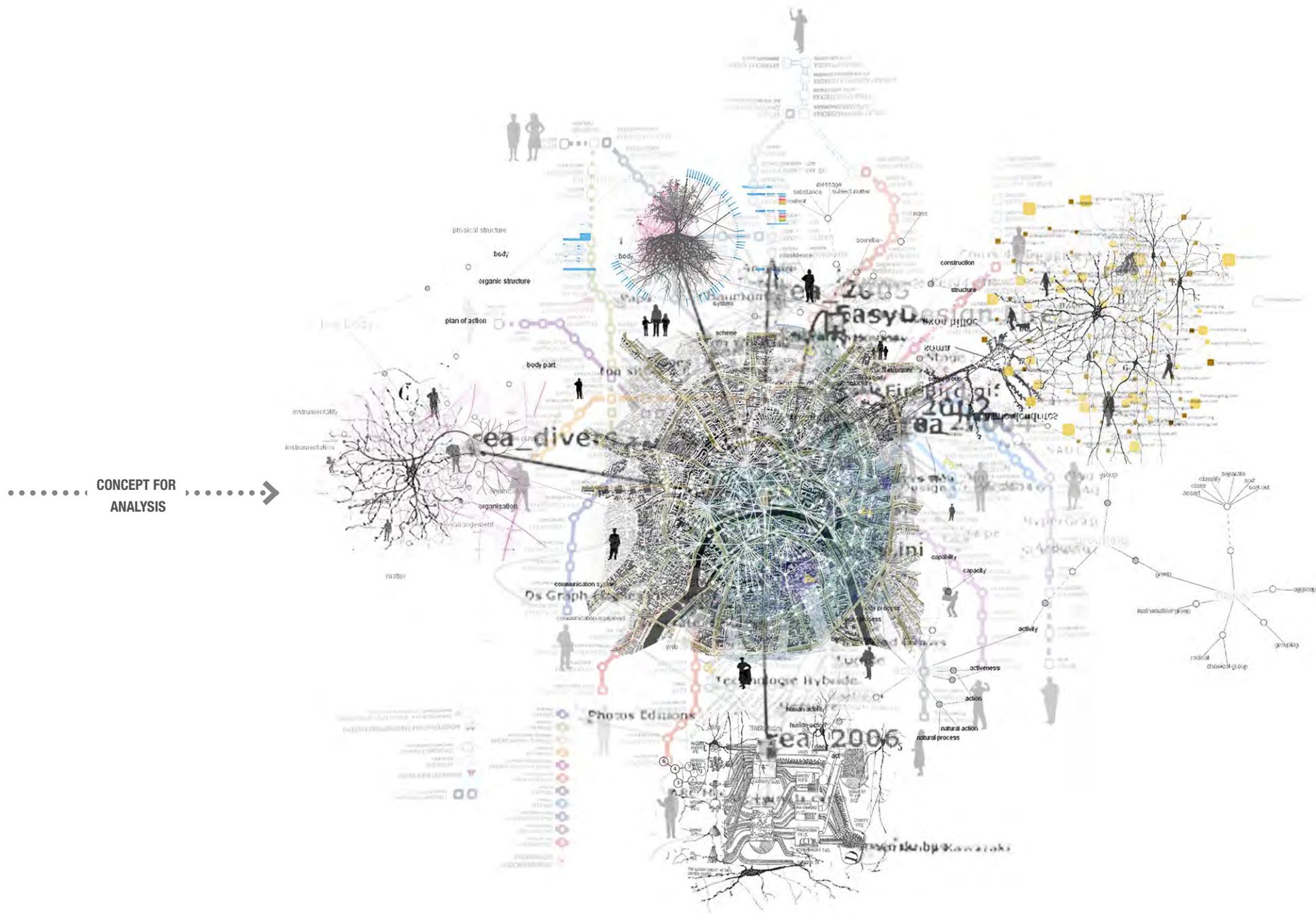
Walter Cannon, the George Higginson Professor of Physiology at Harvard in 1906, proposed the question of interpreting social, domestic or industrial organizations in light of the organic body. (Cannon, 2011: 313)

It is appropriate in this context and this debate to view 'communities' in South Africa more as organic and complex networks than simply space and service sharing 'neighborhoods'. (see Illus: 17)

An understanding of the flows of energy and matter within these networks is crucial in order to engage and determine an appropriate architectural intervention.

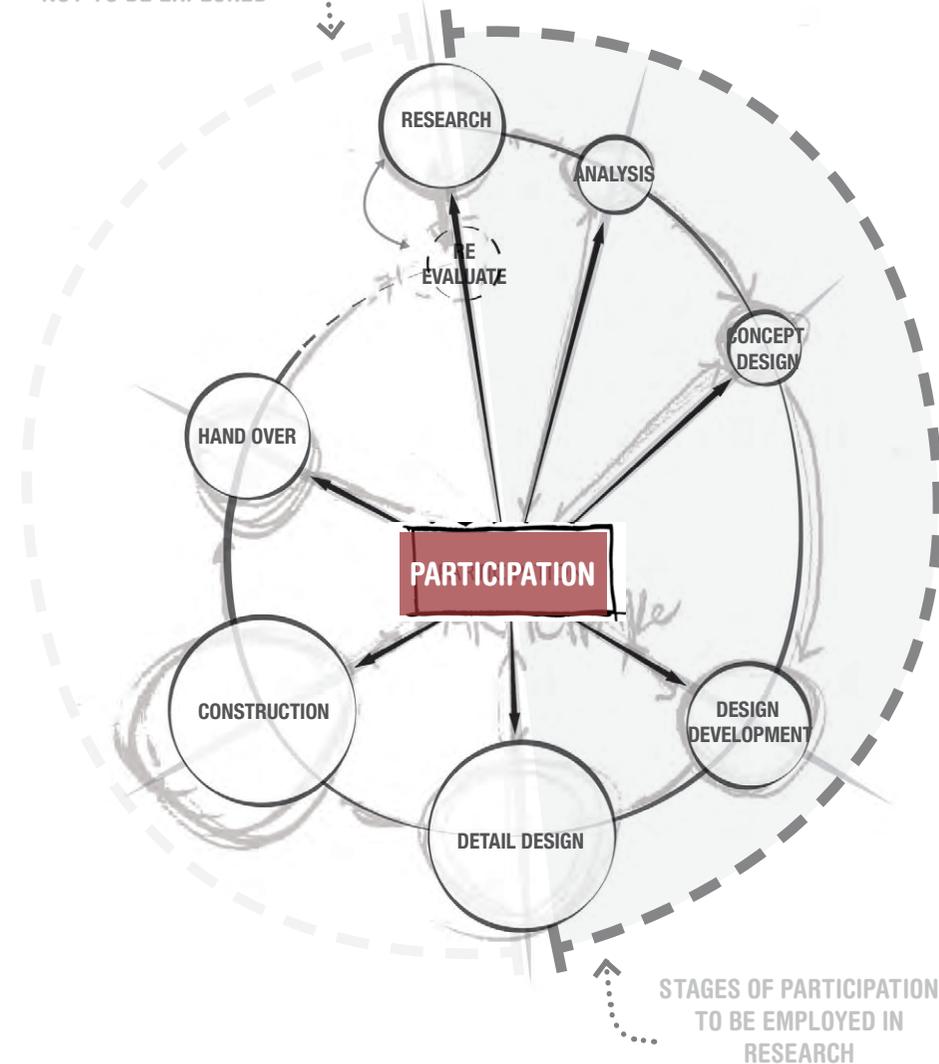


Illus: 16 Analogy of the social organism in regard to networks (Author, 2011)



Illus: 17 Concept for analysis of networks, a social organism (Author, 2011)

STAGES OF PARTICIPATION
REQUIRED IN
PROFESSIONAL REALM
NOT TO BE EXPLORED



Illus: 20 Diagram depicting the author's understanding of participation (Author, 2011)

2.3.1 ENGAGEMENT THROUGH PARTICIPATION

In order to enter into a dialogue with an intangible network, tangible engagement with the actors and agents of the intangible networks needs to be established.

To begin to understand one must participate.

To harvest a level of understanding one has to engage with that network on a personal basis and accept the reality that is revealed through the process of engagement. (Breed, 2010: 2)

Participation can be perceived on several levels. In this dissertation the act of engagement on a personal level with a network on only select stages of the research, analysis, design, construction process and eventual ownership of the completed project is explored. (see Illus: 21)

Engagement is not just a process of understanding a network; but of letting a network understand the researcher, of forming a relationship that allows one to cooperatively enter into dialogue, to optimize an intervention's effectiveness.

2.3.2 FORESEEN CHALLENGES WITHIN ENGAGEMENT

Murray offers that South African Architecture has to function in a political, physical and social landscape that is equally hybrid and diverse; a space in which multiple publics exist and compete for resources and opportunities. (Murray et al, 2007: 8)

These resources and opportunities, previously viewed as limitless, are foreseen to be in short supply soon.

Between the looming resource crisis, and the 'jamming together' of previously distinct social categories and their associated distinctly formed spaces, the spatial disciplines and specifically the practice of Architecture will be confronted with new sets of unforeseen challenges. (Murray et al, 2006: 7)

In light of this the author questions whether the current methods generally employed by designers have embraced the required socially-inclusive and 'culturally respectful' methods of undertaking research as is practiced in the social sciences.



Illus: 21 Slovo Park: Engagement through Research (Author, 2010)



Illus: 22 Slovo Park: Engagement through public participation (Slovo-Group, 2010)



Illus: 23 Slovo Park: Engagement through construction1 (Author, 2010)

2.3.3 THE SLOVO PARK PROJECT - PRECEDENT OF ENGAGEMENT

The Slovo Park project was the basis from which the author, who was personally involved, began the investigation in this dissertation. For this reason, it has been included as a local precedent of an approach with an intangible network.

PART 1: RESEARCH & DESIGN PROJECT

In 2010 the University of Pretoria Department of Architecture, under Carin Combrinck, offered its Honours year students the opportunity to work with a small informal community just South of Soweto, named Slovo Park.

The Slovo Park Project began as a small research project in the University of Pretoria's Housing and Urban Environments module of the Architectural Honours Year.

It began as a process of engagement in order to experience the issues faced by South Africa's urban poor. The process culminated in a joint project towards a built goal with not only a physical product, but many intangible outcomes that extended beyond simply 'another community project'.

The student group of Bennett, Casson, Fillipe, Hattingh and Makgabutlane, started the project with a sensitive and holistic research process to begin to understand the socio-economic context of day-to-day life in Slovo Park. (see Illus: 21)

From this process, a larger urban framework was proposed that sought to link Slovo Park to its neighbouring community; while developing the neighborhood from within and maintaining the existing sense of community that the area demonstrated to the students during the research phase.

From here the students were required to propose their own individual theoretical projects that they felt would aid in the development of Slovo Park which were well received by the University and were presented to the Department of Human Settlements at their Indaba in September of 2010 as well as to the community themselves during their meeting with government on-site.

The responses from the students were dynamically varied in nature with some designing a processional route from the township to the adjacent cemetery, incorporating the myriad of African cultures and their relationship to death.

Others focused on development around housing through 'housing clinics'. All projects were an attempt to capture the humble manner in which the inhabitants throughout South Africa exercise their power to build their own houses yet benefit from assistance and knowledge sharing.

PART 2: THE BUILT INTERVENTION - SLOVO HALL

As the designs proposed over the research period were far too large and costly to build in the 8 week period, therefore the student group decided that they would combine the principles from each project into the design of a social facility within a civic space - Slovo Hall.

This hall and civic area would provide the people of Slovo Park with a place for them to meet and determine the future for themselves. An existing dilapidated structure that housed the 1994 election station was chosen since the student group felt that this was where the first change began and should continue.

Slovo Hall was specifically designed with a larger future in mind and phased into five early Construction Phases and five larger Future Development Phases.

This scheme was then taken to the community for further design assistance of the future Slovo Hall.

Early Construction Phases allowed the functions of the Future Development Phases to still operate on-site without the actual infrastructure of the Future Development, and as part of the formal hand-over these construction plans were given to the people of Slovo Park. (see *Illus: 23*)

Building began in September 2010 and the support received from the people of Slovo Park the local business was overwhelming. (see *Illus: 24*) Each day varied from the previous. Daily more people would join the workforce and get involved in some way.

The project was completed on the 20th of November 2010 and opened during an exuberant day of celebration and deliberation.

Locals met and discussed the future of Slovo Park in their new hall, while children and the adults danced on the fresh paving area and inaugurated in their newly completed and opened public structure. (see *Illus: 26*)



Illus: 24 Slovo Park: Engagement through construction 2 (Author, 2010)

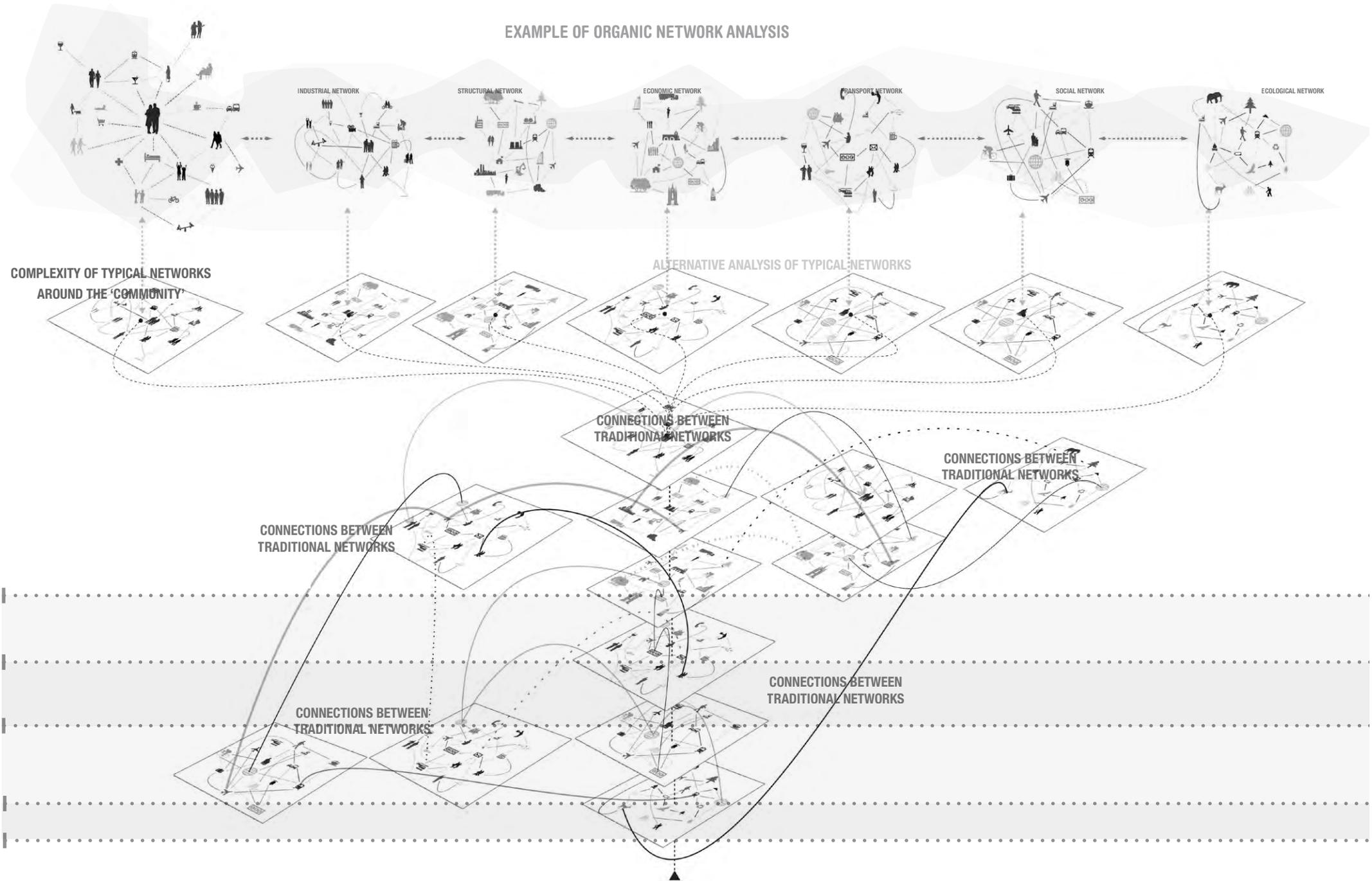


Illus: 25 Slovo Park: Engagement through process (Author, 2010)



Illus: 26 Slovo Park: Engagement through completion of Slovo Hall (Author, 2010)

EXAMPLE OF ORGANIC NETWORK ANALYSIS



Illus: 27 Diagram depicting the analysis of network through respect as a social organism (Author, 2011)

2.3.4 METHODOLOGY OF ENGAGEMENT

Walter Elsasser, 1989, a holistic biologist from John Hopkins University, explains in his manifesto that the nature of any organism can be seen in understanding the most basic component, the living cell. He argues that the structural complexity of even a single living cell is 'trans computational' - i.e It is beyond the power of any imaginable system to compute. (Elsasser, 1989: x)

Locally, Clarke and Fischer's paper on ecotropic approach towards design mention how projects aim to create an awareness of the biophysical, not only in the possibilities that it might hold for the designer, but also in the impact on the biophysical. (Clarke & Fischer, 2011: 21)

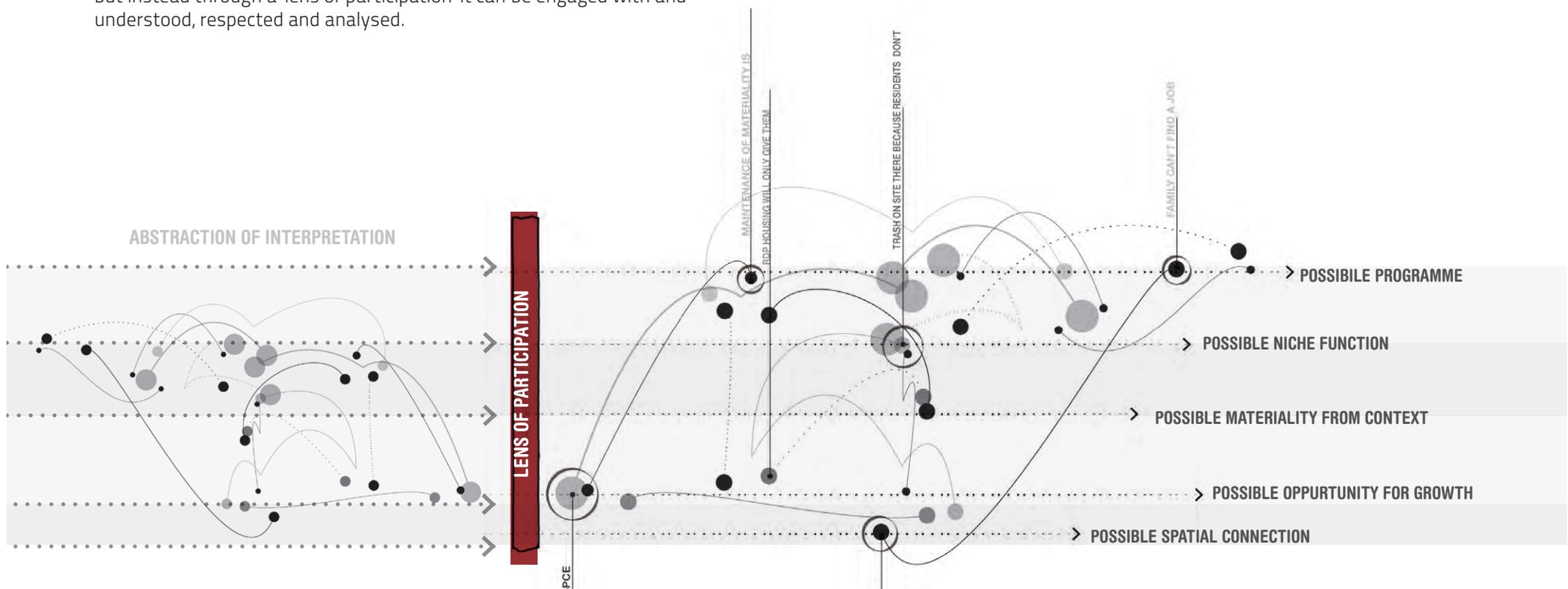
Expanding on this notion, the nature of an organism network cannot be defined, but instead through a 'lens of participation' it can be engaged with and understood, respected and analysed.

2.3.5 LENS OF PARTICIPATION

Through this lens the weaknesses, strengths, threats and opportunities of the organic network can be identified. By unpacking and identifying the layers of a network, this organically complex network can be qualitatively evaluated.

Abstracting the essence of these relationships and interpreting it (through the lens of participation) one can begin to interpret the organic nature of the network itself.

As illustrated below, an example of an interpretation offers that through this lens of participation, several possible spatial, material, programmatic and niche interventions can be derived through engagement and analysis. (see Illus: 28)



Illus: 28 Diagram depicting an example of extraction of strengths, weakness's, threats and opportunities of network through a process of participation and engagement (Author, 2011)



Illus: 30 Author undertaking the process of engagement (Author, 2011)

2.3.6.3 PROGRAMME HYPOTHESIS

THROUGH THE RESEARCH, KEY POINTS AT WHICH THE NETWORK REQUIRES INTERVENTION WILL BE IDENTIFIED AND FORM THE PROGRAMMATIC AND STRUCTURAL SPECIFICATIONS OF THE DESIGN.

- No action should take place on entirely altruistic grounds. In order to sustain ownership, respect and management, an intervention should have incentive for all stakeholders. Possibly, in a mutually beneficial relationship of tangible resources.
- The intervention cannot replace any of the primary sensitive functions in the network. The identified niche within the intangible network, will generate a programme that would support and enhance the intangible network.
- The intervention should required to perform an educational function in order to truly be a positive factor in development. The nature of education through practical application i.e. workshops, hands-on exercises or public demonstrations is considered appropriate for this context.

2.3.7 RESEARCH AIM

TO ENGAGE WITH AN INTANGIBLE NETWORK AND OBTAIN FROM IT APPROPRIATE GUIDELINES FOR A DESIGN INTERVENTION IN ORDER TO MAINTAIN ITS GENIUS WHEN MADE TANGIBLE.

Subsequently an in-situ documentation of the flows of energy, information and resources seeks to identify how exactly an intervention can begin to positively affect the identified network without disrupting any of the strong relationships between the components of that network.

This, coupled with spatial studies of current relationships between formal components around the building, construction and distribution networks will form the documentary process towards the programmatic, spatial and material aspects of the intervention.

These points will be identified, documented and capitalized upon in the form of an intervention that works with the adds resilience to a network.

Chapter 3: Engaging with the Network

“WE ARE RESISTING THE NOTION THAT LAGOS REPRESENTS AN AFRICAN CITY EN ROUTE TO BECOMING MODERN.

RATHER, WE THINK IT POSSIBLE TO ARGUE THAT LAGOS REPRESENTS A DEVELOPED, EXTREME, PARADIGMATIC CASE STUDY OF A CITY AT THE FOREFRONT OF GLOBALIZING MODERNITY.

THIS IS TO SAY THAT LAGOS IS NOT CATCHING UP WITH US.

RATHER, WE MAY BE CATCHING UP WITH LAGOS.

THE AFRICAN CITY FORCES THE RE CONCEPTUALIZATION OF THE CITY ITSELF.

(KOOLHAAS, 2009;193)

Illus: 31 Symbol of the social capital - the act of self guidance and control (Author, 2011)

3.0.1 PROBLEM STATEMENT

DESIGN PRINCIPLES THAT UNDERPIN ARCHITECTURAL INTERVENTIONS IN DEVELOPING AREAS DO NOT FULLY EMBRACE THE FLUXUAL NATURE OF THE CONTEXTUAL NETWORKS.

In order to design an intervention that supports an intangible network, a process of engagement is required to investigate the requirements of a host network, in this case the building retail network of Mamelodi, Gauteng.

Mamelodi, Gauteng has been chosen as the laboratory of research due to the current influx from rural environments, rapid rate of urbanization, mass housing projects and termed 'informality'.

PART 1: BACKGROUND TO THE NETWORK

A brief overview of the developmental history and context in which the research was conducted.

PART 2: THE INTANGIBLE NETWORKS

An initial site visit revealed a potential network around the Mamelodi Brickyards. This was followed up with a 10 day documentation process.

PART 3: ANALYSIS OF FINDINGS

Several emergent concepts based on observed site conditions are analyzed and translated into architectural themes.

3.0.2 CONSIDERING AN INTERVENTION

When engaging with a context such as South Africa's developing areas, it is extremely difficult to find design generators in their traditional form as the nature of these environments is so fluid and the social hierarchy so organically structured.

This fluidity is noted by John Habraken who states that "*The built environment has always been self organizing*". He further explains that professionals will always be intervening in natural and ongoing process.

Despite the design professional's increasing ability to effect large scale change in the built environment, it will always follow its own laws. (Habraken, 2008:326)
Habraken speaks here of the nature of the human spirit reflecting itself through its environmental manifestation from the micro through to the macro.

Human creativity is irrepressible. The desire to invent, renew, and re-interpret makes environments bloom. Designers tend to record the innovative while ignoring the familiar, but the familiar, which designer initially depend on, will eventually transform it. (Habraken, 2008:316)

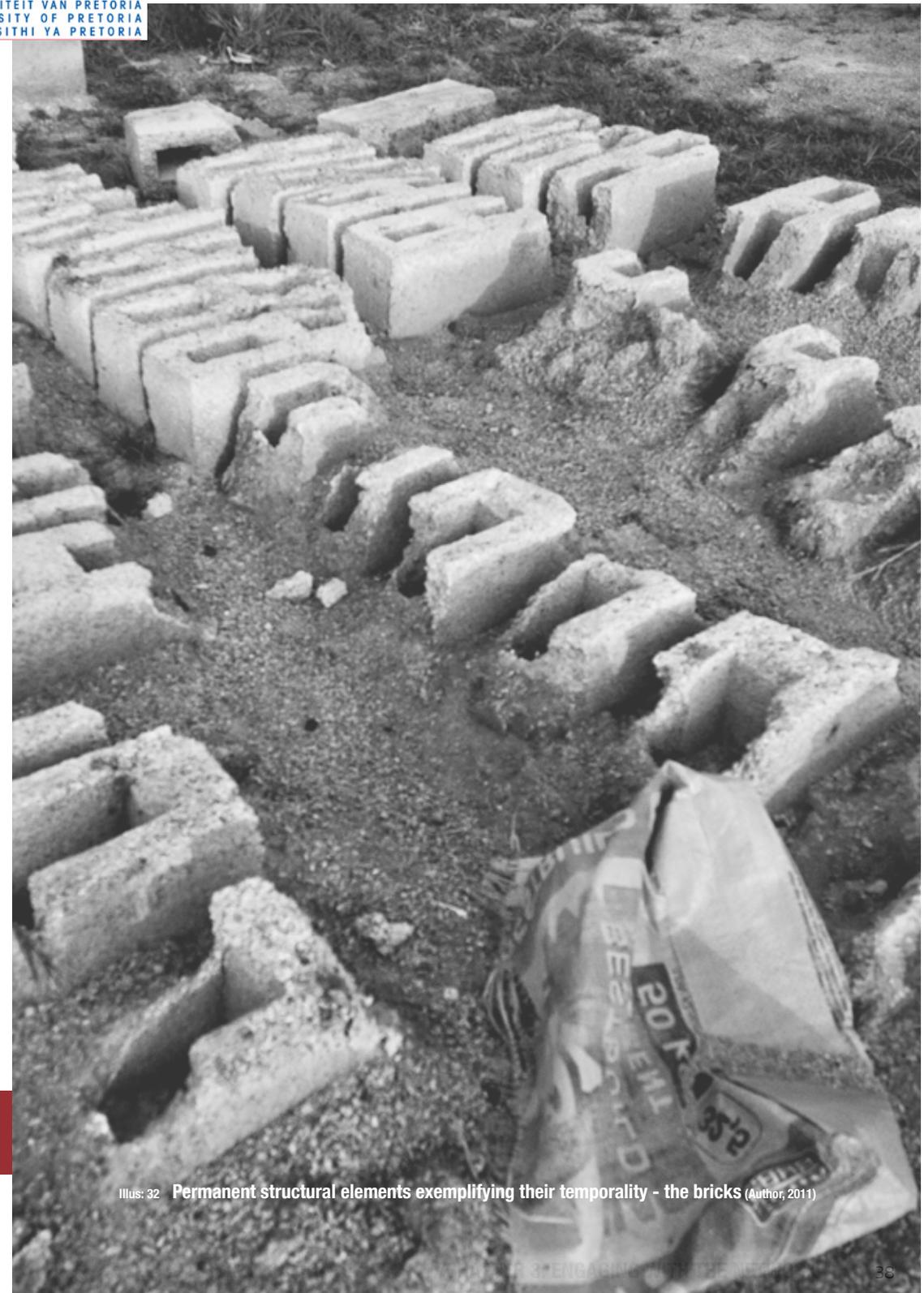
Through a process of engagement the aim of this chapter is to not only engage with a network, but to identify where the familiar will generate form and spatial thematic design informants to create a successful intervention based from the roots up.

Habraken states that the act of building, by professional or inhabitant, is an expression of control over form. Although it takes place while a building takes shape, it is ultimately temporary. (Habraken, 2008:88)

This notion is key, especially in the context of Mamelodi. He offers further that once building is complete inhabitation takes over. Eventually habitation will trigger additional transformation over form. The act of building then resumes. (Habraken, 2008:88)

A corresponding space formed by physical parts is not required for territorial space to exist. All that is needed is an agent exercising spatial control (Habraken, 2008:129)

The principle taken from Habraken's work is that a traditional intervention is not necessarily the only way to engage with such a fluid and dynamic context.



Illus: 32 Permanent structural elements exemplifying their temporality - the bricks (Author, 2011)

PART1: MAMELODI IN CONTEXT

DEMOGRAPHICS

TOTAL POPULATION:	359 122
HOUSEHOLDS:	106 670
AVE HH SIZE:	3.4
AVE POPULATION DENSITY:	9 415.5 km ²
ECONOMICALLY ACTIVE POP:	70%
<small>(GAPP [Demacon],2010:149)</small>	

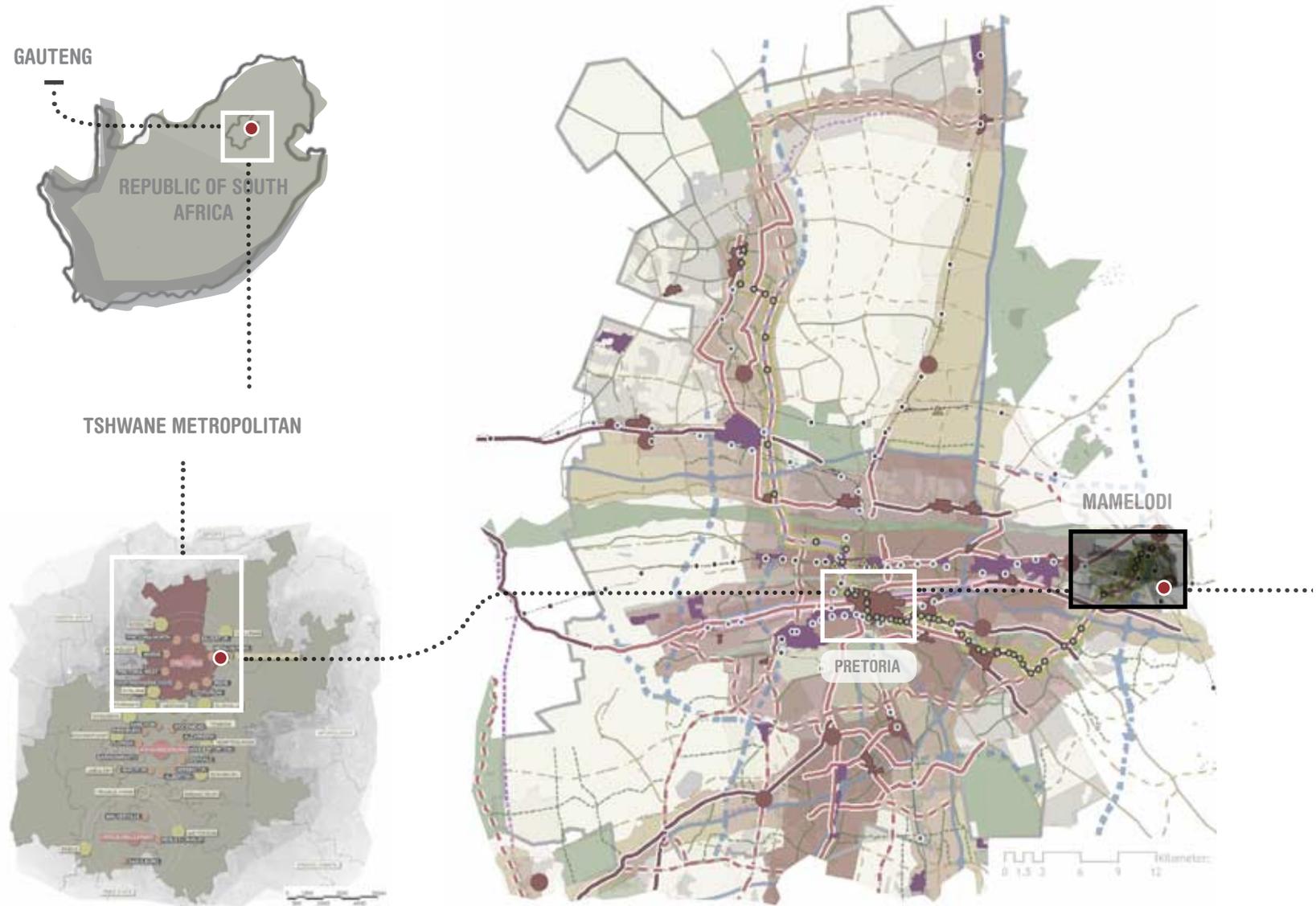
RETAIL IN MAMELODI

MAMELODI CROSSING:	41.2%
MAX CITY:	6%
OUTSIDE MAMELODI:	54.2%
<small>(GAPP [Demacon],2010:180)</small>	

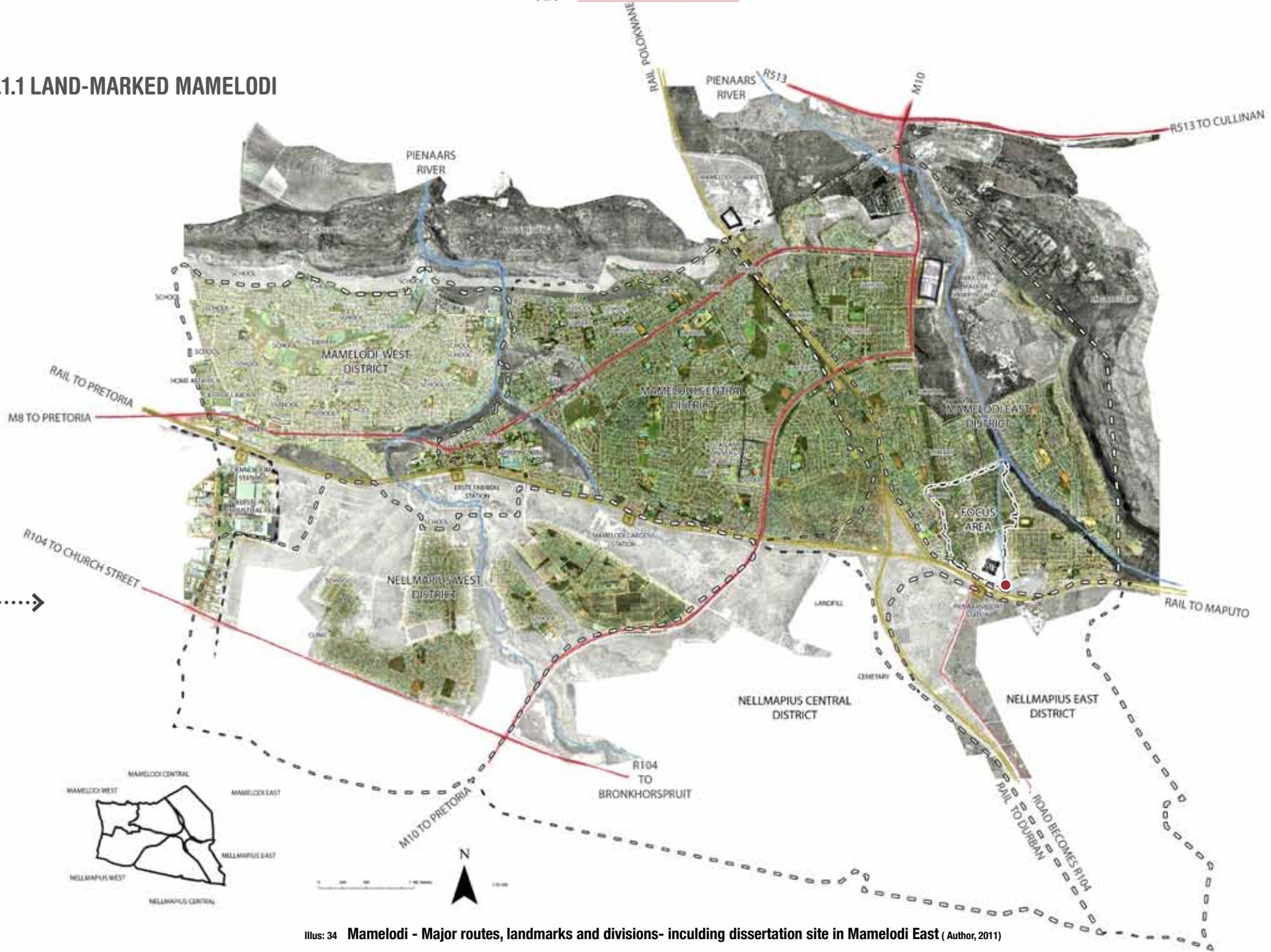
Mamelodi has a rich history of development alongside Pretoria's own growth, and still provides a buffer for the rural population who wish to move closer to the urban centre of Tshwane.

Mamelodi is the one of the oldest 'townships' in South Africa, as a result the inhabitants have access to older and relatively larger infrastructure in comparison to more temporary settlements that have emerged in Gauteng's post apartheid era.

The average household income by 60% of the inhabitants is more than R3 000 a month (GAPP [Demacon],2010: 155-158) while transport is still primarily by foot at 36.4% (GAPP [Demacon],2010: 155-158) While more than 78% of residents have access to basic services there is still an ever growing non-serviced portion of the population that is constantly augmented by rural migration. (GAPP [Demacon]2010: 161)

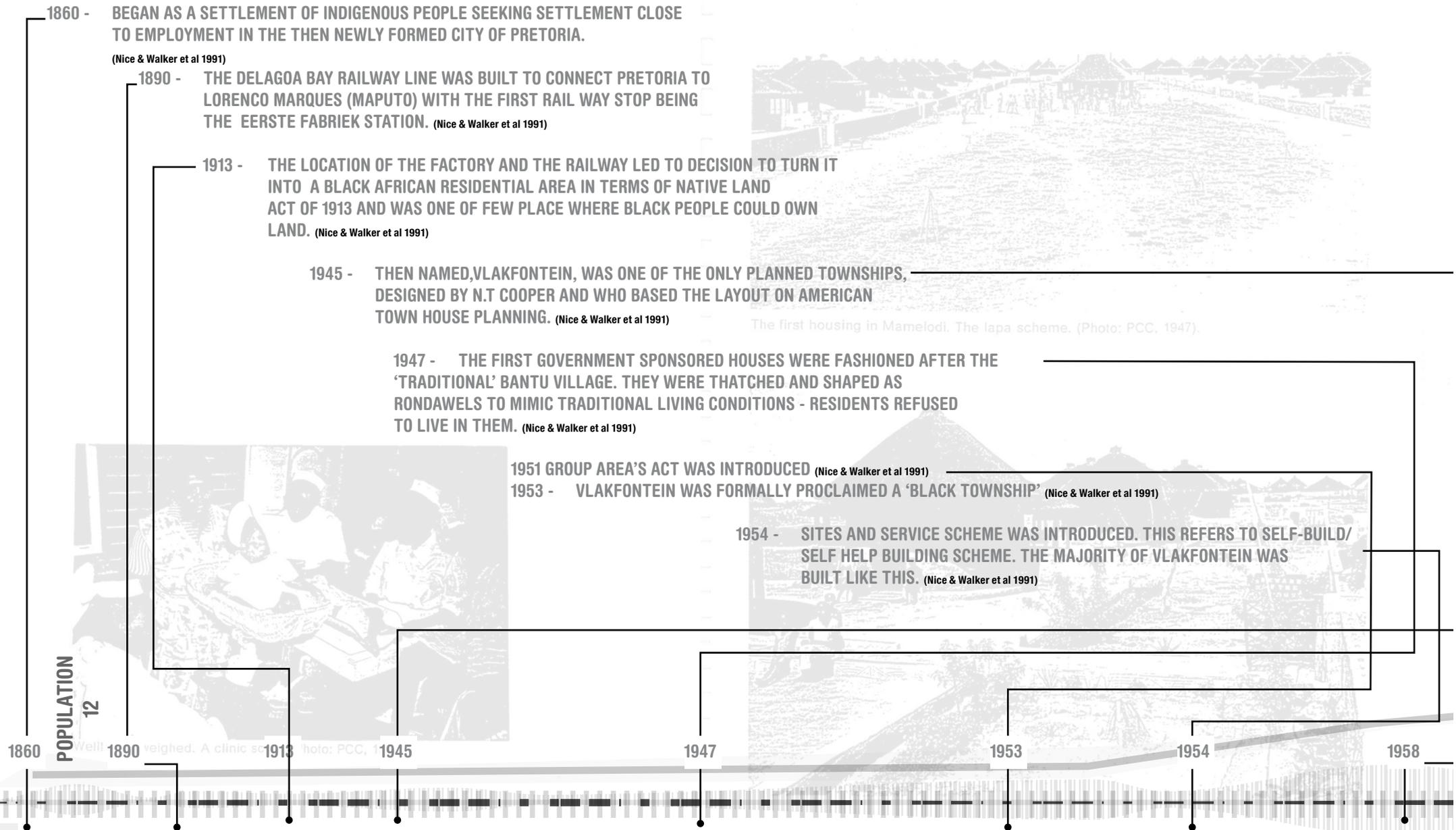


3.1.1 LAND-MARKED MAMELODI



Illus: 34 Mamelodi - Major routes, landmarks and divisions- including dissertation site in Mamelodi East (Author, 2011)

3.1.2 HISTORIC BACKGROUND TO MAMELODI



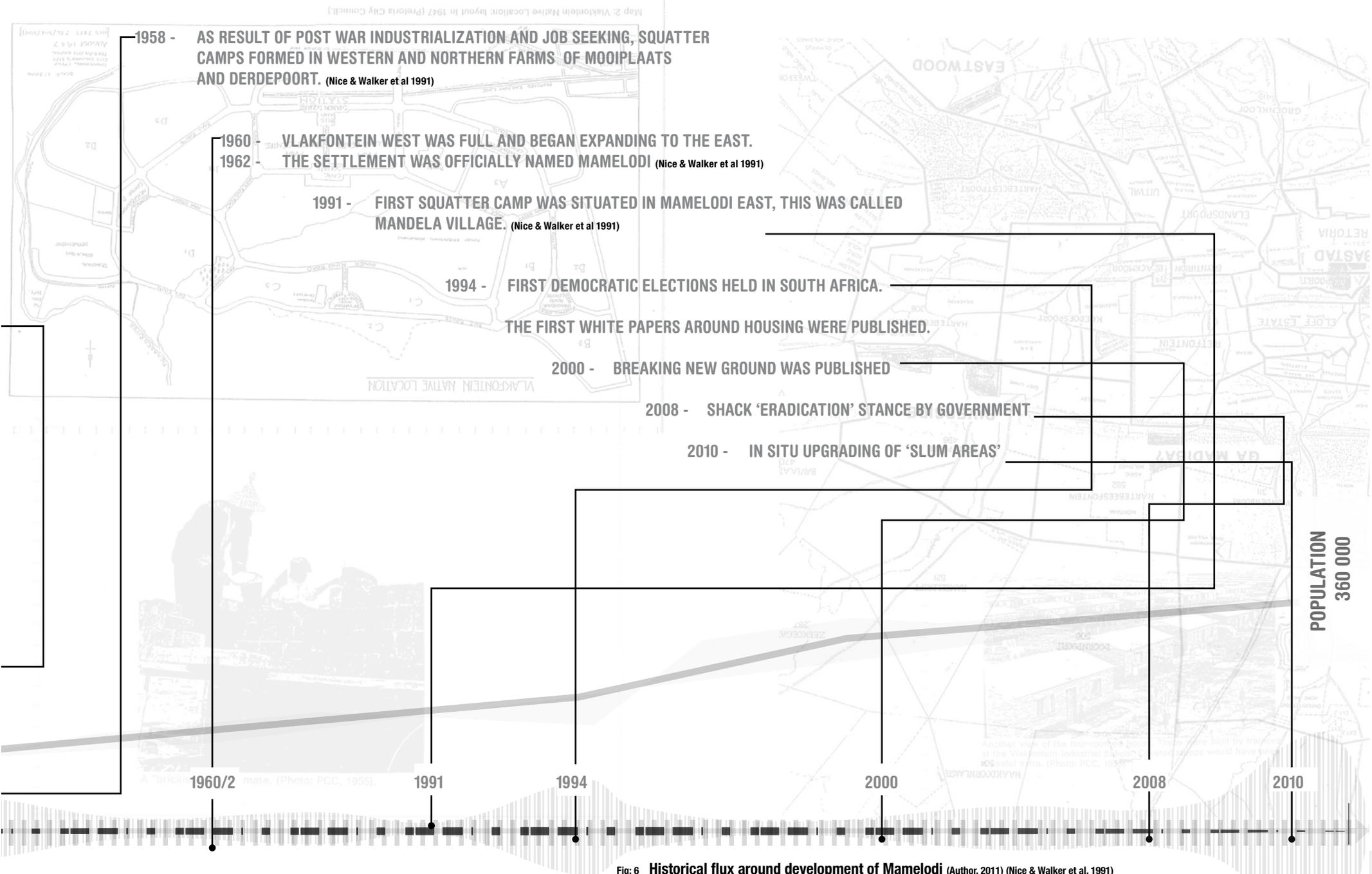
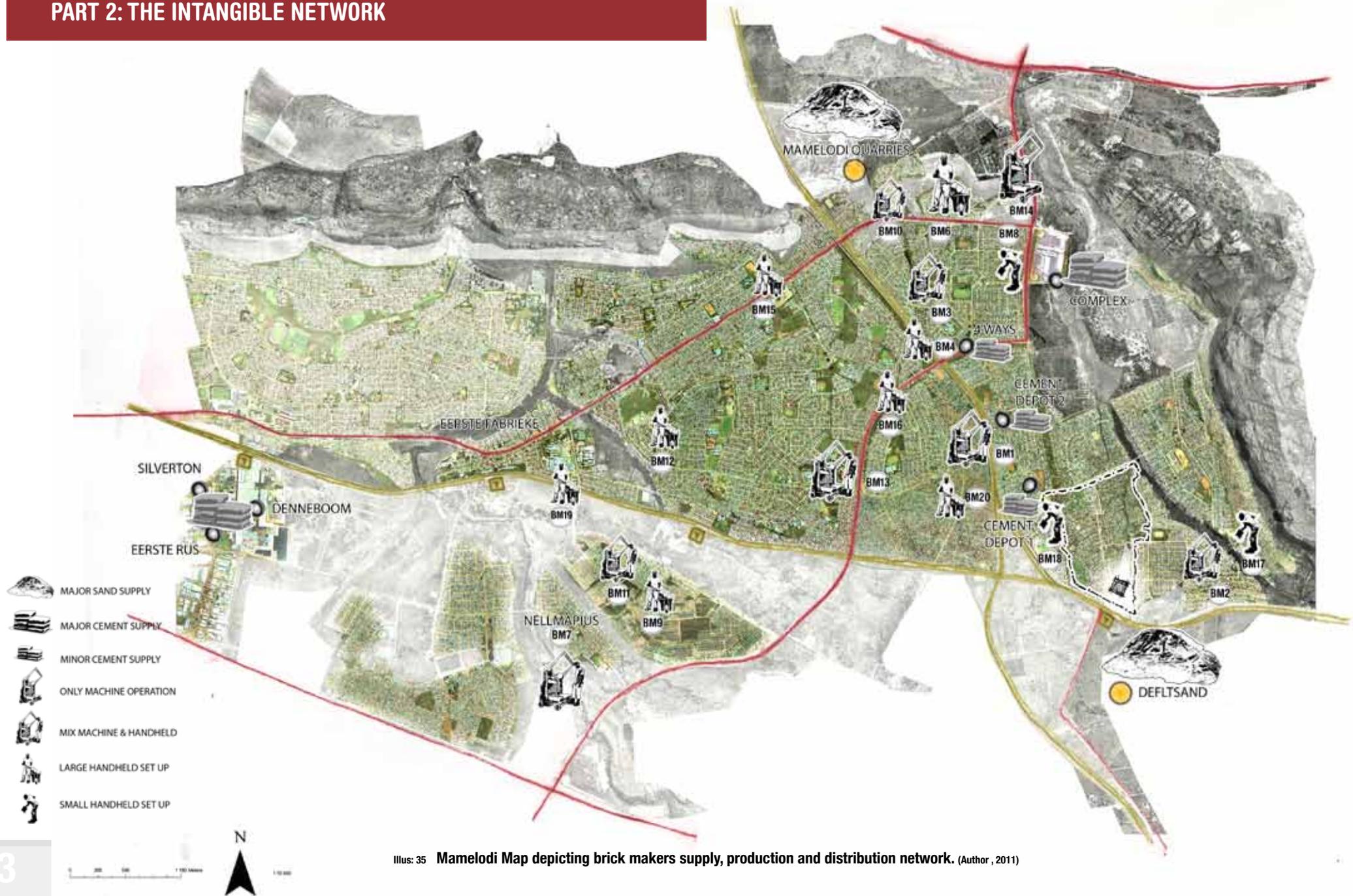


Fig 6 Historical flux around development of Mamelodi (Author, 2011) (Nice & Walker et al, 1991)

PART 2: THE INTANGIBLE NETWORK

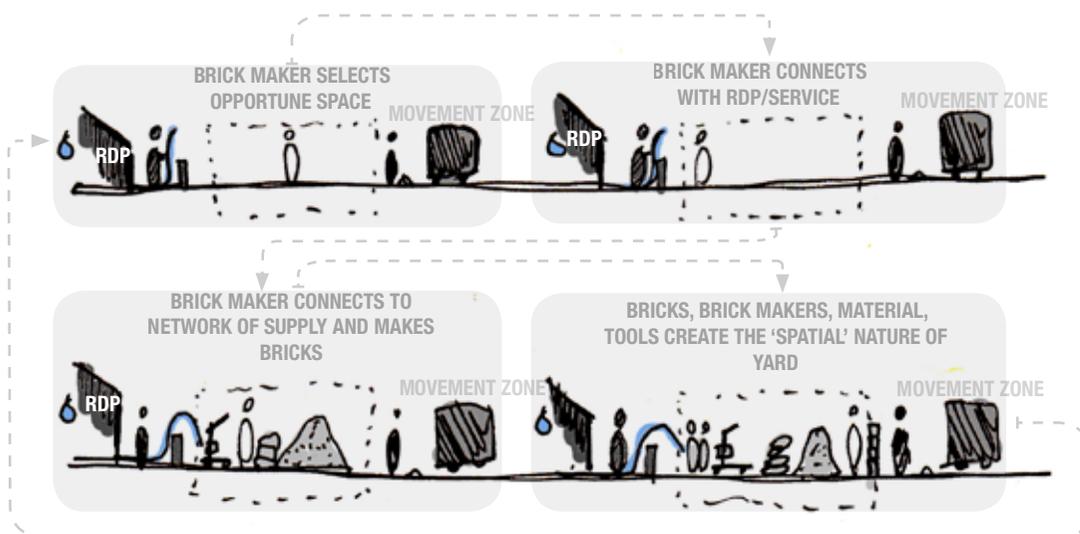


Illus: 35 Mamelodi Map depicting brick makers supply, production and distribution network. (Author, 2011)



Illus: 36 Family Planning- a brickyard in Mamelodi East (Author, 2011)

BRICK MAKERS PROCESS OF SPATIAL APPROPRIATION



Illus: 37 Diagram depicting the brick makers process of appropriation (Author, 2011)

3.2.1 CEMENT BRICK MAKERS OF MAMELODI

During the initial site visits to Mamelodi, the discovery of several backyard brick factories was made. Initially these businesses seemed haphazard, but after a brief interview there appeared to be a larger network behind the small businesses.

It emerged that there was a larger supply chain of resources and a market that fed the demand for cement bricks. Upon a closer inspection these bricks were being used to supplement and add to the government provided housing. The bricks were also being used to support temporary housing in the developing areas of Mamelodi.

Many of the brick makers were registered companies and managed by a family member. And generally were supplementary businesses to other forms of income. (see Illus: 37)

3.2.2 PATTERNS OF APPROPRIATION

The brick making businesses themselves appeared to operate in a similar fashion to the temporary housing (see Illus: 37):

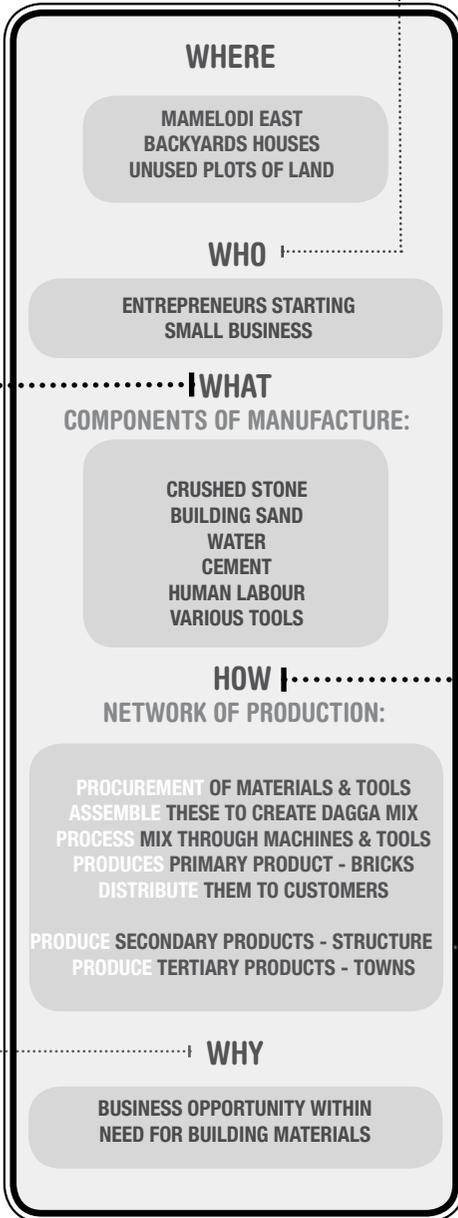
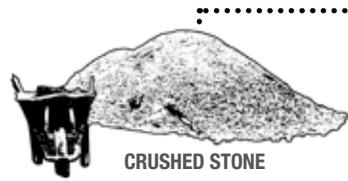
- They select an appropriate area close to major transport routes,
- Make contact with a water source; municipal supply or river,
- Procure material from local distributors,
- Use the bricks themselves to create temporal space, to advertise bricks and channel in potential customers.

3.2.3 FIELD RESEARCH CONDUCTED

A further study was conducted over a ten day period with measured results being taken from several interviews with the brick makers.

The process of engagement with the brick makers was documented and captured by photographic, video and field notes. (see Appendix Illus: 2) on (page 153)

3.2.3 STUDY OF ACTIVITIES INVOLVED IN CEMENT BRICK MAKING PROCESS

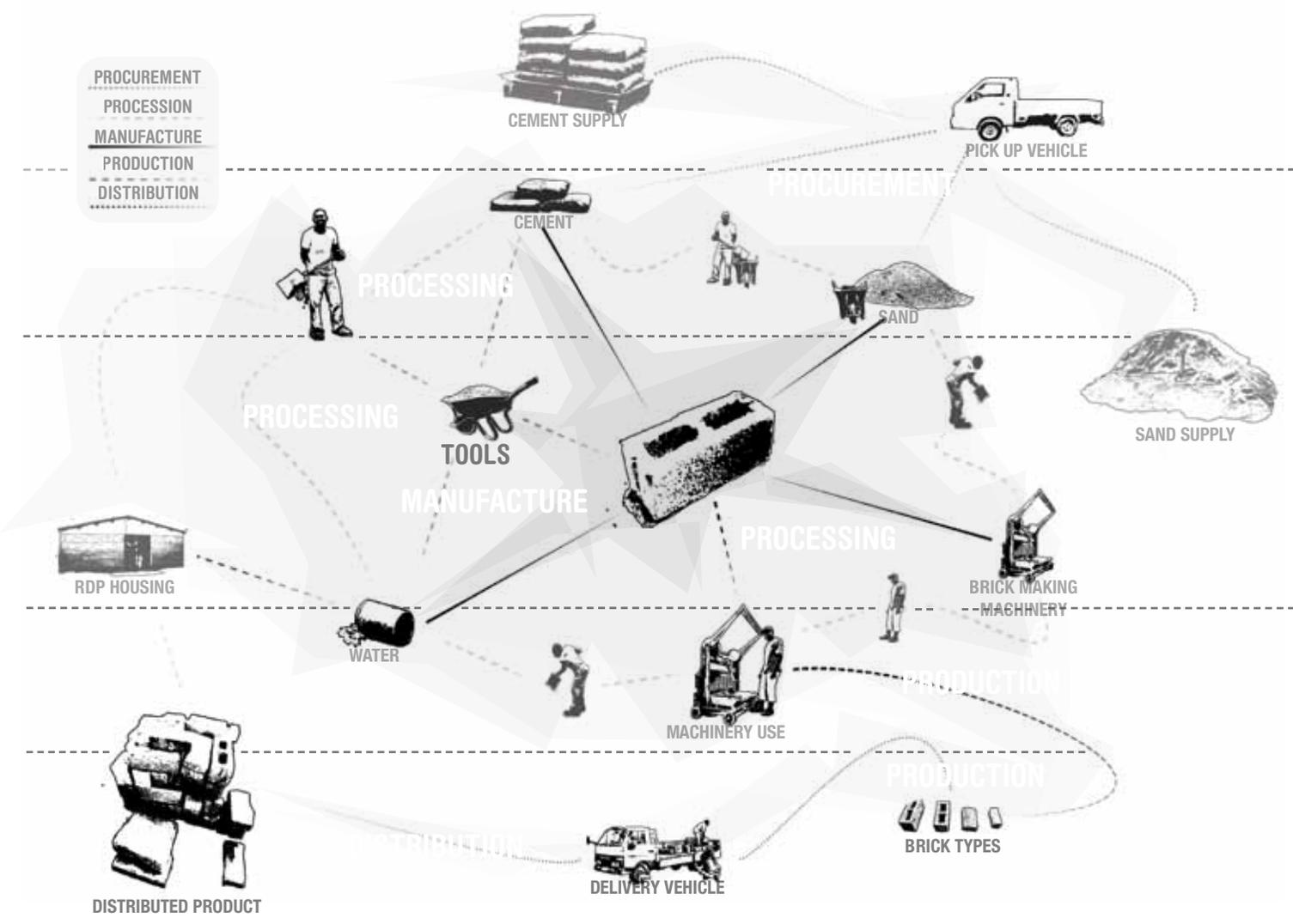


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Illus: 38 Profiles of cement brick makers in Mamelodi (Author, 2011)

NETWORK OF PRODUCTION

PROCUREMENT → PROCESSION → MANUFACTURE → PRODUCTION → DISTRIBUTION



Illus: 39 Diagram depicting the discovered network of production around cement brick makers (Author, 2011)

3.2.4 SUMMARY OF FIELD RESEARCH

The initial research study was held over a period between April and May of 2011.

Over twenty recorded interviews were conducted, with thirteen unrecorded interviews taking place and twelve independent site visits. (see Appendix Illus: 3, on page 154)

During the ten days on-site investigation into the processes around the Mamelodi brick makers, several core findings became clear:

THE CONNECTIONS BETWEEN THE BRICK MAKERS LIE MAINLY IN THE SUPPLY AND DISTRIBUTION OF THE MATERIALS USED: I.E SAND, CEMENT & WATER. (see Illus: 42)

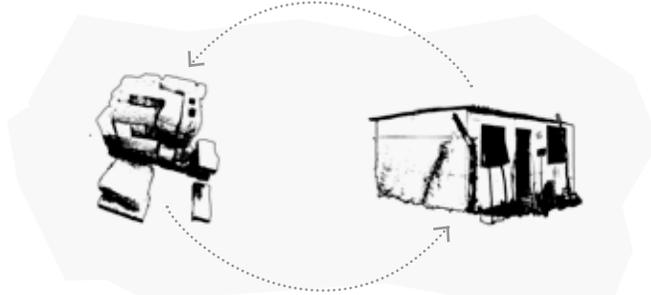
GENERALLY THE BRICK MAKERS HAVE A STRONG CONNECTION WITH TRANSPORT NETWORKS IN THE AREA AS WELL AS THE GOVERNMENT SUPPLIED SERVICES AND HOUSING IN THE FORM OF WATER AND BASIC SERVICES. (see Illus: 39)

PEOPLE BUY MATERIALS FAIRLY INCREMENTALLY, LEAVING BRICKS AND OTHER BUILDING MATERIAL AROUND THEIR HOMES. (see Illus: 44)

THE FORMS OF SUPPLY EXIST AS A BALANCE OF CENTRALISED AND DE-CENTRALISED SOURCES, EACH FUNCTIONING TO VARIOUS SECTORS OF THE MARKET.

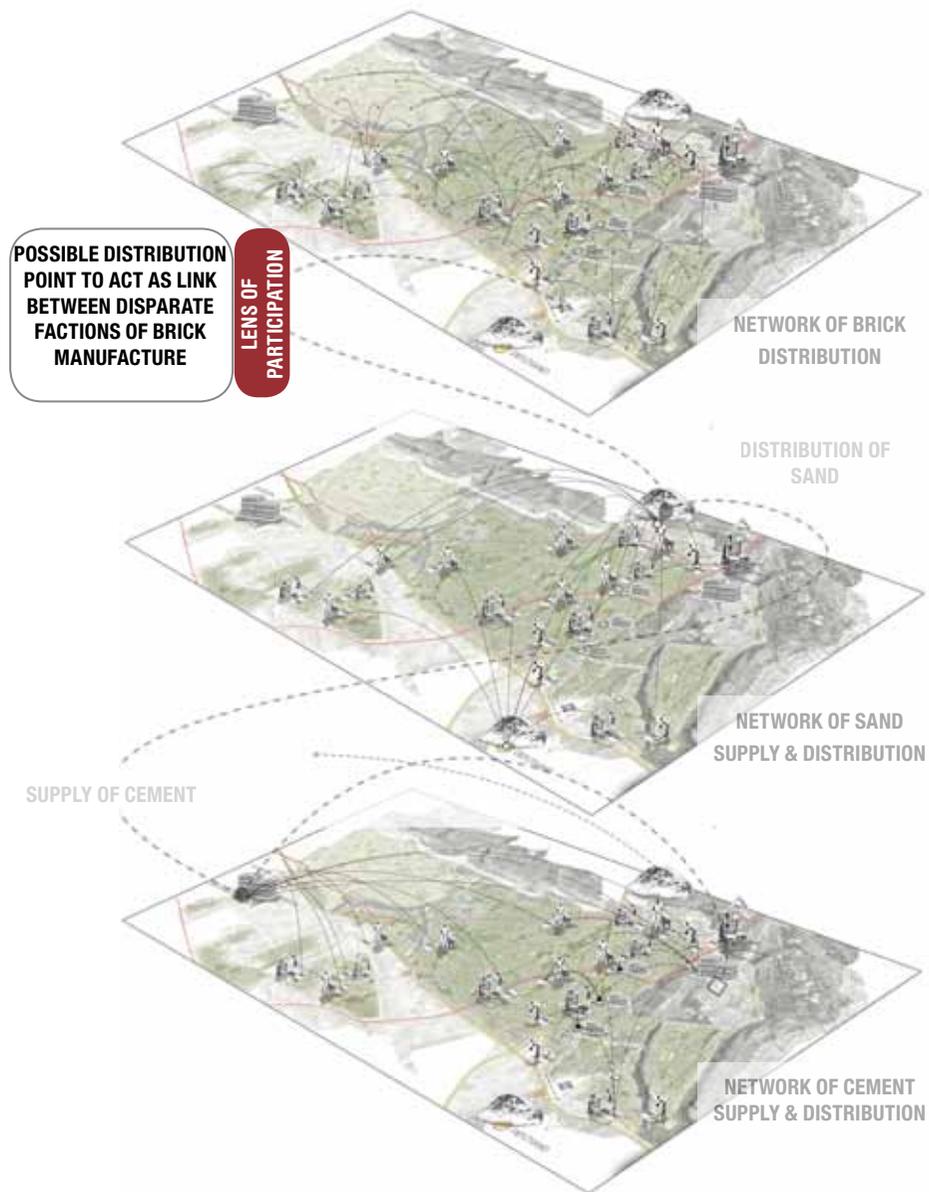
THE BRICK MAKERS EXPRESSED MAJOR CONCERN ABOUT THE SUPPLY AND DISTRIBUTION OF RESOURCES IN TERMS OF SUPPLY AND DEMAND OF BRICKS VS CAPITAL EXPENDITURE ON STOCK. (Appendix Illus: 8, page 159)

THERE APPEARED TO BE A RECIPROCAL RELATIONSHIP BETWEEN THE BRICK MAKERS AND THE TEMPORARY HOUSING. (see Illus: 42)

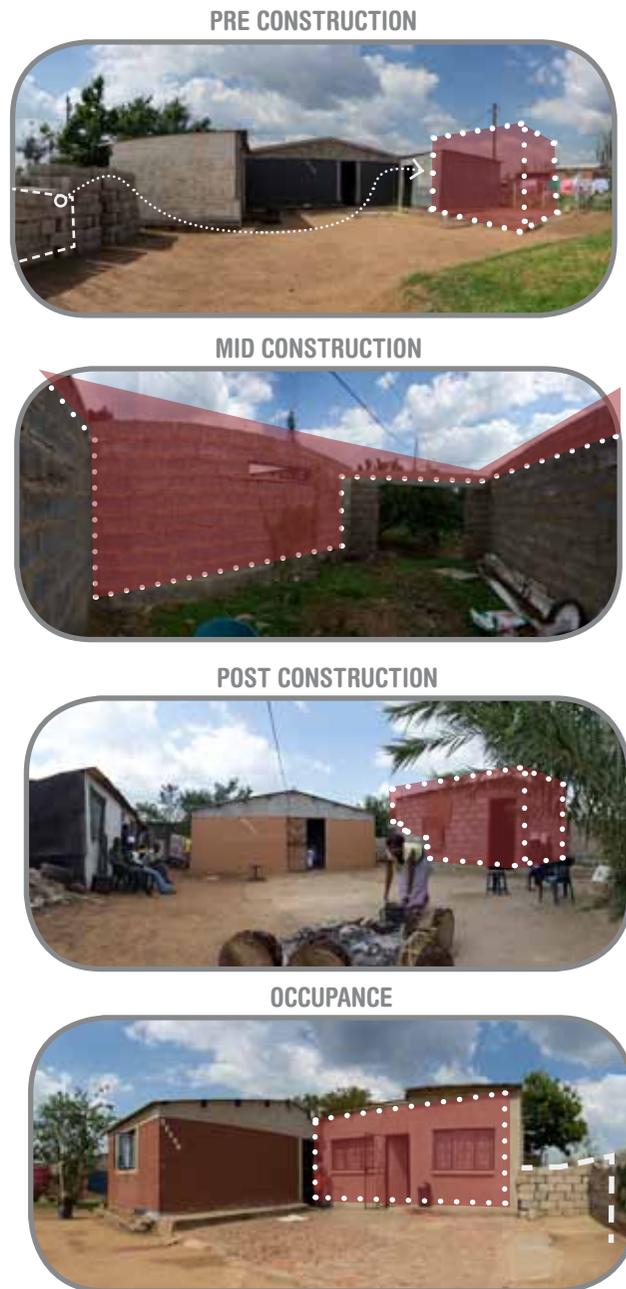


Illus: 42 Identification of link between brick makers and housing through resource use i.e. water and space (Author,2011)

CONNECTIONS BETWEEN BRICK MAKERS & SUPPLY NETWORK



Illus: 41 Identification of connections between brick makers and supply points through lens of participation (Author,2011)



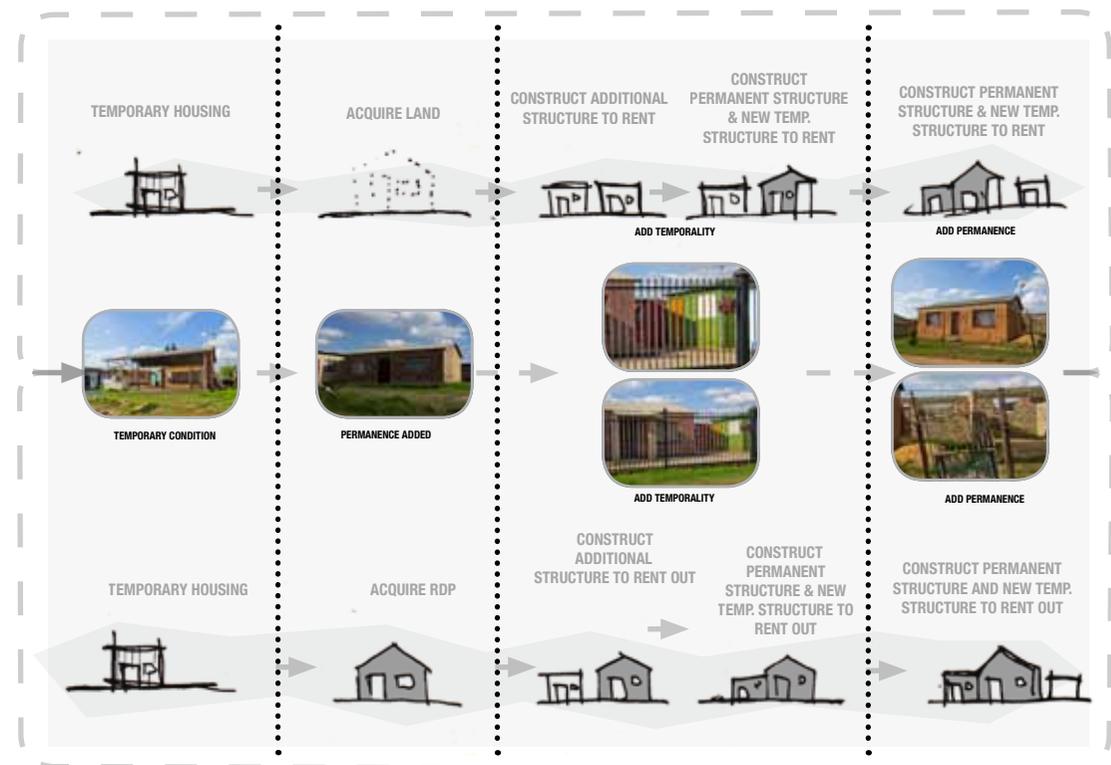
Illus: 43 States of observed flux within self built homes (Author, 2011)

3.2.5 OBSERVED STATES OF FLEXIBILITY IN GROWTH

While investigating the brick makers, certain patterns around the growth and decay of the houses began to emerge. Wages are used sparingly to buy small amounts of building materials which sit outside homes long before the 'final' product is built. (see Illus: 43)

The growth patterns of homes were observed and noted to have been in steady but varied states of growth and adaptation, according to home owners or residents needs, requirements or available funds. (see Illus: 44)

Structures that appeared 'permanent' and fixed were highly mobile and adaptable, being changed and moved according to the needs of the inhabitant, sometimes on a daily basis.



Illus: 44 Diagram depicting the states of flux within Mamelodi homes (Author, 2011)

3.2.6 OBSERVED STATES OF MOBILITY IN GROWTH

During an early morning interview on the 25 of June, several occupants of Pienaarspoort, Extension 12, were interviewed in their homes around the Pienaarspoort Station. Later that afternoon, the same residents had moved their entire dwellings to an adjacent site on the orders of a municipal body.

Not only were their structures highly adaptable and flexible they had a heightened mobility that resembled a caravan more than a fixed home. (see Illus: 45)

Certain commercial structures throughout Mamelodi exhibited similar aspects of mobility in the form of Container shops, fruit and vegetable stands (*stalletjies*) and various other commercial operations that ran from these mobile platforms.

Amidst various states of flux there appeared to be several connections between the structures and the occupants. (see Illus: 47), (see Illus: 48), (see Illus: 49), (see Illus: 50)

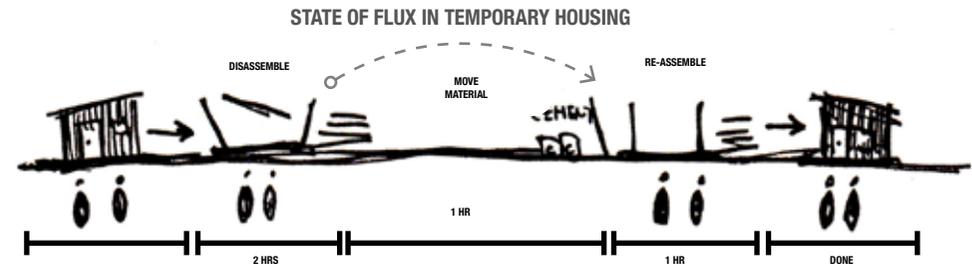
From this observation certain key concepts emerged:

STRUCTURE IN MAMELODI EXISTED IN VARIOUS STATES OF:

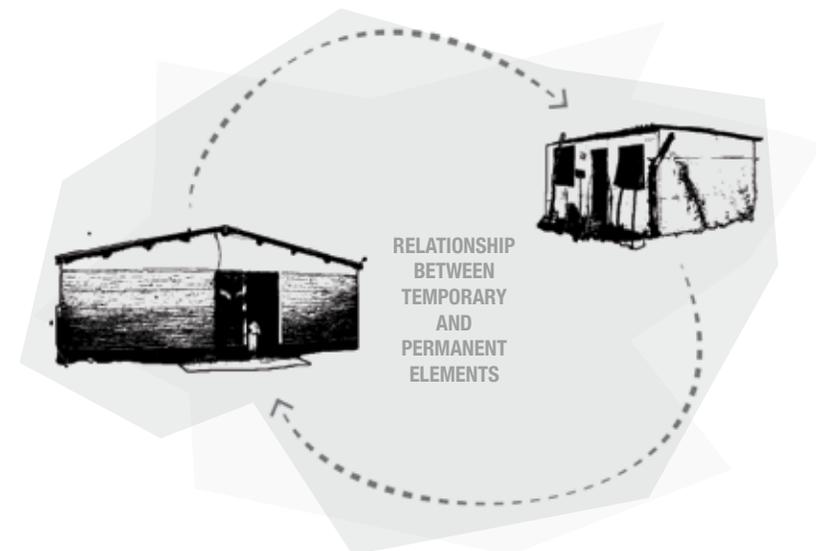
- TEMPORALITY
- PERMANENCE (IN FORM)
- MOBILITY
- FIXITY (IN LOCATION)

THESE VARYING STATES OF EXISTENCE CREATE VARIED STATES OF FLUX IN THE NATURE OF THE STRUCTURES AND THE PROCESSES AROUND THEM. (Illus: 52, page 51)

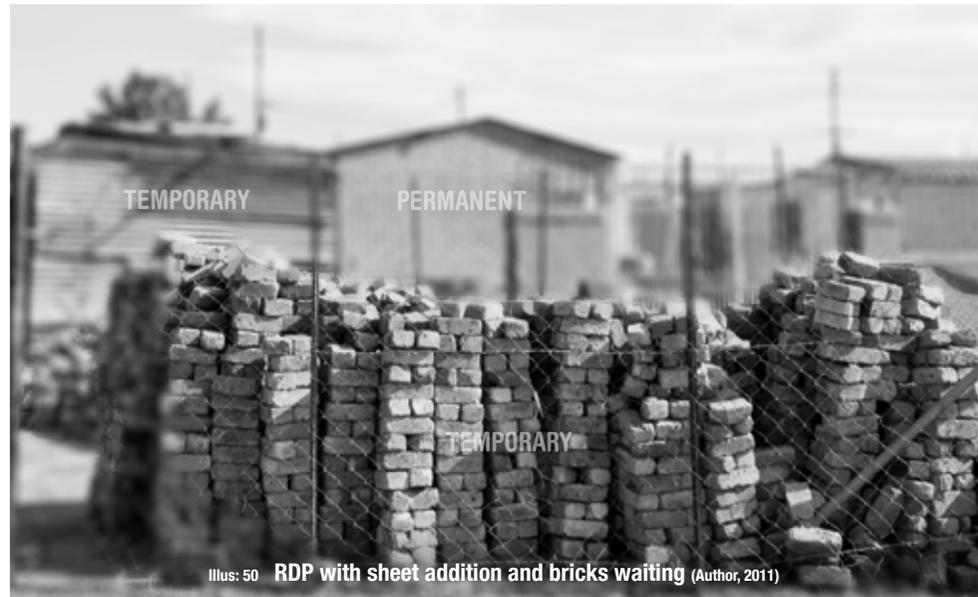
THERE APPEARED TO BE A STRONG LINK BETWEEN THE PERMANENT STRUCTURAL ELEMENTS AND THE TEMPORARY IN HOW THEY EACH FACILITATED THE OTHER DURING THE PROCESS OF STRUCTURAL GROWTH (CONSTRUCTION). (see Illus: 46)



Illus: 45 Observed relationship between temporary brick makers and permanent housing (Author, 2011)



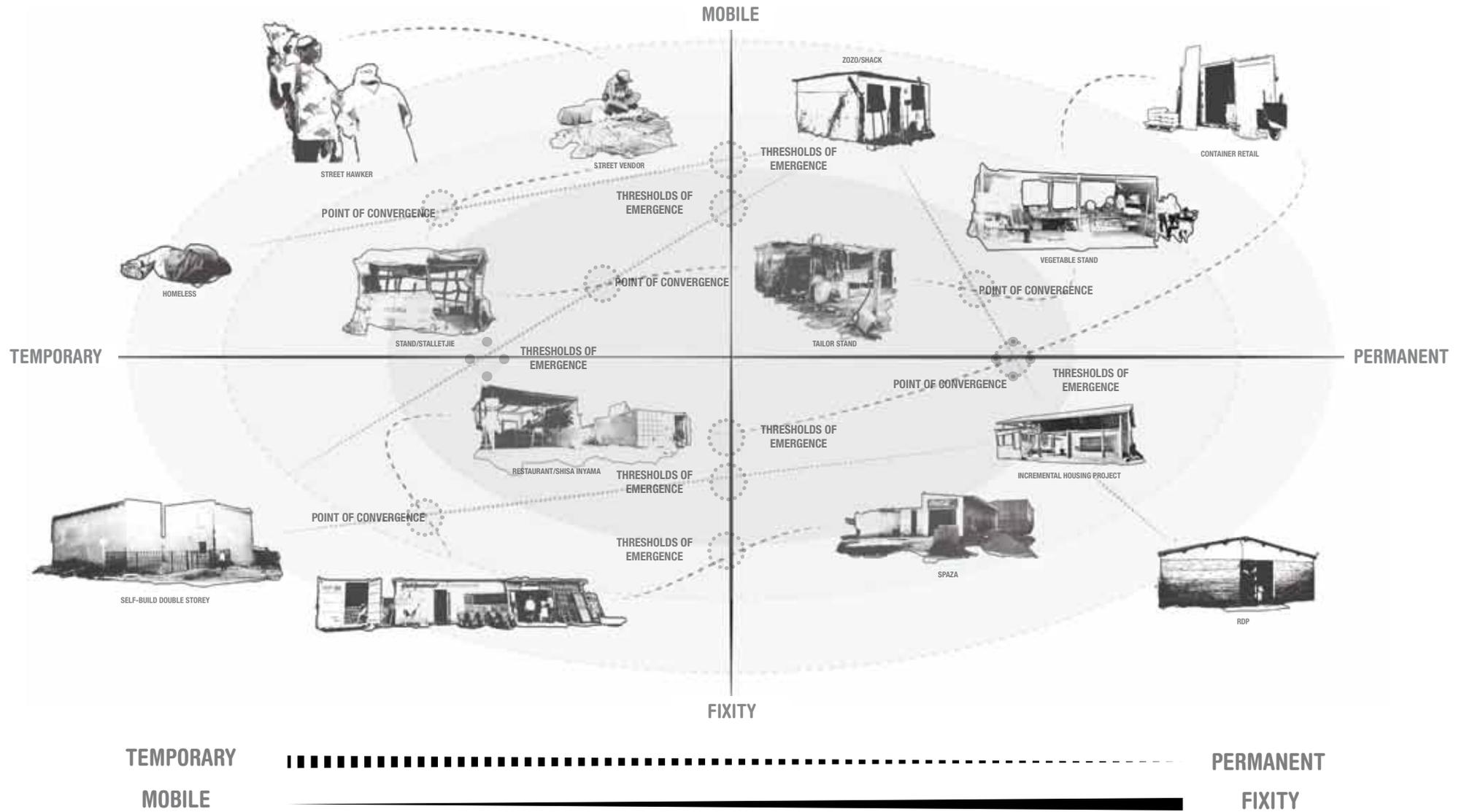
Illus: 46 Relationship between temporary and permanent housing elements in structural growth (Author, 2011)



Illus: 48 RDP with potential future growth (Author, 2011)

Illus: 49 Self-build with future bricks in yard (Author, 2011)

PART 3: INTERPRETATION OF FINDINGS



Illus: 51 Diagram depicting the Methodology of emergence through states of fluxual growth as seen in Mamelodi (Author, 2011)

3.3.1 KEY FINDINGS - SUMMARY

Through the process of engagement with the brick makers of Mamelodi and the elements in their network of production, a strong theme emerged:

A SENSE OF STRUCTURAL MOBILE FLEXIBILITY ENABLING A FLUXUAL GROWTH OF LARGER STRUCTURAL BODIES THROUGH STATES OF TEMPORALITY AND PERMANENCE.

3.3.2 PERMANENCE VS TEMPORALITY

In the context of Mamelodi, there appears to be a hierarchy within the levels of permanence and temporality attached to various elements, structural and personal. A person is not limited by mobility, but enhanced by it.

The aspects of temporality provide a flexible structure for an individual, through thresholds of emergence, to gain permanence as when needed. *(see Illus: 52)*

John Habraken describes this condition as the human instinct that drives one to build, to endure and to resist time, although one knows that ultimately time will win. As humans we instinctively seek permanence. *(Habraken,2008: 8) (see Illus: 52)*

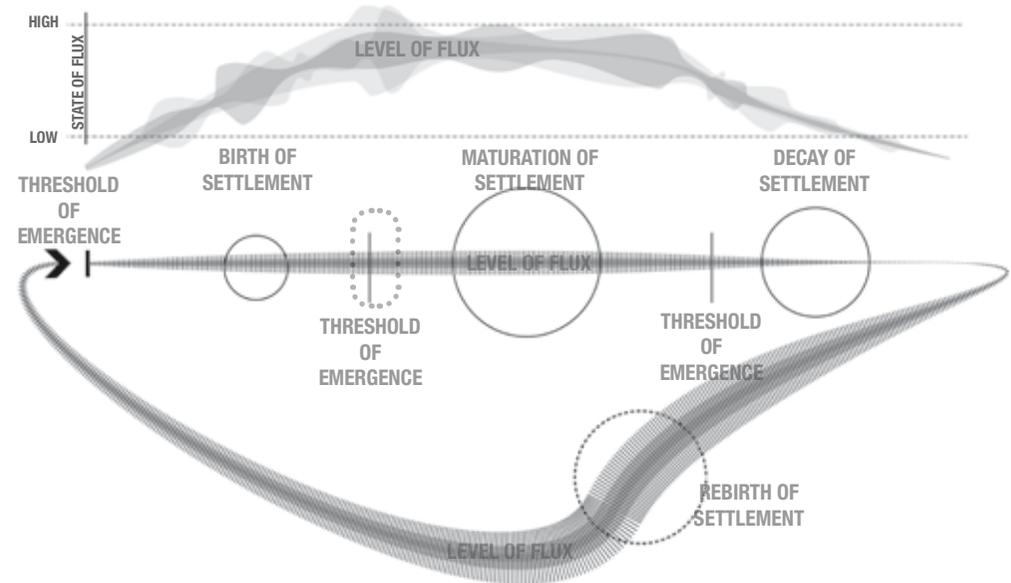
He describes how a detached observer could recognize the builder as an agent of change, but in fact the builder is an actor who, in striving for permanence, engages the existing context and transforms what is there. *(Habraken,2008: 8)*

The built environment, like all complex phenomena, artificial and natural, endures by transforming its parts. *(Habraken,2008: 7)*

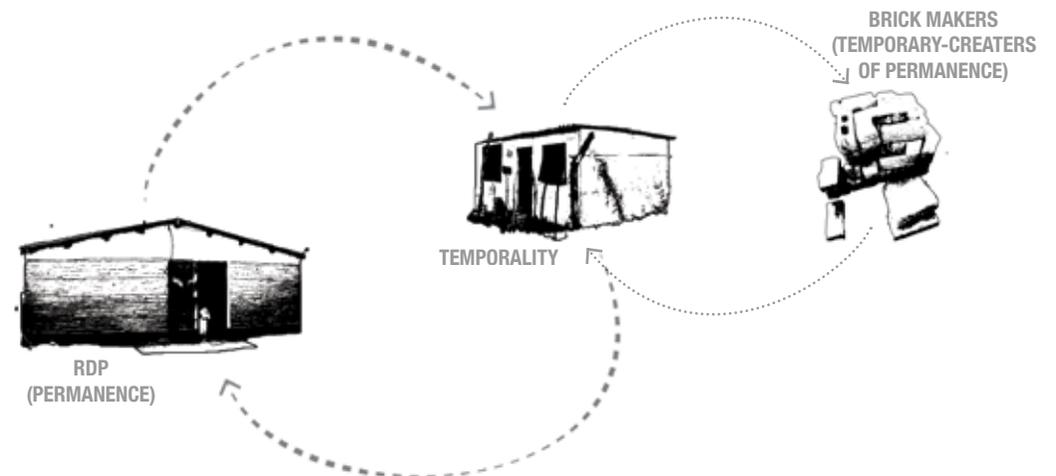
The context of Mamelodi exemplifies this condition in the respect placed on brick housing. Permanence, in the form of bricks, is a symbol of status in the context of developing South Africa. *(see Illus: 54)*

Habraken draws the metaphor of the built environment as an organism, only so by virtue of human intervention.

The human elements manifested in structure give life and create the spirit-of-place as long as people are actively involved and find the built environment worth renewing, altering, and expanding. Only then it will endure. *(Habraken,2008: 7)*



Illus: 52 Interpretation of Habraken's patterns of permanence in settlement (Author, 2011)



Illus: 53 Larger connections between RDP and brick makers through temporary housing. (Author, 2011)

3.3.3 MOBILITY

Tim Creswell notes mobility's inherent duality as a product of social relations that simultaneously acts as an agent of social production. (Edjabe [Creswell] 2011: 169)

In the case of the Cement Brick Network of production, the aspect of mobility is key in terms of accessing services, supply and distribution.

Creswell defines mobility in terms of 6 key factors:

THE STARTING POINT	- WHY DOES A PERSON OR THING MOVE?
SPEED	- HOW FAST DOES A PERSON OR THING MOVE?
RHYTHM	- IN WHAT RHYTHM DOES A PERSON OR THING MOVE?
ROUTING	- WHAT ROUTE DOES IT TAKE?
EXPERIENCE	- HOW DOES IT FEEL?
FRICTION	- WHEN AND HOW DOES IT STOP?

3.3.4 MOBILITY AS A SYMBOL

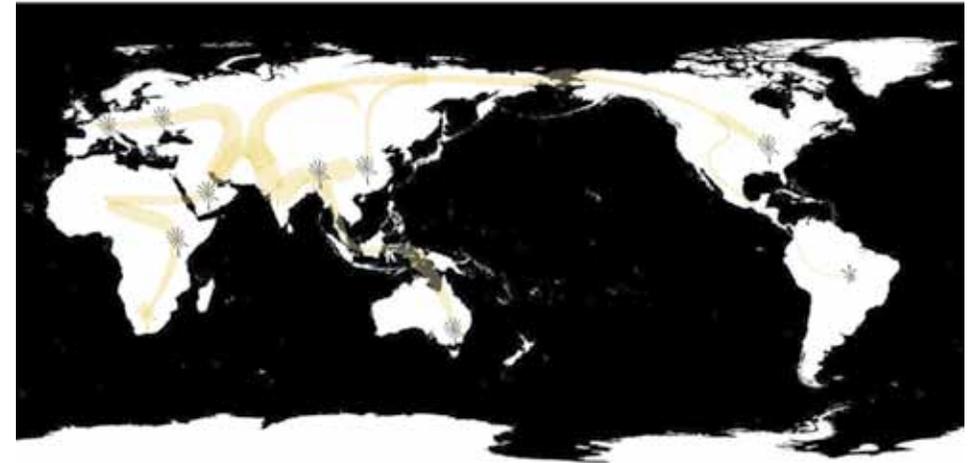
Although one could see the mobile world as something that replaces a foxed world, Creswell points out that one needs to constantly consider fixity and friction in contrast to mobility within its context. (see Illus: 54), (see Illus: 55)

Mobility has been described as dysfunctional, as inauthentic and rootless and, more recently, as liberating, anti foundational and transgressive in forms of representation. (Edjabe [Creswell] 2011: 168)

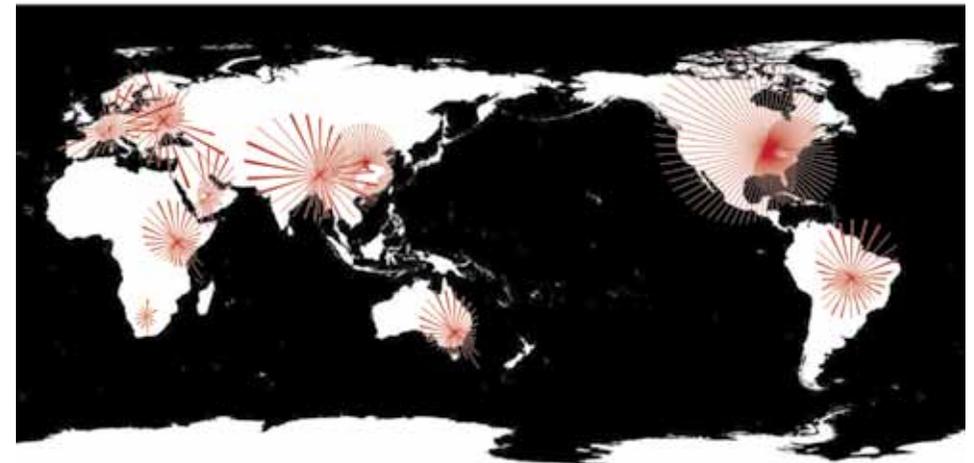
During a conference at The University of Witwatersrand's *Faces of the City* seminars Dr. Megan Jones presented her finding around themes of masculinity and mobility in the townships of South Africa.

Dr Jones discussed how during apartheid movement was controlled by the Pass Laws and the Group Areas Act and that after the regime change the free movement of the population was a notable symbol of expression by the South African people.

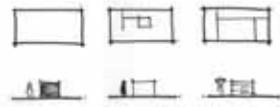
Mobility, in the South African context, can be regarded as an expression of freedom.



Illus: 54 Simplification of human mobility through history - Pre 20th Century (Author, 2011)



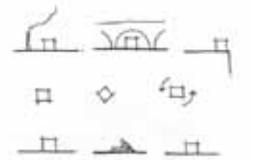
Illus: 55 Simplification of current human permanence being replaced by digital temporality and mobility - 21th Century (Author, 2011)



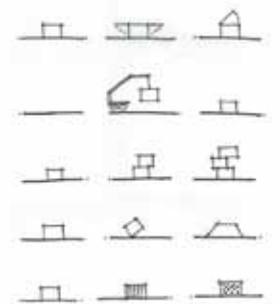
ADAPTABLE ARCHITECTURE



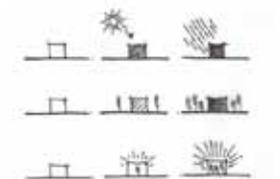
UNIVERSAL



MOVABLE ARCHITECTURE



TRANSFORMABLE



RESPONSIVE ARCHITECTURE



3.3.5 FLEXIBILITY

Architecturally flexibility is considered a modern issue. It became a crucial aspect when designers realized that attempting to fit a building form precisely to its function ignores the potential and inevitable growth and change that will occur over time. (Otts, 2011: 105)

A number of strategies are proposed for achieving the needed flexibility (see Illus: 56):

ADAPTABLE ARCHITECTURE - adaptable structures features re-positionable partitions or are changeable per user or occupant.
i.e. Rietveld House

UNIVERSAL ARCHITECTURE - what typifies a universally flexible building is its ease of adaptation per use. These buildings are often characterized by open floor plans and typology free design to be accessed and used by all.
i.e. Eames House, Crown Hall by Mies Van Der Rowe.

MOVABLE ARCHITECTURE - movable flexible buildings consist of re-locatable or re-positionable structures or buildings capable of being torn down and reassembled in another location.
i.e. Nomadic tents, Airstream Trailers.

CONVERTIBLE OR TRANSFORMABLE SPACE - relies upon technology to quickly change the characteristics of space within a minimum effort. Characterized by modular design that is capable of adding or removing units or components such as hotel ballrooms that can be converted from one large space to many smaller spaces.
i.e. Archigram's Plug-in City, University of Phoenix Stadium.

RESPONSIVE SPACE- involves architecture that moves, as it responds to changing demands.
i.e. Jean Neupal's Di Monte Building

MULTI STRATEGIC SPACE/LOOSE FIT - mainly accommodates growth in design. Buildings are designed to be too large and grow as infill increases.

This Architecture is designed to accommodate a fixed range of current and expected future uses. It anticipates a limited number of likely changes to occur and provides for built potential for those changes to occur.

Illus: 56 Diagrams depicting elements of flexibility in Architecture and examples [Otts,2011] (Author, 2011)

3.3.7 STRATEGIC INTERVENTION

New structures grow and transform out of the old. Habraken states that we must learn to look at the intricate ongoing symbiosis between people and the built matter in order to understand this process of transformation. (Habraken, 2008: 45)

"To perceive how buildings' intrinsic capacity to adapt and transform represents the key to survival, the perspective that has given rise to programmatic functionalism must be transcended." (Habraken, 2008: 46)

In light of built environments' organic patterns of growth and change, and the transformational behavior of its forms, it appears to act very much as a living whole.

By understanding the organic nature of appropriated structure and the process by which human interaction imbues its properties on a building, one can begin to overlap certain conditions to determine niche points of engagement.

3.3.8 STRATEGIC DESIGN

There is a relationship between the structures we design and those we enable to emerge; this relationship is dynamic and in constant need of adjustment. (Hamdi, 2010:89)

Structure, by design, offers a network a shared context of meaning and a shared sense of purpose and justice with rules and routines that offer continuity and stability. The key questions are:

HOW MUCH STRUCTURE WILL BE NEEDED BEFORE THE STRUCTURE ITSELF INHIBITS PERSONAL FREEDOMS, GETS IN THE WAY OF PEOPLE AND PROGRESS?

AT WHAT POINT DOES IT DISABLE THE NATURAL ORGANIC PROCESS OF EMERGENCE?

Nabeel Hamdi offers that the best way to deal with the elements of change, participation or emergence, whether in standards, cultural norms or legal dictates, is incrementally and with practical example. He explains this as interventions should showcase their process within construction process. (Hamdi, 2010: 45).

The concept is one of a catalyst - of practical interventions with strategic objectives, that begin by looking for key starting points. Building of prototypes, is key to encouraging appropriation of an intervention.

3.3.8.1 ARCHITECTURAL INTERVENTION PROPOSAL

An intervention that actively engages with its immediate context through architectural means, in order to cultivate ownership and future growth, should respond to the existing conditions that enhance that environment:

- The intervention should employ incremental growth patterns, and grow with its context. In this way potential ownership is increased as people who develop with a building are likely to take ownership of the structure.
- The intervention will aim 'to grow' through a series of negotiated responses in different forms of temporality and permanence depending on the required need.
- The intervention itself should fluxually grow with its context, and allow for responsive flexibility from its users.

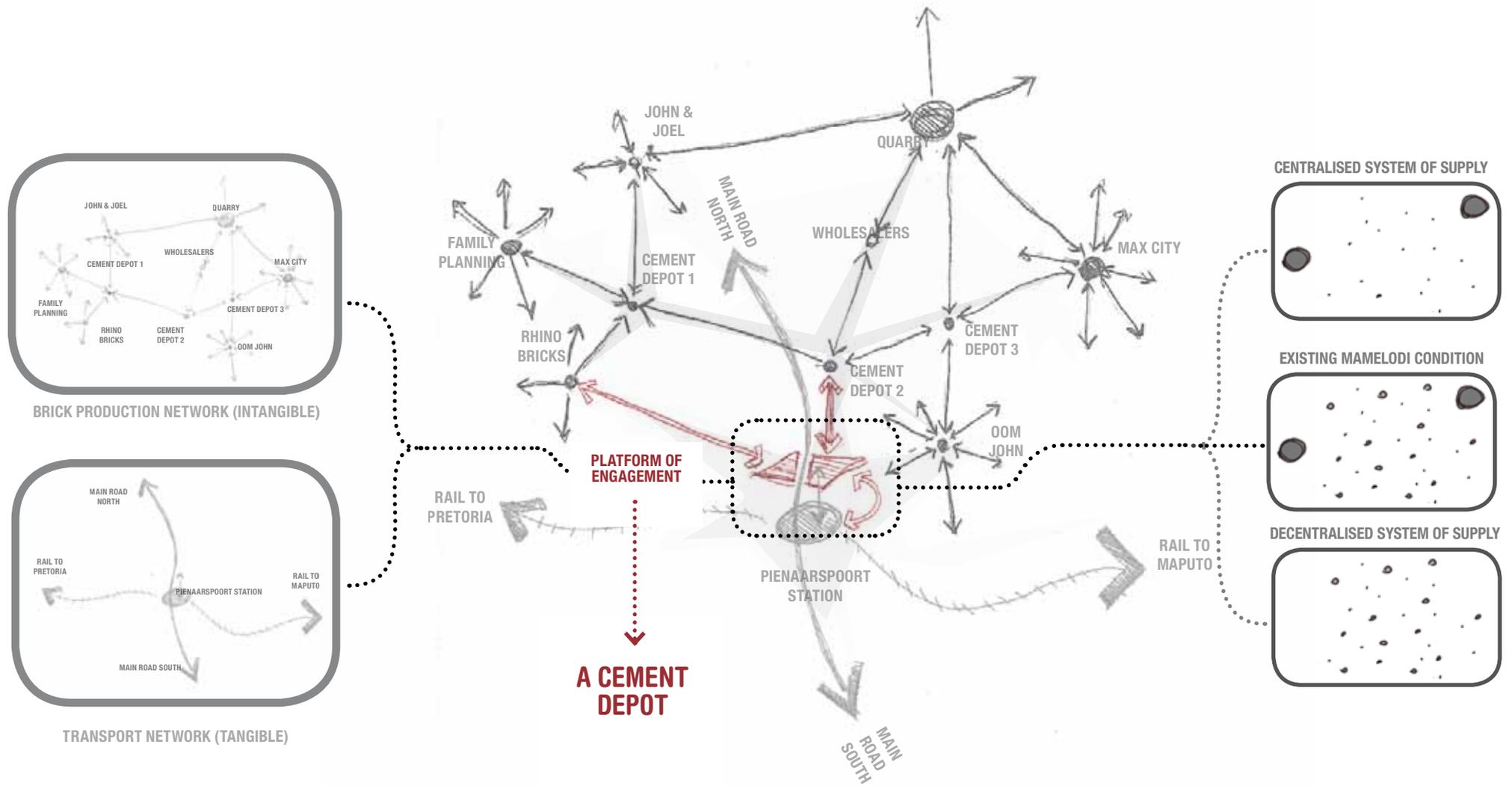
3.3.8.2 INTERVENTION NICHE

As stated before the intervention should not replace any functions of its host network, in this case the brickmakers, but rather seek to enhance existing processes by placement of a niche service(s) that the network cannot provide for itself:

- At present the supply of cement is from external sources at market prices based on the higher end market of large scale industry.
- There is an opportunity to provide the most basic building element for the network and its context in order to enhance a developing network for future growth.
- The connection of this function to an existing mobility node would optimize the impact of such an intervention.

3.3.8.3 INTERVENTION STRATEGY

By providing a platform of engagement between the intangible connections of the brick makers and sub networks around cement use and the tangible connections of the mobility route network, an intervention location can be identified. (see Illus: 57)



Illus: 57 Diagram depicting where the niche intervention lies within the tangible and intangible networks (Author, 2011)

Chapter 4 : Precedent Studies



Illus: 58 The Ubuntu Centre - An example of a building that is questionably contextual and responsive (Author, 2010)

4.0.1 DESIGNING FOR VULNERABILITY

The first wave of buildings to be constructed in the post-apartheid South Africa were remarkable for their ground breaking attempts to harmonize the differences between previously segregated population groups.

In reference to Red Location, by Neoro Wolff Architects, Murray refers to them as positive 'showcasing', which reveal the bizarre realities that are made material by actions and agency. A strong forerunner of overlapping positive programming in architecture. (Deckler et Al[Murray], 2006;8)

Although, the current creation of buildings and urban spaces in contemporary South Africa persists in a manner that is largely without sustained critical reflection or self consciousness. (Deckler et Al[Murray], 2006;2)

While these interventions serve to uplift their immediate context and put these previously unknown areas 'on the map' they appear to sometimes lack the ground-up base to allow them to prosper holistically beyond opening day.

Often the nature of Architectural projects in these areas aim to only address cultural and heritage issues. In today's climate one cannot ignore the social and economic opportunities that are required and that cannot be wasted with available resources.

These processes of spatial design within a developing context are seen in a positive manner, and should take into account the needs of social reform on one hand and the consumer based economy on the other. (Deckler et Al[Murray], 2006;9)

4.0.2 RESPONSIVE INTERVENTION

It is the role of the next wave of designers in South Africa to critically evaluate the positive aspects of these ground breaking designs and add the next level of understanding, and appreciation for the inhabitants of these vulnerable areas and aid in building resilience.

While these projects are seminal in the process of establishing an appropriate set of design principles, one cannot ignore the 'white elephant' status attributed to some of the current projects found in vulnerable areas.

To gain a better understanding of this question, the author completed a research trip to gain first hand experience of how these building functioned in their context. (see Appendix Illus: 27 , on page 174)

4.0.3 OVERVIEW OF CASE STUDIES

SELECTED WORK OF CEDRIC PRICE

Cedric Price's work inspired such revolutionary work as Archigram's Plug In City, and Renzo Piano's Pompiduo Centre.

His revolutionary theories on flexible and adaptable architecture are essential to lay the foundation to explore these concepts further.

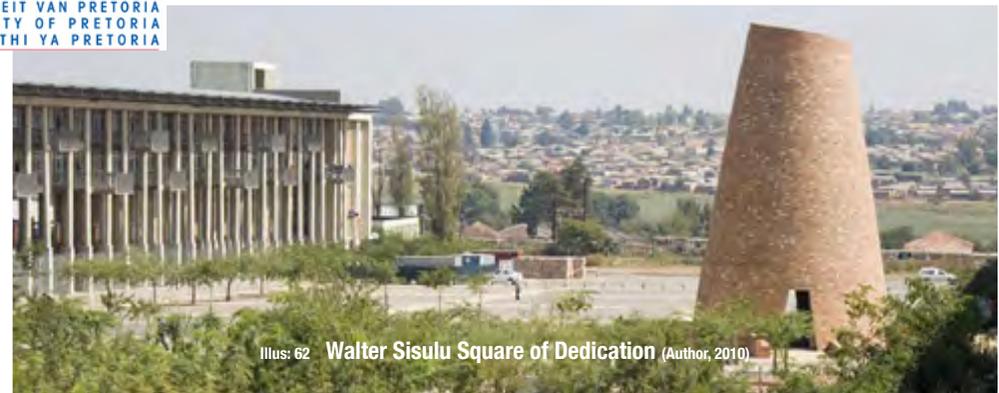
BARAGWANATH JUNCTION - URBAN SOLUTIONS

The Baragwanath Transport Interchange is the one of the first positive steps taken by development agencies to begin the process of re-writing previous planning wrong.

Its redefinition of the transport interchange model, employing elements of informality into its planning and structural, is key.

QUINTA MONROY HOUSING SCHEME - ELEMENTAL ARCHITECTS

Progressive and Incremental development cannot be discussed without looking at the Elemental Multi Disciplinary team's work in South America. This highly published and acclaimed project demonstrates the key principles of design through negotiated response while respecting vulnerability.



4.1 SELECTED WORK OF CEDRIC PRICE

THE FUN PALACE

The Fun Palace is considered the most famous creation of Cedric Price. Although never built, it is described as a giant toy or a machine process the size of a building. The interest of this project lies in its radical dependence on structure and technology. (Matthews, 2007:34)

With the Fun Palace, Price responds to social and political issues that go beyond the traditional boundaries of architecture with the ultimate goal to try create a building that changed according to the desires of its users.

The only fixed component within the Fun Palace was to be the structural lattice grid of columns and steel beams. All other elements of the programme - suspended theaters, activity spaces, cinema screens and speakers - were to be made mobile or prefabricated modular units that can be quickly assembled and disassembled as needed. (Matthews, 2007:42) The columns, towers or mounting in addition to serving as anchor, also contained the stairs release and relief, elevators, plumbing and electrical connections.

POTTERIES THINKBELT

Potteries Thinkbelt, also un-built, reuses an existing railway infrastructure to support a university for 20 000 students. By addressing not only the programmatic needs, but also the needs of the surrounding community, Price designs for inherent sustainability and flexibility into the Potteries Thinkbelt. (S. Hardingham and K Rattenbury, 2007:67)

The project aimed to regenerate the brownfield site of the Potteries in North Staffordshire, which has a span of over 160km, embrace new technology, and to revitalize the economy of the area by infusing the industries with intellectual power and experimentation.

Flexibility was also achieved through the use of mobile classrooms, which were integrated into railbuses” moving from site to site along the Thinkbelt.

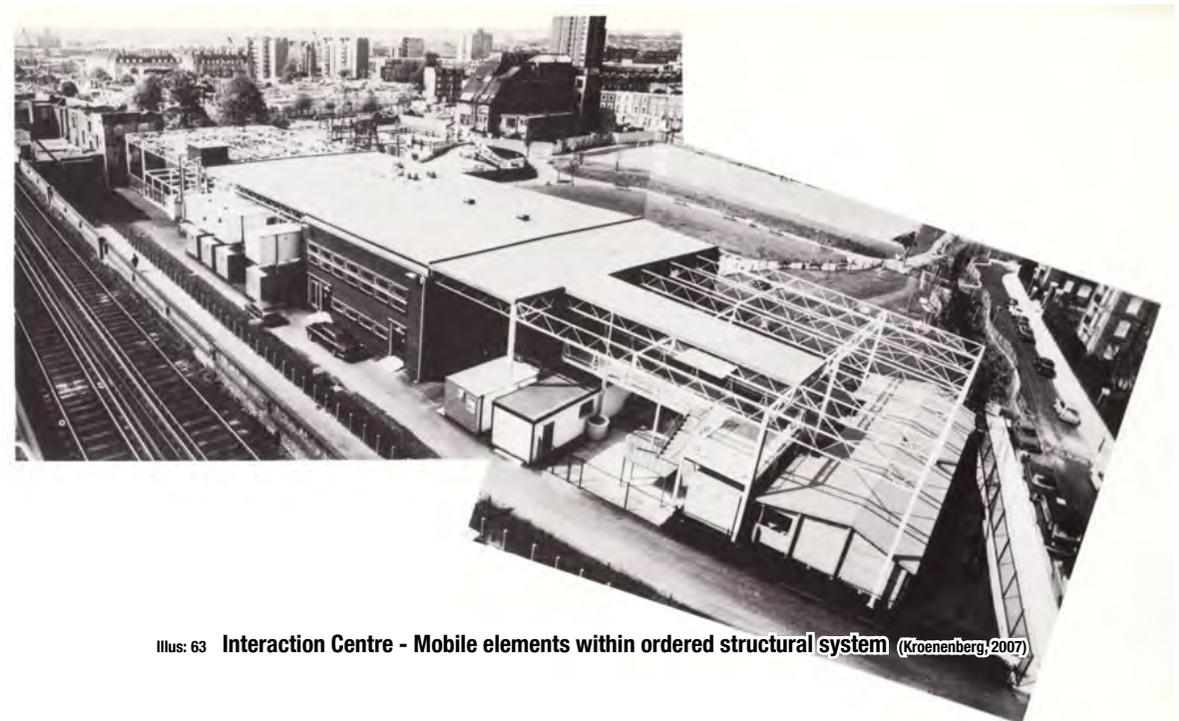
Equipment and goods were transported along the same rail network; since education was linked with industry, the classrooms had to be moved from factory to factory in order to support ongoing research.

THE KENT INTERACTION CENTRE

One of the few built Price projects, the Kent Interaction Centre was designed in order to explore the possibilities of dynamism in architecture: Cedric Price noted that if the components remained static for a certain amount of time, a computer system would take over and programme the cranes to reconfigure their locations. (Kronenburg, 2007: 59) He seemed to foresee that the motion might be unfamiliar or uncomfortable for the users.

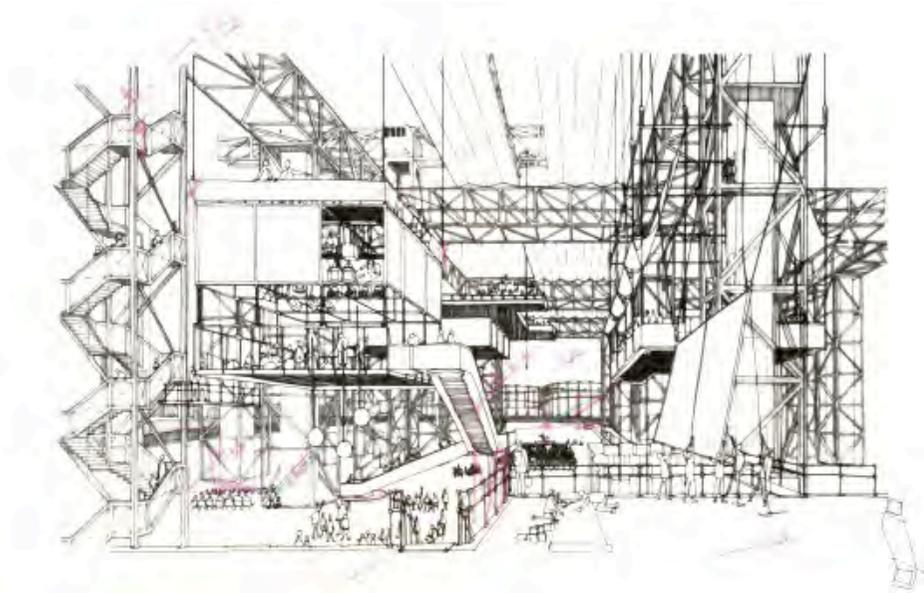
The Kent Interaction Centre employs a system of specialized modules united under one envelope. However, the flexibility of this project is further enhanced by its capacity for physical movement. (Kronenburg, 2007: 59)

The construction is comprised of a steel frame, prefabricated components such as walls, stairs, and service modules, and traveling cranes that use the steel frame as rails. Based on the users’ input, the cranes relocate the components within the frame. This concept allows for complete adaptation and new uses within a time period of minutes. (Kronenburg, 2007: 61)



Illus: 63 Interaction Centre - Mobile elements within ordered structural system (Kronenburg, 2007)

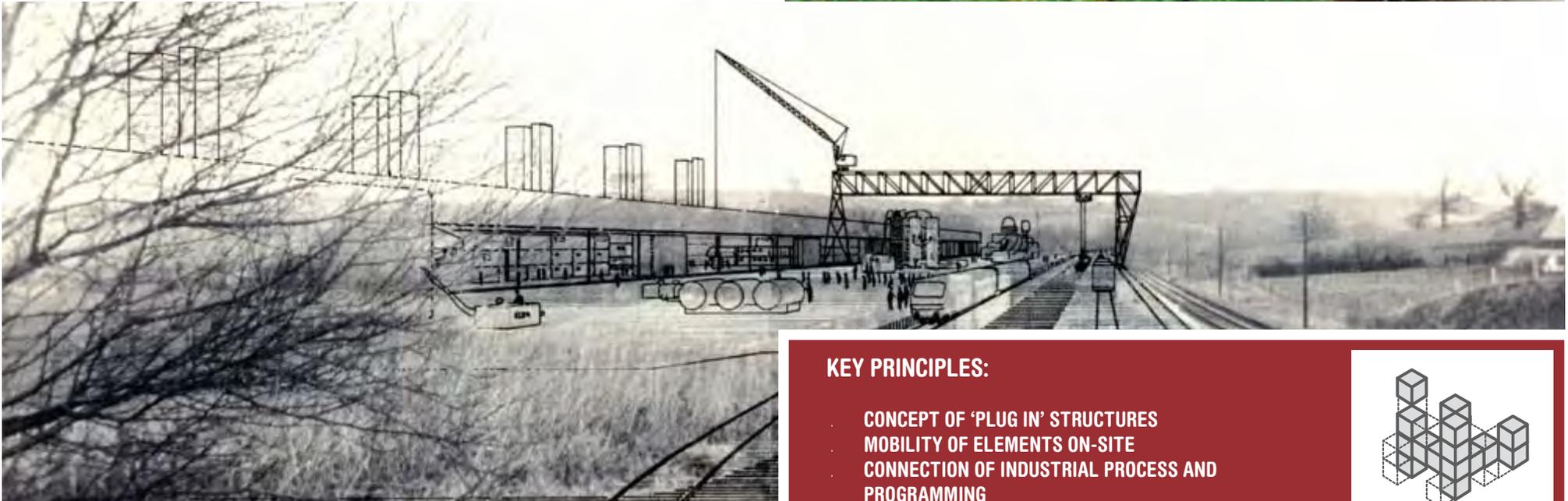
CEDRIC PRICE- *a building is not necessarily the best solution to a spatial problem.*



Illus: 65 **The Fun Palace** - depicting the industrial but human feel of the building (Kroenberg, 2007)



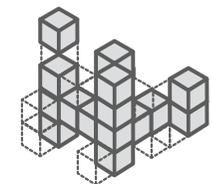
Illus: 66 **Interaction Centre** - Industrial Structure in balance with organic material (Kroenberg, 2007)



Illus: 64 **Potteries ThinkBelt** (<http://www.arch.cuhk.edu.hk/server2/m08/wlng/potteries%20thinkbelt>, 2011)

KEY PRINCIPLES:

- CONCEPT OF 'PLUG IN' STRUCTURES
- MOBILITY OF ELEMENTS ON-SITE
- CONNECTION OF INDUSTRIAL PROCESS AND PROGRAMMING



4.2 ELEMENTAL DO TANK- QUINTA MONROY HOUSING PROJECT

In 2002 the Chile Barrio programme, which works to upgrade Chile's illegal settlements, changed its housing policy. Rather than giving families loans and subsidies worth \$10,000 the policy makers decided to offer them mostly subsidies worth \$7500. (Stohr & Sinclair, 2006:164)

The new programme, a 'Dynamic Social Housing without Debt' was intended to increase the number of beneficiaries without increasing the financial burden on families. The programme involved re-settling 93 families from Quinta Monroy, to the port city of Iquique. (Stohr & Sinclair, 2006:165)

The design was constrained in several ways:

- The new housing had to be built on the site of the old settlements where land is more expensive, leaving less money for construction.
- They had to build a structurally safe home for less than \$7500, including the cost of the land, without pushing families into cheaper lots on the edge of the city, where they would be far from jobs and support networks.
- It had to provide each family with the largest home for the subsidy provided.
- It had to be able to allow occupants to easily build additions as they could afford them.
- And all this had to happen within a site plan that would allow new development to grow in an orderly way.

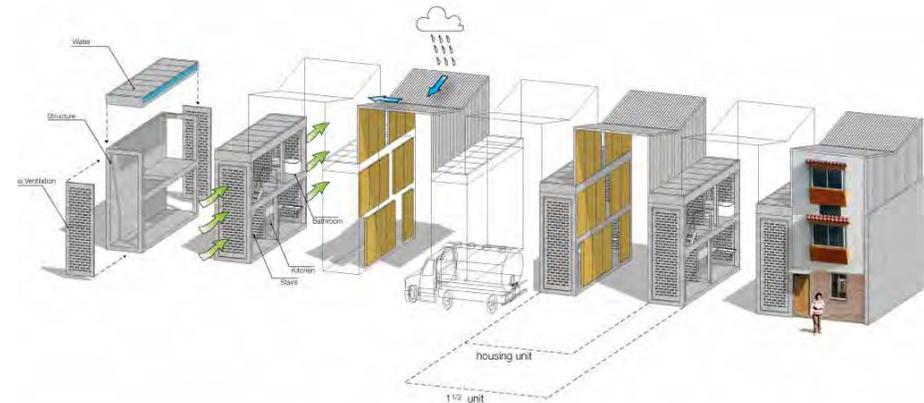
Most importantly, in order to ensure that the project could be replicated the housing scheme had to be feasible within the existing policy framework - despite the limitations.

Collaborating with families in a series of workshops, the design team explored several alternatives before settling on this duplex solution. By building alternating single storey and double storey units, the scheme allows families to expand vertically rather than horizontally, thereby allowing for greater density without overcrowding.

In an effort to ensure 'orderly' growth, the team chose a U-shaped site plan that clearly demarcated common spaces and allowed for parking, roads and walkways between residential clusters. (Stohr & Sinclair, 2006:165)



Illus: 69 Depiction of Incremental Growth through time (<http://www.elementalchile.cl/viviendas/quinta-monroy/quinta-monroy>, 2011)



Illus: 68 Diagram depicting the systems that support structural growth (<http://www.elementalchile.cl/viviendas/quinta-monroy/quinta-monroy>, 2011)



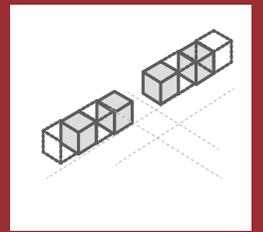
Illus: 67 The families were asked to illustrate their ideas of 'Home' (<http://www.elementalchile.cl/viviendas/quinta-monroy/quinta-monroy>, 2011)



Illus: 71 The Support Provided (<http://www.elementalchile.cl/viviendas/quinta-monroy/quinta-monroy,2011>)

KEY PRINCIPLES:

- VOLUMES OF APPROPRIATION OFFERED
- SUPPORT ADDS HORIZONTAL AND VERTICAL GRID
- PARTICIPATORY NATURE OF PROCESS



Illus: 70 Images Depicting the appropriation of support and Infill (<http://www.elementalchile.cl/viviendas/quinta-monroy/quinta-monroy,2011>)

4.3 BARAGWANATH TRANSPORT INTER. - URBAN SOLUTIONS

The Baragwanath Transport Interchange was one of the earliest steps by the city of Johannesburg to reverse apartheid planning and is the key component of the Baralink Development Framework.

The site is on average 50 meters wide but stretches for 1300 meters along the old Potch Road, the most important access route to Soweto.

The project addresses the needs of one of the busiest transport nodes in South Africa, and required six years of community workshops, negotiations between bus and taxi associations with city officials. (Deckler et al, 2006:65)

It is planned so as to accommodate 500 street traders, with associated storage facilities, management offices and support infrastructure. Transport planning includes 22 bus ranking bays to serve the long and short distance operations and 650 minibus taxi holding and ranking bays representing 12 different taxi operators serving the routes between Johannesburg and Soweto. (Deckler et al, 2006:66)

The primary planning device was an arcade structural spine that runs the full length of the site. This arcade, constructed of concrete elements, is the binding element that the various spatial elements are formed from, and attached to.

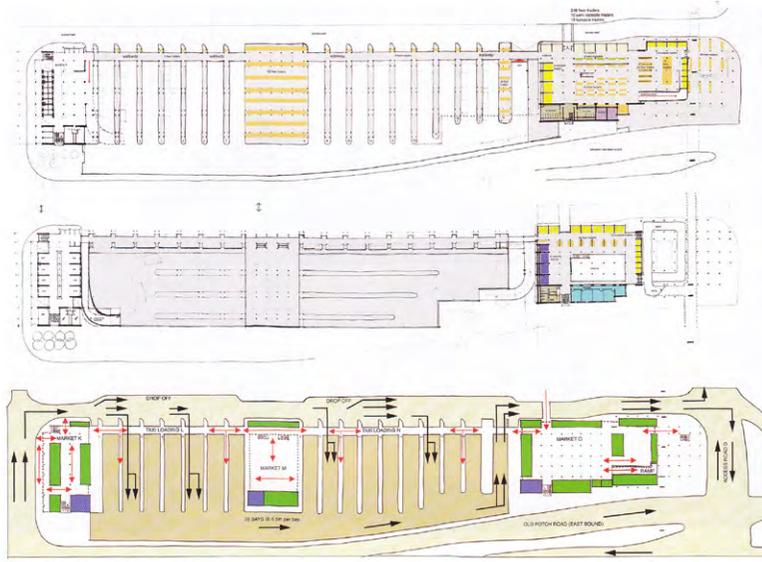
The spine connects commuters from one public facility point of the development to the transport facilities while hosting the majority of the traders and public amenities within it. Intentionally landmarked tower structures are positioned at key public entry points to ensure a strong sense of orientation.

Concrete construction is used to provide a more robust, permanent structure, an acknowledgement of the permanence of this public building type. The material is sculpted to break the monotony of the lengthy, and sometimes harsh, scale of the building.

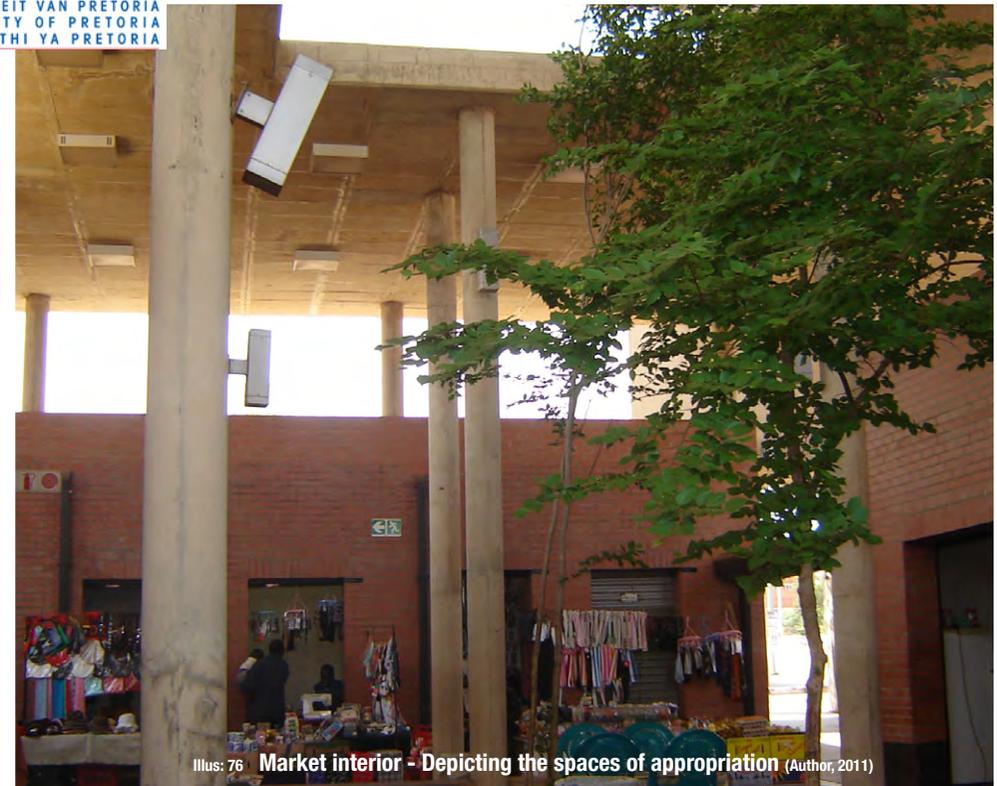
The Baragwanath Transport Interchange and Market is a strong example of a public catalyst for the development of new urban spaces and fabric in a formerly underdeveloped and marginalized context. (Deckler et al, 2006:66)



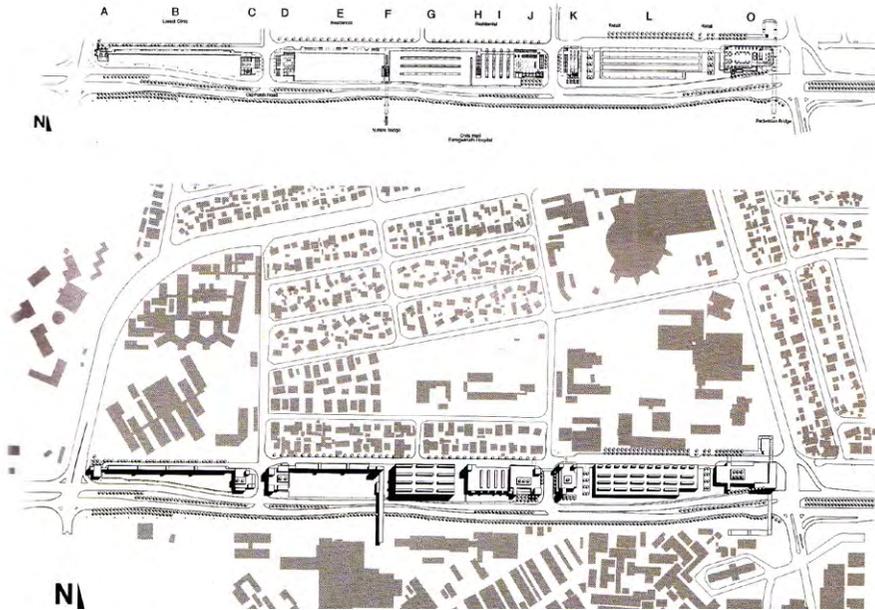
Illus: 72 Focal points in the Baragwanath Transport Interchange (Author, 2011)



Illus: 74 Plans of Interchange - Programing dependant on function with space for appropriation (Digest SA, 2006)



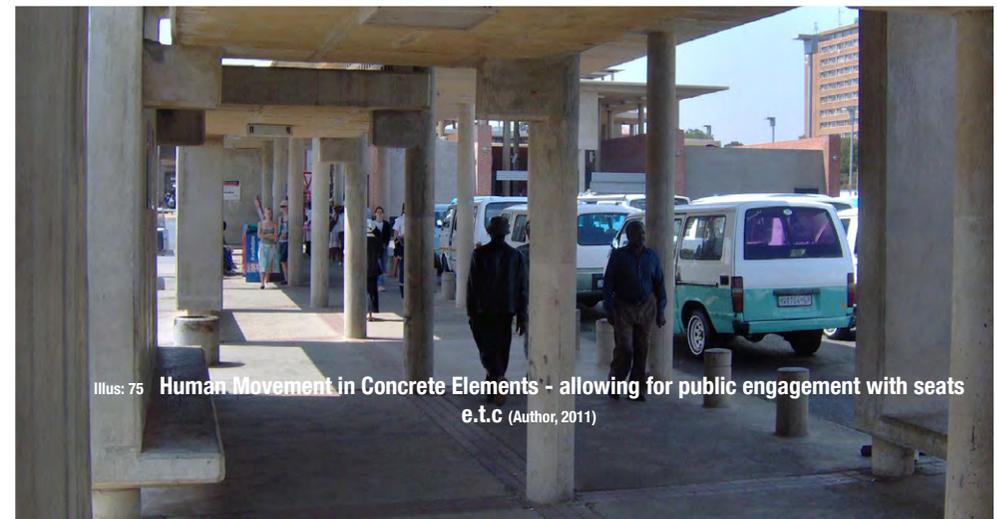
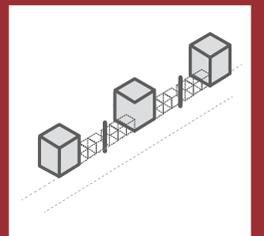
Illus: 76 Market interior - Depicting the spaces of appropriation (Author, 2011)



Illus: 73 Site Plan of Interchange - Long thin plan in fluid context (Digest SA, 2006)

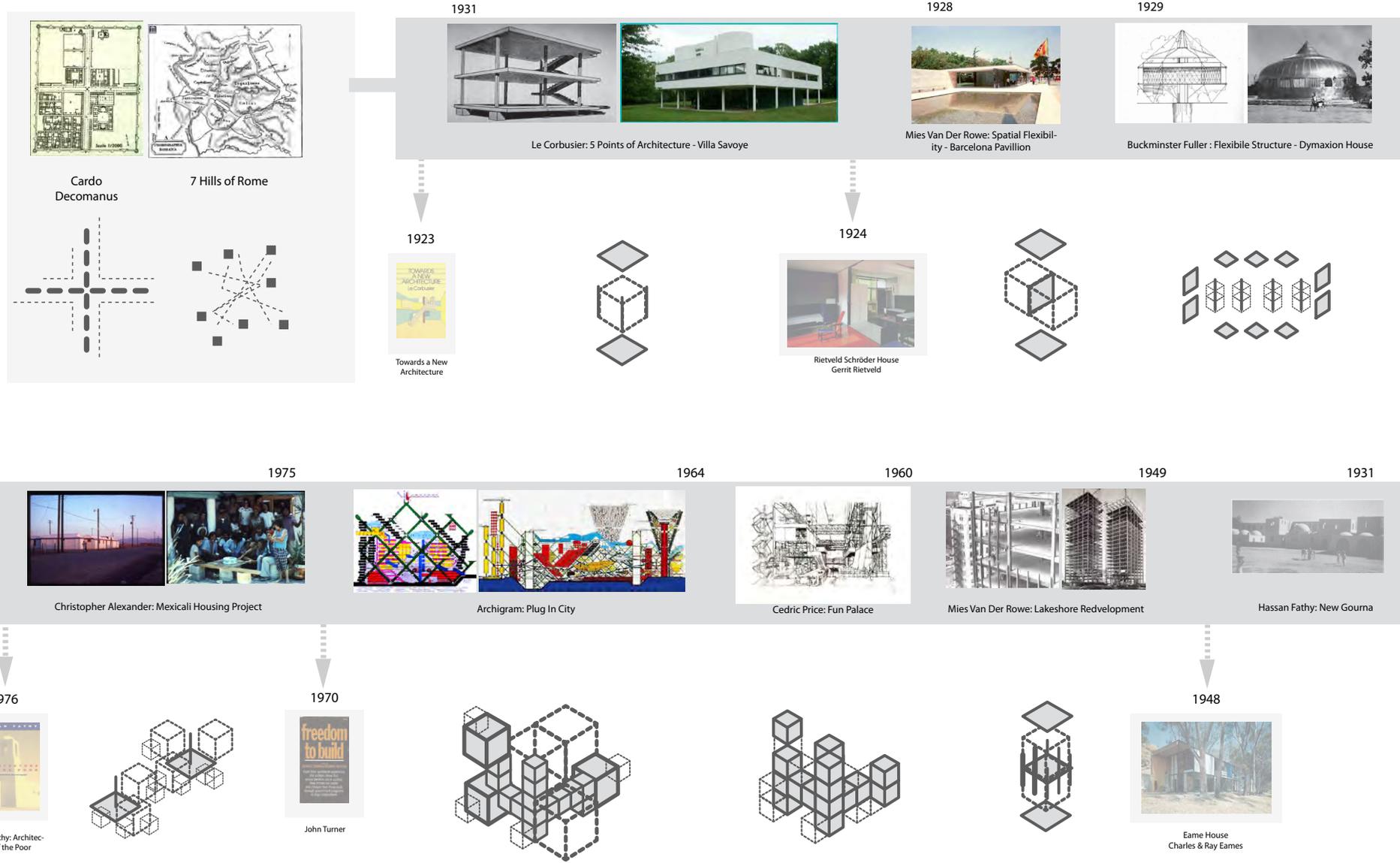
KEY PRINCIPLES:

- LOOSE, CONTEXTUALLY APPROPRIATE STRUCTURE
- STRONG PROGRAMME FOR APPROPRIATION
- SITE FACTORS AROUND MOBILITY OF PROGRAMME



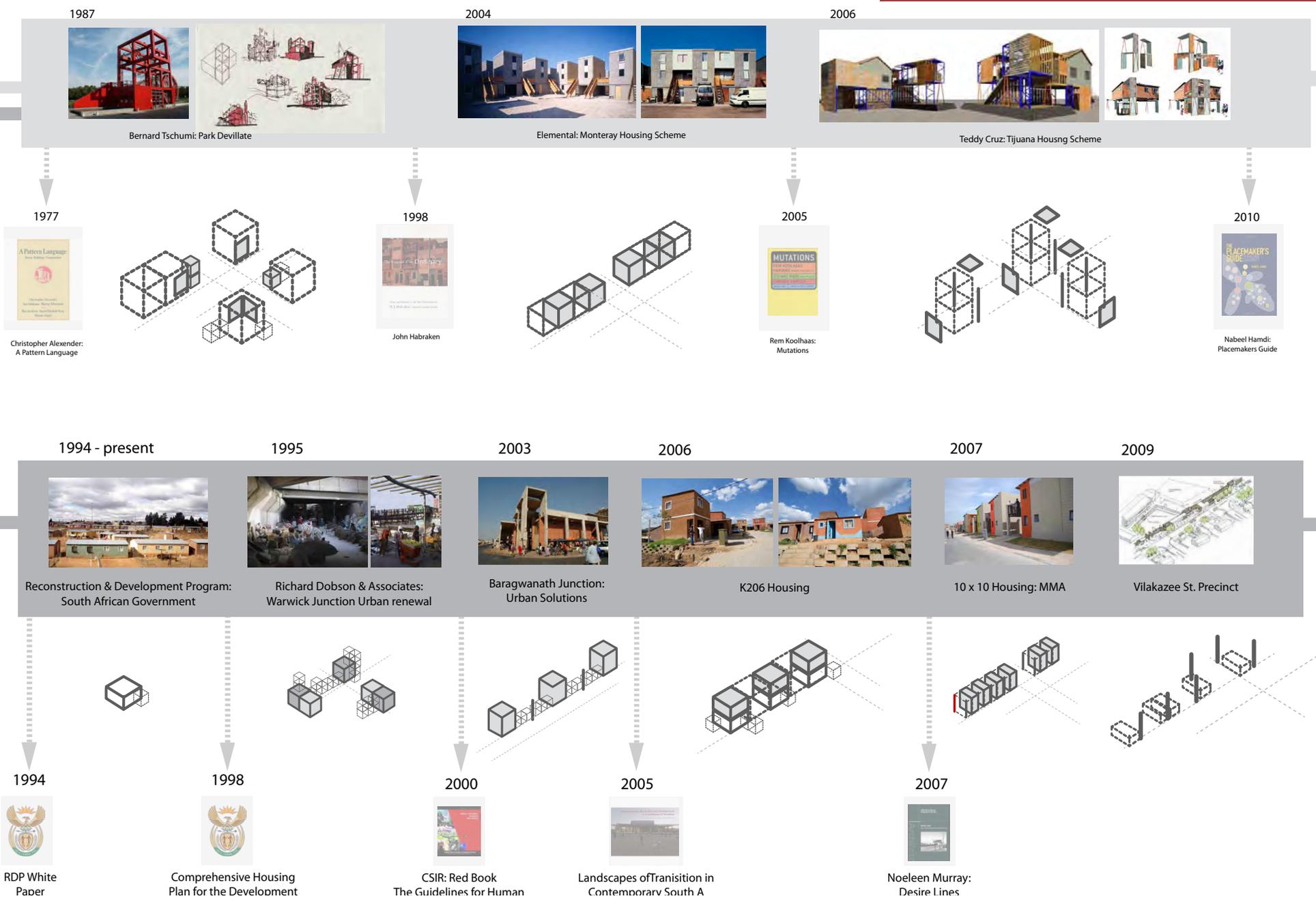
Illus: 75 Human Movement in Concrete Elements - allowing for public engagement with seats e.t.c (Author, 2011)

4.4 CASE STUDIES OF FRAME AND INFILL STRUCTURAL ORDERS



Illus: 77 A Historic timeline of point, line, plane and volumetric support and infill including South African examples. (Author, 2011)

AN IN DEPTH STUDY OF SUPPORT AND INFILL STRATEGIES THROUGH OUT HISTORY WAS UNDERTAKEN. INTERNATIONAL EXAMPLES WERE THEN COMPARED TO LOCAL, EXTRACTING THE ESSENCE OF EACH EXAMPLE INTO ITS BASIC ELEMENTS. (SEE APPENDIX ILLUS: 28 , ON PAGE 174)



Chapter 5 : Context & Site



Illus: 78 Proposed Point of Intervention - Pienaarspoort Crossing Point (Author, 2011)

5.0.1 SITE SELECTION

The focus area chosen is Mamelodi East, as it exhibited the most dynamic growth and movement patterns as it is the newest area in regard to development, made up of predominantly temporary housing.

Once this was established, a more permanent element was chosen to become a key stone in future analysis and design proposals, in this case the Pienaarspoort Train Station was a perfect choice as this serviced the largest portion of the Mamelodi East population in terms of rail transport .

An extensive overview of the Mamelodi Nellmapius Master Plan Proposal done by GAPP Architects and planners in 2010 was undertaken by several students in a research group.

The work was condensed and the appropriate points were extracted to form the framework group's master plan approach:

DEVELOPMENT OF NODAL CORRIDORS

DELINEATION OF THE DISTRICTS

LAND USE ALLOCATIONS

NODAL DEVELOPMENT STRATEGY

PRECINCT DEVELOPMENT SCHEME

5.1 MAMELODI/ NELLMAPIUS REGENERATION OVERALL STRATEGY

The GAPP strategy aims to establish the core public realm as a utilizable and managed resource, and to pro-actively promote up-front infrastructure.

Thereby allowing additive growth and development in a desired pattern of development in support of the broader urban growth. (GAPP, 2010:56)

Dewar and Uytenbogaardt cite that South African cities require a paradigm shift from considering outlying areas as 'suburban' and to rethink them in terms of city development. (Dewar & Uytenbogaardt;1991,45)

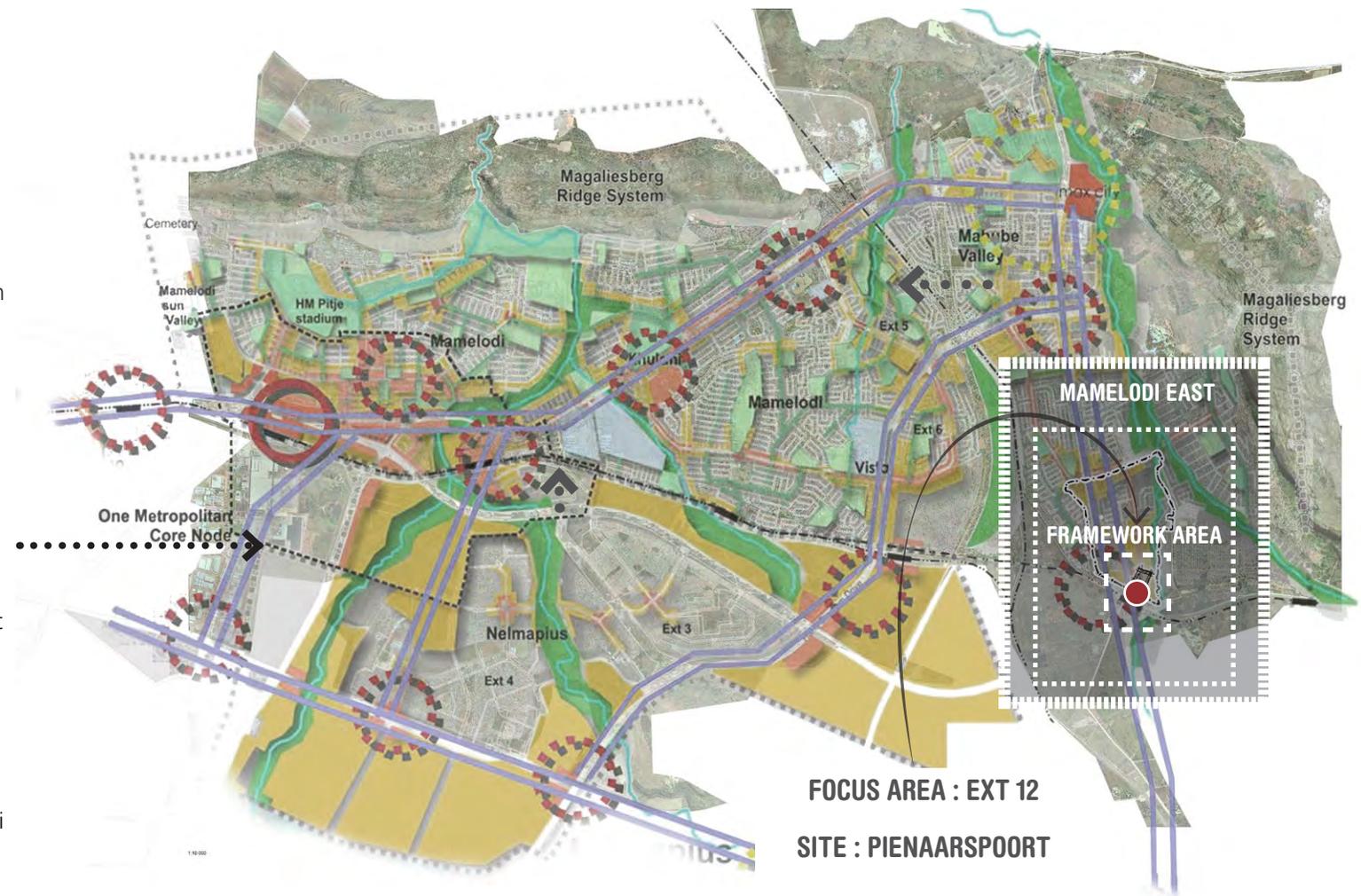
This is seen in the concept termed by the GAPP framework as:

STRATEGIC DEVELOPMENT THROUGH CORRIDORS OF NODAL DEVELOPMENT

These corridors aim to foster development along spines of activity and activate this development at the specified nodes.

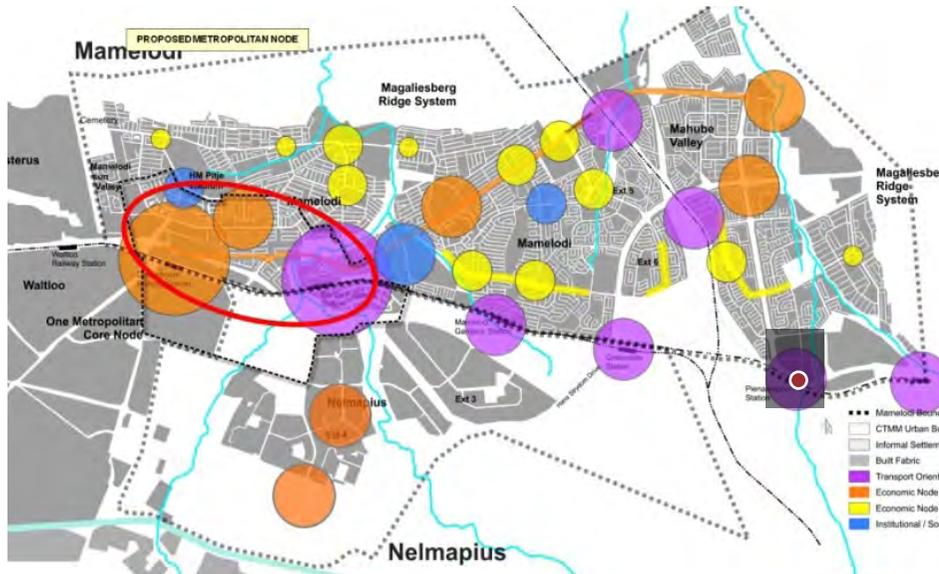
The Framework group noted:

- There were issues of ignoring current and existing activities in the Mamelodi East into development plans.
- A lack of regard for the heritage of Mamelodi/Nellmapius Area

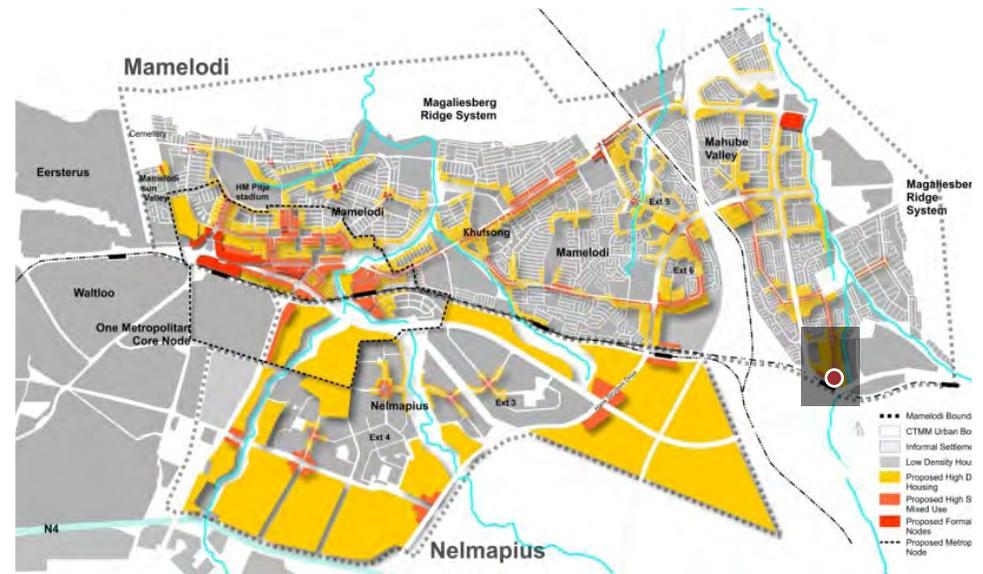


Illus: 79 GAPP FRAMEWORK PROPOSAL & site of intervention (GAPP, 2010)

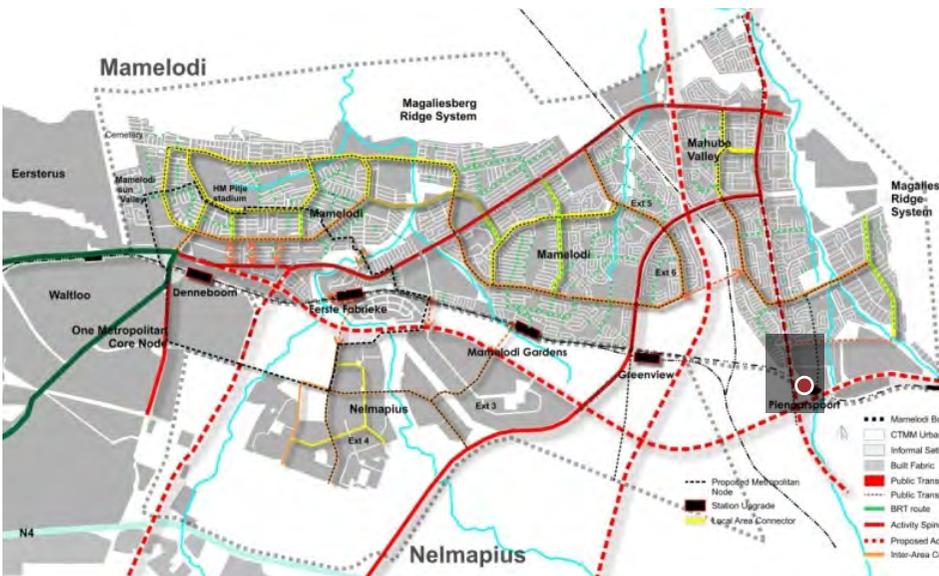
5.1 MAMELODI/ NELLMAPIUS REGENERATION STRATEGIES



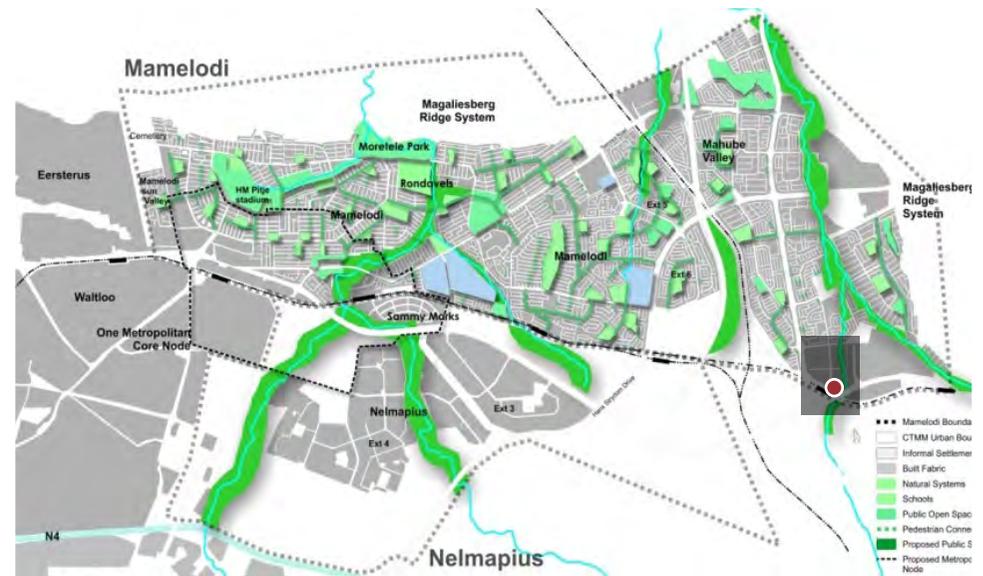
Illus: 80 Nodal development strategy (GAPP,2010)



Illus: 81 Housing density strategy (GAPP,2010)

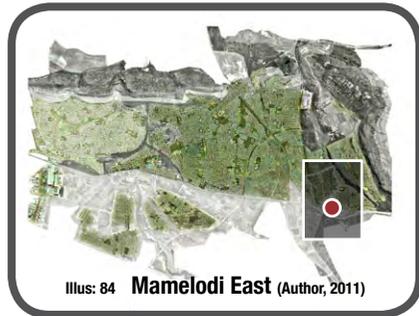


Illus: 82 Vehicular movement strategy (GAPP,2010)



Illus: 83 Open space green strategy (GAPP,2010)

5.2 MAMELODI EAST IN CONTEXT



POPULATION:	144,024
LAND AREA:	1490
HOUSEHOLDS:	42,360
PEOPLE PER HOUSEHOLD:	3.4
GROSS POP. DENSITY:	97
NUMBER OF DWELLINGS:	42,360
GROSS DWELLING UNIT DENSITY:	28

(GAPP,2010;115)

An area of the Eastern sector of Mamelodi has been identified due to the contrast between a consistent lack of formal development and the opportunity presented by the location of a transport node in the form of the Pienaarspoort Station.

This area displays a medium sized settlement of temporary housing bordered by permanent RDP supplied housing. These factors combined make the site an ideal laboratory for experimentation of a space of secondary production.

GAPP's framework calls for a large economic node, the Nellmapius East Precinct, to be proposed on the unused tracts of land south of the Pienaarspoort Station.

The scheme is supported by a new road linking Max City to the south and forming a transport node of economic energy just south of the Pienaarspoort Station.

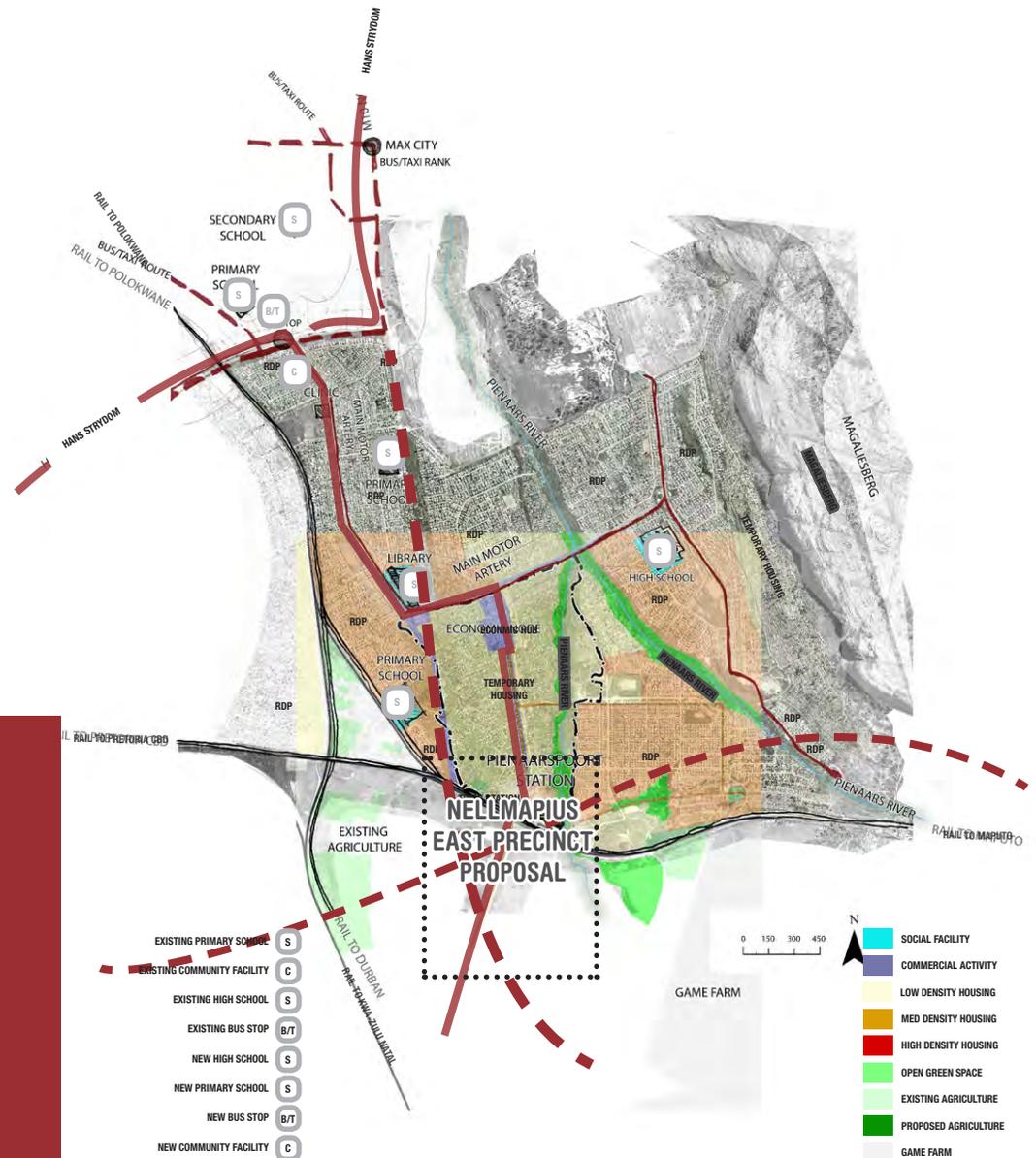
INTERVENTION FRAMEWORK

The author's proposal is to work within the GAPP Framework, but facilitate the growth of the precinct as well as the future major roads through an incremental process of growth around a key intervention. (see Illus: 87 , on page 72)

By using existing mobility routes and land uses, the intervention framework proposes growth through a series of negotiated responses with regard to responses by local inhabitants to mobility opportunities and key social and retail points along this development.

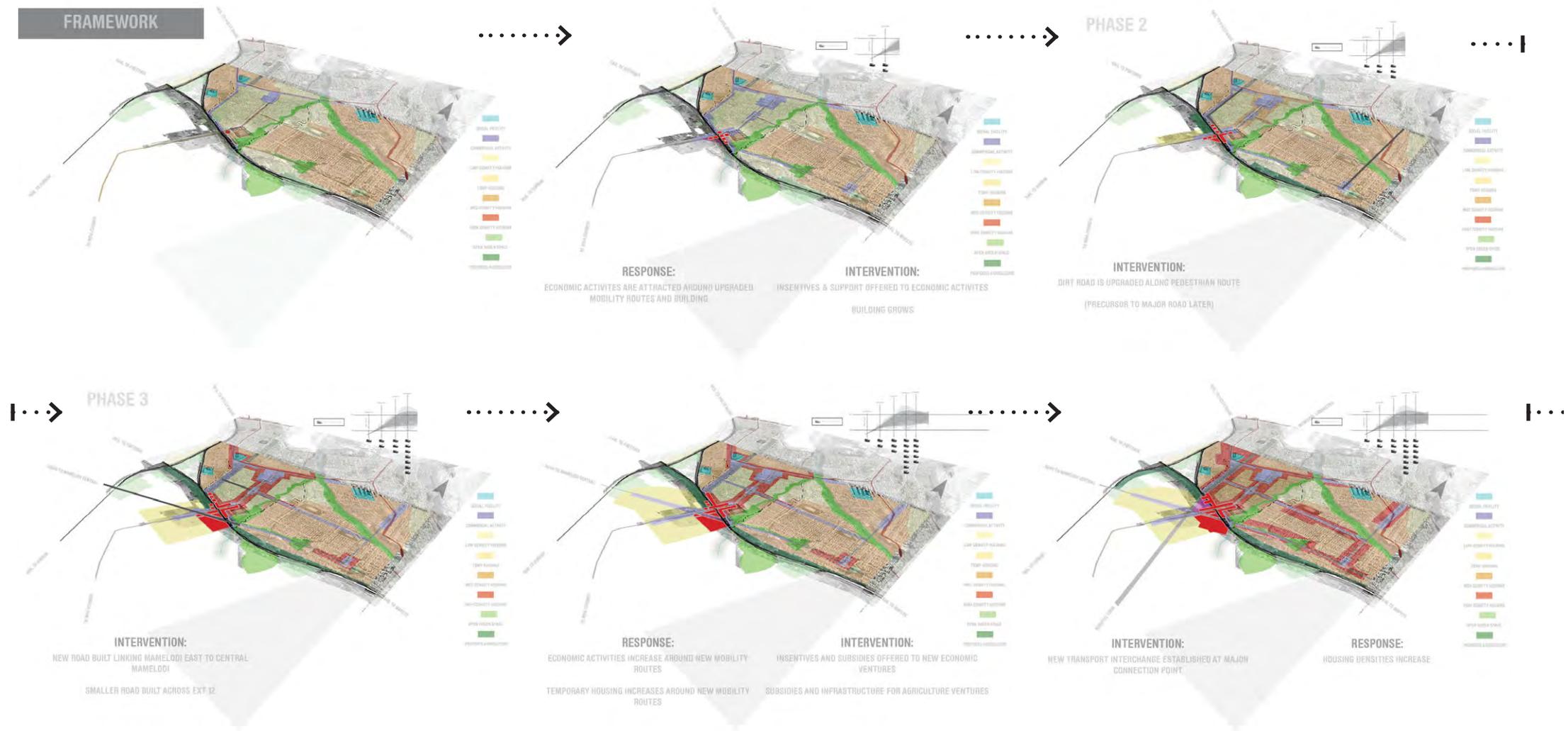
Ultimately the framework revolves around the development of the precinct as major transport hub of rail, bus and taxi.

FRAMEWORK AREA - CURRENT LAND USE ANALYSIS



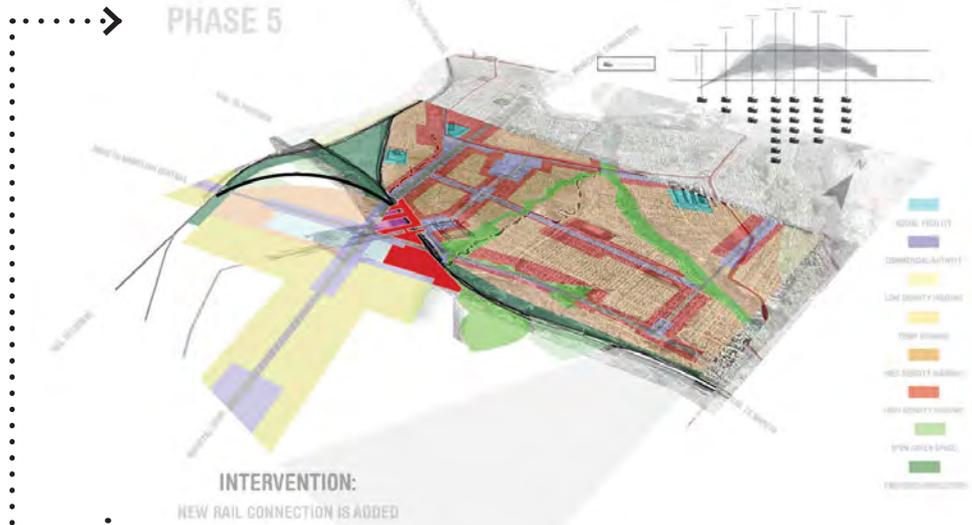
Illus: 85 Analysis of Current Land Use in Mamelodi East (Author, 2011)

5.3 FRAMEWORK AREA - INTERVENTION PROPOSAL

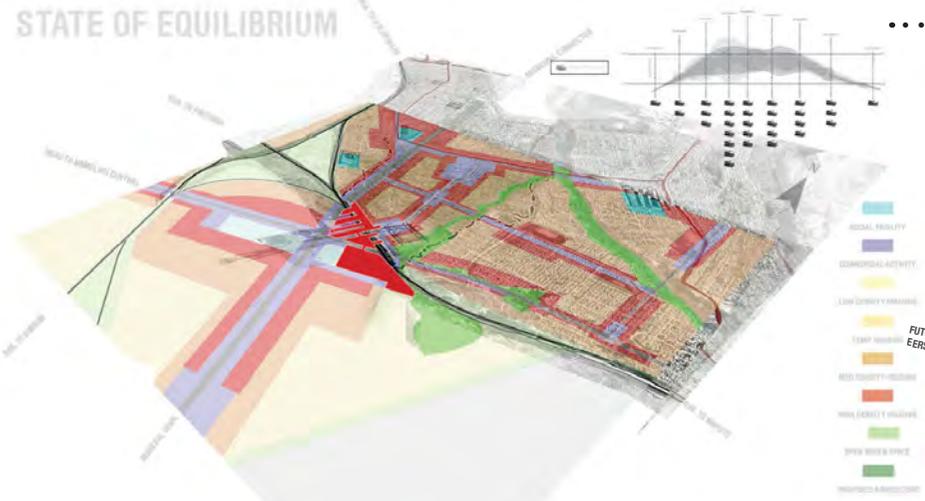


Illus: 86 The framework proposal development for Pienaarspoort (Author, 2011)

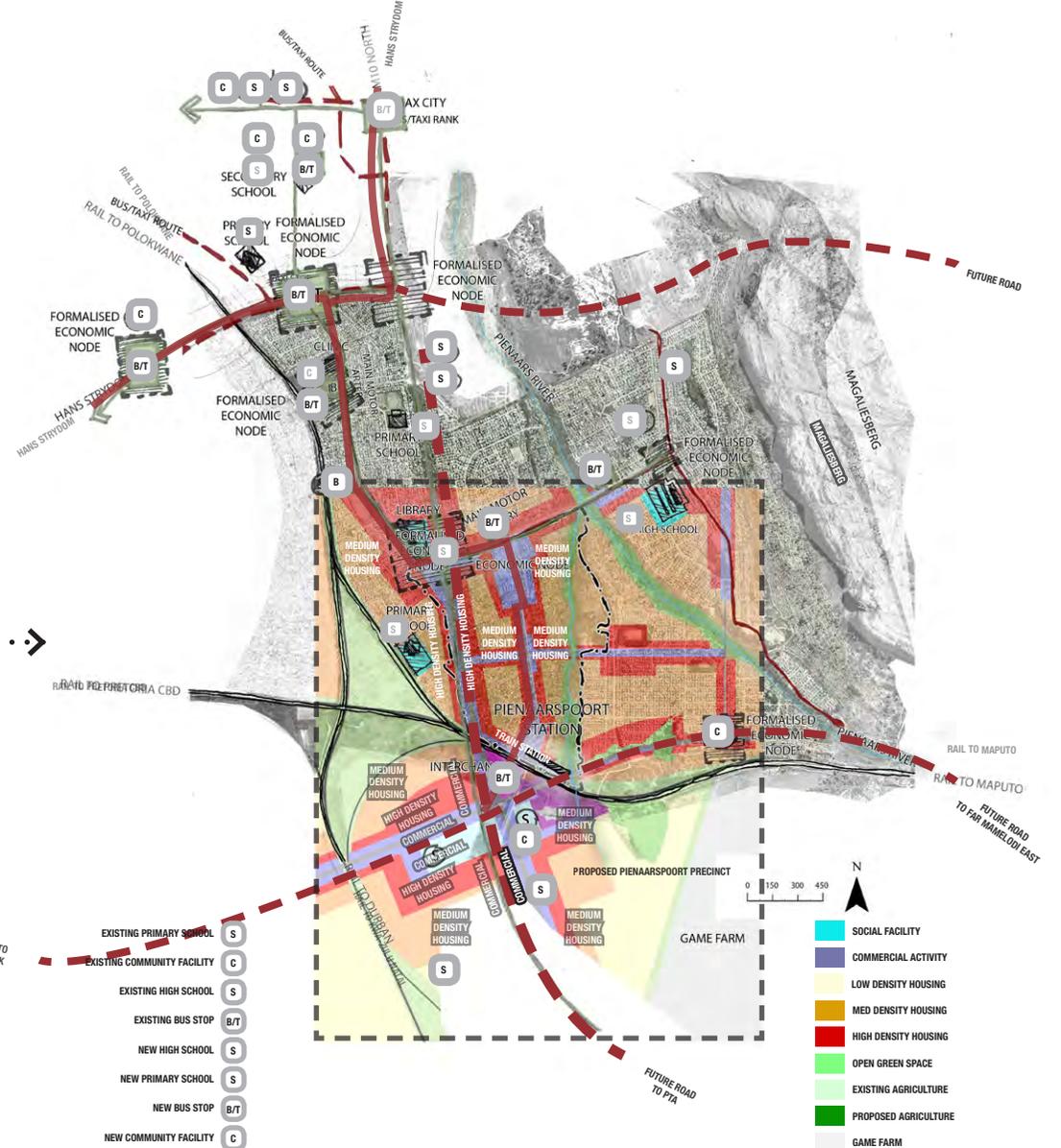
FRAMEWORK PROPOSAL



STATE OF EQUILIBRIUM

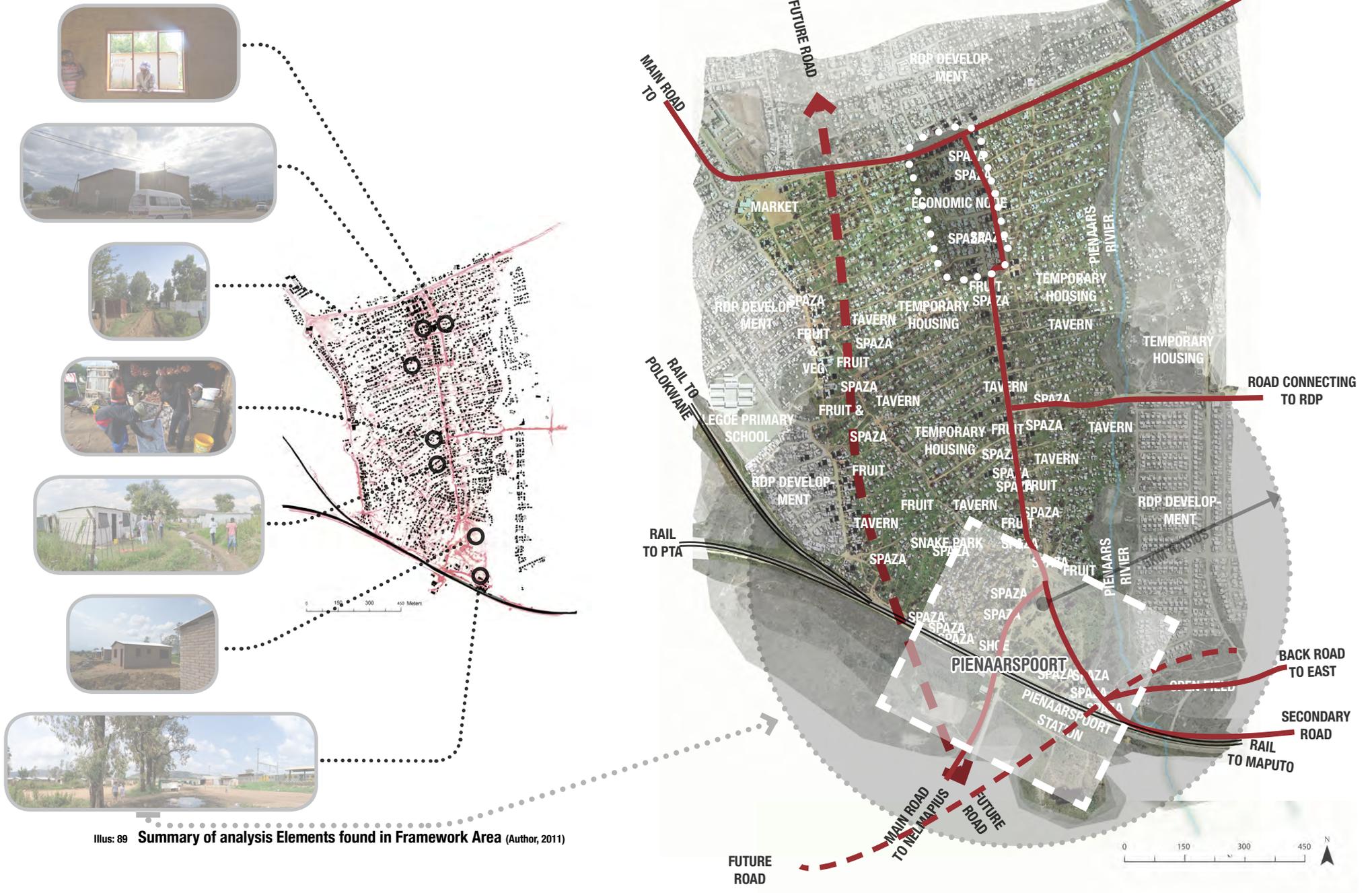


Illus: 87 Key frames of framework plan (Author, 2011)



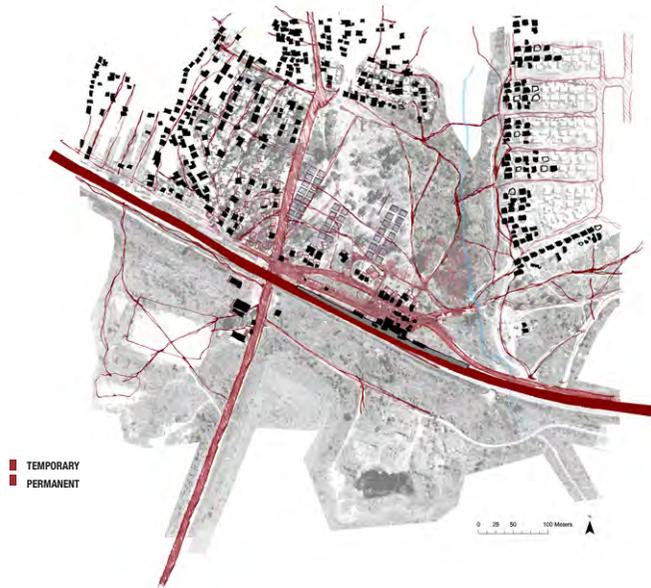
Illus: 88 Proposed Framework by Author for Development (Author, 2011)

5.4 FOCUS AREA - SITE ANALYSIS



Illus: 89 Summary of analysis Elements found in Framework Area (Author, 2011)

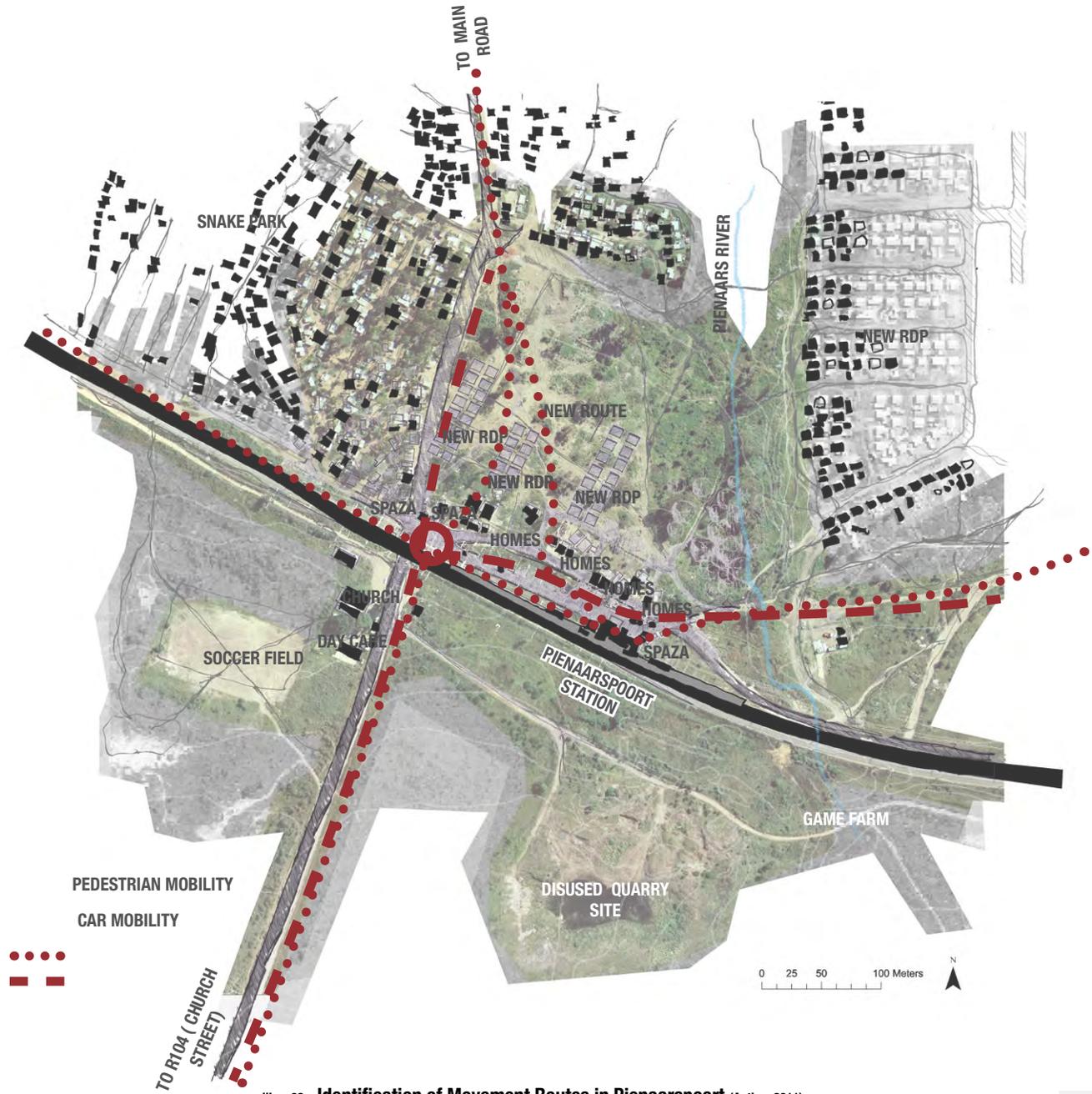
5.5 PIENAARSPOORT - SITE ANALYSIS



Illus: 90 Identification of Temporary & Permanent Mobility Elements in Pienaarspoort (Author, 2011)



Illus: 91 Identification of Temporary & Permanent Structural Elements in Pienaarspoort (Author, 2011)



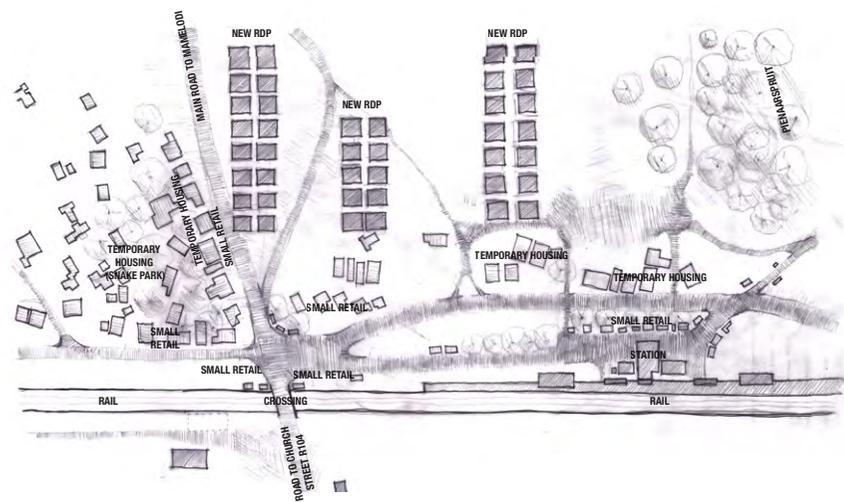
Illus: 92 Identification of Movement Routes in Pienaarspoort (Author, 2011)

5.6 SITE ANALYSIS SUMMARY

Through an in depth site survey, the juncture at the Pienaarspoort Station rail crossing provides a key point at which to intervene and test the theories of flexibility and adaptiveness.

Currently there is a small component of RDP homes being constructed adjacent to the site; the first step by the local government in a much larger RDP scheme.

The station itself supports the Mamelodi East region, and is the focal point of pedestrian movement in the area.



Illus: 96 **Sketched Summary depicting major retail and housing around crossing point** (Author, 2011)

At present there are small retail ventures feeding off the current pedestrian movement, including a tailor, several spazas and handful of smaller stands providing vegetables, phone access and other pedestrian hand held retail. (see Illus: 96)

Although there is major planned housing for the future of the development, strong pedestrian and automobile based retail remains the major programme in the area, coming to a head at the crossing point on the rail line. (see Illus: 97)



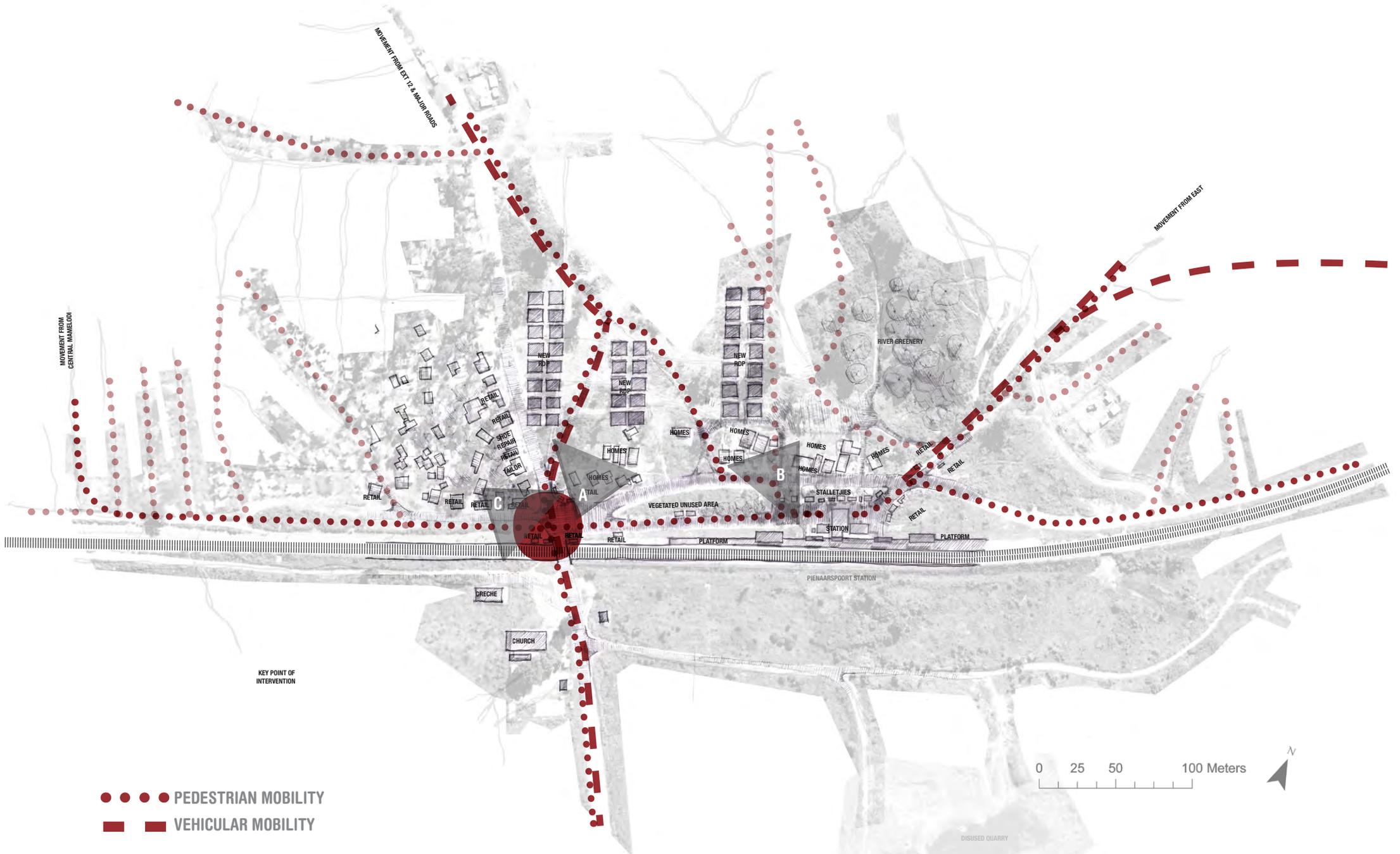
Illus: 95 **Pienaarspoort Retail Stands** (Author, 2011)



Illus: 94 **Pienaarspoort Housing Area** (Author, 2011)



Illus: 93 **Pienaarspoort Rail Crossing** (Author, 2011)



- ● ● ● PEDESTRIAN MOBILITY
- — — — VEHICULAR MOBILITY

KEY POINT OF INTERVENTION

Illus: 97 Site Analysis Summary of Movement and Retail in Pienaarspoort (Author, 2011)

Chapter 6 : Design Development

THE PRINCIPLE THAT EMERGED WAS SIMPLE.

DON'T INVEST IN BUILDING HOUSES THAT PEOPLE CAN DO IN ANY CASE FOR THEMSELVES AND COULD DO BETTER WITH A BIT OF HELP.

BUT RATHER INVEST IN THE COLLECTIVE GOOD THAT PEOPLE CAN'T PROVIDE FOR THEMSELVES.

NABEEL HAMDI

(Hamdi, 2010: 35)

STORAGE /RETAIL
CONTAINER 1

PIONEER
CONTAINER

TEMPORARY
STRUCTURE
BUILT OFF
CONTAINER

BRICK STRUCTURE
BUILT OFF TEMPORARY
STRUCTURE

STORAGE
CONTAINER 2

STORAGE
CONTAINER 3

RETAIL SPACE CREATED

Illus: 98 A process of growth through temporality and permanence on-site (Author, 2011)

6.0.1 FORM FROM RESEARCH

Due to the inherent energies found in Mamelodi, traditional Architectural generators of form and programme were difficult to identify from the context. However, based on the themes uncovered in the process of engagement, a hypothetical 'spirit' of the intervention was rendered from the process.

This spirit of the intervention is intended to represent what, and how the intervention should grow and exist in order to respond to the dynamic and fluid nature of Mamelodi and thereby maximise the required level of appropriation.

These principles of genius are based on the positive factors discovered during the research process and the negative elements observed in various local precedents studied by the author during December 2010 (see Appendix Illus: 28 , on page 174).

6.0.2 GENIUS PRINCIPLES OF THE INTERVENTION

The intervention, while alien at first, is required to 'grow' within its immediate environment in order to allow the local context to witness and be part of this growth, further increasing the possible levels of appropriation. (see Illus: 100)

The intervention needs to embrace the mobility and flexibility inherent in Mamelodi, by responding through its own patterns of growth in a similar fashion.

The intervention needs to reach a point of symbiosis with its context and from this point begin to 'die', making way for future needs and unforeseen design challenges - leaving behind only a residue of necessity.

6.1 CONCEPTUAL STORYBOARD

The on-site research combined with the theoretical exploration of the themes derived from the research were explored in a small storyboard presentation for a film competition: (see Appendix Illus: 23)

The film narrates the story of a character who finds himself in a foreign environment.

Seeking meaning and acceptance, the character begins to interact with the peoples he meets. Through this interaction the character grows through a series of trials and misfortunes, until he is finally accepted into this environment.

Unable to be truly accepted, the character leaves his place of comfort and while on a solitary journey of discovery, he begins to change and metamorphasize into something flexible and ever evolving, thus becoming a symbol of its context - in this case the South African township.

6.2 TRANSITION OF STORYBOARD TO BUILDING

The story is a metaphor for the projected lifespan of the proposed building:

A structure was determined that arrives on-site, grows through engagement with its context and eventually moves away leaving behind elements symbolizing how its life on-site. (see Illus: 99)



Illus: 100 A conceptual image for the spirit of growth through temporality (Author, 2011)

THE STRUCTURE ARRIVES ON-SITE

IT BEGINS TO SEARCH FOR A CONNECTION WITH ITS IMMEDIATE ENVIRONMENT

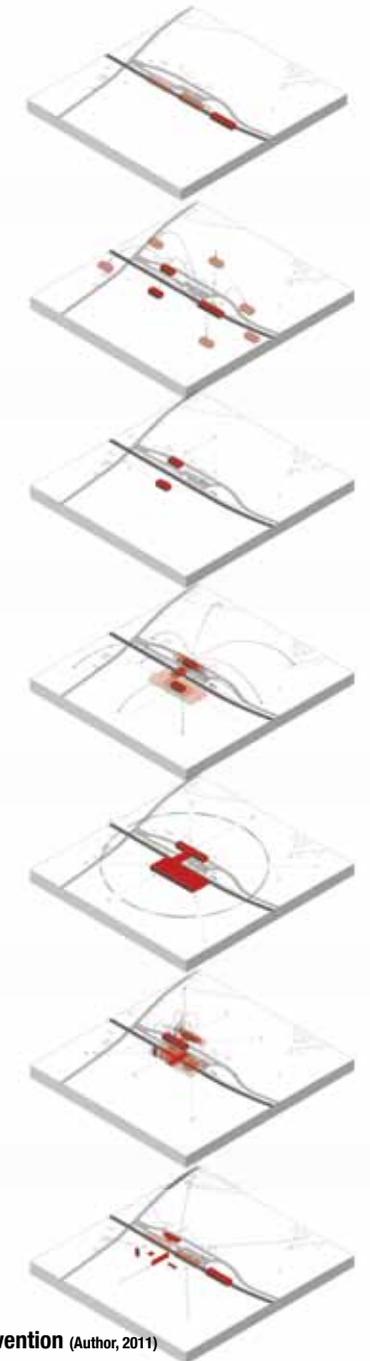
A CONNECTION IS ESTABLISHED

THE STRUCTURE BEGINS TO GROW THROUGH ITS ENGAGEMENT

A POINT OF EQUILIBRIUM IN GROWTH AND SYMBIOSIS IS REACHED

THE ORIGINAL FUNCTION OF THE INTERVENTION IS SUPERSEDED, IT BEGINS TO 'DIE' MAKING WAY FOR FUTURE NEEDS

ONLY A RESIDUE OF NECESSITY IS LEFT BEHIND AS THE LIFE CYCLE OF THE CONTEXT CONTINUES



Illus: 99 The spiritual principles of the intervention (Author, 2011)

6.3 PROGRAMME RE-INTERPRETED

A cement depot, subsidized by a coalition between the Tshwane Municipality and a cement supplier, was identified in Chapter 3.

The dissertation aims to re-examine a typical industrial facility's programmatic layout, and reinterpret it into the context of Mamelodi by separating the functions into the built fabric and allowing them to be re-linked through a central missing function. (see Illus: 102)

In this case the Infraset Cement Brick Factory in Midrand, Gauteng was analyzed and broken into its primary components (see Illus: 101). These components were then separated and local existing equivalents were found in Mamelodi. (see Illus: 104)

Storage and distribution of goods, mainly cement, has been chosen as the missing element in the de-centralised factory which was identified as a potential niche intervention in Chapter 3 (see Illus: 58). (see Illus: 106)

The schedule of requirement is then re-interpreted into factors of temporality and mobility in order to function in this context. (see Illus: 105)

6.4 AGENTS OF CONTROL

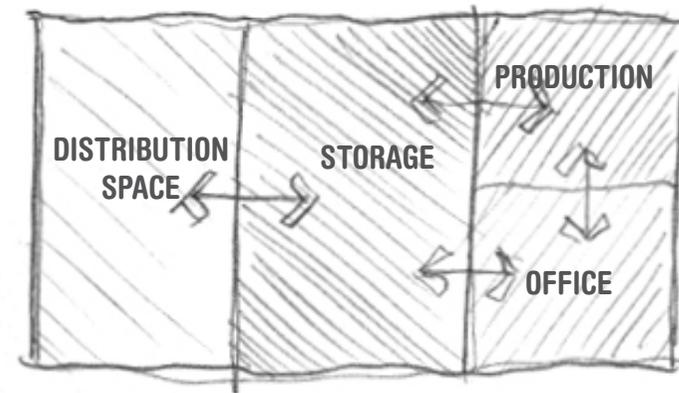
AfriSam is the most appropriate choice as central agent, as they are already involved in aiding the development through cement subsidies in Mamelodi.

As cement being the second most consumed material substance in the world, AfriSam have reason for developing a personal relationship with a developing areas like Mamelodi to establish an economic share of future business in such a fast growing area.

The City of Tshwane has already earmarked the site for major development as a key transport node for Mamelodi East. For this Spoornet and Transnet have been included as later agents of control. (see Illus: 103)



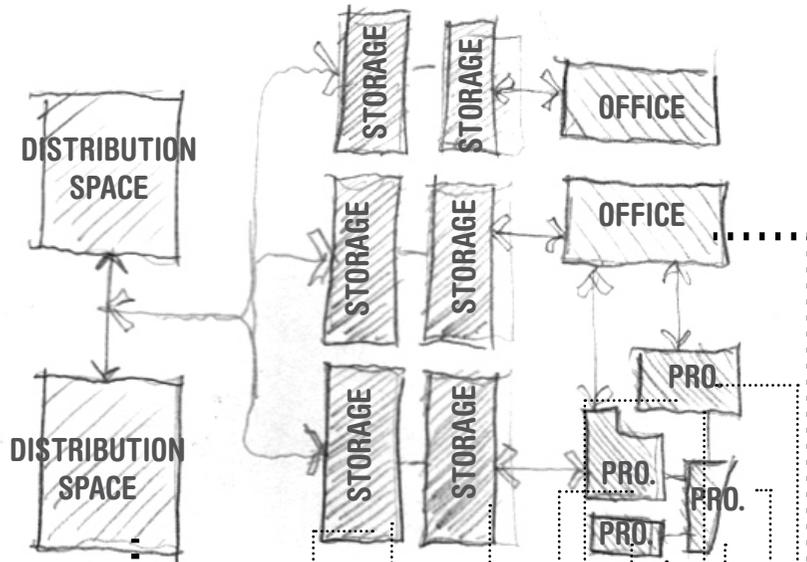
Illus: 101 The Infraset Cement Brick factory in Midrand, Gauteng (Author, 2011)



Illus: 102 Programmatically diagram of Industrial Building (Author, 2011)

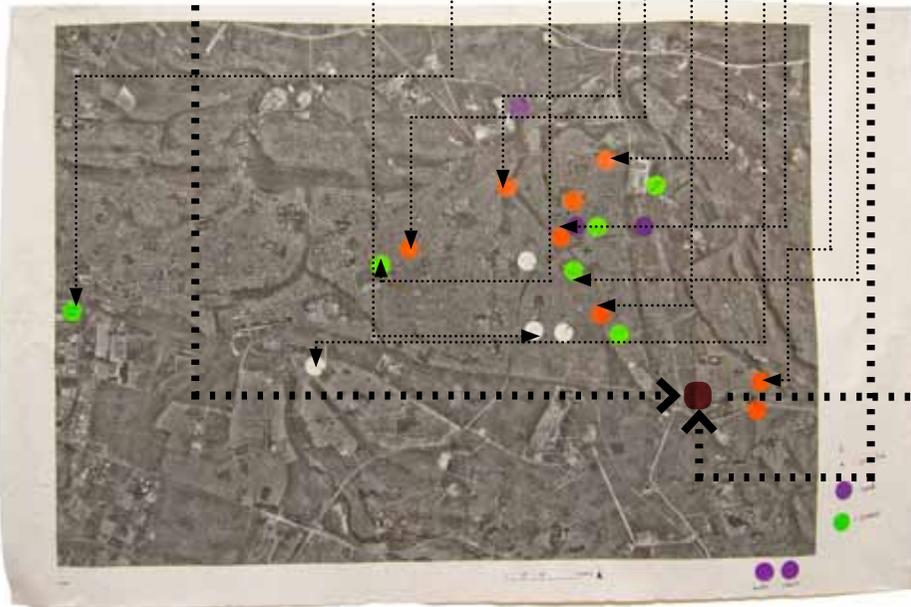


Illus: 103 Agents of Control (Author, 2011)

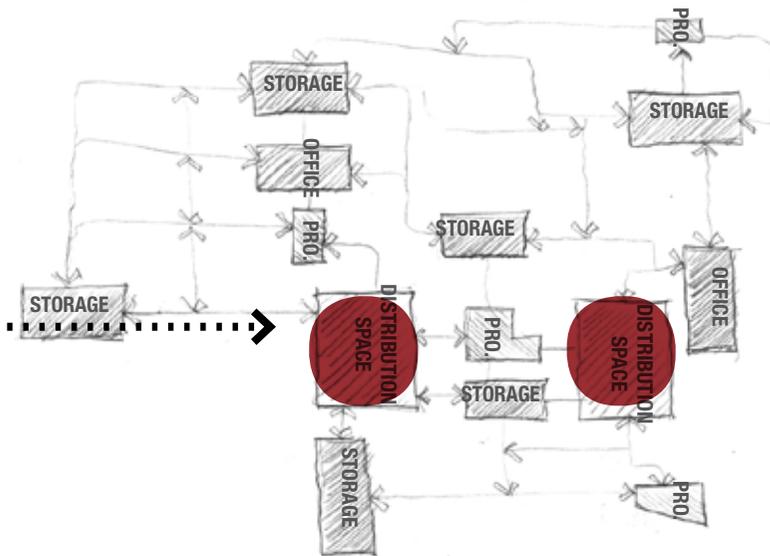


	HIGH MOBILITY	MEDIUM MOBILITY	LOW MOBILITY	TEMPORARY	SEMI TEMPORAL	PERMANENT
DEPOT						
COLLECTION SPACE	X			X		
DROP OFF SPACE	X			X		
STORAGE SPACE	X					X
MONEY EXCHANGE AREA			X		X	
TOOLS STORE			X			X
TRAINING		X	X		X	
PRODUCTION SPACE		X	X		X	
MATERIAL STORE			X			X
INFORMATION/DISPLAY AREA	X			X		X
LECTURE/TEACHING SPACE		X			X	
BREAK AWAY SPACES		X		X		
RESEARCH			X		X	
OFFICE			X		X	
SHARED			X		X	
FILE STORAGE			X		X	
RECEPTION	X				X	
MEETING ROOMS		X		X		
ABLUTIONS		X	X			X
OBJECTIVES						
SUPPORT OF CONSTRUCTION NETWORK	X				X	
CATALYST OF URBAN GROWTH		X		X		

Illus: 105 Re-Interpretation of Schedule into factors of mobility and temporality (Author, 2011)



Illus: 104 A re-programming of the Industrial Typology into the Mamelodi Context (Author, 2011)



Illus: 106 The warehouse typology in its new context, focussing on Distribution (Author, 2011)

6.5 CONCEPT OF FORM - THE PORTAL

Drawing from the process of participation and engagement, clues from the structures and materials in the context were analyzed and lessons drawn from each instance. (see Illus: 108)

What reoccurred in each form was the appearance of a 'portal' that was used temporarily until filled in a later stage. This portal structure allowed for flexibility of use while setting the demarcation of space for later stage at the same time.

It worked with temporary and permanent factors and by its placement responded to mobility in regard to the road networks and pedestrian paths.

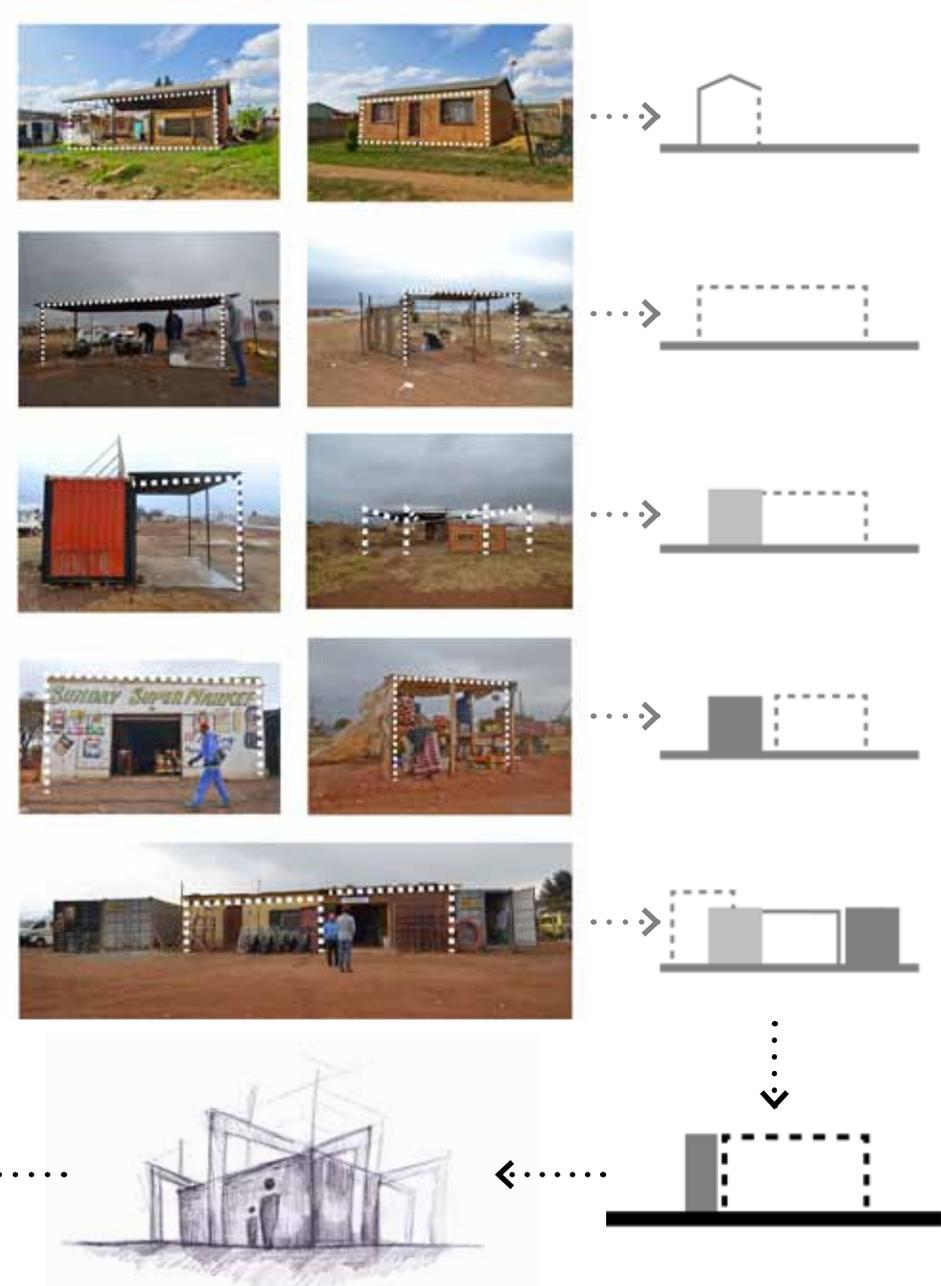
This portal became the conceptual tool from which to explore the idea of an organic de-centralised self-built factory. (see Illus: 107) If these components were then replaced with components on-site, a similar outcome could be reached with a different process and form. (see Illus: 109)

6.6 APPLYING THE PORTAL

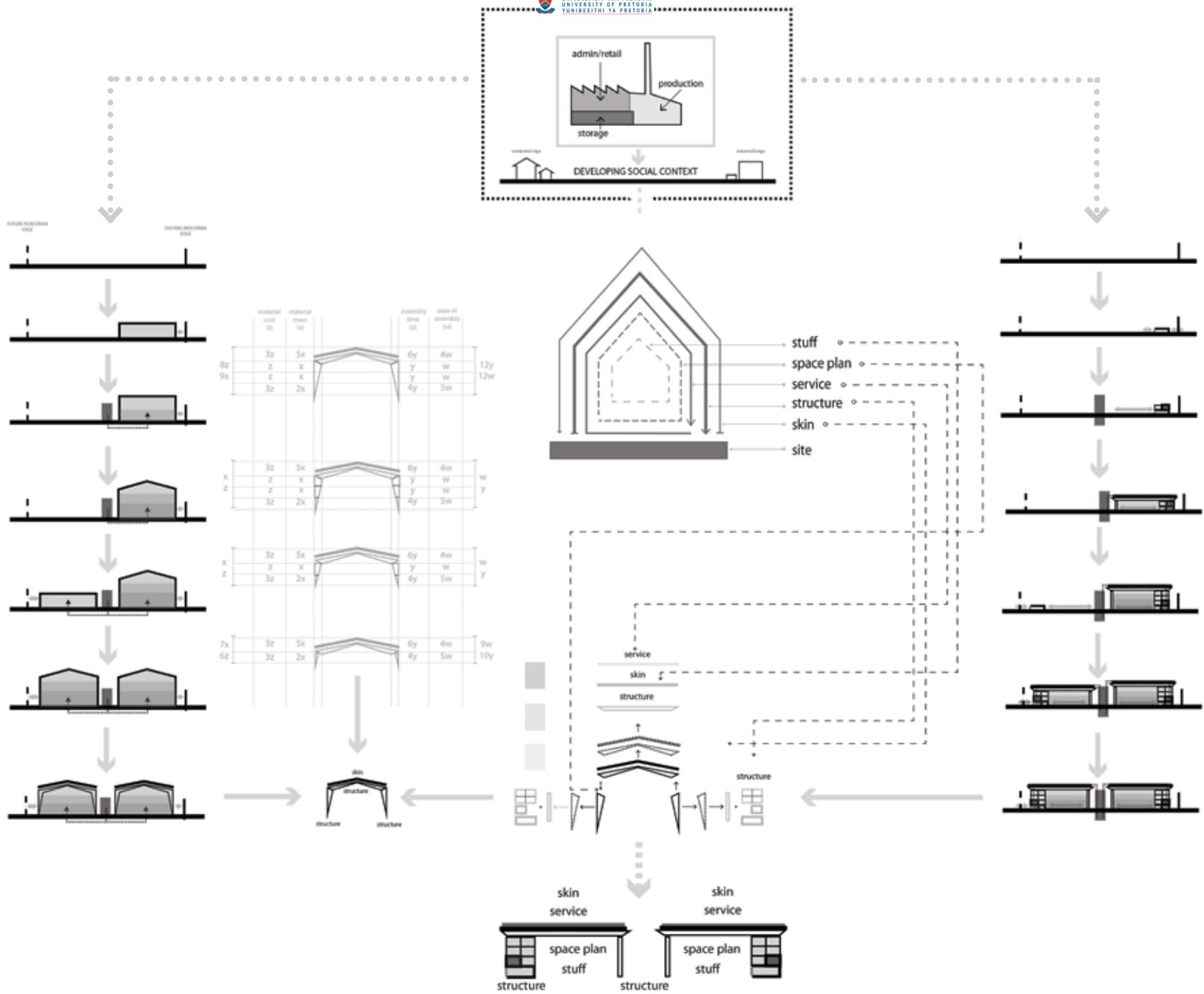
The factory typology was broken into its primary components of production distribution, storage and retail. The tectonics that made these spaces were then isolated and analyzed in order to understand the each element. This was then reinterpreted through Stewart Brand's definition of what makes up a 'building'.



Illus: 107 The 'Portal'. (Author, 2011)



Illus: 108 The process of research from where the portal emerged. (Author, 2011)



Illus: 109 The re-interpretation of the industrial portal through Stewart Brand classification of building elements. (Author, 2011)

6.7 ANALYSIS OF CONTEXTUAL ELEMENTS

In order to allow for an industrial building to grow by itself, the elements of growth needed to be clearly identified.

To facilitate this process of self-build, the elements from the context would need to be used efficiently to their maximum potential. (see Illus: 110)

VERTICAL POINT PROVIDED ELEMENTS - GIVING LINE

LAMP POSTS AND STREET SIGNS: These elements displayed strong ordering principles, giving land-marked properties to area.

They lacked in examples of appropriation due to their social role in context.

HIGH VOLUMETRIC SELF-BUILT ELEMENTS - GIVING VOLUME

SELF-BUILT HOMES AND APARTMENTS: Best examples of volumetric appropriation, responded to edge contextual issues and were the strongest element under consideration.

LOW VOLUMETRIC PROVIDED ELEMENTS - GIVING PLANE

GOVERNMENT SUBSIDIZED HOMES (RDP): Worst examples of future appropriation and growth, difficult to attach to and gave only the basics of form for growth.

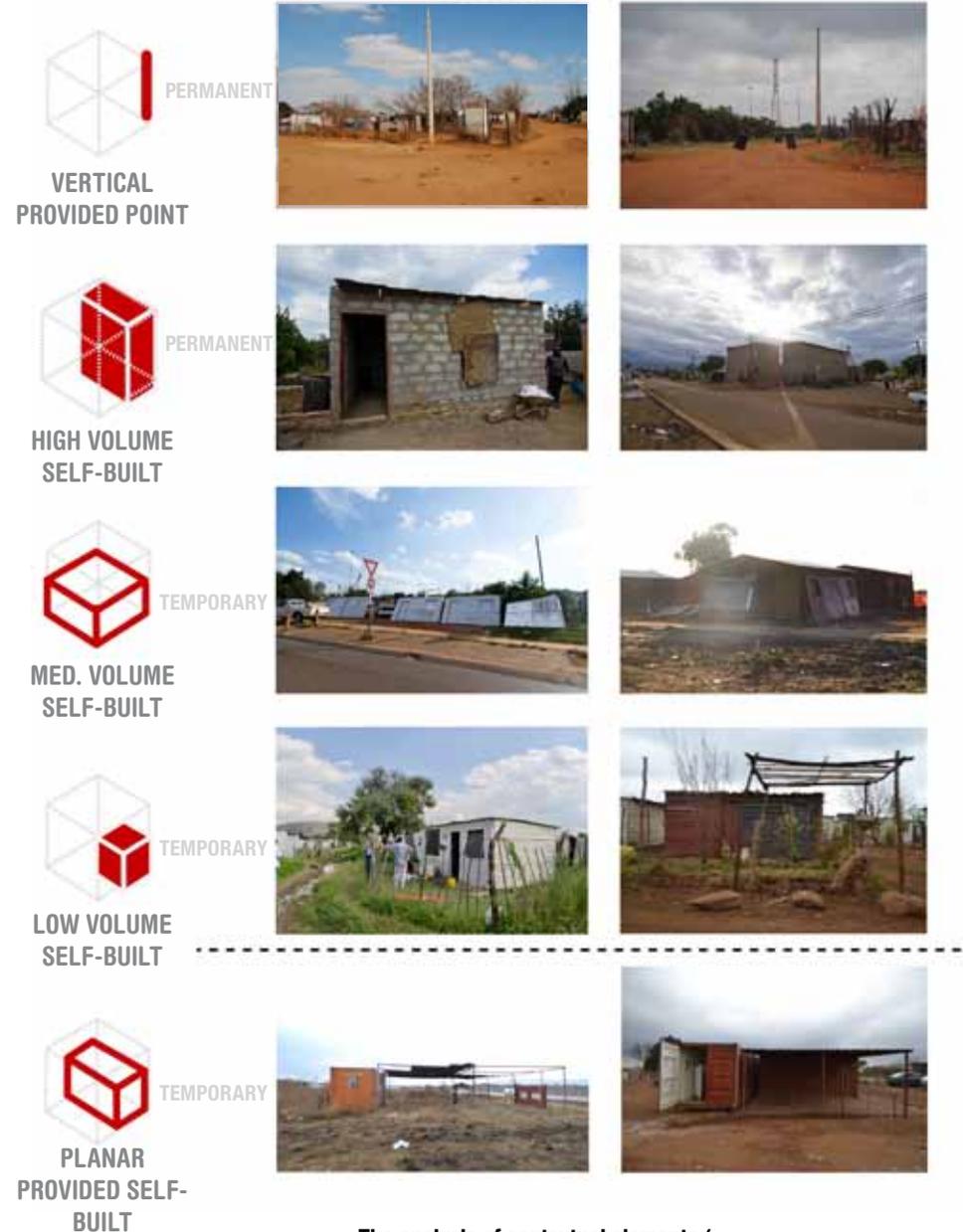
These elements did give some ordering principles by virtue of permanence.

VERY LOW VOLUMETRIC SELF-BUILT ELEMENTS - GIVING VOLUME

SHACKS/MOKHUKUS: Strong example of self-built element, limited in verticality and ordering principles.

LOW PLANAR SELF-BUILT/PROVIDED ELEMENTS - GIVING PLANE

CONTAINERS: Strong in ordering principles and gave a ready to use, easily maintainable and adaptable plane from which to appropriate.

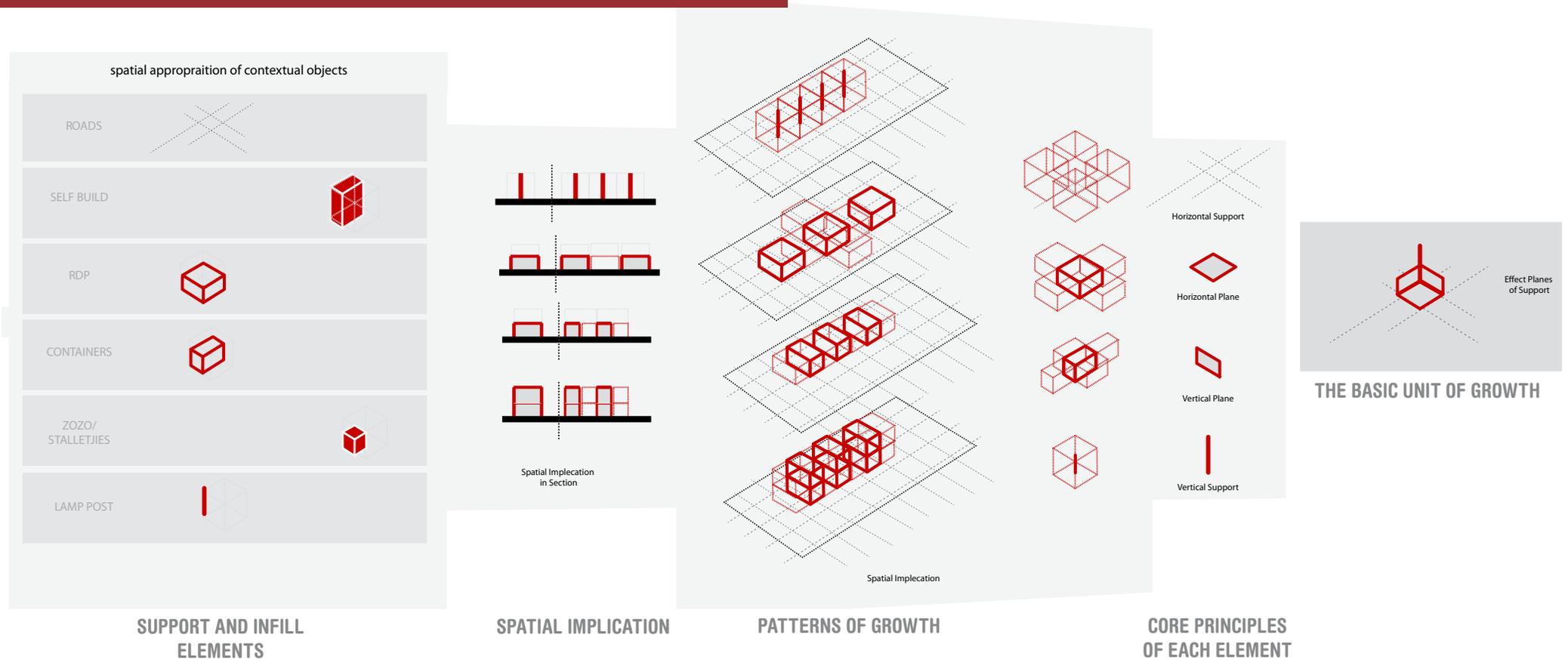


Illus: 110 The analysis of contextual elements (Author, 2011)

6.8 SUMMARY OF ELEMENT ANALYSIS

From the analysis of the patterns of growth that each element gave were explored to determine the most basic form from which to allow for a self-built structure.

This is summarized into two vertical planes (the corner) a vertical element potential (the point) and a large scale ordering principle (the grid). (see Illus: 111)



Illus: 111 An analysis of patterns of growth from contextual elements - culminating in the simplification of potential space (Author, 2011)

6.9 FACTORS IN SUSTAINABLE URBAN DEVELOPMENT

To allow the units of growth to develop in a positive and sustainable manner a structuring system is required.

This system embodies the proposed intervention and as previously discussed, will embrace the contextual patterns of growth while guiding this growth towards a more sustainable and flexible urban order.

Major issues in such developmental areas include:

POTENTIALLY DANGEROUS LAYOUTS OF STRUCTURE WHICH MAY LEAD TO SHACK FIRES AND OTHER HEALTH RISKS.

Currently temporary housing, in the form of shacks, occurs un-serviced and unplanned where most needed. Typically these settlements are demolished and re-built when local government upgrades the area, effectively destroying the energy and spirit-of-place in the process. (CoT,2011:www.tshwane.gov.za)

To embrace patterns of growth, a system is required to guide developmental layouts and embrace temporal growth. This will maintain ownership on a holistic level while facilitating ground up construction and planning.

UN-SUSTAINABLE SERVICE TYPOLOGIES: PIT LATRINES, COAL POWERED ENERGY, WATER FROM LONG DISTANCES ETC

While meeting the current needs of developing areas, the large scale future issues around resource use and provision should be addressed in order to add resilience to developing settlements.

INADEQUATE STRUCTURAL TYPOLOGIES: BADLY INSULATED AND VENTILATED HOMES, LOW DENSITY STRUCTURES ETC

Due to economic and infrastructure availability of large scale machinery, buildings in developing areas generally do not grow higher than two metres. This is mainly determined by the maximum height a ladder-less person can reach in temporary housing and economic factors in foundations and structural member use.

In order to promote more efficient, denser structures, structural provision and support is needed, as well as a larger palette of material choice.

6.10 ADDING A STRUCTURAL, SERVICED ORDERING ELEMENT

Based on the research and on-site observations of the verticality provided point elements in the context, and the potential they offer for structural appropriation, they appear to be the most appropriate element to work with to promote the aforementioned principles for development. (see Illus: 113)

The pre-cast concrete lamp post are a stereotypical element in developmental areas as they are robust and elegantly simple elements of service provision.

These lamp posts present an opportunity to for designers to enhance its mono-function of illumination and with minimal changes convert them into a pioneering elements for participative growth in developing areas.

Although they are efficiently designed for mass production and simple light provision there is a fair amount of untapped potential in the engineering of the lamp post. (see Illus: 113)



Illus: 112 Vertical elements in developing contexts (Author, 2011)

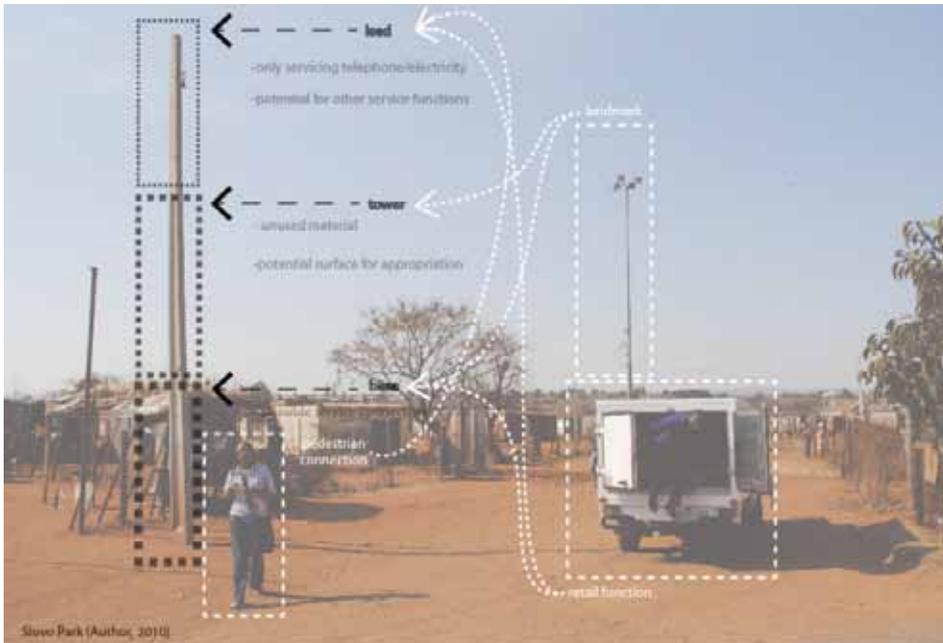
6.11 A VERTICAL ELEMENT OF SUPPORT

Light posts, electrical supports and street signs are the simplest urban infrastructural elements. By their inherent nature they respond to edge conditions and mobility routes as they provide lighting and unintentionally provide landmarked routes along these points.

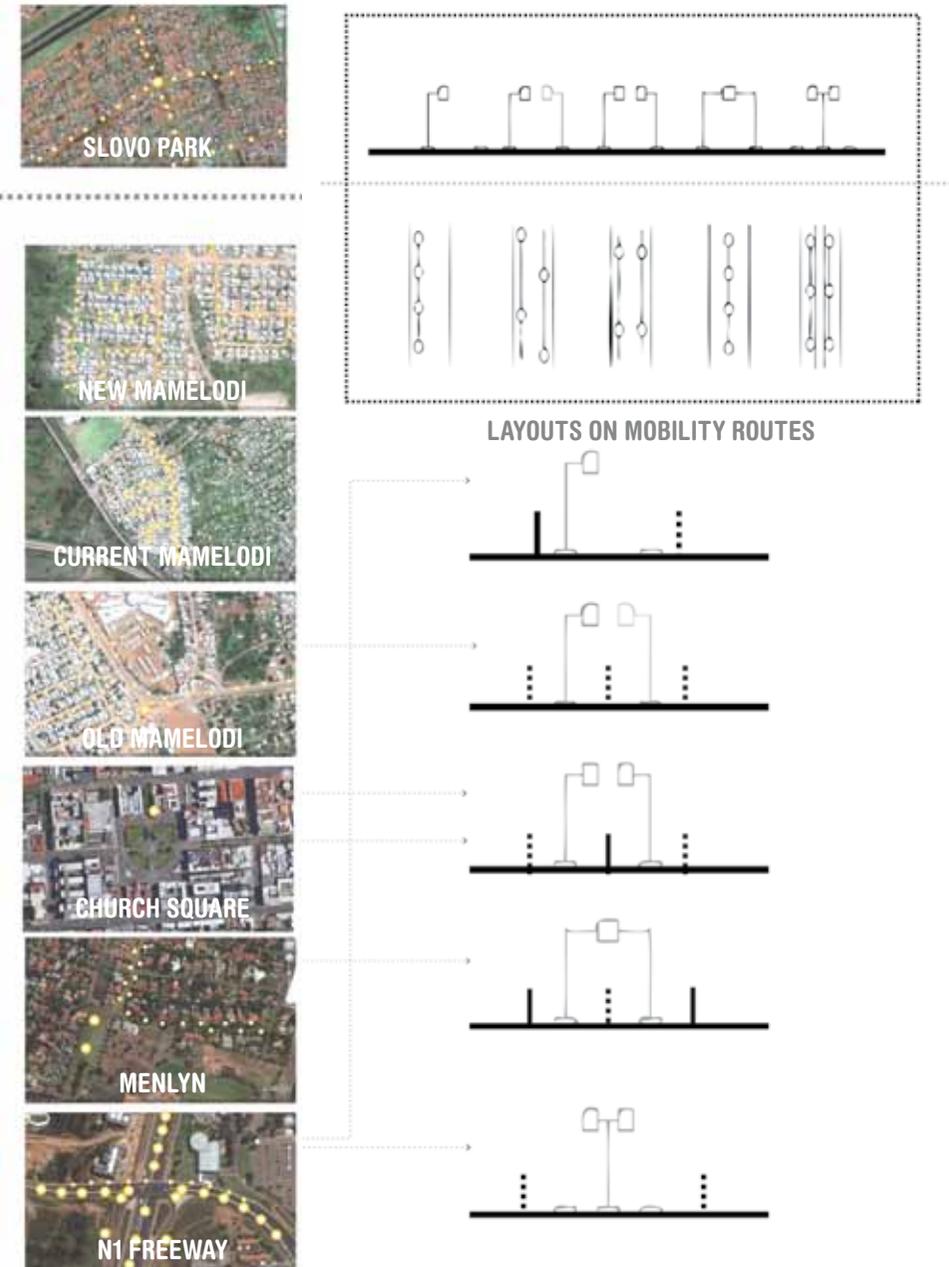
In developing contexts they are often the first elements to be added long before roads, water services or paving structures. In this way they are the ideal pioneers for developing contexts; surreptitiously guiding the urban grid long before other elements of infrastructure are considered. (CoT, 2011: www.tshwane.gov.za)

Although there is a negative stigma around the social role of the lamp posts during the apartheid era as control elements, they simultaneously provide protection by illumination at night, a large safety factor in developing areas.

Lamp posts layout and design is generally loosely arranged depending on the conditions of the mobility routes below, (see *Illus: 114*) thus making the lamp post the ideal component for a structural, serviced ordering element. (CoT, 2011: www.tshwane.gov.za)



Illus: 113 Analysis of potential in vertical element of support, service and structural ordering (Author, 2011)



Illus: 114 Analysis of Lamp post layout and edge response (Author, 2011)

6.12 DEVELOPMENT OF THE VERTICAL SUPPORT

The integration of the social and developmental potential of the typical pre-cast concrete lamp post necessitate small changes to the lamp post pole and its legislature. This will allow the pole to perform its typical function, while simultaneously facilitating major social and developmental changes.

A legislative change will have to be made first, to adjust the road reserve boundaries. (CoT,2011:www.tshwane.gov.za)

The reserve does not acknowledge the current condition of street retail and subsequent pedestrian movement experienced in developing areas. (see Illus: 115) h

A new road reserve limit is proposed using the lamp post to guide and demarcate this. (see Illus: 116)

LIFTING

An analysis of the principles of cranes and lift revealed the basic principles inherent in mechanical lifting. (see Appendix Illus: 14 , on page 165)

By including an arm element into the structural diagram of the lamp post pole, then stabilizing this arm with which stays back to the base the pole could be used as a lifting device enabling self-build. (see Illus: 117) - A)

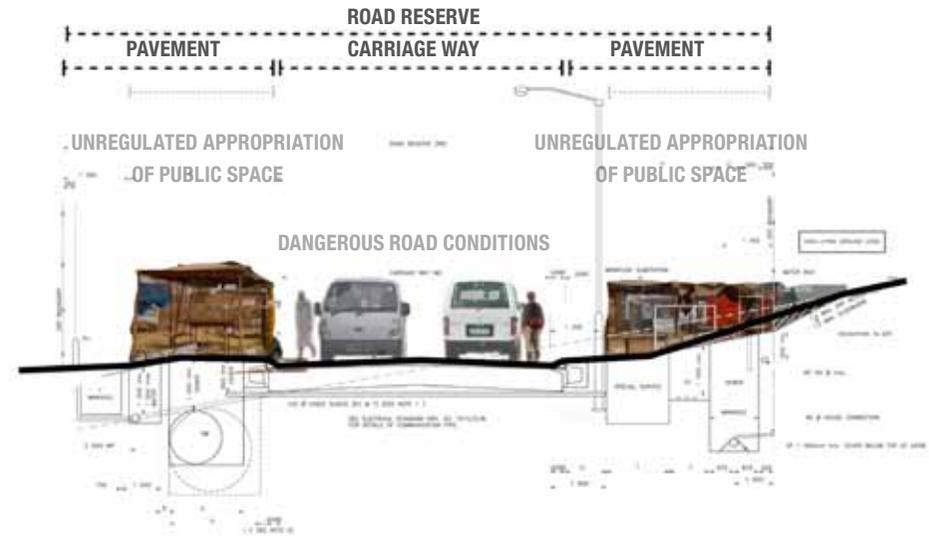
POINTS & PLANES OF APPROPRIATION

By changing the manufacture of the lamp post pole and allowing for points of connection the pole can be used to support secondary structural growth, converting the pole into both an infrastructural and a service piece. (see Illus: 117) - B)

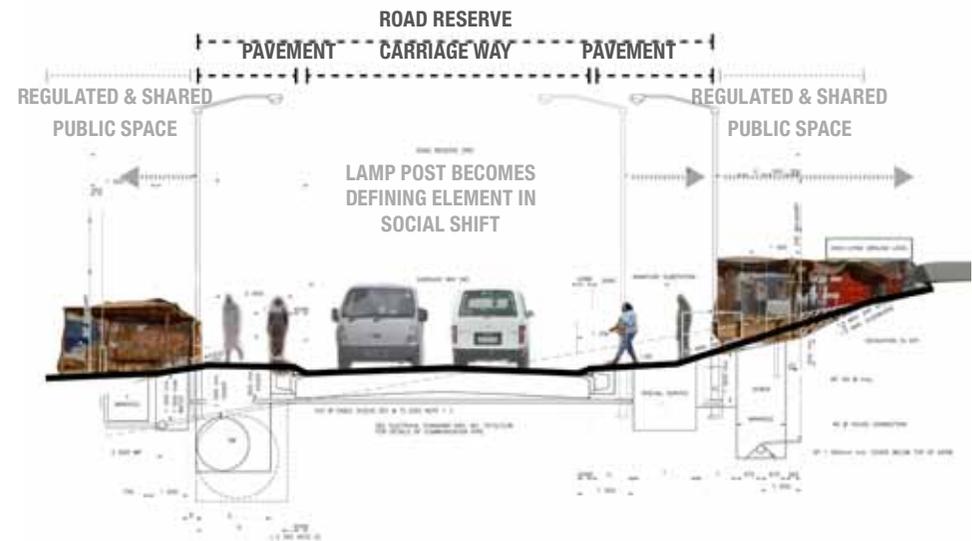
ORDERING SYSTEM OF GROWTH

If this new unit is supported by a system of similar lamp posts in sequence, being pioneered by more serviced poles supporting less serviced infill poles, the structures can begin to guide development in areas. (see Illus: 117) - C)

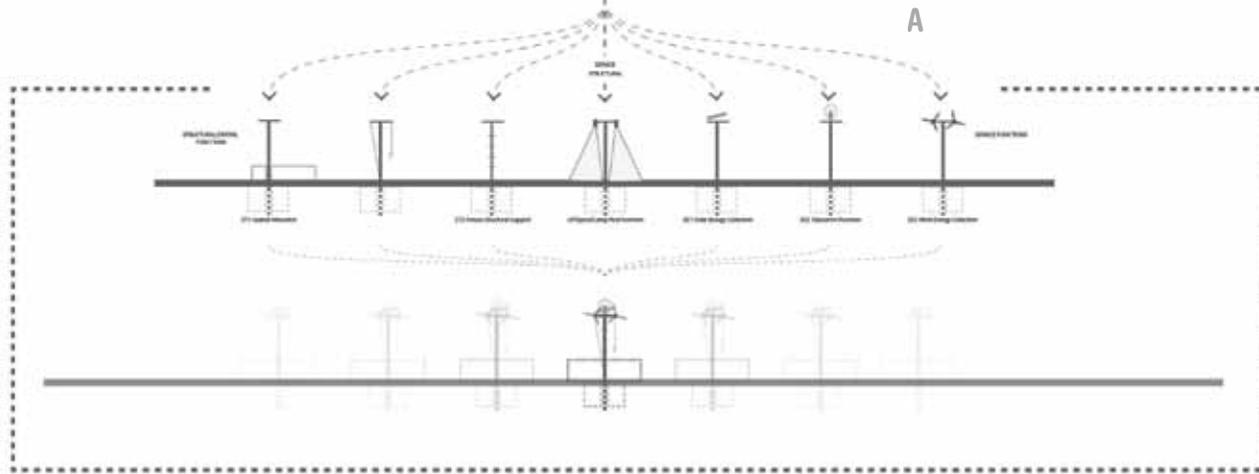
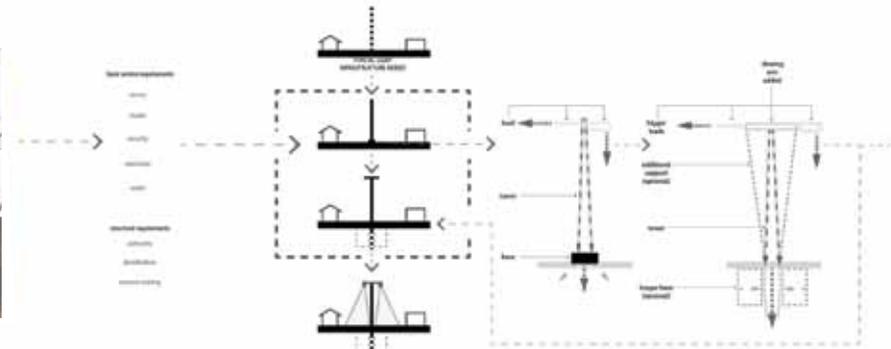
This allows the role of the lamp post-in the development process-to support and guide the growth of the various players in the Mamelodi context. (Illustration 111 - C)



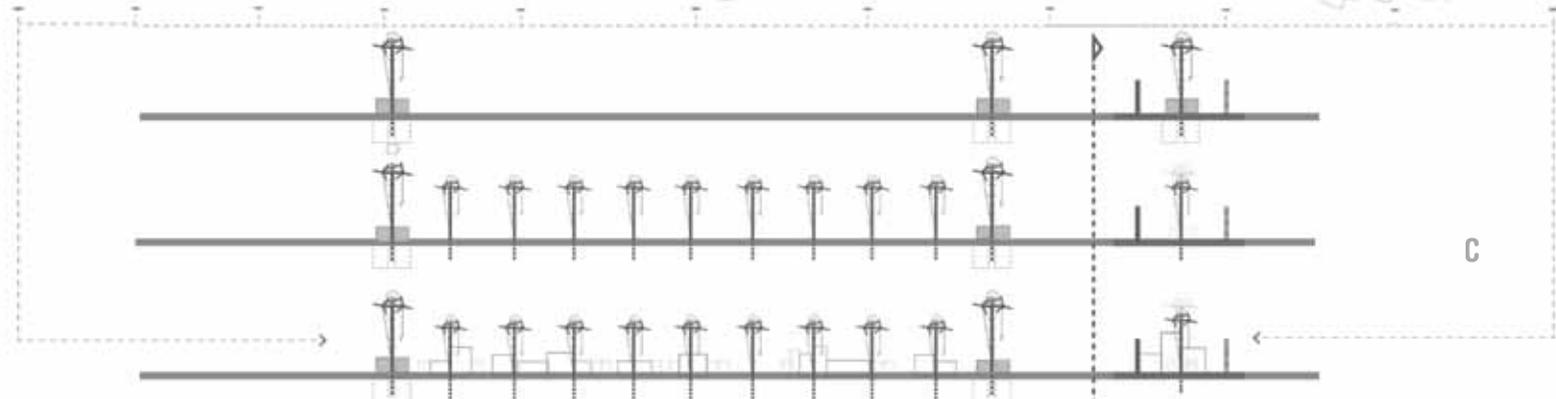
Illus: 115 Current condition brought on by road reserve limit, creating potentially dangerous scenarios (Author, 2011) (CoT,2011:www.tshwane.gov.za)



Illus: 116 Proposed adjustment of road reserve boundaries using lamp posts as ordering elements (Author, 2011)



B



C

Illus: 117 Re-configuring the pole towards service and infrastructural development (Author, 2011)

6.13 A UNIT OF APPROPRIABLE GROWTH

During the process of exploring various options of support and infill to generate an appropriate unit of growth, it became clear that the key was discovering which half of the support was required to allow for an appropriate infill.

By applying the rules determined in (see Illus: 110) the spatial diagram was further tested through several iterations explained in the appendix. (see Illus: 118)

It became an exercise in determining which parts of the element would be either the point, line, plane or volume, and how much of this element needed to either be support or infill, in order to create a form giving space. (see Illus: 118) - A)

The minimum element of form-giving space was determined to be three planes i.e. two vertical and a horizontal. (see Illus: 118) - B)

With the ground plane being a given horizontal it was seen that this corner element gave form to a system of triangle on various planes as directional and spatial drivers. (see Illus: 118) - C)

6.14 MULTIDIRECTIONAL-MULTIPLANAR UNIT

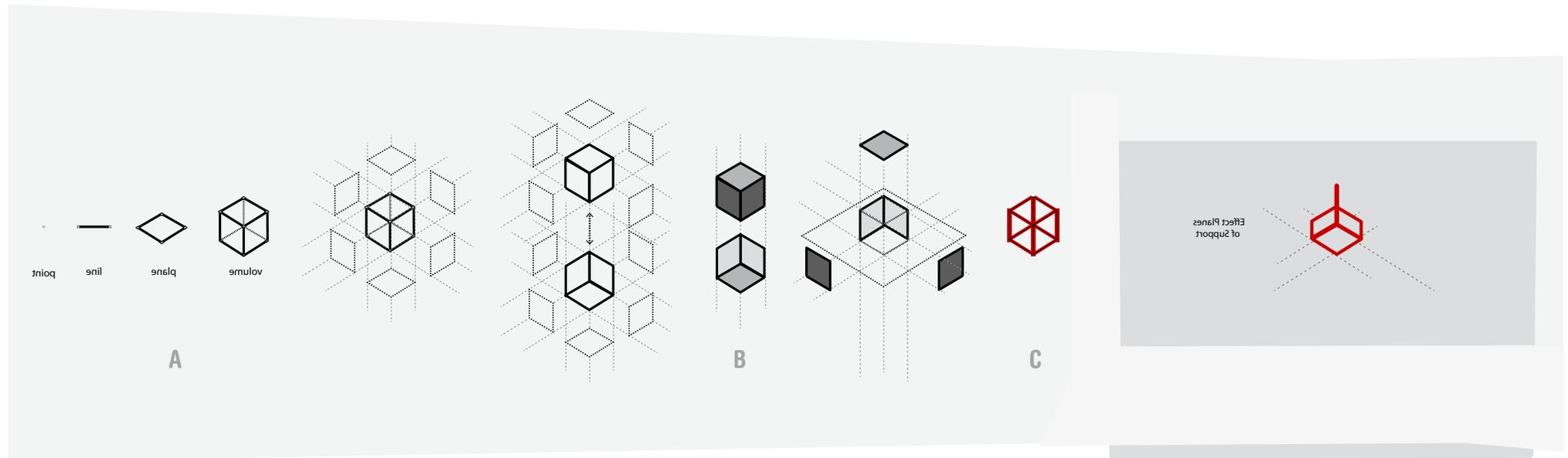
Through a historical and locally contextual exploration of these various planes, point and lines as drivers of form and grid organization, a unit of growth was determined. This resulted in the most appropriate multi-adaptable and flexible system derived from the process. (see Appendix Illus: 27 , on page 174)

The chosen form is based on the lamp post and its vertical role in place-making, form-giving and social function in the context, as discussed earlier. (see Illus: 119)

The pre-cast concrete lamp post is then modified to work as a structural and service element while maintaining its lighting function. (see Illus: 171 , on page 140)

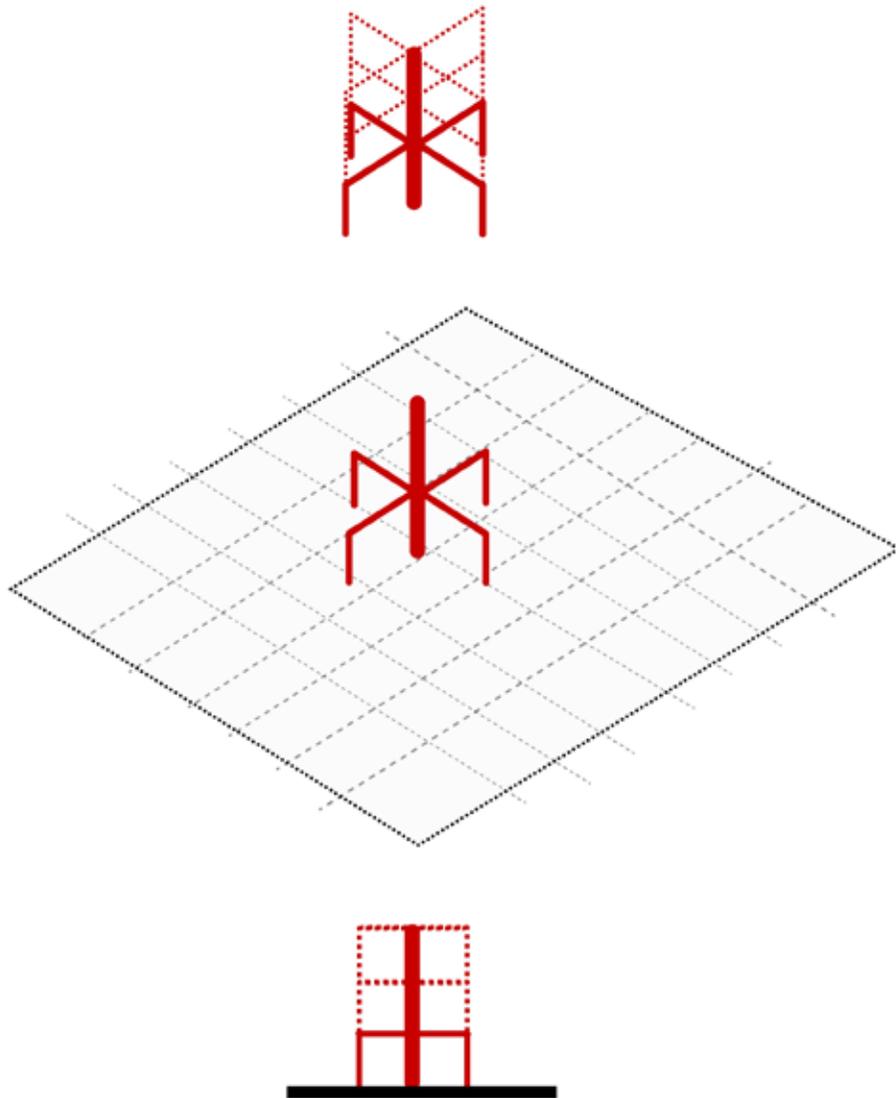
The form would be given with a minimum of two arms as a starting point, and depending on the required need, context and available energy, these elements could have pieces added as required, horizontally and vertically.

The lifting mechanism discussed earlier allows for the future occupant to grow the unit with the standard pieces, as well as speciality structural elements. (see Illus: 120)



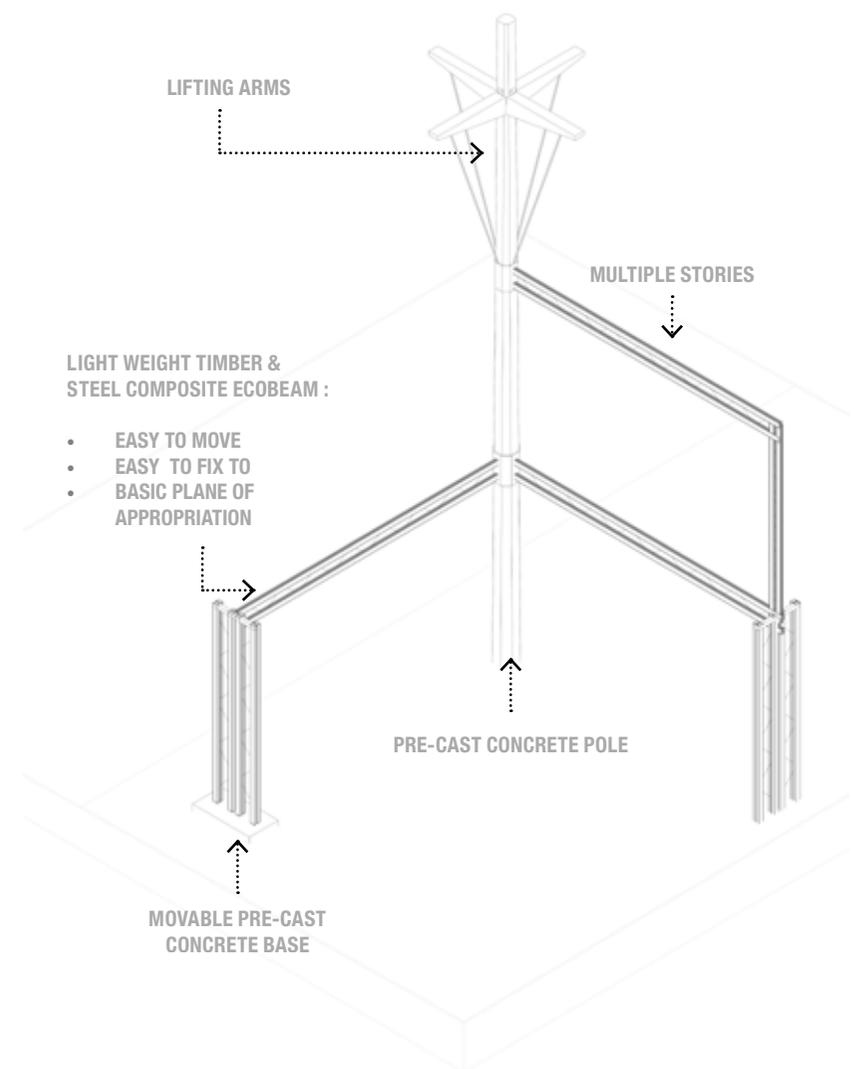
Illus: 118 Spatial exploration of point, line, plane and volume to determine spatial support and infill unit (Author, 2011)

MULTIPLANAR, MULTIDIRECTIONAL UNIT OF GROWTH



Illus: 119 The multi planar multidirectional unit (Author, 2011)

UNIT OF GROWTH



Illus: 120 The unit and its secondary structural and service pieces (Author, 2011)

6.15 RATIONALIZATION OF FORM

Structurally, the form is driven by the need to lift building elements heavier than human-lifting allows, in order to create stronger structures that allow for larger services and facilitate relatively easy vertical growth without disrupting ground level development.

By examining the deflection diagram of the typical concrete pole, the introduction of supports at various levels provides lateral support as well as space for planar appropriation. (see Illus: 121)

The octagonal profile was derived from the need to work in a full 360 degrees of options, but still direct growth in a controlled form. (see Illus: 121) - A)

When tied down with a slew arm introduced, the unit can become a lifting piece, able to adapt as the user requires. (see Illus: 121) - B)

When these units are placed in sequence they can synergistically create a larger building more flexibly and more in sync with the fluxual rhythms of the context than traditional large scale buildings. (see Illus: 121) - C)

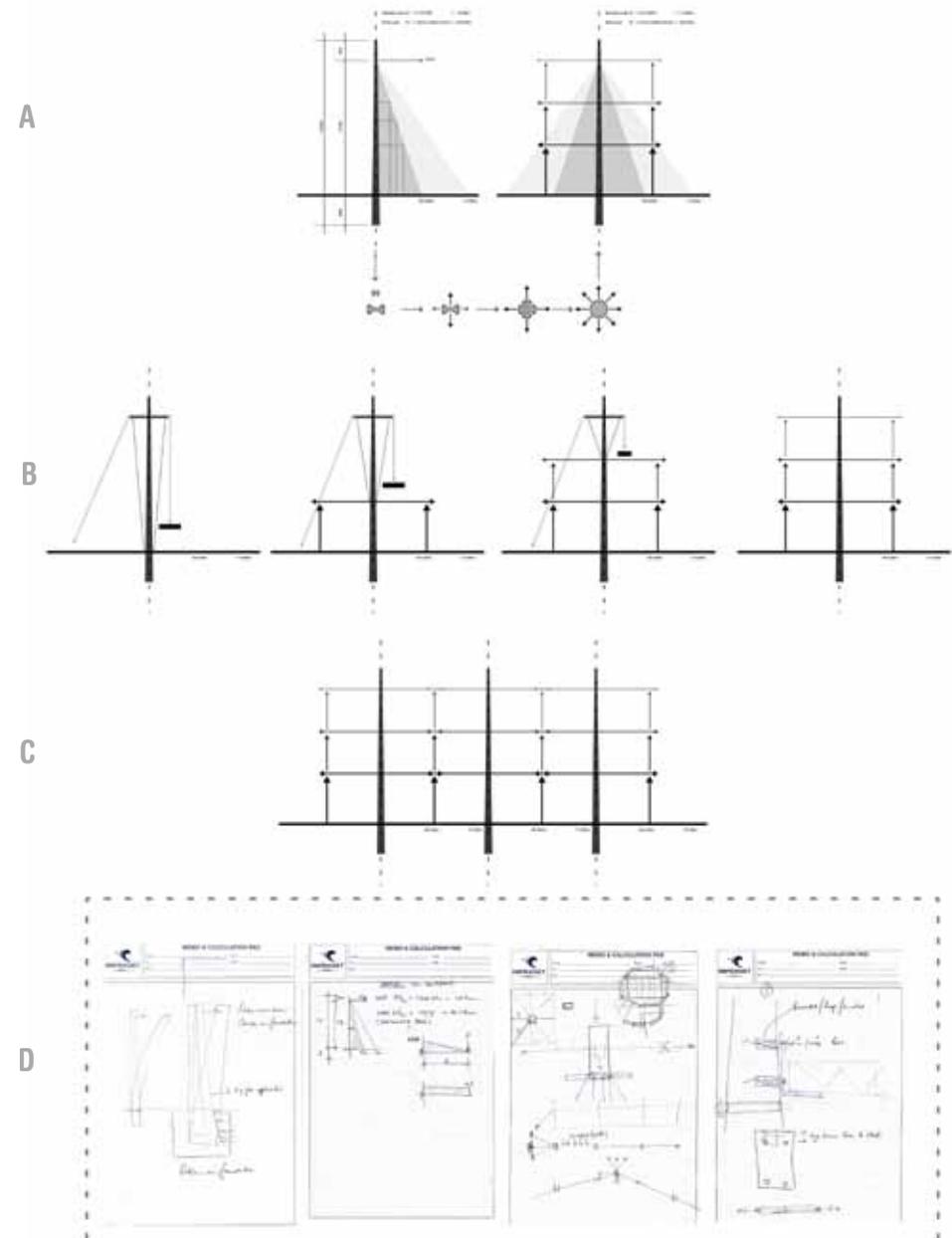
The form is primarily determined by the manufacturing process, as this element is included in any infrastructural pre-cast concrete manufacturing company's arsenal of products. The modifications were made under consultation with the engineer at Infraset's manufacturing plant. (see Illus: 121) - D)

6.16 PROJECTED PATTERNS OF GROWTH

This system of growth embraces the spirit of place explained at the beginning of the chapter while still facilitating sustainable and ordered developmental growth.

While working with all contemporary methods of infill seen in the context the system provides autonomous and sustainable resources in energy and water collection. (see Illus: 122)

By creating the platform for engagement with the local municipality and the public realm, development can begin to grow from the ground up while still meeting the standards and resource use of more traditional buildings as seen in (see Illus: 123).



Illus: 121 Structural resolve of element - Engineer notes supporting form, profile and lifting device (Author, 2011)



Illus: 122 Projected patterns of growth (Author, 2011)



Illus: 123 Rendering of possible manifestation of unit in context with structural and service components of unit (Author, 2011)



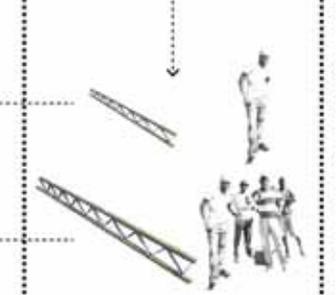
NIGHT TIME SECURITY



ELECTRICAL SUPPLY IN MICRO WIND TURBINE



ELECTRICAL SUPPLY IN SOLAR PV CELL



TIMBER AND STEEL COMPOSITE ECO-BEAM CHOSEN DUE TO WEIGHT AND EASE OF FIXING



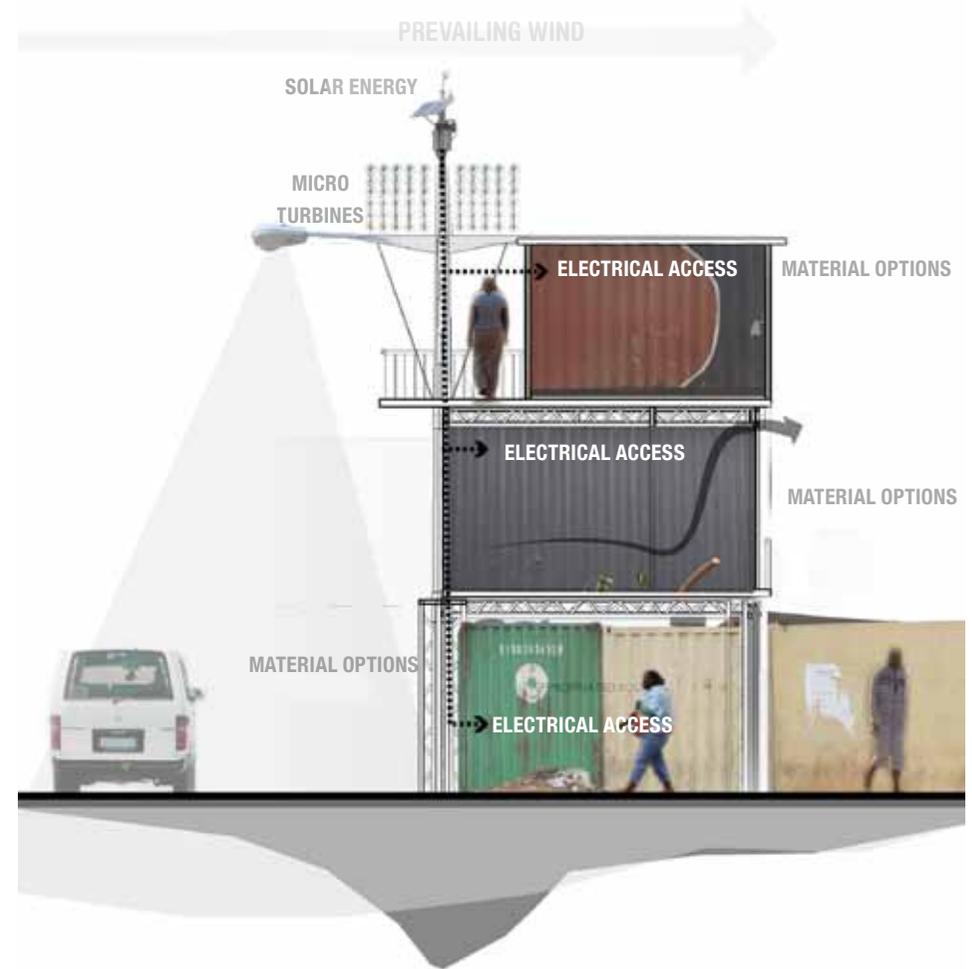
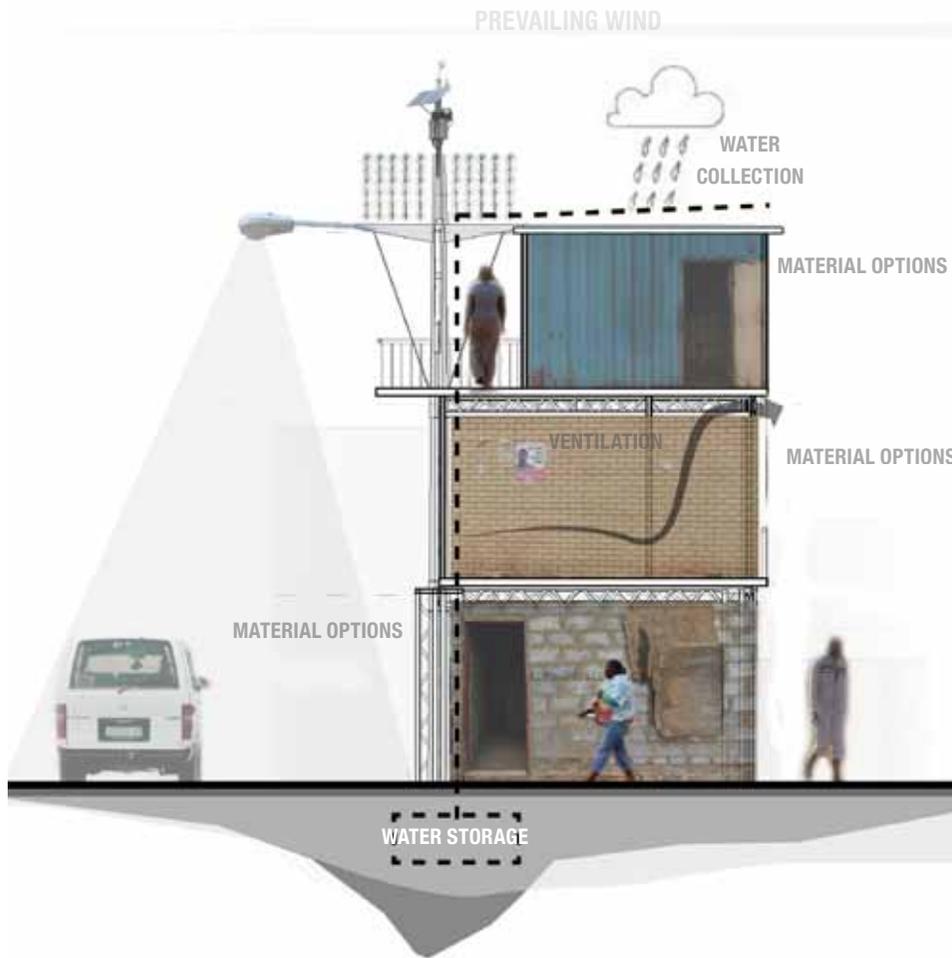
Illus: 124 Patterns of projected growth, ordering principles that allow for mobility routes and public infrastructure (Author, 2011)



Illus: 125 Patterns of projected growth, ordering principles that allow for mobility routes and public infrastructure (Author, 2011)



Illus: 126 Patterns of projected growth, ordering principles that allow for mobility routes and public infrastructure (Author, 2011)



Illus: 128 Analysis of potential in vertical element of support, service and structural ordering (Author, 2011) Illus: 127 Depicting the various material, service and programmatic options in the unit (Author, 2011)

6.17 CONTROL OF UNIT

The unit is intended to be shared by public retail ventures and owned by the local municipality.

Access to service and structures would be monitored and maintained by municipal officials, the agents of control. Each addition beyond certain scales would be regulated through the local municipality. (see Illus: 129) - A)

In developing contexts such as Mamelodi, the street and its edge become the major retail area as it is the most public space. Centralised retail venues, as seen with the failure of Max City Shopping Center, do not appear to work in environments such as Mamelodi. (see Illus: 129) - B)

Any individual or group could then buy units, and combine to allow for larger retail options in the form of co-operatives.

These agents of ownership could then rent out the spaces between the more vulnerable members of the context, thus creating a hierarchy of ownership and control of the public realm. (see Illus: 129) - C)

6.18 APPLICATION TO SITE - PIENAARSPORT

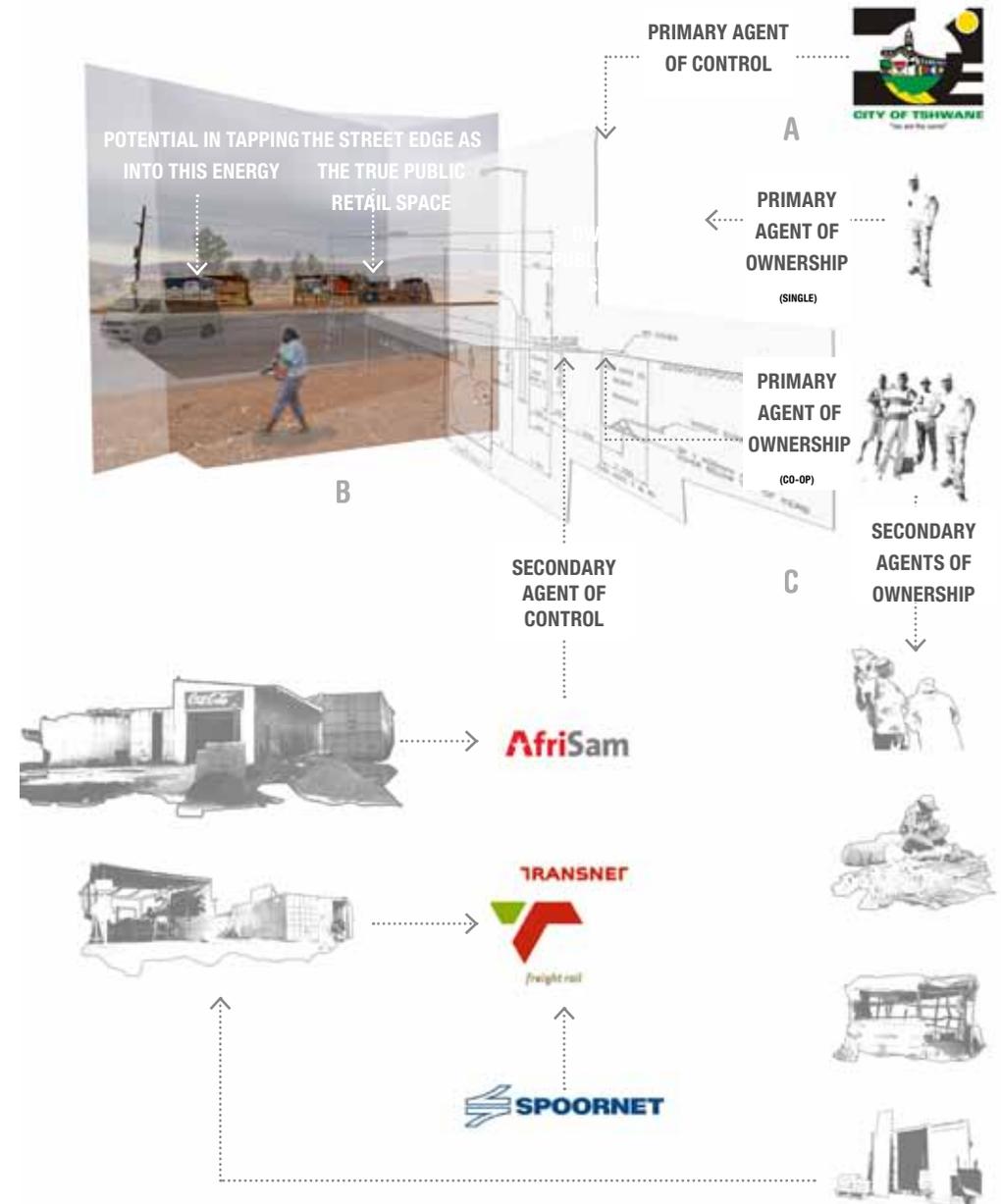
The unit is designed to work in any developing context, to test its potential the unit is applied to develop the Pienaarspoort Station Precinct.

As the current conditions reveal clues to the contextual requirements, a future for the site needs to be speculated and types of projected growth to be explored.

A set of 'rules' and principles of growth will be set down for the exploration, these being based on the on-site research and analysis of the context.

Cement retail and use has been chosen as the factor of development based on the findings of the contextual research. (see Illus: 58 , on page 56)

Working with cement use over a period of time and looking at previous patterns of growth, the project has been broken up into 5 phases. (see Illus: 130)



Illus: 129 Systems of control, ownership and growth facilitation (Author, 2011)

6.19 PHASES OF PROJECTION

EARLY PHASES - these phases reveal the intimate steps in the growth, and depict the flexibility of the unit in the process of support and infill of its placement.

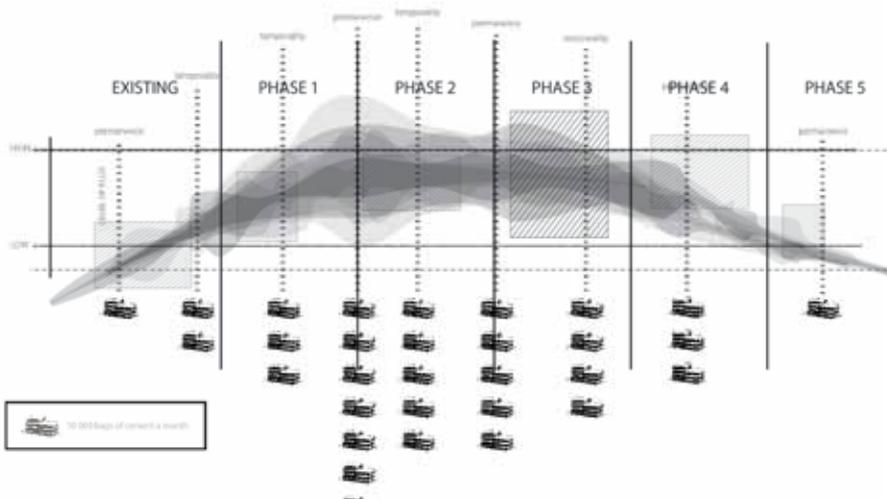
PHASE 1 - Independent cement retailers mixed with other retail forms use the structures.

PHASE 2 - Cement retailers form a consortium and get assistance from Afrisam.

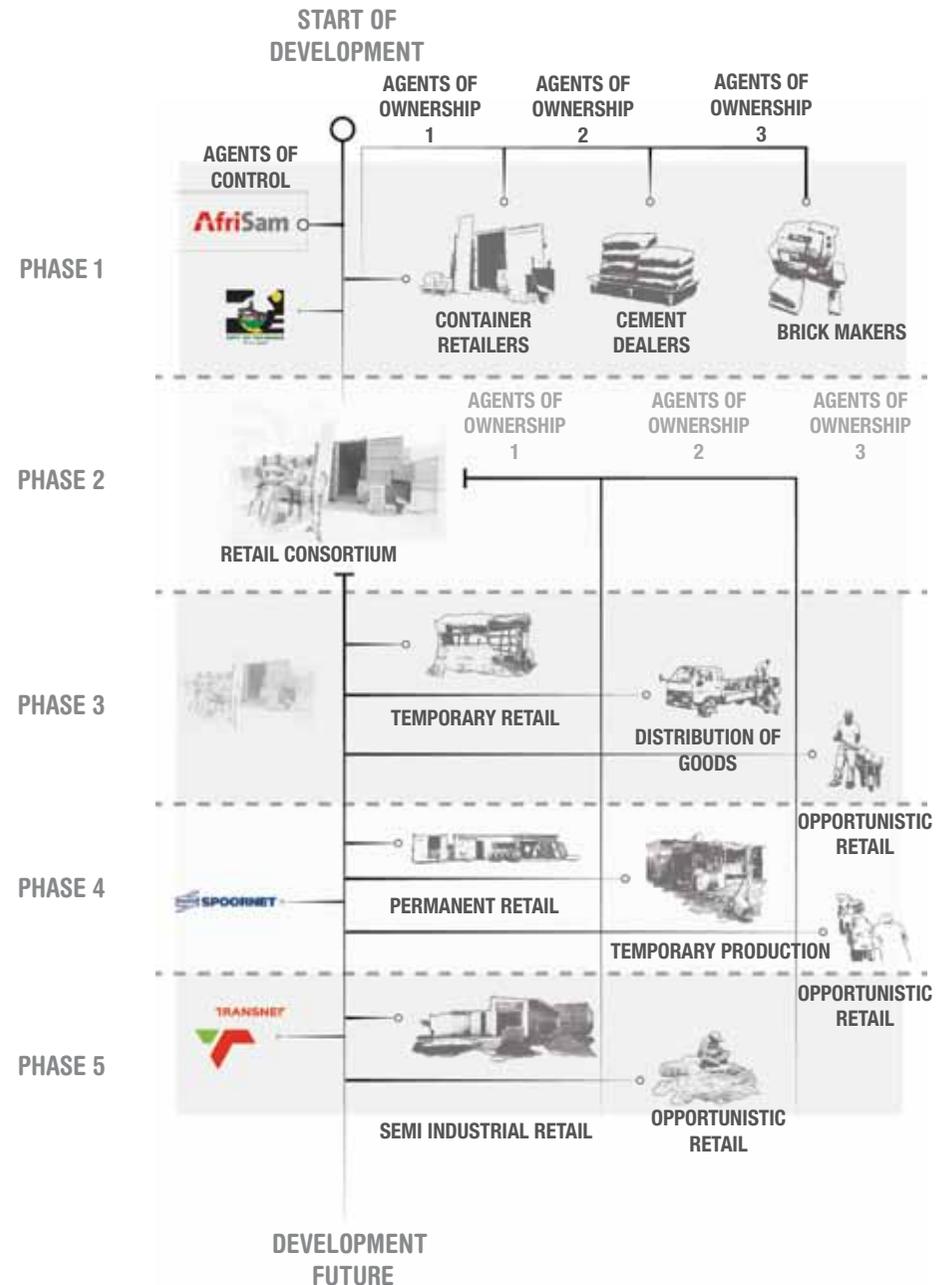
PHASE 3 - Fueled by the cement distribution and collection, the site has become a larger retail depot for any consumable goods required in the area.

PHASE 4 - Cement trade has died down, but the precinct has grown into an important retail and transport hub.

PHASE 5 - The precinct has become the major transport station for the east linking to the transport interchange planned by the City of Tshwane and GAPP.



Illus: 130 Phased development based on cement use (Author, 2011)



Illus: 131 System of control and ownership during the development (Author, 2011)

6.20 NODAL GROWTH DEVELOPMENT

The placement of the lamp post units is intended to work with the typical procedure in placing infrastructure; that a series of lamp posts are placed by an appointed team, in sections at a time in an identified area.

The process will work in the same way, but varying in that two larger serviced public infrastructural pieces such as a public ablution, mobile clinic station, police unit or library will be placed first, as these are elements that the municipality is currently providing. (see Illus: 133)

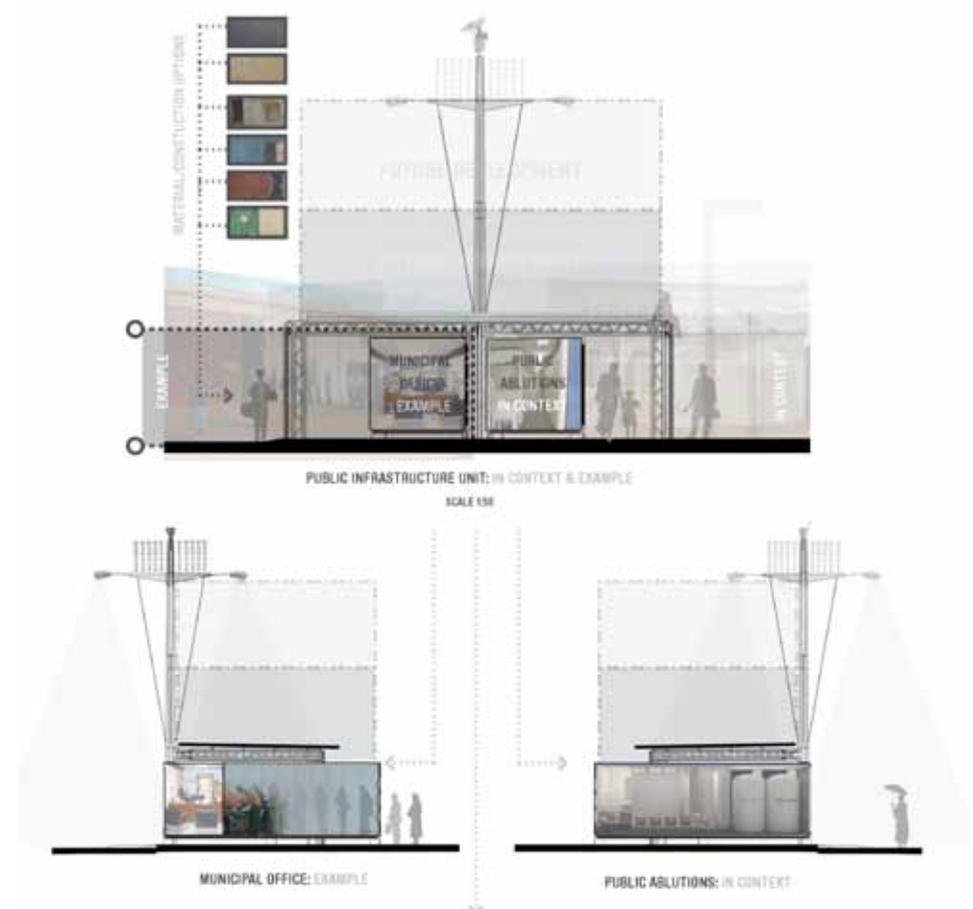
These larger infrastructural pieces would act as catalyst prototype pieces. Once they have been accepted by the immediate context and a relationship has been established, the infill pieces would then be added. These less serviced infill pieces would then be sold out to interested parties. (see Illus: 132) - A)

This process would continue as each unit begins to affect the next, until the precinct develops along the retail edges. (see Illus: 132) - C)

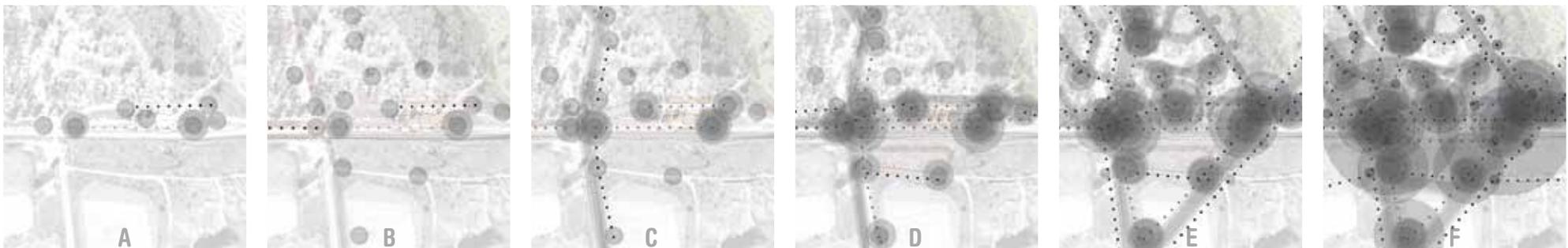
During this process of growth government, NGO's and private investors would intervene where needed, affecting growth, responding and reacting to the life of the building.

This process of development allows growth from the ground up, while embracing the energy of the context from the beginning of the intervention. (see Illus: 132) - F)

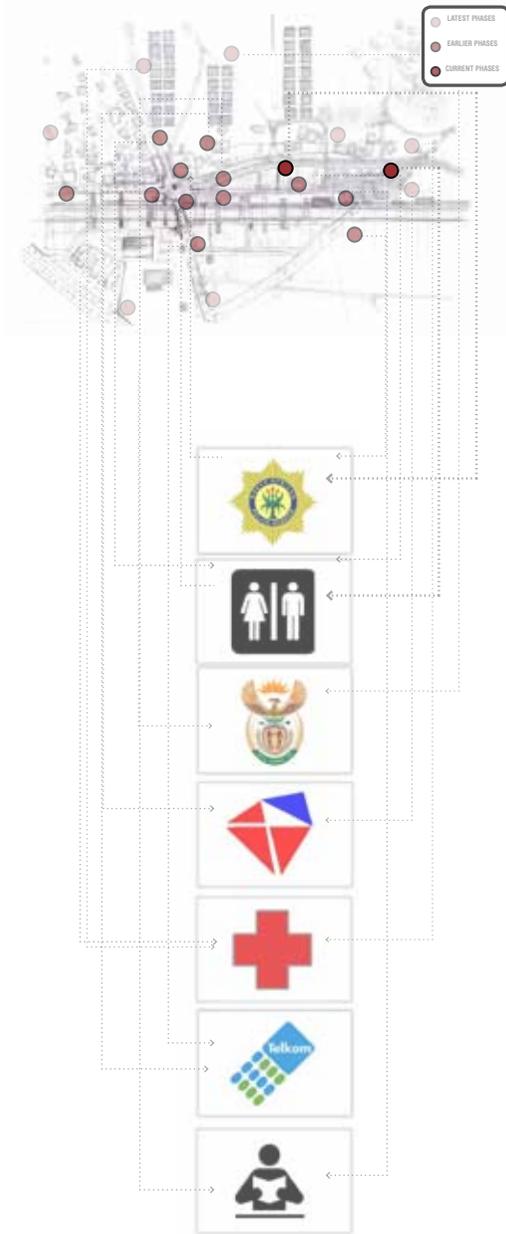
Responding to current edge conditions, (see Illus: 134), the growth patterns facilitate future edge conditions and limit change during the developmental process. (see Illus: 135)



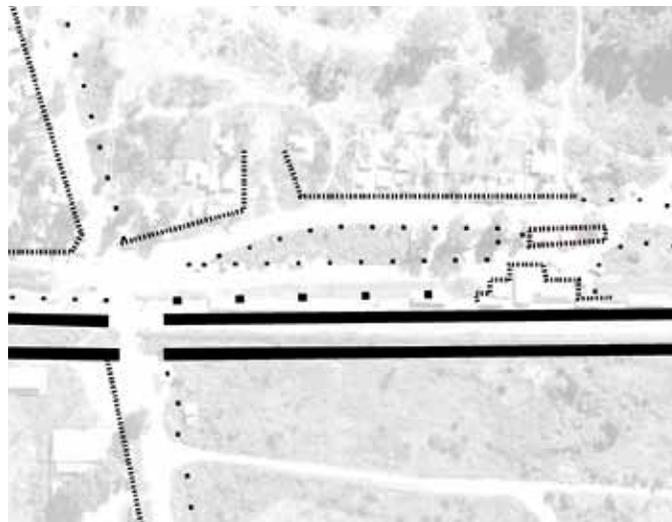
Illus: 133 Prototypical public infrastructural units used to guide development (Author, 2011)



Illus: 132 Analysis of potential in vertical element of support, service and structural ordering (Author, 2011)



CURRENT SITE AND EDGE CONDITIONS



————— HARD EDGE

- - - - - NON INTERACTIVE
EDGE



FUTURE SITE AND EDGE CONDITIONS



..... INTERACTIVE EDGE

Illus: 134 Key Infrastructural Support Elements (Author, 2011)

Illus: 135 Current vs Future edge conditions on-site (Author, 2011)

Chapter 7: Design Resolution

THE BUILT ENVIRONMENT IS A COMPLEX GAME, PLAYED BY FAR MORE PLAYERS ON A MORE COMPLEX BOARD FOR A LONG PERIOD OF TIME.

THE GOAL IS TO ALLOW LARGE NUMBERS OF INHABITANTS AND OTHER ACTIVE AGENTS TO COEXIST IN PEACE AND MUTUAL WELL BEING.

WE BUILD TO LIVE TOGETHER.

JOHN HABRAKEN
(Habraken, 2008: 6)



Illus: 136 Conceptual model exploring possible forms of incremental growth in context (Author, 2011)

7.0.1 ELEMENTS OF INCREMENTAL GROWTH

During the dissertation it emerged that the design question was to be answered by three seemingly separate but interlaced elements in the design process:

THE UNIT OF GROWTH

THE SPECULATIVE MASTER PLAN OF GROWTH

THE ARCHITECTURAL MANIFESTATION OF THE UNIT IN THE MASTER PLAN

The unit and its development are covered in Chapter Six, while Chapter Seven is aimed at exploring how the unit will grow and what architectural ramifications are possible in the context of Pienaarspoort with the cement retailer as users.

7.0.2 PHASE 3 - THE ZENITH OF GROWTH AND ENGAGEMENT

Phase Three was selected for the focal point in the dissertation as this point is far enough into the future to see what the precinct could be, but close enough to still feel the connection to the site as it is now.

While the entire precinct is expected to evolve and grow over time it is speculated that the agents involved will have assistance from larger bodies at certain stages.

This speculation of growth is conceptually illustrated and then focused around the cement retailer at a specific phase in their development. The eventual architectural intervention becomes an exercise in roofing and planning of the larger construction elements, but still aims to retain the ethos of the incremental self-build.

7.1 THE PLATFORM OF ENGAGEMENT

By applying the rules and patterns of growth described in Chapter Six, the possible manifestations and forms of growth were explored in the context of Pienaarspoort.

As described earlier in (see *Illus: 130*) a speculative set of scenarios based around the cement use in the area were put down and a narrative of growth over time was illustrated.

In order to explore this growth architecturally, the focus had to be drawn on one particular agent in this complex process as well one particular phase that best captured the possibility of architectural spatial, structural and programmatic intervention.

7.2 FACTORS IN MASTER PLAN SPECULATION

To explore this possibility, an interactive process of future speculation and current needs was required. This process revealed how the master plan should function as well as defining the requirements of the unit of growth.

The most stable factors in the process became the Pienaarspoort Station and the edge conditions created by the mobility routes, the rail and the station building.

Taking these factors into account with GAPP's proposal discussed in Chapter Five, the design revealed the conditions of the site and its larger context. (see *Illus: 138*)



Illus: 137 Speculative sketched inquiring into Pienaarspoort's future (Author, 2011)



Illus: 138 Conceptual model of form, spatial and structural interventions on-site (Author, 2011)

7.3 MASTER PLAN AT PHASE 3

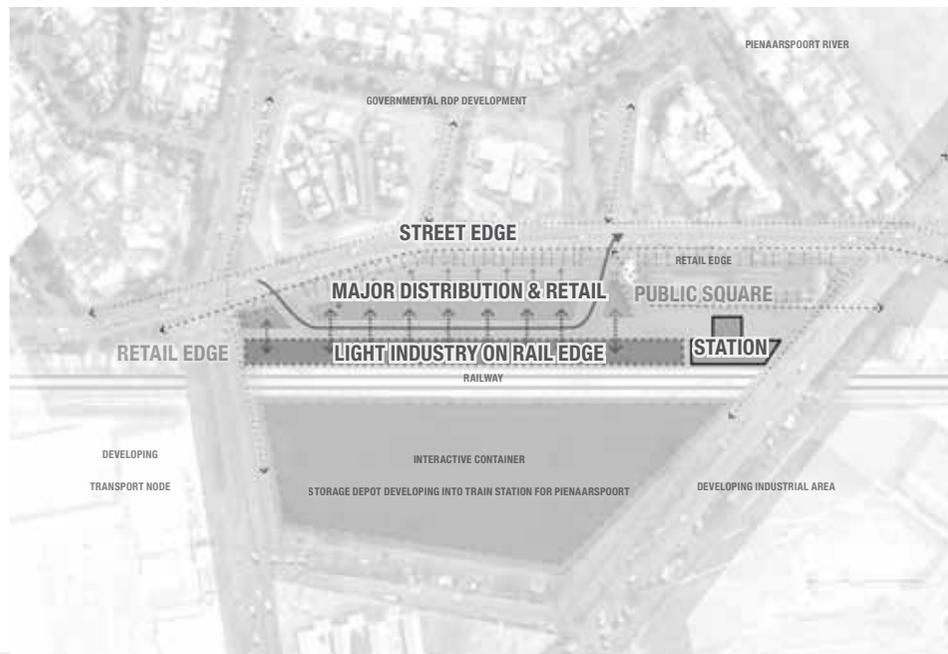
Considering the current processes of growth analyzed and observed on-site, it can be assumed that the government subsidized housing will take precedent over the residential housing patterns in the area.

The nature of the unit and its edge response in this context ((see Illus: 134) is expected to work with the deliminal space around the edges and crossing. By responding to the mobility routes the area between the rail crossing and the Pienaarspoort station will become a major retail zone.

It is expected that the road closest to the rail edge will become a service road and serve the light industry that develops along the rail edge side. (see Illus: 139)

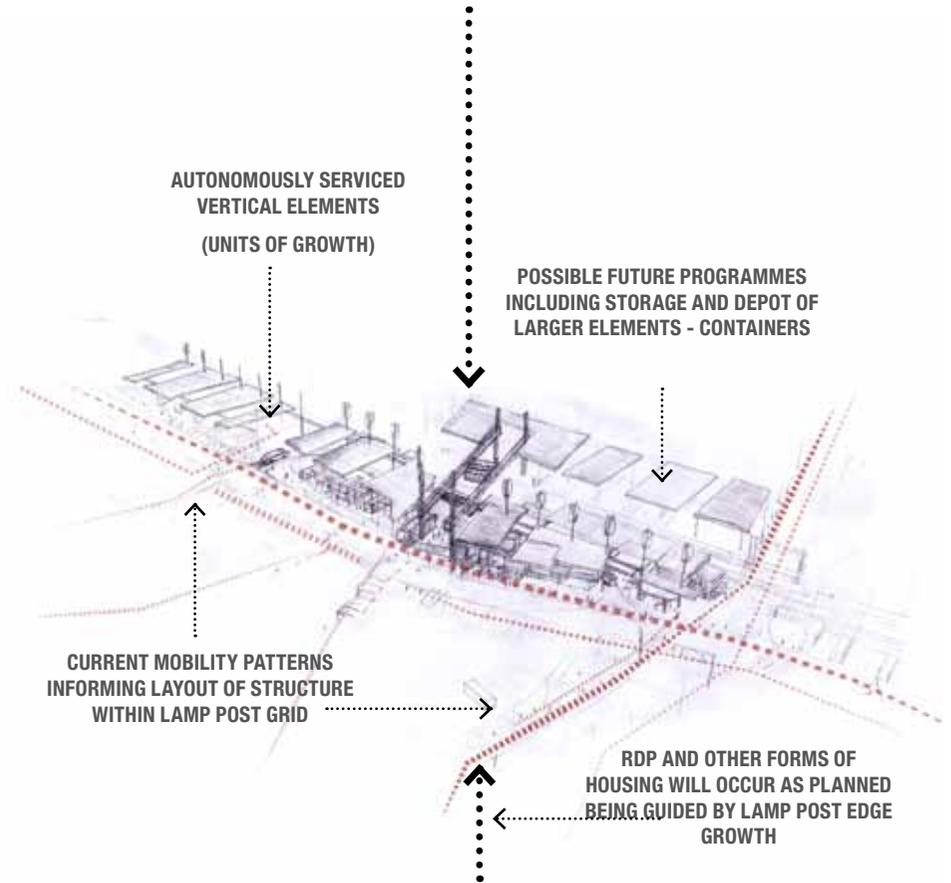
This light industry edge would then support the retail zone between the two roads, thus forming the 'front of house' to the now active street edge. (see Illus: 139)

At this point the area around the Pienaarspoort station would have become a public square with retail activities on its street edges. (see Illus: 139)



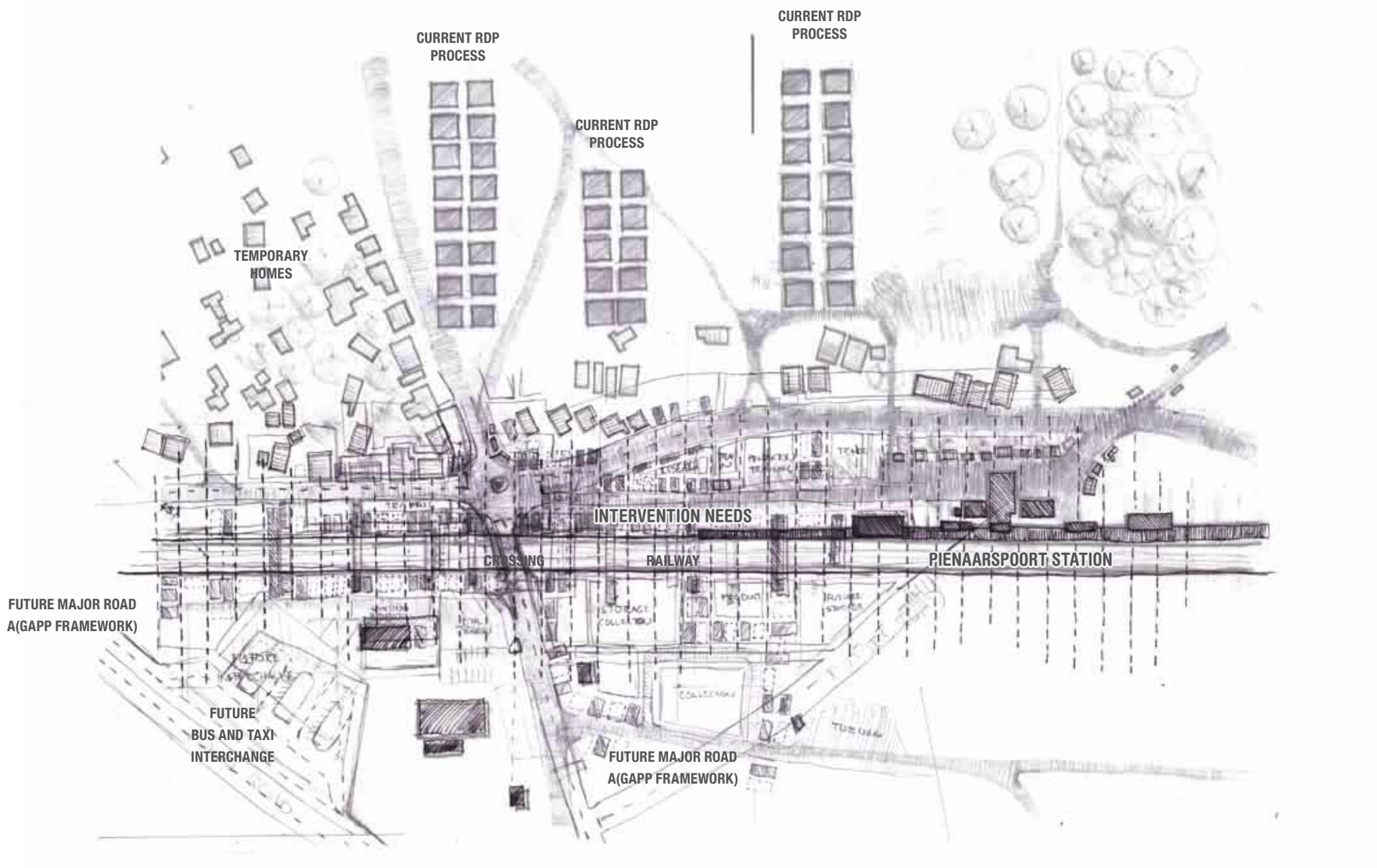
Illus: 139 Diagrammatic functional process of Pienaarspoort at Phase 5 (Author, 2011)

POSSIBLE FUTURE PROGRAMMES INCLUDE: TRAIN STATION, MAJOR RETAIL DEPOT, PUBLIC SQUARE AND EVENTUAL TRANSPORT NODE DEVELOPMENT



MOBILITY AND TEMPORALITY FORMING THE PRIMARY PRINCIPLES OF GROWTH

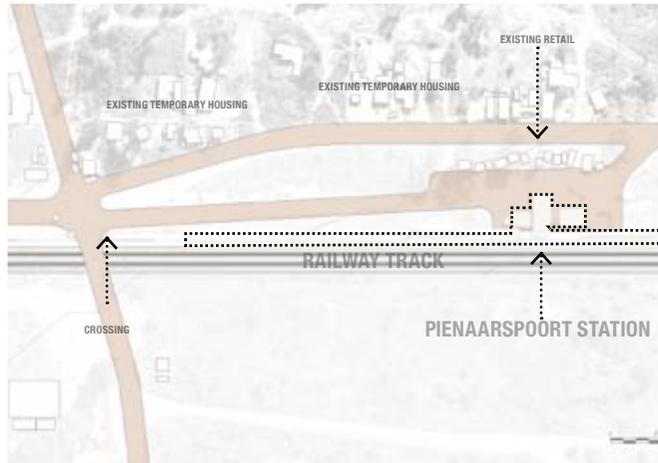
Illus: 140 Phase 3 development in its context, possibilities of future edge response (Author, 2011)



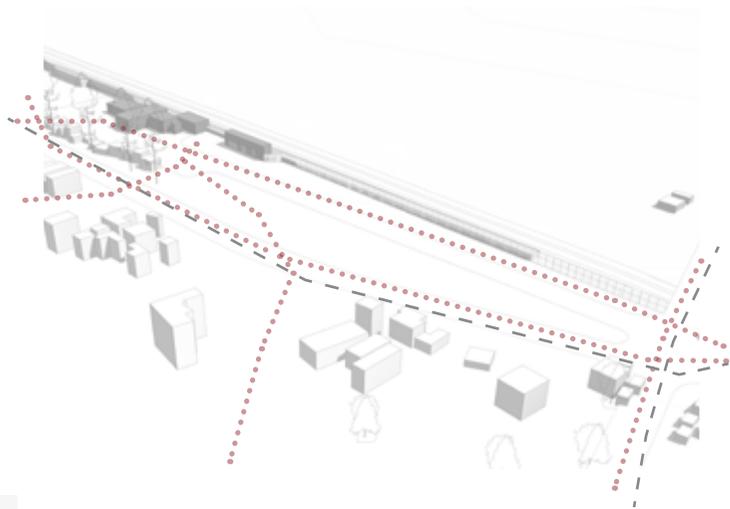
Illus: 141 Sketch Speculation of Possible processes of development and growth in Pienaarspoort (Author, 2011)

7.4 EARLY INCREMENTAL PHASES

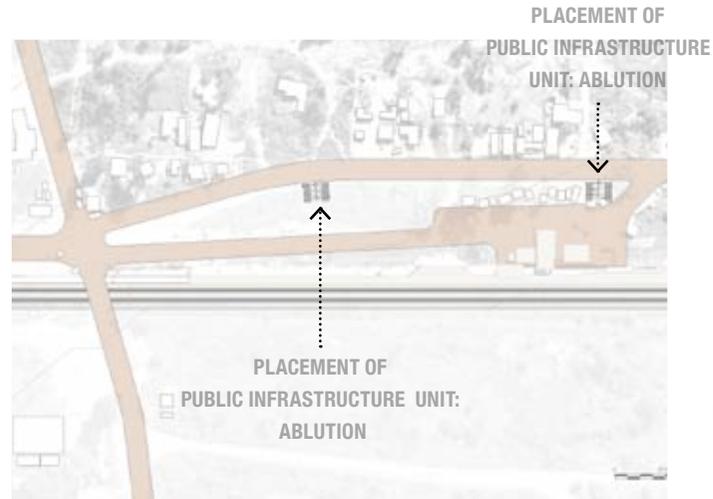
EXISTING



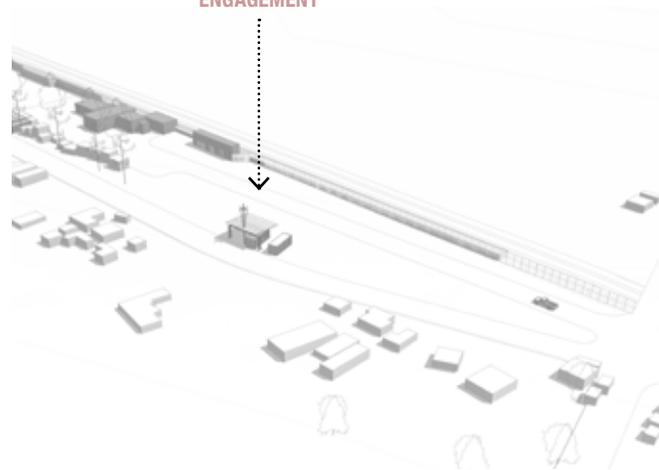
EXISTING SITE AS PREVIOUSLY ANALYZED



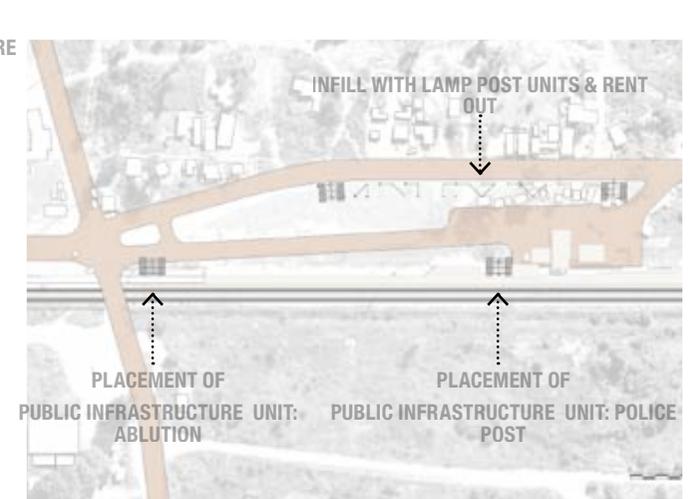
MOVEMENT A



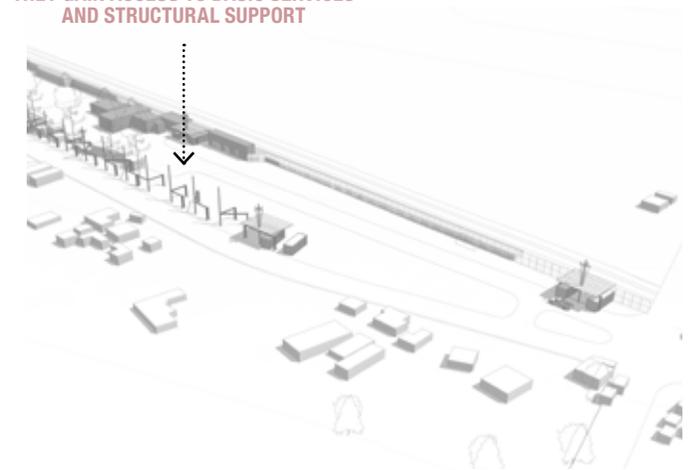
PUBLIC INFRASTRUCTURE UNIT ATTRACTS USE AND BEGINS PROCESS OF ENGAGEMENT



MOVEMENT B



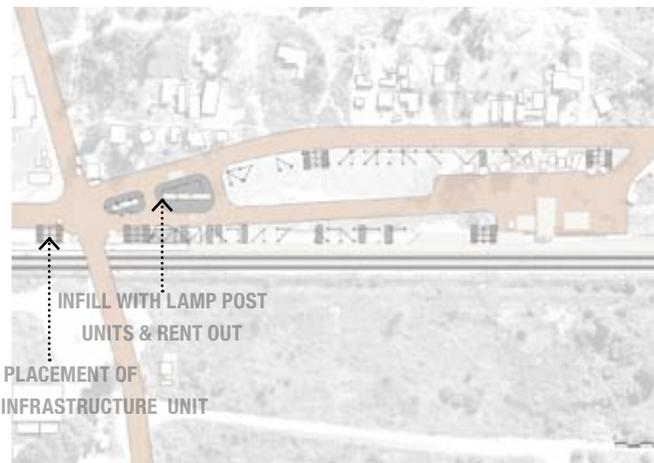
LOCAL RETAILERS ENGAGE WITH MUNICIPAL OFFICIALS TO RENT UNITS. THEY GAIN ACCESS TO BASIC SERVICES AND STRUCTURAL SUPPORT



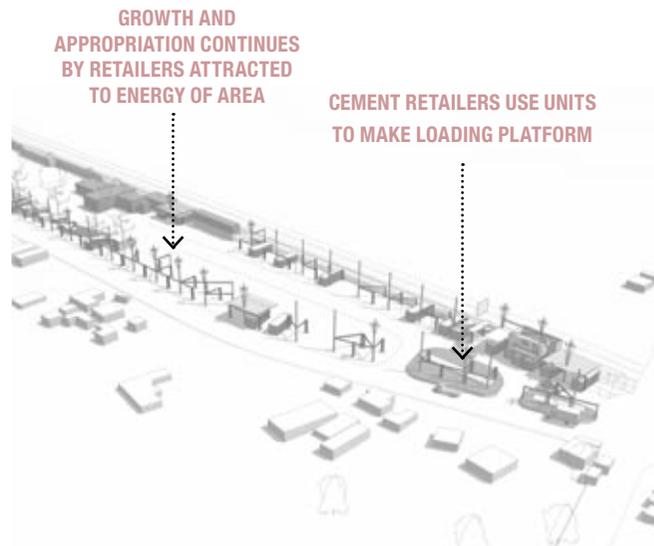
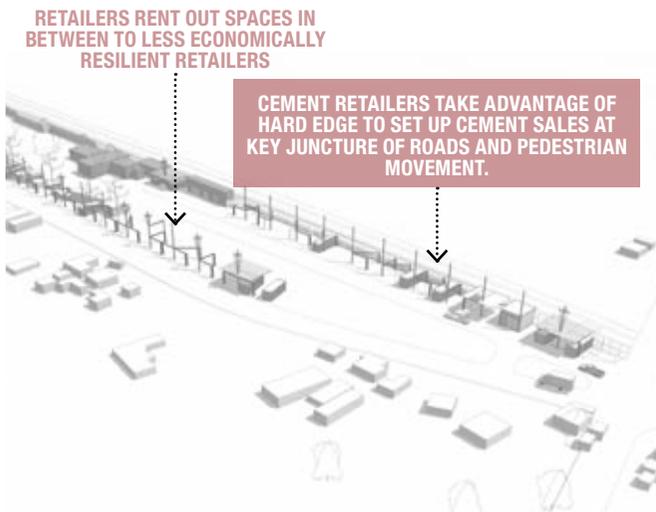
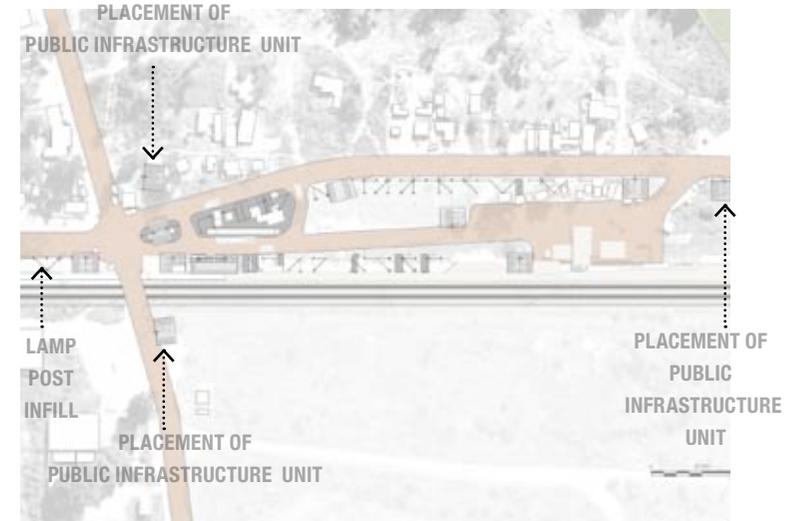
MOVEMENT C



MOVEMENT D



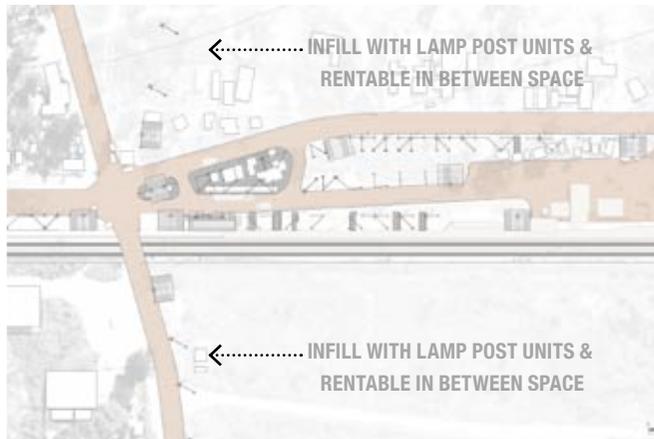
MOVEMENT E



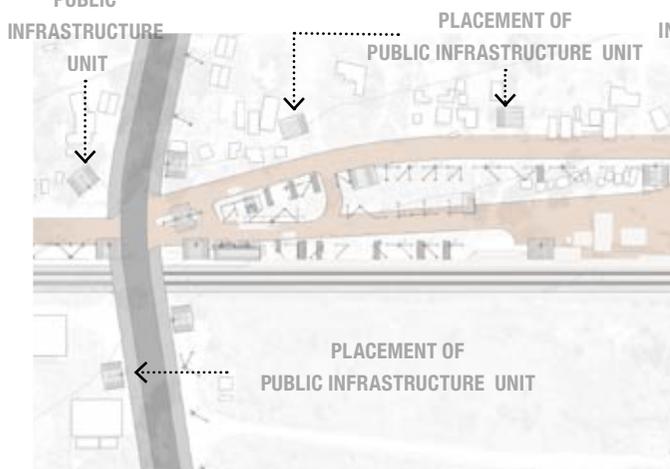
Illus: 145 Speculation of Pienaarspoort growth - incremental phases (Author, 2011)

7.5 MAJOR DEVELOPMENT PHASES

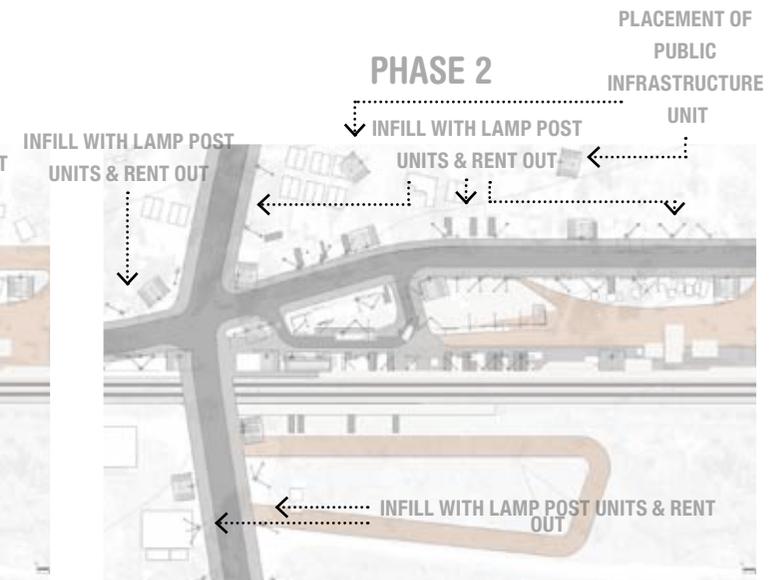
MOVEMENT F



PHASE 1



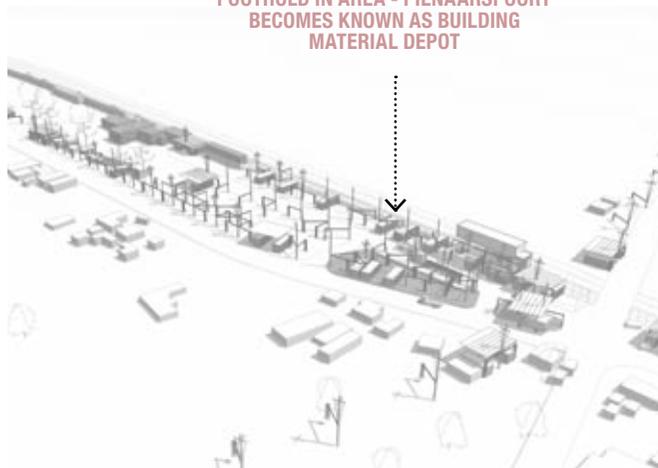
PHASE 2



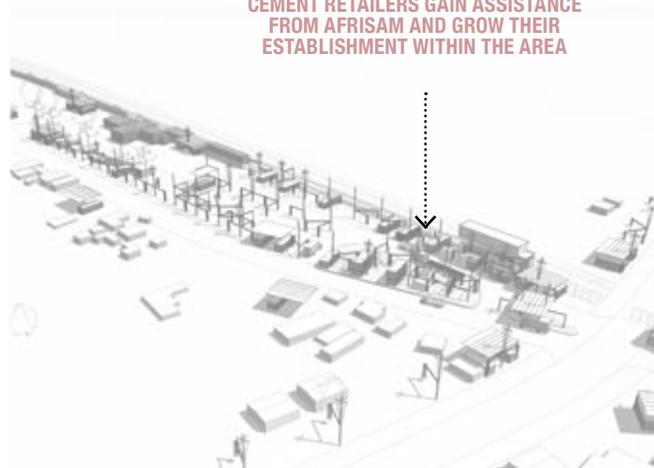
LOOSE RETAIL ELEMENTS ARE INTERMIXED WITH CEMENT RETAIL

DE-CENTRALISED CEMENT DEPOT IS MAJOR ELEMENT IN PIENAARSPOORT

CEMENT RETAILERS ESTABLISH Foothold in AREA - PIENAARSPOORT BECOMES KNOWN AS BUILDING MATERIAL DEPOT



CEMENT RETAILERS GAIN ASSISTANCE FROM AFRISAM AND GROW THEIR ESTABLISHMENT WITHIN THE AREA



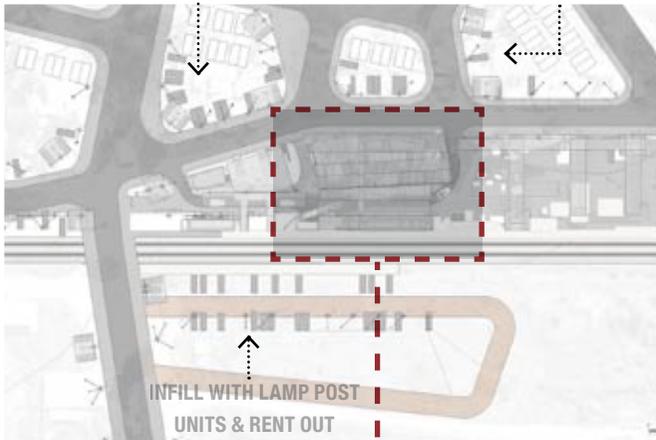
CEMENT RETAILERS MOVE INTO NEW AREA, SELLING THEIR OLD SITE TO OTHER RETAILERS, THEY SEEK HELP TO EXPAND THEIR BUSINESS, GAIN AN IDENTITY AND BECOME MORE THAN JUST SIDEWALK SALESMAN



PLACEMENT OF
PUBLIC
INFRASTRUCTURE
UNIT

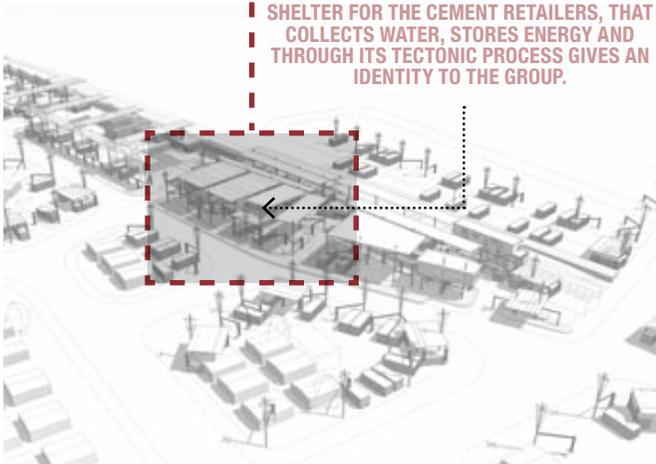
PHASE 3

INFILL WITH
LAMP POST
UNITS &
RENT OUT



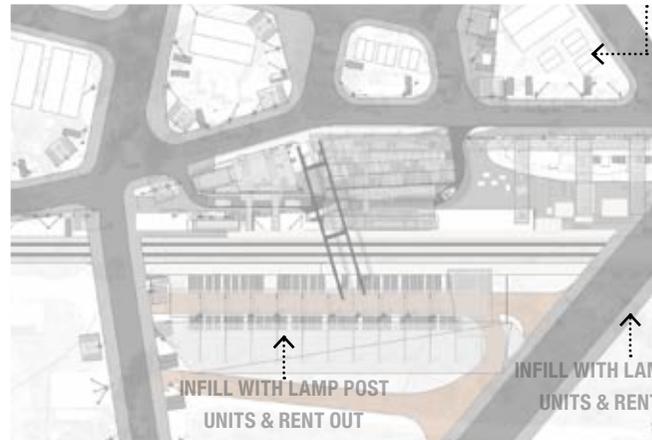
CEMENT DEPOT HAS PUSHED OTHER RETAIL TO UPGRADE - PIENAARSPORT IS NOW A MAJOR RETAIL CENTRE FOR ALL GOODS

AN INTERVENTION IS PROPOSED TO PROVIDE SHELTER FOR THE CEMENT RETAILERS, THAT COLLECTS WATER, STORES ENERGY AND THROUGH ITS TECTONIC PROCESS GIVES AN IDENTITY TO THE GROUP.



PHASE 4

INFILL WITH LAMP POST
UNITS & RENT OUT

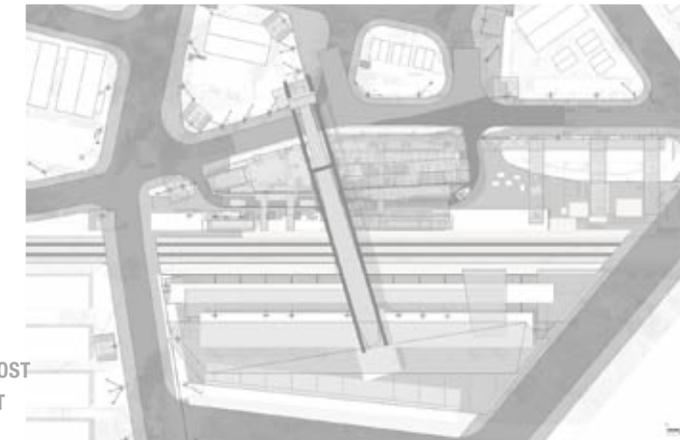


STORAGE OF RETAIL GOODS AND DISTRIBUTION INTERMIXED WITH RETAIL TAKES OVER

YEARS LATER, THE CEMENT GROUP TAKE OWNERSHIP OF THE PRECINCT AND SET UP A DEVELOPMENT AGENCY THAT REVAMPS THE 'OLD CONTAINER' STORE YARD TO THE NEW PIENAARSPORT STATION



PHASE 5



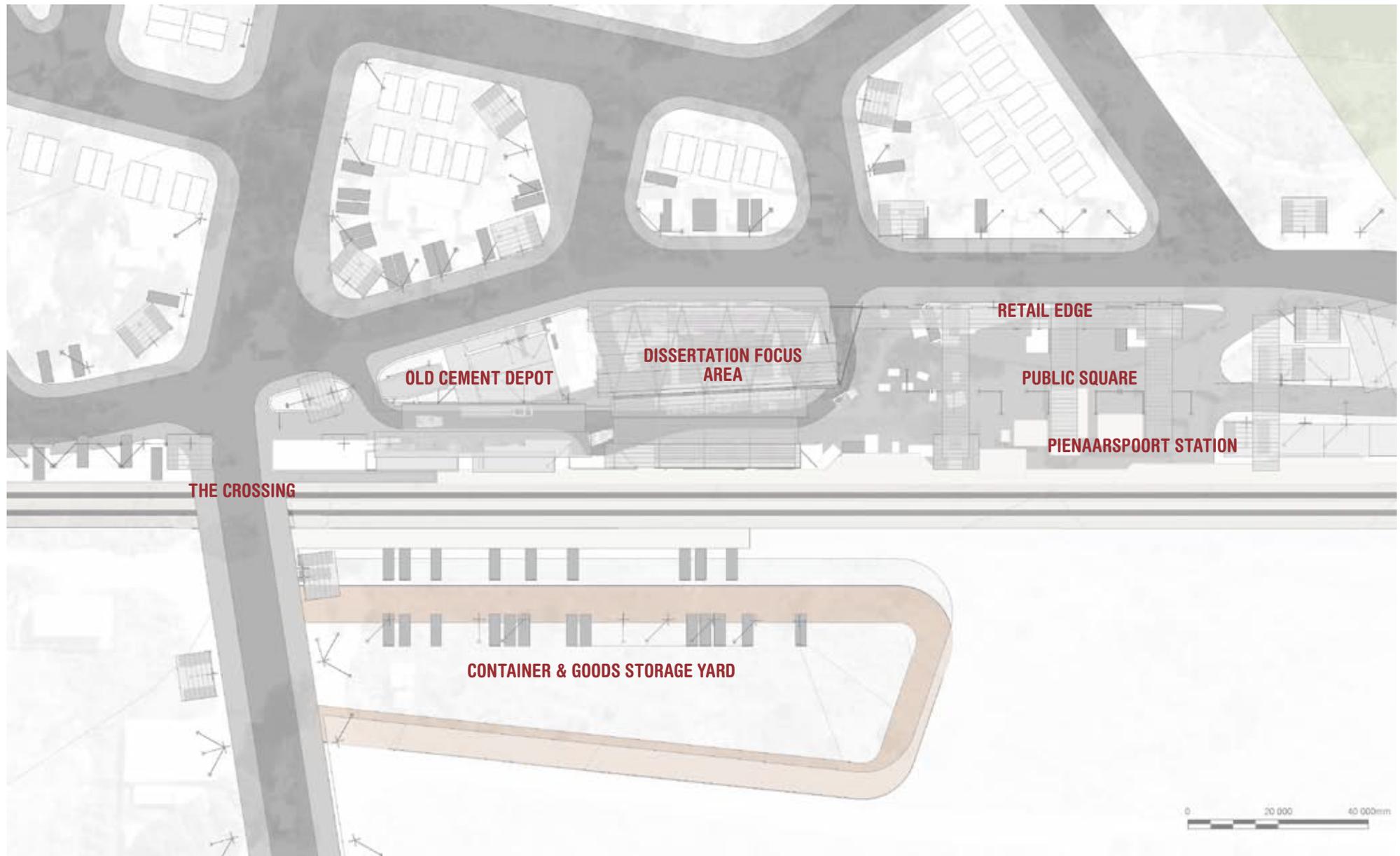
STORAGE MOVES AWAY, LAYING FOUNDATION STRUCTURE FOR FUTURE TRAIN STATION AND TRANSPORT NODE.

THEY CONVERT THE 'OLD' CONTAINER GANTRY INTO A PEDESTRIAN BRIDGE PROVIDING A FOCAL POINT OF IDENTITY THAT PIENAARSPORT IS SYMBOL OF INCREMENTAL GROWTH BY THE PEOPLE FOR THE PEOPLE

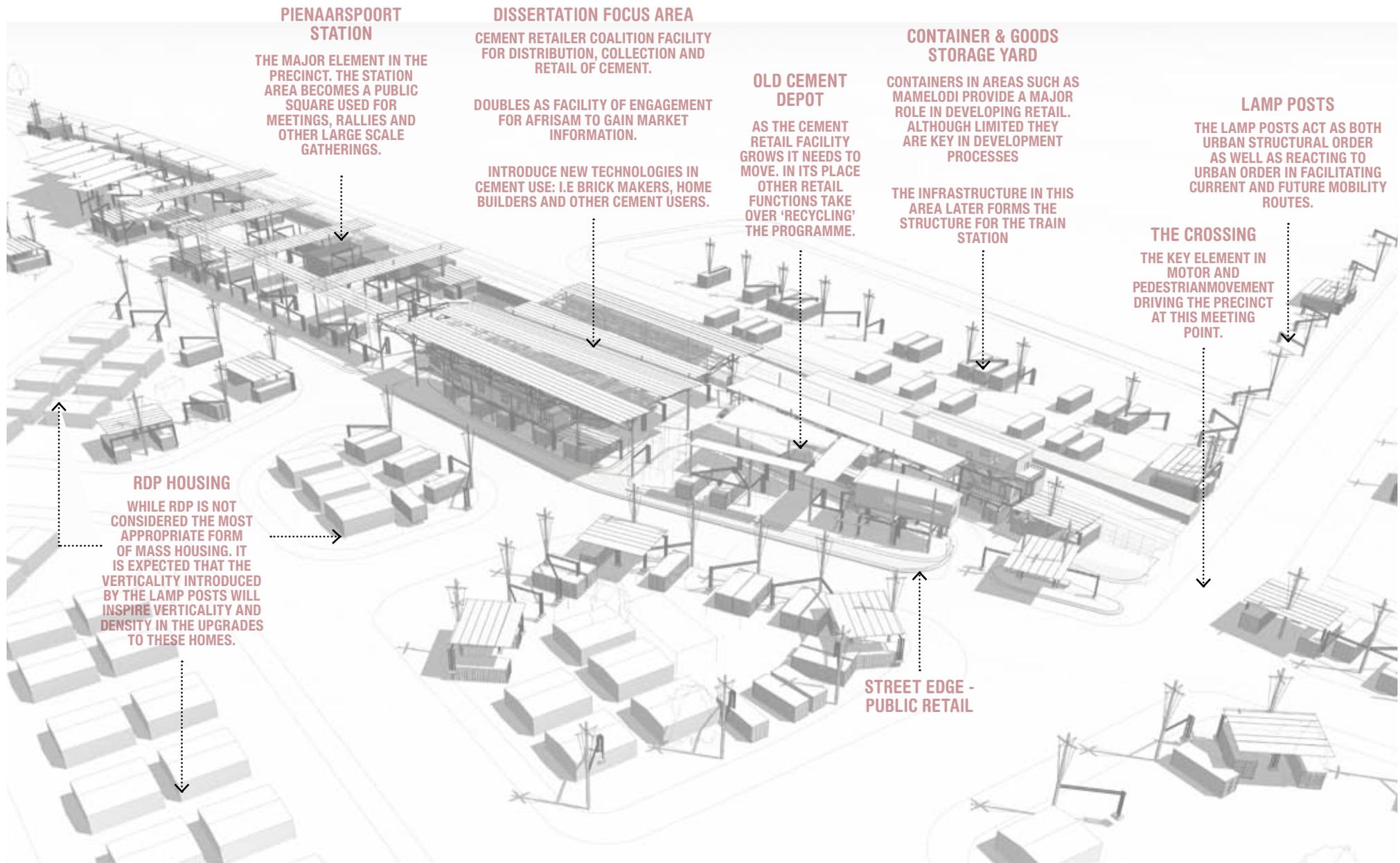


Illus: 146 Speculation of Piensaarspoort Growth - Major Phases (Author, 2011)

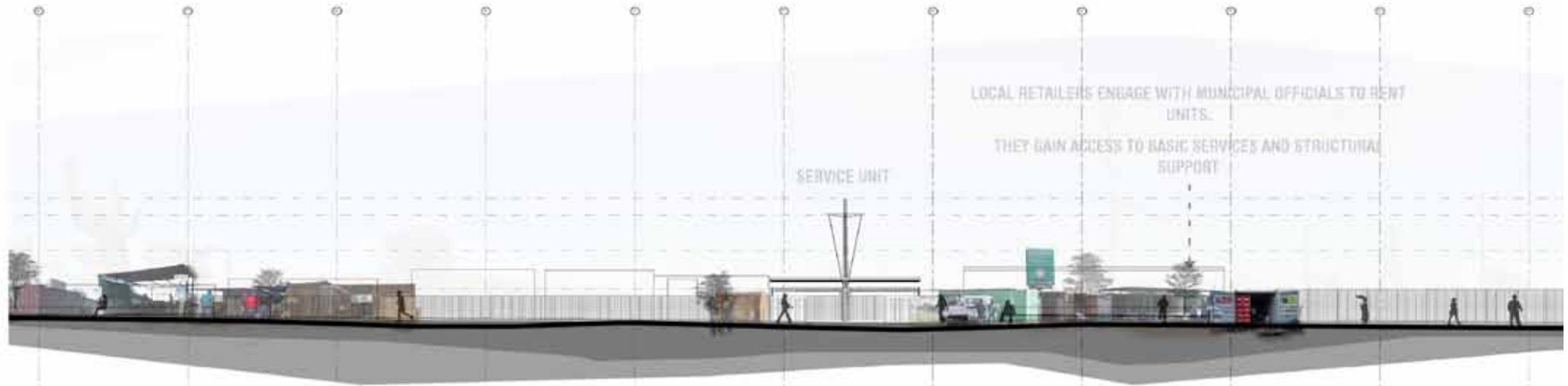
7.6 PHASE 3 - CAPTURED IN A MOMENT



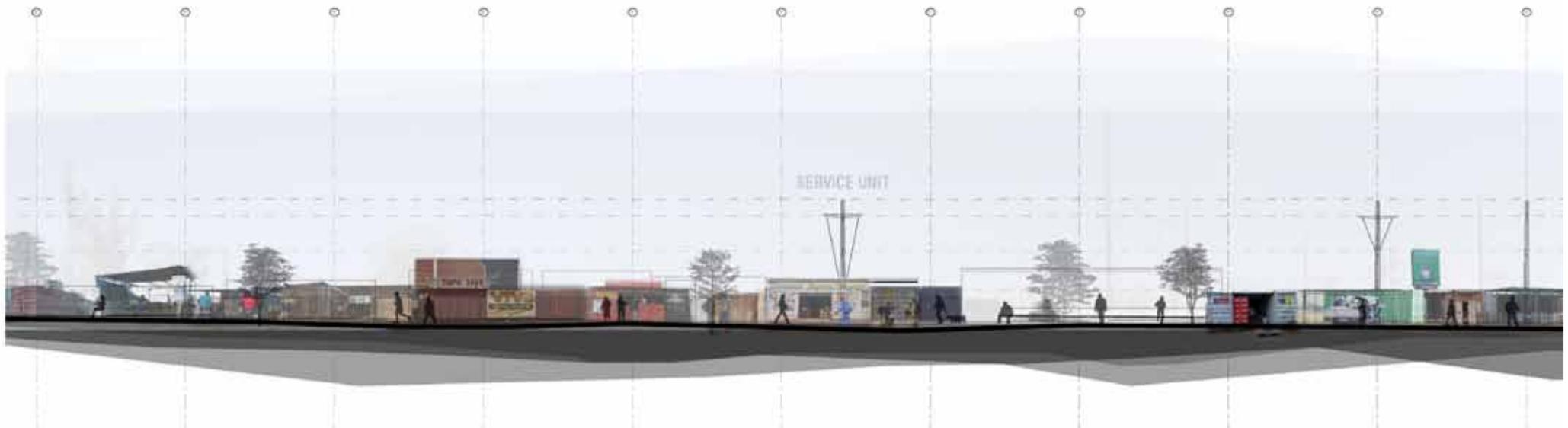
Illus: 147 Phase 3 - plan - captured in a moment (Author, 2011)



Illus: 148 Phase 3 - perspective - captured in a moment (Author, 2011)



PHASE C - SCALE 1:200

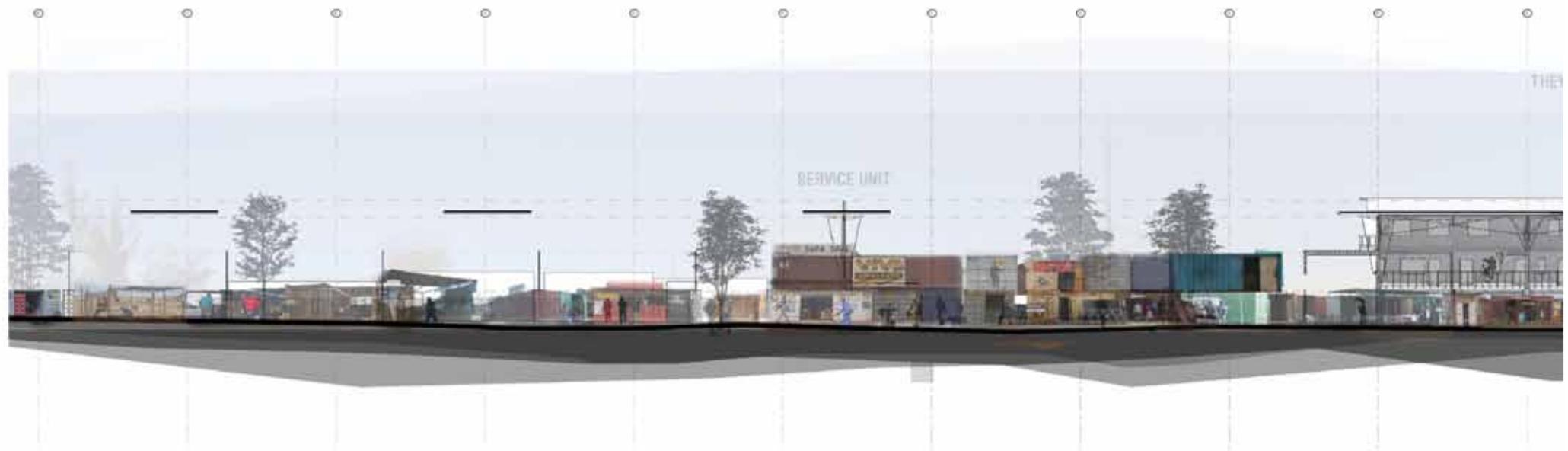




Illus: 149 Phase 2 - Site section - phase A - C (Author, 2011)



PHASE 1 - SCALE 1:200





Illus: 150 Phase 2 - Site section - phase 1 - 5 (Author, 2011)





Illus: 151 Phase 2 - site perspective - view from cross roads (Author, 2011)

7.7 THE CEMENT DEPOT

The depot is the head of a much larger more de-centralised network. From this point the cement is brought in, stored, sold and distributed.

While the main driver of the form was movement of goods, either by fork lift (mechanical, or manual) wheel barrows or hand moving. (see Illus: 152)

The design of the loading platform is the key in arranging this space to work as a distribution and loading point. (see Illus: 153)

The facility also has an administrative and educational and administrative role. For this there is a multilevel floor plan to make space away from the busy ground floor activities, for meetings, offices, administration, lectures and possible retail to other smaller businesses. (see Illus: 154) & (see Illus: 155)

SPATIAL PROGRAMME

The primary component in the planning is the programming of the loading platform. This platform in its use will be the point of interface for the supply, distribution and collection of materials.

The importance of the platform is carried through by becoming the point from which meetings are held and chaired.

Systemically the platform also works as the service core for the facility, housing the pumps, water pipes and various other services that the facility needs. (see Illus: 166 , on page 128) The water faucets are supported and distributed through the platform as well as making the concrete form the key programmatic piece in the forming of the facility.

MATERIALITY

As Afrisam is the agent of control in the facility, the use of pre-cast cementitious products was considered appropriate. As the lamp posts formed the first wave of infrastructure, followed by the roads, the provision of culverts for drainage inspired the use of the same culvert design to be used as the platform base.

The culvert base is then used as the cover element, allowing for ease of access to the maintenance of the service elements below.

CEMENT GOODS



MACHINE LIFTING MOVING FROM TRUCK

HAND MOVEMENT



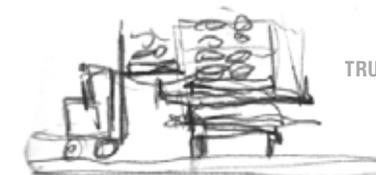
MANUAL FORKLIFT



WHEELBARROW



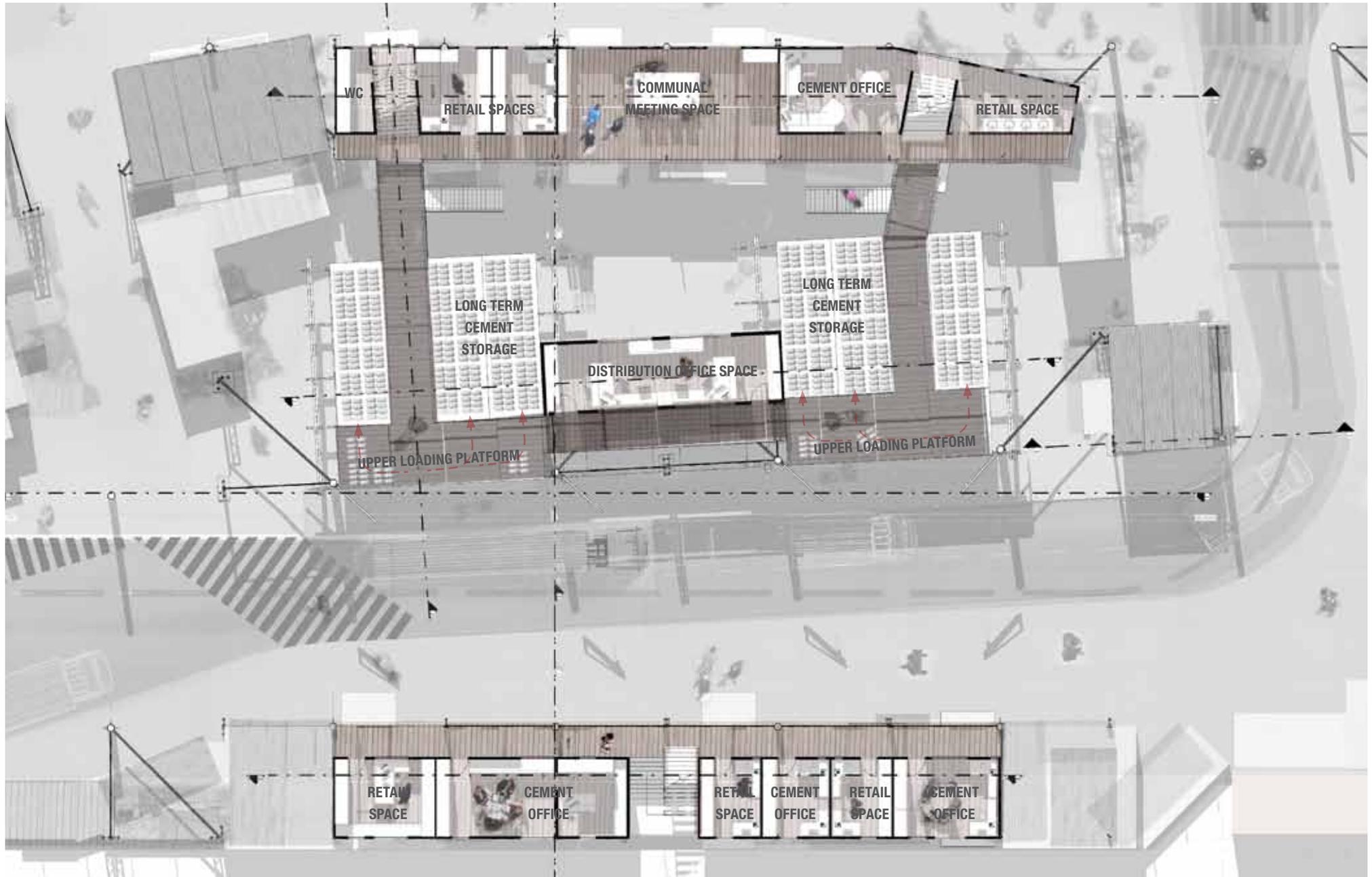
TRUCK FORKLIFT



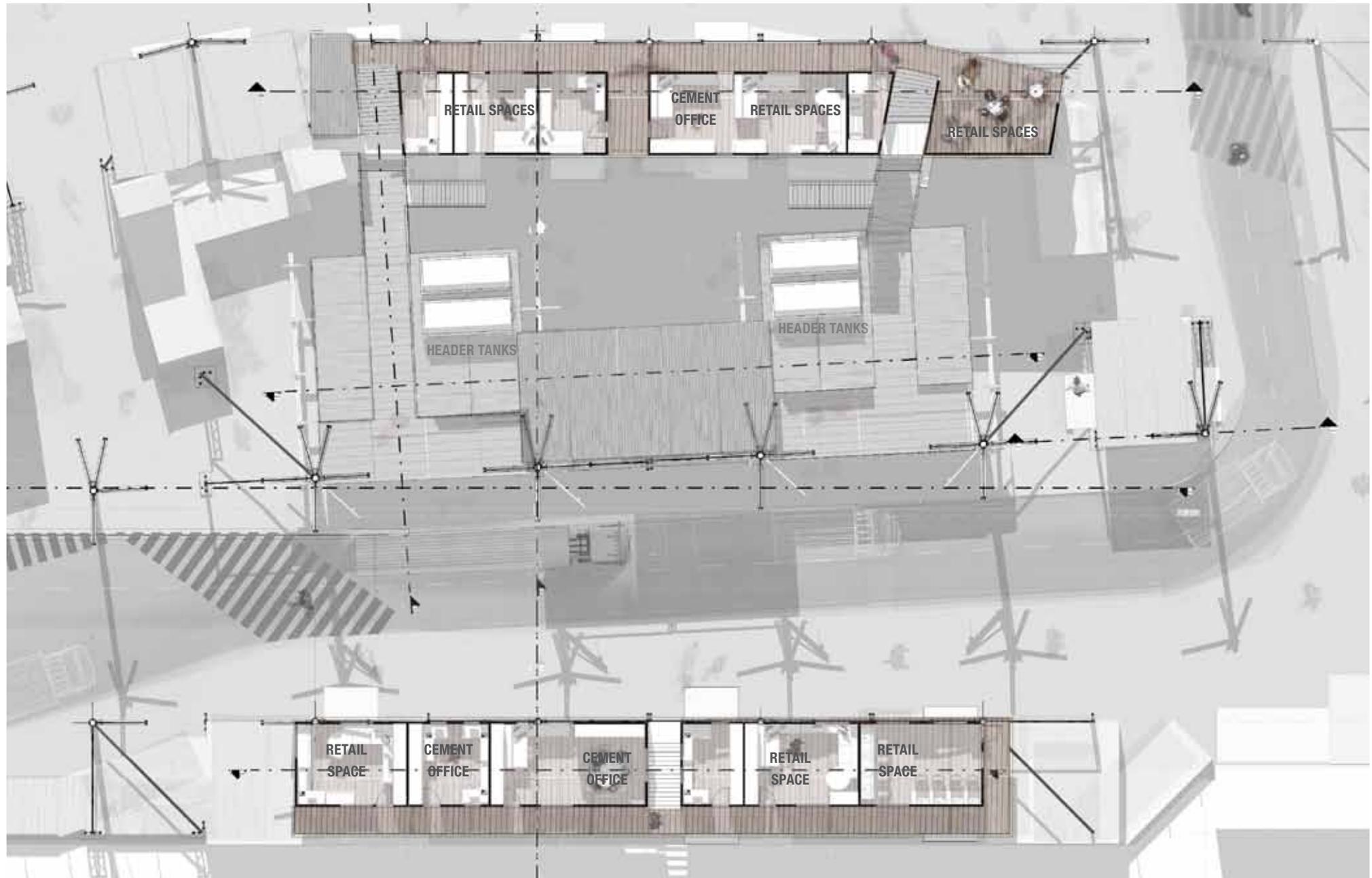
Illus: 152 Design elements in loading platform (Author, 2011)



Illus: 153 The Cement Depot in Phase 3 - Loading Platform Design (Author, 2011)



Illus: 154 The Cement Depot in Phase 3 - Level 1 (Author, 2011)



Illus: 155 The Cement Depot in Phase 3 - Level 2 (Author, 2011)

7.8 PROVIDING SHELTER

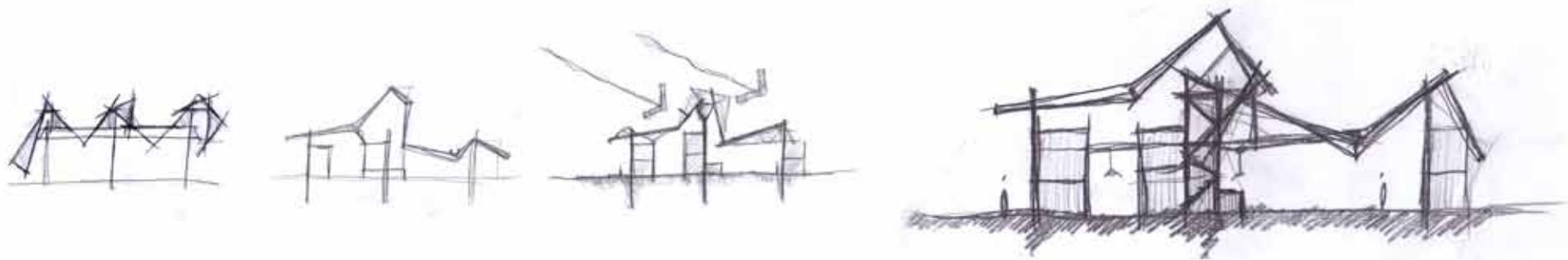
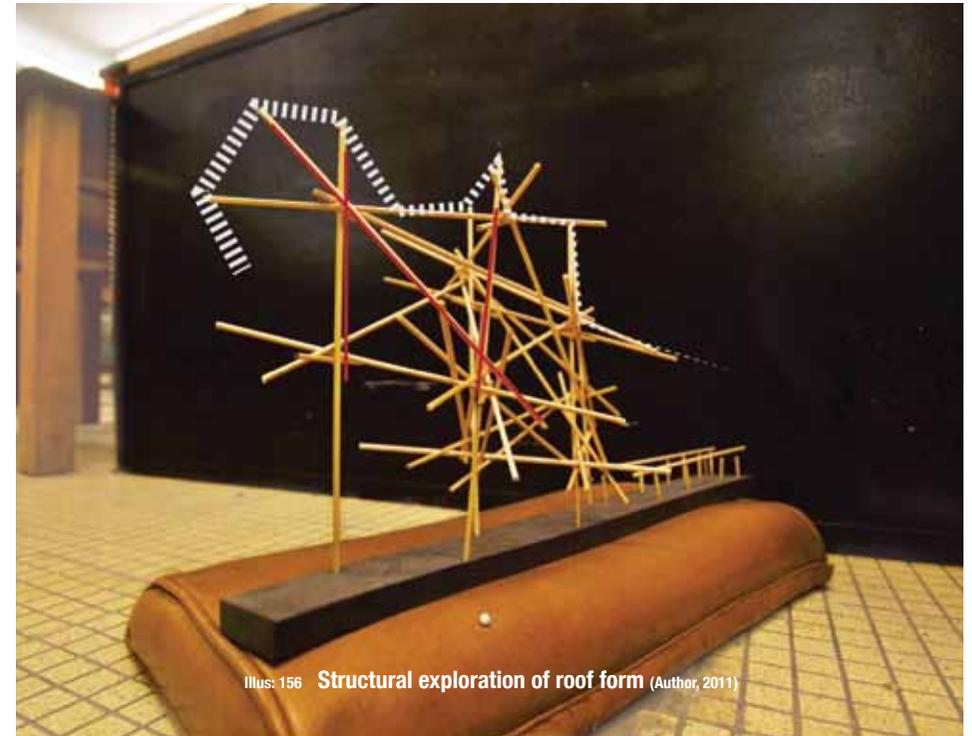
Through the process of designing the unit and its projected patterns of growth it emerged that certain elements in the process could not be facilitated by self-build.

At certain points in the projected growth, when the formation of groups of people performing similar functions reaches a critical point, it becomes necessary to share the collective energy between the available resources.

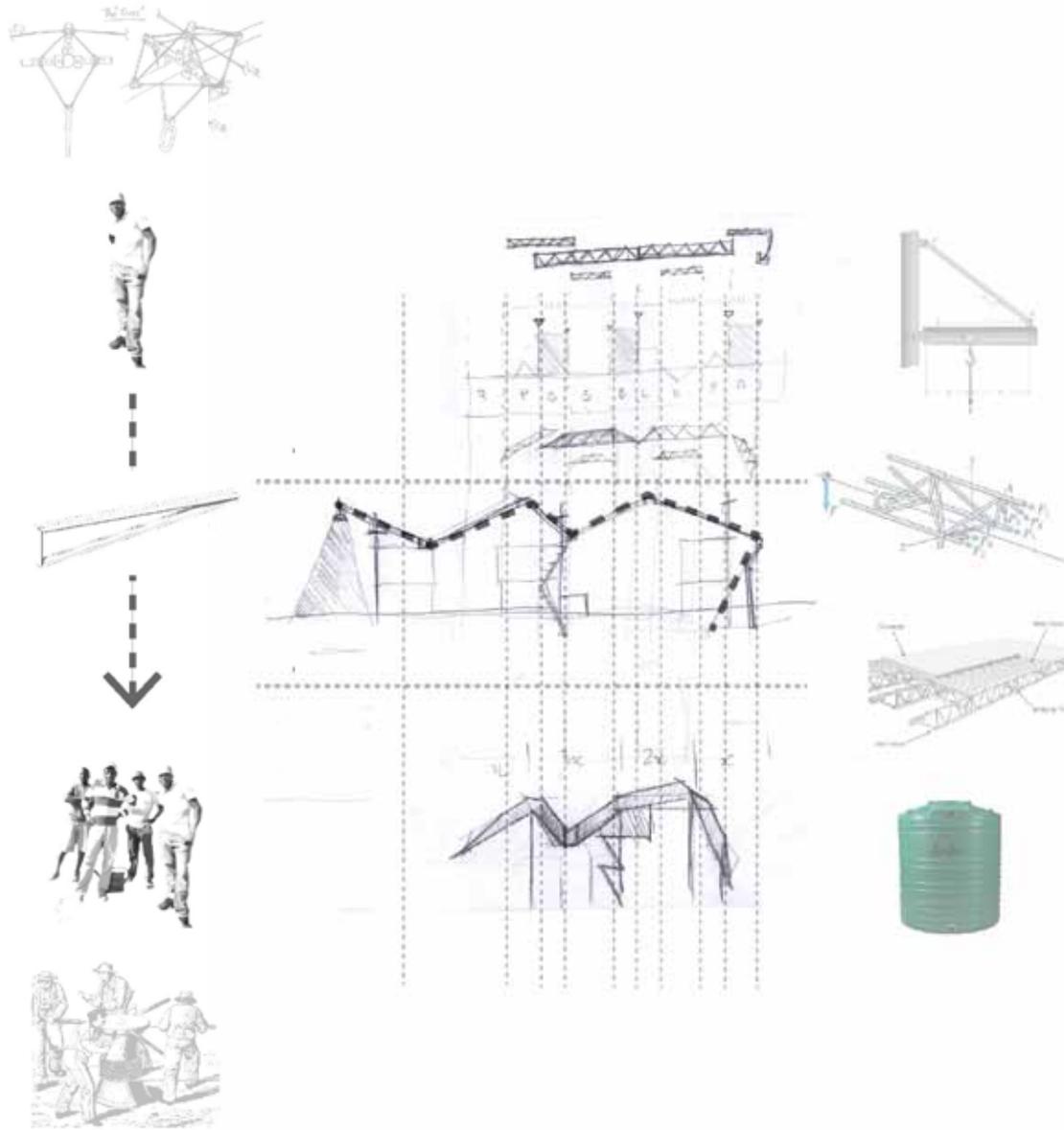
In the form of the cement retailers, the requirements for a facility that enhances their business are simple: a raised point for collection and distribution, a means to move these goods easily, environmentally comfortable administrative spaces and most rudimental a shelter to keep the goods dry.

The roof is simultaneously the strongest element in the identity of the retailers while being the most direct symbol of their need in an architectural form.

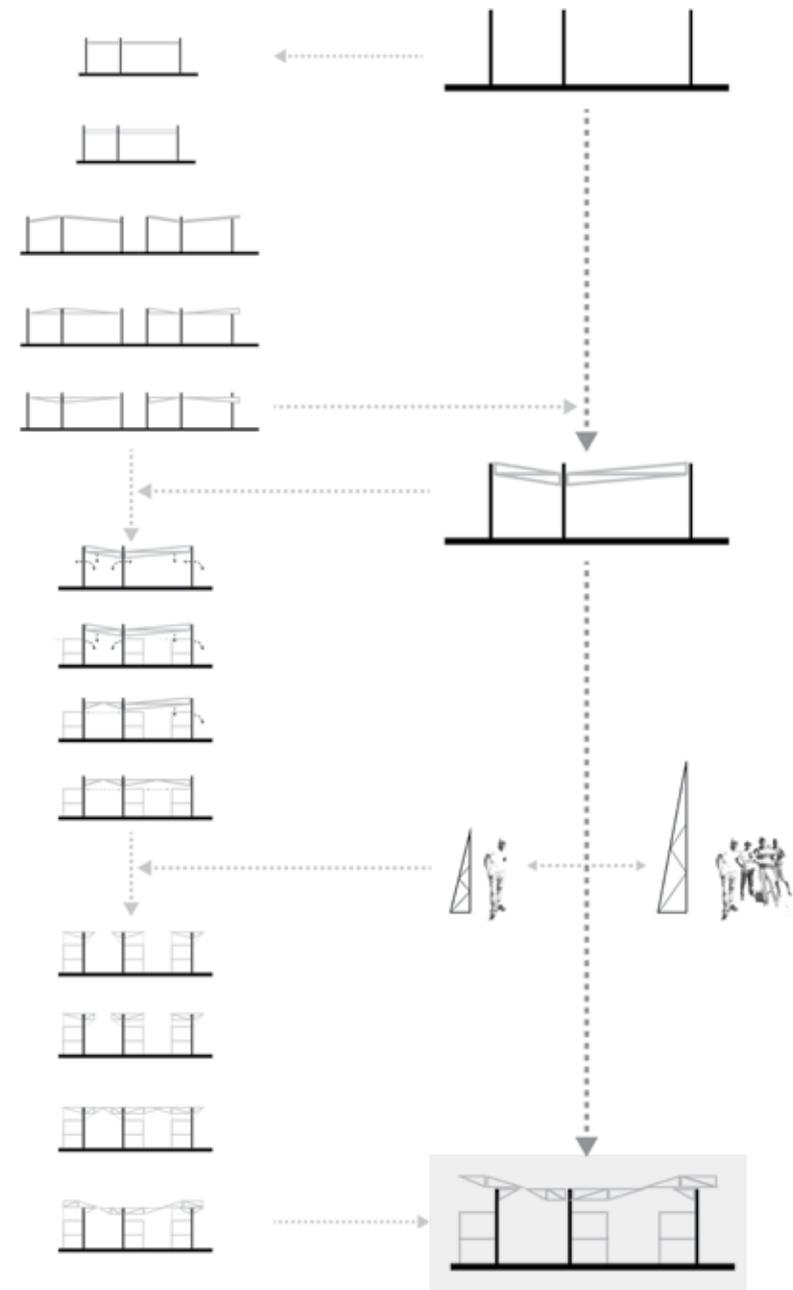
The roof construction, form and concept all lie in the possibilities that a simple unit of growth, in this case a truss member determined by a manageable size for a single or group of men to handle, can be used to span the required length and perform environmentally by collecting water, providing shelter from the sun and ventilating the space below. *(see Illus: 159)*



Illus: 157 Evolution of the roof form based on shelter requirements below and resource harvesting above (Author, 2011)



Illus: 158 Sketched process of roof form based on structural, process and resource requirements (Author, 2011)



Illus: 159 Rationalization of roof form (Author, 2011)





THE SYSTEM ALLOWS FOR:

- INCERASES DENSITY THROUGH VERTICALITY.
- SUSTAINABLE SOLUTIONS THROUGH COLLECTIVE ENERGIES & SHARED RESOURCES.
- A LARGE SCALE DEVELOPMENTAL STRATEGY THAT WORKS THROUGH BOTTOM UP SYSTEM OF CONTROL AND OWNERSHIP
- A MUTUALLY BENEFICAL BUILDING SYSTEM THAT RELIEVES MUNICIPAL BODIES OF ADMINISTRITRIVE RESOURCES

Illus: 160 Proposal for Cement Facility, Using the roof to define the spatial quality (Author, 2011)

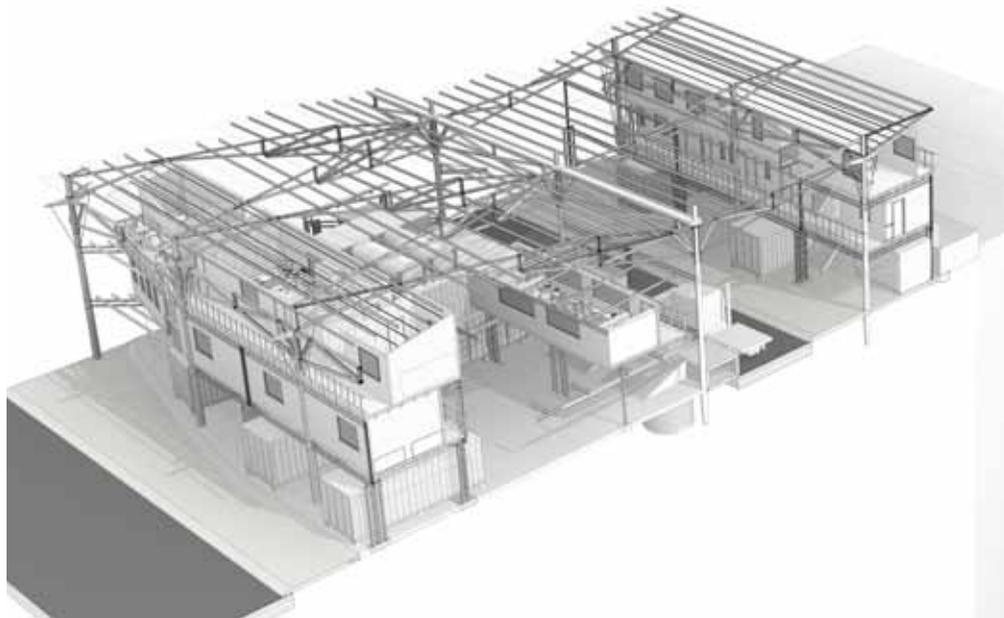
7.9 RATIONALIZING THE ROOF

The construction of the roof is to be made by a small team of builders using the units along with scaffolding and truss ties to incrementally assemble the roof. Using temporary supports to stay members, while further members are added to hold the structure in place. (see Illus: 159)

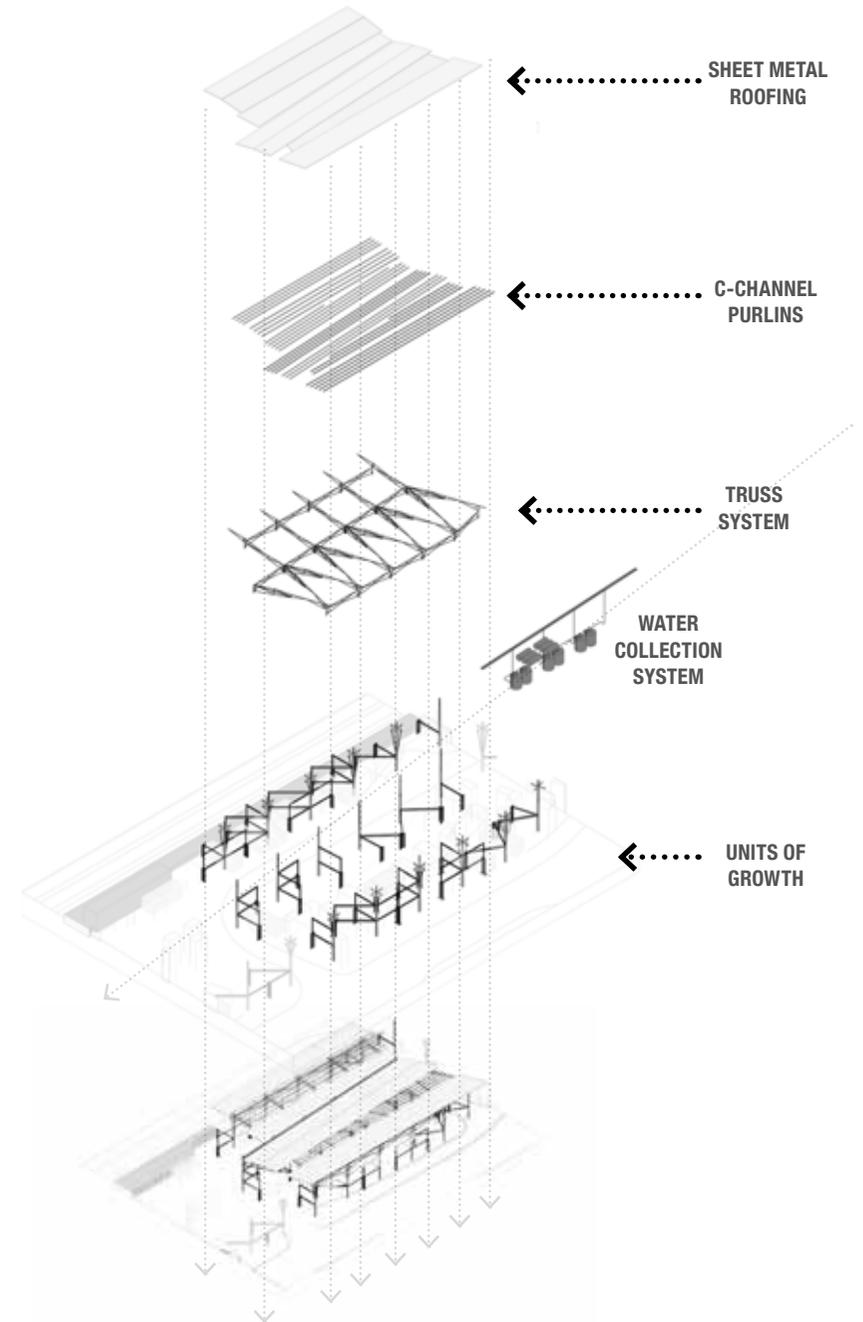
The roof system is intended to symbolize the power in the synergetic assemblage of the similar parts to create a coherent yet elegant element,

The shape of the roof allows for the collection of rain water, while transparent panels of clear pvc allow light into deeper areas.

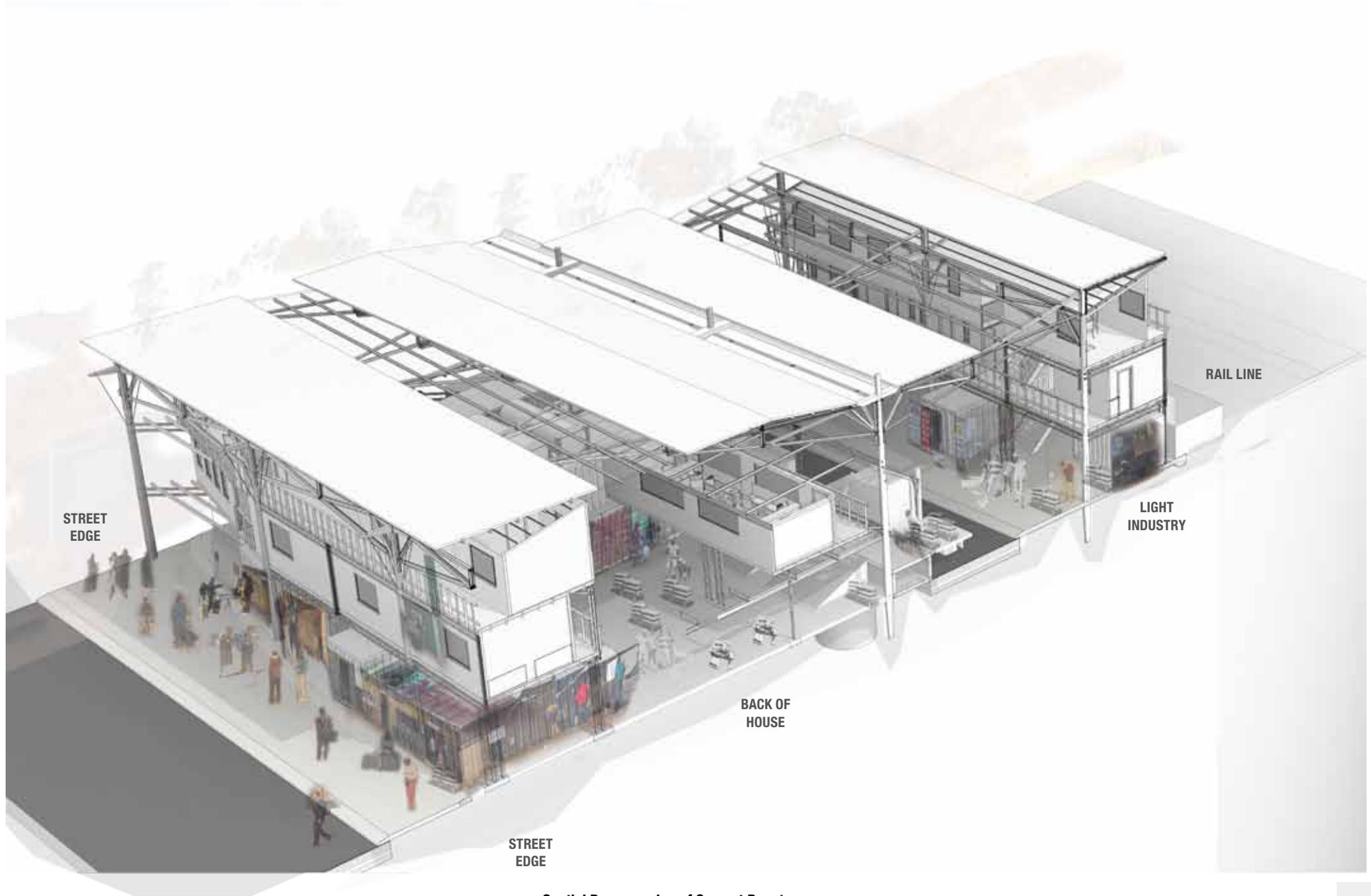
The roof spatially frames the space while giving the cement retailers a facility that embodies their activities and process in the parameters of temporality and flexibility around mobility routes.



Illus: 161 The Cement Depot - structural breakdown (Author, 2011)



Illus: 162 Axonometric explanation of Roof Structure (Author, 2011)



Illus: 163 **Spatial Programming of Cement Depot** (Author, 2011)

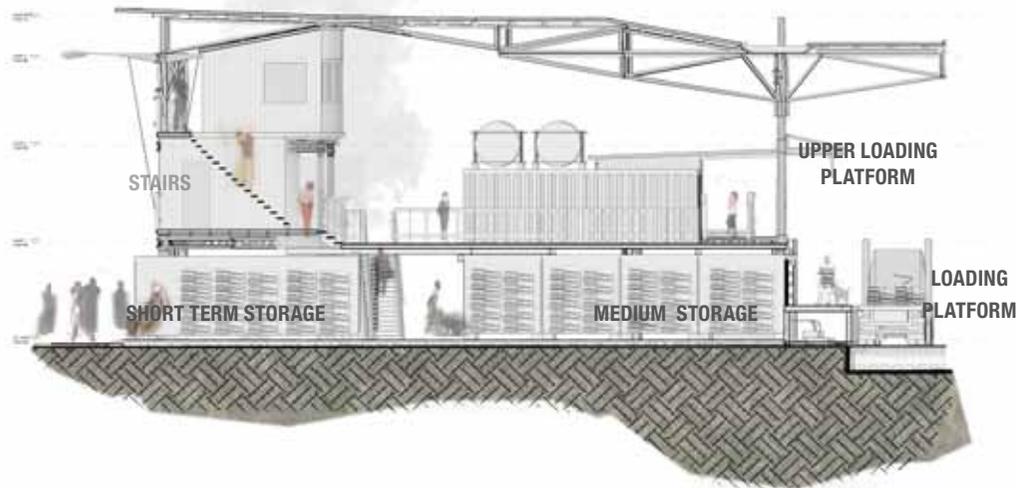
7.10 DISTRIBUTION OF CEMENT

The construction of the roof is to be made by a small team of builders using the units along with scaffolding and truss ties to incrementally assemble the roof. Using temporary supports to stay members, while further members are added to hold the structure in place. (see Illus: 159)

The roof system is intended to symbolize the power in the synergetic assemblage of the similar parts to create a coherent yet elegant element,

The shape of the roof allows for the collection of rain water, while transparent panels of clear pvc allow light into deeper areas.

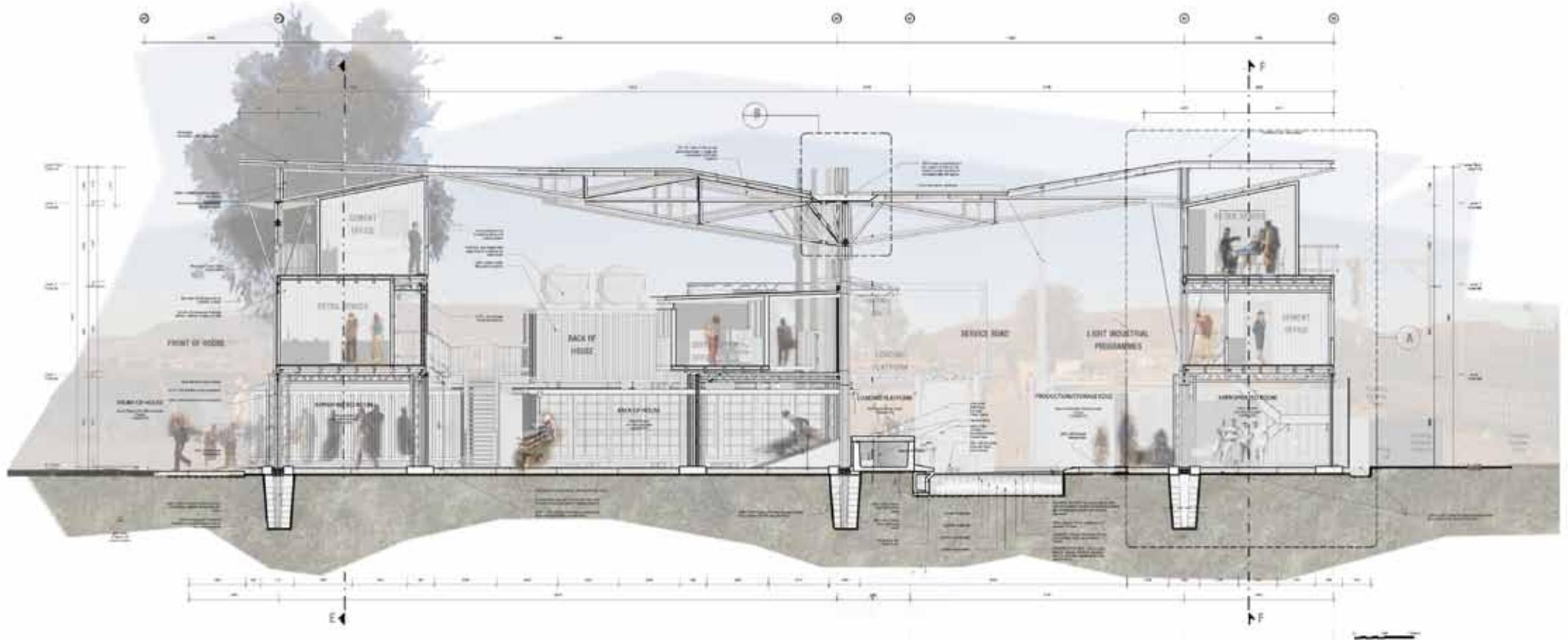
The roof spatially frames the space while giving the cement retailers a facility that embodies their activities and process in the parameters of temporality and flexibility around mobility routes.



Illus: 164 Section CC (Author, 2011)



Illus: 165 Service street perspective looking East (Author, 2011)



Illus: 166 Section AA (Author, 2011)

7.9 RATIONALIZING THE ROOF

The construction of the roof is to be made by a small team of builders using the units along with scaffolding and truss ties to incrementally assemble the roof. Using temporary supports to stay members, while further members are added to hold the structure in place. (see Illus: 159)

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The roof spatially frames the space while giving the cement retailers a facility that embodies their activities and process in the parameters of temporality and flexibility around mobility routes.



Illus: 168 Service street perspective looking West (Author, 2011)



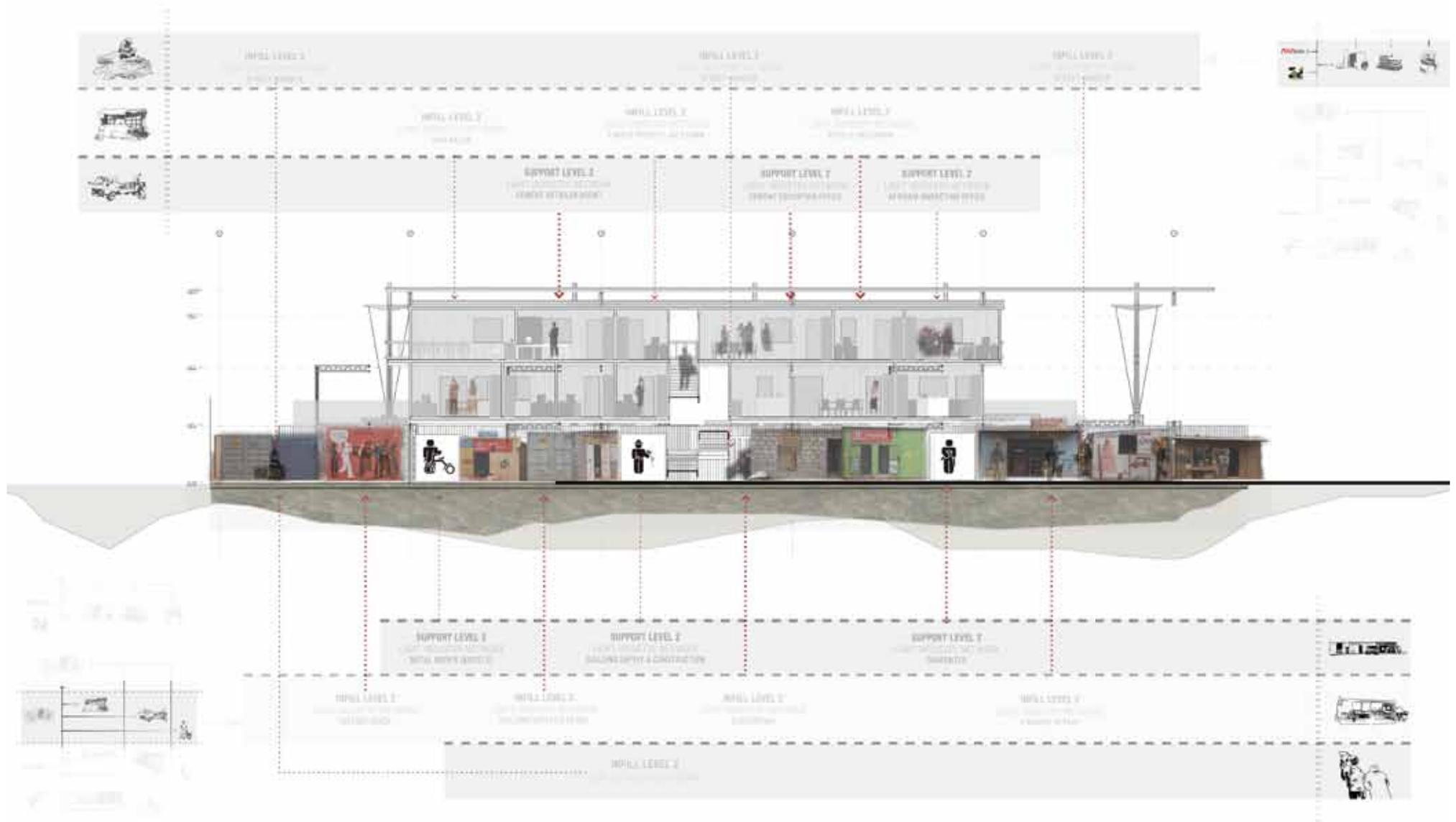
Illus: 167 Section DD (Author, 2011)



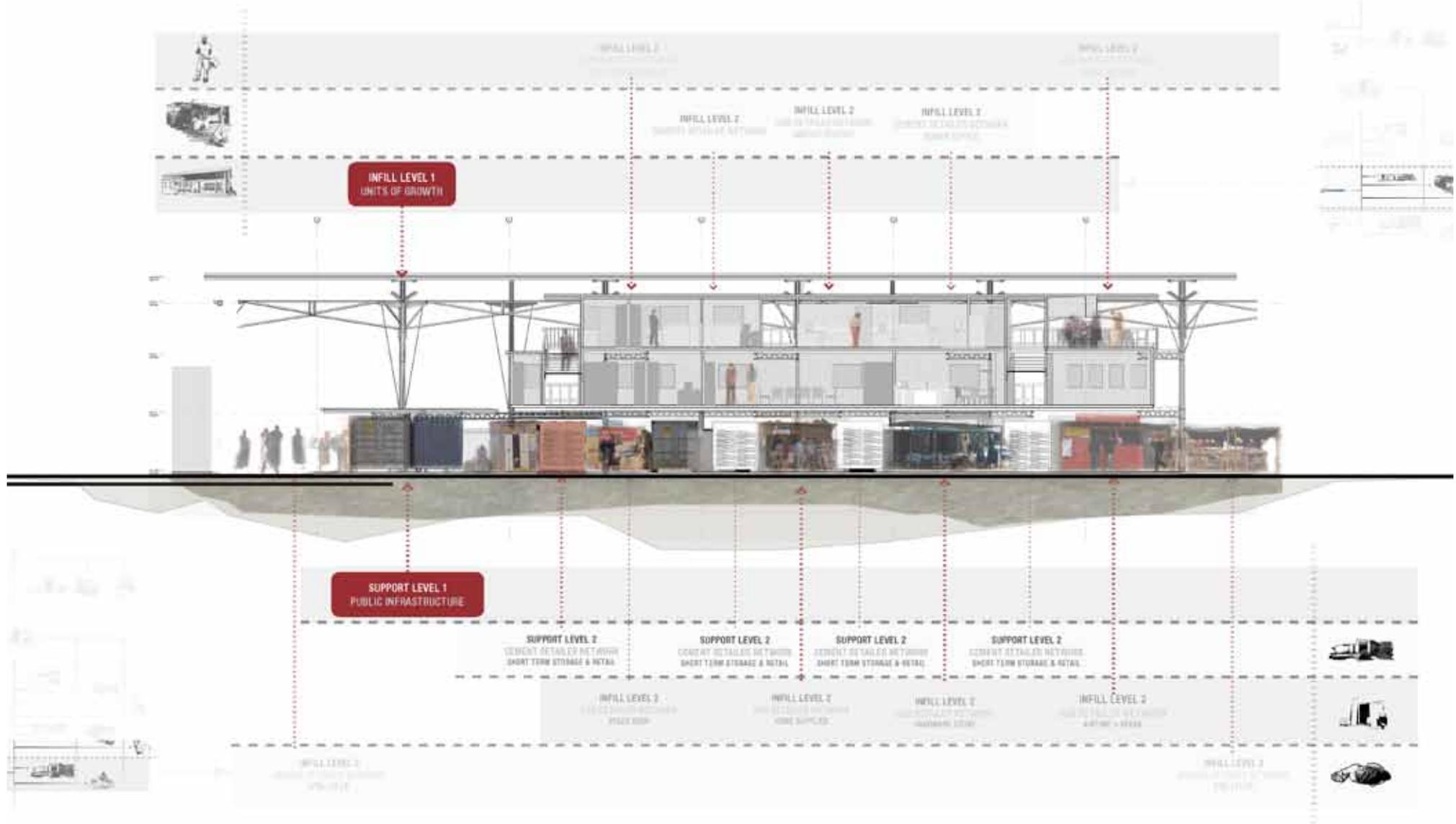
Illus: 169 Back of house perspective (Author, 2011)



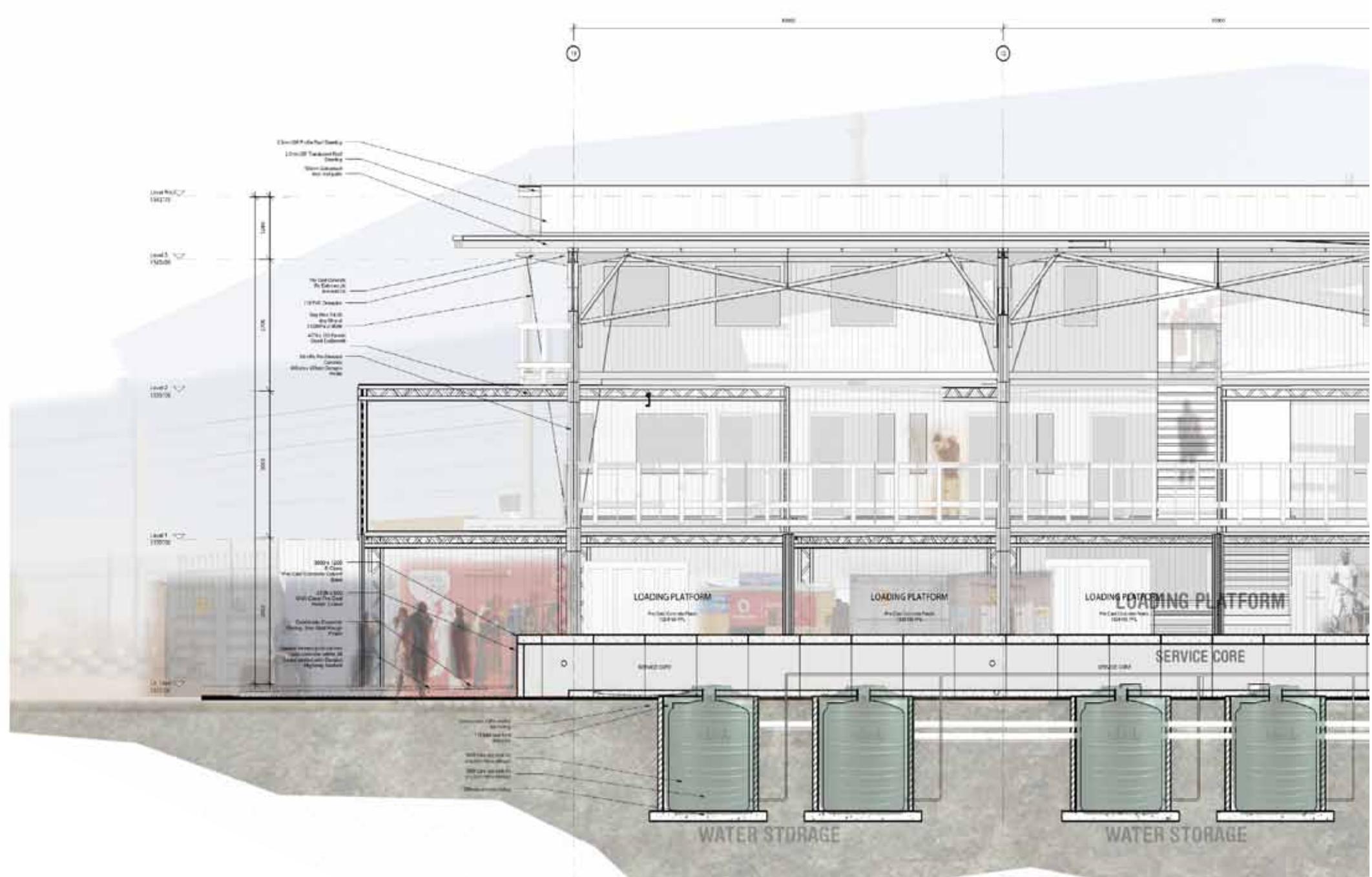
Illus: 170 **Street View** (Author, 2011)



Illus: 171 Section EE (Author, 2011)



Illus: 172 Section FF (Author, 2011)



Illus: 173 Section BB (Author, 2011)



Illus: 174 **Street View 2** (Author, 2011)



Chapter 8 : Technical Report



8.0.1 TECHNICAL RESOLUTION

The ethos of the dissertation's lies in allowing the users of the building to create their own spatial and tectonic appropriate solution to their needs, economic limits and technological capability.

The challenge lies in how much control the designer holds and allows for within the architectural systems applied. This dissertation seeks to achieve that balance through an in-depth process of engagement with the physical and social context.

Chapter 8 explores technical aspects of the proposal at the level from which an architect could enter into the dialogue with the self-build. The tectonics are drawn from the various research exercises and aim to work with the contextual processes.

8.0.2 THE UNIT OF GROWTH

The unit of growth (see Illus: 120 , on page 90) is designed to be a flexible and adaptable piece of urban Infra-Tecture. The manufacturing and construction details are explained in further detail.

8.0.3 THE UNIT MANIFESTED IN CONTEXT

A building system is detailed, chosen for its contextual appropriate tectonic while demonstrating a possible alternative system. (see Illus: 125 , on page 94)

8.0.4 THE ELEMENT OF UNIFICATION - THE ROOF

The roof becomes the strongest architectural symbol and is designed to be built within the ethos of the self-build processes. (see Illus: 158 , on page 122)



Illus: 176 Unit of Growth technical resolution - Site Plan (Author, 2011)

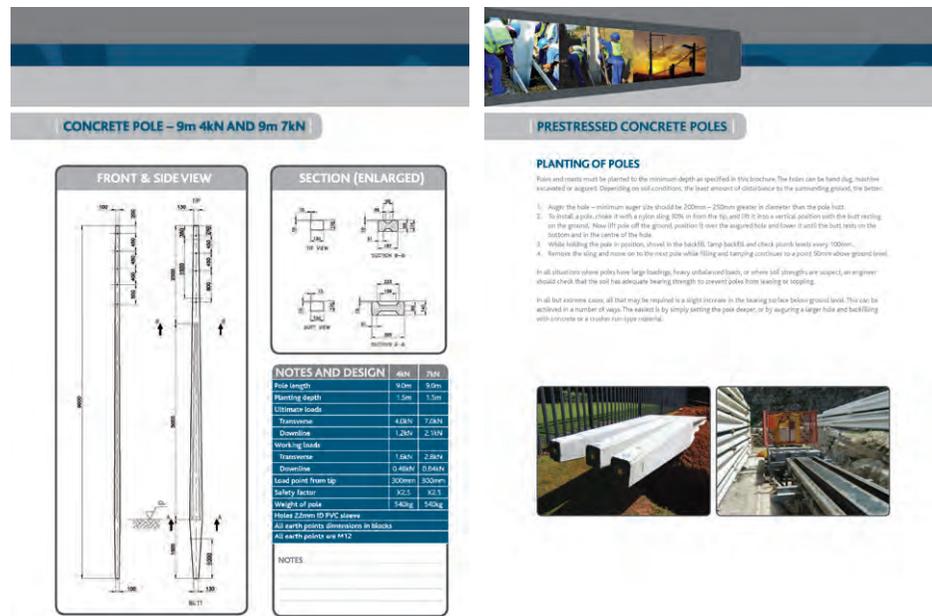
8.1 THE UNIT OF GROWTH

The unit is intended to provide structural and service support for the retailer network of street vendors while using the infrastructural energy and materials of the typical lamppost. (see Illus: 123, on page 92)

Infraset is one of the largest pre-cast concrete manufactures in the South Africa (Infraset, 2011: 45) and have several products in their various production facilities that were used in the design. Most importantly the pre-cast concrete lamp post provided the basis from which to design the unit of growth based on the durability in application, transport and maintenance.

In order to allow the unit to perform its additional social role, (see Illus: 127, on page 96) in addition to lighting, the design was modified with the input of Infraset's production engineer and constrained by manufacturing and transport factors.

The unit is designed to use current structural and service technologies while allowing for the incorporation of possible future technologies.



Illus: 177 Infraset product brochure - pre-cast concrete lamp post (Infraset, 2011)

THE ECOBEAM

EcoBeam, a composite open web joist made from timber chord and mild steel webbing are one of the most efficient span to weight ratio structural member available today. (see Illus: 185-D) Used contemporarily in Mopethi Morajala's 10 x 10 housing in the Western Cape, the Ecobeam has a contextual background in developing areas.

The major benefits of Ecobeams:

- Can be manufactured at any location with minimum facilities.
- Adjustments to Ecobeam lengths are easily made.
- Ecobeams are easy to handle and economical to transport.
- All Ecobeams are straight and uniform in size, despite variations in timber size, because they are manufactured on a straight edge jig.
- Easy joining makes it possible to produce any length.
- The use of Ecobeams typically saves two thirds of the timber used in a classic timber frame construction.
- (www.eco-technologies.co.za, 2011)

The size of the Ecobeams was determined by the weight that the unit and a single retailer can lift

POLAR VOLTAIC

The Solar Light Energy Fund has provided solar powered lamp posts to developing communities all over the world, and have a large success factor in South Africa.

These same thin film silicon cells provide the most cost effective polar voltaic cells, and have been employed in the units. (see Illus: 185-B)

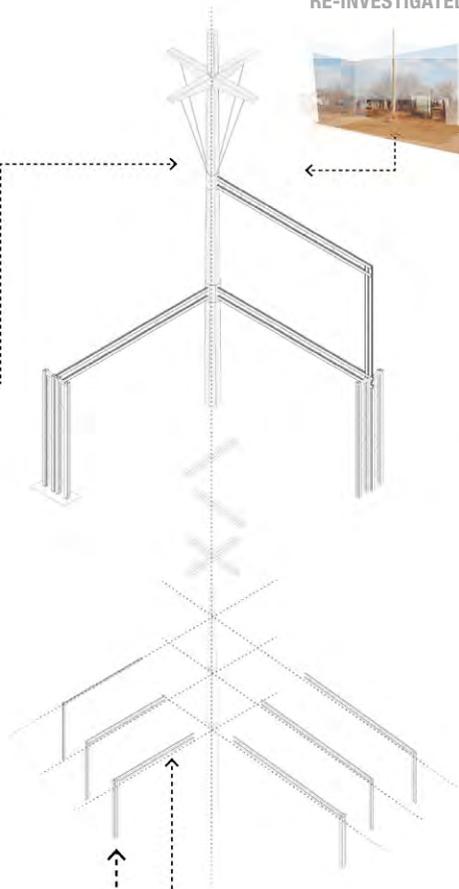
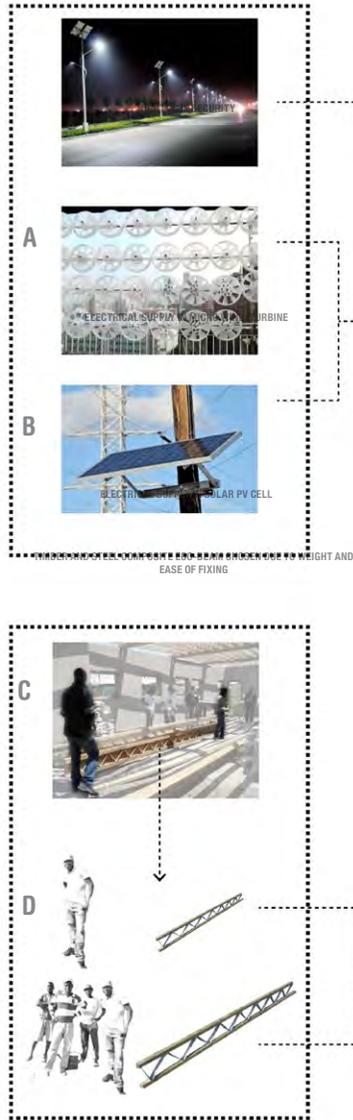
MICROTURBINE

Motorwind is a Port Elizabeth company, which has been pioneering micro-wind turbine technology in South Africa. (see Illus: 185-A)

The microturbines are made from re-cycled plastic and work in parallel series panel that, by being connected in series, work at highly efficient rate in even low wind speed conditions.

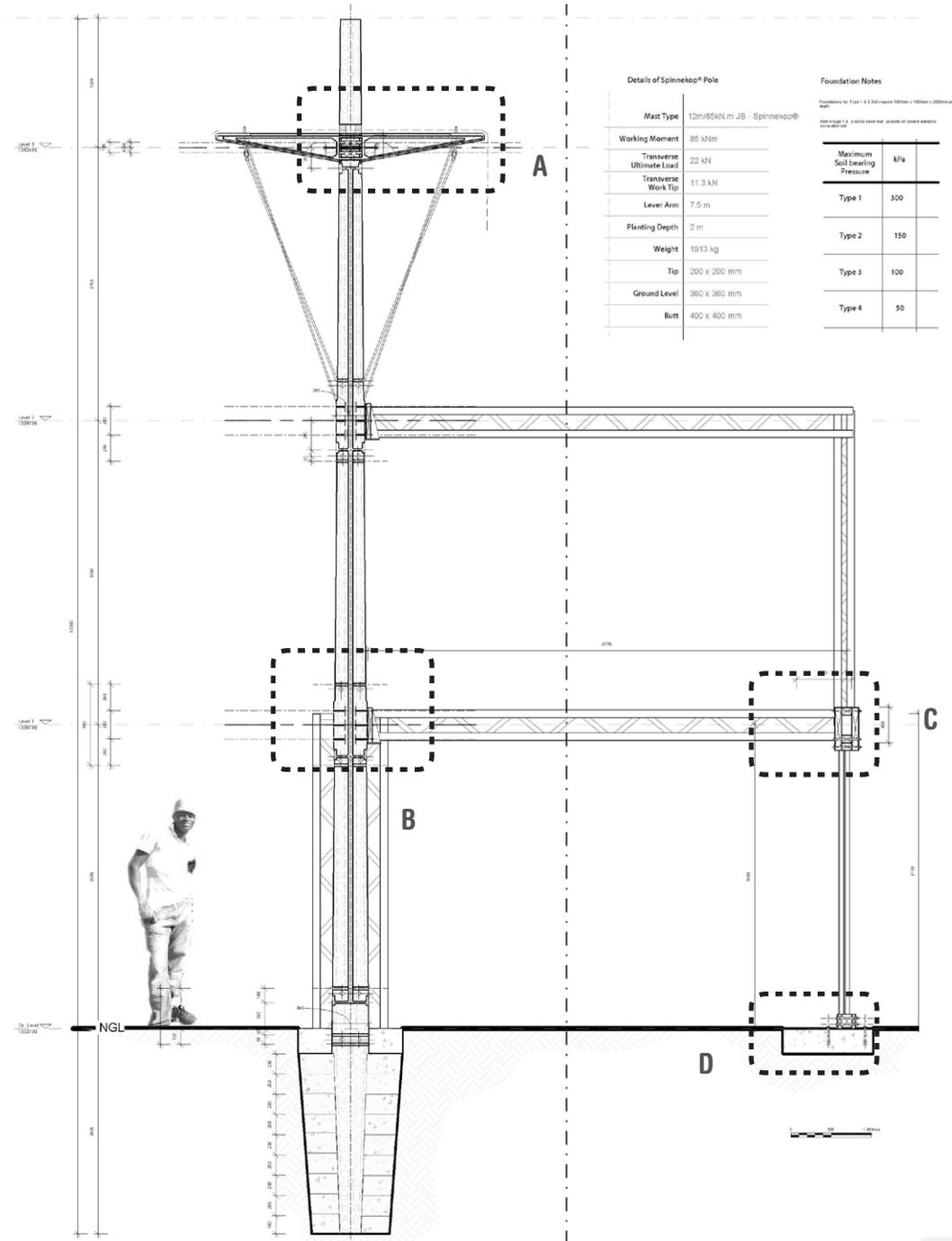
The micro turbine work in extremely low wind speed areas, above 2m/s, where conventional wind turbine's work at wind speeds between 10m/s and 25m/s.

SOCIAL ROLE OF LAMP POST
RE-INVESTIGATED

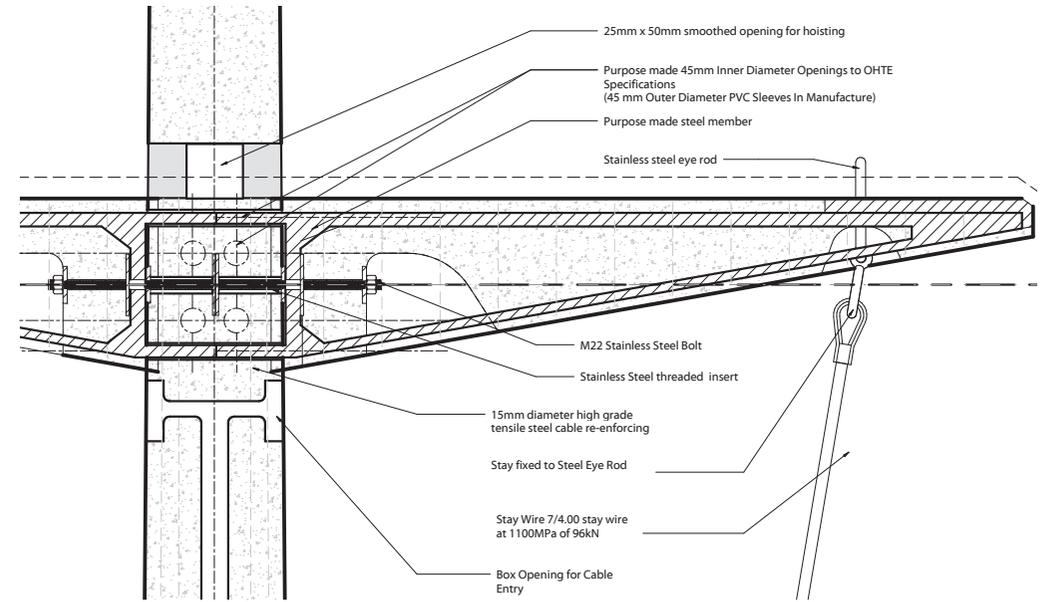
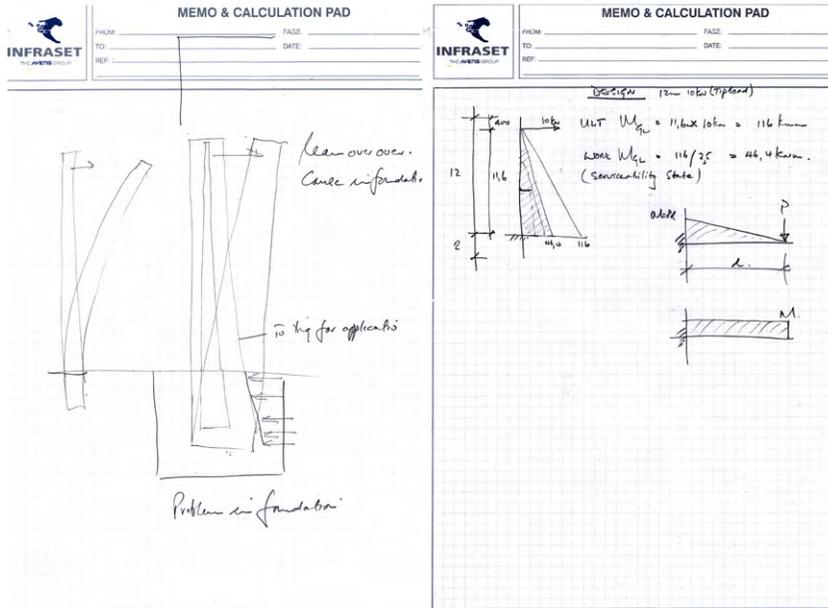


EASE OF FIXING

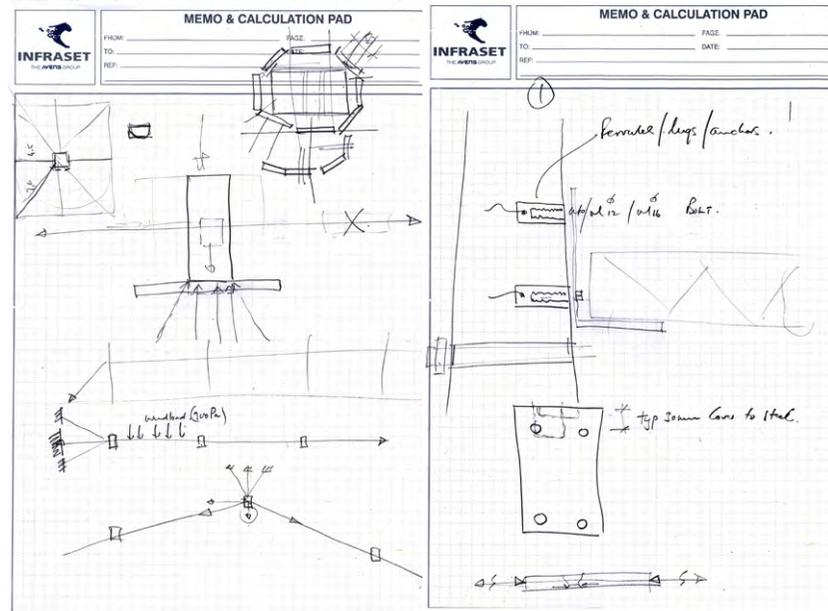
Illus: 178 Unit Axonometric (Author, 2011)



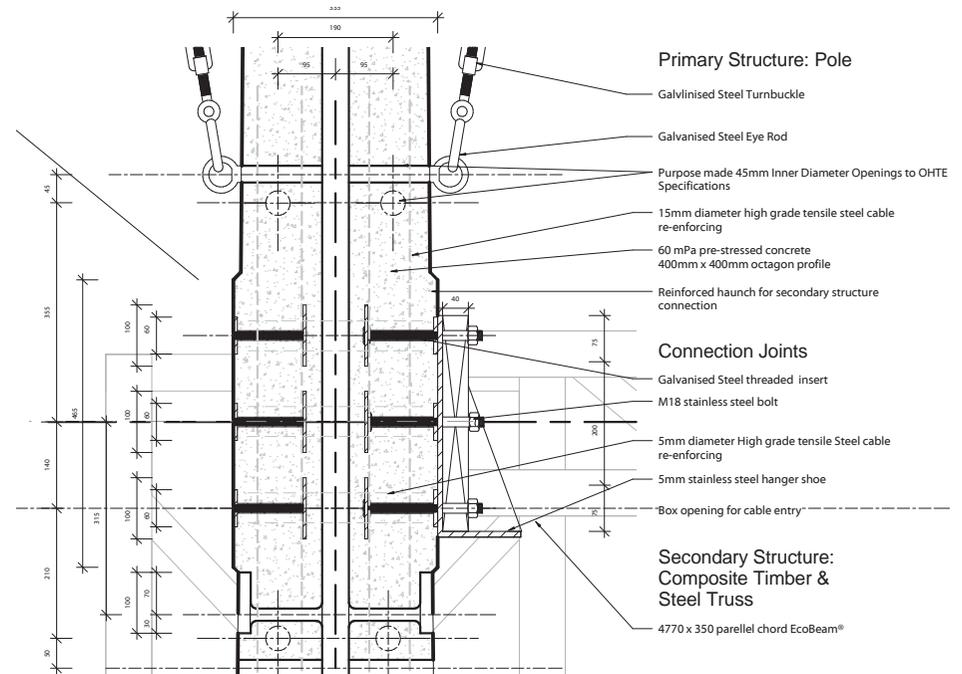
Illus: 179 Technical Detailing of the Unit of Growth- Not to scale (Author, 2011)



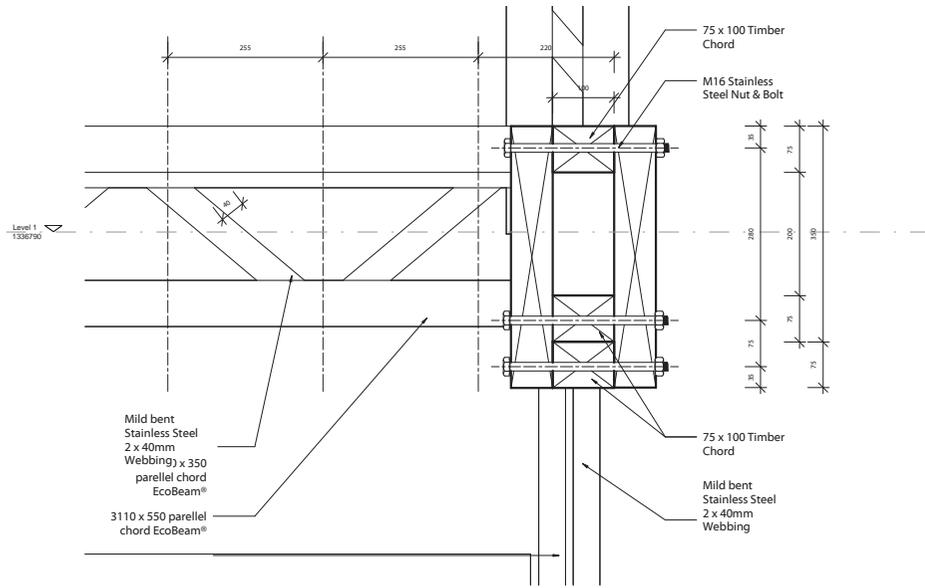
Illus: 181 Unit of Growth technical resolution - Detail A- Not to scale (Author, 2011)



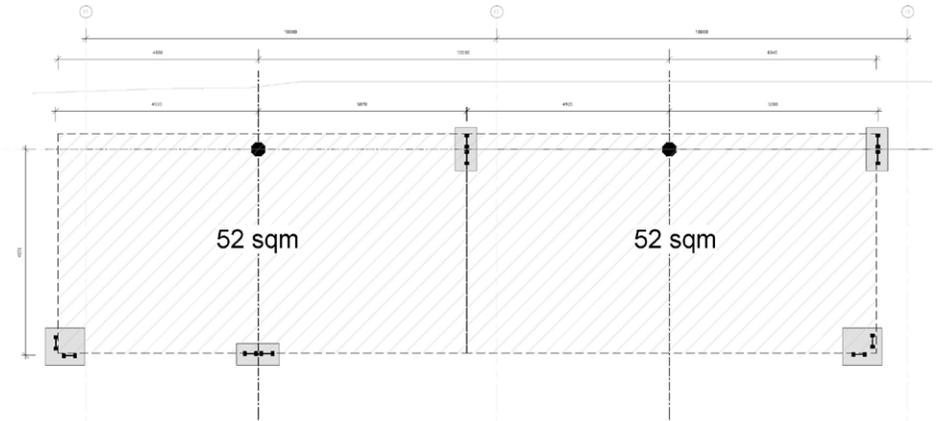
Illus: 180 Engineer's Notes (Author, 2011)



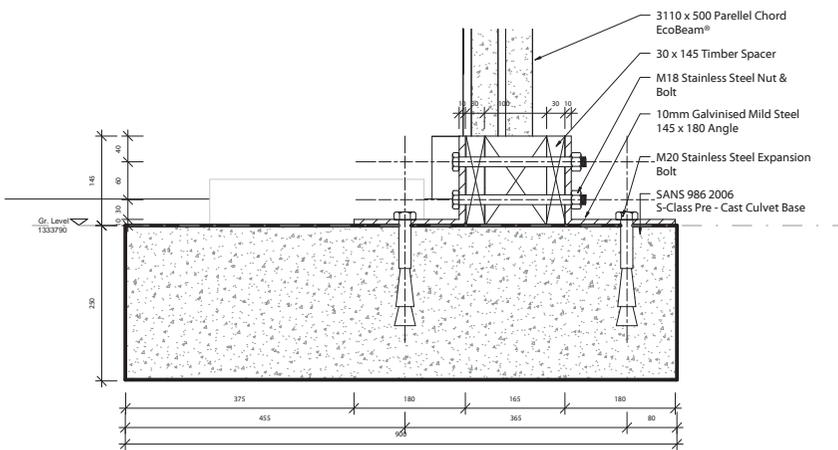
Illus: 182 Unit of Growth technical resolution - Detail C - Not to scale (Author, 2011)



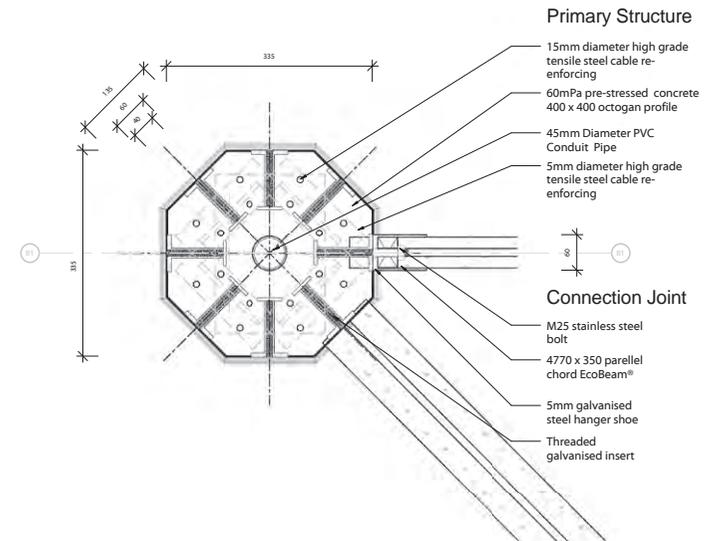
Illus: 183 Unit of Growth technical resolution - Detail B - Not to scale (Author, 2011)



Illus: 185 Unit of Growth technical resolution - Spatial allocation (Author, 2011)



Illus: 184 Unit of Growth technical resolution - Detail D - Not to scale (Author, 2011)



Illus: 186 Unit of Growth technical resolution - Detail E (Author, 2011)

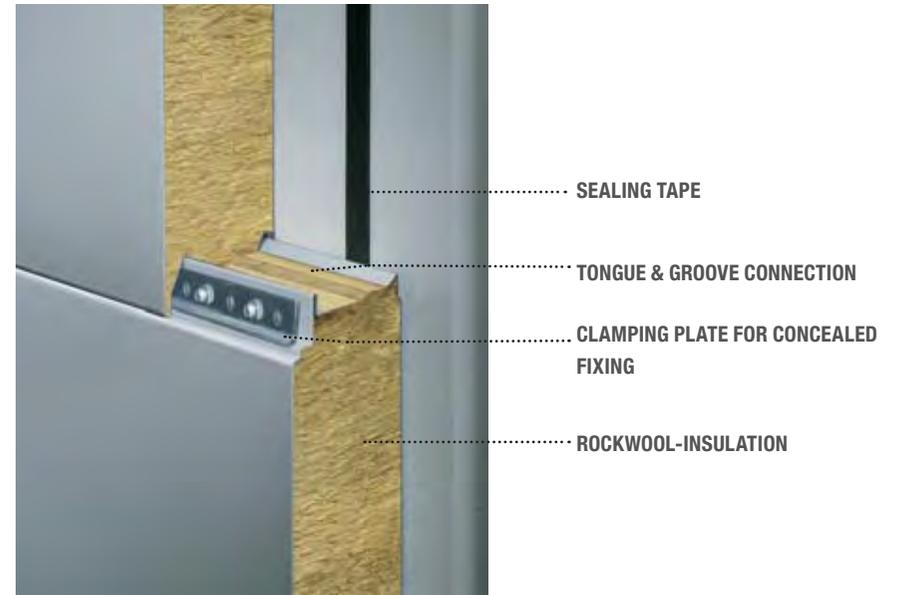
8.2 THE UNIT IN CONTEXT

To explore the manifestation of the unit in context, a hypothetical process of development was illustrated in Chapter Six. The focus of that hypothetical growth was the cement depot of the cement retailer network.

The focus of the dissertation is not in the design of a structure for the retailers, but in the architectural possibilities of the unit. The ArcelorMittal building system was chosen as a contextually appropriate building system as it is similar to contextual metal frame and cladding systems, but provide insulation and fire protection in addition.

Used in the Meetse-A-Bophela primary school in the adjacent neighborhood of Ext 14, the system is made of insulated pre-manufactured walling and roofing components. Joined by off the shelf flashing and connection units the system allows for quick and easy assembly and possible disassembly.

Flooring is dealt with by the use of Eva-Last recycled lumber decking was used for the flooring, as it too had the insulatory as well as recycled properties needed for the flexible building system.



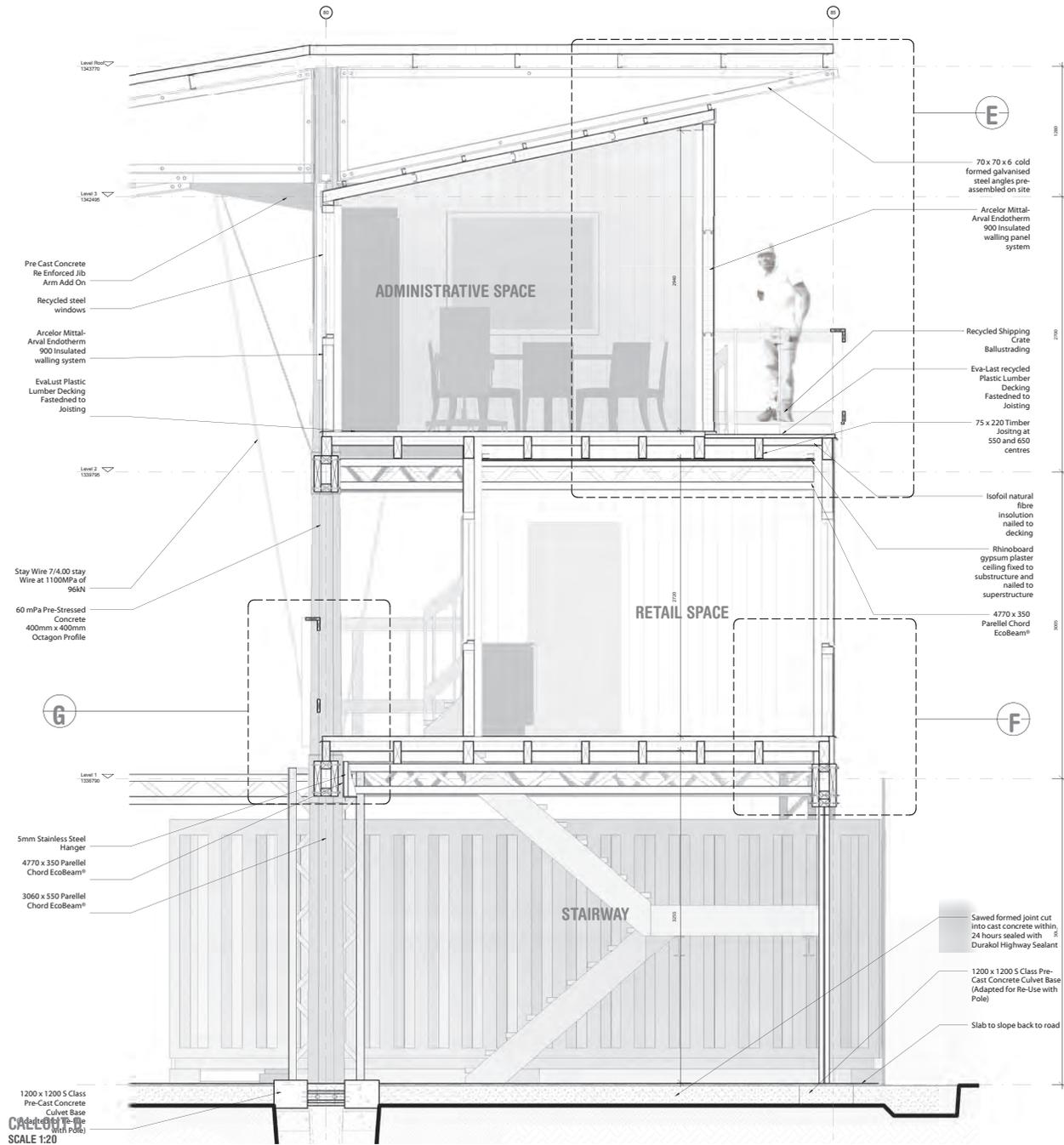
Illus: 188 Sandwich Board - A1 Non-Flammable (ArcelorMittal, 2011)



Illus: 187 Walling system of Meetse-A-Bophela Primary school in Mamelodi (Architecture SA, 2011)



Illus: 189 ArcelorMittal- Arval Alliance Sandwich Walling system (ArcelorMittal, 2011)



Illus: 190 Unit of Growth technical resolution -Callout A- Not to scale (Author, 2011)



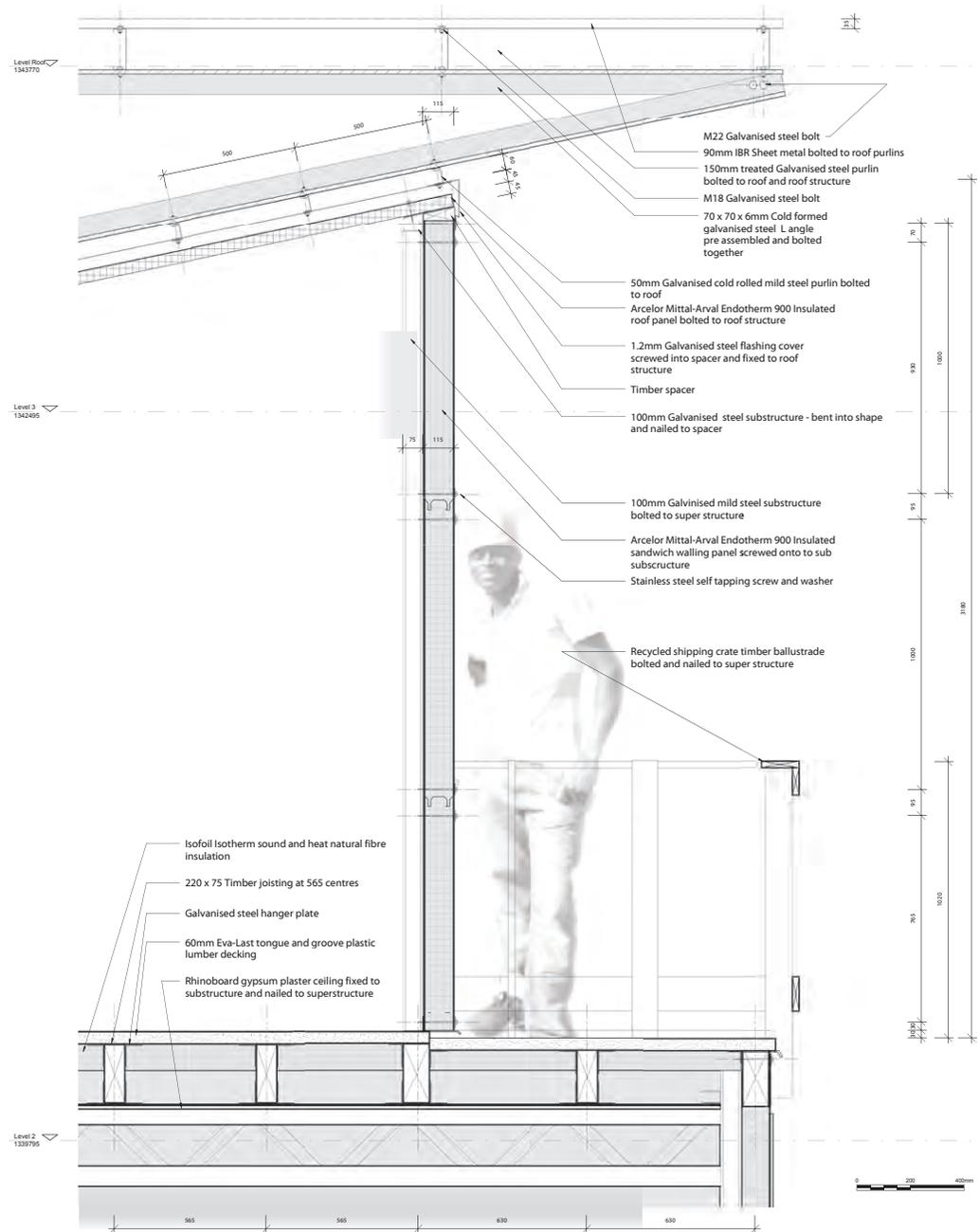
Illus: 192 **Eva-Last recycled plastic lumber**
(Eva-Last, 2011)



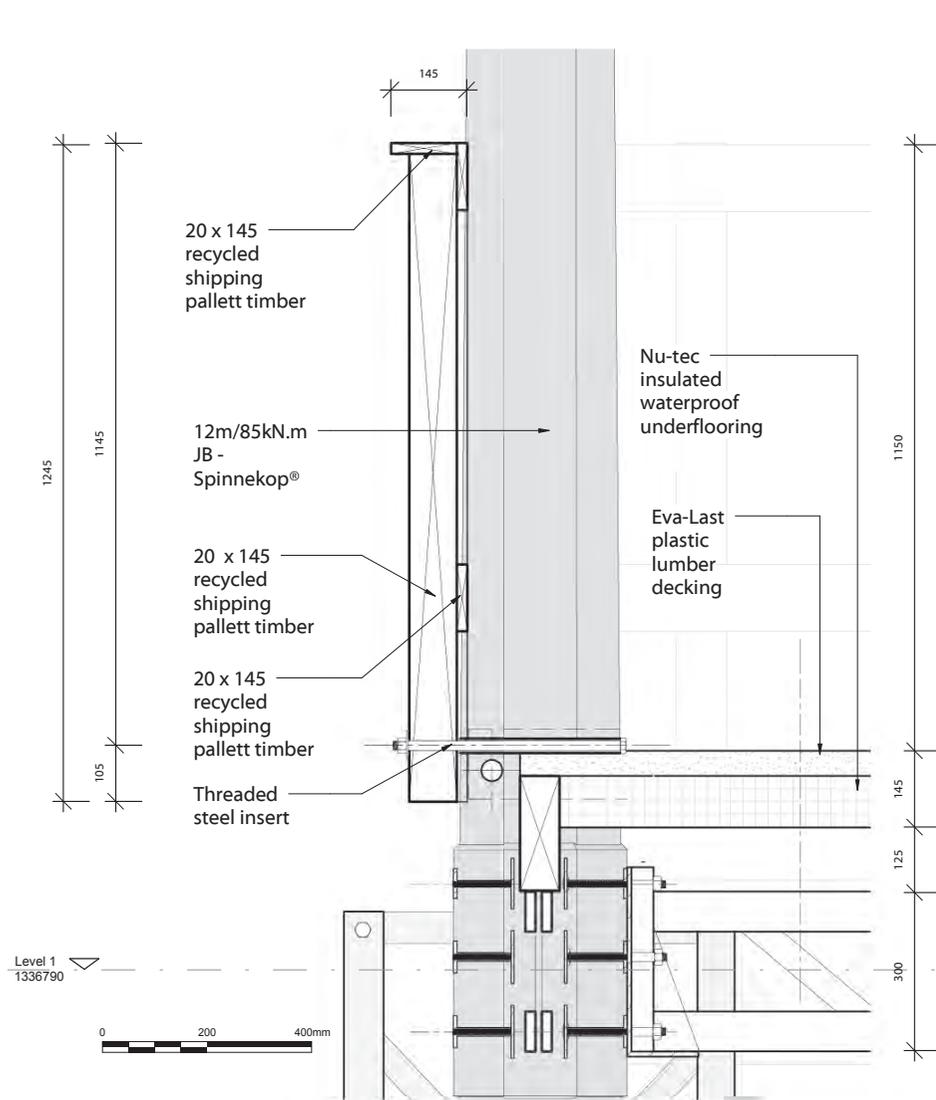
Illus: 193 **Eva-Last plastic fastenings**
(Eva-Last, 2011)



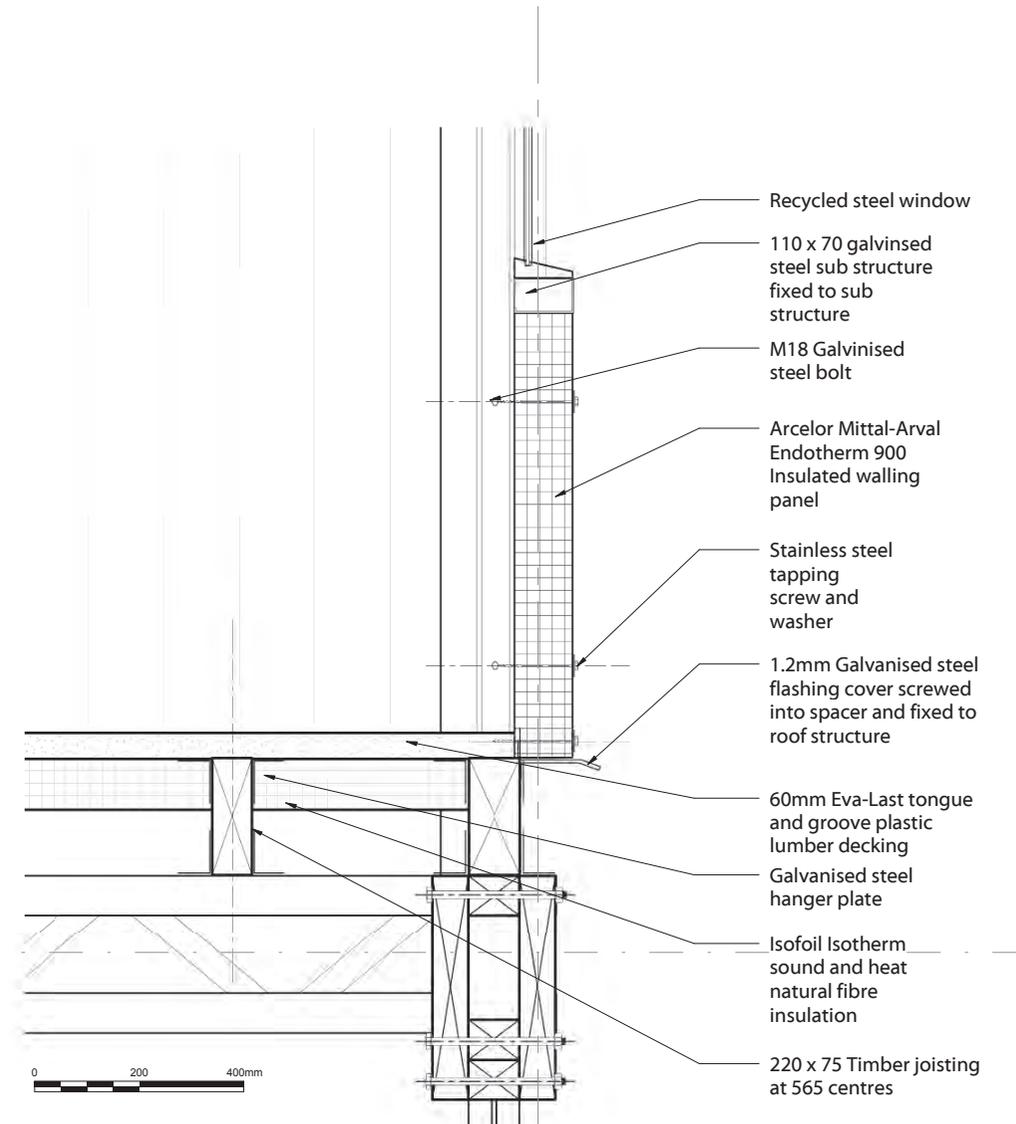
Illus: 194 **Eva-Last recycled plastic lumber joist**
(Eva-Last, 2011)



Illus: 195 **Detail E - Not to scale** (Author, 2011)



Illus: 196 Detail F - Not to scale (Author, 2011)



Illus: 197 Detail G - Not to scale (Author, 2011)

8.3 THE ARCHITECTURAL MANIFESTATION - THE ROOF

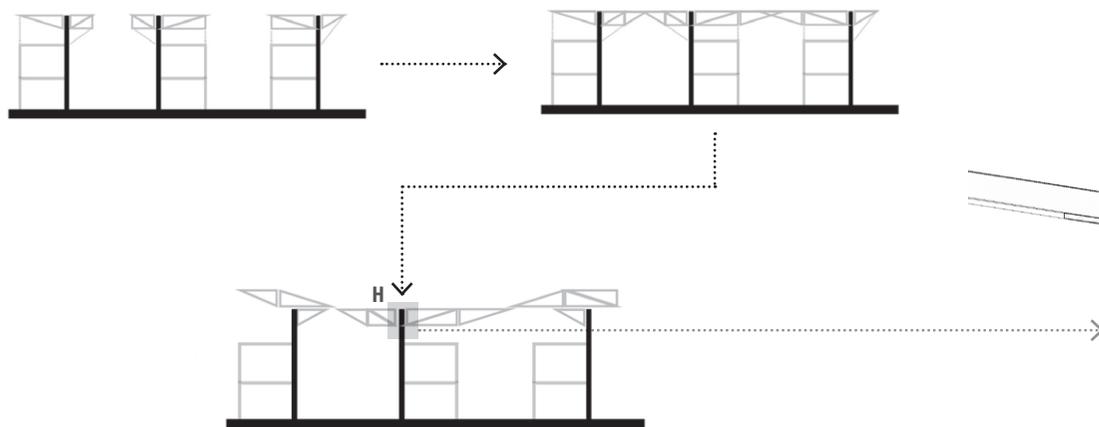
The roof is designed to be assembled from standard parts in order to be built affordably and with minimal extraneous structural supports.

The frame members are mild steel, treated L-profiles bolted together for easy assembly and dis-assembly. These members are then assembled to make an optimized truss system that rest on the main structural members of the concrete poles.

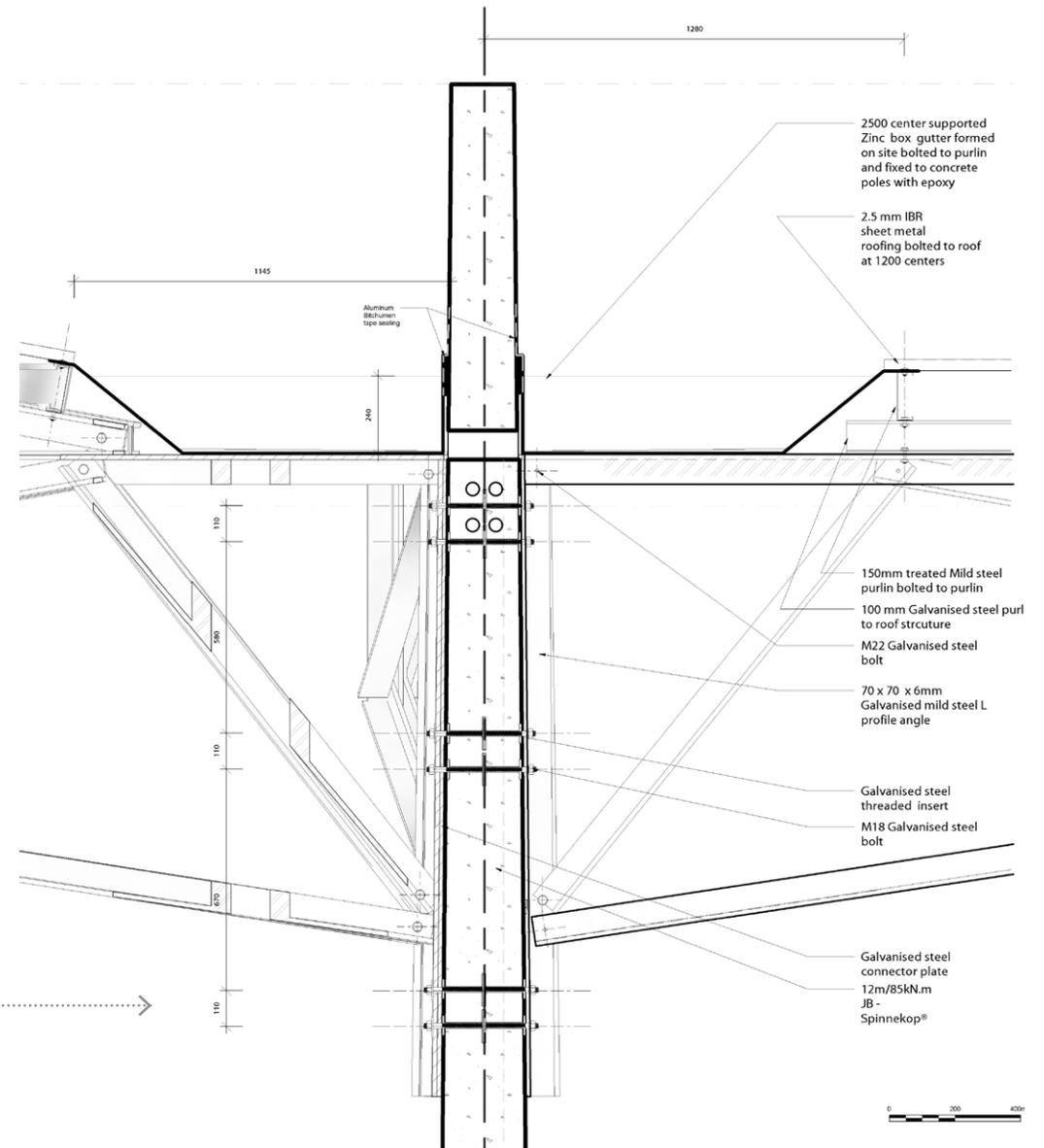
The size and weight of these members are designed to allow a single person to move individual pieces and a group to construct and move the assembled truss units.

The construction of the roof is intended to make use the units as temporary support struts during the process of assemblage. These temporary supports will be removed once the roof structure sits in balance. (see *Illus: 197*)

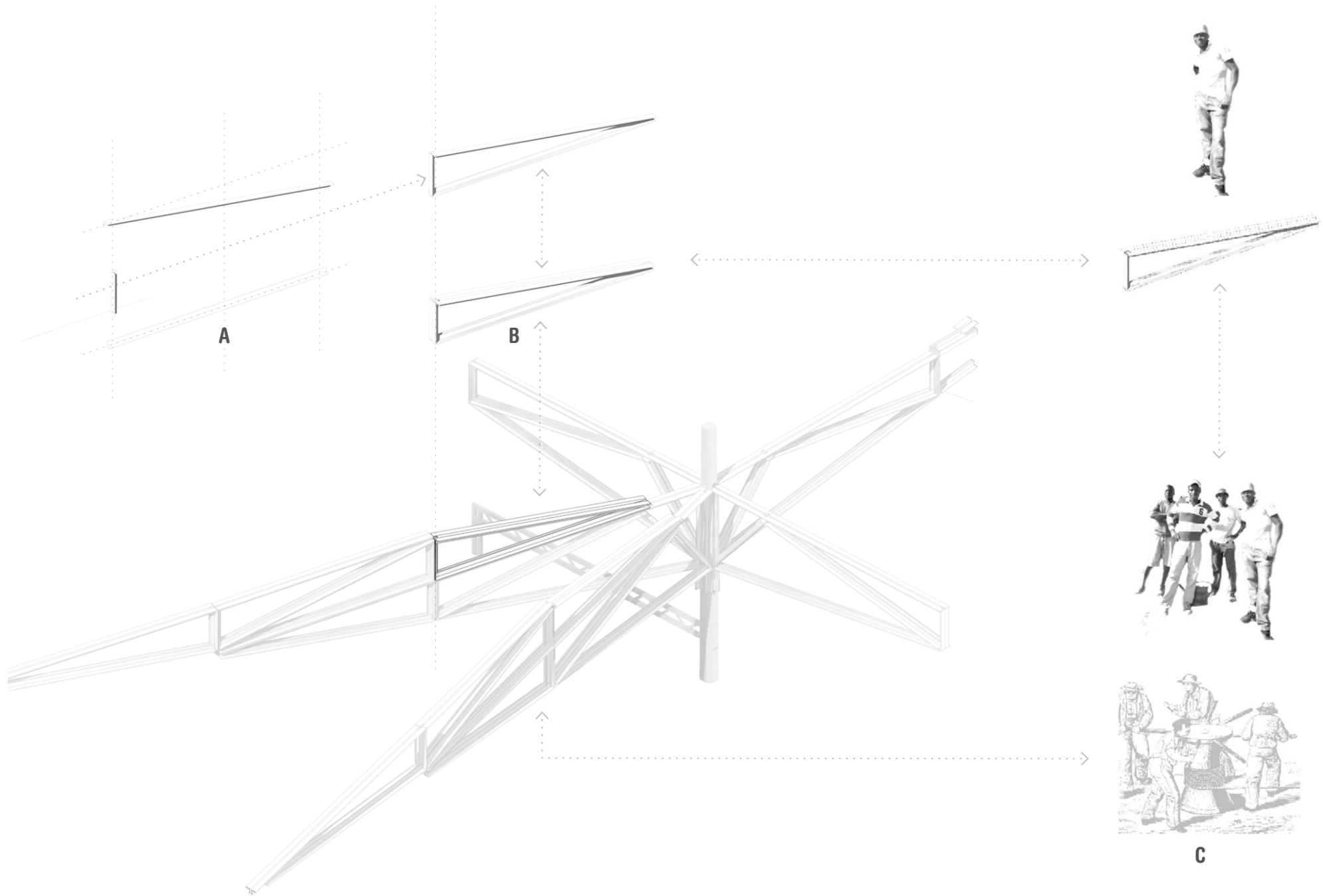
The roof itself is made from treated prefabricated IBR sheet metal, with translucent profiled polycarbonate sheeting in the deepest part of the section to allow for light.



Illus: 198 Diagrammatic depiction of process of construction (Author, 2011)



Illus: 199 Unit of Growth technical resolution - Detail H - Scale:1:20 (Author, 2011)



Illus: 200 The roof structure unit in its assembled form (Author, 2011)

8.4 ROOF SYSTEMS

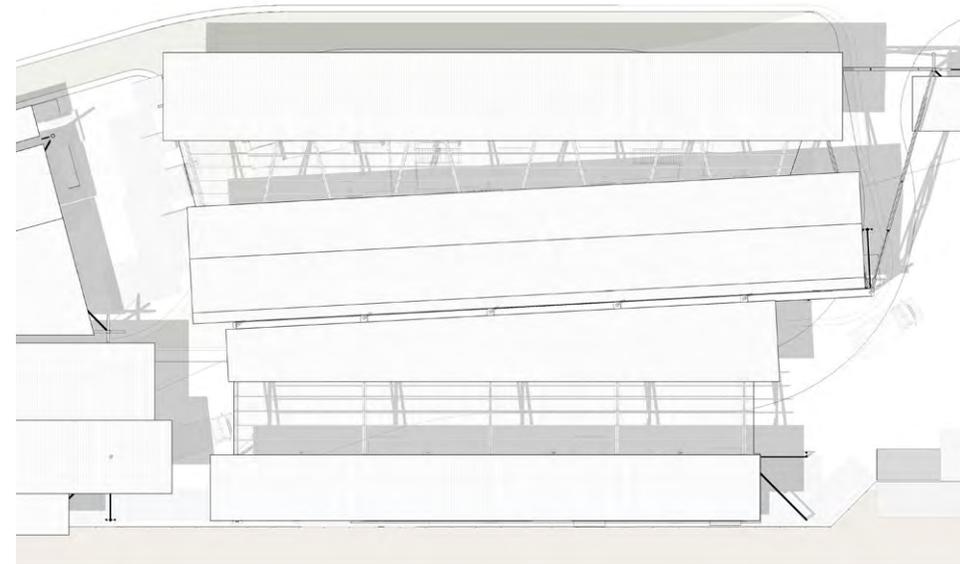
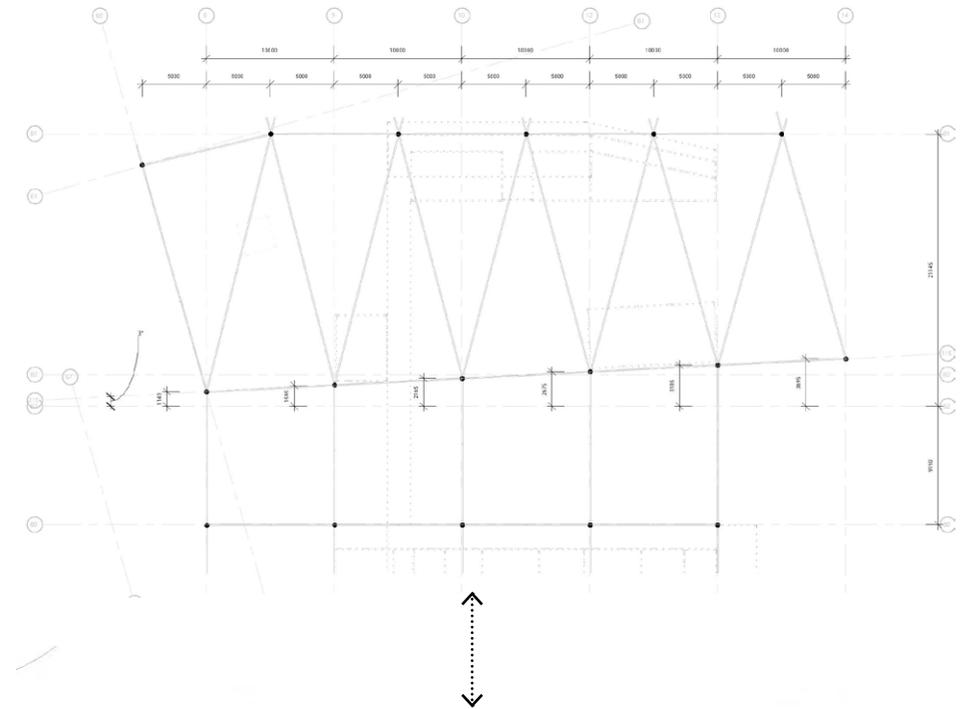
The roof itself forms the spatial and systemic entity that unifies the cement retailer network under a single structural facility. Through water and energy collection the roof not only provides shelter, but access to services that will enable the cement retailers to enhance not only their business, but engage with the other retail networks in the context of Mamelodi.

WATER HARVESTING

The cement retail depot itself does not require a high yield of water use, but provide access to service to its sub agents of control and its own ablution facility. The combined water use in services with the total water storage amount of 3.8 million liters a year requires that 6 x 5000 liter tanks are required. (see Illus: 201)

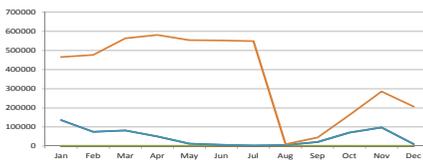
SOLAR ENERGY COLLECTION

The roof in addition to water collection collects solar energy to supplement the energy consumption of the building. These Polar Voltaic Cells, are required to be at an inclination of 10 degrees plus the degree of latitude, placing them at the required 35 degrees of the horizontal.



Rain Water Calculations

	Average Monthly Precipitation (mm) (V)	Run off Coefficient for sheet roof	Roof Area (sqm)	Runoff-A (Rainfall-B) x Roof Area	Demand Per Month	VT=VT1 + (Runoff-Demand)
Jan	136	0.9	1557.4	134000	400	329600
Feb	75	0.9	1557.4	73000	400	402200
Mar	80	0.9	1557.4	80000	400	481800
Apr	51	0.9	1557.4	49000	400	538400
May	13	0.9	1557.4	11000	400	541000
Jun	7	0.9	1557.4	5000	400	545600
Jul	0	0.9	1557.4	1000	400	546000
Aug	0	0.9	1557.4	4000	400	548000
Sep	25	0.9	1557.4	20000	400	23200
Oct	71	0.9	1557.4	69000	400	91800
Nov	91	0.9	1557.4	96000	400	187600
Dec	11	0.9	1557.4	9000	400	196000

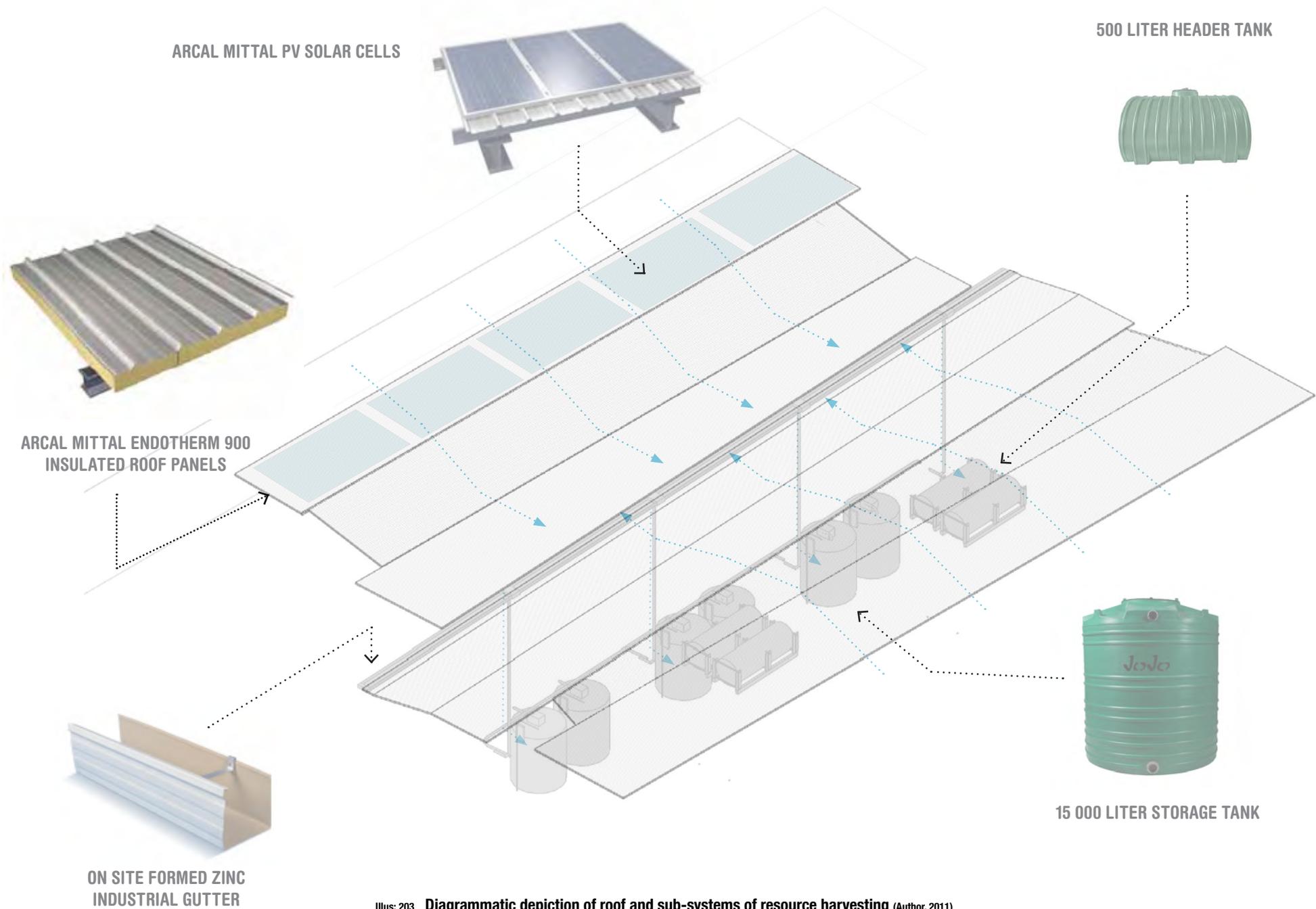


Gutter Size Calculation

Summer Rainfall Area (sqmm)	Roof Area (sqmm)	Required Roof Volume (sqmm)	Gutter Length (mm)	Gutter Width (mm)	Gutter Depth (mm)	Gutter Volume (sqmm)
1740 sqmm	1,757,400,000	10,892,000,000	50,000	1,145	250	11,100,000,000 x 2

Illus: 201 Water Calculation table (Author, 2011)

Illus: 202 The roof structure and the sheeting layout (Author, 2011)



Illus: 203 Diagrammatic depiction of roof and sub-systems of resource harvesting (Author, 2011)

Chapter 9: Conclusion & Appendix

Illus: 202 Pienaarspoort day end (Author, 2011)

9.0.1 CONCLUSION

Although the dissertation process began as an investigation into the social role of buildings in developing contexts and their roles within, it ended quite solidly with a spatial and structural problem.

The problem lay in what does one provide as support, what as infill and who controls what at which times.

A project of this nature that does not clearly address or identify this issue will surely fail as this social programming of space through architectural techniques is essentially the core of what South African spatial professionals need to address in today's developmental climate.

The dissertation process revealed an undercurrent of uncertainty in this specific field of architectural intervention. Feedback from professionals who were involved in the process could not comment on the nature of the dissertation design in architectural terms.

The actual architecture was more of a service engineering with social aspects than the spatial and structural programming of traditional architectural projects.

Nonetheless, what emerged in the end was an understanding of what questions architects need to be asking in these types of contexts.

FULL SUMMARY OF DISSERTATION PROCESS AND CURRENT PROJECTS CAN BE VIEWED @ WWW.JHONOBENNETT.COM

9.0.2 REFLECTION

The dissertation revealed a key question in regard to Architecture of developing areas - **WHAT IS THE ROLE OF ARCHITECTURE IN FACILITATING DEVELOPMENT?**

INFRASTRUCTURE AS ARCHITECTURE - INFRA-TECTURE

The initial premise of the dissertation was to re-interpret the type of Architectural intervention that would facilitate growth in a developing context, in this case Pienaarspoort, Extension 12.

The issue with proposing an Architectural intervention in a developing context is that in order to truly facilitate development bulk infrastructure is needed in the form of roads, services e.t.c. Without these elements it is very difficult to meet the needs of any users in this context.

The dissertation process led to a hybrid of infrastructure and Architectural possibility, not a traditional building as such, but rather a building system. This is only problematic in that a resolved and detailed Architectural product is required to complete the MArch Prof. degree.

The Author sought to resolve this by then exploring the Infra-ecture piece Architecturally in context. But, due to time constraints the author feels that the Architectural product did not reflect the year's process, as well as drawing attention away from the true product of the engagement process - the Infra-ecture Unit.

The Infra-ecture Unit could have been explored in more depth, but now has the opportunity to be taken further in practice and explored outside of academic constraints and discipline specific outcomes.

RESEARCH VS. PRODUCT

Although the process of engagement and subsequent research was crucial in order to determine an appropriate design solution, it took up more than half of the allocated time for the dissertation year. The time spent on research left minimal time for product resolution.

This could have been resolved by a more clear identification of what exactly was expected from the research rather than an open ended question of engagement.

9.0.3 APPENDIX SECTIONS

Working in a context such as Mamelodi has a richness and depth-of-place that required full immersion into what was an unfamiliar environment for the author.

As a result, the research and analysis process entailed more than what could be included in the typical narrative of the book and have been included in the appendix.

References to these sections have been made throughout the dissertation.

APPENDIX SECTION A: INTERVIEW SUMMARY

A detailed overview of all interviews, data and analysis from the formal interviews conducted on-site during April 19 -25 2011.

APPENDIX SECTION B: ON-SITE ANALYSIS

Several diagrams of analysis, further detailed to expand on the social, spatial and tectonic observations and analysis during the dissertation year.

APPENDIX SECTION C: DESIGN OPTIONS AND FURTHER ANALYSIS

A further diagrammatic breakdown of the various process taken to explore the possibilities that guided the dissertation process.

APPENDIX SECTION D: SHORT FILM COMPETITION

The storyboard submitted as a short film for CnCI competition of 2011 where the concepts and themes from the site analysis were expressed and summarized.

APPENDIX SECTION E: RESEARCH TRIP

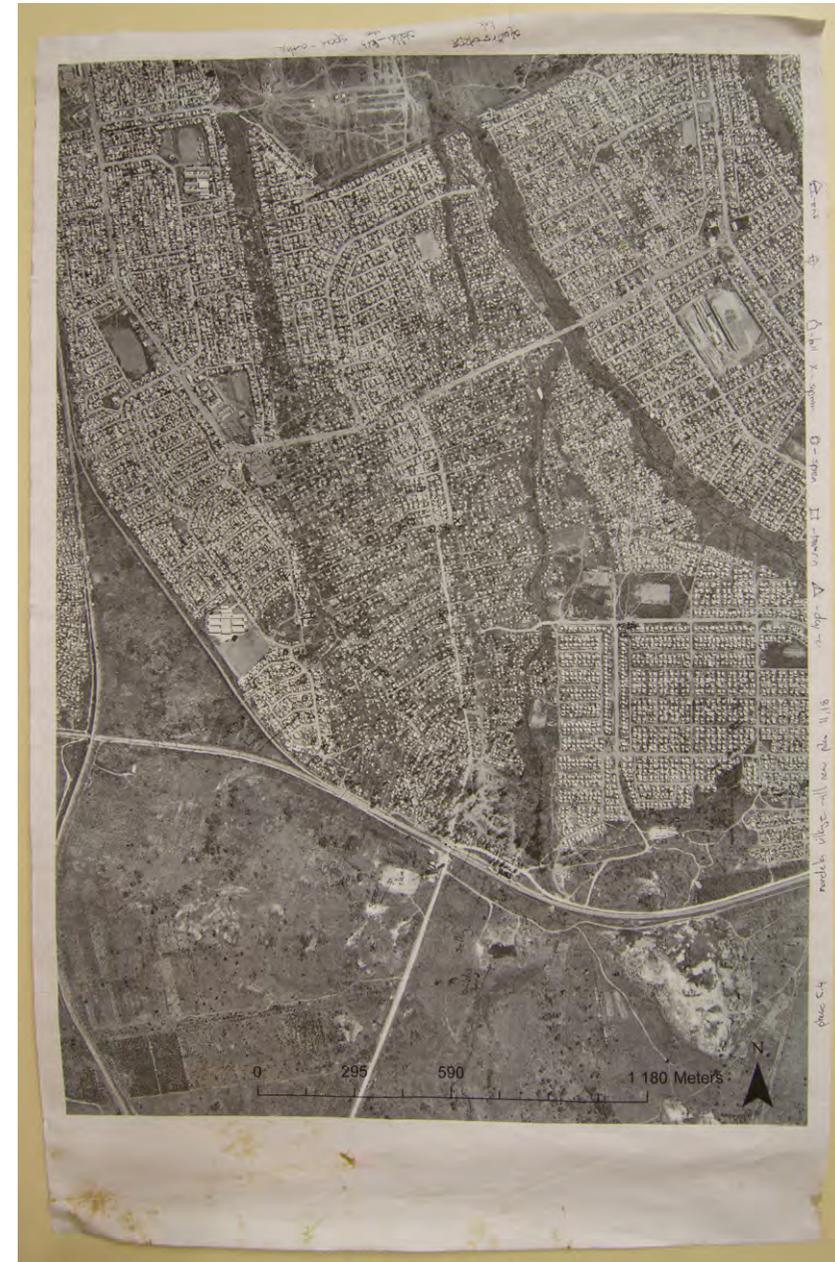
A research trip, looking into the functions of buildings in developing contexts across South Africa was undertaken in December/January 2010.

9.1.1 INTERVIEW SUMMARY: BRICK MAKER PROFILES

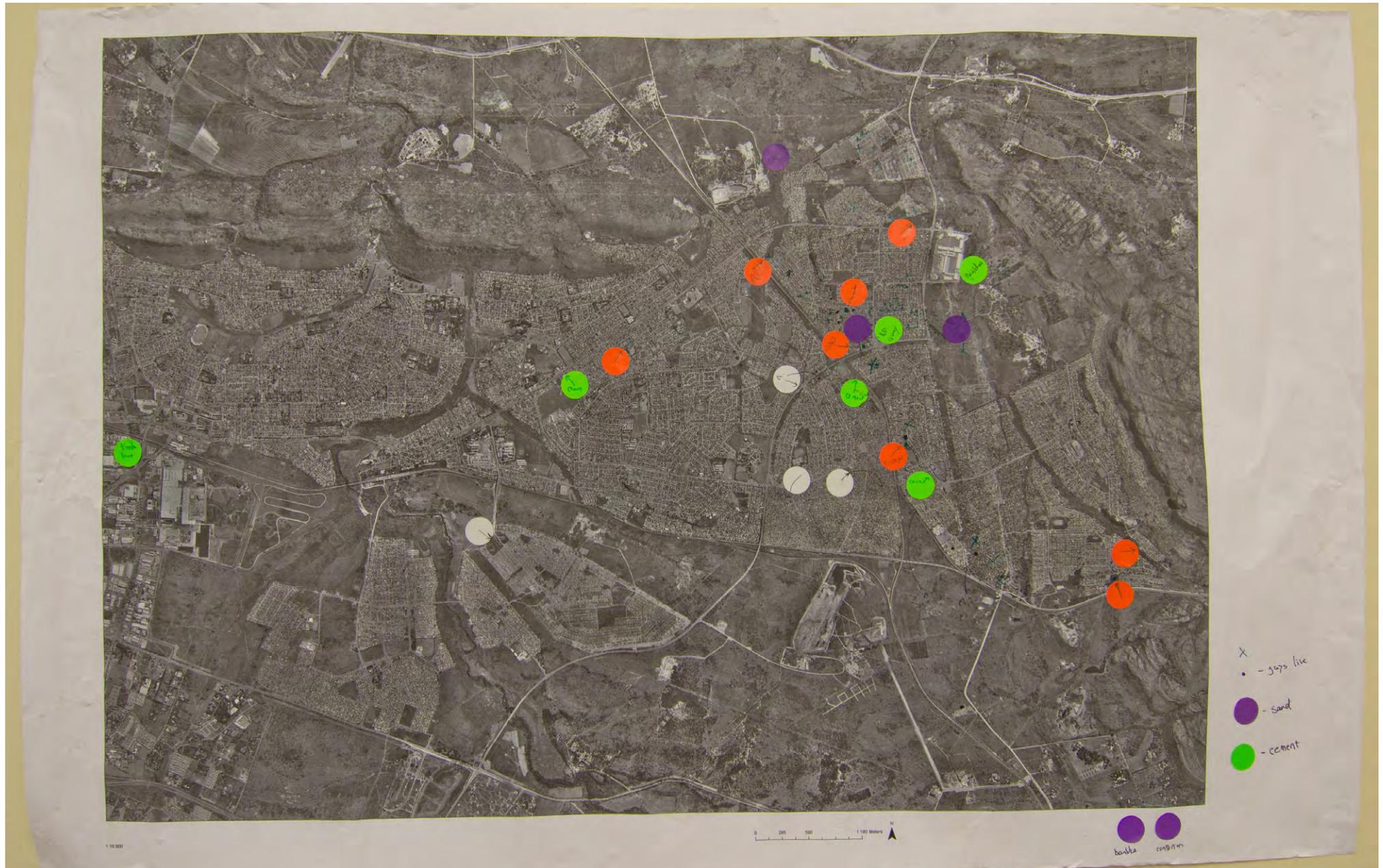
APPENDIX SECTION A: INTERVIEW SUMMARY



Appendix Illus: 2 Photographic journal of interviews (Author, 2011)



Appendix Illus: 1 On-site interview map used for analysis of Extension 12 & Pienaarspoort (Author, 2011)



Appendix Illus: 3 On-site interview map used for analysis of brick makers and supply networks (Author, 2011)

9.1.2 INTERVIEW SUMMARY: BRICK MAKER DATA



Appendix Illus: 4 Graphic representation of questionnaire : 1 (Author, 2011)

TRANSPORT

Who transports your bricks?

All operations had their own delivery trucks.

Who drives these cars?

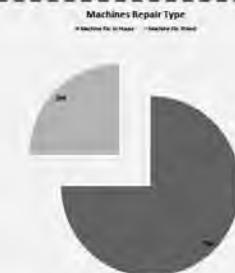
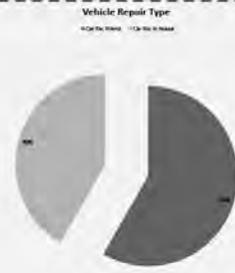
All operations had their own drivers

Who fixes your cars?

Most fixed them themselves, others used associates

Where do you get petrol

Anywhere in Mamelodi, not one specific



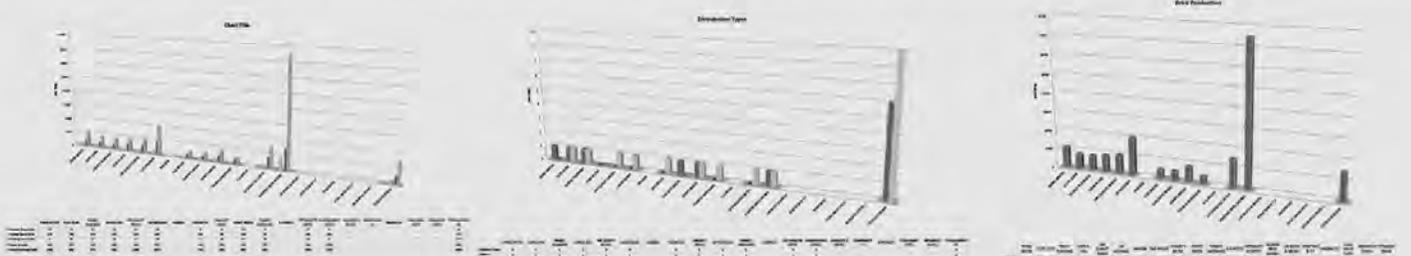
BRICKS

How many brick types do you have?
What are they?

*Maxi Hollow Block
Med Hollow Block
Mini Hollow Block
Maxi Block (RDP)
Mini Block (Stock)*

How much do you charge per brick?

*Maxi Hollow Block - R5.00
Med Hollow Block - R4.50
Mini Hollow Block - R3.50
Maxi Block (RDP) - R2.50
Mini Block (Stock) - R1.50*



PRODUCT

Who Buys these bricks?

Generally people from their immediate area, 5 km radius

Where do they use them?

Home additions, building rental units, making taverns, or spazas

Why don't they use other bricks?

These are cheaper, and more readily available with transport included.

ALTERNATIVE

Why Cement bricks?

Easy to make, almost no infrastructure, can pick and move at any time.

Why not earth bricks?

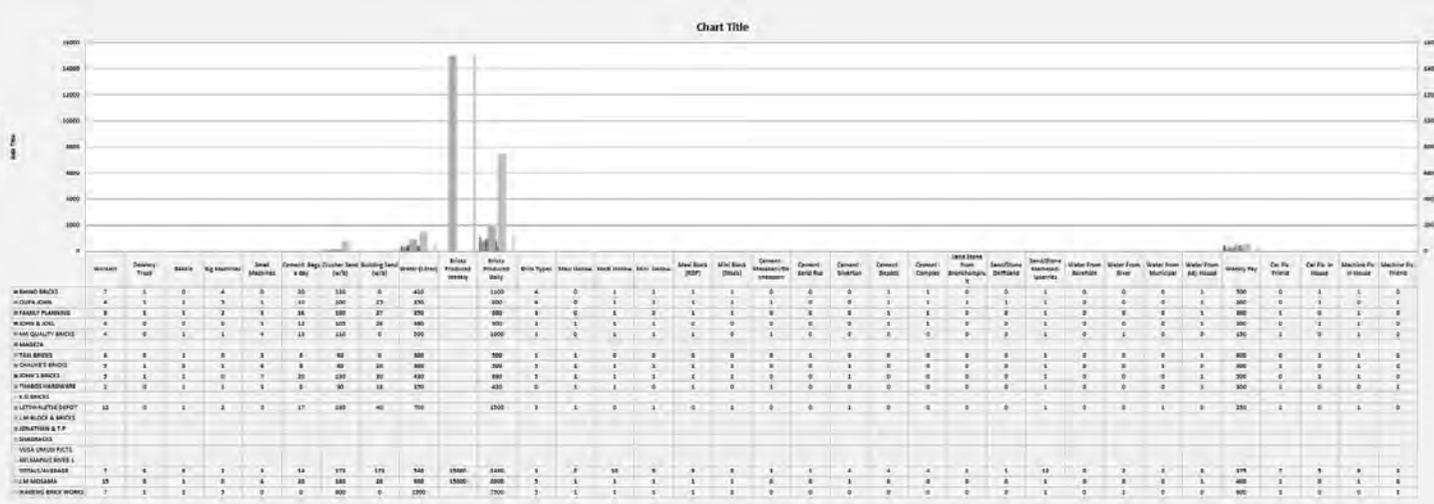
Most hadn't seen or heard of them.

Where do the workers stay?

Most stayed with 5 km radius, or on site

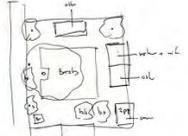
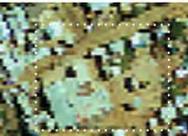
Where do you get lunch?

From 'stalletjies' around site



Appendix Illus: 5 Graphic representation of questionnaire : 2 (Author, 2011)

9.1.3 INTERVIEW SUMMARY: BRICK MAKER PROFILES

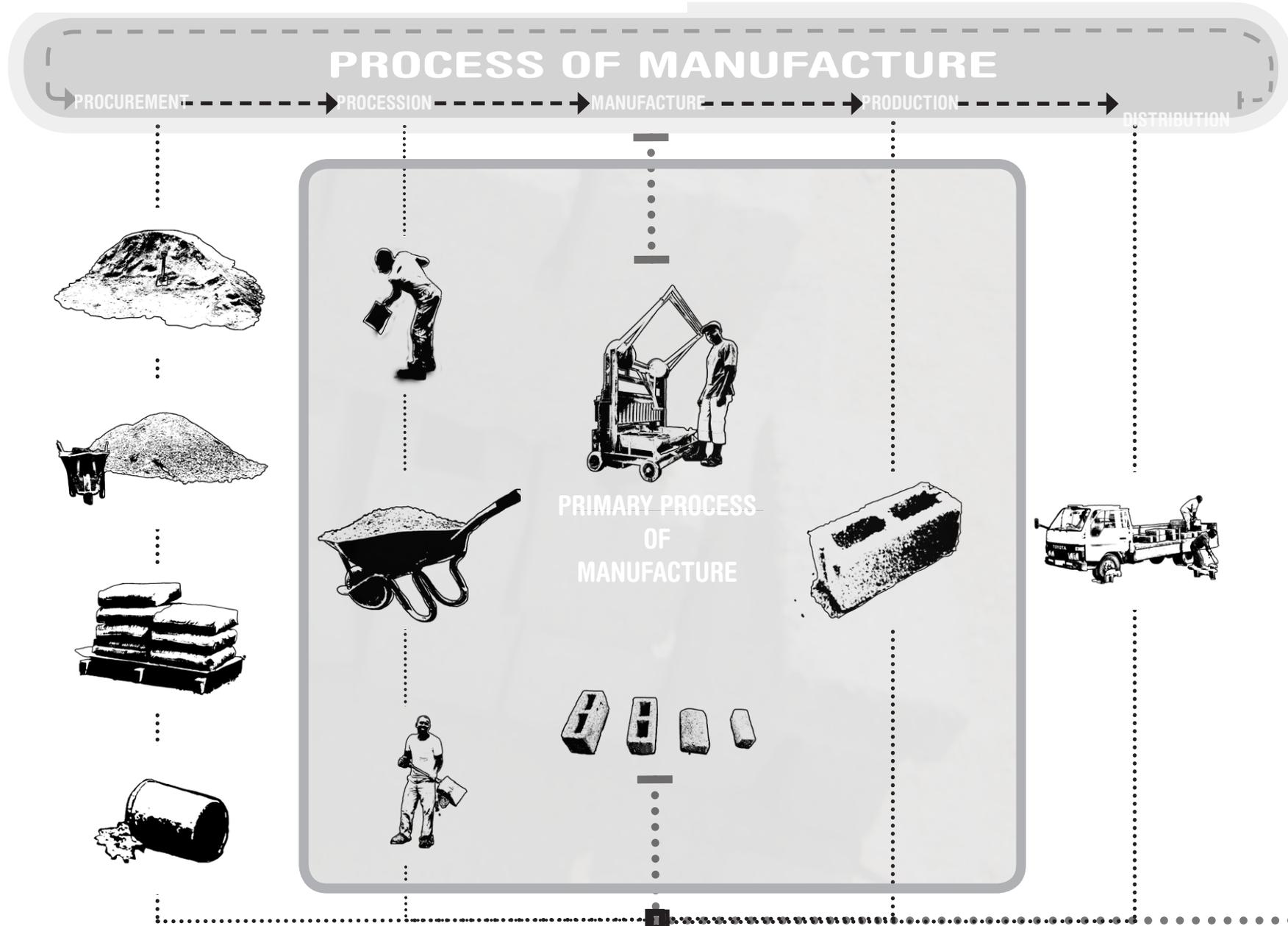
<p>JONATHAN & TP</p>  	<p>JOHN'S BRICKS</p>  	<p>LETSWALETSE DEPOT</p>  	<p>THABOS HARDWARE</p>  
			
<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>Medium scale operation, working off Tsamaga Road</p> <p>MATERIALS</p> <p>Cement: Capitec</p> <p>Sand: Mamelodi Quarries, Delfand</p> <p>Water: Adjacent a river, but uses municipal connection</p> <p>MANUFACTURE</p> <p>Make 4 types: Large Hollow, Med Hollow, Mini Hollow, Maxi Block</p>	<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>They have 1 truck, 1 medium sized bakkie</p> <p>MATERIALS</p> <p>Cement: Capitec</p> <p>Sand: Mamelodi Quarries, Delfand</p> <p>Water: Adjacent a river, but uses municipal connection</p> <p>MANUFACTURE</p> <p>Make 4 types: Large Hollow, Med Hollow, Mini Hollow, Maxi Block</p>	<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>The business is owned by Mr. Letswaleitse, and he runs it for him. He started it from a construction company.</p> <p>They have 1 bakkie, 1 tipper</p> <p>MATERIALS</p> <p>Cement: Silmaron</p> <p>Sand: Mamelodi Quarries</p> <p>Water: Municipal Connection</p> <p>MANUFACTURE</p> <p>Make 3 types: Large Hollow, Med Hollow, Maxi Block</p>	<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>Thabos and his wife moved from Mamelodi East where they ran a bakkie. They couldn't get a liquor license in Mamelodi, so they started making bricks to supplement it from a hardware store.</p> <p>They have 1 medium sized bakkie.</p> <p>MATERIALS</p> <p>Cement: Moskor (Derebroom)</p> <p>Sand: Mamelodi Quarries</p> <p>Water: From the town</p> <p>MANUFACTURE</p> <p>Make 3 types: Large Hollow, Med Hollow, Maxi Block</p>
<p>FAMILY PLANNING</p>  	<p>K.G BRICKS</p>  	<p>DOM JOHN</p>  	<p>MR QUALITY BRICKS</p>  
			
<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>The owner started the small business from the money he was receiving from the MK Veteran fund. They also supply basic hardware on site.</p> <p>'Family Planning' is in relation to house building nature of bricks.</p> <p>They have 1 truck, 3 ton flatbed</p> <p>MATERIALS</p> <p>Cement: Complex, 4 says, Cement Depot 1 & 2</p> <p>Sand: Mamelodi Quarries</p> <p>Water: House adjacent site</p> <p>REX</p> <p>4 wls of Chopper stone + 2 wls of Baking Sand + 1 wls Cement + 40 litres of Water (4 x 10L)</p> <p>MANUFACTURE</p> <p>Make 3 types: Med Hollow, Mini Block, Maxi Block</p>	<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>Operates from Est 12, house in middle of PERI. To extension and individual local structures.</p> <p>They have 1 truck, 3 ton flatbed</p> <p>MATERIALS</p> <p>Cement: Complex, 4 says, Cement Depot 1 & 2</p> <p>Sand: Mamelodi Quarries and Delfand</p> <p>Water: Oppa John's House</p> <p>REX</p> <p>4 wls of Chopper stone + 1 wls of Baking Sand + 1 wls Cement + 40 litres of Water (4 x 10L)</p> <p>MANUFACTURE</p> <p>Make 4 types: Med Hollow, RCP (Cement Stacks), Mini Block, Maxi Block</p>	<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>Oppa John Mkhulu Trading</p> <p>Operates from Est 12, house in middle of PERI. To extension and individual local structures.</p> <p>Oppa John has 2 trucks, one small bakkie, 1 Large Flatbed</p> <p>MATERIALS</p> <p>Cement: Derebroom, Complex, 4 says, Cement Depot 1 & 2</p> <p>Sand: Mamelodi Quarries and Delfand</p> <p>Water: Oppa John's House</p> <p>REX</p> <p>4 wls of Chopper stone + 1 wls of Baking Sand + 1 wls Cement + 40 litres of Water (4 x 10L)</p> <p>MANUFACTURE</p> <p>Make 4 types: Med Hollow, RCP (Cement Stacks), Mini Block, Maxi Block</p>	<p>EMPLOYED LABOUR</p> <p>NO. OF BUSINESS</p> <p>WEEKLY CEMENT</p> <p>WEEKLY CHIPPED STONE</p> <p>WEEKLY WATER</p> <p>WEEKLY BRICKS PRODUCED</p> <p>GENERAL</p> <p>This is small scale low cost set up on the main road from Mamelodi to Mamelodi.</p> <p>They have 1 truck, sand bakkie.</p> <p>MATERIALS</p> <p>Cement: Moskor, Derebroom</p> <p>Sand: Mamelodi Quarries</p> <p>Water: River</p> <p>MANUFACTURE</p> <p>Make 3 types: Large Hollow, Mini Block, Maxi Block</p>

Appendix Illus: 6 Profiles of various brick makers : 1 (Author, 2011)

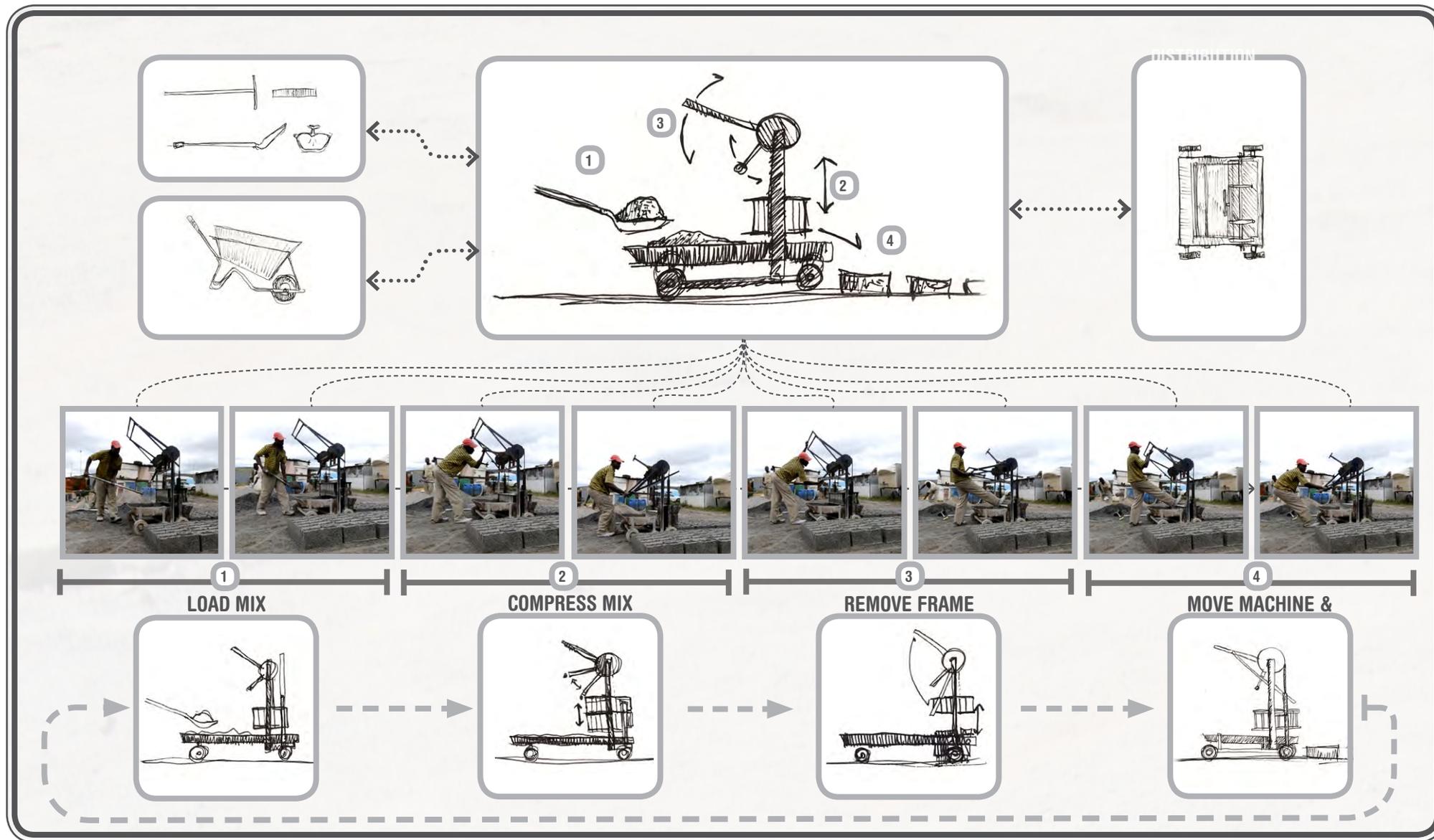
Case Study	General Information	General Description	Materials	Mix	Manufacture
FAMILY PLANNING 	EMPLOYED LABOUR 7 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL The owner started the small business from the money he was receiving from the M&K Welfare fund. They also supply basic hardware on-site. 'Family Planning' is in relation to house building culture of bricks. They have 1 truck, 3 ton ballast.	MATERIALS Cement: Complex, 4 ways, Cement Dignit 1 & 2 Sand: Manganese Quarries Water: House adjacent site	MIX 4 w/b of Crusher stone + 2 w/b of Building Sand + 1 w/b Cement + 40 litres of Water (4 x B34)	MANUFACTURE Make 3 types: Med Hollow, Mini Block, Maxi Block
TAXI BRICKS 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL The owner, Medisoane, was a taxi driver who saved up and started the brick business. They use 1 medium size Bakker.	MATERIALS Cement: Capbuild Skerton Sand: Manganese Quarries Water: House adjacent site	MIX 4 w/b of Crusher stone + 2 w/b of Building Sand + 1 w/b Cement + 40 litres of Water (4 x B34)	MANUFACTURE Make 1 type: Large Hollow
RHINO BRICKS 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL The owner, Fibiso, comes from Polokwane, but stays in Hammanskop. He has background in construction. Fibiso employs people who have brick making knowledge. Fibiso bricks has one delivery truck (44T Ton 1 year old)	MATERIALS Cement: Complex, 4 ways, Cement Dignit 1 & 2 Sand: Manganese Quarries Water: House adjacent site	MIX 4 w/b of Crusher stone + 1 w/b Cement + 60 litres of Water (3 x B34)	MANUFACTURE 4 types of Brick: Med Hollow, Maxi Hollow, Mini Block, Maxi Block + 7880 bricks a week
IKAGENG BRICK WORKS 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL This is a large scale production of bricks, working with electrical mixing machines, and brick making machines. They use chemical hardware and have been trained by manufacturers. They have 2 ballists, and 1 x 3 ton truck	MATERIALS Cement: Hammanskop, African Sand: Manganese Quarries Water: Municipal Connection	MIX 4 w/b of Crusher stone + 1 w/b Cement + 60 litres of Water (3 x B34)	MANUFACTURE Make 5 types: Large Hollow, Med Hollow, Mini Hollow, Maxi Block, Mini Block
JOHN & JOEL 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL Medium scale operation, working in Molepolole area. Adjacent site where from 10 years to make a 'former' brick making facility. Already under construction. Chauder's has one medium sized bakker.	MATERIALS Cement: Complex, 4 ways, Cement Dignit 1 & 2 Sand: Manganese Quarries Water: Municipal Connection	MIX 4 w/b of Crusher stone + 1 w/b of Crusher Sand + 1 w/b Cement + 40 litres of Water (4 x B34)	MANUFACTURE Make 3 types: Large Hollow, Med Hollow, Mini Hollow
CHAUVER'S BRICKS 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL Medium scale operation, working in Molepolole area. Adjacent site where from 10 years to make a 'former' brick making facility. Already under construction. Chauder's has one medium sized bakker.	MATERIALS Cement: Capbuild Skerton Sand: Manganese Quarries Water: Municipal Connection	MIX 4 w/b of Crusher stone + 1 w/b of Crusher Sand + 1 w/b Cement + 40 litres of Water (4 x B34)	MANUFACTURE Make 5 types: Large Hollow, Med Hollow, Mini Hollow, Maxi Block, Maxi Block
MAGEZA 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL Medium scale operation, working in Molepolole area. Adjacent site where from 10 years to make a 'former' brick making facility. Already under construction. Chauder's has one medium sized bakker.	MATERIALS Cement: Capbuild Skerton Sand: Manganese Quarries Water: Municipal Connection	MIX 4 w/b of Crusher stone + 1 w/b of Crusher Sand + 1 w/b Cement + 40 litres of Water (4 x B34)	MANUFACTURE Make 5 types: Large Hollow, Med Hollow, Mini Hollow, Maxi Block, Maxi Block
J.M. MOSAMA 	EMPLOYED LABOUR 4 NO. OF BUSINESS MEMBERS 4 WEEKLY CURRENT 1 WEEKLY OVERSEEN STAFF 1 WEEKLY WATER 1 WEEKLY BRICKS PRODUCED 1	GENERAL Johannes started making bricks in 1975, he was taught by an old man who sold him the business. He has a long history with many people he works with, so has good flow. They have 1 truck, 2 ton ballast.	MATERIALS Cement: Capbuild Skerton Sand: Manganese Quarries Water: House adjacent site	MIX 4 w/b of Crusher stone + 1 w/b of Crusher Sand + 1 w/b Cement + 40 litres of Water (4 x B34)	MANUFACTURE Make 5 types: Large Hollow, Med Hollow, Small Hollow, Mini Block, Maxi Block

Appendix Illus: 7 Profiles of various brick makers : 2 (Author, 2011)

9.2.1 STUDY OF PROCESS OF BRICK MANUFACTURE WITHIN THE



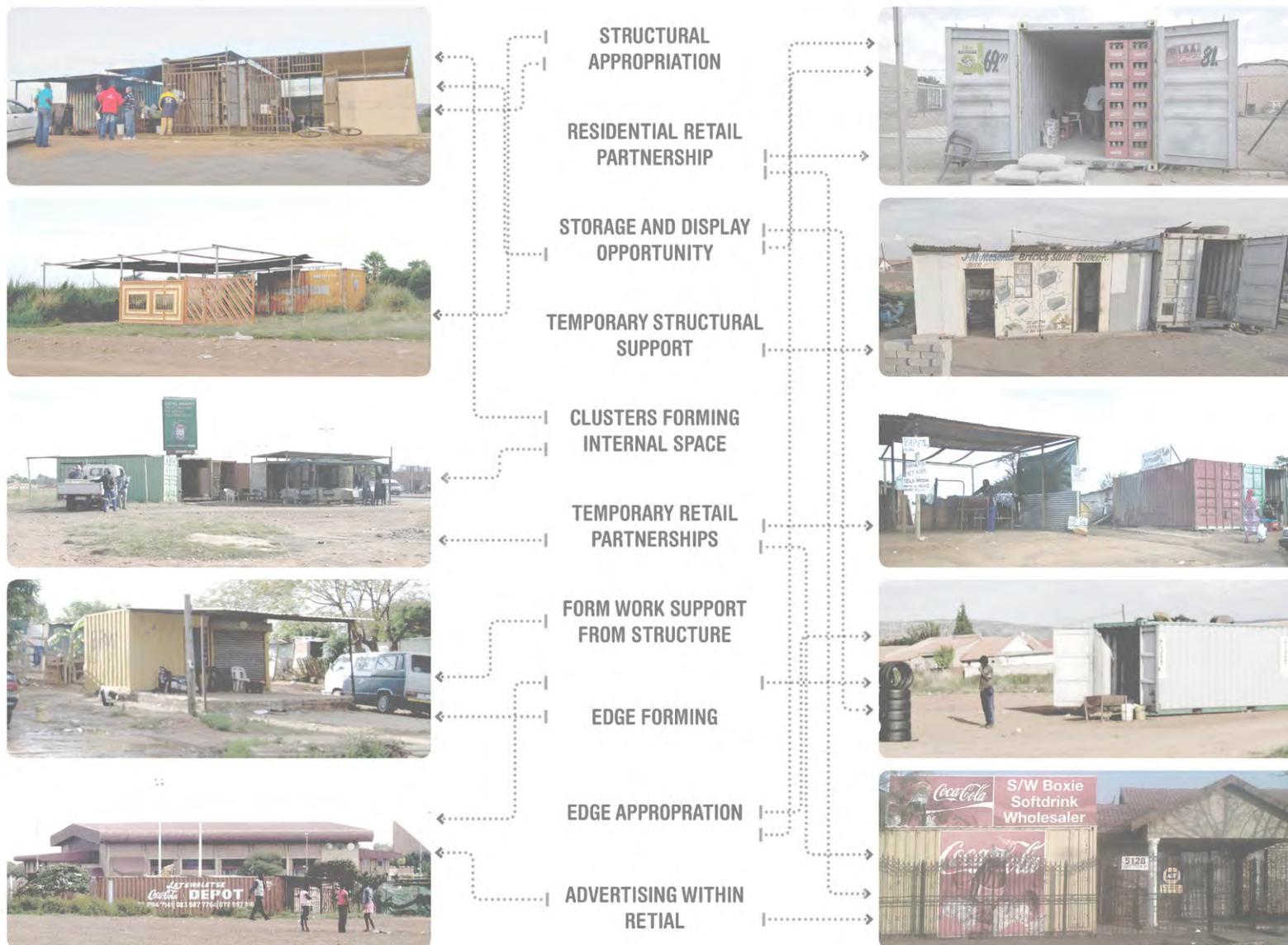
Appendix Illus: 8 Graphic summary of process of production undertaken by the brick makers: 1 (Author, 2011)



Appendix Illus: 9 Graphic summary of Process of Production undertaken by the brick makers: 2 (Author, 2011)

9.2.2 ON-SITE OBSERVATION OF CONTAINER APPROPRIATION

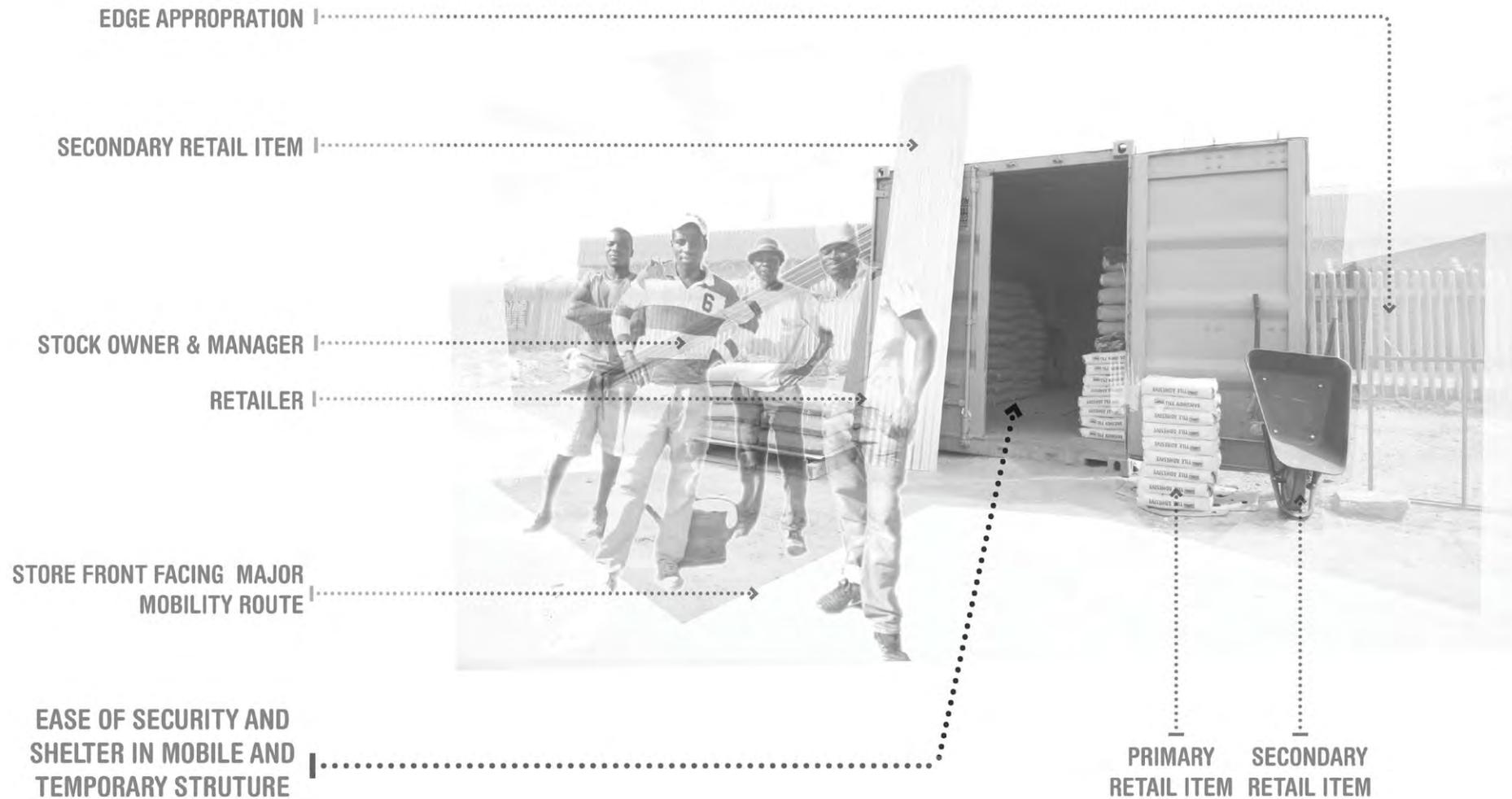
ON-SITE OBSERVATION OF CONTAINER APPROPRIATION



Appendix Illus: 10 Summary of container retail, storage and living (Author, 2011)

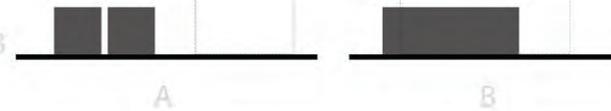
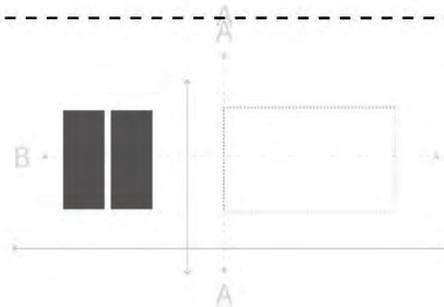
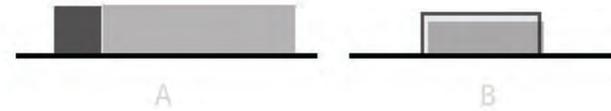
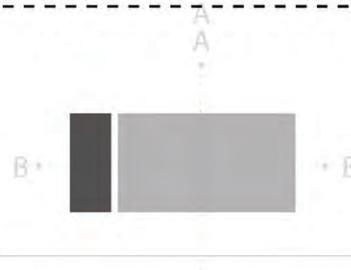
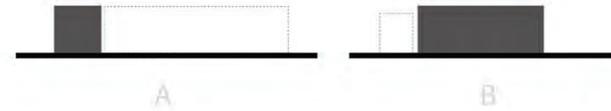
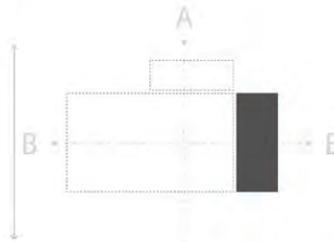
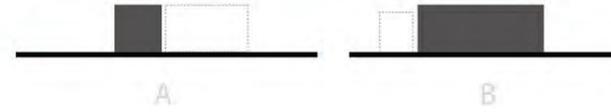
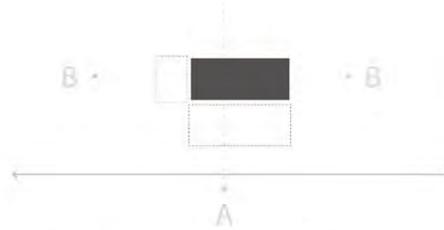
AGENTS OF OWNERSHIP

APPROPRIATION OF SHIPPING CONTAINERS BY RETAIL VENDORS AND PROSPECTIVE BUSINESS'S:
CEMENT & BUILDING MATERIAL RETAIL

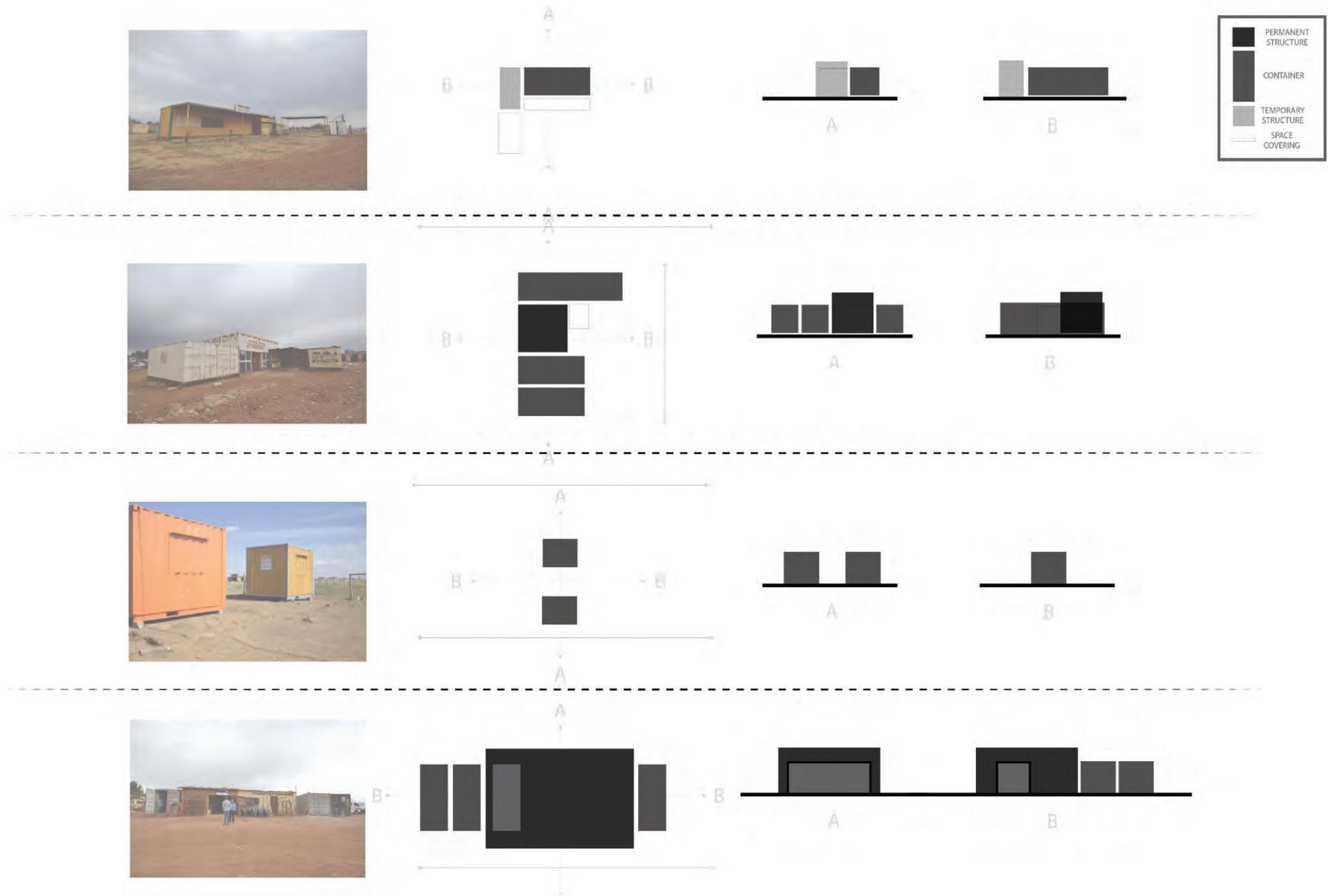


Appendix Illus: 11 Summary of agents of ownership in container form. (Author, 2011)

9.2.3 ON-SITE OBSERVATION OF CONTAINER SPATIAL CONDITION

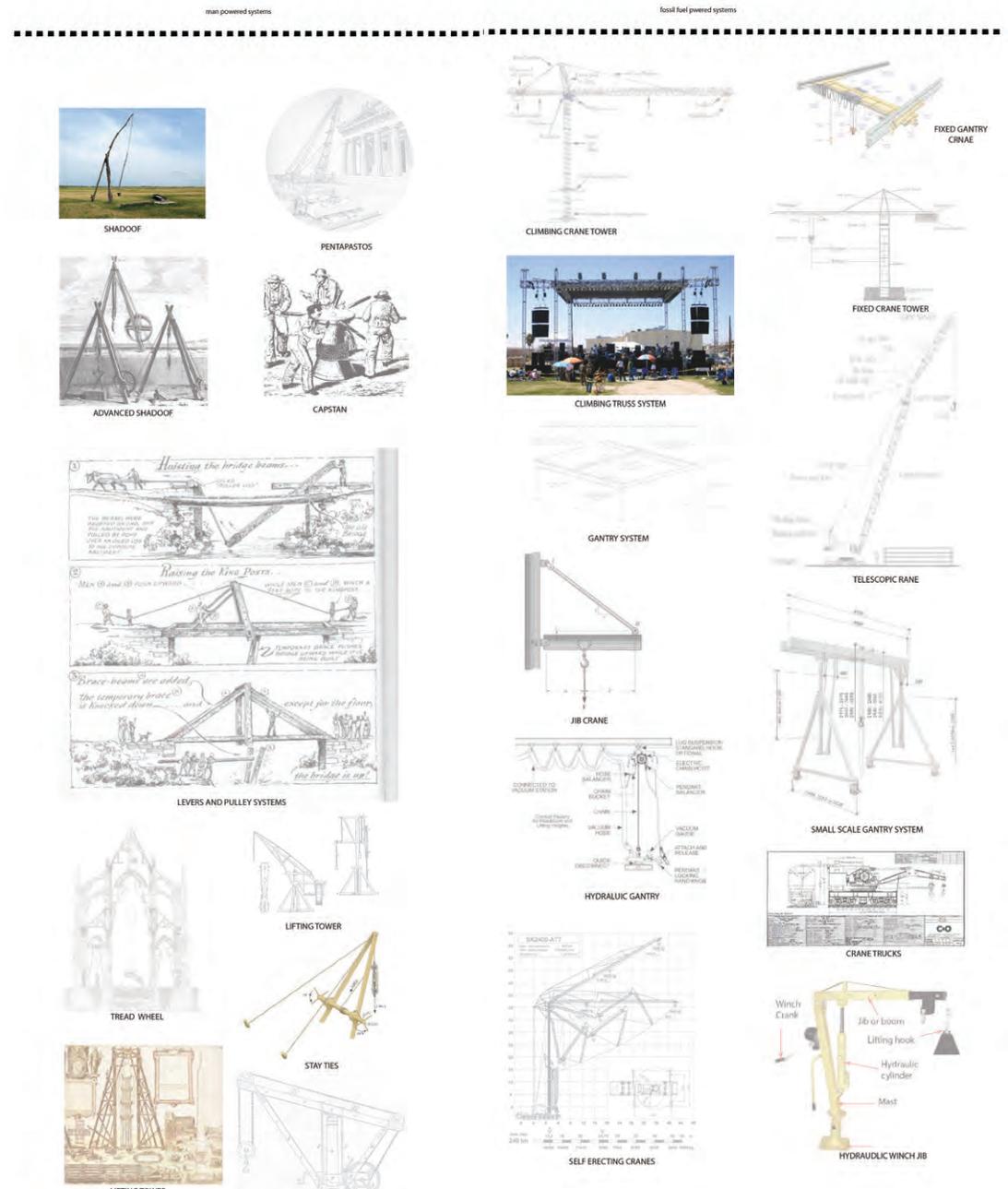
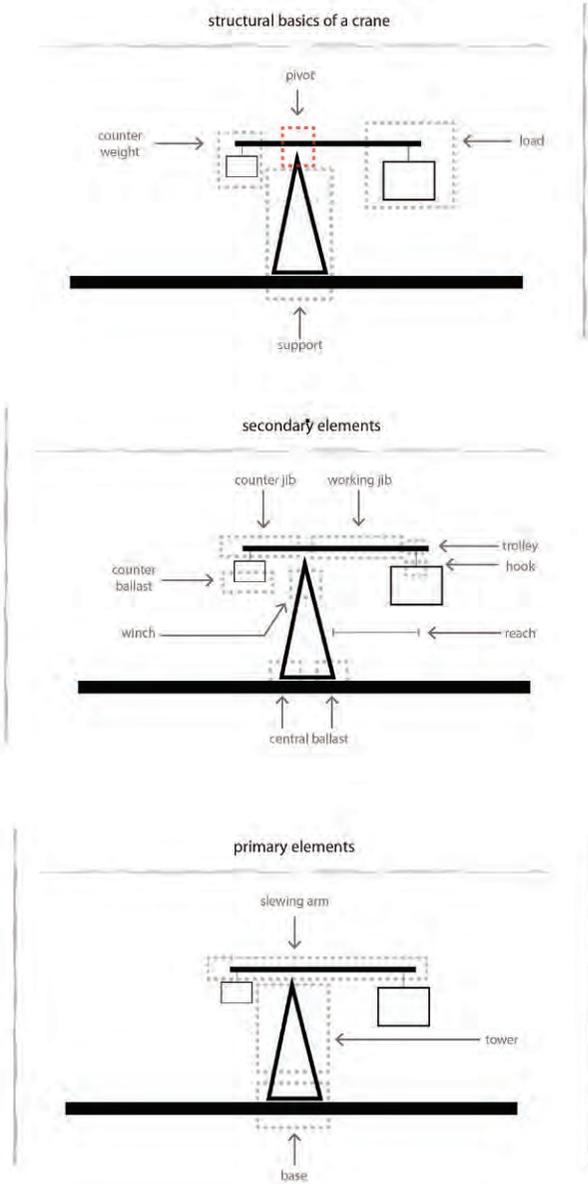


Appendix Illus: 12 Spatial exploration of container appropriation: 1 (Author, 2011)



Appendix Illus: 13 Spatial exploration of container appropriation: 2 (Author, 2011)

9.3.1 SPATIAL AND STRUCTURAL RESEARCH ON LIFTING



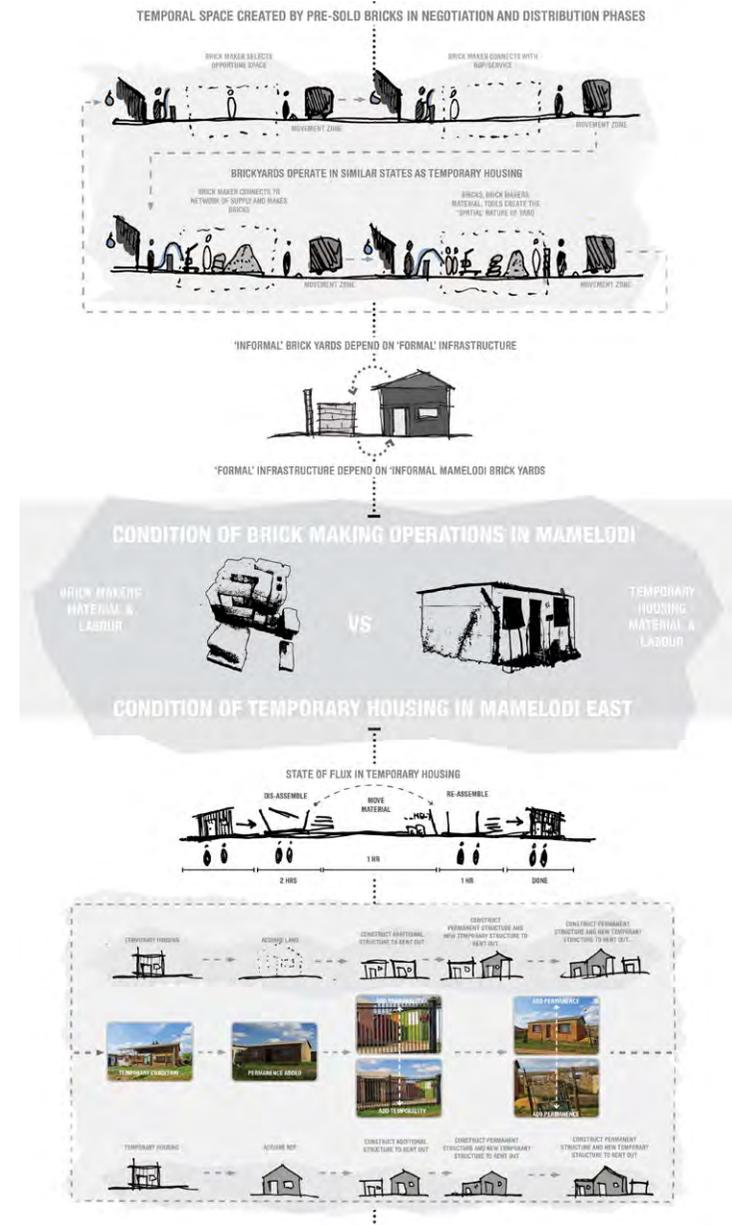
Appendix Illus: 14 Diagrammatic exploration of cranes to support manual mechanical lifting (Author, 2011)

9.3.2 HISTORIC SUMMARY OF FRAME AND INFILL



Appendix Illus: 15 Historic breakdown of frame and infill structure (Author, 2011)

9.3.3 CONDITIONS BETWEEN BRICK MAKERS AND HOUSING

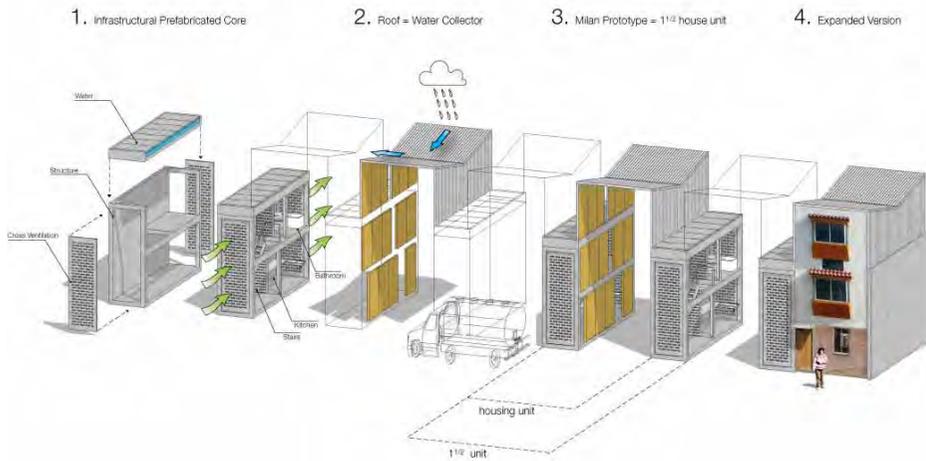


Appendix Illus: 16 Summary of observed conditions in Mamelodi (Author, 2011)

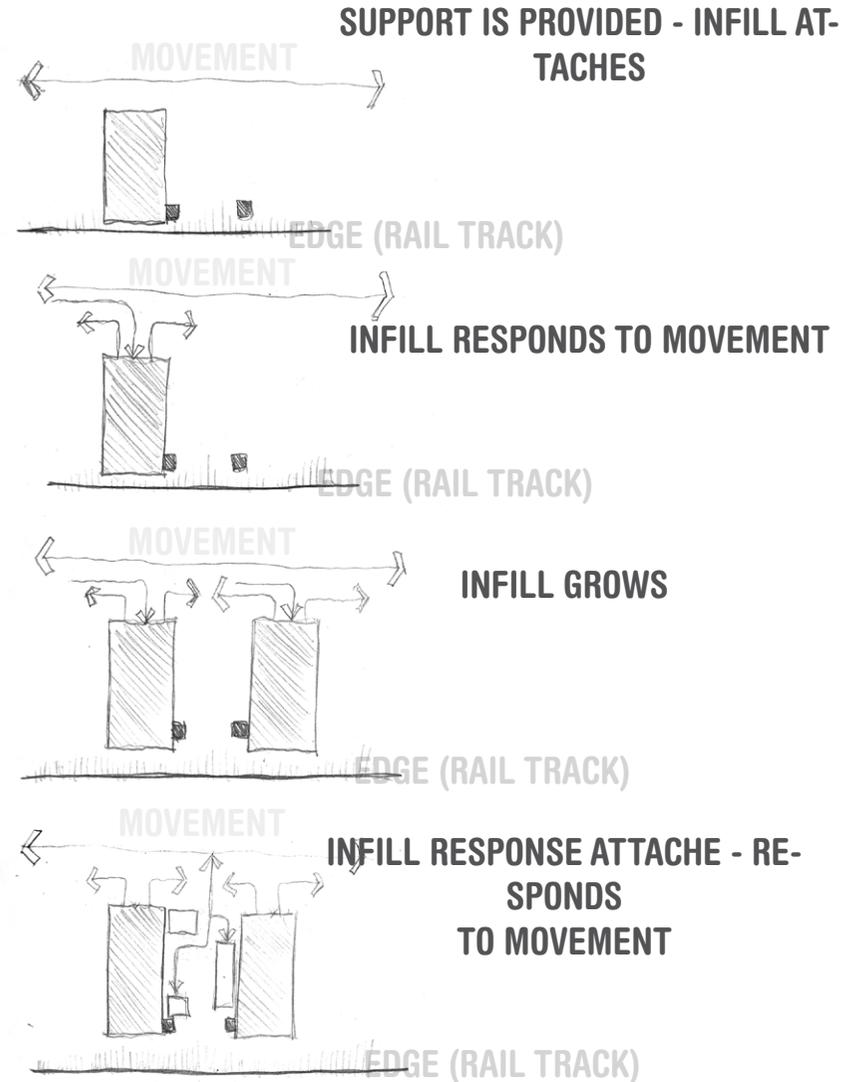
9.3.4 ORIGINAL CONCEPTION OF UNIT OF GROWTH

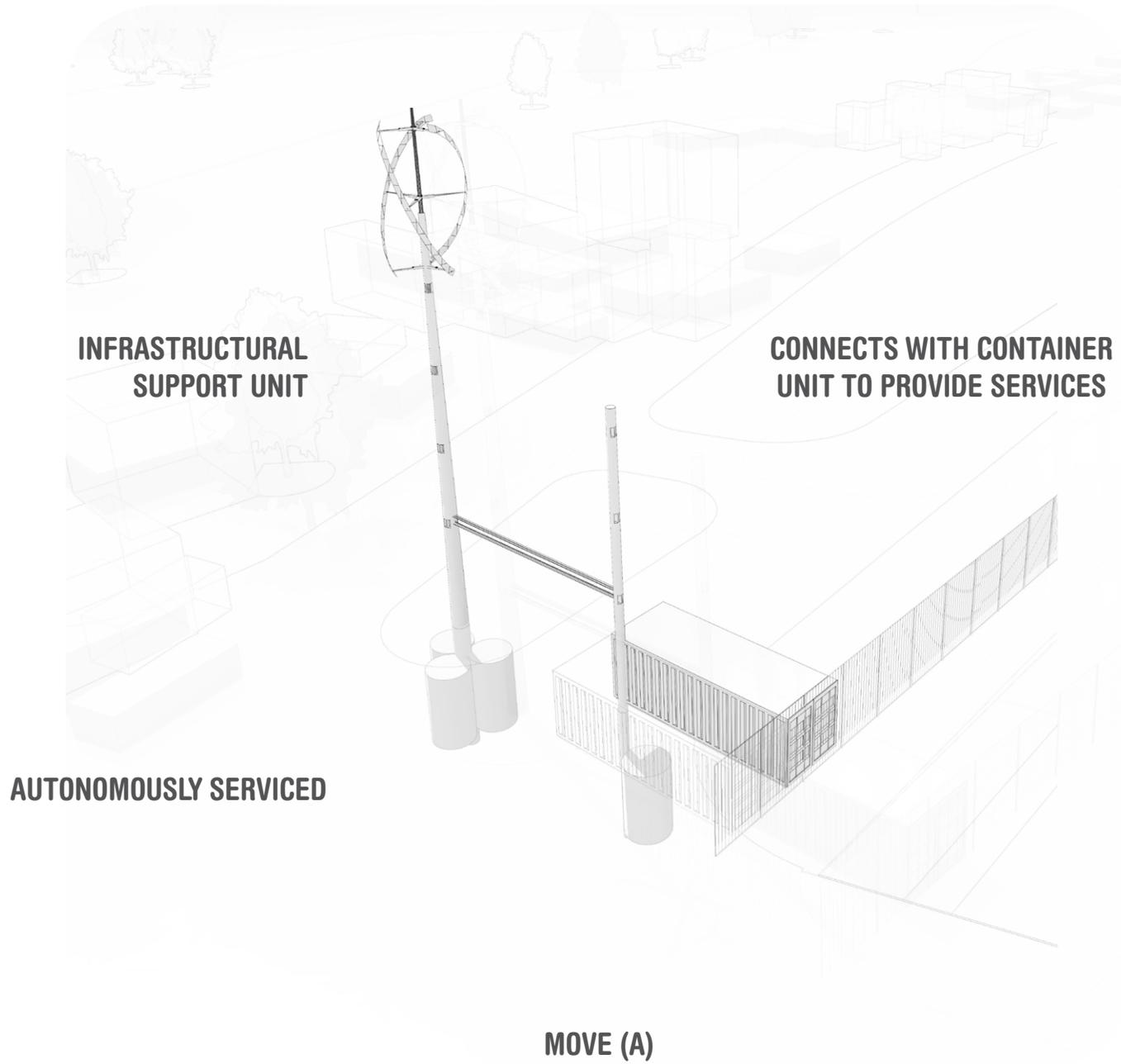


APPENDIX SECTION C: DESIGN OPTIONS & FURTHER ANALYSIS

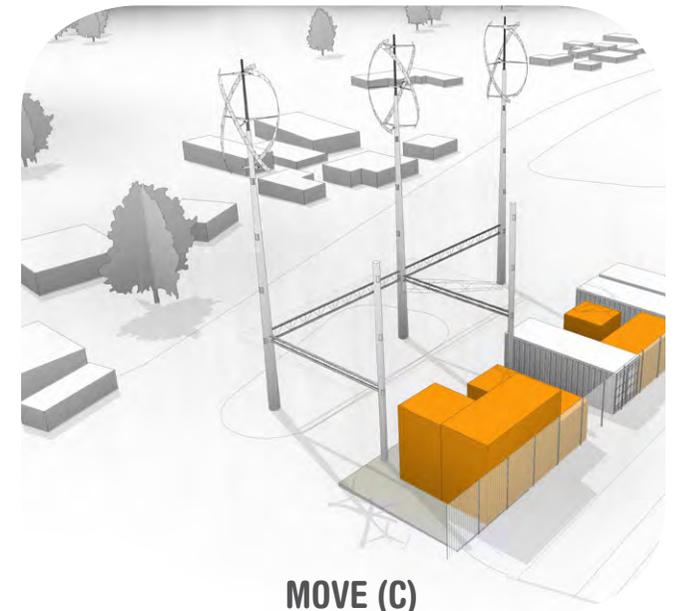


- INFILL RESPONSE (AGENT OF OWNERSHIP)
- ▨ INFILL (AGENT OF OWNER-)
- ▩ SUPPORT - AGENT OF OWNERSHIP (SERVICE)



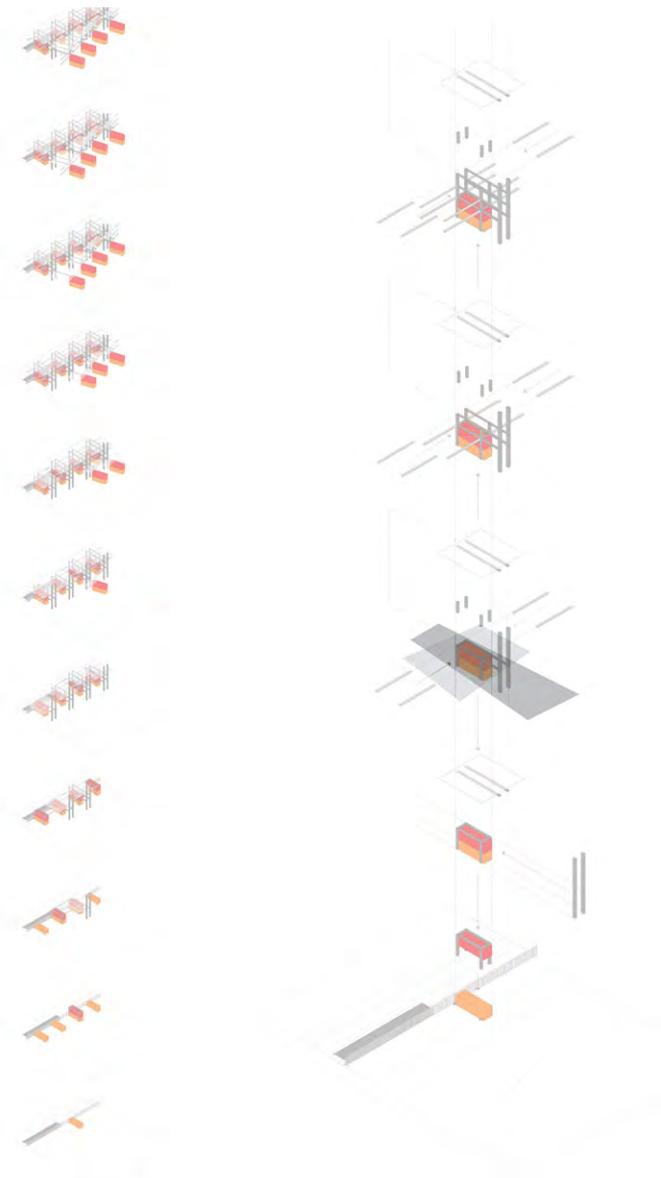


MOVE (B)

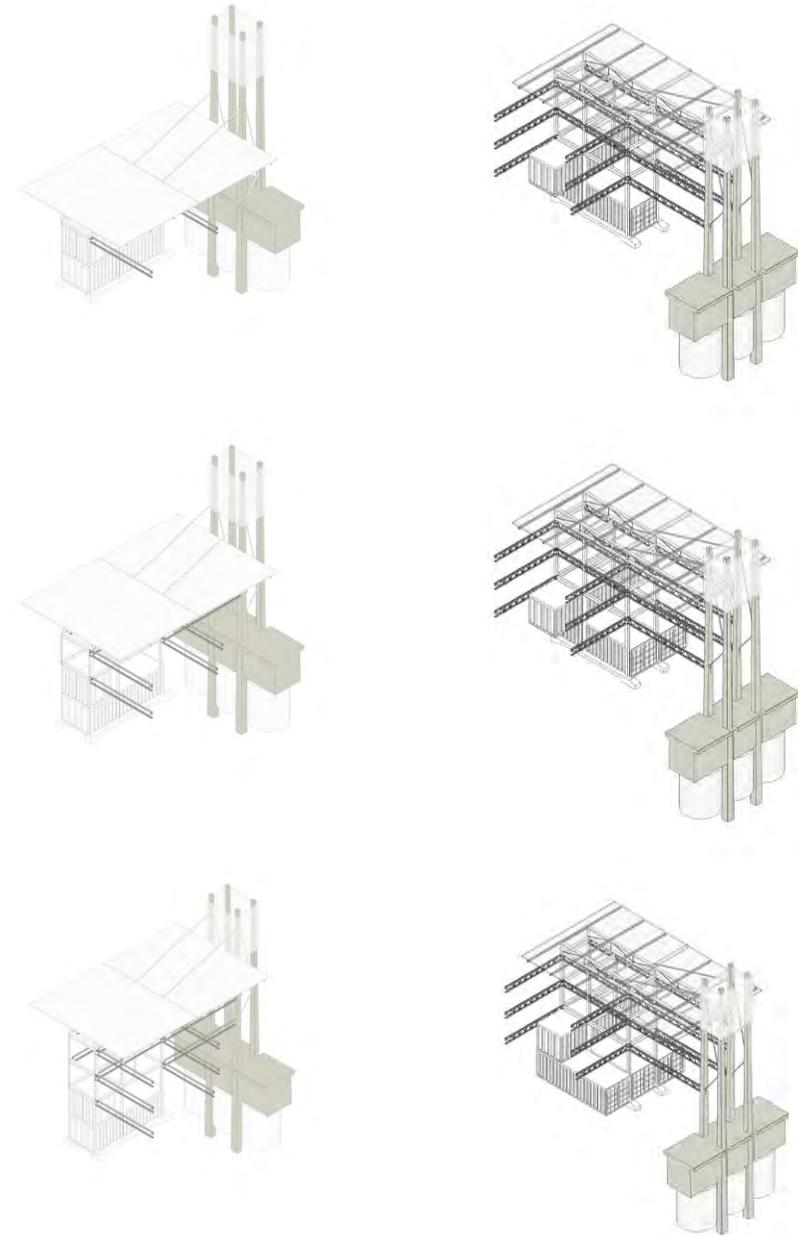


MOVE (C)

9.3.5 FURTHER EXPLANATION OF UNIT OF GROWTH

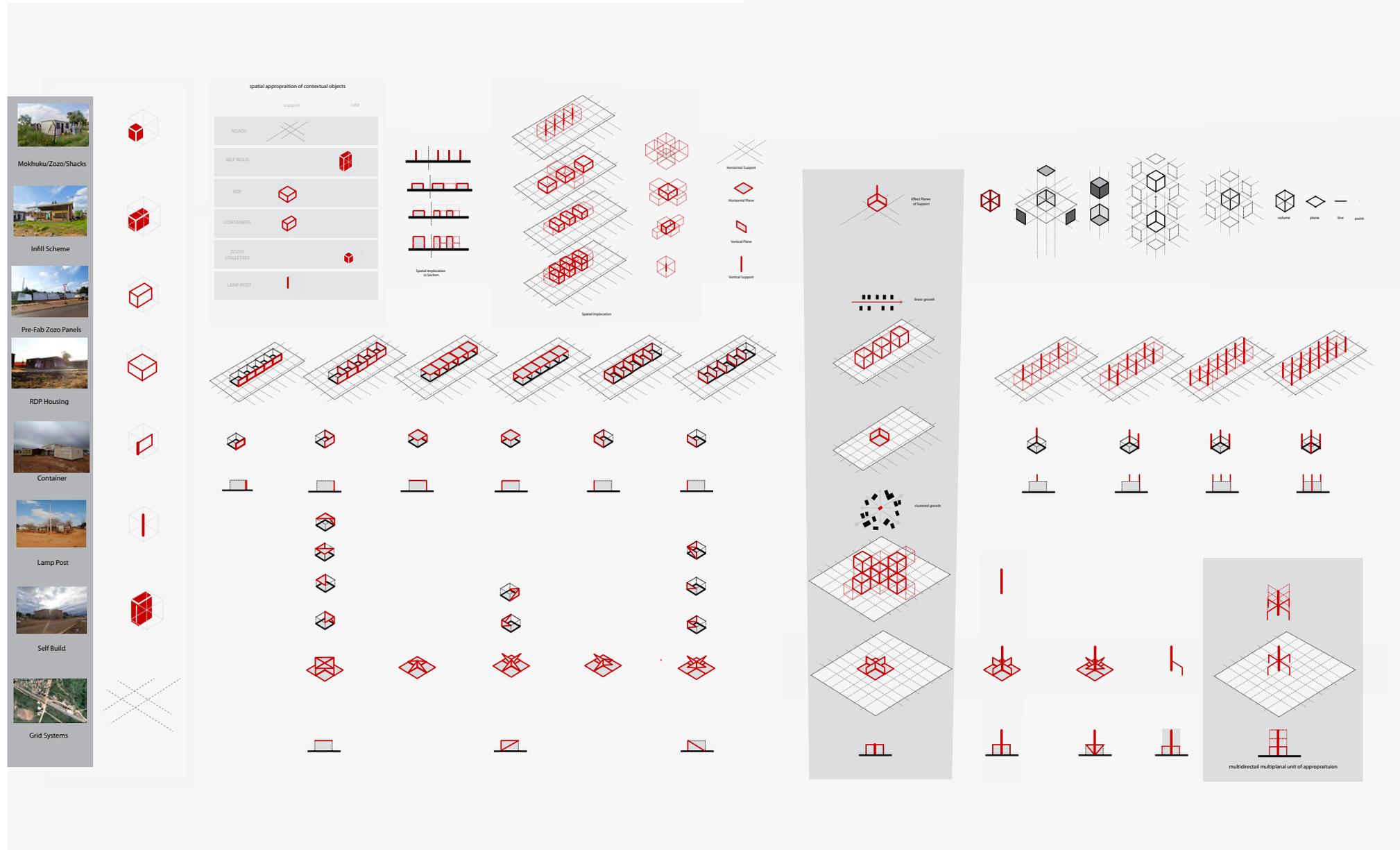


Appendix Illus: 21 Exploration of form and process to create a process of self-build : 1 (Author, 2011)



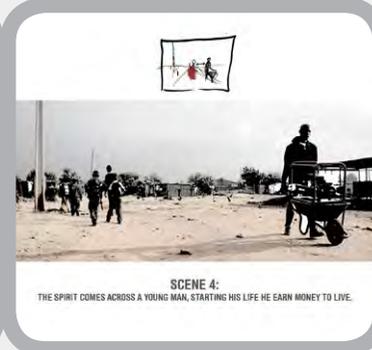
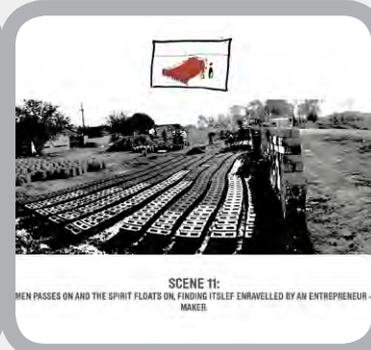
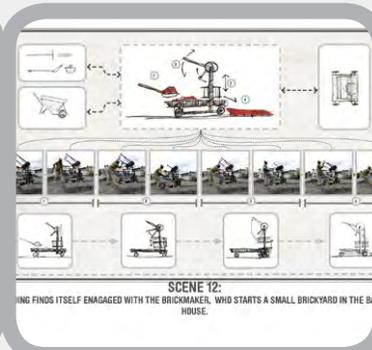
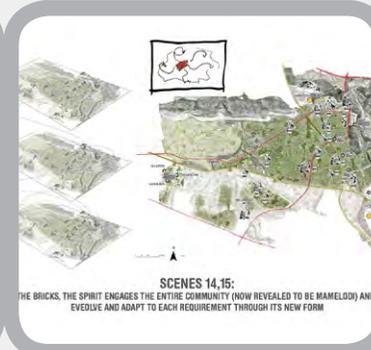
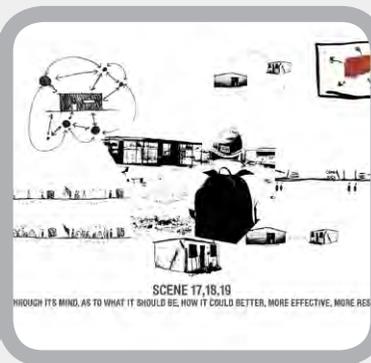
Appendix Illus: 20 Exploration of form and process to create a process of self-build : 2 (Author, 2011)

9.3.6 SUMMARY OF UNIT OF GROWTH

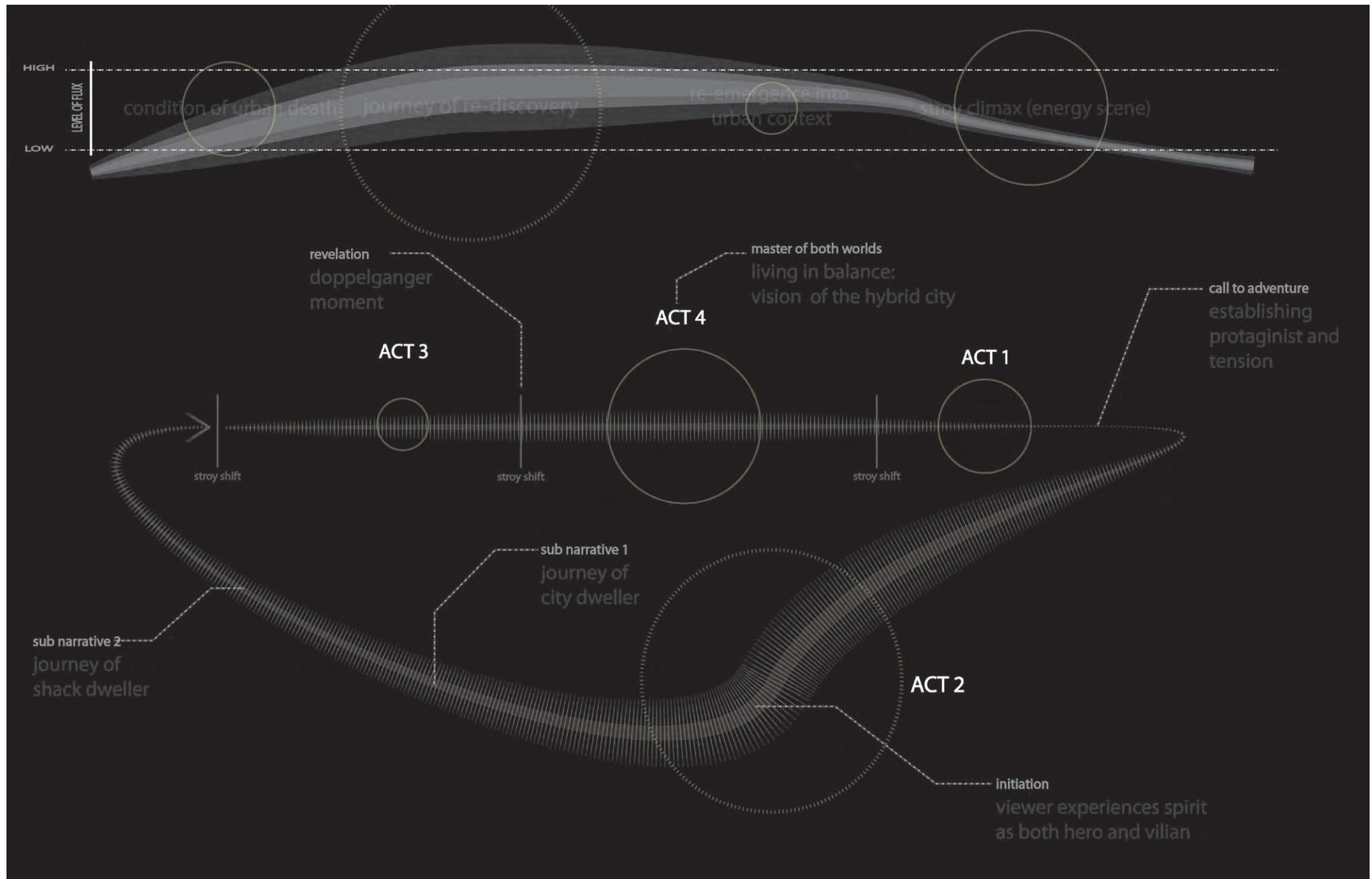


Appendix Illus: 22 Summary of form, process and history of form (Author, 2011)

9.4.1 STORY BOARD TO CNCI FILM COMPETITION

 <p>SCENE 1 SET IN PERBURGAN SOUTH AFRICA A LONELY SPIRIT ARRIVES BY TRAIN.</p>	 <p>SCENE 2,3: THE SPIRIT IS UNREST AND UNSURE OF ITS PURPOSE. IT WANDERS THE ITS SURROUNDING, SEARCHING FOR PURPOSE AND MEANING IN A TURBULENT SOCIETY.</p>	 <p>SCENE 4: THE SPIRIT COMES ACROSS A YOUNG MAN, STARTING HIS LIFE HE EARN MONEY TO LIVE.</p>	 <p>SCENE 5: THE SPIRIT TAKES THE FORM OF HIS SMALL STALL THAT HE SELLS BOUGHT GOODS FROM TO PAY HIS TUITION.</p>	 <p>SCENES 8,9,10 THE SPIRIT EMBRACES THE FAMILY AND BECOMES THE IDOL PROTECTING AND SUPPORTING HER, THE WALLS BECOME HER WARM.</p>
 <p>SCENE 6: THE SPIRIT ALONE NOW, IS MET BY AN OLD WOMEN WHO SEES IT FOR WHAT IT IS. SHE INVITES IT INTO HER HOME, BECOMES THE HOME SHE NEEDS FOR FATHERLESS CHILDREN.</p>	 <p>SCENE 11: A WOMAN PASSES ON AND THE SPIRIT FLOATS ON, FINDING ITSELF ENWRAPPED BY AN ENTREPRENEUR WHO MAKES BRICKS.</p>	 <p>SCENE 12: THE SPIRIT FINDS ITSELF ENGAGED WITH THE BRICKMAKER, WHO STARTS A SMALL BRICKYARD IN THE BACKYARD OF HIS HOUSE.</p>	 <p>SCENE 13: THE SPIRIT IS EMBODIED IN THE BRICKS MADE BY THE MAN AS SMALL PIECES ARE SOLD OFF AND INTERMIXED WITH THE COMMUNITY.</p>	 <p>SCENES 14,15: WITH THE BRICKS, THE SPIRIT ENGAGES THE ENTIRE COMMUNITY (NOW REVEALED TO BE MAINLEAD) AND EVOLVES AND ADAPTS TO EACH REQUIREMENT THROUGH ITS NEW FORM.</p>
 <p>SCENE 16: THE SPIRIT REACHES A POINT OF OVER SATURATION. IT CAN'T SUPPORT THE COMMUNITY IT HAS NOW BECOME LOVE THROUGH ITS CURRENT FORM. IT BECOMES OVERWHELMED IT WANDERS BACK TO THE SITE WHERE IT ARRIVES AND BEGINS TO REBUILD.</p>	 <p>SCENE 17,18,19 THROUGH HIS MIND, AS TO WHAT IT SHOULD BE, HOW IT COULD BETTER, MORE EFFECTIVE, MORE RESILIENT.</p>	 <p>SCENE 20,21 AS HE THINKS, IT STARTS TO TAKE MANY FORMS, BUILDING AND ADAPTING TO EACH NEW THOUGHT WHILE IT IS IN THIS STATE OF FLUX, IT ATTRACTS MORE PEOPLE TO IT AT EACH NEW MANIFESTATION, GATHERING A LARGER CROWD EACH TIME.</p>	 <p>FINAL SCENES 22,23,24,25: IT REACHES A FINAL STAGE OF EMERGENCE. IT CANNOT HELP EVERYONE, CANNOT BE EVERYTHING, ASSIMILATING ALL IT HAS LEARNED WHAT IT NEEDS TO BE: A FORM AND BECOMES SOMETHING BIGGER, LARGER FOREVER TEMPORAL, FOREVER CHANGING ADAPTING.</p>	 <p>FINAL SCENES 22,23,24,25: IT REACHES A FINAL STAGE OF EMERGENCE. IT CANNOT HELP EVERYONE, CANNOT BE EVERYTHING, ASSIMILATING ALL IT HAS LEARNED WHAT IT NEEDS TO BE: A FORM AND BECOMES SOMETHING BIGGER, LARGER FOREVER TEMPORAL, FOREVER CHANGING ADAPTING.</p>

Appendix Illus: 23 The storyboard for the CnCI Moving Spaces film competition (Author, 2011)



Appendix Illus: 24 Conceptual breakdown of film concept into dissertation concept (Author, 2011)

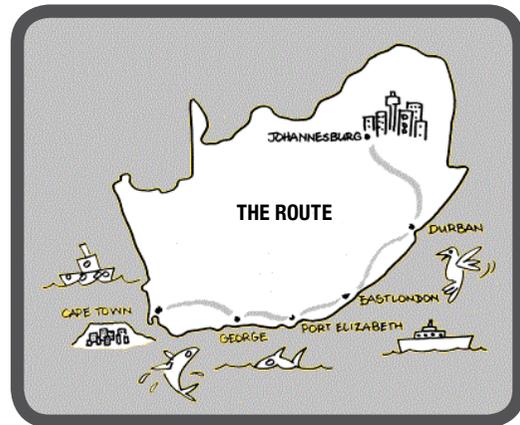
9.5.1 RESEARCH TRIP SUMMARY

During the December/January 2011 period the author undertook a countrywide architectural field research trip to focus on architecture in developing contexts in South Africa.

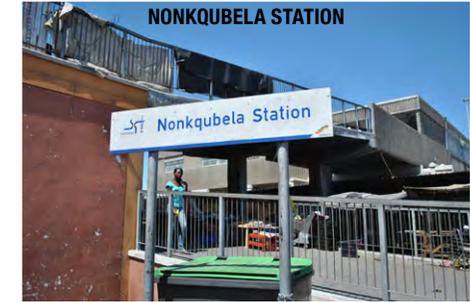
The focus of the trip began as a quite broad look into contemporary Architecture in developing settlements of South Africa - I had no specific question to answer, I felt the journey was more a search for a question rather than a search for an answer.

From the trip a set of intangible lessons of good programming, bad materiality and spatial conditions as well as interesting conditions in unexpected places.

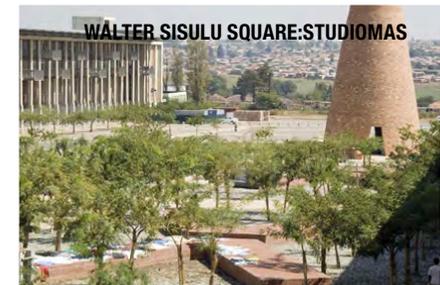
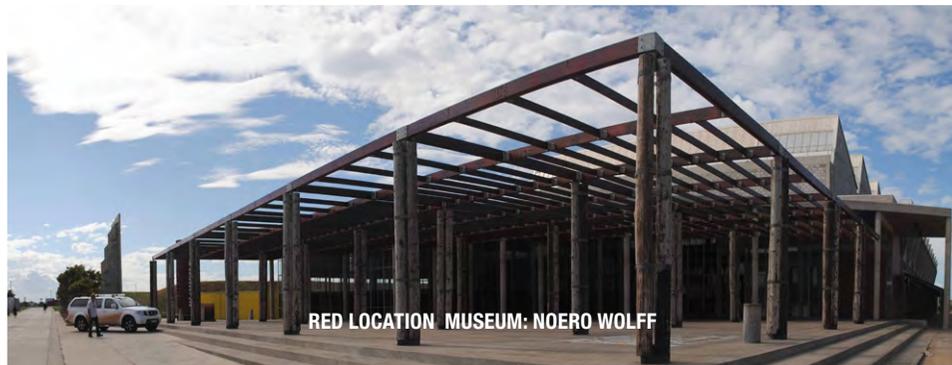
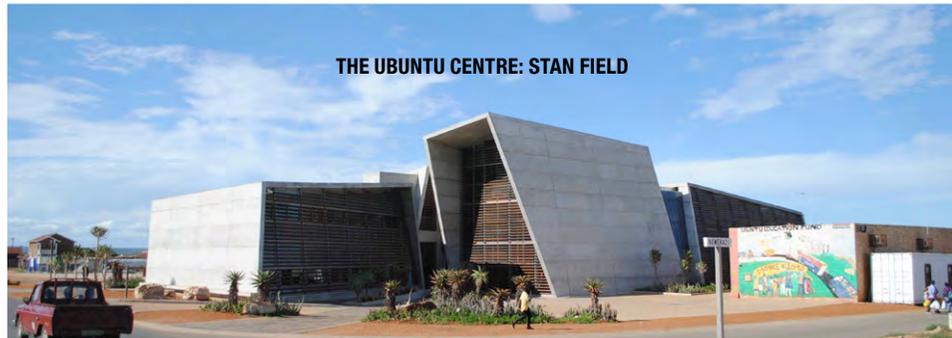
APPENDIX SECTION E: RESEARCH TRIP



Appendix Illus: 26 Summary of research trip (Author, 2011)



Appendix Illus: 25 Summary of research trip Western Cape (Author, 2011)



Appendix Illus: 27 Summary of research trip: Kwa-Zulu Natal & Eastern Cape (Author, 2011)

Appendix Illus: 28 Summary of research trip: Gauteng (Author, 2011)

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