

Incremental Support Structures
for Housing and Urbanisation

• • •
*M.Arch dissertation for
the University of Cape Town*

Lawden Holmes

October 2015

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

PROPOSITION

What is the role of the architect in the upgrading of informal settlements?

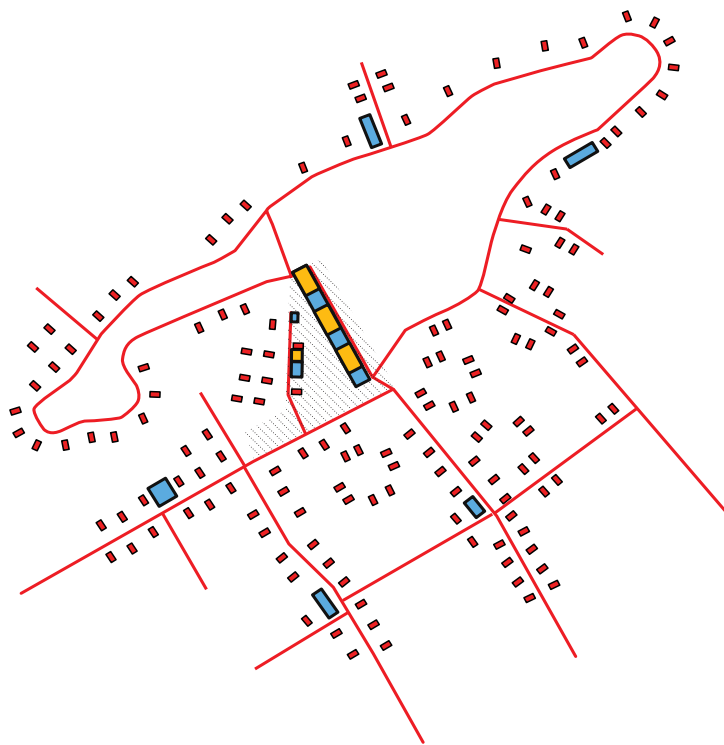
ABSTRACT

South Africa is experiencing unprecedented population growth due to rapid urbanisation. This growth often overwhelms the current planning and developmental capacities of city-regions acutely impacting informal settlement areas. As a result the city's most vulnerable citizens experience poor service delivery and poor living conditions.

This project proposal challenges the current approach to housing delivery and the upgrading of informal settlements in urban areas of South Africa. It is positioned within a complex informal housing environment with poor basic infrastructure and high exposure to the risk of fire and flooding in winter. Based on the research of this project, the Barney Molokana Section in Khayelitsha was selected as the conditions above were evident in this informal settlement.

The project comprises three parts; the first is a proposal for an infrastructural intervention aimed to act as a settlement organisational device, the second is a public amenities building that promotes an active public interface and a didactic architecture and the third a series of support structures that further promote the concept of incremental housing development.

The process learnt from existing spatial configurations and transformations within informal settlements allowed the working backwards to discover the minimal elements or support structures from which a settlement can grow incrementally.



1 : Conceptual diagram showing infrastructural and institutional support structures, newly defined public space and dispersed housing supports.

ACKNOWLEDGEMENTS

I would like to express my deep gratitude to Mr Siyabulela, BM Section community leader, for his willingness to walk me through the settlement and open my eyes to the ways of life of so many South Africans. Melinda Silverman for her valuable critique of my work and putting up with my argumentativeness.

I would like to thank the following people: My mother for her attention to detail when trying to make my life easier. Heinrich Wolff, for his guidance and availability. The not-for-profit organisations that helped me along the way, Peoples environmental Planning (PEP) and CORC, The late night studio group for good advice and even better company. Brogan Bradfield, for her support and encouragement throughout the year.

This year would not have been possible without the financial support offered by the: The Knowledge Co-op, The Chemi Top Black Mamba Scholarsip, The Hugh and Winwalker Scholarship and the Masters Research Bursary.

A special acknowledgement to my fellow M.arch students for their companionship and for making up a large amount of my architectural education. I hope we all design the buildings we wish existed.

Incremental Support Structures for Housing and Urbanisation

*Multiscalar Interventions for the upgrading of the
BM Section Informal Settlement*

Supervisors: Melinda Silverman
Assisted by : Associate Professor Nic Coetzer
Kevin Fellingham
Matteo Fraschini

22 October 2015

*This dissertation is presented as part fulfilment
of the degree of Master of Architecture (Professional)
in thwe School of Architecture, Planning and Geomatics,
University of Cape Town*

PLAGIARISM DECLARATION:

- 1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.*
- 2. I have used the Chicago convention for citation and referencing. Each contribution to, and quotation in, this report from the work(s) of other people has been attributed, and has been cited and referenced.*
- 3. This report is my own work.*
- 4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.*

Signature: _____

'We may find we have too many architects skilled at designing museums and mansions, and too few able to work with indigent people and communities in need of basic housing, sanitation, and security'.

(Thomas Fisher, 2008)



2: BM Section Informal Settlement, Khayelitsha

CONTENTS

• • •

M.Arch dissertation

	I	Abstract
	II	Acknowledgments
	III	Plagiarism Declaration
	00	INTRODUCTION
Part 1 : <i>COMPLEXITIES IN HOUSING AND URBANISATION IN SOUTH AFRICA</i>	01	OVERVIEW AND OUTLINING THE CHALLENGE (Pg. 8) HOUSING BACKGROUND & CURRENT VISION (Pg. 10) CURRENT SITUATION (Pg. 12) INFORMAL SETTLEMENTS & THEIR UPGRADING (Pg. 14) THE UPGRADING OF INFORMAL SETTLEMENTS PROGRAMME (UISP) (Pg. 18) THOUGHTS ON IMPROVEMENT (Pg. 22)
Part 2 : <i>THEORETICAL POSITION, TOWARDS ALTERNATIVE URBAN STRATEGIES</i>	07	INTRODUCTION (Pg. 25) EXERCISES IN COMMUNITY PLANNING (Pg. 26) CASE STUDY: <i>MTSHINI WAM</i> (Pg. 28) INSURGENT ARCHITECTURE AND THE IMPORTANCE OF USER INPUT. CASE STUDY: <i>TORRE DE DAVID</i> (Pg. 32) ANTICIPATORY DESIGN AND THEORY OF 'SUPPORT STRUCTURES'. CASE STUDY: <i>RIO DE JANEIRO, FAVELA BAIRRO</i> (Pg. 36) INFORMAL ARMATURE AND THE ROLE OF THE ARCHITECT. CASE STUDY: <i>DU NOON TOWNSHIP</i> (Pg. 42) CONCLUSION (Pg. 46)
Part 3 : <i>FIELD RESEARCH AND LESSONS FROM THE GROUND</i>	17	PARTICIPATION (Pg. 50) CORC ENUMERATION (Pg. 52) COMMUNITY MEETING (Pg. 56) EMPOWER SHACK (Pg. 58) PAST RESEARCH: ONE CITY STUDIO (Pg. 60)
Part 4 : <i>BECOMING FAMILIAR WITH CONTEXT AND SITE RISKS</i>	20	CONTEXT (Pg. 70) DESIGNING FOR FIRE (Pg. 72) STRATEGIES (Pg. 76) DESIGNING FOR FLOODING (Pg. 82) STRATEGIES (Pg. 84) TECHNICAL REFLECTION (Pg. 88)
Part 5 : <i>SITE ANALYSIS, UNDERSTANDING THROUGH MAPPING AND EXPERIENCE</i>	29	BM SECTION, <i>KHAYELITSHA</i> (Pg. 93) SANITATION (Pg. 94) MAPPING (Pg. 94)
Part 6 : <i>DESIGN DEVELOPMENT</i>	31	STRATEGIES OF INTERVENTION: MULTISCALAR SYSTEMS OF SUPPORT (Pg. 109) STEP 1: INFRASTRUCTURE AS SETTLEMENT ORDERING DEVICE. STEP 2: PUBLIC SPACE AND ALTERNATIVE SERVICE PROVISION AS CATALYST FOR COMMUNITY ENGAGEMENT (Pg. 116) STEP 2.1 :PUBLIC AMENITIES BUILDING AS INSTITUTIONAL SUPPORT AND ARCHITECTURAL DIDACTIC (Pg. 118) STEP 3: NODES OF SUPPORT (Pg. 150)
Part 7 : <i>FINAL MULTISCALAR INTERVENTION</i>	36	DRAWINGS ILLUSTRATING PROCESS OF INTERVENTION (Pg. 157)

INTRODUCTION

In part 1, this dissertation reflects on the housing context in South Africa, in particular the growth of informal settlements due to urbanisation, and reviews the associated policy environment. In part 2, key theories in alternative urban strategies are presented, along with global and local case studies. In part 3, this dissertation engages with participatory processes which support informal settlement upgrading. In part 4 the context and site risks of the BM section in Khayelitsha are unpacked, along with proposed strategies to mitigate these risks. In part 5, a mapping process conducted through field research is presented to inform the site analysis. In part 6 this dissertation presents a series of design interventions, each informed by a design development process and strategy. Finally in part 6, final drawings of the phased, multiscale intervention are presented.

PART 1

• • •

*COMPLEXITIES IN HOUSING AND URBANISATION IN
POST-APARTHEID SOUTH AFRICA*

OVERVIEW AND OUTLINING THE CHALLENGE

Contemporary cities are experiencing unprecedented growth due to the influx of people moving from rural to urban areas. Africa and Asia are urbanising faster than any other continent and are projected to become 56% and 64% urbanised respectively by the year 2050 (Davis 2007). This growth often overwhelms the current planning and developmental capacities of city-regions. If cities are to accommodate this movement it is estimated that globally, we will need to build a city for 1 million people every 5 days until the year 2050 (Davis, 2007). In the global south, where the majority of people live in what is termed informal settlements or slums, impacts of this rapid growth are most severe creating worrying patterns of inequality and cycles of perpetual poverty.

Informal settlements have for some time been stigmatised as a problem in cities. However in the South African context, these settlements are often the consequence of apartheid planning, subsequent policy decisions and rapid urbanisation. In the past these settlements have been neglected or eradicated through forceful relocation and the development of cookie-cutter housing projects, all of which fail to grasp the potential opportunity for vibrant and balanced urbanism. Realising the opportunity depends on various stakeholders making use of pre-emptive design and innovation in the re-design and re-development of informal settlements.

A review of South Africa's relevant informal settlement and housing policies will help contextualise these past approaches and highlight government's challenges with capacity and resources in delivering formal

housing projects. A decisive and pragmatic pivot in policy has therefore taken place. The pivot has been towards an incremental approach to upgrading informal settlements, which today stands at 1.2 million households (Ziblim 2013). There is an urgent need for creative solutions and urban interventions that seek to contribute to the appropriate development of informal settlements. These interventions should comprise explorations on a spatial, social, economic and environmental scale. Without such action, the risk of civil unrest may continue to increase - as is being played out on the streets of South African cities in the form of regular service delivery protests and a poor quality of life for many will persist - (Cooke 2014).

Existing informal settlements can in fact provide adequate shelter and social networks, both of which most housing programs fail to provide (Gouverneur, 2014). Within this context, what is then the division of roles between the architect, the residents and government authorities in building homes?

Fig 1 : Conceptual diagram

Fig 2 : BM Section Informal Settlement, Khayelitsha

Fig 3 : Collage showing the juxtaposition between the formal and informal.



3 : Collage showing the juxtaposition between the formal and informal.

HOUSING BACKGROUND & CURRENT VISION

Since the 3rd United Nations Conference in Istanbul in 1996 there has been a growing sense of urgency about the need to address the unprecedented growth of Informal settlements. This conference presented a significant shift in the discourse of global policy in the provision of adequate shelter for the movement of people from rural to urban areas (Ziblim, 2013). The Istanbul Declaration on Human Settlements had a direct effect on the United Nations Millennium Development Goals which set a target to improve the lives of over 100 million informal settlement dwellers by the year 2020 (UN Habitat, 2003). As a response, South Africa sought to realign its policies with international treaty agreements and specifically those that prompted national slum upgrading programs. This led to the 2004 review of the country's housing policy and introduced Breaking New Ground (BNG), a policy which included a programme focused on upgrading informal areas termed the Upgrading of Informal Settlements Programme (UISP).

(Huchzermeyer, 2010).

Two dominant approaches anchored the BNG policy; the first referred to as "total redevelopment" whereby the existing informal settlement is demolished and the inhabitants are relocated to suitable greenfield sites elsewhere, in most cases at the periphery of cities. The second approach termed in-situ upgrading entails re-developing the existing informal settlement, where it currently is located, by gradually extending to the residents, land tenure, infrastructure and social services, such as water, sanitation and electricity.

The in-situ upgrading approach is considered more successful in addressing the growth of informal settlements. It is "more likely to be more responsive to poverty and vulnerability and lead to social inclusion, rather than a relocation process, which has the tendency to disrupt fragile community networks and livelihood opportunities (Huchzermeyer 2010)". Despite the desirability of the in-situ upgrading approach, the reality in practice is often quite different.

Huchzermeyer explains that there was "high-level political obsession in South Africa" for our cities to be competitive with City Alliance's 'Cities without Slums' action plan which in addition to the global urban development agenda at the time. This in some sense 'legitimised' the actions of municipalities who showed a preference for slum eradication - since the associated relocations - forced and unforced was more administratively viable to implement

However, after a decade of the UISP programme and its initiatives, which in large part showed a preference for eradication rather than in-situ upgrading the hopes of eradicating all informal settlements by 2014 became an unrealistic one. The growing population of the country would therefore not receive government planned housing and informality as a condition needed to be embraced. This is discussed in more detail below.

Fig 4 : Blikkiesdorp is a so-called 'temporary relocation area' for poor South Africans evicted
Taken on April 8, 2010 Source: www.flickr.com

Fig 5 : Serviced plots for tented accommodation in the Blikkiesdorp Temporary Relocation Area at Delft 34km north-east of Cape Town with Table Mountain in background (coutesy Kerry Chance)



4 : Blikkies Dorp, Temporary Relocation Area



5: Blikkies Dorp, serviced plots for tented accomodation

CURRENT SITUATION

In South Africa it is clear the past few decades of rapid urbanisation has presented some serious challenges for city-regions.

The 2001 census data shows that the total number of South African households who live in an informal settlements in South Africa is 1 779 426 (HDA 2012), Despite efforts commencing in 1994 to provide affordable housing through numerous housing subsidy schemes, South Africa’s housing delivery system is not working. At the time, the national government considered housing delivery to be a key strategy for poverty alleviation, helping with resource distribution to the poor (Ziblim, 2013) The current backlog in the metropolitan region of Cape Town is estimated to be 400 000 houses based on 310 000 households registered on the City’s integrated housing database (Ziblim, 2013). This excludes the vast number of unregistered informal households, backyard shack dwellers and immigrants.

The second challenge is the worrying levels of inequality in South African cities. These patterns are evident within our built environment in the clear spatial lines of racial segregation inherited from Apartheid planners. The inequality can be measured in terms of the differences in income, access to infrastructure and provision of services. And correlate almost directly with the apartheid spatial precincts that favoured the white population. Figure 2 shows the UN Habitat’s Gini Coefficient that depicts the levels of income inequality in the worlds cities. It is clear that the situation in African cities is alarming.

The third challenge can best be described by Trevor Ngwane, a social change researcher focusing on the mobilisation of large numbers of people displaying their grievances in protests - commonly known as service delivery protests. Between 2004 and 2008 there have been 8000 peaceful gatherings and 700 incidents of unrest as recorded in police figures (Ngwane, 2010). Ngwane suggests that the high number of protests

Relative Difference in Wealth between Rich and Poor

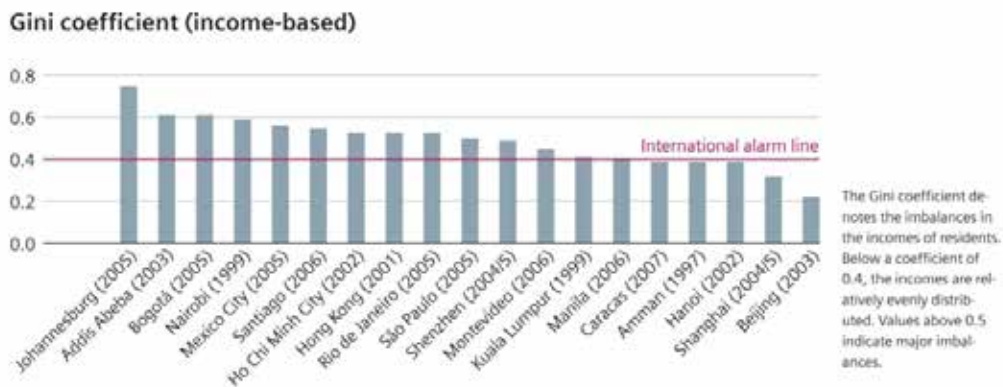


Fig 6 : UN Habitat’s Gini Coefficient that depicts the levels of income inequality in the worlds cities
Source: UN Habitat, Global Urban Observatory, 2009

Fig 7 : Service delivery protest, Source : www.timeslive.co.za, (coutesy Siphilwe Sibeko)

have resulted in South Africa acquiring the title of the “protest capital of the world” (SACSI, 2014) . And, while these protests have been labelled as service delivery protests the issues are not solely related to the lack of the provision of services and infrastructure but almost equally attributed to uneven development and social and economic exclusion. (SACSI, 2014)

In the light of these challenges, urbanisation requires creative solutions not solely from the world’s designers and engineers but all occupants and stakeholders who live in and engage with informal areas. A serious acknowledgement of the lived reality is required: that is that people are the dominant builders and designers of our current urban environment and that designers have to engage and understand the realities of the circumstances (Neuwirth, 2005). It is now more apparent, that South African cities have been developed without acknowledging the capacity

of residents to house themselves, the limitations of their socio economic situation and the potential for a transformation of existing informal settlements into sustainable urban forms. The next chapter expands on the first challenge unpacks the complexities of housing, informality and the upgrading of informal settlements.



7 : Service delivery protest

INFORMAL SETTLEMENTS AND THEIR UPGRADING

The majority of Africa's urban population reside in informal settlements. Research conducted across Africa by UNCHS depicts the size of these populations. Between 70% and 95% of all new housing built in developing countries was built in informal settlements. Informal settlements are defined by two particular themes within all definitions: (i) the houses are illegally built and (ii) there is limited access to basic services (water, roads, sewerage and storm water etc.) and community amenities such as schools and clinics. In this instance the word illegality can refer to houses built without permission from the authorities or houses built on land which has neither been formally purchased nor zoned for residential development (Sheuya 2004).

The various causes for illegal construction of informal settlements include:

1. Costly fees for acquiring and surveying land.
2. Formal housing requires skilled professionals to design and construct.
3. High population growth rate.
4. High rates of urbanization
5. Slow economic growth
6. Restricting or inappropriate policies.

Informal settlements comprise a dense urban fabric with shacks or structures that appear in various shapes and sizes. A 2014 enumeration study of 3000 shacks in Khayelitsha, 43% of the shacks were less than 10sqm and only 10% were larger than 25sqm, housing three people on average (Bolnick 2009).

The most recognised form of housing delivery for people living within these areas comes from the government in the form of subsidised housing which is implemented by the private sector. However, something quite unexpected is evident. The construction of shacks by people matches or equals the efforts of the government. Informal settlements house 62% of African urban dwellers and specifically in South Africa more than 50% of the urban poor. Some people may argue that the informally constructed city is the real African city due to the significant contribution of city making outside housing delivery orchestrated by the government (Pieterse 2009).

Since 1994, the government's housing delivery rate has been approximately 160 000 houses per year and while this is one of the largest delivery rates in the world, the backlog of 2.3 million subsidised houses remains the same. The general size of the subsidised house is based on statistics that represent the nuclear family being, a mother, father and 2.5 children. This results in 36 sqm in total space which comprises two bedrooms, a toilet and kitchen (Bolnick 2009). Each beneficiary household can access the R43 506 subsidy.

The current approach to building a subsidised house is to use conventional masonry walls, timber trusses and a clay tile roofing. The building quality is often poor as the contractors cut costs or have had no previous experience in delivering housing at a large scale. Security of tenure is also part of the acquired subsidy. This leaves the vast amount of South Africa's urban poor unable to access security of tenure and forced

Fig 8 : Informal urbanism, traditional beer shebeen. Water colour and fine liner by author.



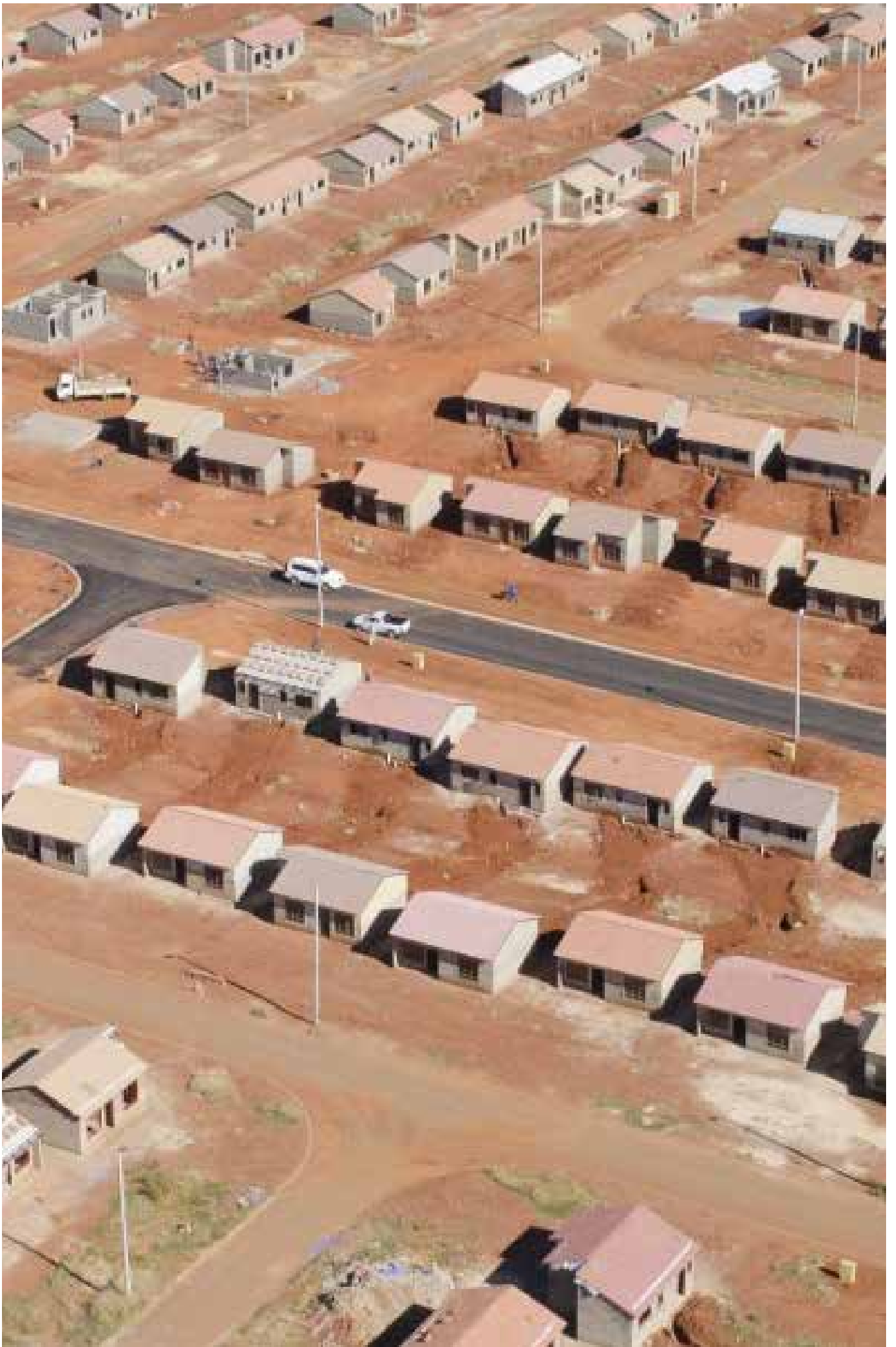
8 : Informal urbanism, traditional beer shebeen

to live as illegal squatters on government owned or private land. The flawed and backlogged system only allows access to security of tenure if the households are integrated into the housing subsidy programme.

The post-apartheid government current housing delivery rate of approximately 160 000 houses per year, although this is quite a feat, the backlog of 2.3 million subsidised houses remains the same. The general size of the subsidised house is based on statistics that represent the nuclear family being, a mother, father and 2.5 children. This yields 36sqm, two bedrooms a toilet and kitchen (Bolnick 2009). Each beneficiary household can access the R43 506 subsidy. The current house model is constructed using conventional masonry walls timber trusses and clay tile roofing. The building quality is poor as the contractors cut costs at every opportunity possible thus leading to problems with the house in the future. Security of tenure is part of the acquired subsidy. This leaves the vast amount of South Africa's urban poor unable to access security of tenure and forced to live as illegal squatters on government owned or private land. The flawed and backlogged system only allows access to security of tenure if the households are integrated into the housing subsidy programme.

Another approach by the government has been to make rental stock more available, this newer option is not new to the people residing in informal settlements as the informal rental market is not only a common means of housing but a large means of income generation. This rental market is in the form of shacks in informal settlements as well as back-yard shacks rented out from the subsidised household. It is also not uncommon for the beneficiaries to sell the subsidised house usually due to the location of the housing development being on the periphery of the city driving up commuting and travel costs dramatically, unable to meet the expense of rates and services.

Fig 9 : Westonaria Borwa Mega Project RDP housing, Source: <http://westonariaborwa.co.za/housing-2/bng-housing/>



9: Typical subsidised housing development

THE UPGRADING OF INFORMAL SETTLEMENTS PROGRAMME (UISP)

The upgrading of informal settlements programme (UISP) was added into chapter 13 of the national housing code in 2004. The programme focuses on the in situ approach, which are more flexible and have a greater participation of communities (Misselhorn 2008). The important shift to a more incremental upgrading approach shifted the responsibility for the provision of land and services to the government and allocating the housing subsidy to the top structure only.

However, this forward thinking policy shift is not without its flaws. The UISP being a four phased program (See diagrams) is heavily regulated by the government within each phase, where the final phase is the construction of a formalised top structure. The worrying issues are that the UISP will only provide funding for informal settlements that are on land suitable for permanent residential development, and that the beginning phases are not approved by the state unless they lead to phase 4, in which the housing consolidation is linked to the housing subsidy program' (Bolnick 2009). Thus the 'new' approach is still based on land, house, services and title as a single package (Misselhorn 2008).

The program is has not been effective with incremental upgrading on the ground and municipalities are using the UISP to speed up delivery of conventional projects through the easily accessible subsidies. Thus the innovative, flexible and self-help solutions this policy is intended for is not manifesting into effective on the ground change. These issues have been highlighted by various not-for-profit organisations. One of these organisations is the Community Organisation Resource Centre (CORC), has identified specific ways to improve the UISP policy (see following page).

Fig 10 : Graphic illustration of task team adapted by author.

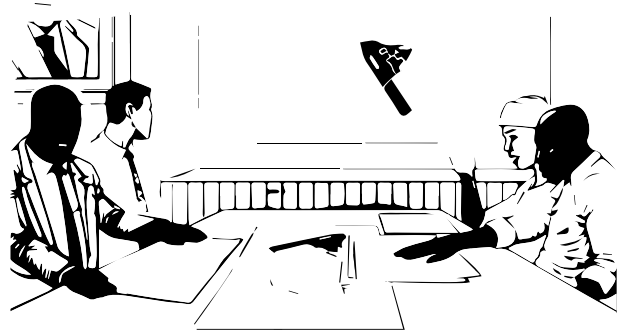
Fig 11 : Graphic illustration of professionals working adapted by author.

Fig 12 : Graphic illustration of infrastructural construction adapted by author.

Fig 13 : Graphic illustration of housing and tenure adapted by author.

PHASE 1: Pre-planning

- Feasibility assesment
- community facilitation
- Multi-sectoral cordination
- Bulk services feasibility
- Environmental assesment
- Land legal assesment
- Enumeration and socio-economic profiling
- Geo-tech assesment
- Planning, block layouts



PHASE 2: Intermin Services

Planning and Design

- Topographical and geotechnical urveys
- Environmental impscst sssesments
- Application for project funding
- Preliminary planning (town planning, urban design, participatory spatial plan, architectural design)

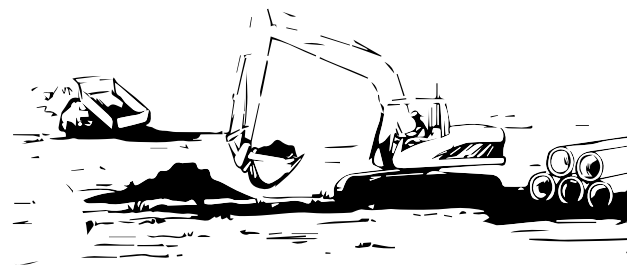


Construction

- Delivery of intermin services and land aquisition
- Site supervision
- project management

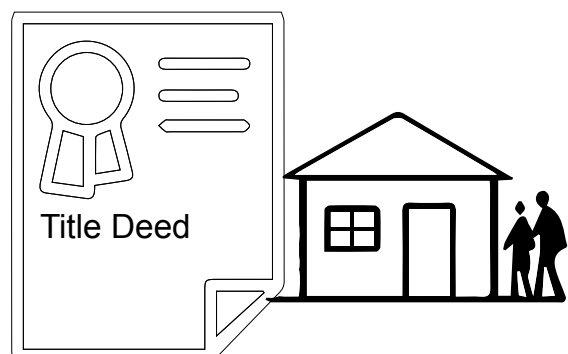
PHASE 3: Full Services

- Final land aquisitions and transfers
- Continued community participation
- Floodline determination
- Engineering design and layouts
- Relocations
- Subsidy applications and management



PHASE 4 : Housing Consolidation

- Construction of top structure
- Tull title
- Close out



1: 'Partnership approach'. Currently the city is seen as the housing developers, although this role is crucial, the suggestion is that the local democratic structures need to drive the upgrading process. (SDI Alliance 2014)



2: Area-based planning. The current model of housing is based on greenfields development, where the upgrading of informal settlements is upgrading of brownfield development. Then the government needs to outline how the UISP project may relate to other public investments in its built form (Integrated development plan, spatial development frameworks ect.) as well as other grants (urban settlements development grants, Urban Network Strategy) (SDI Alliance 2014).

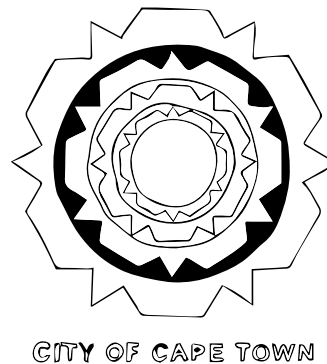
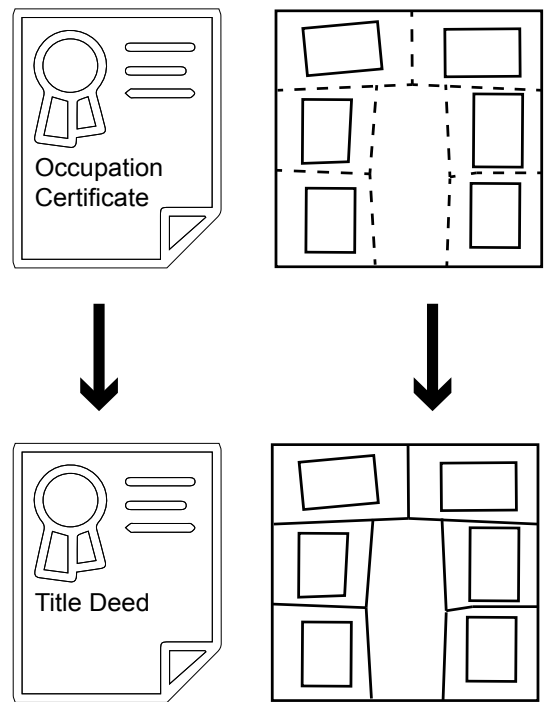
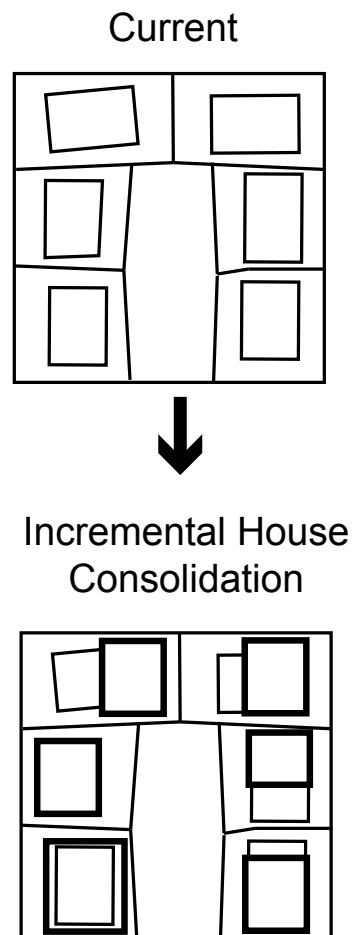


Fig 14 : Graphic illustration of community leaders by author.
Fig 15 : Graphic illustration of City of Cape Town logo by author.
Fig 16 : Graphic illustration of new types of tenure arrangements by author.
Fig 17 : Graphic illustration of new types of housing consolidation by author.

3: New Tenure arrangements, the UISP is in favour of a greenfields development. This model does not work for brownfield site developments. The desired manner of this development requires the phasing of the project to be planned together with the community. New forms of temporary accommodation are needed for incremental housing to take place, as the instillation of infrastructure in dense settlements can become disruptive. This leads to new type of tenure arrangements to be developed as the current individual ownership is not suitable. Local municipality needs to be able to implement and advise on these new types of tenure (SDI Alliance 2014).



4: New forms of consolidation housing. Housing that achieves higher density, provides for social needs and rental or income opportunities. The old one size fits all house on the periphery of the city needs to be discarded (SDI Alliance 2014).



THOUGHTS ON IMPROVEMENT

Informal settlements need to be recognised as an important part of the city. Informality is here to stay and currently, it is our best means of housing the poor during our housing crisis. It is important that there is recognition of the power and ability of communities to self-organise and become active agents in the development of the city. The UISP needs to consist of land that is and is suitable for residential development, as well as providing tenure which is not linked to the housing consolidation phase (Bolnick 2009). This would empower people and result in a system that is bottom up and not a subsidy-driven top down approach, putting people and their needs as the central driving force in informal settlement upgrading and housing production.

WHAT NEXT?

A pilot project is required where the government, communities and professionals work together come up with solutions to achieve a common goal.

This project views housing development as a process and not a finished product. The objective is to find communities that are most vulnerable and situated in areas not suitable for development. Together with an organised community the project team can implement the project helping the cities most vulnerable first and achieving a flagship project for the progressive view on housing production. If communities are to become active agents within the rollout of upgrading in informal settlements new programmes of community participation will need to be designed, mobilising people around their own

capacities and means to self-develop, and creating a partnership with the government who would supply the urban elements which communities would not be able to achieve themselves. Through the provision of resources and a greater understanding of the community's need one would be able to negotiate and leverage resources with the government or private sector.

Fig 18 :Photograph of kinetic sculpture as conceptual artefact for this dissertation, by author.



ACTION / REACTION

'How can the architect create one small action and achieve one large harmonious reaction?'

PART 2

• • •

*THEORETICAL POSITION, TOWARDS ALTERNATIVE
URBAN STRATEGIES*

INTRODUCTION

In light of the challenges discussed in the previous sections, the impacts of urbanisation require creative solutions not only from the world's designers and engineers but all occupants who live in informal areas. An acknowledgement that people are the dominant builders and designers of our current world and that designers have to engage and understand the realities of the circumstances (Neuwirth, 2005). It is apparent that South African cities have been developed without acknowledging the capacity of residents to self-build and neither the limitations of their socio economic situations. This section aims to explore the significance of informal upgrading approaches (commonly referred to as 'slum upgrading') by drawing on several case studies. The case studies range from government led in situ approaches to participatory design methods and cases where people have acted as self-builders. These case studies will be linked to relevant theories highlighting the architectural paradigm shift from the conventional paternalistic

architect to an architect that plays a new role in the development of community architecture. The theory draws from the pioneers of the participatory design approach including N.J Habraken, John F.C Turner and Nabeel Hamdi. These theorists looked to create a discussion in favour of the participatory approach as they found little merit in the prevailing modernist housing practices. In order to understand the practice of community architecture, one must know the limits of who designs what for who. The case studies and relevant theories will seek to build a case for the new role of the architect in adequately housing a growing population living in informal settlements. It will then seek to draw from these case studies and argue for the best possible approach to a South African context that aligns with the current views of the City of Cape Town on informal settlement upgrading as well as the community's capacity to self-build.

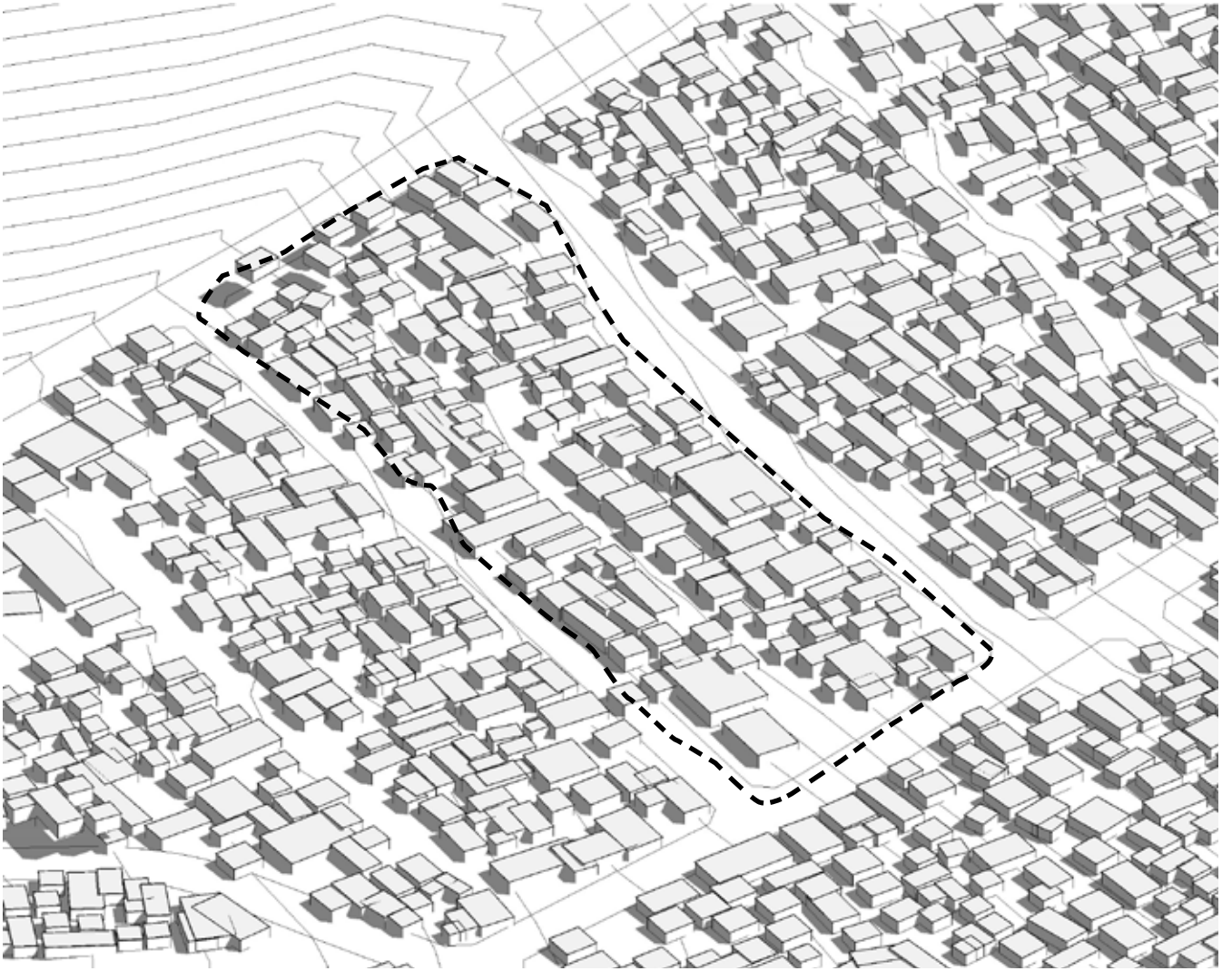
EXCERSISES IN COMMUNITY PLANNING

The shift to include community participation in the designing of urban developments originates from the failures of many low-income housing initiatives delivered by governments across the world. The questioning of the mass housing approach was in part ignited in the book 'Housing by People: Towards an autonomy in Building environments., by John Turner, where the author calls for the direct participation of communities in the development of housing programs, due to the government "putting their faith in 'centralised systems' for housing the poor, rather than community input". These 'centralised systems' adopted by government give preference to hierarchal and top down administration and thus the scale of the projects and the limitation of management capabilities rule out any possibility of the variety of individual inputs for the housing choices (Turner 1991). This reflects in the new approach which has been adopted to improve the conditions for a large majority of South Africa's population residing in informal settlements. The current inability of the government to achieve its current housing delivery objective is made evident by the 2.3 million unit backlog of subsidised housing.

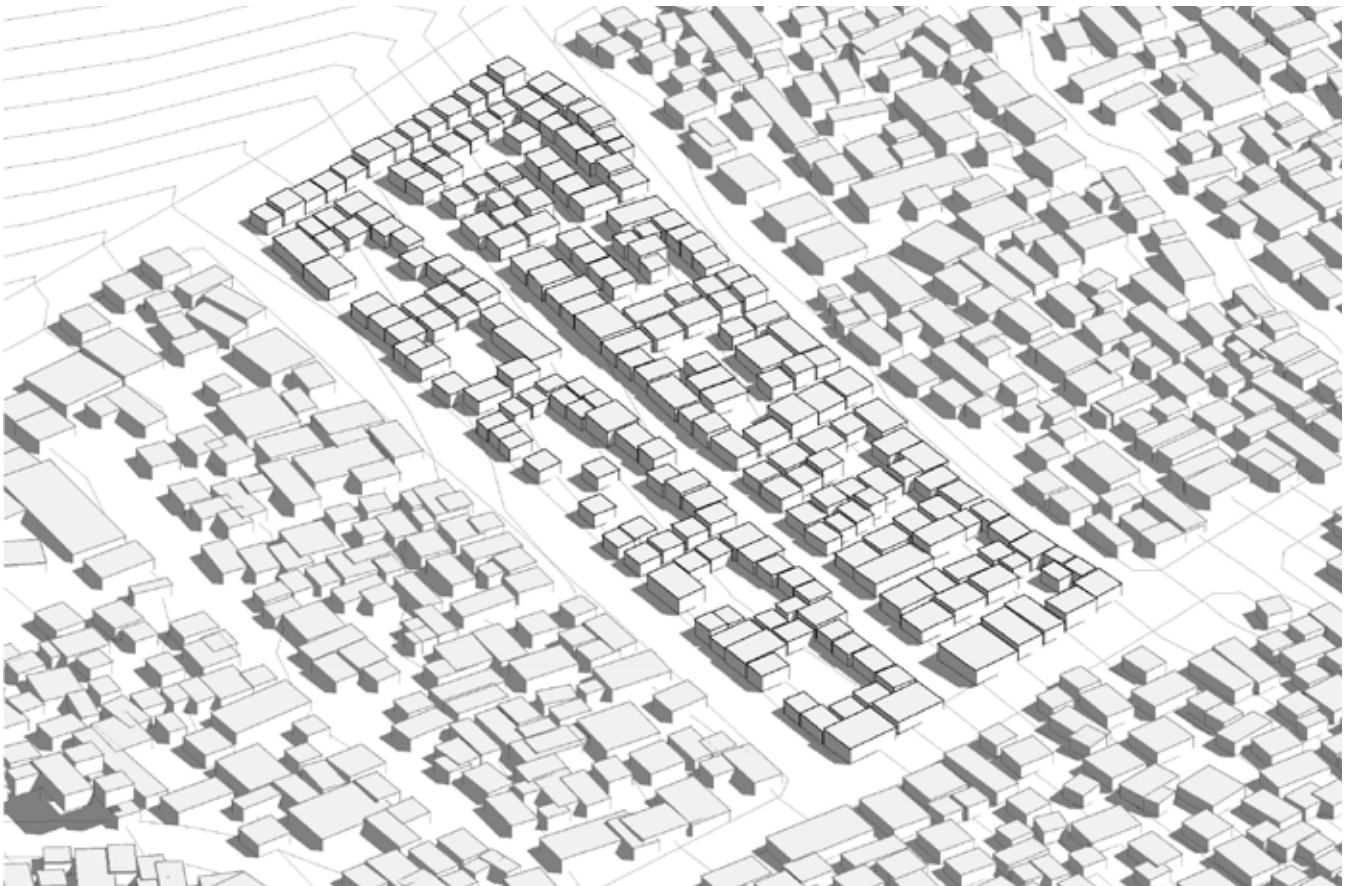
Government has now shifted to an in-situ upgrading approach referred to by local government and non-government community organisations as re-blocking which is defined by the City of Cape Town as:

"the process of reconfiguring the current layout of informal settlements by grouping shacks into clusters and reorganizing the ground plane in such a manner as to optimally utilize space to promote the health, safety and well-being of households, with a particular focus on promoting accelerated service delivery to the occupants"

(Settlements, 2013)



19 : Existing Langarug Informal Settlement drawing for CORC



20 : Proposed Reblocked area in Langarug Informal Settlement, drawing for CORC

CASE STUDY: *MTSHINI WAM*

An example of a successful community lead in-situ upgrading project is a reblocking of the Joe Slovo Park area, adjacent to Milnerton in Cape Town. A settlement of over 200 shacks were re-organised through a community designed layout plan to create public spaces and accessible roads promoting a more sustainable future development of the area.

The project delivered by Community Organisation Resource Centre (CORC), the Informal Settlement Network (ISN), the City of Cape Town and the community members, saw the design teams being involved throughout the process. The design team led the community through a process of self-enumeration where information about the different families was collected and used to outline the issues and needs of the community. A design studio was then held to explain the issues and dangers of density and the re-blocking principles (Jack, 2014). During this studio, the settlement,

dwelling and immediate context was mapped for the designers to understand the parameters. Simultaneously a 1:200 scale model was built as the primary tool for communication between all of the parties involved (Jack, 2014). This allowed for a greater understanding of the existing conditions and possible actions. Through the use of the model, public and private spaces were identified by creating clusters around communal washrooms desired by the community, as well as creating access routes required by the City for future development.

Once clusters were ready to be re-blocked, the implementation process lasted three days. The first day focused on demolishing the existing structures and laying the foundations. The second day was focused on the construction of the new shacks, together with the families who built their homes according to their needs by placing windows and adding extras. The third day saw people move into their newly configured homes (Jack, 2014).

Fig 21 : Community participants, Mtshini Wam Reblocking 2013, Source: SDI Alliance

Fig 22 : Community members designing their new structures, Mtshini Wam Reblocking 2013, Source: SDI Alliance

Fig 23 : Reblocking Strategy adopted by the city of Cape Town 2013. Source: <http://sasdialliance.org.za/city-of-cape-town-adopts-reblocking-policy/>

Fig 24 : Design of Clusters, Mtshini Wam Reblocking 2013, Source: SDI Alliance



21 : Community members of Mtshini Wam settlement



22 : Community members designing their new structures



23 : Reblocking Strategy adopted by the city of Cape Town 2013



24 : Design of reblocked clusters.

INSURGENT ARCHITECTURE AND THE IMPORTANCE OF USER INPUT

In *Freedom to Build* (J. F. Turner 1991) he outlines three laws to housing. The first law stipulates the importance of the individual input;

'When dwellers control the major decisions and are free to make their own contribution to the design, construction or management of their housing, both the process and the environment produced stimulate individual and social well-being. When people have no control over, nor responsibility for key decisions in the housing process, on the other hand, dwelling environments may instead become a barrier to personal fulfilment and a burden on the economy' (Turner 1991)

Turner's thesis looks at the two approaches of mass housing, comparing government initiated modernist mass housing projects such as Pruitt Igoe with self-built housing solutions as seen in informal settlements and slums. The award-winning t Pruitt Igoe built in St Louis stood from only 1954-1976 and was completely demolished due to its severe physical and social deterioration. Turner explains that there are two systems running concurrently both as a means to housing the poor. On the one hand there is the failure of high investment projects and on the other there is an organised system of slum and informal settlement, where people take their housing into their own hands. Turners research shows that some of the makeshift structures, although materially poor were remarkably effective. In contrast the 'high standard' projects were, as Turner puts it, 'socially oppressive' as depicted in the case of Pruitt Igoe (Turner 1991).

He suggests an alternative approach for governments, shifting their focus to providing resources in which the people living in slums and informal settlements cannot access or provide for themselves (Turner 1991). Turner refers to a theory of 'Loose Parts' which looks at various building elements that can be "assembled in a maximum number of different ways (Turner 1991)". This is directly related to the idea of people having the ability to do things that are tailored to their habits and daily needs. However, the same theory does have its own types of controls. Namely 'Lines' and 'Limits'. Lines refers to planning and setting out procedural lines that need to be adhered to while 'limits' is concerned with allowing the individuals freedom to build and adapt according to their needs within specified limits.

'Limits' is the form of control that supports input from the user by allowing them to make decisions while still understanding the limits provided. This makes up the center of Turner's case; that is that government needs to act as the enabler through the provision of resources, specifying appropriate limits and allowing people to express their own freedom to build.

Insurgent architecture is the capacity of people to self-build in places that provide necessary supports to sustain the organic growth of informality where this growth tends to be tailored exactly to the immediate needs of the users. In cities across the world, groups of people have reclaimed areas and spaces in urban areas that challenge the status quo. Despite in some cases occupying land illegally or defying the zoning regulations these insurgencies express alternative socio-economic and spatial resolutions which are appropriate to changing cities. These resolutions are aided by certain systems which are already in place. The following case study presents an example of people shaping their environment through an infill approach.

Fig 25 : The demolition of Pruit igoe,
Source: politecture.wordpress.com



25 : *The demolition of Pruitt Igoe*

CASE STUDY: TORRE DE DAVID AND THE THEORY OF SUPPORTS

The City of Caracas in Venezuela, much like other developing countries has felt the effects of rapid urban growth with the population growing from 1.1 million to 4 million in 2013 (Caldieron 2013). Due to the invasion of open land by people, there is now a lack of available land in and around the city for occupation, coupled with a massive housing deficit. As a result of this, a new trend emerged whereby residents started to occupy unused and unfinished buildings. Among the many malls, offices and various other vacant structures, the vacant Centro Financiero Confinanzas also known as 'Torre de David' was invaded by over 200 families in 2007 (Caldieron 2013). Situated in financial district of Caracas, the five building, 22,100 square meter complex was invaded by squatters. One of these buildings, the 47 floor modern office building, was converted in to a living vertical city.

The glass clad concrete frame building was filled by its new inhabitants, starting with tent like partitions and over time and as budget allowed, brick partition walls were built. Each family shaped their space to suit their particular needs. The 'vertical informal city' has small and large shops, rentable apartments, a church, and recreational spaces which include a gym on the roof terrace. In addition to the micro and macro economies throughout the building, there is also a surprisingly organised community structure that manages the entire building. The 10 story parking lot allows for the easy movement of products to the various convenience stores through the means of motor-taxi's (Caldieron 2013).

Much like Caracas' informal settlements one of the primary problems is the absence of suitable sanitary infrastructure. The current water and electricity services were self-installed and are insufficient for the number of residents. Despite the inventive solutions to place making, recreation, micro economies and homes there are also architectural principles that have been tackled by the residents including cross ventilation, thresholds and service provision. The vertical slum is an unsustainable example of an informal settlement community. Due to the legal status of the low-income inhabitants of Torre de David, all of the residents are subject to eviction if the government changes its current 'nuanced' attitude. A survey conducted by 'The Macro Theme Review' showed the tower has too many challenges to overcome, as well as the concern for safety and rampant criminality (Caldieron 2013). Apart from some of the negativity displayed by the residents. Architects have voiced their opinion, due to the building being designed specifically for office use, the adaption of the services for squatter residential spaces will never be adequate to sustain the community for a prolonged period of time (Caldieron 2013).

Fig 26 : Torre de David - Vertical slum and infill in existing structure. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 27 : Torre de David - Recreational Space. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 28 : Torre de David - Informal grocery store.. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 29 : Torre de David - Incremental apartments. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index



26 : Informal infill by sky skrapers new inhabitants.



27 : Appropriation of open spaces as recreational public spaces.



28 : Informal grocery store.



29 : Incrementally built apartment.

ANTICIPATORY DESIGN AND THE THEORY OF 'SUPPORT STRUCTURES'

On a larger urban scale, Anticipatory design anticipates future informal growth by providing public space around which new development grows. The underutilised open space is used for the creation of a public space or the construction of needed public amenities. The intention of the intervention is to provide a space that contributes to the social, economic and physical landscape. This allows for community gathering which in turn improves cohesion, income opportunities as well as the improved provision of services. Furthermore the fundamental principle for securing a sustainable development, is by defining the edges of public spaces, roads, and pedestrian ways to allow for safe, incremental developments, and the future provision of infrastructure by government.

In similar fashion to Turner's theories in the previous case study, Dutch architect, N.J Habraken also theorises the idea of user input. In his book *Supports: an alternative to Mass Housing* written in 1972, Habraken debates the solution to the Post-war housing deficit in the Netherlands in which standardised mass housing was built. During his research, he found that people were highly dissatisfied with the standardisation of buildings and the spaces which they inhabited. The

Opinion was that people were reduced to 'herd-animals' and this method of housing production was highly undesirable (N. J. Habraken 1999). The disconnection between man and method is argued as the main cause and similar to Turner's belief, Habraken identifies the inadequacies of the

method in which the housing takes on a factory-like assembly, and its uniform appearance. The loss of individualism results in the uniformity of the built form. He concludes by outlining that the problem is not that of the modern construction or use of the machine but the absence of human input in the process of the housing development.

Habraken's conclusions about the problems of mass housing offers an alternative solution. The concept of 'Support Structures' as defined by Habraken: 'a construction which allows the provision of dwellings which can be built altered and taken down, independently of others' (N. J. Habraken 1999). In another book by Habraken, *Variations: The Systemic Design of Supports*, he explains that the concept of 'supports' and its success is founded on input and participation from the inhabitants in the decision making processes. The dwelling in this system is not seen as a finished product, but rather a dwelling as a process. Thus allowing the inhabitants the freedom to make decisions based on their current of future needs, while adhering to a larger system of shared and infrastructural services (N. J. Habraken 1976). His conclusion speaks about the relevance of the 'support structures' as they re-establish the relationship between man and the participation in the built environment, as well as taking full advantage of the viability of using prefabrication as means for efficient delivery. Anticipatory design and 'supports' share strong principles with the case of Rio de Janeiro's Flavela Bairro project.

Fig 30 : Image showing supports and infill make dwellings. Source : Low-income housing, technology and policy, International Conference on Low-income Housing (1977 : Bangkok, Thailand)



THE SUPPORTS



INFILL



DWELLINGS

30 : Image showing supports + variations of infill make dwellings

CASE STUDY: RIO DE JANEIRO, FAVELA BAIRRO

Neighbourhood upgrading programs implemented by the municipality of Rio de Janeiro aimed to incorporate the informal favelas into the formal fabric of the city through four interconnected projects. The primary objective was the provision of basic urban infrastructure. The second was the physical urban reconfiguration of the informal settlement which was achieved through new street grids and the construction of new public buildings such as nurseries and community centers. The third was the provision of social services to support income generation and training programs with the fourth being the increased security of land tenure.

In similar fashion to South Africa's efforts to eradicate informal settlements, Flavela Bairro's departure from the previous ideas of eradication was born from Rio's 1992 master urbanization plan. The aim was to upgrade medium sized settlements of between 500 and 2500 households, through the four step approach.

Key buildings were designed by a team of architects and built by private building contractors and utility contractors. (Jorge Fiori, 2000). A component that helped the ease of the project was the deployment of Urban and Social Advice Centers which had various municipal representatives available for consultation. The centers offered advice on benefit entitlements, utility services and legal advice. These centers although envisioned as temporary are now permanent platforms for community participation and gathering.

The inclusion of social projects running concurrently to the upgrade created the multi-sectorial involvement

of NGO's, government and local residents. This was achieved through the consultations, approvals and maintenance initiatives used to distribute information to residents. The success of this project can be attributed to the municipality's progressive stance in integrated city planning, collaboration and the regularisation of the city's assets through community participation.

Key Strategies

1. The provision of basic urban infrastructure.
2. The physical urban reconfiguration of the informal settlement which was achieved through new street grids and the construction of new public buildings such as nurseries and community centers.
3. The provision of social services to support income generation and training programs.
4. The increased security of land tenure.

Figure 31: Cooperativa Diagrams of Chacara Del Castilho. Source: Favela - Bairro Uma outra historia da cidade do Rio de janeiro.

- 1- Reserved area for municipal daycare;
- 2-Community service center labour market;
- 3- Leisure area / canalized faria river
- 4- 24 Units of relocation (2/3 floors);
- 5-Soccer field with bleachers end leisure gear; square;
- 6- Community association headquarters;
- 7- Cloak room;
- 8- Daycare;
- 9- Community square;
- 10- Comercial boxes;
- 11- Basket field
- 12- Favela-bairro articulation
- 13- Public green area with equipments for leisure.



INFORMAL ARMATURE AND THE ROLE OF THE ARCHITECT

Traditionally, the line of work in architecture and planning is very much specialised. Due to the credibility of the required education, it is assumed that the professionals creating the built environment would know what is best for the users. The theorist Nabeel Hamdi, makes the case in his book *Housing without Houses: Participation, Flexibility, Enablement*, that throughout the ages the production of housing was achieved without any intervention from professionals, equally in developing and developed countries (Hamdi 1991). Hamdi further explains that the intervention of architects, planners and their contribution to housing the masses, was evidently inadequate. People either self-build or with the help of small builders are responsible for 80% of the world's houses across the globe and the trend is still prevailing today (Hamdi 1991). In light of this idea, the new role for the architect is to understand the capacity of people to house themselves, and contribute in a manner that enables people to build safely and appropriately.

Informal Armature comprises design and managerial tools that allow newcomers in urban areas various opportunities to excel within their neighbourhoods, municipality and the city at large (Gouverneur, 2014). This design tool focuses on connectivity, the utilisation of site assets, phasing and co-responsibility with community and stakeholders.

The idea of self-help housing solutions provided by the government; which aim to provide informal settlers with the means to incrementally develop a type of formalised housing through their own endeavors - has proven to be the most successful

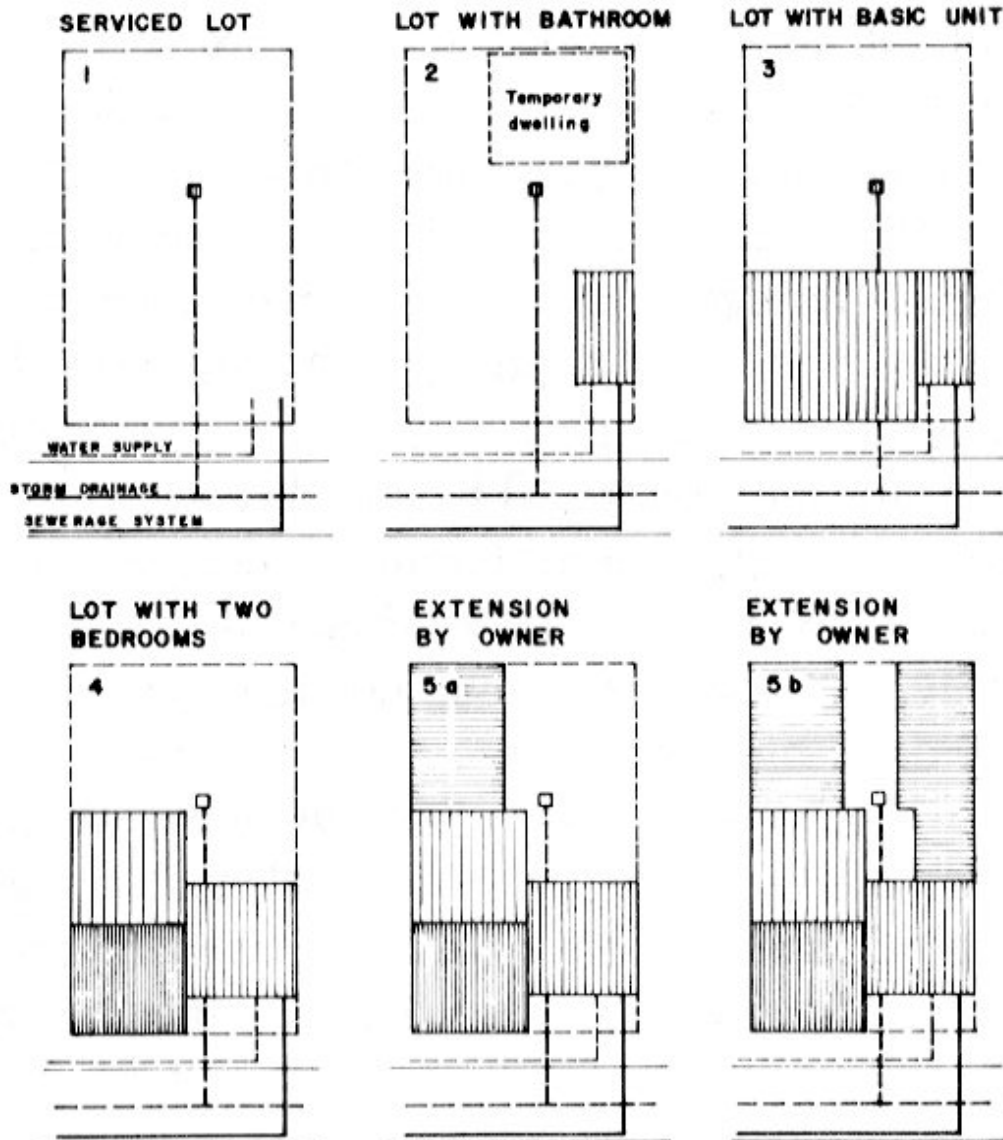
method of settlement upgrade. This can be seen in the manner in which various spaces reflect the unique character of each household. Turner emphasises that cities need to stop contracting large organizations to build or manage settlement environments and should rather invest their energy into building infrastructure and supplying tools or materials that people and informal businesses can use self-build (Turner, 1991).

The infrastructure required should still be provided by the government and in a variety of forms. This includes simple access to public utilities, safe connecting public spaces, and public amenities buildings which can act as ordering devices that link the formal grid with the organic informal fabric.

Another type of infrastructure that needs to be provided is a facility similar to the Urban and Social Advice Centers in Rio where various municipal representatives were available for consultation. This being a key for the distribution of information between communities and government officials where an asymmetry of information impacts the negotiating power of citizens. There are also crucial lessons that can be learnt from the current community planning initiative that happens with the re-blocking approach, where the communities realise their collective power for change and the success of co-responsibility.

Fig 32 : Progressive development using open solutions. Source: Self-help Housing, a critique / edited by Peter M. Ward.

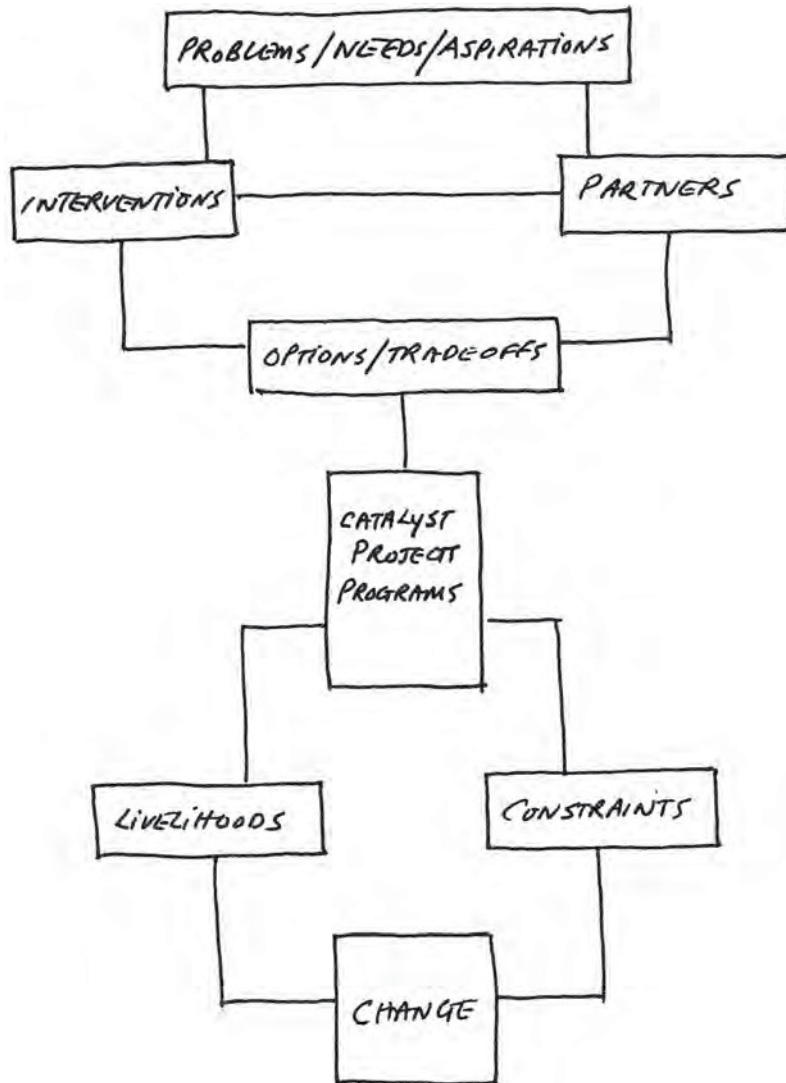
PROGRESSIVE DEVELOPMENT USING OPEN SOLUTIONS



The benefits of informal settlement upgrade lie in the appropriation of space by the users - who may not have an education in architecture - but are still able to shape their surroundings to suit their needs and wants. As noted by Habraken, who sees that the role of the professional in community participation, is to understand the scope of the project and apply his skills to specific aspects that would best benefit the project. He further underlines the great contribution the knowledge of architects and their design thinking can provide in the possibilities of modern times (N. J. Habraken 1999).

Habraken suggests that “the professional is perhaps not to be made completely redundant but must learn to adopt a new, less arrogant role (N. J. Habraken 1999)’. He adds that the “new professional must forget the traditional boundaries of architecture and look to engage with the users, be open-minded and contribute in a way that enhances the daily life of the world’s inhabitants”. Hamdi’s similarly argues that community participation should be an intrinsic component to the implementation of housing and planning. The professional needs to team up with the people who know more about their needs and design for those particular needs accordingly. This was a missed opportunity in the case of Du Noon, where the inhabitants informalised the formal housing provided.

Fig 33 : The Placemaker’s Guide To Building Community work plan. Source: Nabeel Hamdi



CASE STUDY: *INFORMALISING OF THE FORMAL IN THE STUDY OF DU NOON*

In the case of Du Noon Township, the government subsidised a housing system in the form of RDP Housing. Unknowingly, the government provided a 'Support System' for informal growth to occur. An investigation into the settlement of Du Noon, on the northern outskirts of Cape Town was conducted by the 2014 Honors in Architecture class at the University of Cape Town. An understanding was sought of the urban structure and physical fabric as well as the social and spatial situations and practices of homes and businesses in the area. The importance of tenure security to poverty alleviation was a central concern in the research.

What can be seen immediately is the rapid expansion of Du Noon. This can be attributed to its location in relation to other industry, farmlands and quarries, which providing opportunities not always found near to settlements of this nature. This has therefore contributed to a rather large rental culture compared

to other informal settlement areas in Cape Town. The growth has led to an overload on the existing infrastructure including sanitation systems, an

increase in the fire risk as well as the availability of social infrastructure and open space. However, what can also be seen is how people have adapted.

What is remarkable is how the original RDP layout of plots has allowed for this. The plots act as infrastructure to spur new growth by providing rental space and service points, with the original RDP house demolished and replaced by new structures including blocks of flats. Many houses have been also converted for commercial use. It is common for both RDP and informally constructed houses to be bought and sold unofficially. It can be seen that a RDP house has value not primarily as a shelter, but as a piece of owned land and an asset which can generate income.

Fig 34: The RDP house as asset for income generation. Source: Authors own

Fig 35: Variations of the RDP house figure ground as asset for income generation. Source: Authors own

The RDP house as asset for income generation

RDP market price ranges from R45000 to R80000



RDP rented at R1500
(only one instance, it was used as a shop)



'shack space' on RDP land rented at
between R250 to R400



FIGURE GROUND OF PROPERTY BOUNDARY USE

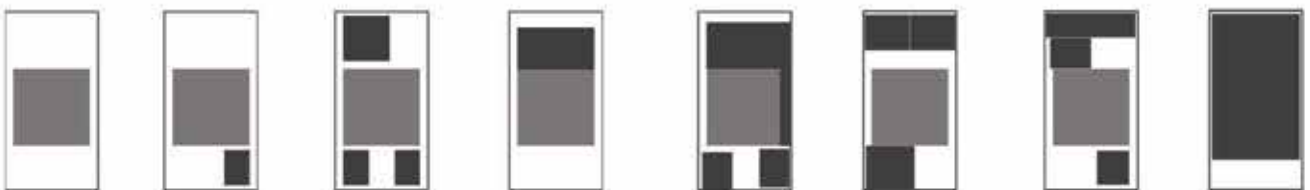




Fig 36, 37: The rapid expansion of Du Noon Township between 2004 - 2014 Source: Authors own

RDP SETTLEMENT- 2014
Organic growth of shacks shown in grey



CONCLUSION

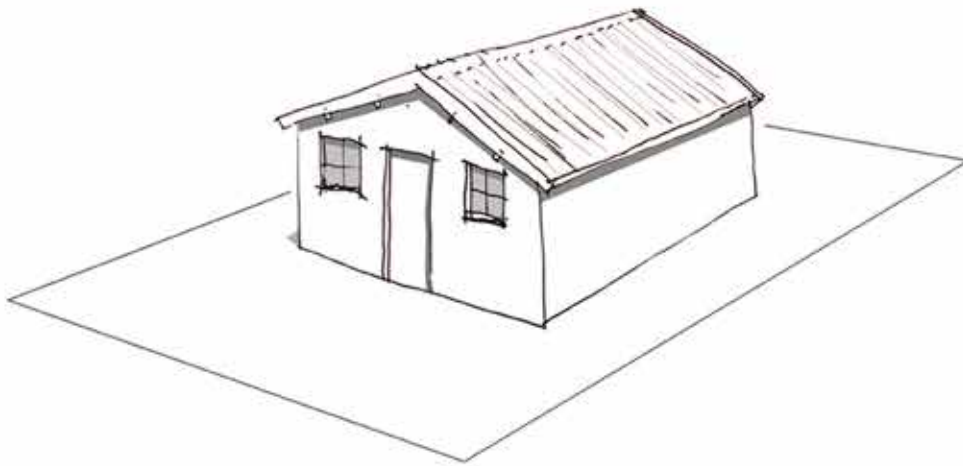
Designers and in particular architects can learn from the case studies and experiences of marginalised people living in informal settlements and together can create housing developments that are better suited to receive informal growth as well as retaining sensitive livelihood networks. There is increasing evidence to suggest that the key to dealing with the pressures of rapid urbanisation lies in the human agency within slums and the social processes of adaptation. Inhabitants in these areas continue to generate ingenious solutions to place making, public space improvement, dwelling constructions and various other approaches to meet their needs as seen in Du Noon in Cape Town and Torre de David in Caracas. This suggests that designers should anticipate organic growth and design for it to occur.

The rate of unplanned growth can lock people into cycles of poverty and pose serious health and safety risks. In light of this, interventions are required by professionals. This calls for the new role of the architect, where the designer engages and understands the individual needs of the users but also takes on a managerial role to organize the various stakeholders. This is especially important when governmental infrastructure can be intelligently utilised in an informal settlement upgrading program as experienced in the Flavela Bairro case study. A problem arises when the needs cannot be met through self-built solutions. The urban elements usually associated with creating a public realm such as mobility, public space, amenities and simple services are hard to come by without external support (Gouverneur, 2014). If provided by the government and designed by architects the informal settlement can be adapted by the inhabitants to best suit their needs.

One could say that informal settlements have a more transformative capacity than the formal city, largely attributed to the adaptation to changing site conditions, the expansion of neighbouring dwellings, and various other socio-economic factors and climactic conditions. Designers should find the limits of this transformative capacity and use it to their advantage in creating a better urban realm and living environment within these areas. This, together with the theories of Turner, Hamdi and Habraken outlines the importance to listen to the individual to understand the needs and capacities of people. Without this more service delivery protests will fill the streets and the rate urban growth could cripple communities and further entrench the system of spatial, social and economic inequality in South Africa.

Fig 38: Variations of the RDP house adaptations and means of income generation. Source: Authors own

'We need to design housing developments that are better suited to receive informal growth, as well as retaining sensitive livelihood networks'



divided up within and rooms are rented



+ various combinations



demolished, new flats built



used as shops



resold to new owners or rented out



'shack space' / extensions built and rented



PART 3

• • •

*FIELD RESEARCH AND LESSONS FROM
THE GROUND*

PARTICIPATION

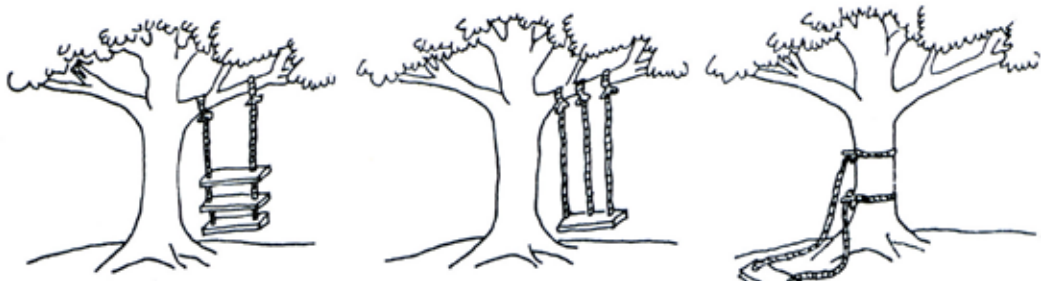
Participation is essential and effective in building community. It is the equivalent to building the social economy of place which is the building of all things tangible and intangible that contribute to the wellbeing of people and livelihoods. This gives communities the means to live the lives they desire and value and thus contributes to human development (Hamdi 2014).

Through the progressive developmental interventions which seek to find alternatives to the current provision of housing and basic services, participation and fostering of meaningful engagement are the key to the success of such initiatives. The method of in-situ incremental upgrading is a means to provide communities with a viable type of housing which caters specifically to that community's needs. This method relies on the communities having generative capacity to contribute effectively and creatively to the upgrading program. The communities are seen as the holders of the information to help the stakeholders in problem solving and holding the city accountable for their contribution. And more importantly achieving a development plan that is tailored to suit the community's particular needs.

These progressive policies are limited in their capacity as everyday hardships within informal settlements hinder the ability for the state and the communities to communicate effectively. This is perpetuated by the uncontrolled growth of informal settlements which has led the state to stick to methods of delivery which are quantifiable. These are the provision of taps, toilets and emergency shelters. This type of delivery does not require lengthy project time-lines, community meetings and limited meaningful participation.

Fig 39 : Participation , Christopher Alexander, The Oregon Experiment 1975

PARTICIPATION



As specified in the project request.

As proposed by the project sponsor.

As designed by the senior analyst



As produced by the programmers.

As installed at the user's site.

What the user wanted.

CORC ENUMERATION

In order to get an in depth understanding of community participation in Cape Town, the project entailed research to find not-for-profit organisations who are responsible for community participation and community planning in informal settlements. The Community Organisation Resource Centre (CORC) is one such organisation with whom various meetings were conducted to better understand how the organisation functioned. Based on the meetings, it was understood that they act as the mediator between grass root community mobilisations regarding land evictions, informal settlement upgrading, basic services and citizenship.

Through the facilitation of communities learning from each other and mobilising the community into an organised entity CORC helps broker deals with the City and other professionals. The community based centers for learning help residents achieve outcomes such as incremental security of tenure, basic services and various low-income housing solutions. This either happens in-situ or in accepted relocation areas.

As part of CORC's process the community and their needs are documented. As part of the project research, assistance was provided to the enumeration of the Nonquebla community and a think-tank for possible solutions for better use of the spaces in this community.

The meeting took place in the Lutheran church structure which happened to be the largest space for community gathering. After understanding the history and challenges of the site, the community elders walked the workshop group through the extremely dense area pointing out their challenges and needs. There was a clear clash between some of the vendors and residents, where four vendors' shacks were only occupied for short parts of the year. It was also noted that the City installed three toilets in an obscure part of the site facing the road, which angered the community as there was no dialogue with the people who would use them. The two water stand pipes were the only alternative places of gathering and seen as an important place of socialisation. The children either played in the road or around the toilets. The drains around the site were blocked and did not drain water effectively and leads to constant flooding. Security at night was always a constant worry especially around the toilets.

Fig 40 - 46 : Photographs are authors own
Fig 42 : Source :Google Earth



40 : Community members and CORC team mapping the settlement.



41 : Community members pointing out their challenges with the informal traders.



Nonquebela Station

Nonquebela Station Reblocking

- 32 Shacks (inc. traders)
- 79 People on site.
- 3 Toilets.
- 2 Water stand pipes.
- No open space.
- Flooding after rain.
- Fire risk.
- Access a problem.
- Clash between owners and informal traders.



43 : Cheerful resident.



44 : Walk through the settlement.



45 : Typical informally built dwelling.



46 : Government provided toilets.

COMMUNITY MEETING WITH CORC AND JAKUPA ARCHITECTS

During the project's research, a community meeting was held at 'The White House' Community Centre in Khayelitsha with CORC and JAKUPA Architects. The meeting was led by CORC's community planners with the aim to establish action plans for the various communities at the meeting.

The methodology was to discuss various problems within each of the settlements and map them out on an aerial photograph. Each group was made up of seven or eight community members, one architect and a CORC representative. The questions asked were as follows;

What are your three main problems within the informal settlement, and rank them in order of priority.

1. Where does the community gather?
2. Where do the kids play?
3. Where does flooding occur?
4. Where does crime occur the most?
5. How do people get to work?

Although the community meeting was effective within its outcome it did have some challenges. The meeting was chaotic and the scope and reason for this particular meeting was not specified and thus there were long discussions about unaddressed issues which no one at the meeting was qualified to answer.

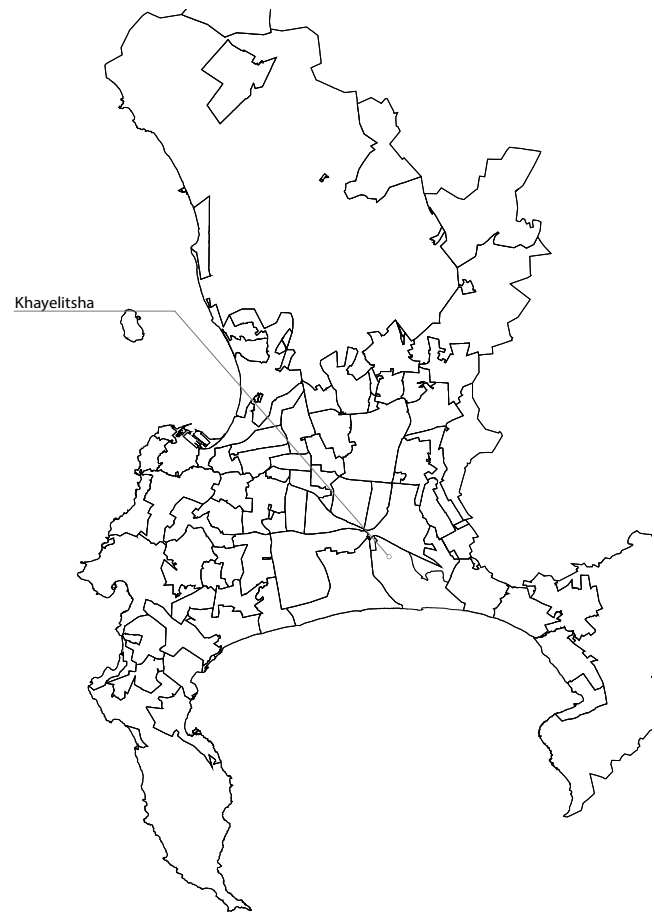
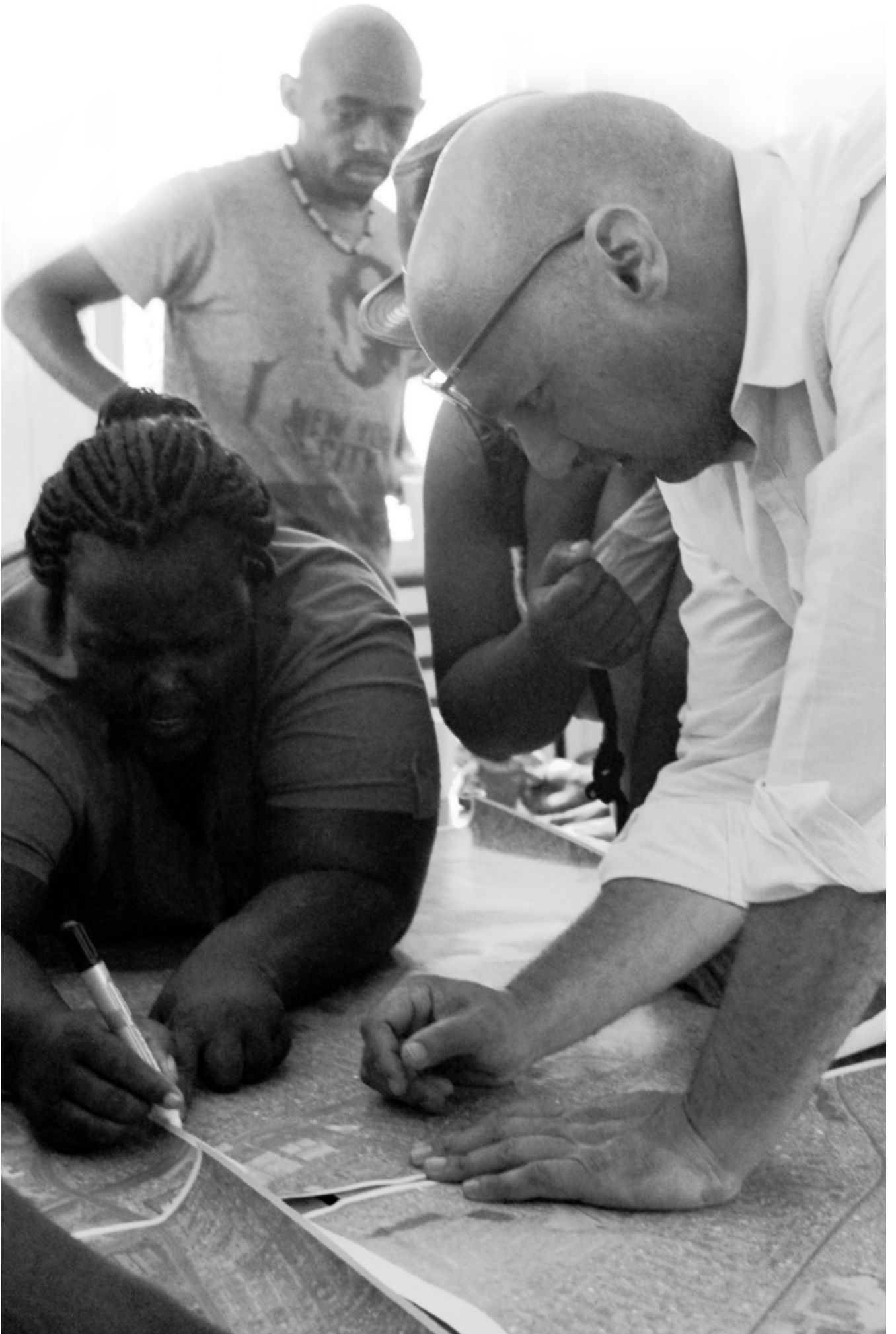


Fig 47 : Illustration of Cape Town by author.

Fig 48: Photograph of community meeting by author.



48 : Galiep Jakobs of JAKUPA architects mapping out challenges with the community.

EMPOWER SHACK

A Young Urbanist excursion to Khayelitsha to visit and learn about the Empowershack Project. The trip was led by Venezuelan Architect Alfredo Brillembourg from EHT Zurich and founder of Urban Think Tank, Andy Bolnick founder of a not-for-profit organisation Ikhayalami as well as community leaders. A discussion was held on the double story prototype to discuss the projects aim as well as listen to the owner's personal experience of the project.

The replicable prototype is a double story timber frame building clad in corrugated sheeting. The shack is designed as a modular structure which is economical and can be built by residents themselves. The projects is part of a larger urban plan based on reblocking principles, including public courtyards, improved circulation and fire breaks. Theoretically, the project explores the social role architects play in economic, social, security and ecological challenges faced by informal communities.

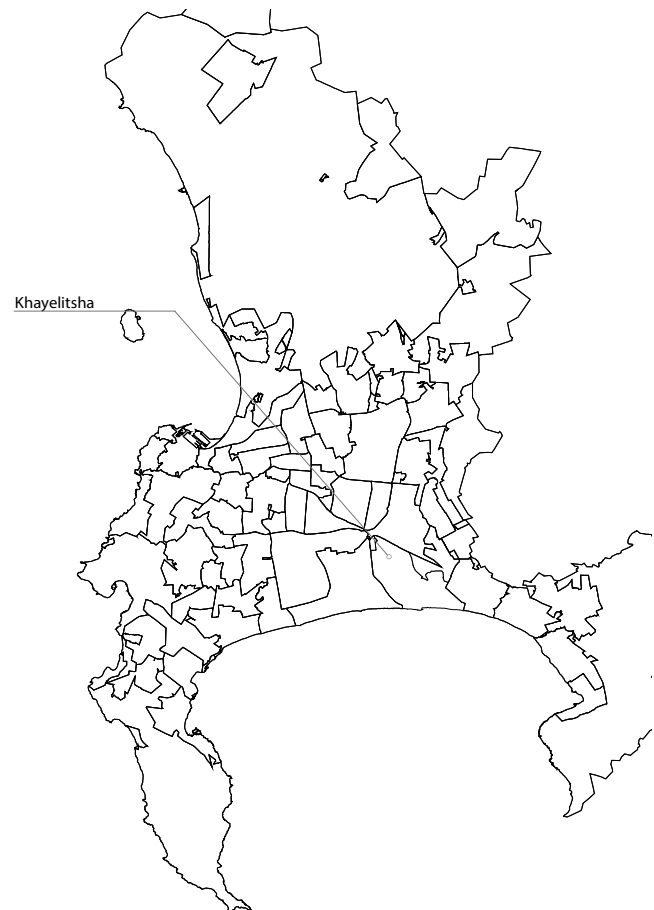
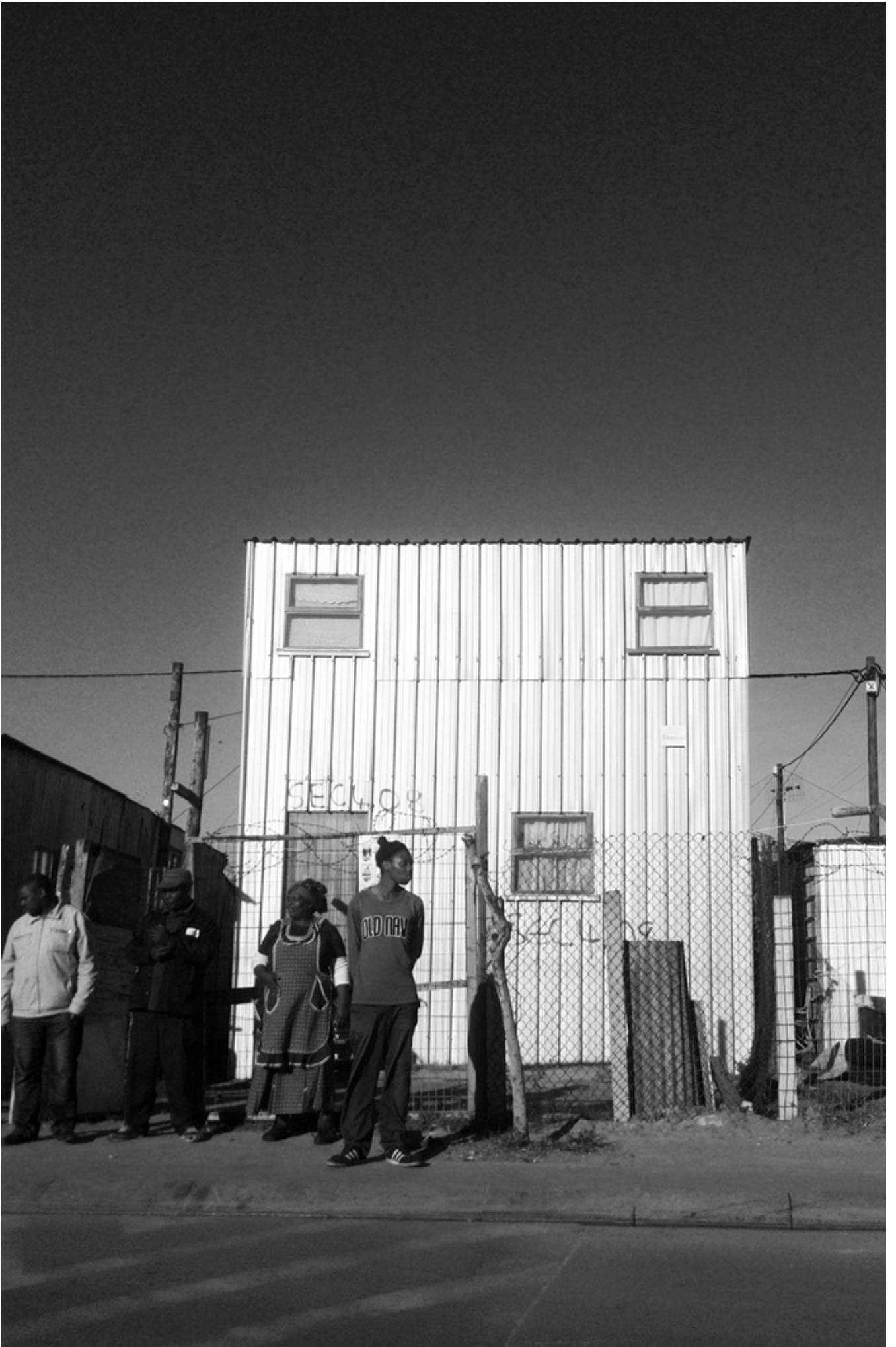


Fig 49 : Illustration of Cape Town by author.

Fig 50 : Photograph of the Empower Shack by author.



50 : Empower Shack street frontage.

ONE CITY RESEARCH

This research was the outcome of an investigation into the settlement of Du Noon, on the northern outskirts of Cape Town, by students of Architecture (Honours) from the University of Cape Town and lead by Heinrich Wolff.

An understanding was sought of the urban structure and physical fabric as well as the social and spatial situations and practises of homes and businesses in the area.

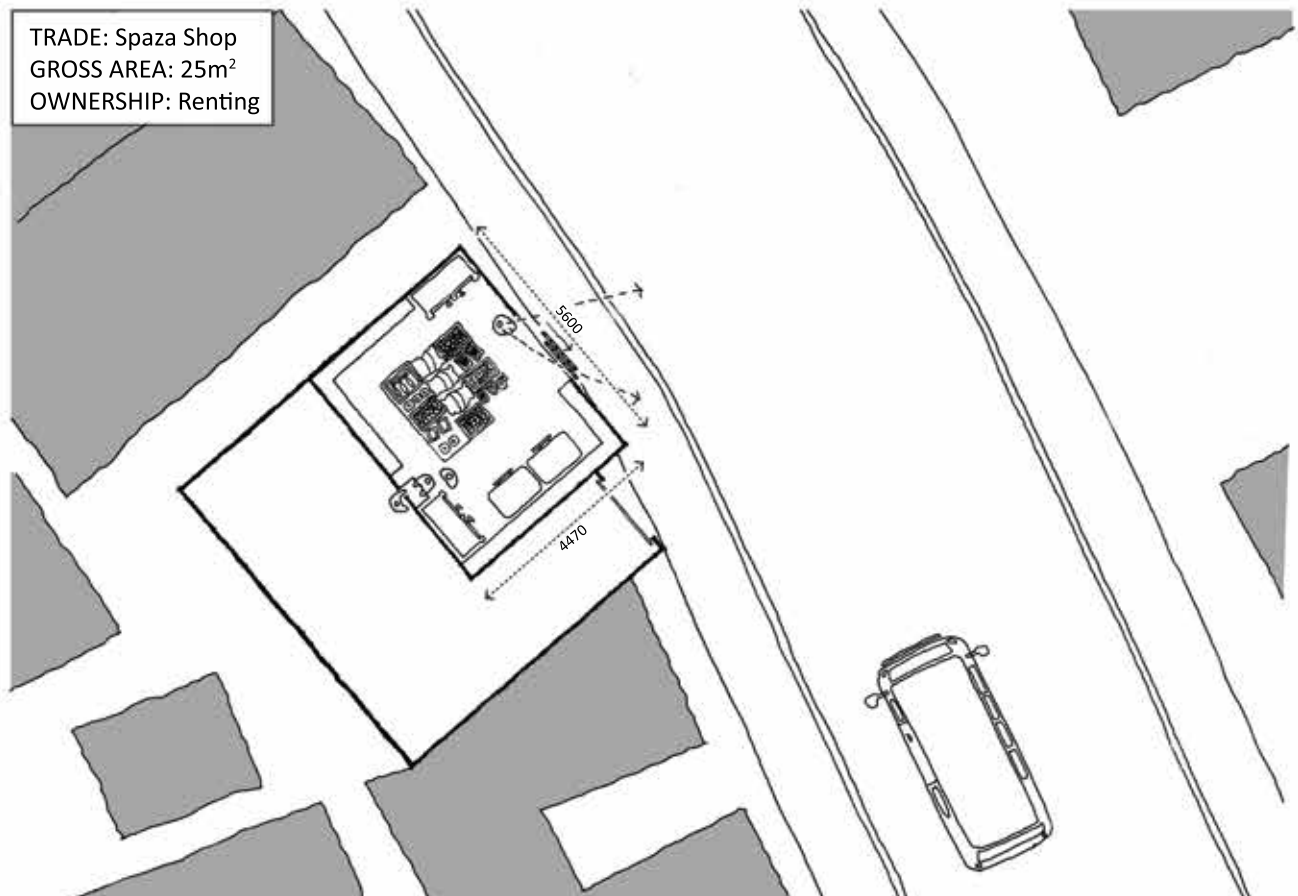


Fig 51 : Illustration of Cape Town by author.

Fig 52 : Drawing of spaza shop by Alex Coetzee.

BUSINESS TYPES

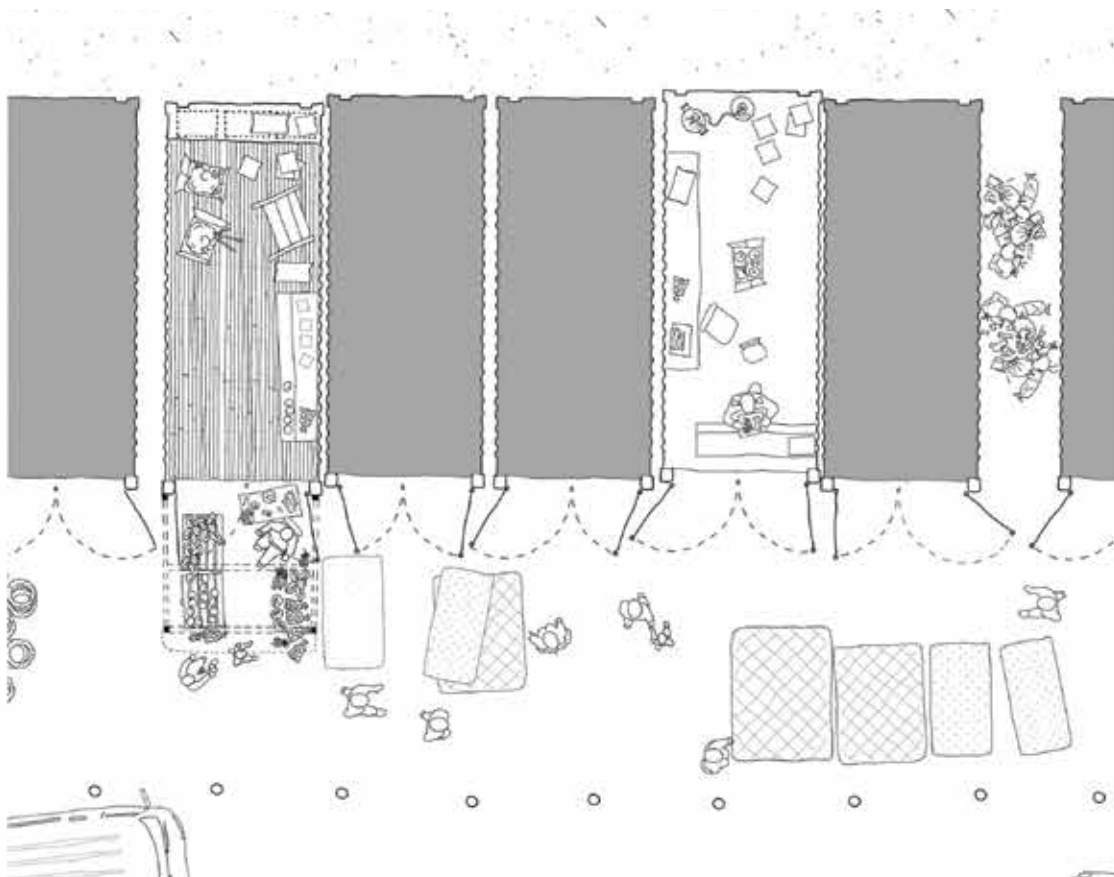
This part of the investigation sought to understand the spatial situation of businesses in the settlement. At a large scale, it looks at the location of businesses within Du Noon. At a smaller scale, specific cases are explored in terms of internal spatial organisation, ergonomics and relation to the public realm.



52 : Informal spaza shop layout.

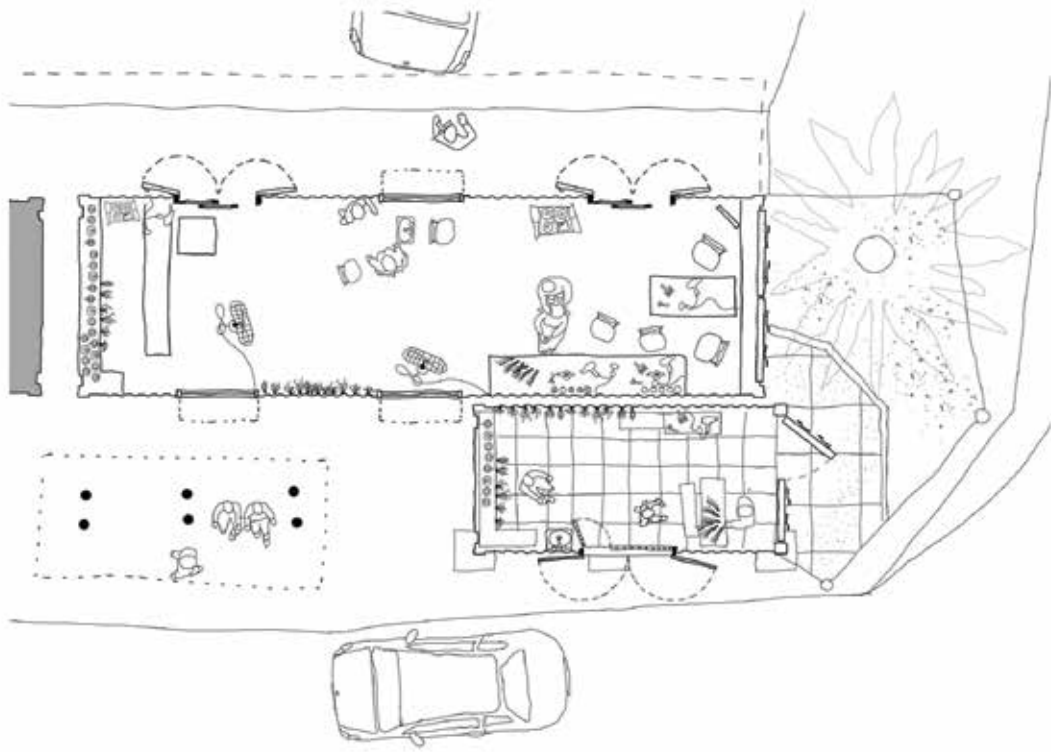


53 : Informal shebeen and furniture workshop.

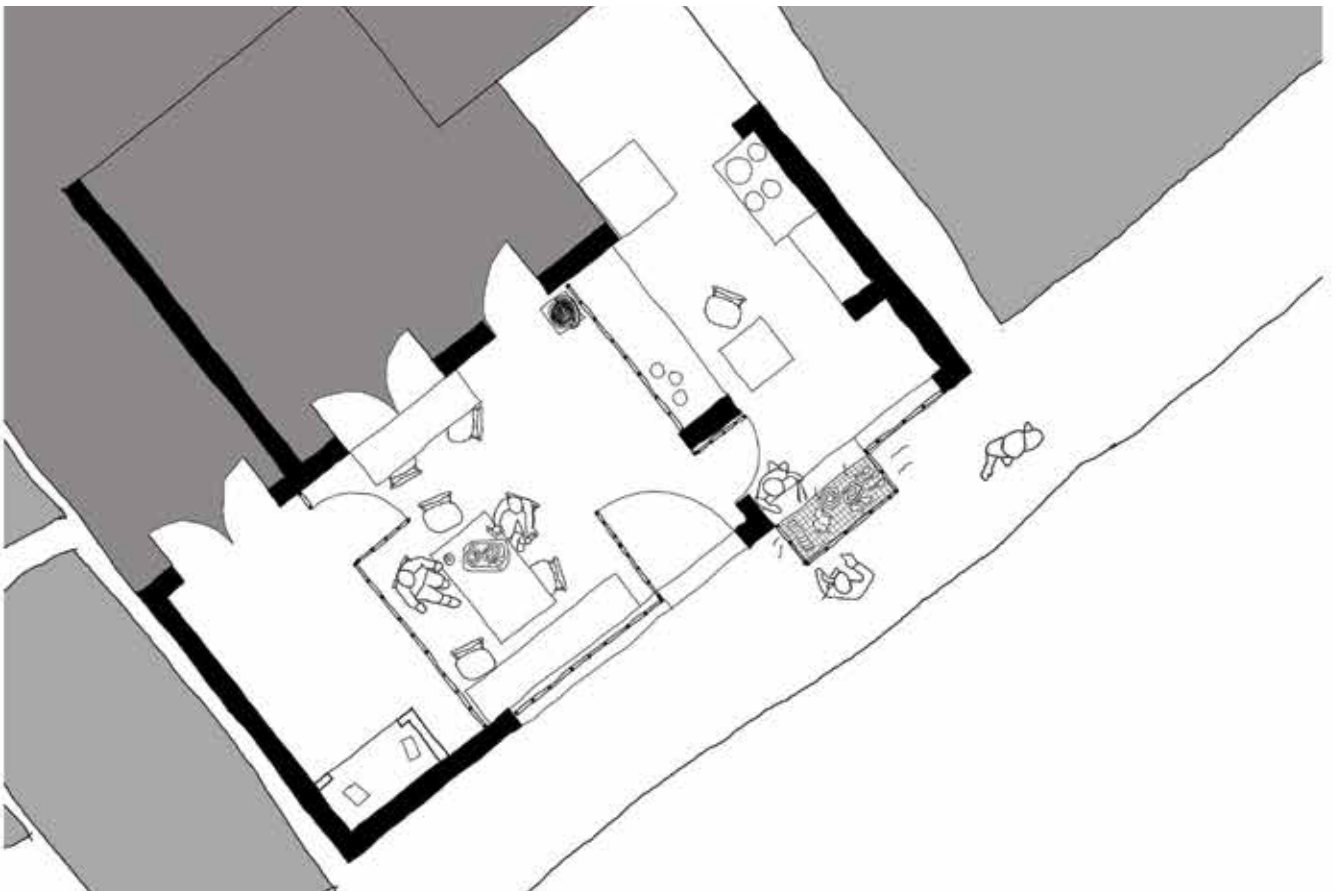


54 : Informal traders trading from containers at taxi rank.

Fig 53 - 56 : Drawings of various informal businesses by author.



55 : Informal hair salons trading from containers at taxi rank.

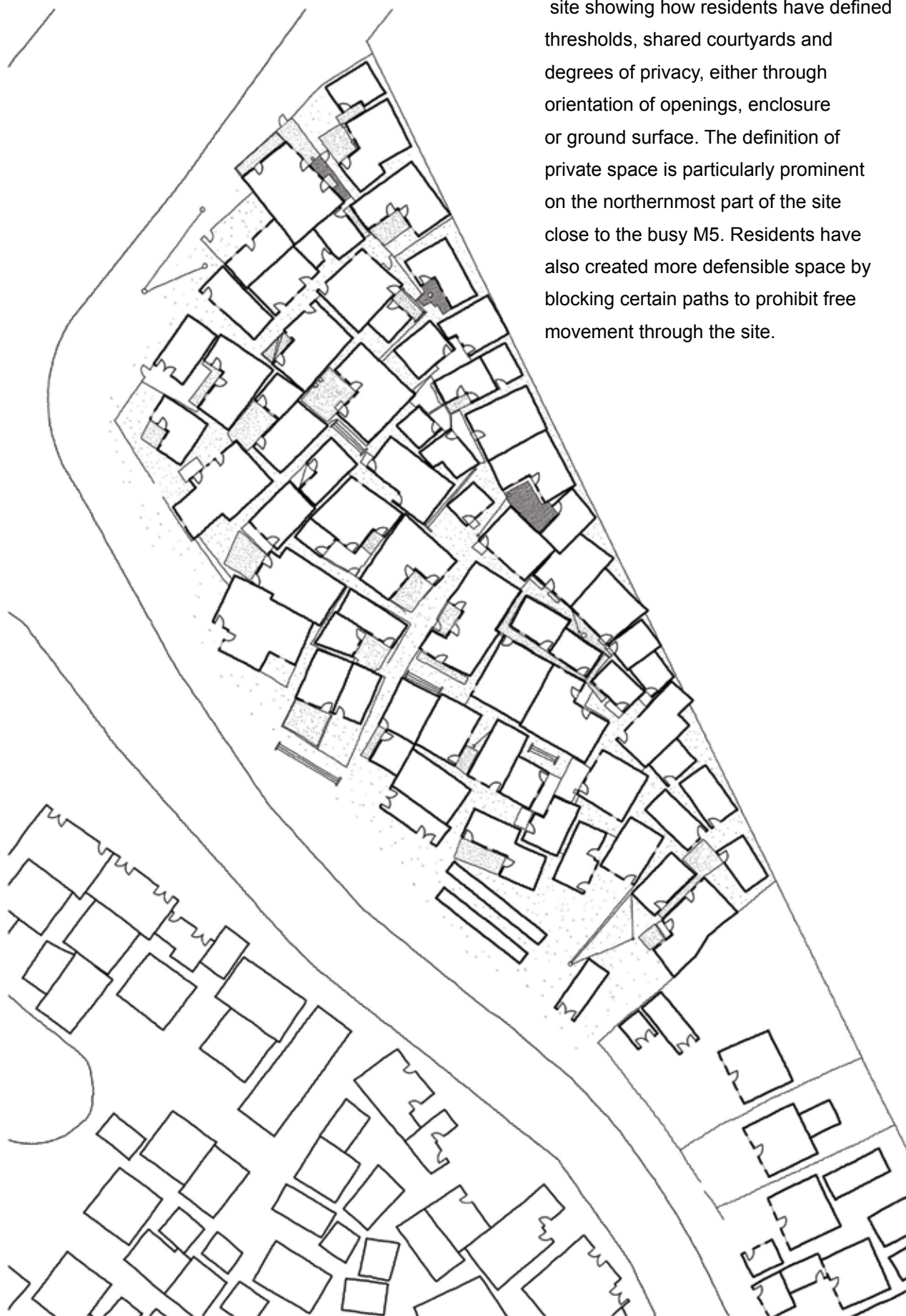


56 : Front of formal house converted into 'Chisa Nyama' restaurant.

RESIDENTIAL SITUATIONS

The residential fabric of Du Noon was explored in relation to its development as an RDP roll-out. From this point, two typologies emerged: the backyard shack, built on a privately owned RDP plot, and the informal settlement – shacks built on unowned (or municipally owned) land. RDP houses were investigated for the ways in which they have been adapted or replaced; shacks for the ways they have been situated in relation to each other and the public realm; and the relationship between the two was explored

This is an analysis of an informally occupied site showing how residents have defined thresholds, shared courtyards and degrees of privacy, either through orientation of openings, enclosure or ground surface. The definition of private space is particularly prominent on the northernmost part of the site close to the busy M5. Residents have also created more defensible space by blocking certain paths to prohibit free movement through the site.



Self-built homes tend to open onto informal paths rather than the street. Furthermore, they tend to open onto secondary alleys or small courtyards rather than directly onto the path, deening thresholds of varying degrees of privacy - as indicated by the density of the stippling in this image.



Fig 58 : Drawing of degrees of privacy by Bayo Windapo.
Fig 59 : Photograph of the Empower Shack by author.



main path

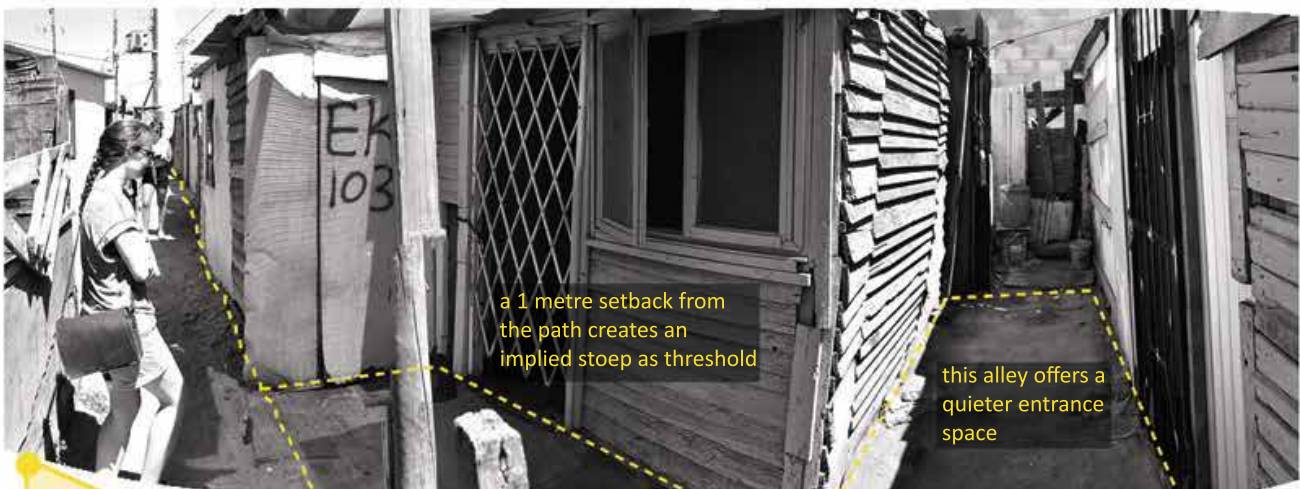
this court offers a more private entrance as well as space for drying clothes

1



setting these houses at an angle to the path creates a softer threshold

2



a 1 metre setback from the path creates an implied stoep as threshold

this alley offers a quieter entrance space

3

PART 4

• • •

*BECOMING FAMILIAR WITH
CONTEXT AND SITE RISKS*

Fig 60 : Aerial photo of an informal settlement: UCT, Submitted City and Regional Planning Report 2015



CONTEXT

The Cape Flats is an area in Cape Town which is characterised by large spatial formations of informal settlements. These settlements are subject to alarming health and safety risks, dominated by two factors; namely excessive flooding and fire. The residents in this area have built their dwellings on and around prominent wetlands. With the naturally high water table and inability for storm water runoff to occur during the rainy season, the residents are under continuous threat of flooding and associated hazards. The challenges for informal dwellers are perpetuated by the second safety risk: fire. The dwellings in the Cape Flats are predominantly self-built, erected using combustible materials and poor construction techniques. Additionally, the structures are required to lie in close proximity to one another because of the space shortages. With this spatial formation and strong Cape winds, it is understandable why the shacks are prone to devastating fires. To add to these woes, the daily use of hazardous materials such as paraffin when open flame cooking, or candle lighting increase the likelihood of fire.

These strategies focus on the creative provision of infrastructure in order to enhance the government's existing in-situ approach to housing development. Therefore the infrastructural technology and fire principles explored enable the formulation of design strategies to protect the most vulnerable citizens. As a result, the architectural strategies become a pre-emptive guide to address the future sustainable growth of informal settlements that are forced to deal with precarious flooding and fire challenges elsewhere. The following chapters introduce the two predominant health and safety risks and outline five of the key strategies when designing for fire and flood mitigation.

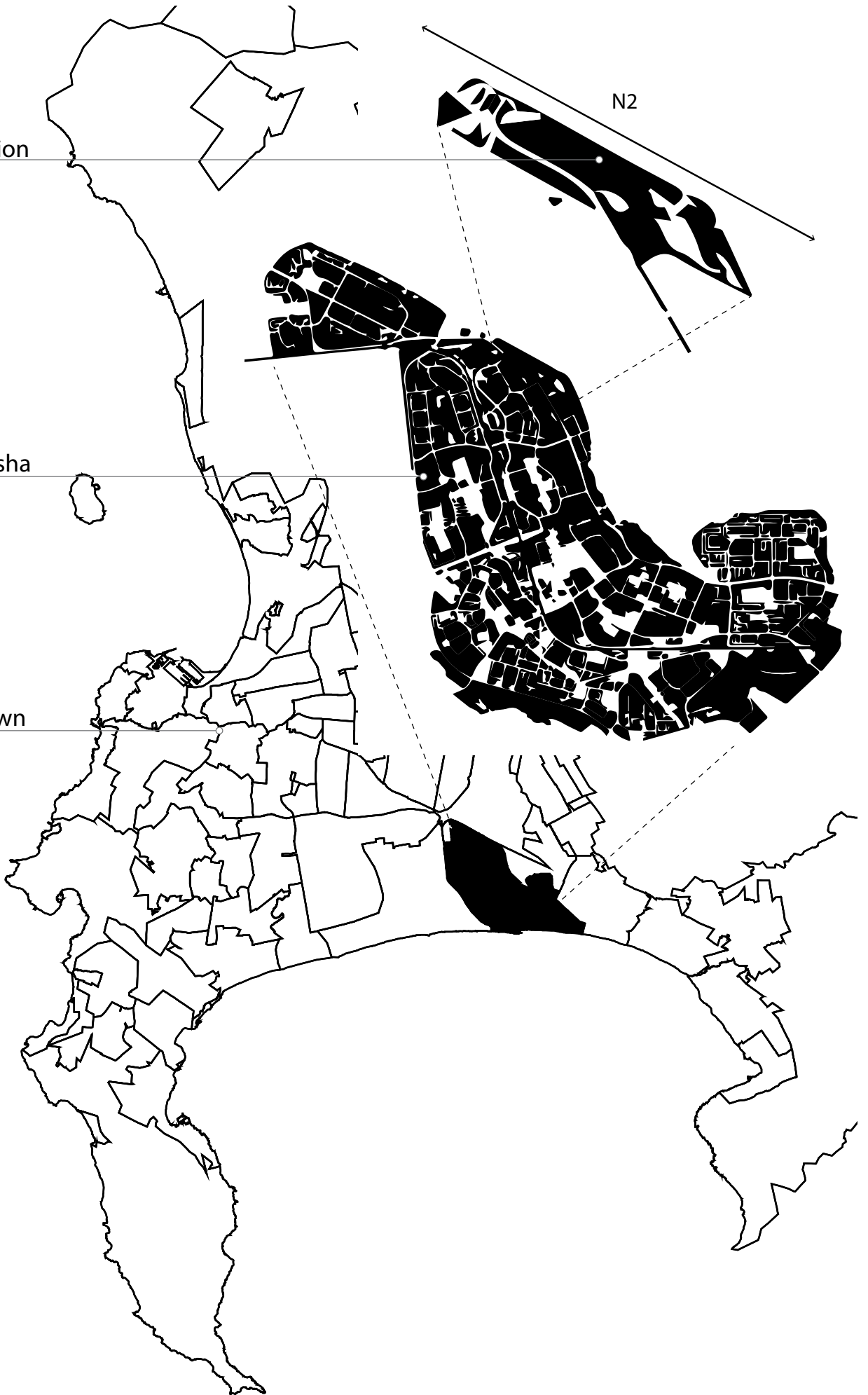
Fig 61 : Illustration of the BM Section informal settlement context in relation to Cape Town by author.

BM Section

N2

Khayelitsha

Cape Town



DESIGNING FOR FIRE

Informal settlement construction materials tend to be combustible – the density of urban fabric and strong Cape Town winds make for devastating fire scenarios. A report prepared by the City of Cape Town for a Fire Safety Symposium outlines the severity of shack fires in Cape Town: in 2012 the city's fire emergency services responded to 1,177 informal settlement fires. Subsequently, 3480 shacks were burnt to the ground with a resultant 110 fatalities (CoCT – Fire and Rescue Service 2013).

An informal settlement that was of particular concern came about when a widely covered story by local news agencies published an article about a fire that broke out in the Barney Molokoana Section (BM Section) in khayelitsha on New Year's day in 2013. The devastating fire left more than 4,000 people homeless and four lives were lost, due to the density of the shacks and gale force winds, there was little firefighters could do (Ikhayalami.org 2012). After emergency meetings between the city of Cape Town and the community, the effected residents made it clear that relocation was not an option. This is when Ikhayalami, a not-for-profit organisation who develops and implements technical solutions appropriate for informal settlement upgrading, was commissioned by the City to help construct 90 temporary shelters adjacent to the OR Tambo sports hall as well as head up a participatory design of the new re-blocked layout for the devastated site. The new layout of 452 dwellings was developed together with the community, the City and Ikhayalami which consisted of communal courtyards, firebreaks, roads and public spaces.

Fig 62 : Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.



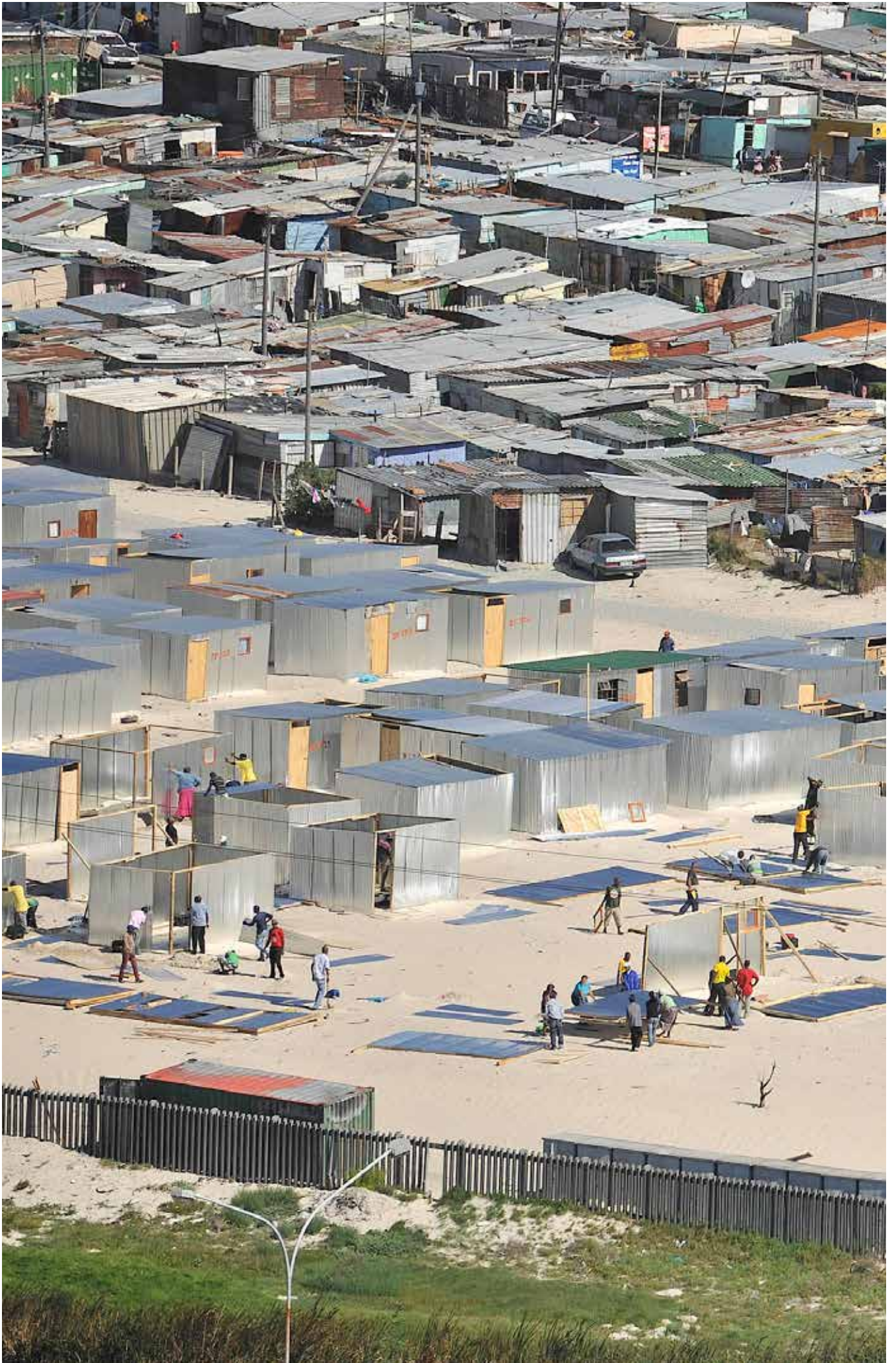
After an Informal settlement fire The City of Cape Town's Disaster Management Team provides food for three days and opens municipal halls as temporary accommodation. However, many of the residents turn down the City's offerings and choose to occupy the exact site of the burnt shelter. This is due to theft and the possibility of losing the land the house previously occupied. Emergency fire kits are then provided which consist of IRB corrugated sheeting, nails and a few timber battens. This provides temporary relief as the residents would have no other means to rebuild after a fire. The irony in this solution perpetuates the same patterns that lead to the settlements destruction.

In light of the current approaches when dealing with fires, the aim of this discussion is to present the principles of fire safety to decrease the current chances of shack fire devastation. The principles firstly cover urban issues of site planning, fire ignition and spread, fire extinguishing and rescue procedures. And on a building scale the construction techniques and fire resistant materials appropriate to low-income areas.



Fig 63 : BM Section 2013 new years day fire devastation. Source: <http://www.ikhayalami.org/>

Fig 64 : Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.

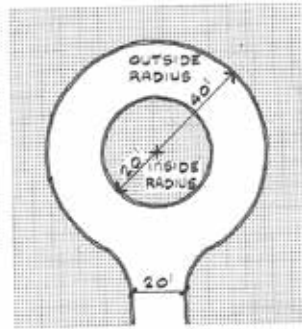
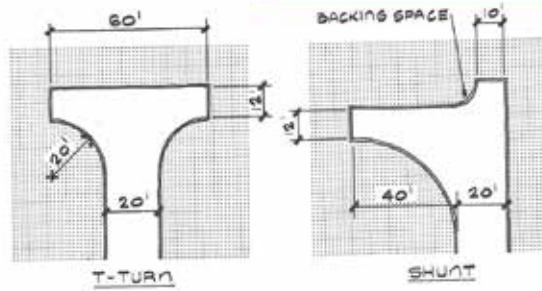


1: Site Planning: When planning for fire access there are a few key aspects one needs to consider. The site should have firm, level roads with minimal barriers that could interfere with the operation. When designing access roads the general turning circle radius of a fire truck (9-12m) needs to be considered. The paved road is required to support the load of the fire truck. In order to ensure efficient deployment of firefighting equipment, the trucks need to have unobstructed access or removable barriers to streets and driveways. It is good practice to have access within 23m of lowrise residential housing. Access to the settlement should be designed in conjunction with site obstacles, such as electrical poles, trees, informal trader stands and various other obstructions. (Egan 1978). With regards to fire hydrant placement, they should be easily visible, not more than 3m from the road, placed at road intersection and at 100m intervals (Egan 1978). Street lighting plays an important role in night-time fire-fighting operations – fire hydrant location and ease in setting up firefighting equipment are both important factors. The removal and storage of refuse can be a common cause or aid for the spread of fires, and thus they should be safely located or protected.

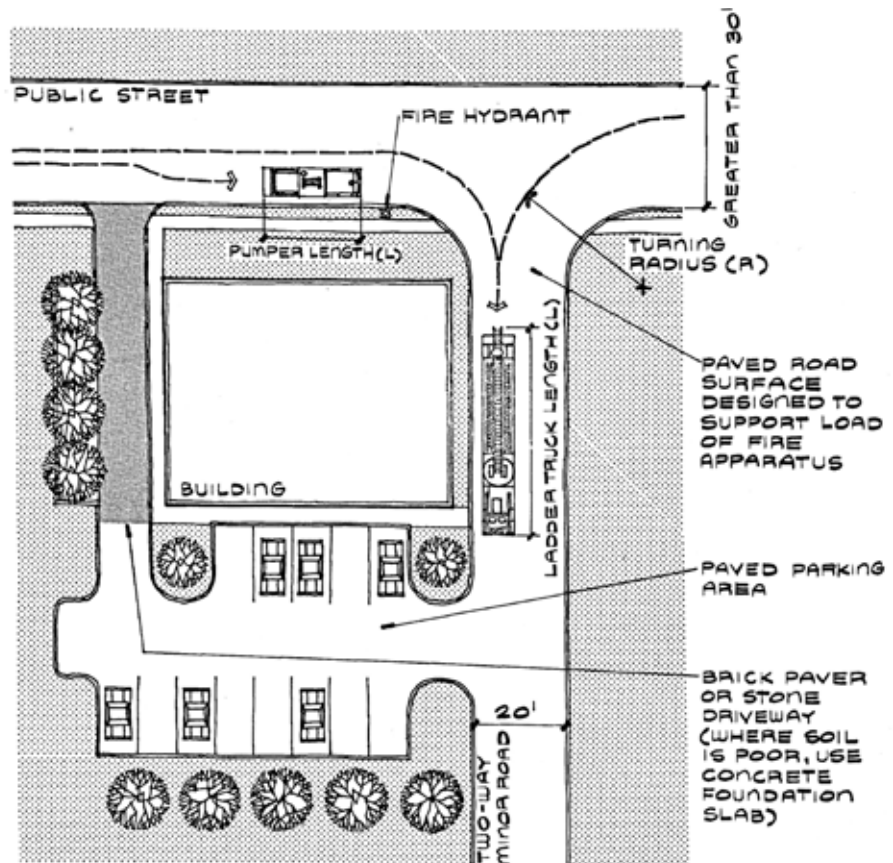
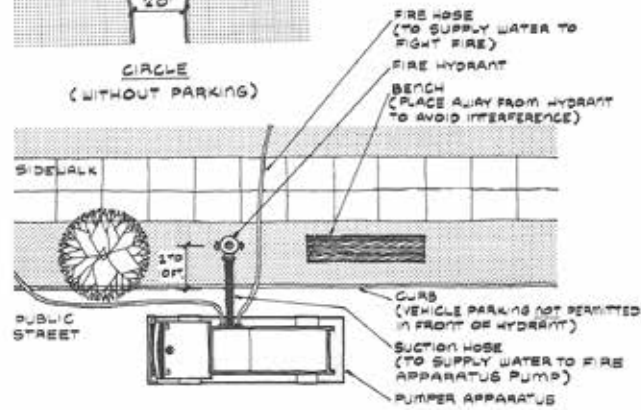
2: Fire Ignition and Spread: The key strategy is to increase the distance between each dwelling and combustible materials, and to insert as many barriers of incombustible materials as possible – these may include low-growing fire retardant plants, pathways, or paved areas. The City of Cape Town's Fire and Rescue Service recommends at least 3m between dwellings (CoCT - Fire and Rescue 2015). Dwelling layouts should provide areas of containment, this is especially important for separating the cooking spaces with living spaces. The use of fire-rated materials to construct buffers is imperative. The layout should also have multiple means of escape as suggested by Cape Town's Fire and Rescue service (CoCT - Fire and Rescue 2015).

Fig 64 : Site Planning diagram. Source: Concepts in Building Fire Safety

Fig 65 : Fire truck turnaround layout options. Source: Concepts in Building Fire Safety

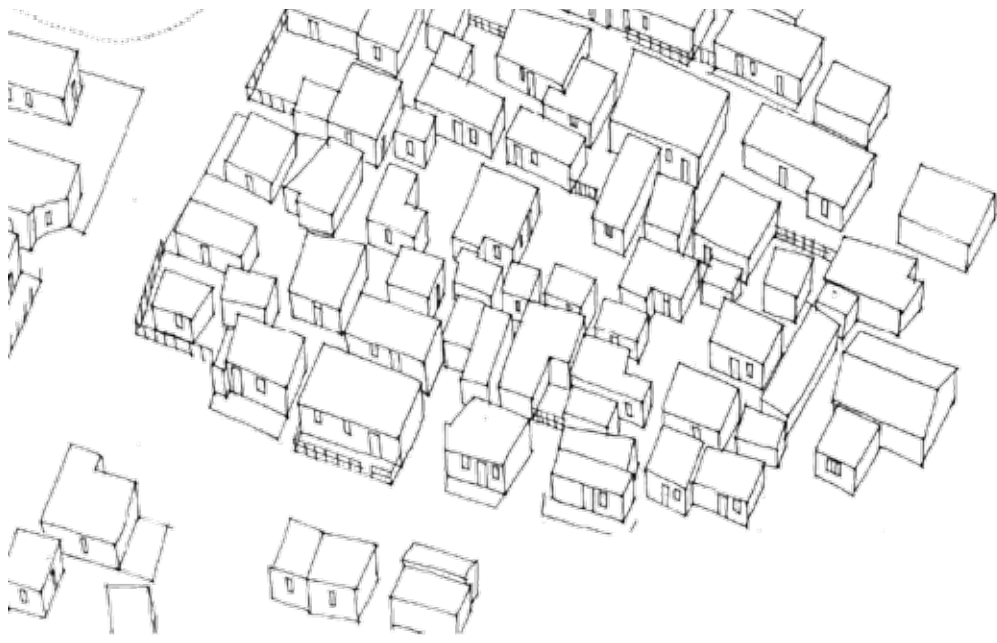


NOTE: IN GENERAL, PROVIDE GREATER OUTSIDE RADIUS FOR COMMERCIAL AND INDUSTRIAL AREAS.

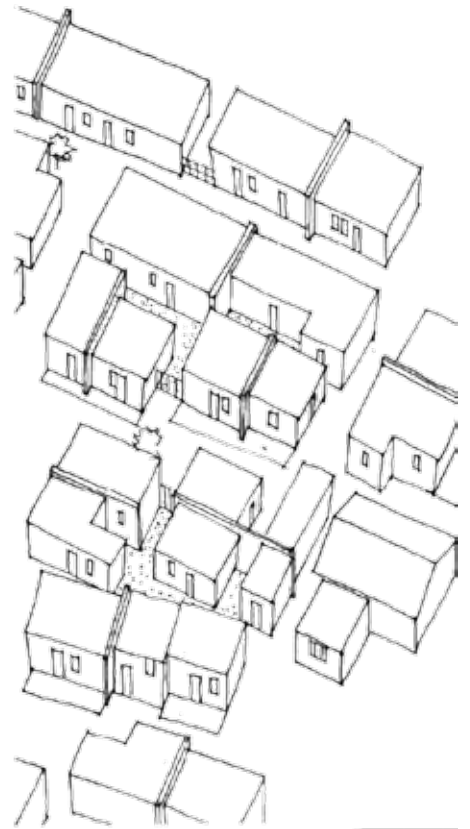


3: Construction Techniques of Fire walls: In Julian Cooke's essay (mentioned previously) an age old idea is explored for the containment of fires in informal settlements: the application of fire walls built between neighbours. The walls should be built above the height of the shacks that 'lock' onto it, and should primarily run parallel to prevailing winds. These walls would create barriers between buildings and contain potential fires (Cooke 2013). This would also prompt a formalised structure and the start of an incremental housing development. By replacing 3m fire breaks, as specified by the City of Cape Town (CoCT - Fire and Rescue 2015), the spaces would be opened for provision of services, public use and access for emergency services. Maintaining housing density without having to relocate people is a primary factor for in-situ township upgrading. Additionally, the areas that have developed using the firewall strategy can act as fire breaks between undeveloped areas.

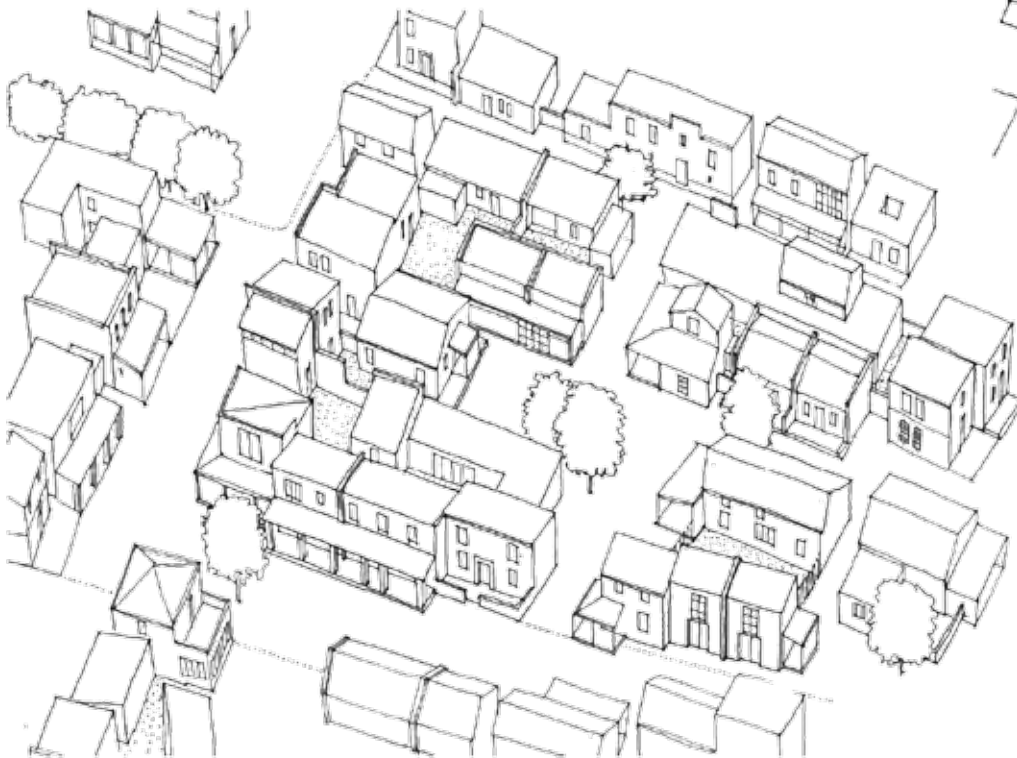
Fig 66 : Julian Cookes phasing of firewalls in Informal settlements. Source: ASA Edition 59



1.



2.



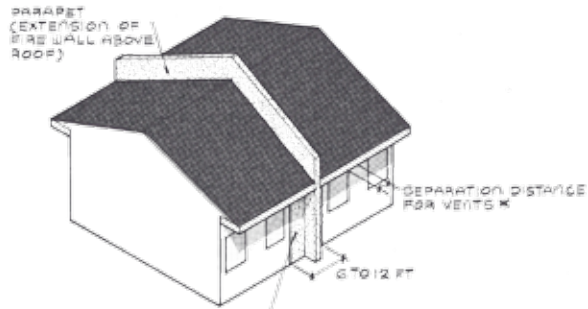
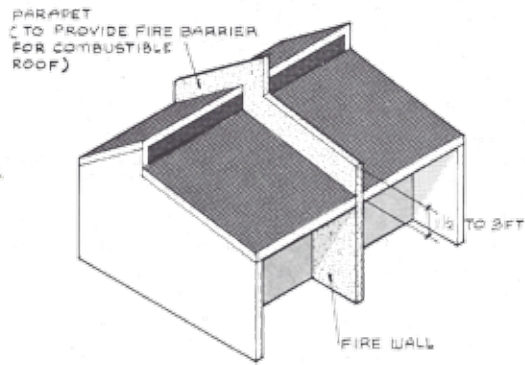
3.

The construction of separating walls between dwellings must either pass 450mm above highest structure if the roof covering is combustible, or alternatively, the gap between the underside of the roof and the separating wall should not allow the passage of fire. If there is a gap due to shared roof structure, the gaps should be filled with fire rated materials such as mineral fibres or mortar infill (The Australian Building Codes Board (ABCB) 2012).

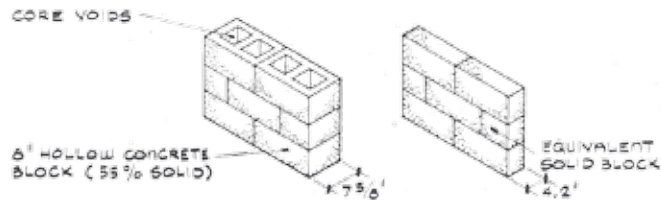
4: Fire Resistant Materials: Concrete blocks and brick walls: The optimal fire resistant barriers. The fire resistance is related to the type of aggregate used within the unit as well as the thickness of the block. The resistance can be further improved through the use of filling the voids within the blocks with insulating material and, in the case of brick walls, create air cavities within the walls themselves. Gyp-roc fire resistant board: Gyproc FireStop is a gypsum plasterboard with added fibreglass strands and unexfoliated vermiculite imbedded into the gypsum core. These features enable it to achieve its improved fire resistance. (Gyproc 2015) The additional applications include interior walls and exterior wall cladding.

Fig 67 : Axonometric drawing of firewalls between houses. Source: Concepts in Building Fire Safety

Fig 68 : Concrete block and brick wall fire ratings and detail. Source: Concepts in Building Fire Safety



BLACK NONCOMBUSTIBLE PORTION OF SIDE WALL (PERPENDICULAR TO FIRE WALL)
 *VENTS LOCATED IN THE SOFFIT OF ROOF OVERHANG SHOULD BE AT LEAST 3 FEET AWAY FROM VERTICAL PROJECTIONS OF ADJACENT WINDOW AND DOOR EDGES.



Equivalent Thickness Table (in Inches)

TYPE OF AGGREGATE	FIRE RESISTANCE (IN HOURS)				
	4	3	2	1 1/2	1
EXPANDED SLAG OR PUMICE	4.7	4.0	3.2	2.7	2.1
EXPANDED CLAY OR SHALE	5.7	4.8	3.8	3.3	2.6
LIMESTONE, CINDERS, OR AIR-COOLED SLAG	5.9	5.0	4.0	3.4	2.7
CALCAREOUS GRAVEL	6.2	5.3	4.2	3.6	2.8
SILICEOUS GRAVEL	6.1	5.7	4.5	3.8	3.0

DESIGNING FOR FLOOD MITIGATION

In July 2007 the City of Cape Town experienced 120mm of rainfall over the course of five days. The unrelenting weather caused severe flooding, directly impacting over 8000 households and equating to approximately 38000 residents – most of whom live in informal settlements such as Khayelitsha and Philippi (Bethany Bouchard 2007). These occurrences are not uncommon to low-income areas situated on the low-lying areas of the Cape Flats. The economic vulnerability of the residents, coupled with exposure to flooding, compromises their health and safety, and consequently destroys many of their personal possessions. The vulnerability of these residents can be attributed to the Apartheid planners, who designated poorly-located land to black and coloured South Africans. Since the fall of Apartheid in 1994 there have been efforts to address these factors with strategic flood risk management plans, focusing on the improvement and maintenance of storm-water infrastructure in informal settlements (Bethany Bouchard 2007).

However, service delivery of water-related infrastructure has become increasingly difficult to provide due to the rate of urbanisation (Armitage 2009). Due to poor maintenance and management of these systems, the current urban development is leading to the demise of sustainable water-related infrastructure in South African cities. This typically results in the continuation of unachievable service delivery, as well putting more strain on the existing infrastructure, and finally leads to the deterioration of natural and ecological systems. Conventional methods are concerned with efficient collecting,

conveying and discharging of storm-water runoff into nearby natural water systems. The usually impervious construction techniques neglect the impacts of storm-water and its relationship to the natural environment.

Khayelitsha and various other areas were constructed on the Cape Flats in the 1980's; the dunes were flattened for the construction of residential units in their place. Rapid urbanisation and development led to large scale canalisation of rivers and their tributaries as well the large areas of wetland being drained and filled in to make way for urban development. An area of particular concern within Khayelitsha is the BM section which sits within the catchment area of the Kuils River. The city has adopted low-tech solutions for storm-water infrastructure in the form of retention ponds. These open spaces have been created to reduce the risk of flooding in the adjacent areas, as they provide a system in which effective drainage can occur. The full utilization of these open spaces is not often achieved. The encroachment of informal settlements on and around storm-water ponds not only endangers the residents, but has a negative impact on the quality of the retained water. These ponds become highly polluted from the dumping of grey and black water. This can have a severe effect on the ecology of the surrounding area and pose serious risks to the health and safety of the surrounding residents which adversely costs the public services and general productivity. Currently, the Kuils River system that borders the BM Section in Khayelitsha, is unsuitable for human contact. According to the City of Cape Town, the quality of water contain 'High Escherichiacoli levels (10 000 – 100 000 E coli per 100 ml median value) (Bethany Bouchard 2007).

Fig 69 : Encroachment of Informal dwellings into wetlands. Source: Worcester Polytechnic Institute. 2007

In light of these challenges the technical exploration when designing for flood mitigation in informal settlements focuses on the Kuils River flood plain in the BM Section of Khayelitsha, which is my intended site. By exploring sustainable urban drainage system technologies (SuDS) the next chapter will look to

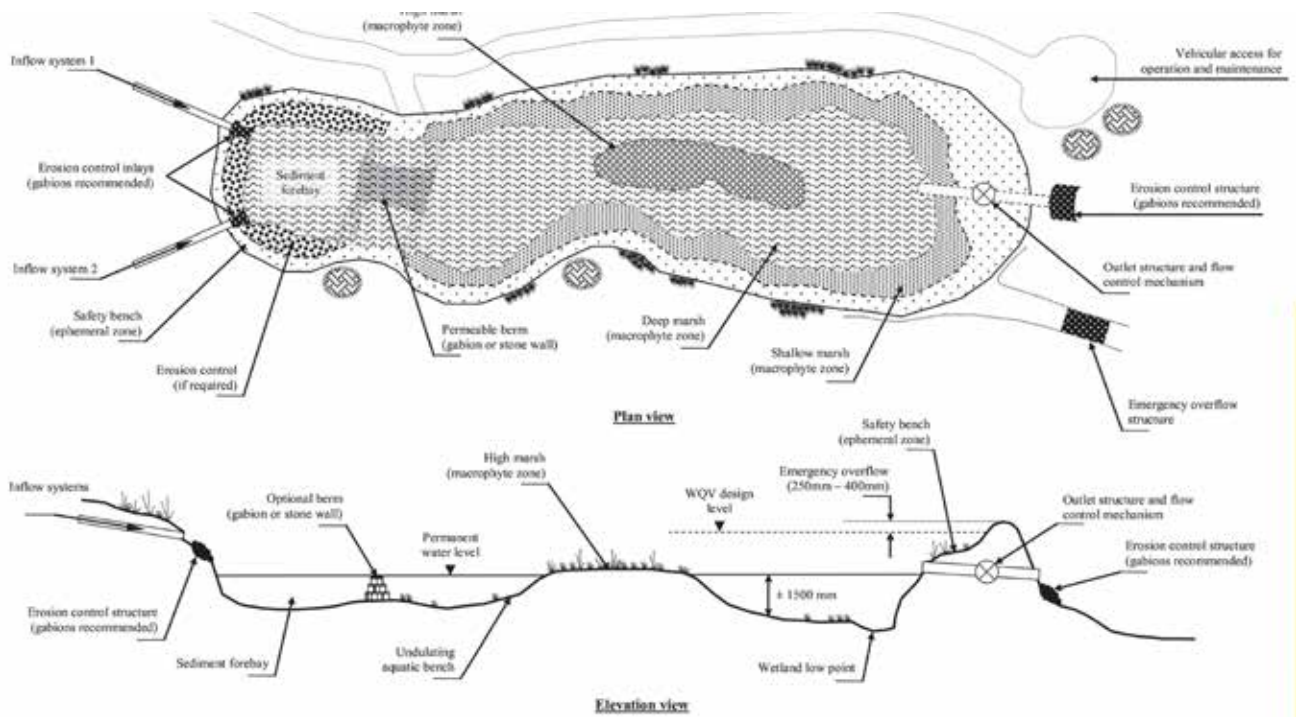
find appropriate spatial interventions that conserve and regenerate natural areas while creating dignified public open spaces. Firstly looking at dealing with storm-water at a precinct scale, and secondly looking at smaller solutions such as landscaping systems that clean the water and promote biodiversity.



1: Precinct Scale: Water Retention Ponds; these open spaces have the potential to be linked and managed as part of the urban fabric. They create routes to public amenities and economic opportunities, whilst still serving to mitigate flooding and enhance the biodiversity

2: Constructed Wetlands; The design of a constructed wetland seeks to effectively treat the surface runoff by retaining volumes of water in sections. The capacity to hold the water in each section will remove 20% of the pollutants. The more sections a wetland has, the more effective the removal of pollutants will be (Austin 2014). The wetlands not only provide opportunity to treat the water and provide a framework for an ecosystem to thrive, but also provides spaces for park structures, picnic locations and recreational facilities, as well as a beautified pedestrian routes around the edges.

*Fig 70 : Detention pond will become a 'wetland amenity': <http://thecitizen.com/news-government-city>
Fig 71: Plan and section of a constructed wetland. Source: Ethekewini Municipality. 2008*



3: Better Stormwater Retention / Detention Ponds; The most effective strategy would be develop each detention pond into a detention basin by excavating them below the natural ground level, lining the base with various layers of geotextiles and gabion walls. This would help with infiltration and water storage. Through the planting of varying species of vegetation contaminants will be removed by the processes of biological intake.

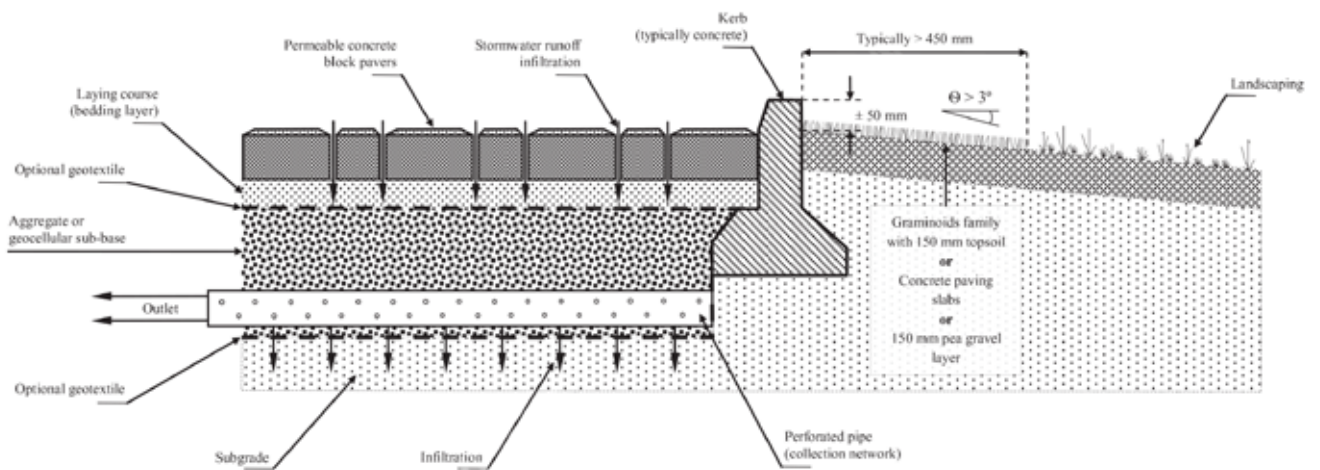
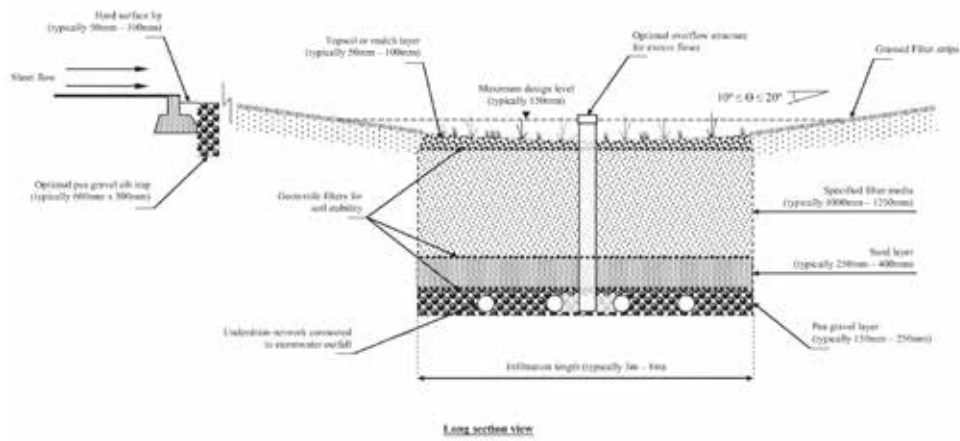
4:Bio Retention Areas; Effective residential block scale management systems. The system is based on a small valley depression in the earth and natural processes such as infiltration, absorption and biological uptake (Austin 2014). The system not only reduces the rate of storm-water runoff but also removes pollutants before discharging the water into natural watercourses.

5: Permeable Paving; Permeable pavements are bricks, concrete blocks, gravel and porous asphalt surfaces which allow for a developed loadbearing surface and stormwater infiltration. The layering of the surface and subsurface stores the water and effectively discharges it into the ground below. The permeable paving sits on a geotextile lining above varying layers of aggregate and sometimes subsurface drainage pipes (Vice 2011)

Fig 72 : Storm Water Detention Pond construction. Source: 2013 Blue Ridge Engineering PLL

Fig 73 : Cross-section of a bio-retention area. Source: Ethekewini Municipality. 2008

Fig 74 : Cross-section of a permeable pavement. Source: Ethekewini Municipality. 2008



TECHNICAL RESEARCH REFLECTION

Upon reflection of the various technical explorations. The provision of infrastructure and the requirements to prevent fire and flooding have proven to be usable assets in contributing to in-situ upgrading. The provision of access routes for fire trucks, the use of SuDS together with the application of firewalls. The settlements must be developed into safer and more manageable urban blocks. This framework sets up parameters in which architects can utilise and design methods for incremental building to take place. If provided by the government and designed by architects, the informal settlement can be adapted by the inhabitants to best suit their needs. With

the use of green infrastructure, firewalls and other fire safety principles, there is no reason the BM section in Khayelitsha could not become a model for appropriate incremental upgrading projects.

ENTRY FOR SHELTER’S DENSITY COMPETITION 2015

The aim of the competition is to foster new ways of designing for rapid urbanization and growth in unplanned cities. Another component was to design scenarios in which the community could become empowered and self-sufficient. This proposal informed some of the core principles investigated in this dissertation.

A proposal by Alexander Frehse and Michael De Beer and myself was based on the most recognized plant in the Cape Floral Kingdom, the Protea, and its ability to germinate after burnt in a fire. The project tackled the persistent and devastating effects of fires in South African informal settlements. The intervention, activated by disaster, - comprises of stages which offers immediate aid in the reoccupation of land in the process defining urban edges and pre-empting future growth.

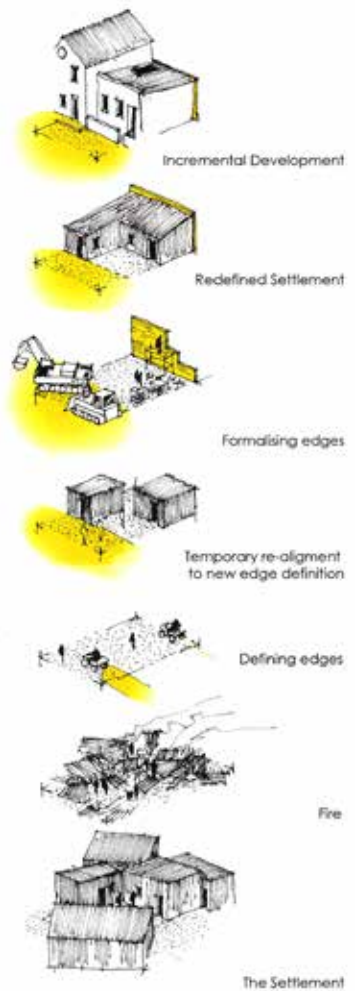
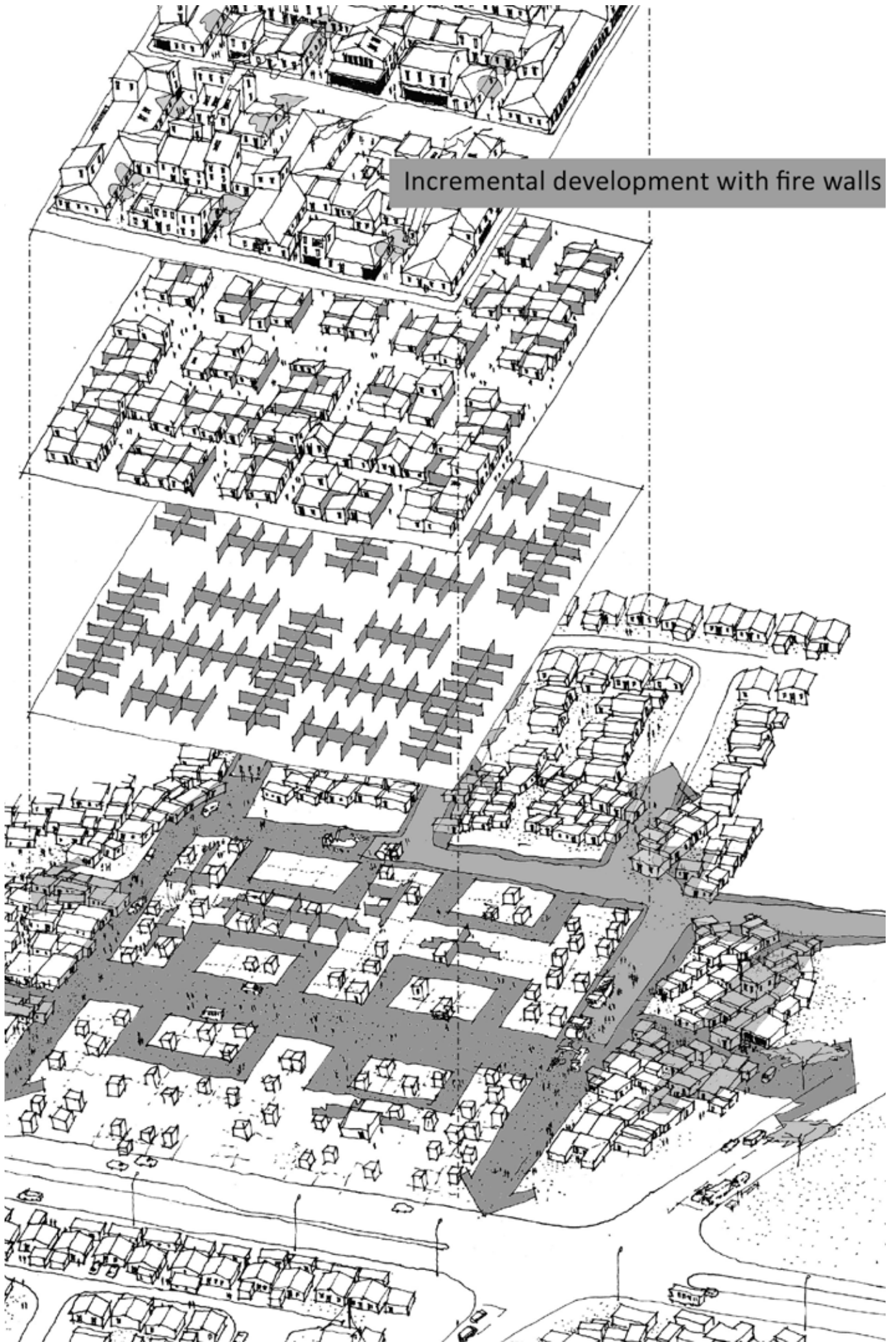


Fig 75 : Drawing of the implementation process of firewalls after fire has occurred. Source: Authors own
 Fig 76 : Drawing of incremental development of settlement after fire has occurred. Source: Authors own

Incremental development with fire walls

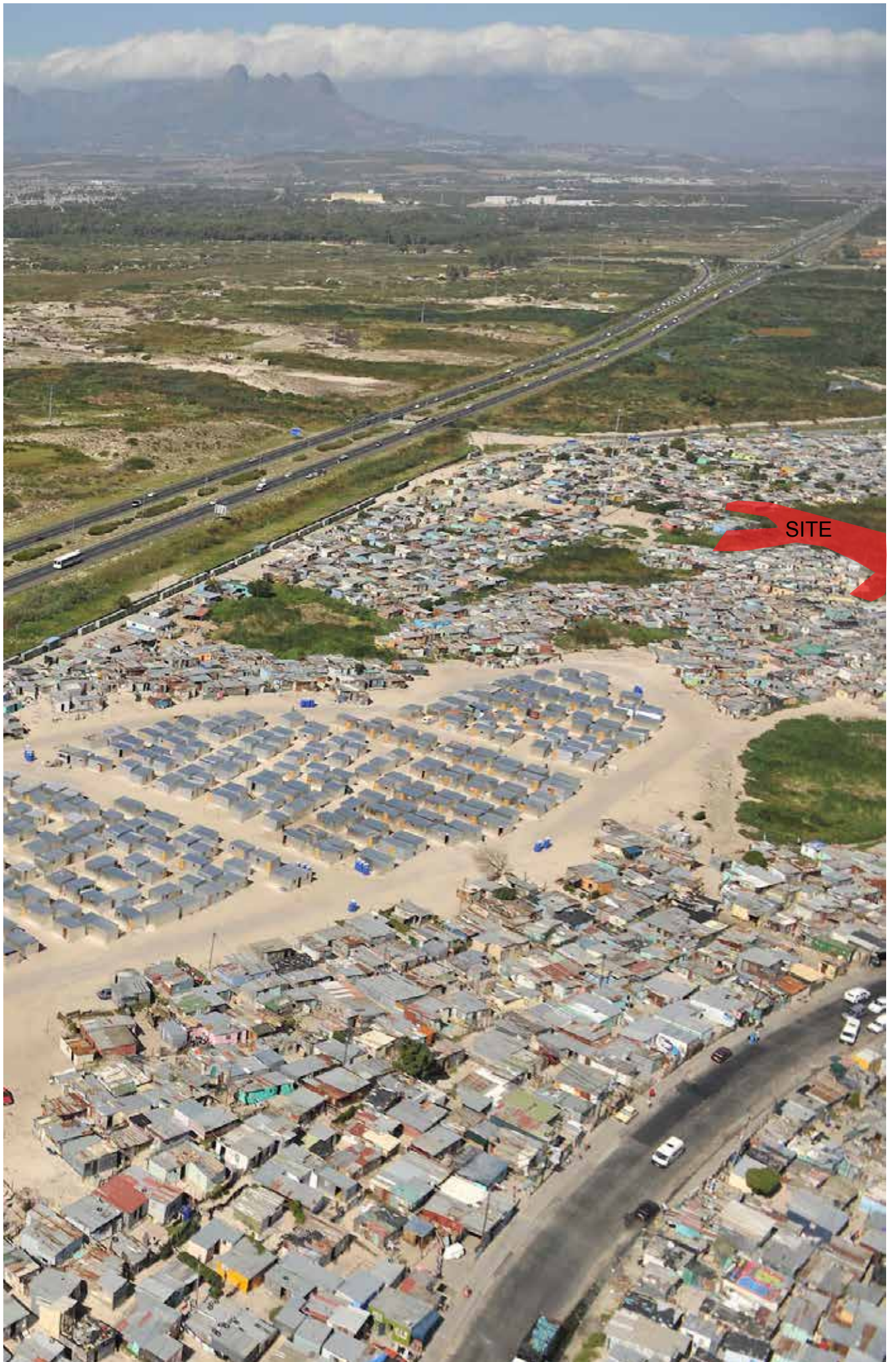


PART 5

• • •

*SITE ANALYSIS: UNDERSTANDING THROUGH
MAPPING AND EXPERIENCE*

Fig 77 : Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.



SITE



Fig 78 : Aerial photograph of the BM section. Source: Arc GIS

Fig 79 : Statistics and infographics of the BM Section. Source <http://wazimap.co.za/profiles/ward-19100089/>

BM SECTION, KHAYELITSHA

Khayelitsha is located roughly 30km southeast of the Cape Town business district. The township was positioned on the periphery of the city by the apartheid government in 1984. The chosen site named the BM Section was first settled on in 1986, and named after Barney Molokwana a known struggle activist during apartheid, who lived in a neighbouring neighbourhood. The BM Sections current borders are the N2 highway and Kuils River to the North, the Nulothando Educational Centre to the east and Lansdowne Road on the southern edge.

The city has provided electricity to the majority of the settlement, shared water stand pipes that are dispersed throughout the settlement, full flush toilets, portable flush toilets, chemical toilets as well as one communal ablution facility on Lansdowne road.

The statistics below portray the need to provide income generation within the settlement as 40% of the population is unemployed and earn half the average amount of income in South Africa. Furthermore there is a large portion of the voting ward paying off their houses and acquiring ownership thus setting good precedent for the informal portion of the settlement.

Households

9 574

Households

less than 10 percent of the figure in Western Cape: 1 633 998

South Africa: 14 450 132

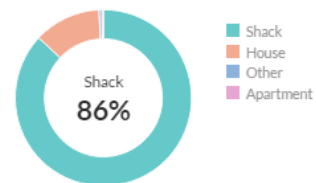
86.3%

Households that are informal dwellings (shacks)

more than double the rate in Western Cape: 18.2%

more than double the rate in South Africa: 13.6%

Households by type of dwelling



[Show data](#) / [Embed](#) / [Share](#)

Household ownership

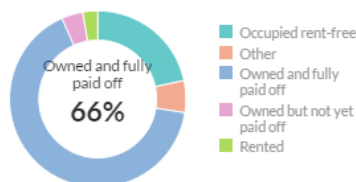
69.8%

Households fully owned or being paid off

about 1.3 times the rate in Western Cape: 52.4%

about 1.3 times the rate in South Africa: 53.1%

Households by ownership



[Show data](#) / [Embed](#) / [Share](#)

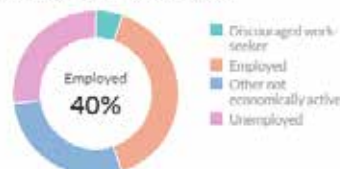
39.7%

Employed

about 80 percent of the rate in Western Cape: 50.1%

about the same as the rate in South Africa: 38.9%

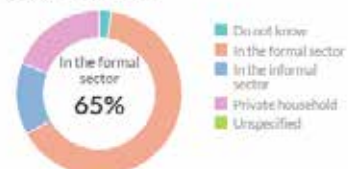
Population by employment status



* Universe: Workers 15 and over

[Show data](#) / [Embed](#) / [Share](#)

Sector of employment



* Universe: Workers 15 and over

[Show data](#) / [Embed](#) / [Share](#)

Monthly income

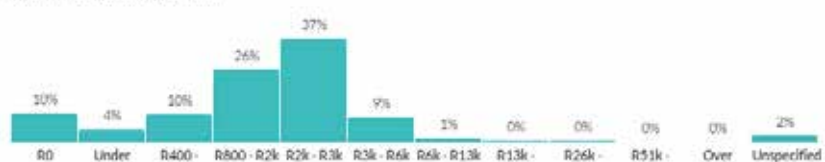
R1 200

Average monthly income

about half the amount in Western Cape: R2 400

about half the amount in South Africa: R2 400

Employees by monthly income



* Universe: Employed individuals

[Show data](#) / [Embed](#) / [Share](#)

SANITATION

The City of Cape Town opted to install 420 full flush toilets on the periphery of the settlement due to the dense built fabric and irregular topography caused by the wetland.

Each toilet is enclosed within a precast concrete box with a corrugated iron door. The toilets are laid out in rows of 9 to 39 units along the concrete palisade fence separated from the settlement by a gravel service road (Water Research Commission 2014). The toilet infrastructure and service road has no storm water drainage which causes greywater and rain water to pool around the entrance of the toilets. Standpipes for washing and water collection have been installed at the end of each toilet cluster. The main sewer line is located on the N2 side of the palisade fence transferring the waste water to the Zandvliet Wastewater Treatment Plant (Water Research Commission 2014).

There are a total of 420 Toilets

- 61% were padlocked
- 31% were unlocked
- 7% had no doors
- 11% were inaccessible due to proximity to the wetland
- 73 units had no issues and worked well

There are a total of 45 standpipes

- 58% had no taps
- 36% had blocked drains
- 9% had no drainage system

Key Lessons

- Sanitation is undignified and lacks concern for the users
- Toilets are rolled out in scale using prefabricated elements.
- There is an opportunity to utilise the precast toilet unit as a support structure.
- Due to the lack of ownership from the community the toilets have not been looked after.

Fig 80 - 83 : Photos of the BM Sections communal flush toilets, conducted for a social audit. Source: The SJC and Ndifuna Ukwazi



80 : Blocked toilet.



81: Child standing at the entrance of vandalised toilets.



82 : Janitorial service allocated to the BM Section.



83 : Toilets and water points are places of activity and play.

MAP PROFILE : Livelihoods



2015

-  Spaza Shop
-  Shoe and Clothes Repair
-  Barber / Salon
-  Braai / Food
-  Building Materials
-  Shebeen
-  Educational
-  Community Centre
-  Church
-  Water Collection and Washing

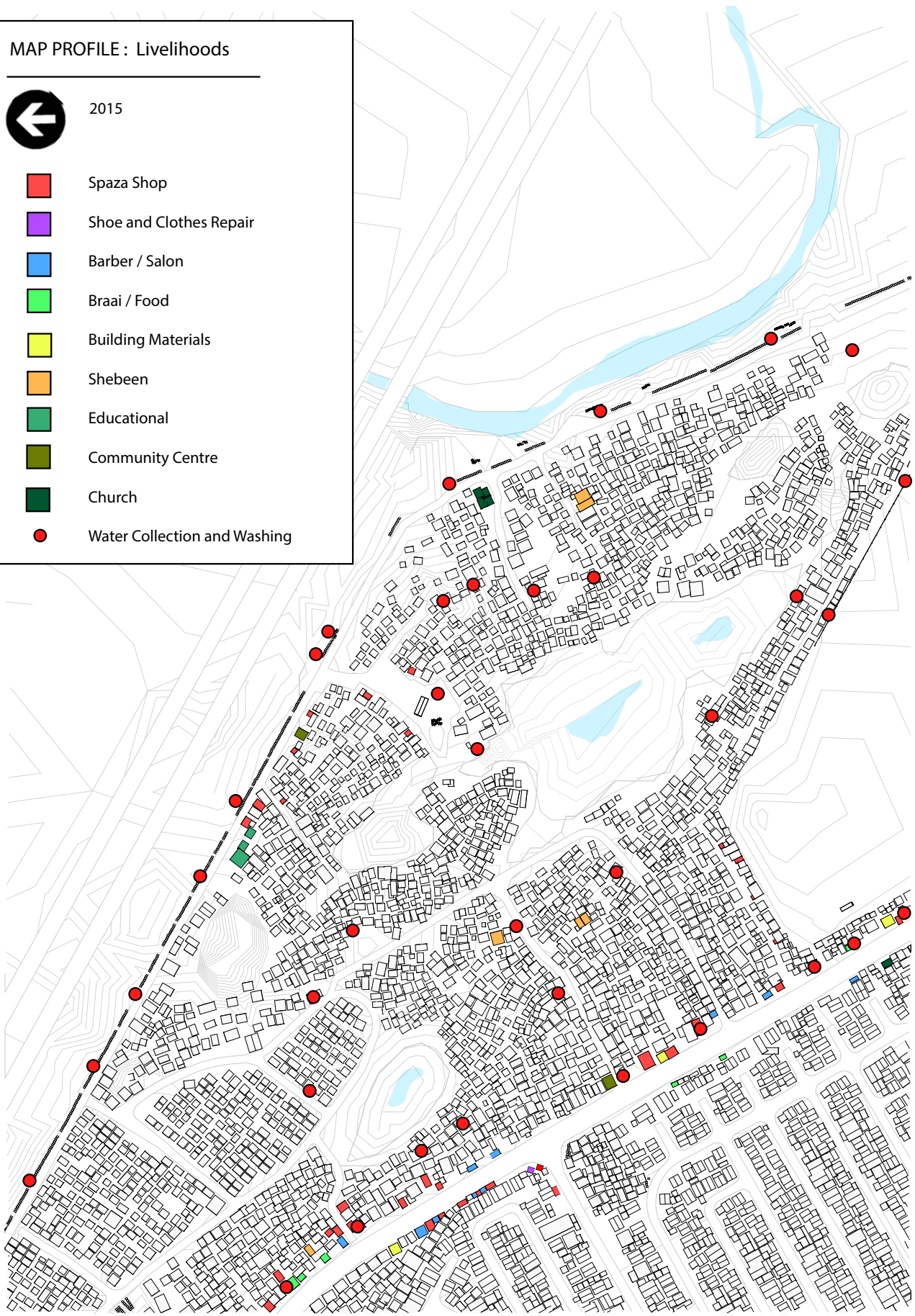


Fig 84 : Map by author.

Fig 85 : Photograph by author.

Fig 86 - 88 : Source Google Street View.

LIVELIHOOD MAP

The livelihood map indicates the types of income generation and community institution structures. These various livelihoods are a crucial source of income for shop owners and encourage the community to spend their money within the settlement. The layout of the various structures indicates that the edges of the settlement are where the most activity takes place this is due to accessibility and proximity to roads and services.



85 : Mr Siyabulela and his father outside their community centre



86 : Cash store on Lansdowne Road



87 : Barber on Lansdowne Road





88: Pre-fabricated shack trade on Lansdowne Road

MAP PROFILE : Local Routes, Gateways and Spaces of Engagement




2015

 Vehicular and Pedestrian Routes

 Pedestrian Routes

 Routes Unusable
in Winter Due to Flooding

 Gateways

 Spaces of Engagements

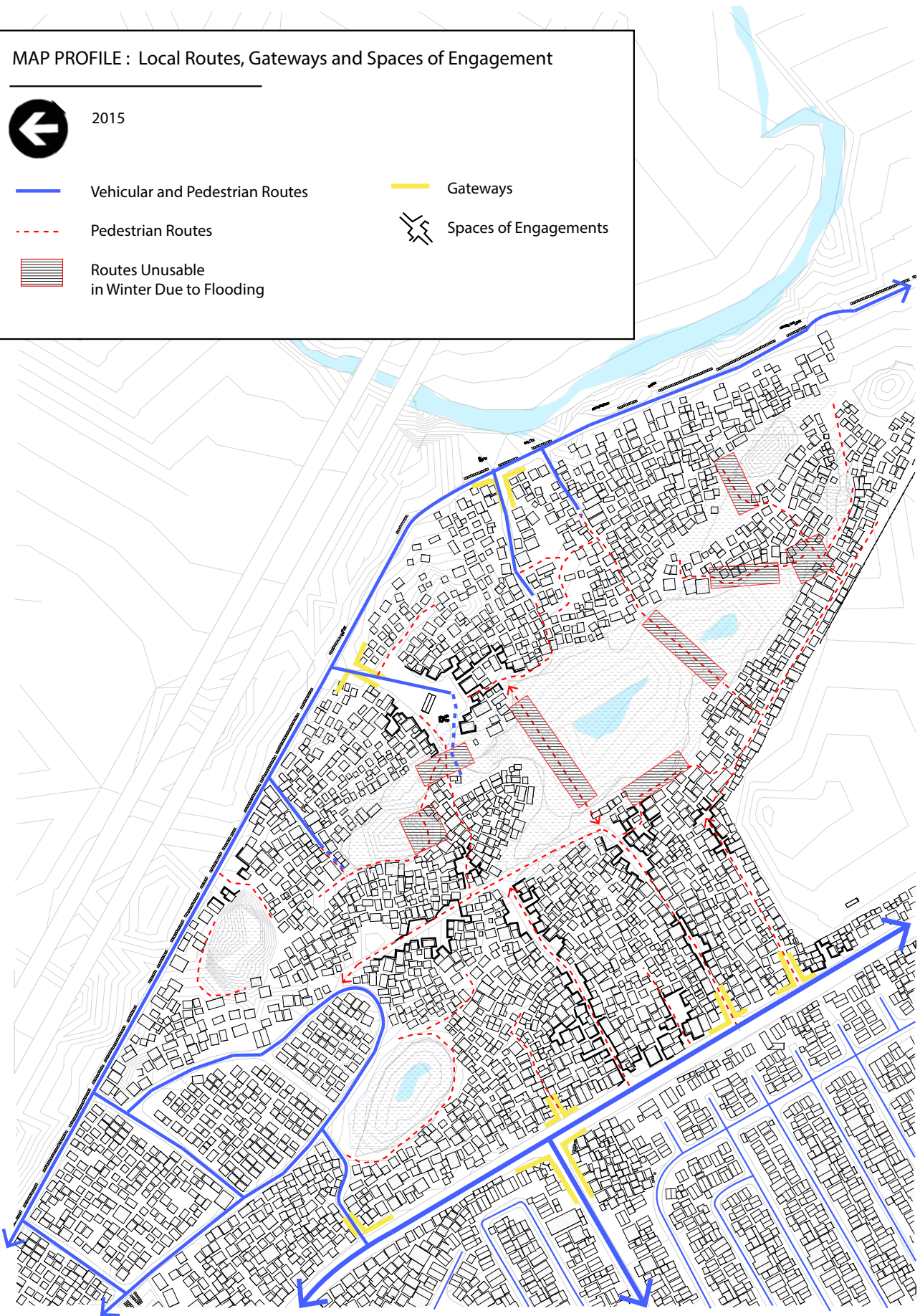


Fig 89 : Map by author.

LOCAL ROUTES

Local routes are a multi-layered network of movement pathways. The highest level of movement are the formal tarred roads, then the semi-formal gravel roads (recognized as road reserves by the municipality), then the inter-dwelling movement pathways also known as desire lines, these provide pedestrian access within the dense settlement and are usually informed by key landmarks which are connected.

Key Lessons

- Emergency vehicle access is limited.
- Dwelling encroachment into movement routes created fire risk.
- Key pedestrian routes are unusable in winter.
- Urban fabric is illegible and lacks hierarchy of movement routes / access.
- Paths have no consistent width.


GATE WAYS AND SPACES OF ENGAGEMENT








Gateways refer to entry points to the high activity informal pedestrian paths, these are intense nodes of commercial, social and institutional activities. Spaces of engagement are the areas that generate the productive realm. These spaces blur the interior and exterior, the shared and individual, between formal and informal. An understanding of these spaces can allow formal and informal environments to co-exist. The spaces are created by activities; social meeting spaces such as shops, taverns, religious, taps and toilets which define the edges around the space of engagement. There is a common understanding between the users to protect and look after the space. These areas have large economic benefits, and cater for communal gatherings. These spaces often contain large amounts of advertising.

Key lessons

- Gateways consist of multiple uses and facilitate large volumes of foot traffic.
- Spaces of engagement have clearly defined edges.
- Understanding between residents to protect and maintain these spaces.
- Colourful advertising in and around communal gathering spaces.

MAP PROFILE : Government Supplied Infrastructure

 2015

	Toilets		Tar Roads
	Water Stand Pipes		Gravel Roads
	Refuse Disposal		Proposed Roads
	High Level Mast Light		

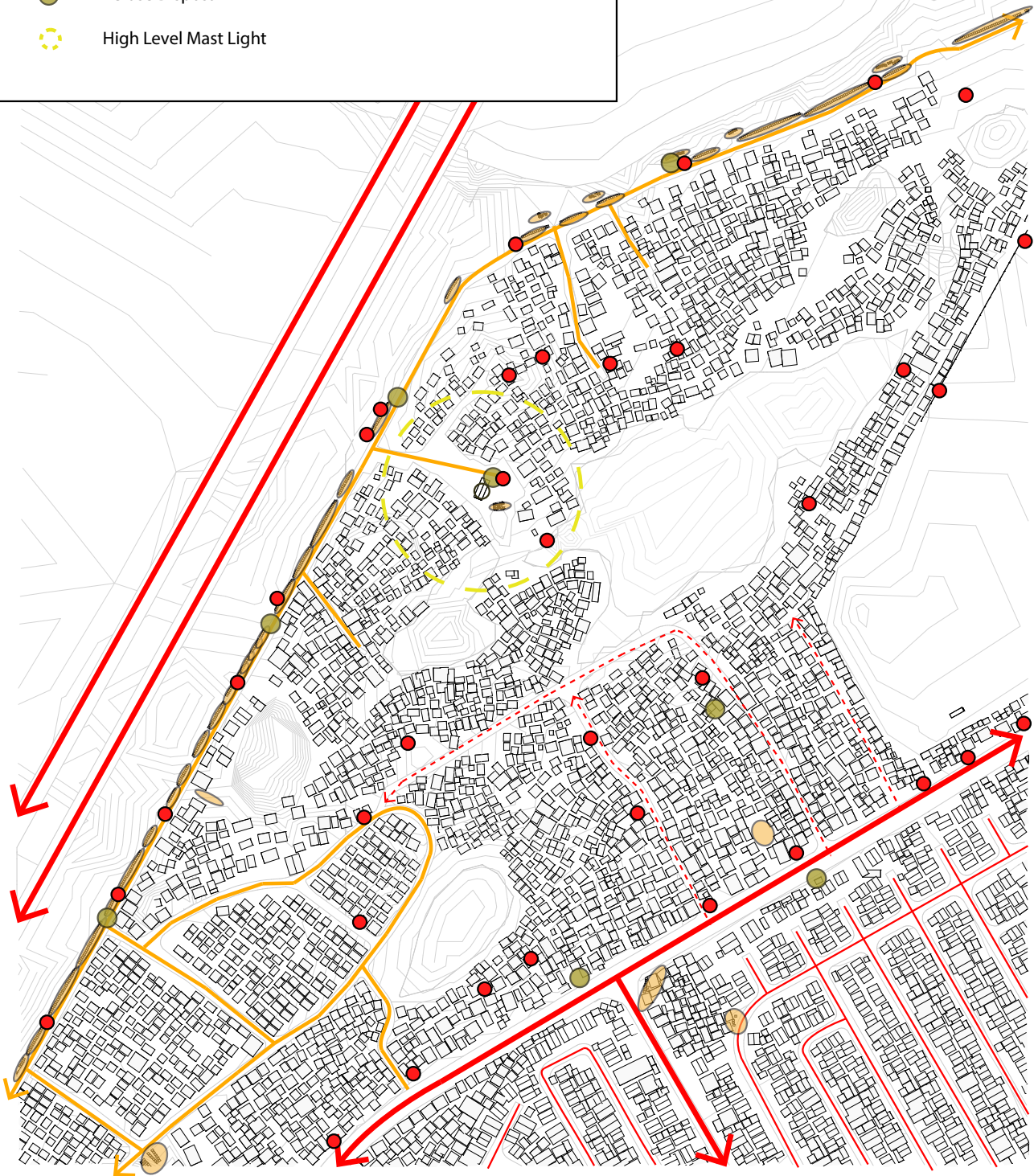


Fig 90 : Map by author.
 Fig 91, 92 : Photograph by author.

GOVERNMENT SUPPLIED INFRASTRUCTURE

ROAD INFRASTRUCTURE

The majority of roads around the settlement do not penetrate deep into the settlement. These paths originated from simple footpaths to form streets wide enough for vehicular access, however the streets are gravel and do not cater for heavy vehicle access. This does not allow for emergency services to respond to requests for assistance. During winter rains, these roads become impassable.

Key lessons

- Engineered road infrastructure for emergency vehicles.
- Drainage and fire hydrants are needed.
- Turn-around's and maneuverability need to be considered.

WATER AND SANITATION

The current provision of services is un-even and lacks maintenance. The majority of toilets and taps are located on the periphery of the settlement. As a result some residents walk far to access portable water and toilets. This is especially dangerous for women and children at night. The toilets are unhygienic and laid out in vast rows. The current approach to sanitation and service provision is undignified and lacks concern for the users.

Key Lessons

- No dignified provision of infrastructure.
- Refuse removal within the settlement is poor, resulting in large amounts of dumping in and around the wetland occur.
- Use of services are dangerous at night.
- Communal areas create high activity nodes.
- Opportunity for multipurpose areas around toilets and taps.









91 : Communal toilet blocks.



92: Water point located in wetland.

MAP PROFILE : Health and Safety Risks

 2015
 Area affected by flooding
 Shacks affected by flooding
 Water body
 Dumping
 Burn area

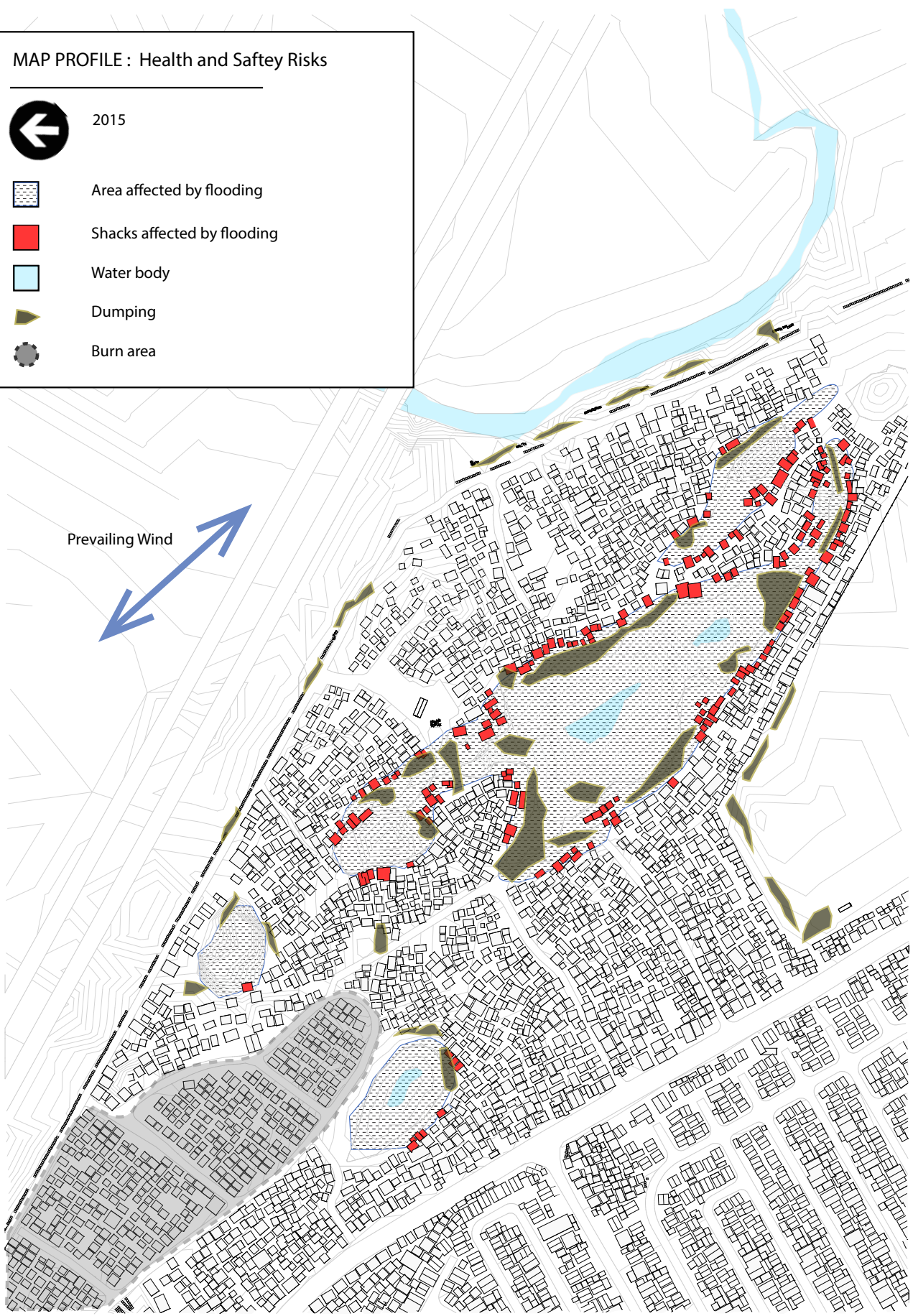


Fig 93 : Map by author.
 Fig 94, 95 : Photograph by author.

HEALTH AND SAFETY RISKS

FIRE

Currently the interior of the settlement is inaccessible to fire trucks, making it a dangerous scenario in windy conditions. The fire and rescue services use fire engines when responding to the fires within informal settlements. Each truck carries 8 x 30m fire hoses. Every 4 lengths a booster pump must be installed. The optimal scenario is using 4 x 30m fire hoses as this is deployed quickly and without the need for additional pumps and ensures the correct distance and type of spray can be achieved. Another crucial aspect is accessibility upwind from the fire and quick escape incase the wind changes direction.

Key lessons

- Optimal distance is 130 meters from fire hydrant.
- Access of the fire engine needs to be upwind and the fire.
- Use and number hoses can be a combination; from the hydrant to the truck and from the truck to the fire.

FLOODING

The economic vulnerability of the residents, coupled with exposure to flooding, compromises their health and safety, and consequently destroys many of their personal possessions

DUMPING

The encroachment around the wetland has caused the area to become highly polluted from dumping of refuse, grey and black water. This has a severe effect on the ecology of the surrounding area and poses serious risks to the health and safety of the surrounding residents



94 : Home affected by flooding.



95 : Dumping and makeshift promenade along wetland edge.

MAP PROFILE : Urban Response



2015



Focus area



New Open public Space



Access Roads



Water Service Line



Sewerage Service Line



Formalised Pedestrian Routes and emergency vehicle access (Incremental Service Provision)



Placemaking Opportunities



Reconstructed wetland



Rehabilitation of Ecological Link

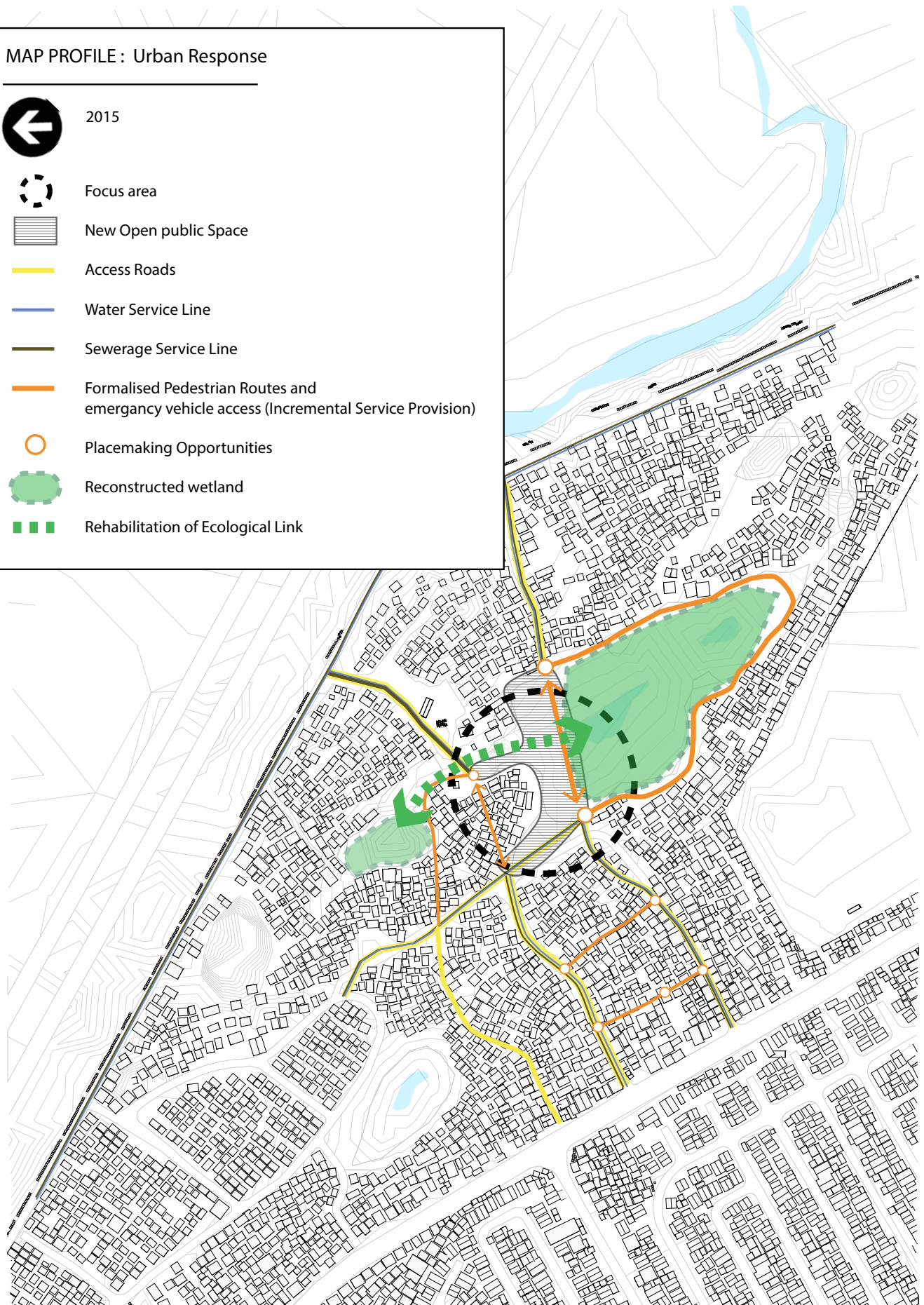


Fig 96 : Map by author.

URBAN RESPONSE

The urban strategies follow the principle for securing sustainable development, defining the edges of public spaces, roads and pedestrian ways to allow for safe, incremental developments. This is achieved through the strategic provision of infrastructure and supports structures along prominent local routes. The design anticipates the future informal growth by providing well connected public spaces around which new development grows. This previously un-occupyable / underutilised space being ,the most polluted part of the wetland, is used for public space and the construction of much needed public amenities. The roads provide means in which incremental services can be installed, as well as providing an address, which is the first step in securing tenure. The rehabilitation of the wetland and the formalising of the edges provides a new space for public engagement and means of service provision. By creating an accessible piece of 'city' in the middle of the settlement can contribute to its sustainable development.





1: Community center



2: Refuse removal



3: Wetland edge



4: Wetland edge



5: Local route



6: Communal courtyard



7: Wetland edge



8: Water standpipes



9: Path at wetland edge



10: Toilet blocks



11: Main road view



12: Electrical infrastructure

PART 6

• • •

DESIGN DEVELOPMENT

STRATEGIES OF INTERVENTION: Multiscalar Systems of Support

The aim of multiscalar interventions is to support the existing informal dynamics in a manner which co-exists with the formal processes of the City. The scales range from the surrounding district to the community and individual level. The interventions act as phased development which seek to enable people to incrementally develop the settlement.

Step 1. Infrastructure as Settlement Ordering Device

The provision of infrastructure (roads, pedestrian paths, sewerage, water and lighting, incremental tenure) to improve existing conditions and support sustainable growth and connect the settlement with the surrounding formal fabric. Using the provision of services to define edges and act as a network of serviced connections to promote the incremental development formally and informally. The importance lies in not just providing services but providing the urban elements which allow social, economic and cultural practices to mix and engage.

Step 2. Public Space and Alternative Service Provision as Catalyst for Community Engagement.

These structures (public ablutions and civic service cores) provide a higher order to the settlement due to their large scale in comparison to their surroundings. These built interventions become primary activators of the infrastructural network and act as the primary zone for public engagement. They also act as support structures for the construction of the community amenities building.

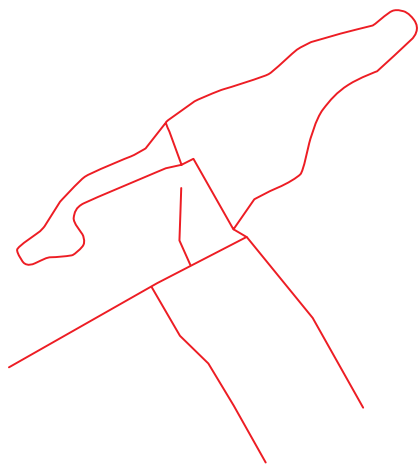
Step 2.1 Public Amenities Building as Institutional Support and Architectural Didactic.

An architectural intervention which offers oversight and coordination to the sustainable development of the settlement. This is achieved by programming the public amenities with the organisations whom are crucial the the upgrading of informal settlements. The organisations facilitate the development through the distribution of information and professional advice in collaboration between the City and the community. The architecture of the building allows the users of the building to see and understand how the architecture is achieved and through this they can learn how to build better structures using materials and systems they are familiar with.

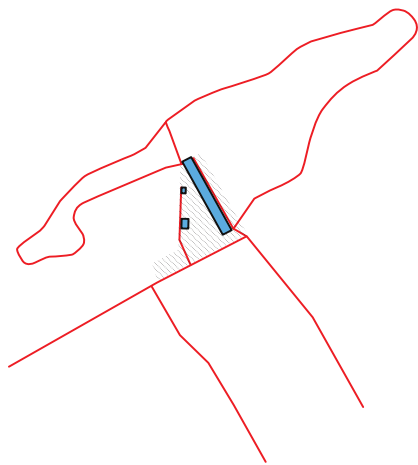
3. Nodes of Support

These are dispersed support structures which contribute to incremental housing and community clusters. This could be considered as a kit of parts to improving living conditions and existing housing structures, and in this dissertation a service core structure is proposed to fit between housing structures.

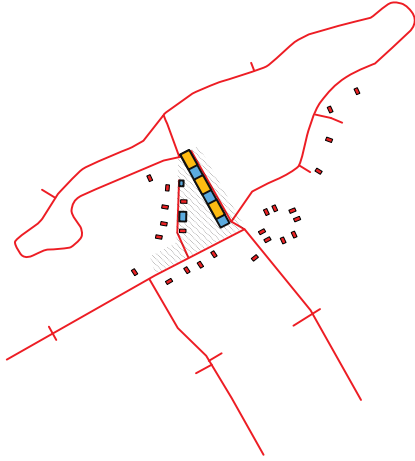
INTERVENTION AS PROCESS



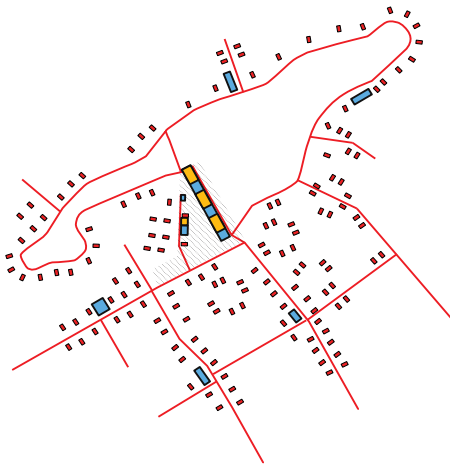
*Phase 1 / Year 1: Infrastructural proposal /
Roads, pedestrian pathways, sewerage and water
articulation, electricity and settlement enumeration.*



*Phase 2 / Year 2: Defining Edges / Public Space and
alternative service provision, incremental tenure.*



Phase 3 / Year 3: Oversight and development / Public amenities building and the facilitation of the settlements housing programme. Further planning of secondary roads and infrastructure penetrating into the settlement.



Phase 4 / Year 6: The incremental City / The incremental provision of infrastructure additional Public amenities and the continuation of the settlements housing programme.

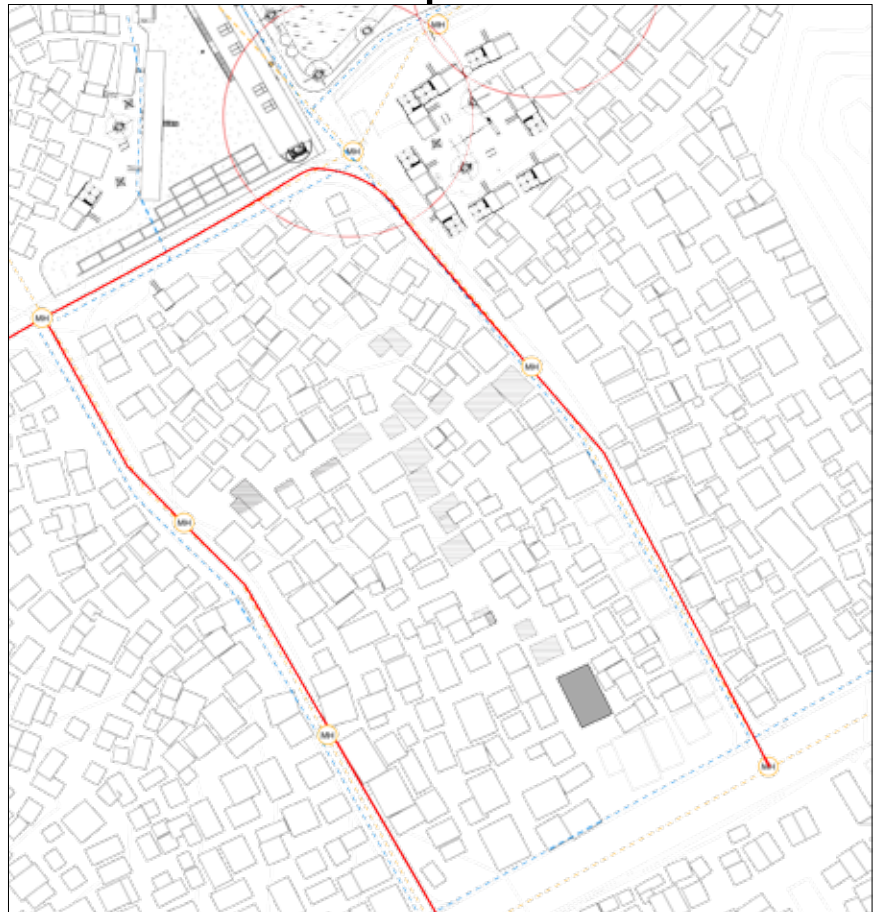
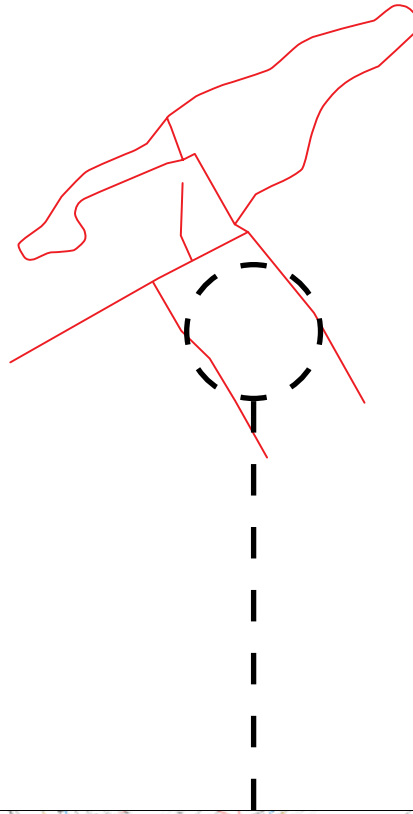
STEP 1. INFRASTRUCTURE AS SETTLEMENT ORDERING DEVICE

The provision of infrastructure (roads, pedestrian paths, sewerage, water and lighting, incremental tenure) to improve existing conditions and support sustainable growth and connect the settlement with the surrounding formal fabric. Using the provision of services to define edges and act as a network of serviced connections to promote the incremental development formally and informally. The importance lies in not just providing services but providing the urban elements which allow social, economic and cultural practices to mix and engage.

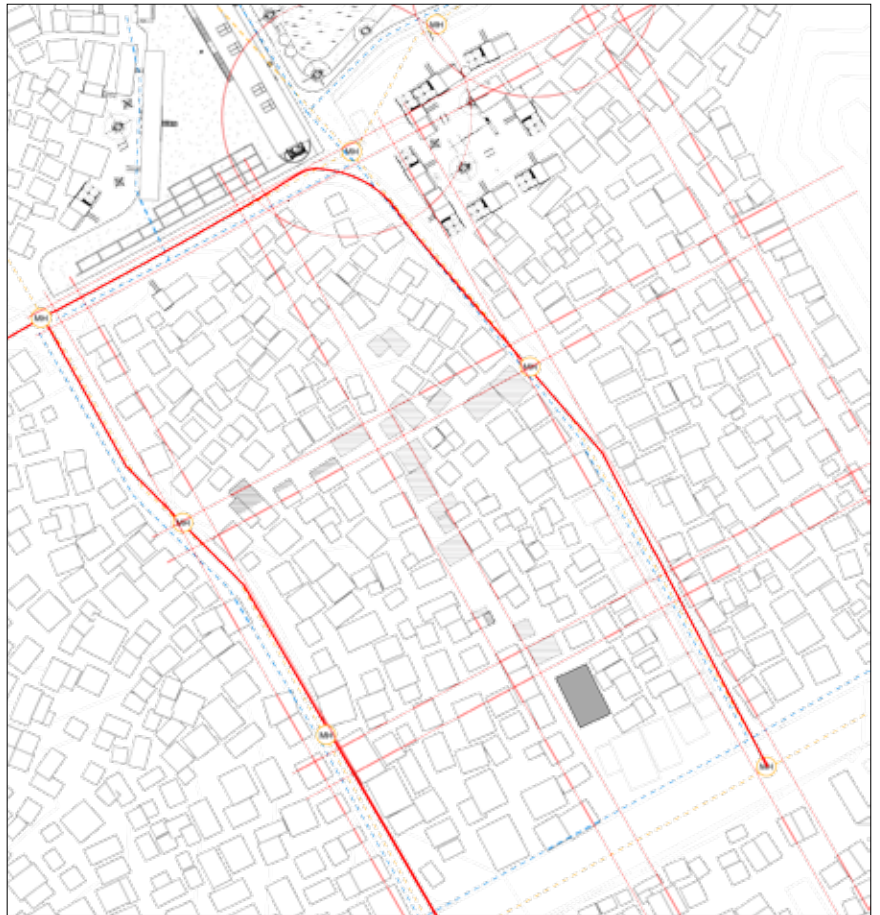
**USING INFRASTRUCTURE TO CONNECT AND ENHANCE COMMUNITY POCKETS
(Strategy for Expansion of Thresholds in Key Entry Points of Surrounding Community)**

In order to expand infrastructure into the dense settlement, key community pockets must be enhanced and connected. Through a participatory process the pockets will be developed into multifunctional public spaces with water and sanitation points, spaces for gathering, economic opportunities and play. Defining the public space by facilitating positive occupation, in order to reduce crime and foster community cohesion. Using the activity of the space as passive surveillance. This space is a process, and can start to define edges of activity and enable the incremental provision of infrastructure, The strategy is as follows:

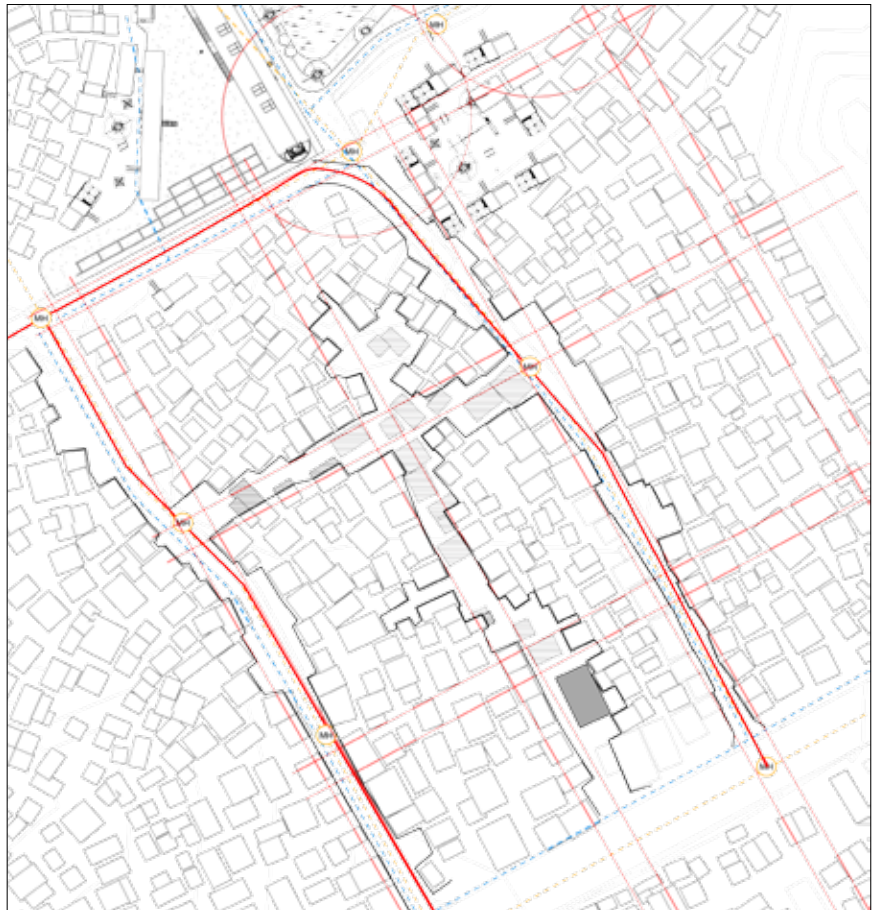
Area for potential infrastructural expansion identified.



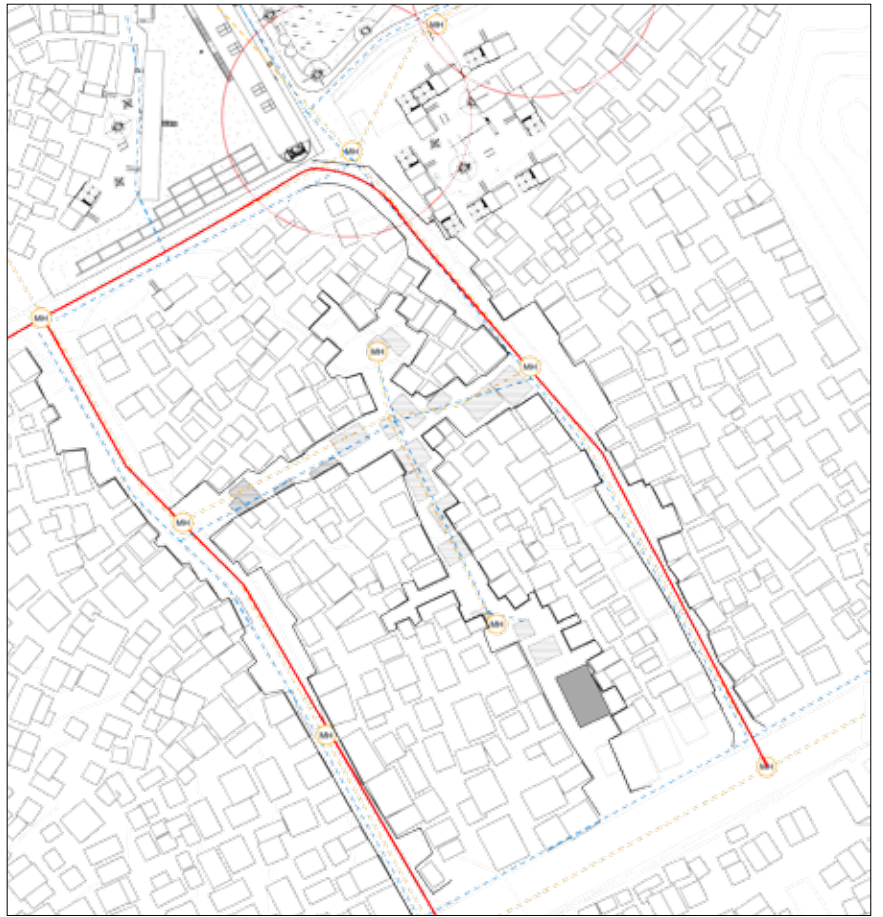
- Overlaying the adjacent formal residential grid as template for future road provision.
- Finding path of least resistance and minimum displacement of dwellings.
- Allocating dwellings for resettlement at wetland edge.
- Plan for enhancement of community pockets.



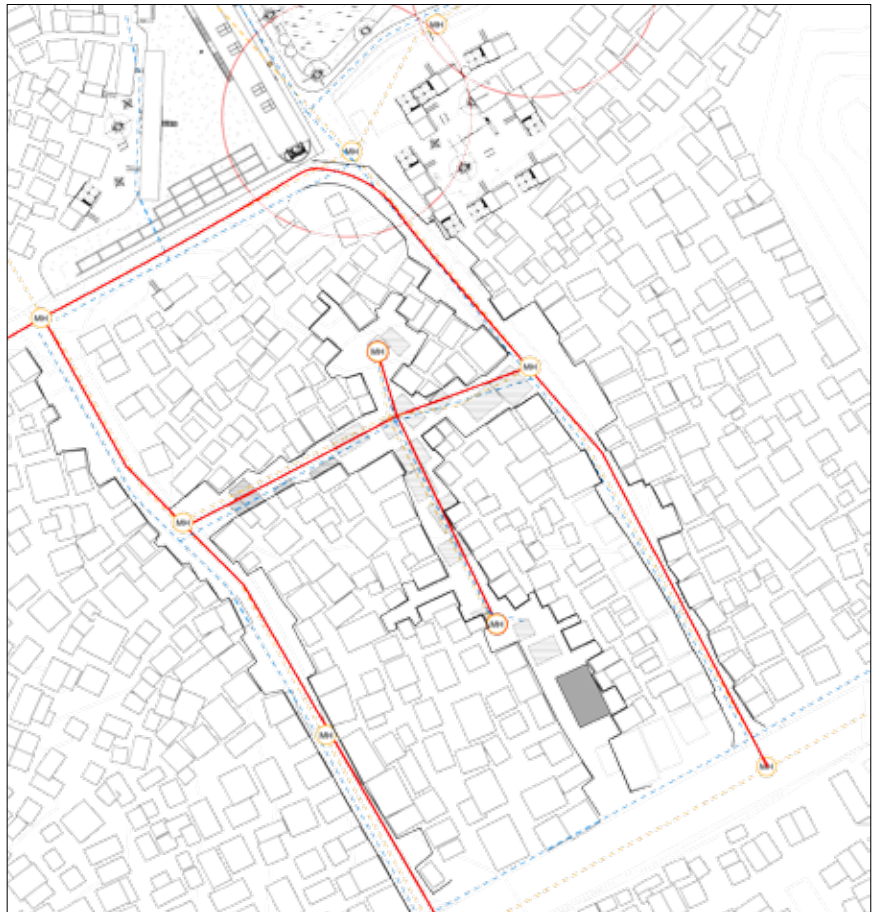
Formalising edges of local routes to make way for 6m road reserve using paving and curbs.



Paving provides means for incremental provision of water, sewerage and storm water drainage.



Final phase of formalising 6m road reserves and providing enhanced community pockets.



STEP 2. PUBLIC SPACE AND ALTERNATIVE SERVICE PROVISION AS CATALYST FOR COMMUNITY ENGAGEMENT.

Currently vandalism is endemic to free issued services and the simple toilet provision does not satisfy the needs of the community. Through alternative service provision, more choice is offered and if designed appropriately and with community input the provision can engender a sense of ownership, alleviating pressure on the existing service provision and act as a space activator. Once activity node is established the various stakeholders can start to define ownership. The activity also provides opportunity for job creation.

These structures (public ablutions and civic service cores) provide a higher order to the settlement due to their large scale in comparison to their surroundings. The structures define public spaces and become primary activators along the infrastructural network as zones for public engagement. They also act as support structures for the construction of the community amenities building.

Infrastructural network as public space connector.

Key alternative service provision points.

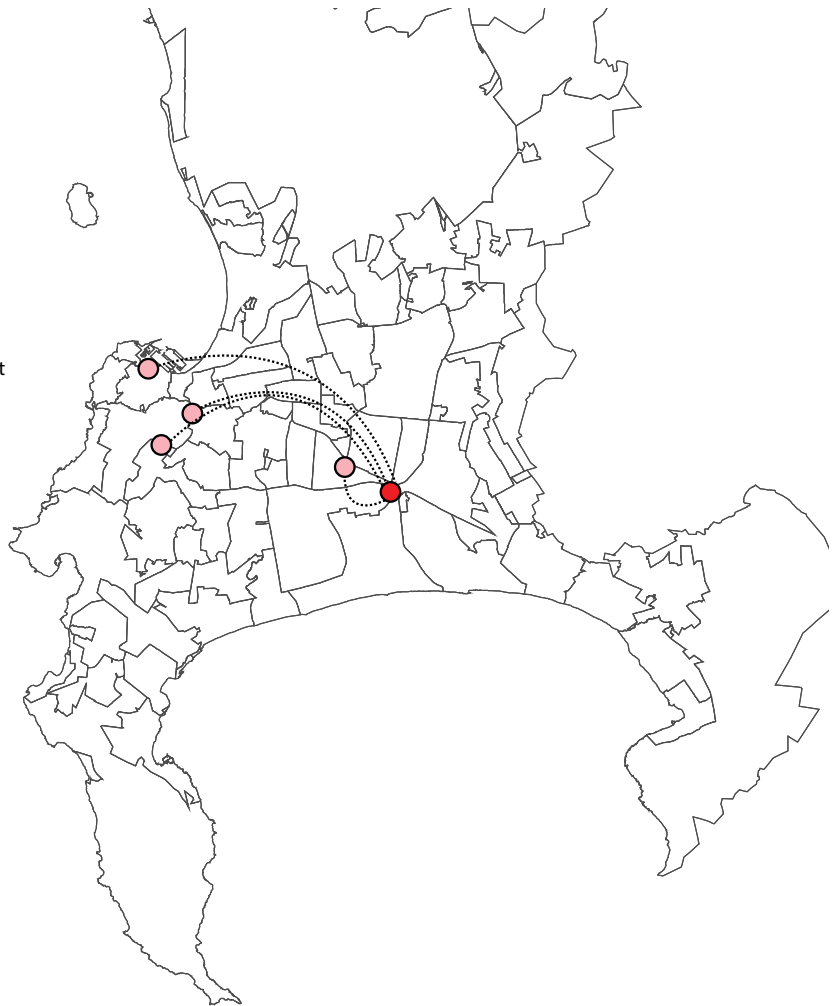


STEP 2.1 PUBLIC AMENITIES BUILDING

An architectural intervention which offers oversight and coordination to the sustainable development of the settlement. This is achieved by programming the public amenities with the organisations whom are crucial the the upgrading of informal settlements. The organisations facilitate the development through the distribution of information and professional advice in collaboration between the City and the community. The architecture of the building allows the users of the building to see and understand how the architecture is achieved and through this they can learn how to build better structures using materials and systems they are familiar with.

NGO Site Office

- Locations of Secondary Organisations Involved within the UISP Program
- Proposed 'site office' as institutional support within the BM section

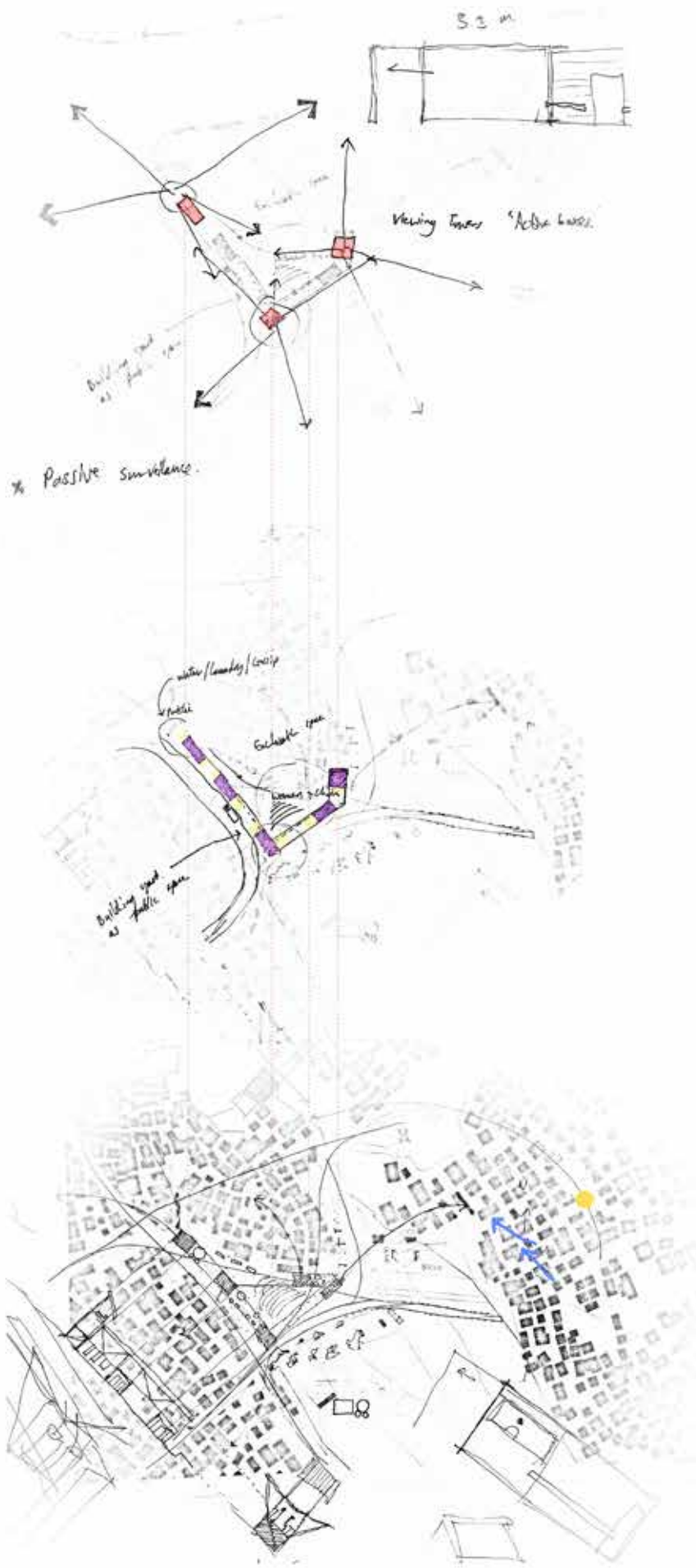




Original concept sketch of public amenities building.

STRATEGIES IN PLAN

- Occupy underutilised space as public space.
- Define edges for formal and informal growth to co-exist.
- Become part of, and enhance local movement routes
- Design for informal expansion and retrofitting.
- Buildings and structure to 'hold' public space and protect from encroachment.
- Express corner, provide landmark elements.
- Use 'Active Box' method as means of passive surveillance and hierarchy.
- Provide spaces for engagement and interaction.
- Rehabilitate wetland.
- Design for fire and flood prevention



Concept sketch of key elements making up the public amenities building precinct.

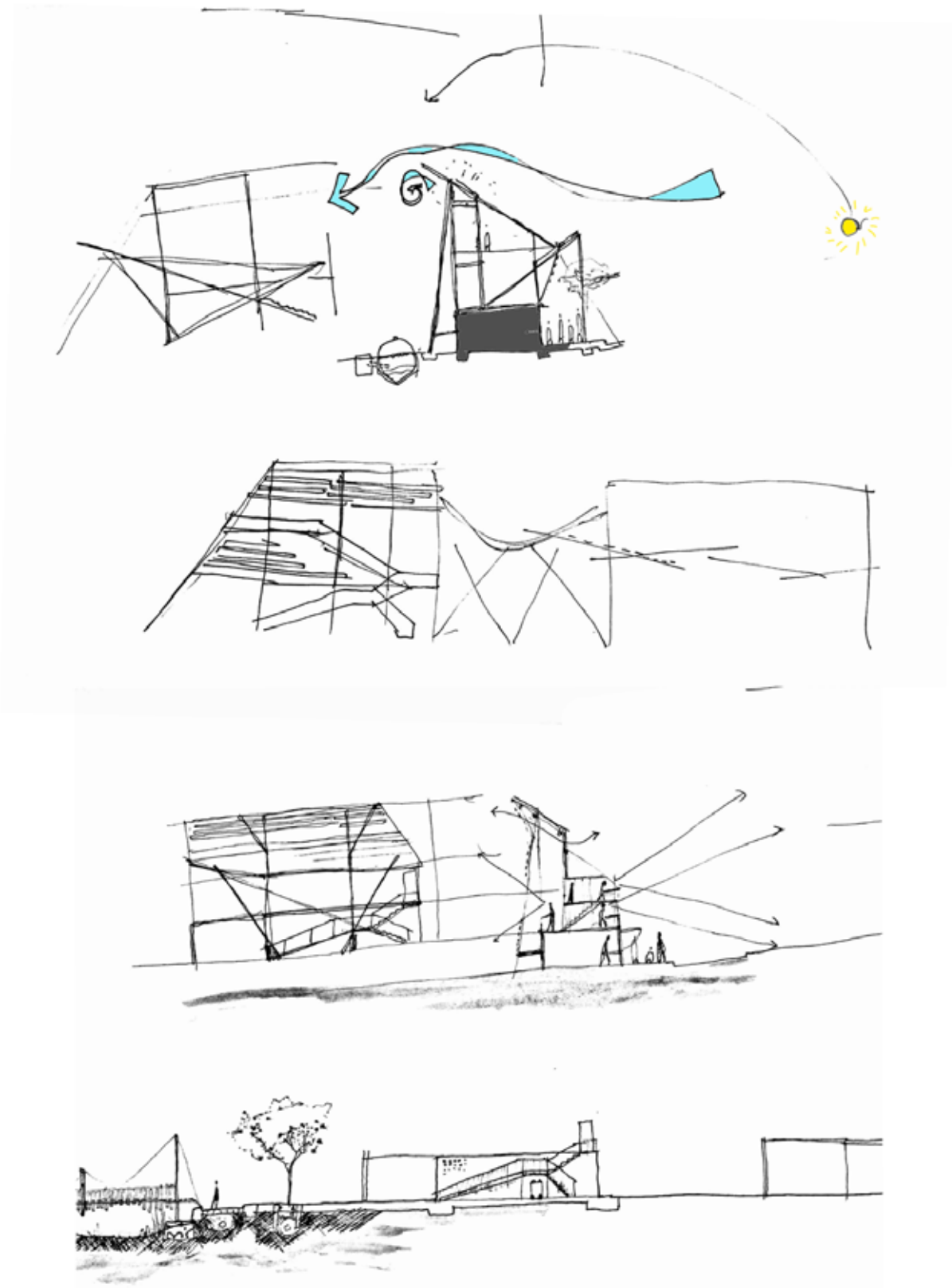




FIRST DESIGN PLAN 

STRATEGIES IN SECTION

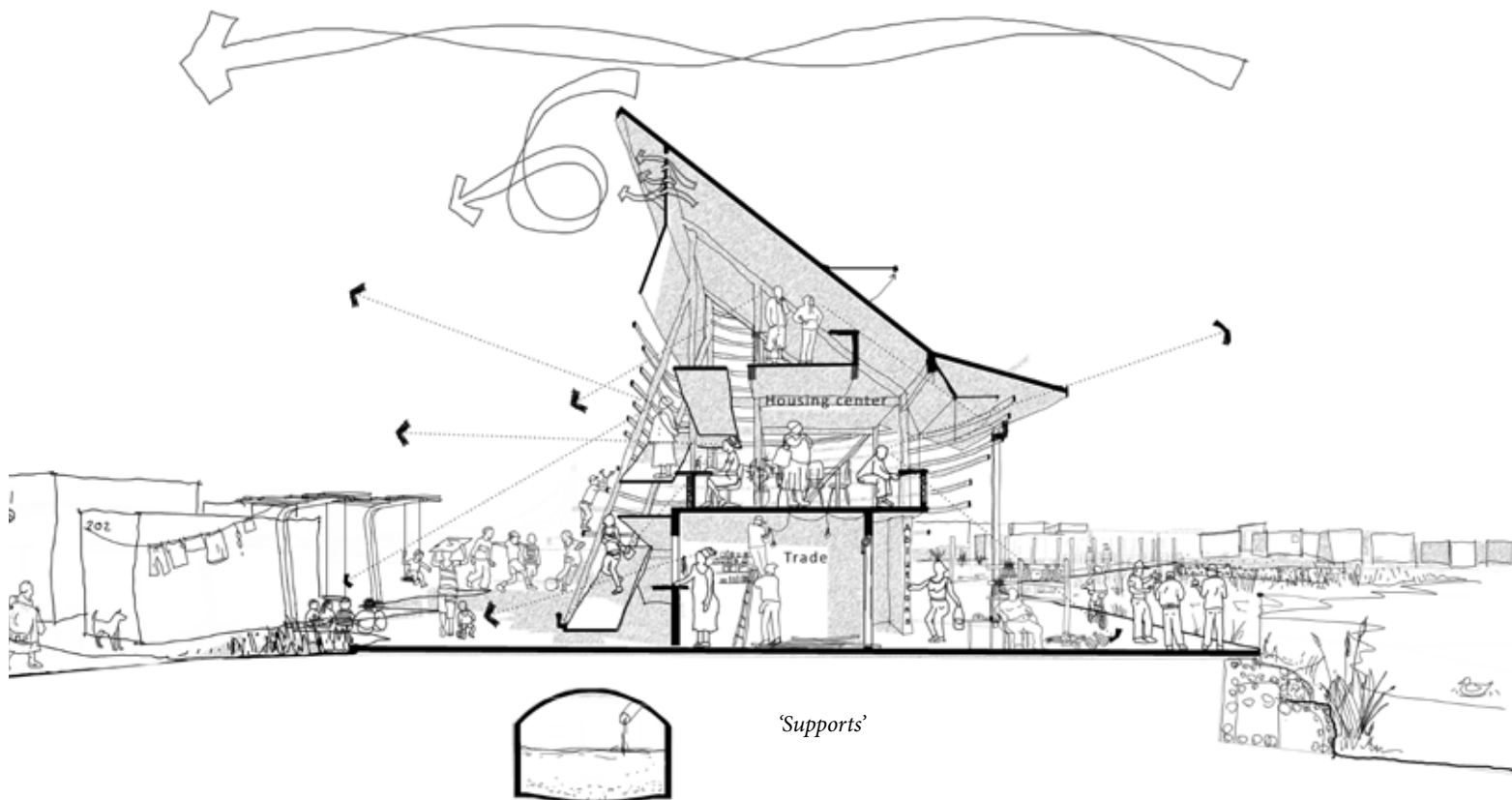
- Support structure as solid and robust base.
- Lightweight timber structure above.
- Low-cost, fixable detailing.
- Passively heated and cooled.
- Space allows for retrofitting and adaption.
- Accommodates for various uses over time.
- Passive surveillance over public space.

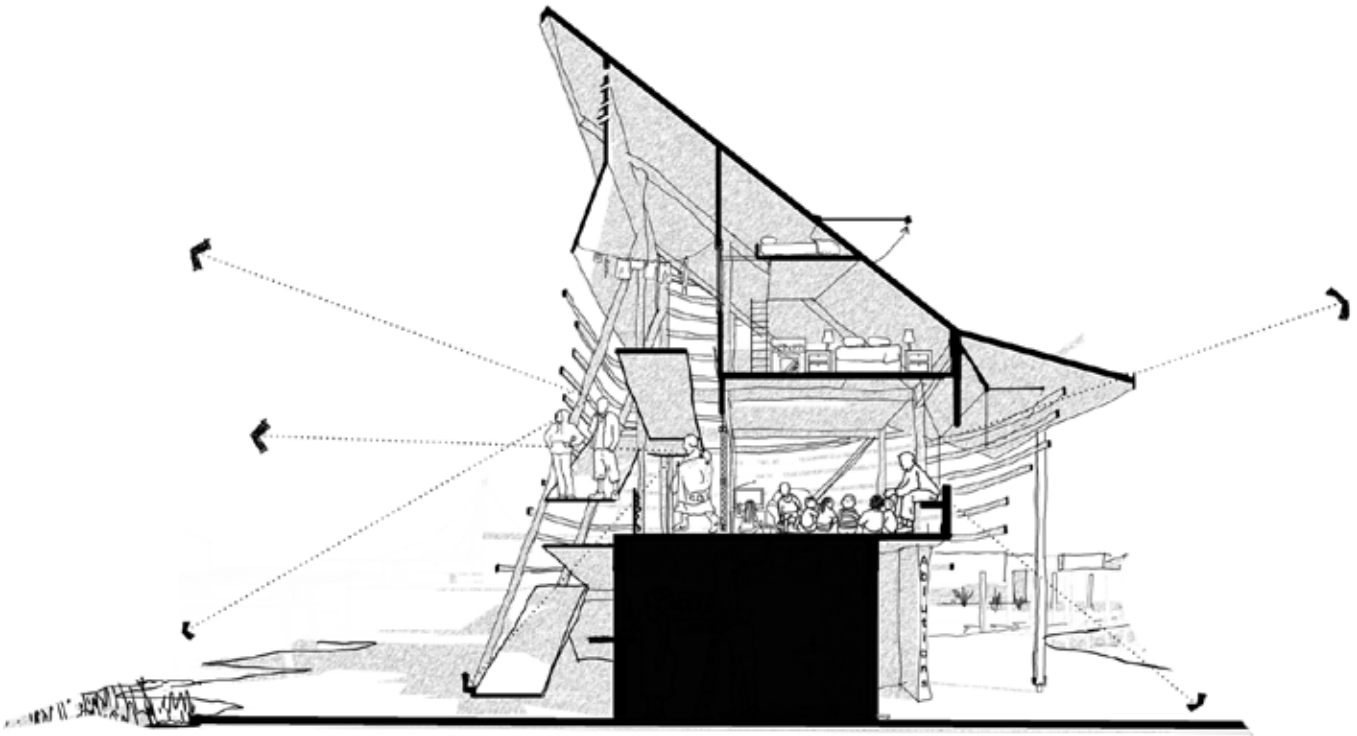


Concept sketches of robust base and lightweight venacular architecture above.

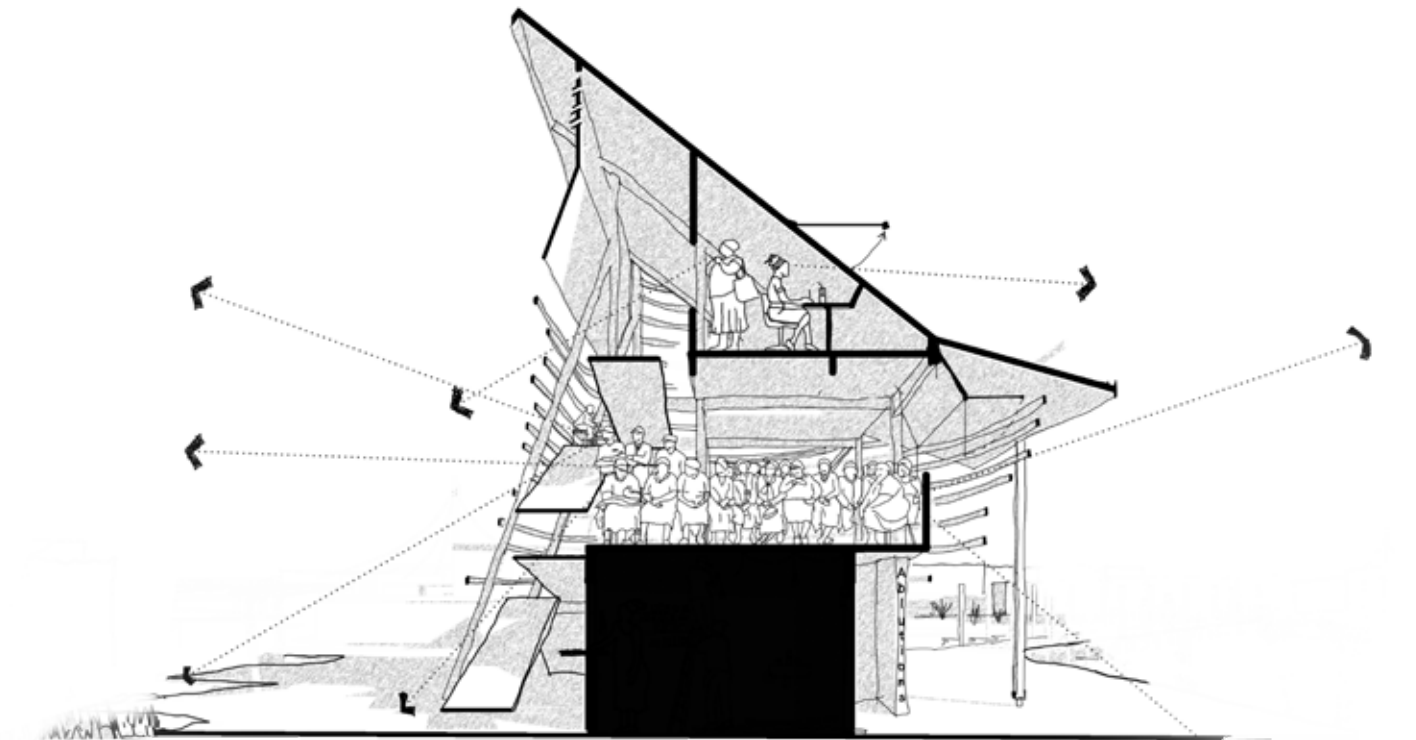
ABLUTIONS AS SUPPORT STRUCTURES

Learning from the Informally built shacks, which seem to be typologically similar, the make shift structures are able to facilitate various functions and adapt to market needs over time. These drawings, using the before mentioned strategies, investigated the idea of using public ablutions on the ground floor as a support structure for lightweight construction above. The spatial qualities and inhabitation of the architecture are based on the speculation of the shack typology used as a public amenities building.



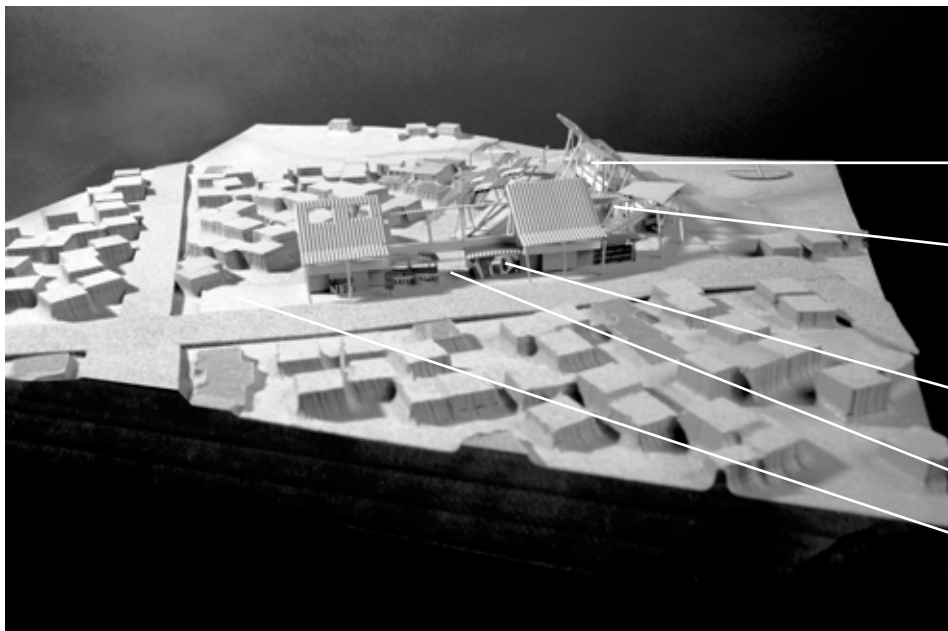


Living and Caring

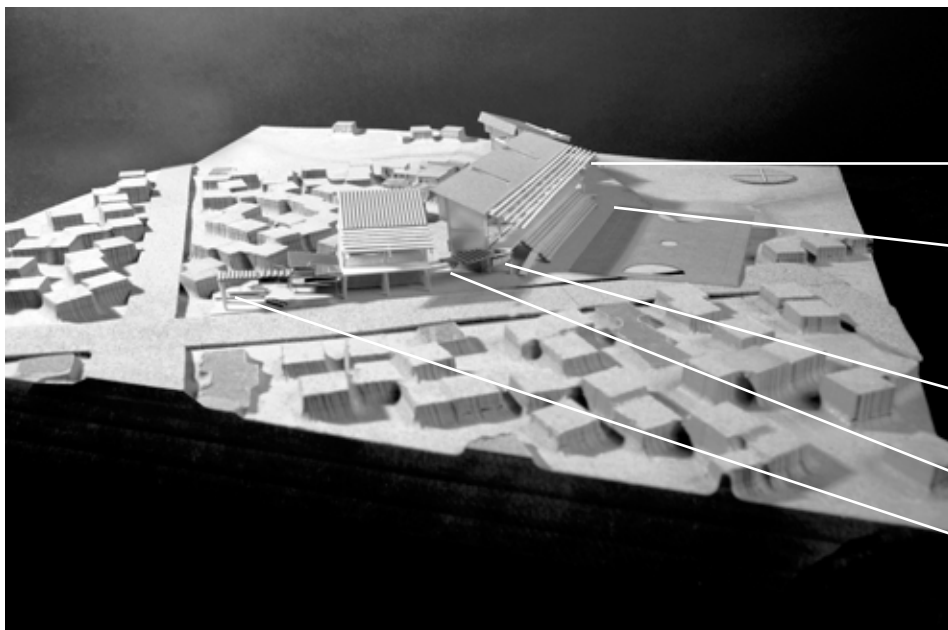
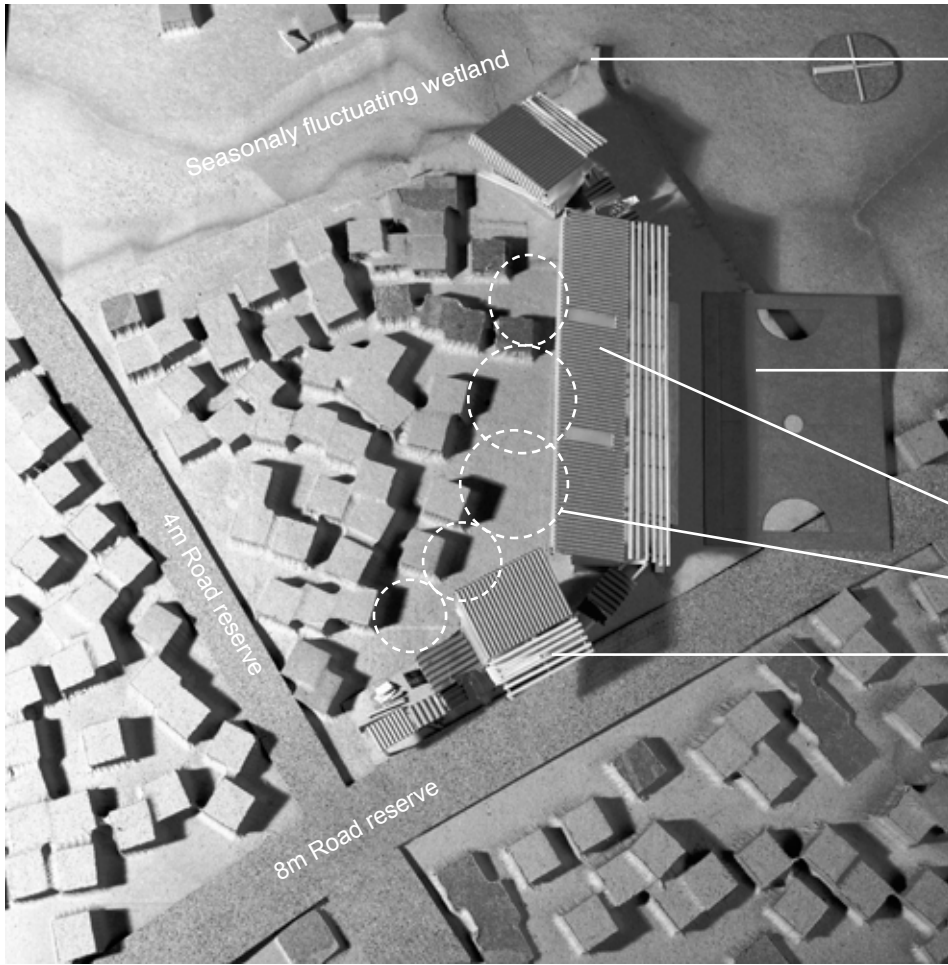


Decisive Community

01 PERIMETER BUILDING WITH ENCLOSED PUBLIC SPACE



02 BUILDING WRAPPED ALONG SETTLEMENT EDGE



—————| wetland bridge allowing for winter crossing.

—————| Testing of sporting facilities over attenuation pond.

—————| Shared NGO offices overlooking sportsfield.

—————| placemaking intervention of adjacent informal settlement court.

—————| Active box on top of building material suppliers.

—————| Active box offers passive surveillance onto public square.

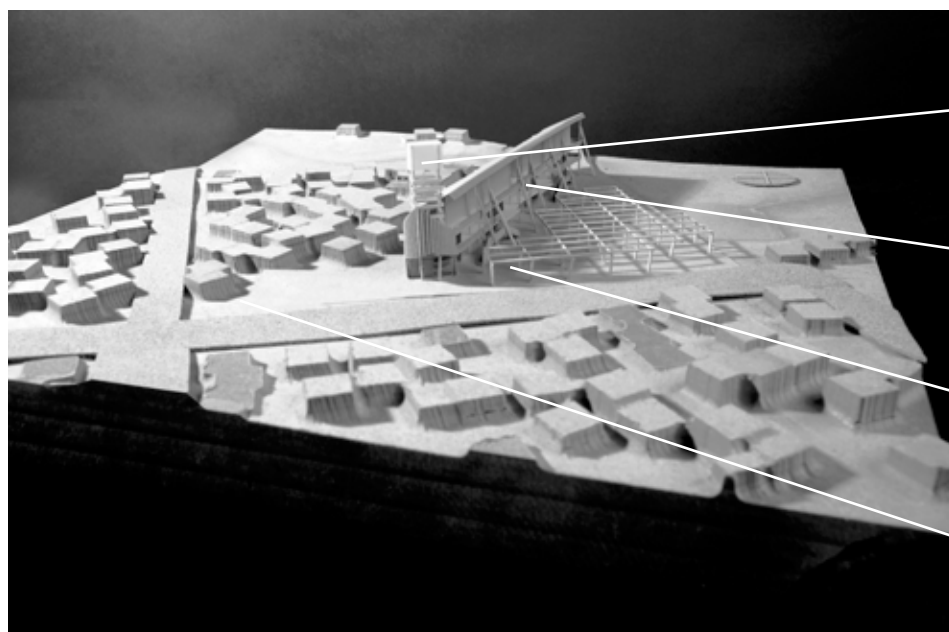
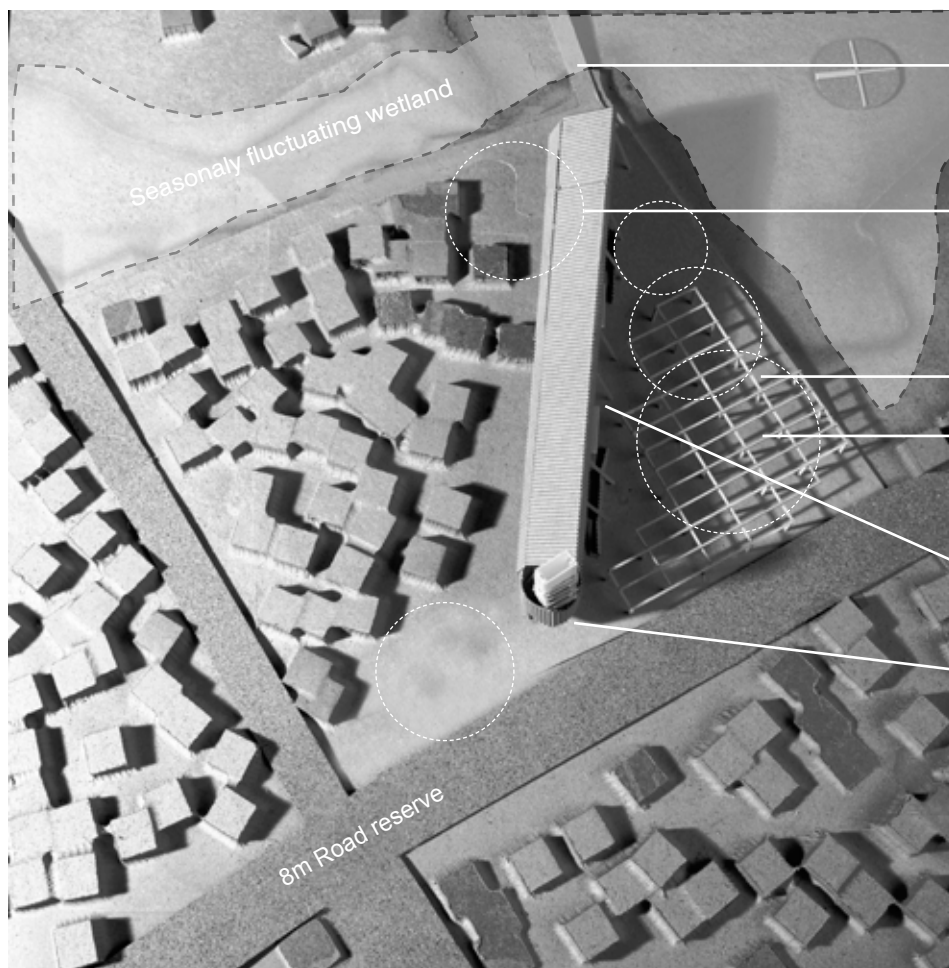
—————| Civic amphitheater overlooking wetland and sports field.

—————| Infill construction of informal traders.

—————| Entrance into placemaking intervention of adjacent informal settlement court.

—————| Covered open space for informal building material Suppliers and refuse collection, and taxi stop.

03 LINEAR BUILDING WITH PUBLIC FORECOURT



- | wetland bridge allowing for winter crossing.
- | Public wash space as place of socialization.
- | Public space disseminates into wetland edge.
- | Civic canopy to occupy public space
facilitate community activities space.
- | Urban ramps for ease of access to
piano nobile.
- | Expressed treatment of the corner, with lightbox
and watercollection tower.
- | Lightbox as landmark and water catchment tower.
- | Piano nobile as second public floor.
- | Infill armature for informal traders.
- | Paved open space for informal occupation, refuse
collection and taxi stop.

04 BRIGE BUILDING: CHOSEN SCHEME



Wetland bridge allowing for year round crossing, and for building to become part of local movement routes.

Public wash space as place of socialisation

Public space embraced by perimeter building and infill armature.

Informal armature for building material suppliers and traders.

Lightbox as landmark and water catchment tower.

Piano nobile as second public floor.

Infill armature for informal traders.

Paved open space for informal occupation, refuse collection and taxi stop.

DEVELOPMENT OF THE SECTION

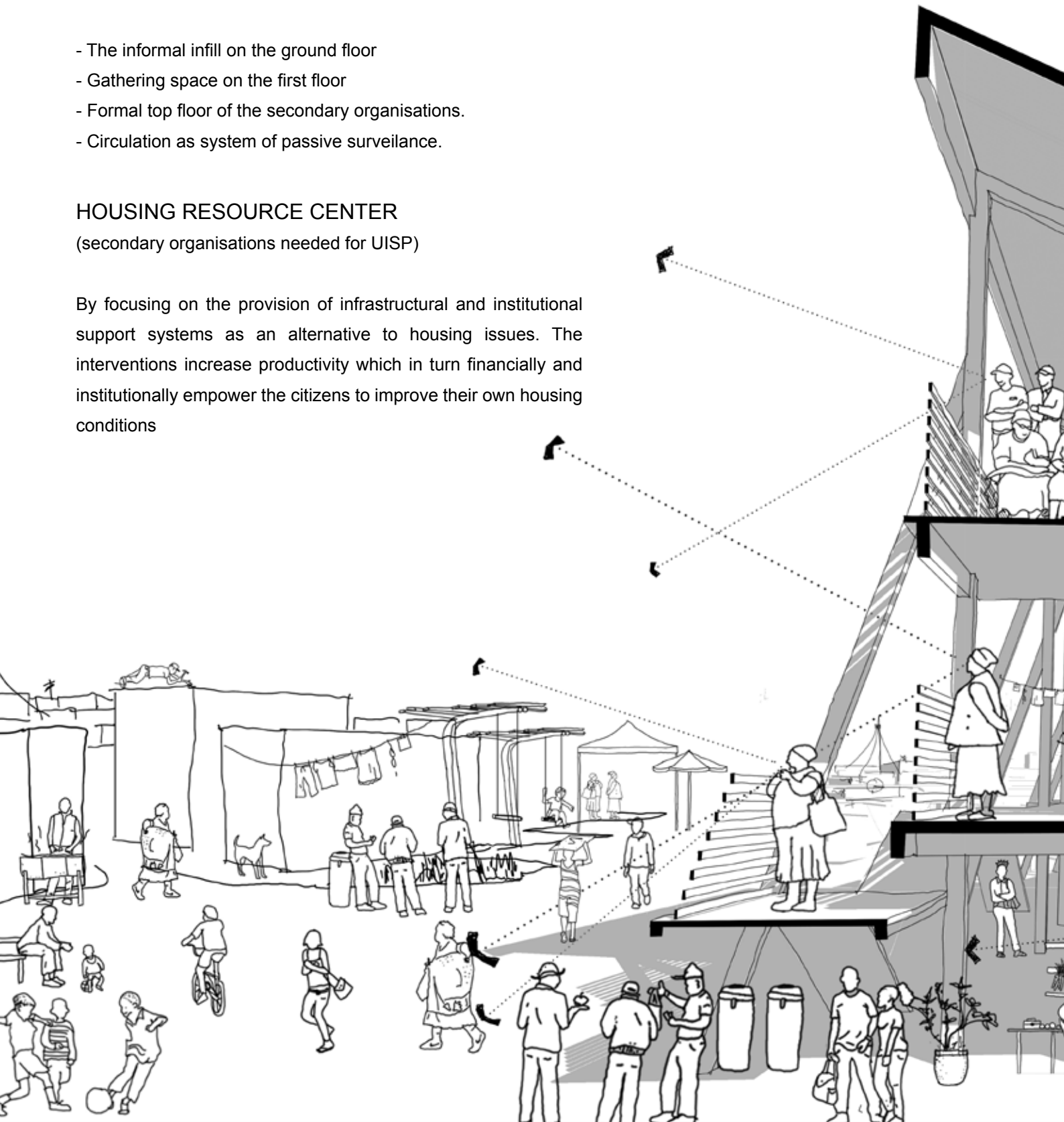
Drawing investigates the inhabitation of the public square and public amenities building.

- The informal infill on the ground floor
- Gathering space on the first floor
- Formal top floor of the secondary organisations.
- Circulation as system of passive surveillance.

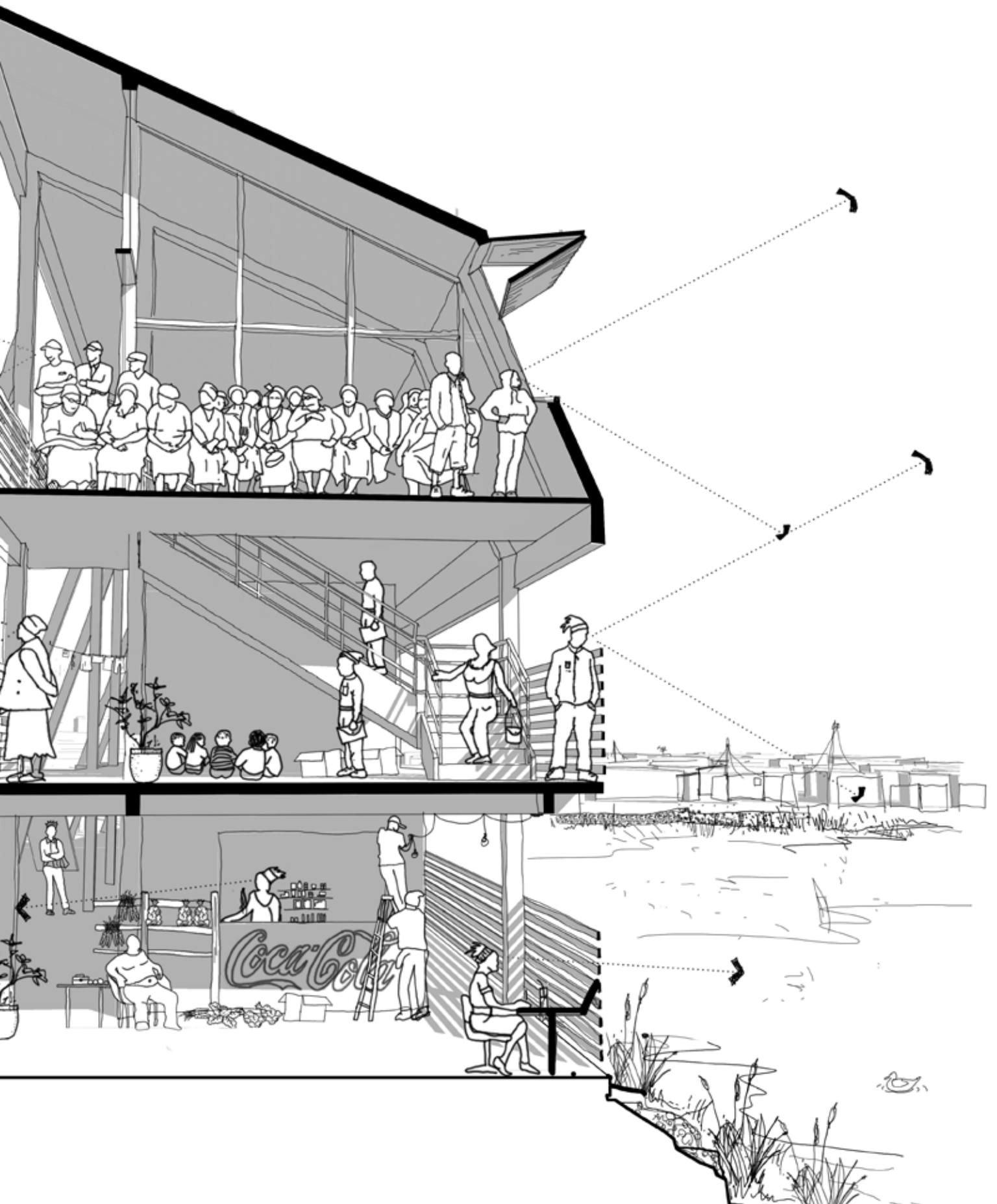
HOUSING RESOURCE CENTER

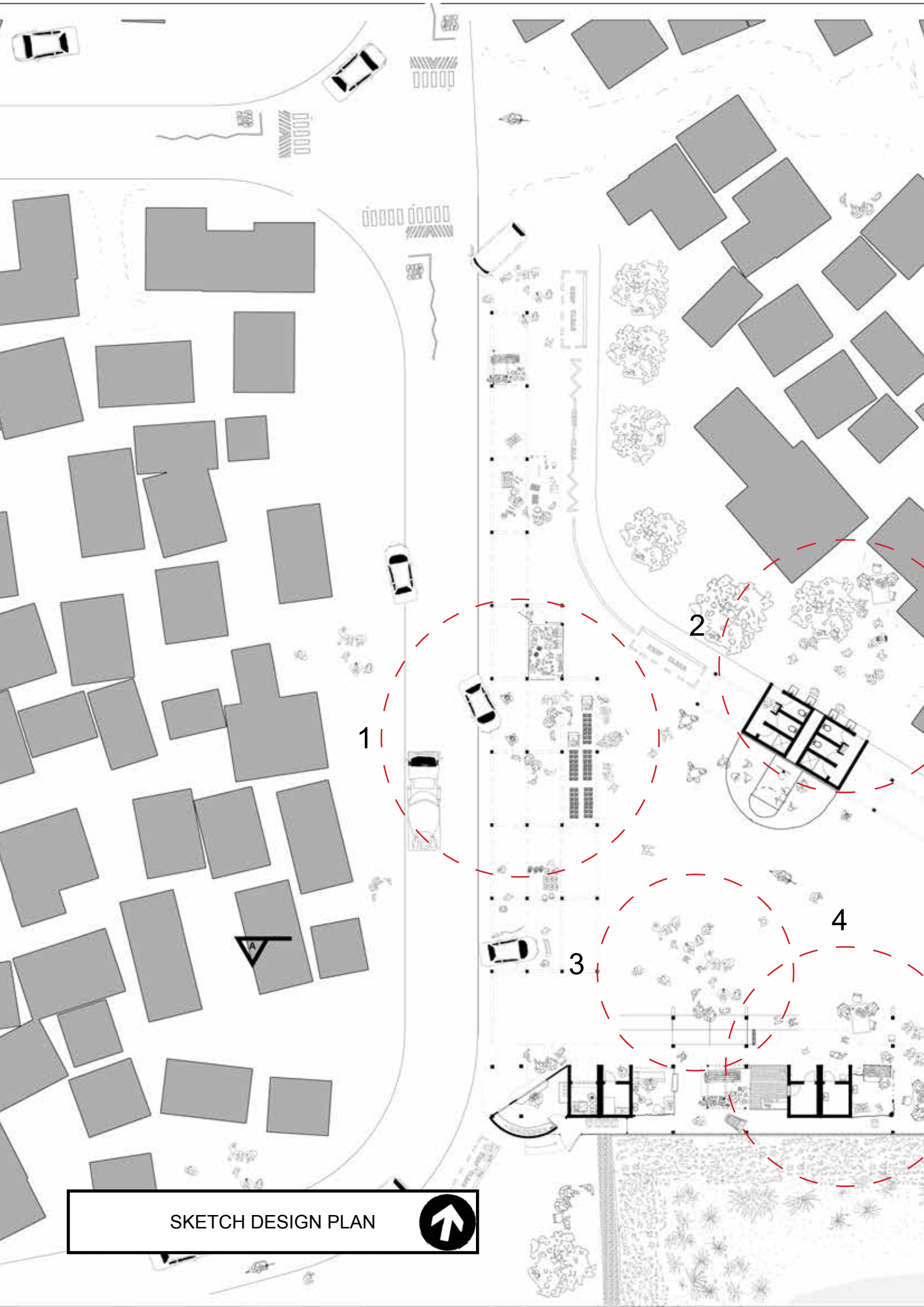
(secondary organisations needed for UISP)

By focusing on the provision of infrastructural and institutional support systems as an alternative to housing issues. The interventions increase productivity which in turn financially and institutionally empower the citizens to improve their own housing conditions



SKETCH DESIGN SECTION





1

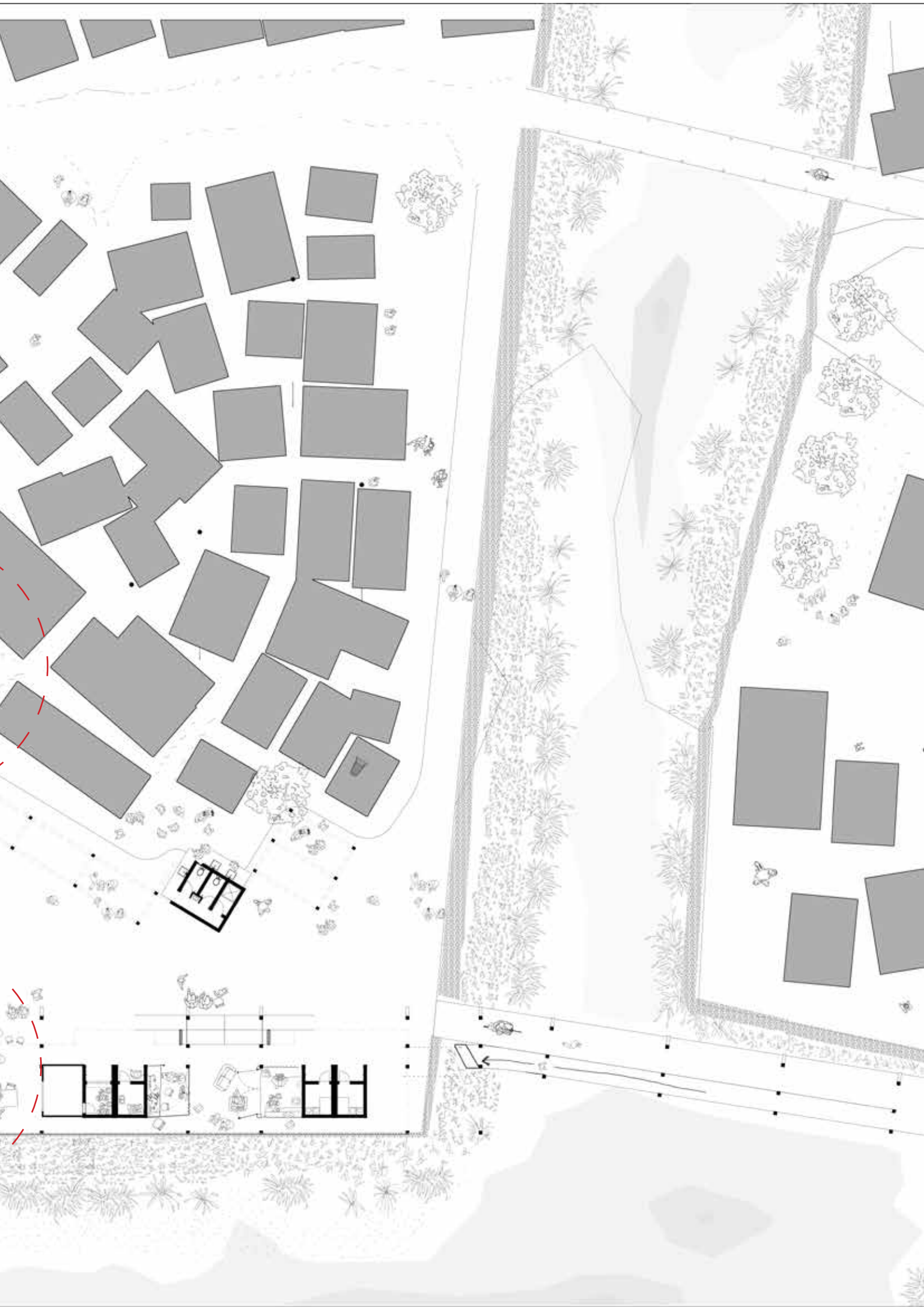
2

3

4

SKETCH DESIGN PLAN

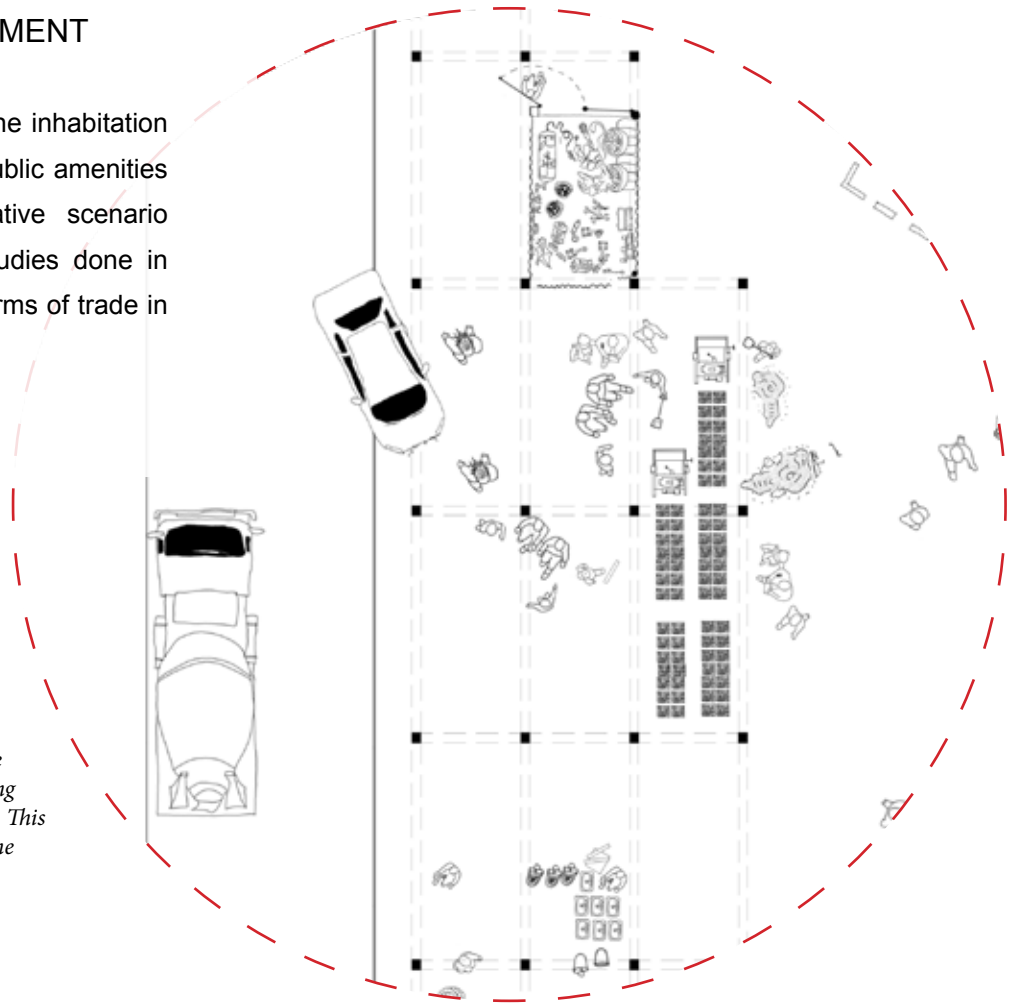




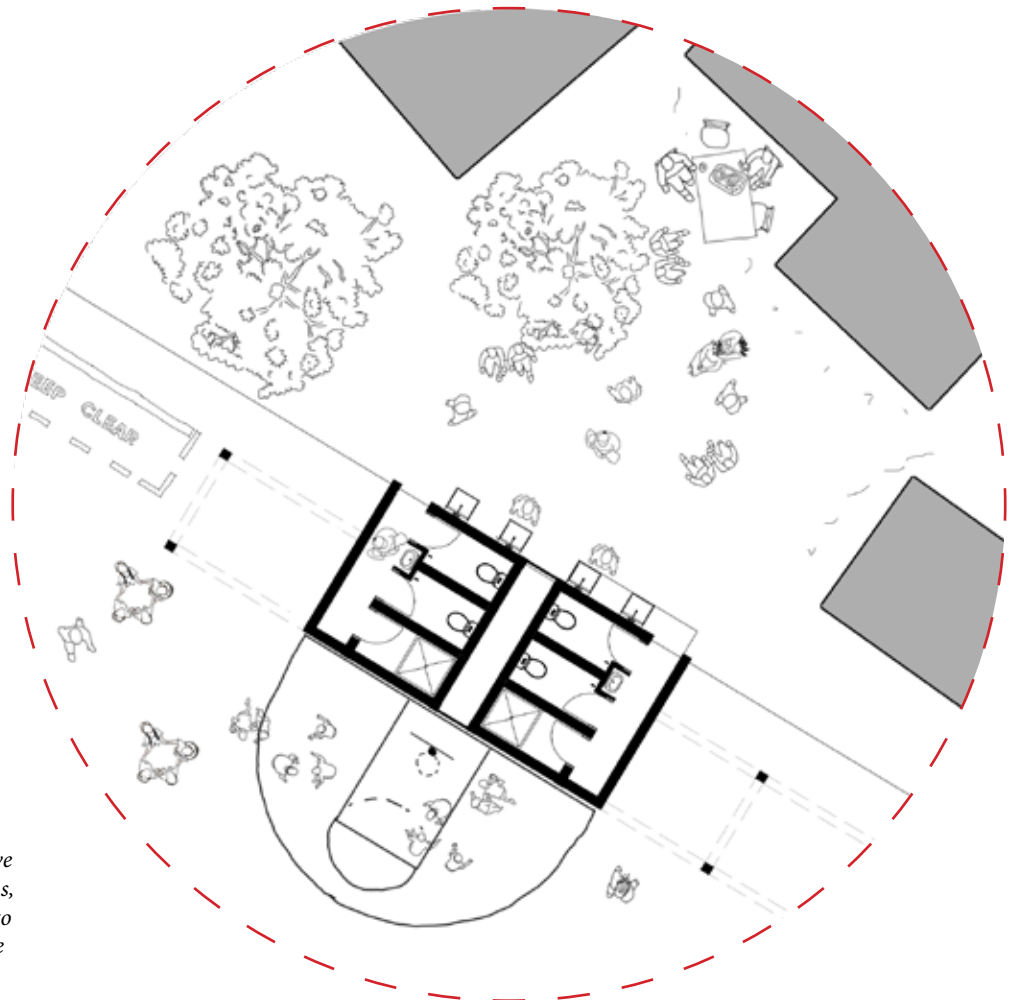
SPACES OF ENGAGEMENT

The Drawings investigate the inhabitation of the public square and public amenities building. Through speculative scenario drawings based on the studies done in Dunoon and the existing forms of trade in the settlement.

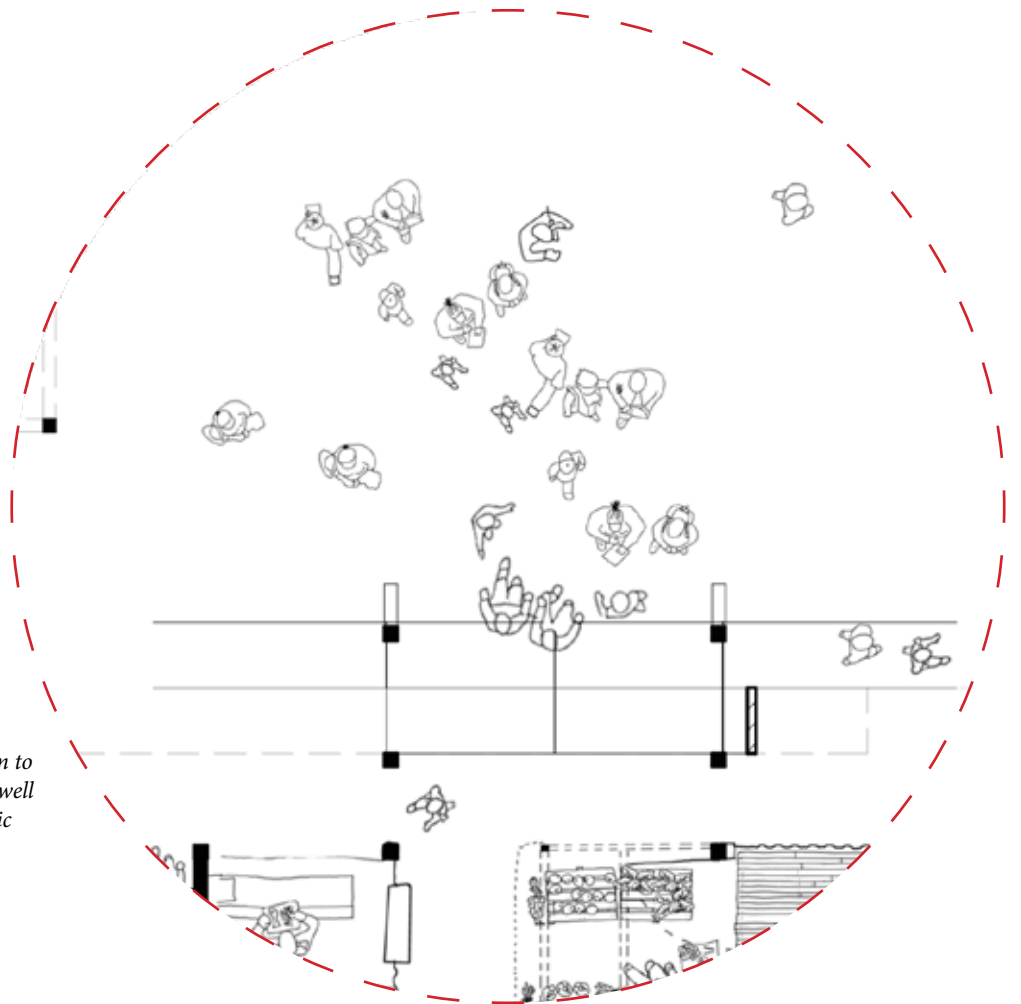
The timber armature provides space for the making and selling of building materials, and various other trades. This structure acts as an active edge to the public square.



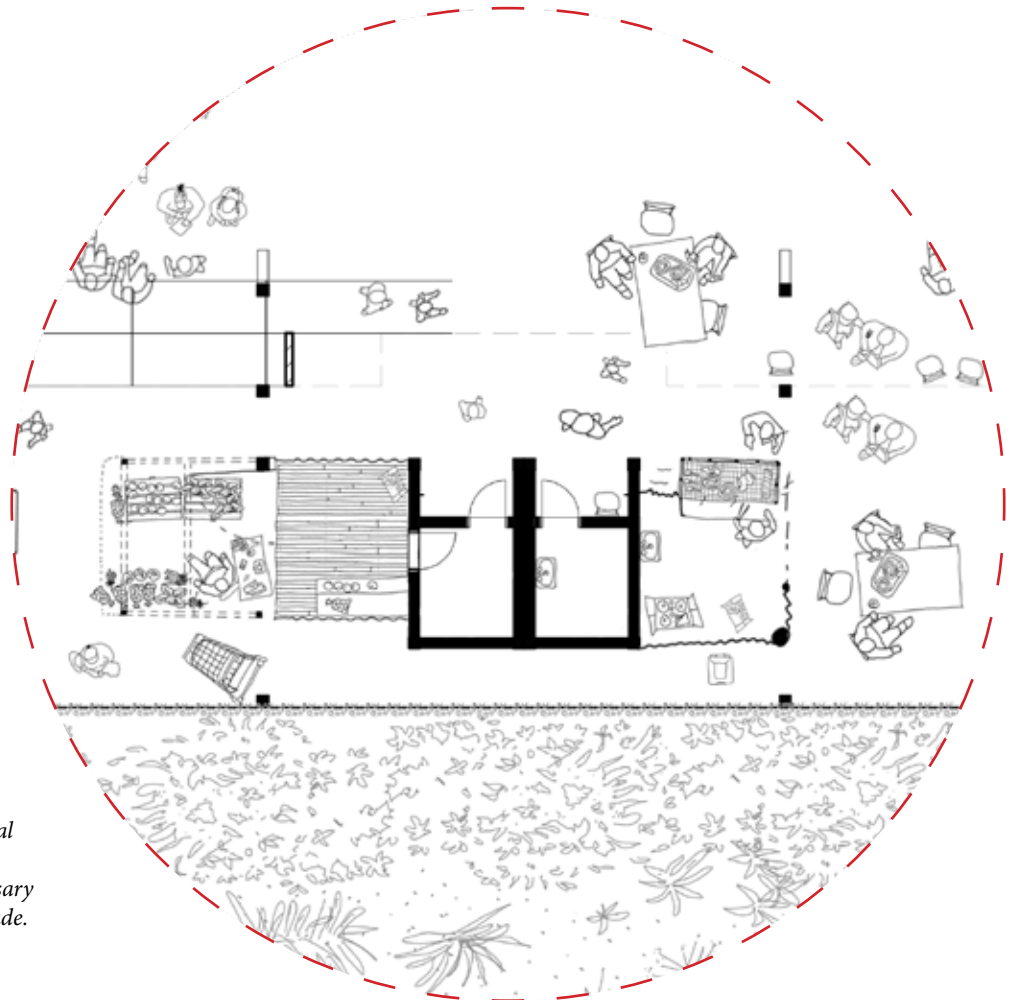
The edge conditions between the settlement and the public square have used the provision of public ablutions, washing and spaces of socialisation to act as a soft barrier to prevent future encroachment of the existing shacks.



The circulation ramps and stairs aim to provide informal meeting spaces as well as areas for announcements to public gatherings.

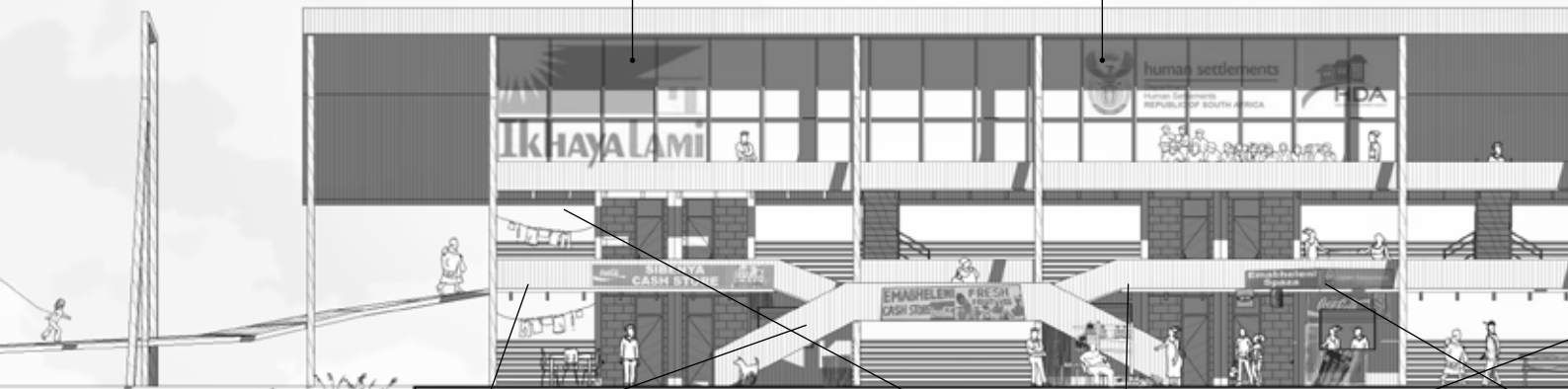


Service cores as supports for informal trade. The adaptive cores allow the user to retrofit and attach the necessary structure tailored to a particular trade. They also provide secure storage, electricity and water points.



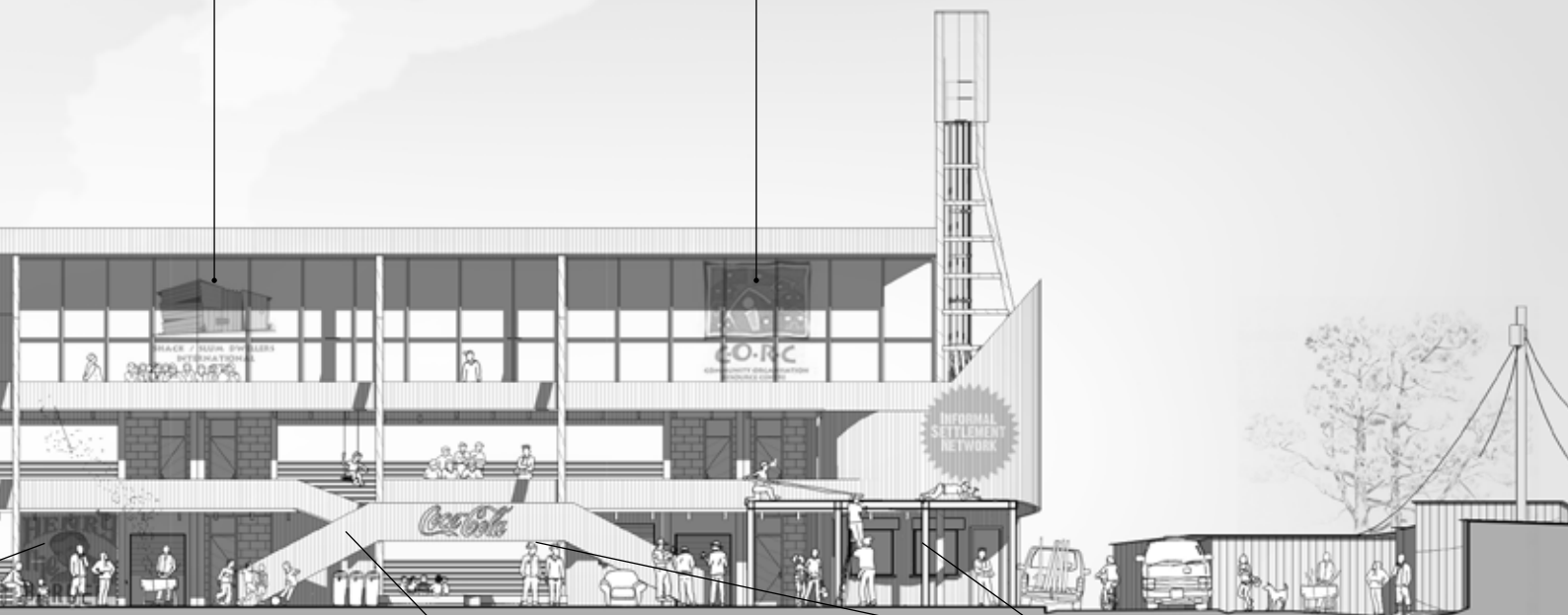
Ikhayalami: construction and project management advice.

Housing Development Agency: Tenure provision and advice center.



Slum Dwellers International:
Neighbourhood advice center, action plan
and urban design.

CORC: Community planning, profiling and
enumeration center.



STRUCTURAL AND INSTITUTIONAL SUPPORT

- The building consists of a skeletal frame and three floors.
- The ground floor occupies and defines public space, and provides areas for informal infill.
- The first floor provides areas for infill and spill out spaces between the infill.
- The upper floor is the most formal floor occupied by NGO's that facilitate the upgrading programme. The spaces are arranged as generic office spaces with the ability to become gathering spaces in the future. The balcony space also provides places for informal discussion.

Civic cores as support structures for public amenities and informal infill.

Public amenities programme of UISP secondary organisation site office.

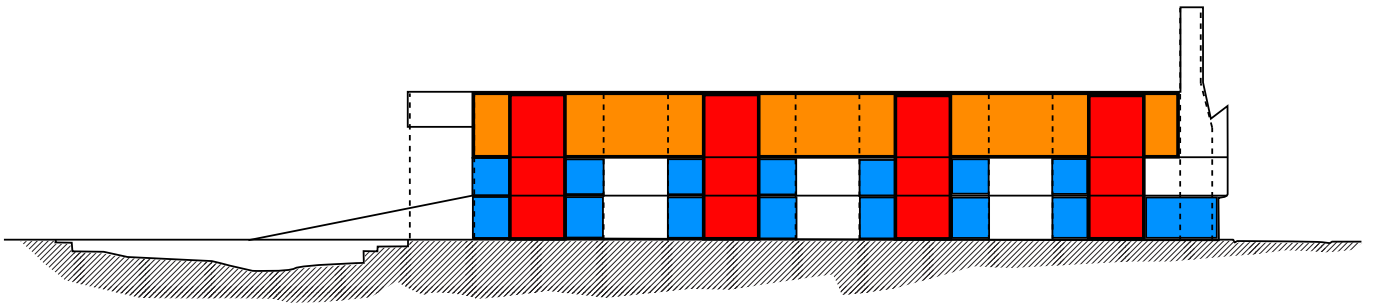
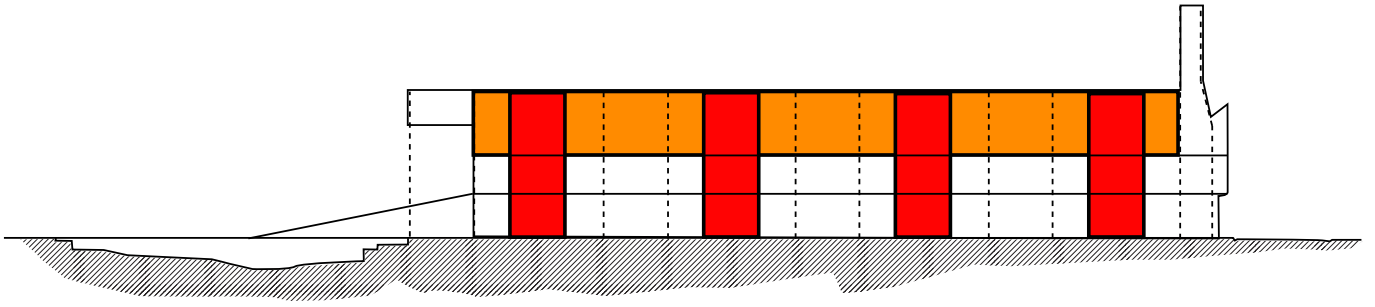
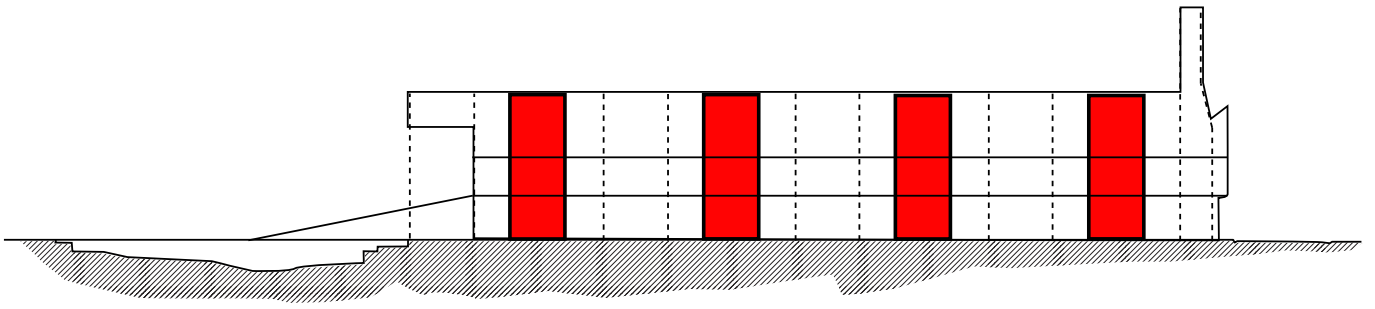
Housing resource center:

(Secondary organisations needed for UISP)

By focusing on the provision of infrastructural and institutional support systems as an alternative to housing issues. The interventions increase productivity which in turn financially and institutionally empower the citizens to improve their own housing conditions

Secondary organisations that facilitate the upgrading of informal settlements program. These include a community planning center, housing and tenure support centre, building and construction management centre. These programs provide support to informal building material suppliers that are a major economic activity within informal settlements.

Framework supporting infill by traders.



DESIGNING WITH DIDACTIC INTENT

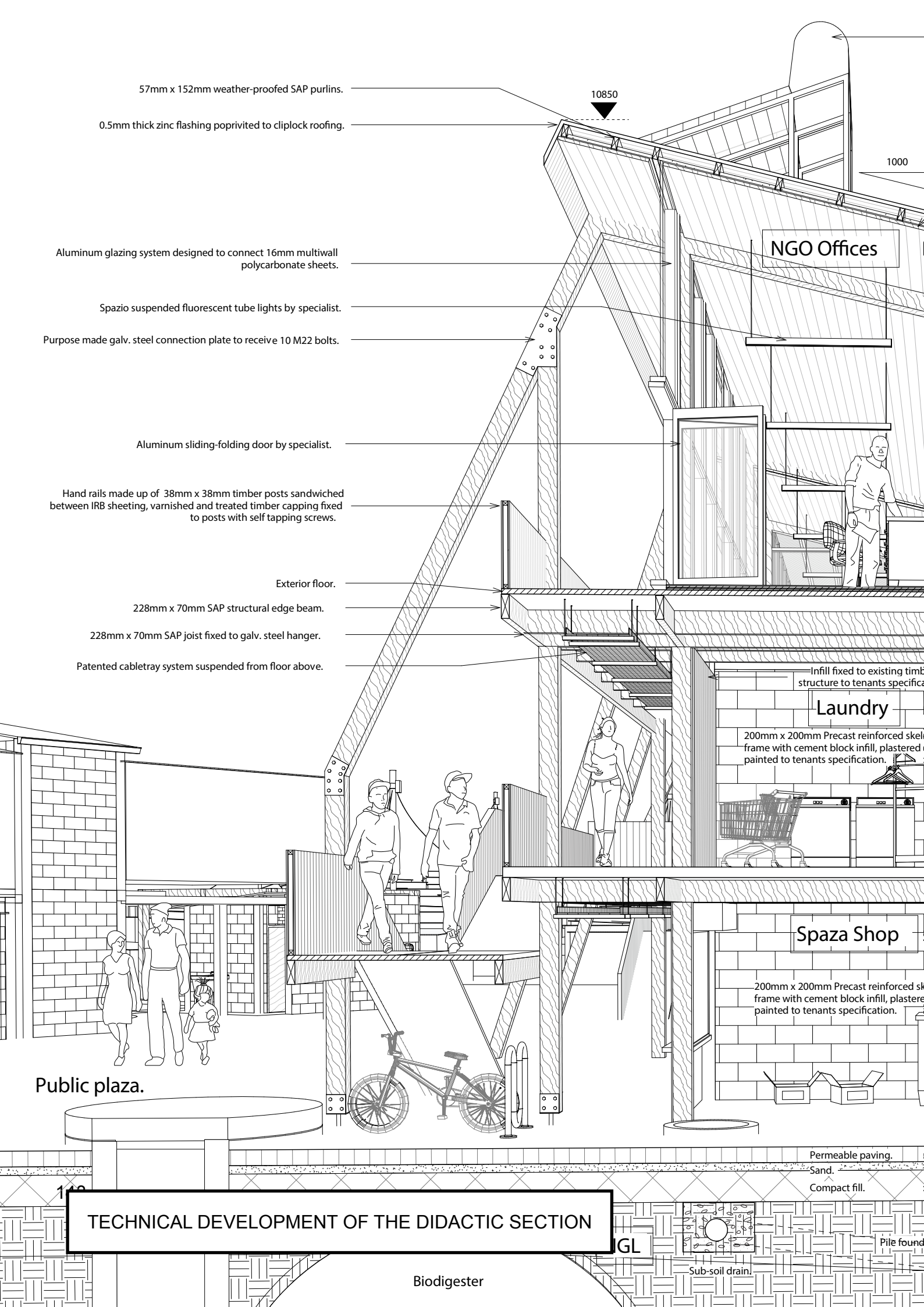
The choice of materiality, structural solutions and their jointing aims to be familiar and didactic. It is familiar because it borrows the vernacular language of the surrounding informal settlement.

This design decision reflects and pays tribute to the time and energy that went into the construction on the shacks. The building borrows the language and interpenetrates it into a sophisticated manner. The manner in which the building is put together and materials are joined is purposefully didactic. The users of the building can see and understand how the architecture is achieved. People can learn how to build better using materials and systems they are familiar with. Thus the design of the building is made very clear and allows people to appreciate and experience the architecture on a basic level.



FIRST PERSPECTIVE VIEW OF PUBLIC SPACE AND AMENITIES BUILDING





57mm x 152mm weather-proofed SAP purlins.

0.5mm thick zinc flashing poprivited to cliplock roofing.

10850

1000

Aluminum glazing system designed to connect 16mm multiwall polycarbonate sheets.

Spazio suspended fluorescent tube lights by specialist.

Purpose made galv. steel connection plate to receive 10 M22 bolts.

Aluminum sliding-folding door by specialist.

Hand rails made up of 38mm x 38mm timber posts sandwiched between IRB sheeting, varnished and treated timber capping fixed to posts with self tapping screws.

Exterior floor.

228mm x 70mm SAP structural edge beam.

228mm x 70mm SAP joist fixed to galv. steel hanger.

Patented cabletray system suspended from floor above.

NGO Offices

Infill fixed to existing timber structure to tenants specification.

Laundry

200mm x 200mm Precast reinforced skeleton frame with cement block infill, plastered and painted to tenants specification.

Spaza Shop

200mm x 200mm Precast reinforced skeleton frame with cement block infill, plastered and painted to tenants specification.

Public plaza.

Permeable paving.

Sand.

Compact fill.

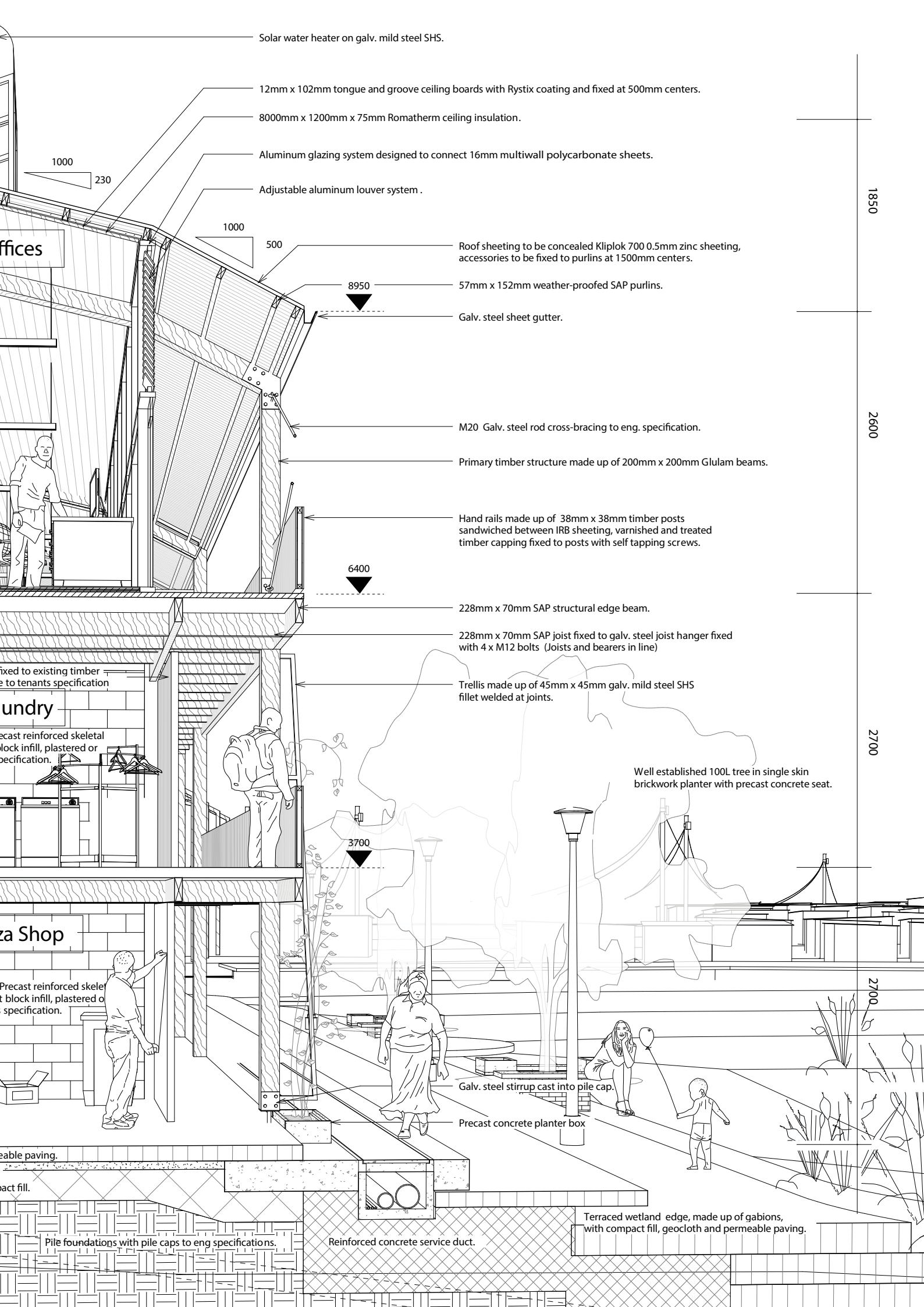
TECHNICAL DEVELOPMENT OF THE DIDACTIC SECTION

GL

Sub-soil drain

Pile found

Biodigester



Solar water heater on galv. mild steel SHS.

12mm x 102mm tongue and groove ceiling boards with Rystix coating and fixed at 500mm centers.

8000mm x 1200mm x 75mm Romatherm ceiling insulation.

Aluminum glazing system designed to connect 16mm multiwall polycarbonate sheets.

Adjustable aluminum louver system.

1000

230

1000

500

Roof sheeting to be concealed Kliplok 700 0.5mm zinc sheeting, accessories to be fixed to purlins at 1500mm centers.

8950

57mm x 152mm weather-proofed SAP purlins.

Galv. steel sheet gutter.

offices

M20 Galv. steel rod cross-bracing to eng. specification.

Primary timber structure made up of 200mm x 200mm Glulam beams.

Hand rails made up of 38mm x 38mm timber posts sandwiched between IRB sheeting, varnished and treated timber capping fixed to posts with self tapping screws.

6400

228mm x 70mm SAP structural edge beam.

228mm x 70mm SAP joist fixed to galv. steel joist hanger fixed with 4 x M12 bolts (Joists and bearers in line)

fixed to existing timber
to tenants specification

Trellis made up of 45mm x 45mm galv. mild steel SHS fillet welded at joints.

laundry

Precast reinforced skeletal
block infill, plastered or
specification.

Well established 100L tree in single skin
brickwork planter with precast concrete seat.

3700

pizza Shop

Precast reinforced skeletal
block infill, plastered or
specification.

Galv. steel stirrup cast into pile cap.

Precast concrete planter box

permeable paving.

compact fill.

Pile foundations with pile caps to eng specifications.

Reinforced concrete service duct.

Terraced wetland edge, made up of gabions,
with compact fill, geocloth and permeable paving.

1850

2600

2700

2700

STEP 3. NODES OF SUPPORT**GOVERNMENT PROVIDED PRECAST TOILET AS DESIGN INFORMANT**

The module was inspired by the precast concrete toilet:

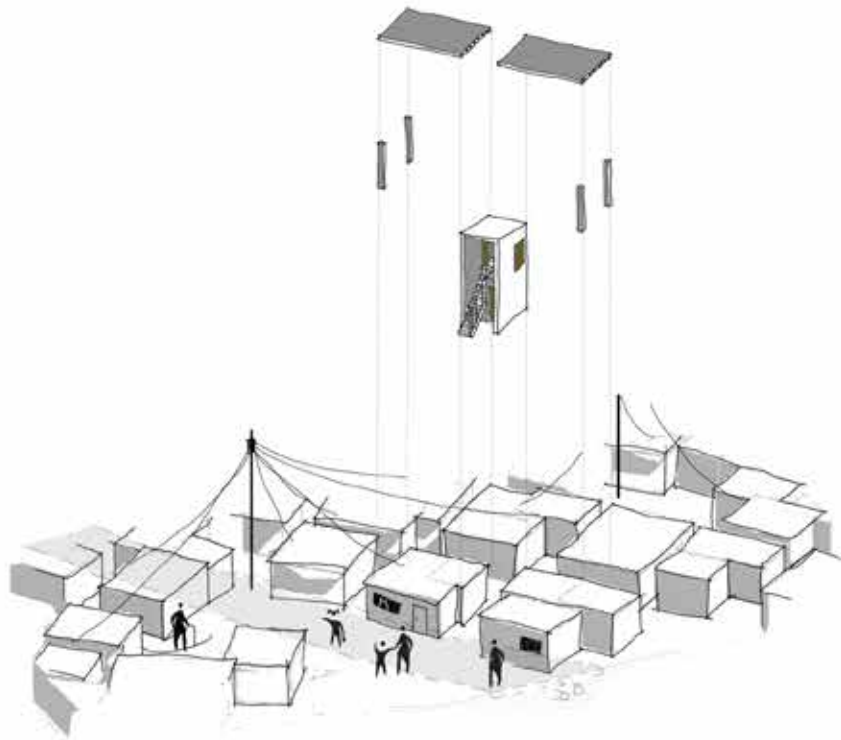
- Perception of permanence
- Most 'formal' elements within a settlement
- Structurally sound
- Provide sanitation
- Part of larger infrastructural system provided by the city
- Non flammable

With the addition of a stair case the precast service core was achieved, these elements are effective for a number of reasons:

- Prompt a formalised building process in line with the UISP housing consolidation phase
- Ensure structural safety to a degree
- Thermal mass
- Fire break
- Vertical expansion
- Can be shared by two families
- Affordable
- Dignified service provision

The unit becomes the catalytic agent of growth within the developing informal context. Making use of Harbrakens support and infill.





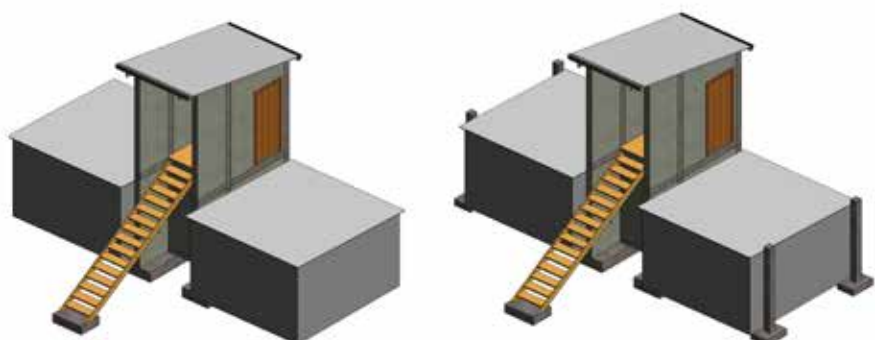
SERVICE CORE SUPPORT STRUCTURES

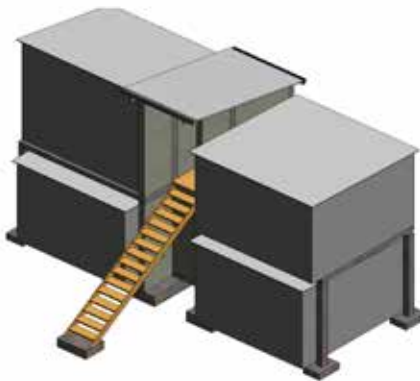
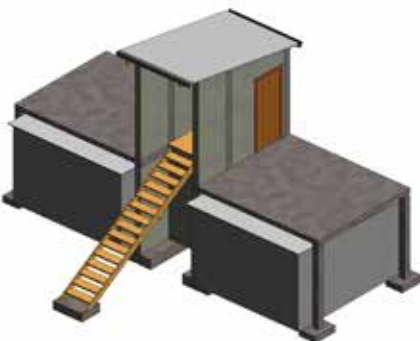
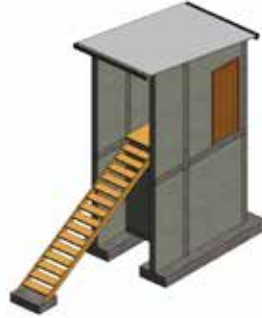
The two types of service cores use a skeleton system made up of precast concrete components such as footing, column, beams and partially cast joists. These elements would be fabricated at the housing center and be brought to site. The frame allows for a variation of infills that can be improved over time.

CIVIC CORE



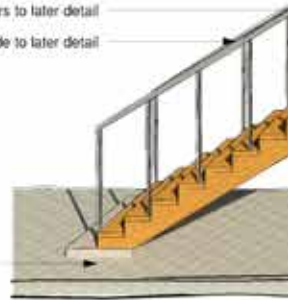
HOUSING CORE





- Crest fixings to secure IRB sheeting to timber battens, to use 3 screws per sheet
- 38mm x 38mm timber roof battens fixed by exterior grade screws
- 150mm x 150mm Aluminum flashing to be pop-riveted to IRB sheeting
- 52mm x 152mm timber bearer bolted and epoxy grouted to precast concrete wall

- Pre-fabricated timber stairs to later detail
- Timber balustrade to later detail



- Cast in-situ concrete footing to receive fixing from staircase
- Swartland timber door with openable fanlight

- 52mm x 105mm Glulam timber floor joists nailed to metal hanger

- Swartland timber door with openable fanlight to be bolted and epoxy fixed to precast concrete wall.

- Cobra wall mounted sink

- 200mm Precast concrete wall.

- Swartland timber door with openable fanlight to be bolted and epoxy fixed to precast concrete wall.

- Cobra wall mounted sink

- Utility water tap.

- Permeable brick paving.



DEVELOPMENT OF THE SERVICE CORE



- Aluminium gutter and brackets pop-rivited to IRB sheeting.
- 200mm Precast concrete wall.
- Swarfand 1hr fire rated timber door and frame to be bolted and epoxy fixed to precast concrete wall.
- 25mm Pine-ply varnished and treated to be screwed with exterior grade screws to timber battens.
- 38mm x 38mm timber patterns @ 300 c.c.
- 52mm x 105mm Glulam timber floor joists nailed to metal hanger .
- Recycled plastic shower enclosure.
- 125mm concrete Cast in-situ floor, finished with a cementitious screed.
- 300mm x 900mm concrete footings cast in situ, exposed rebar to receive precast concrete walls.

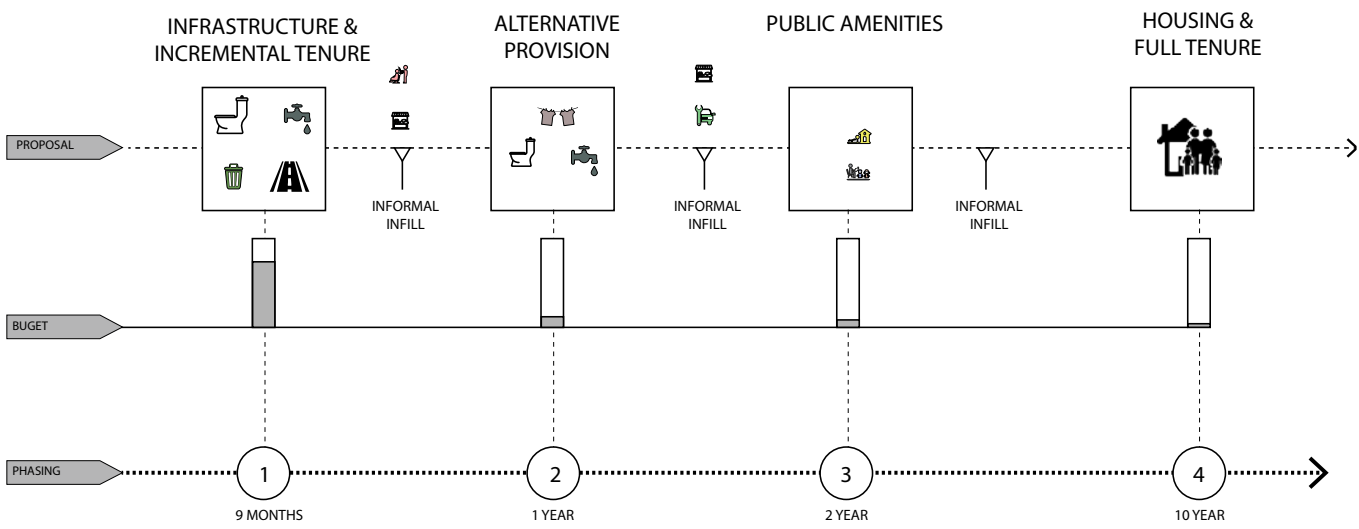


- 25mm Pine-ply varnished and treated to be screwed with exterior grade screws to timber battens.
- 38mm x 38mm timber patterns @ 300 c.c.
- 200mm Precast concrete wall.
- 25mm Pine-ply varnished and treated to be screwed with exterior grade screws to timber battens.
- 38mm x 38mm timber patterns @ 300 c.c.
- 52mm x 105mm Glulam timber floor joists nailed to metal hanger .
- Recycled plastic shower enclosure.
- 125mm concrete Cast in-situ floor, finished with a cementitious screed.
- 300mm x 900mm concrete footings cast in situ, exposed rebar to receive precast concrete walls.

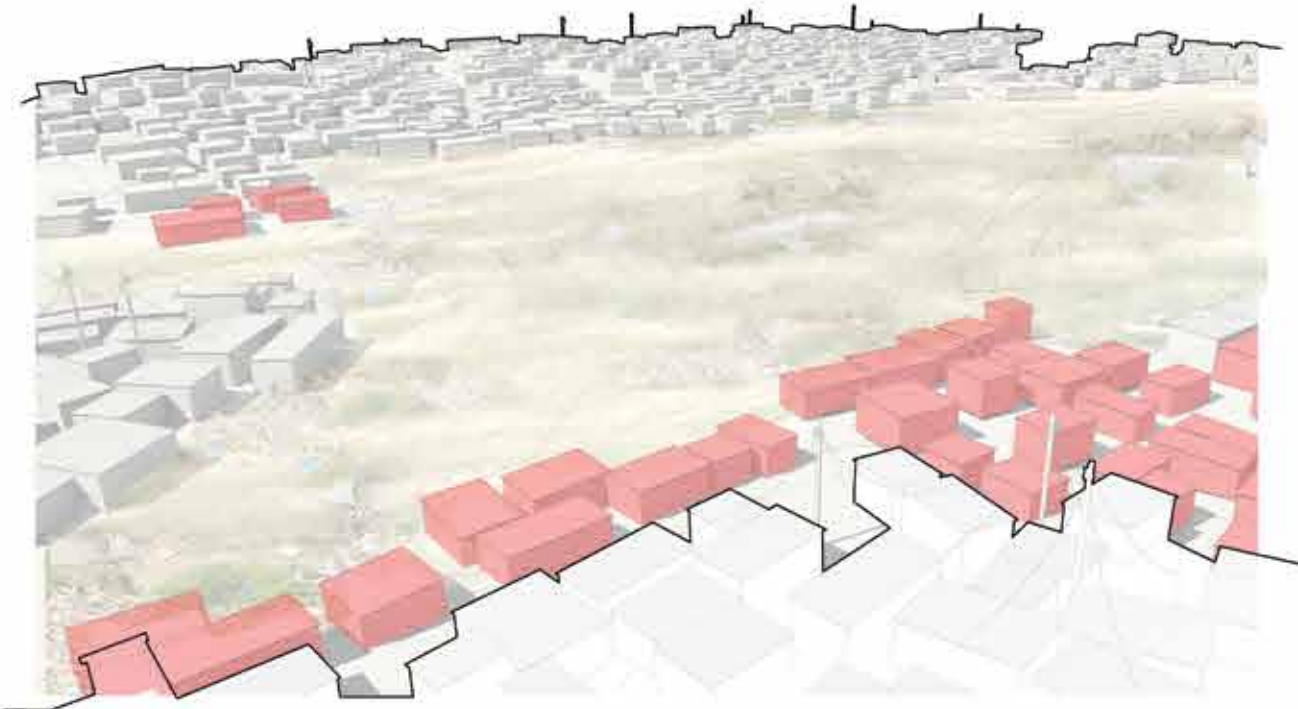
PART 7

• • •

FINAL MULTISCALAR INTEVENTION



Phase 1: Year 1, Selection of shacks which need to be relocated out of the flood line and to make way for infrastructural proposal. Shacks are relocated to newly reclaimed wetland edge.



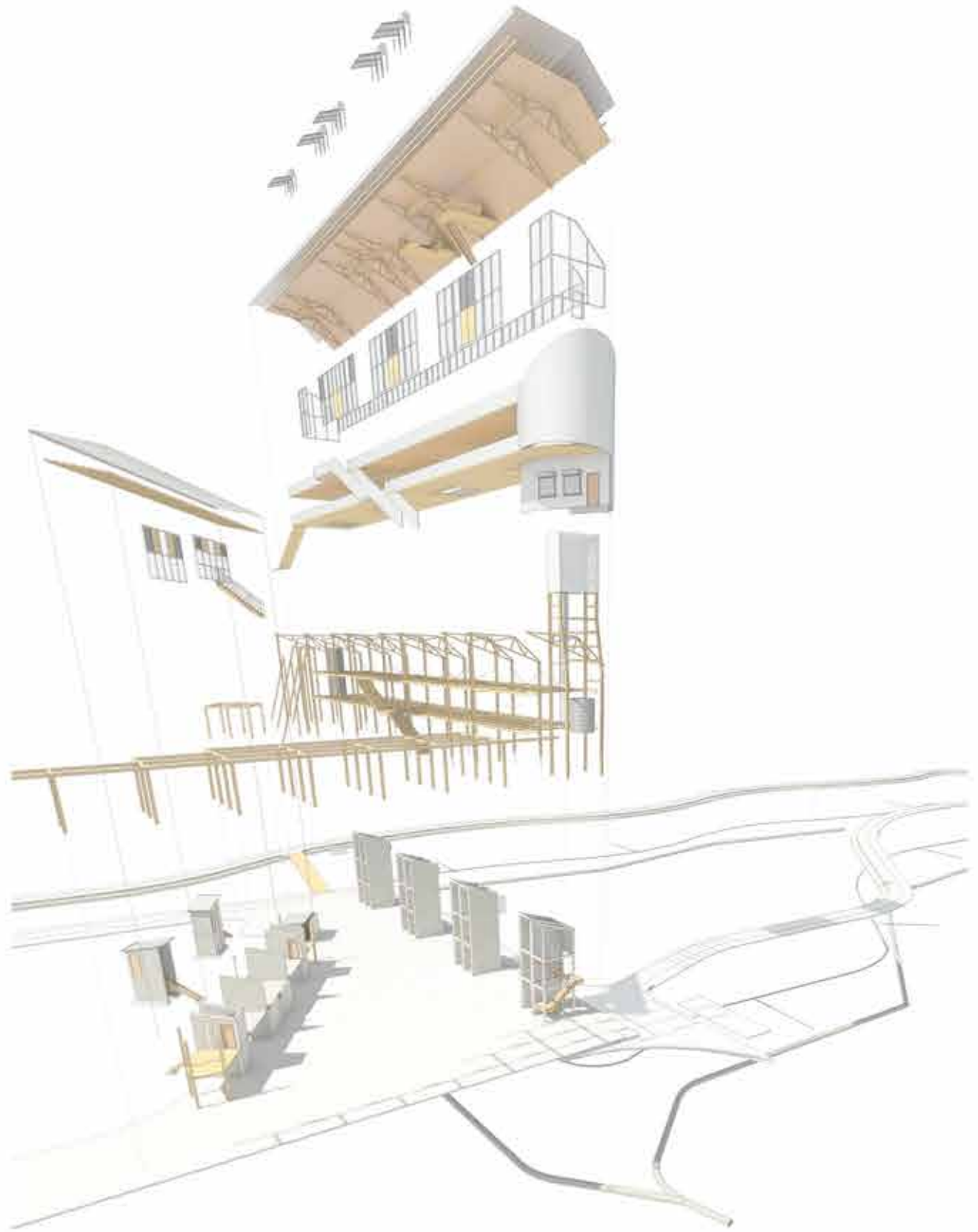
Step 2 : Phase 2 / Year 1, using infrastructure as public space connector and alternative service provision as activator along the public space network. The activity nodes further provide supports for formal and informal growth. Wetland is converted from a health and safety risk to a public asset.



Step 2.1 : Phase 3 / Year 3, The primary activity node is further formalised by the construction of the public amenities which offer institutional support to the settlement. The building is further infilled on the ground and first floors by informal traders.



Architecture of necessity: The architecture learnt from existing spatial configurations and transformations within informal settlements, and by working backwards the uncovering of the minimal elements or support structures from which the building can be in a constant state of transformation.



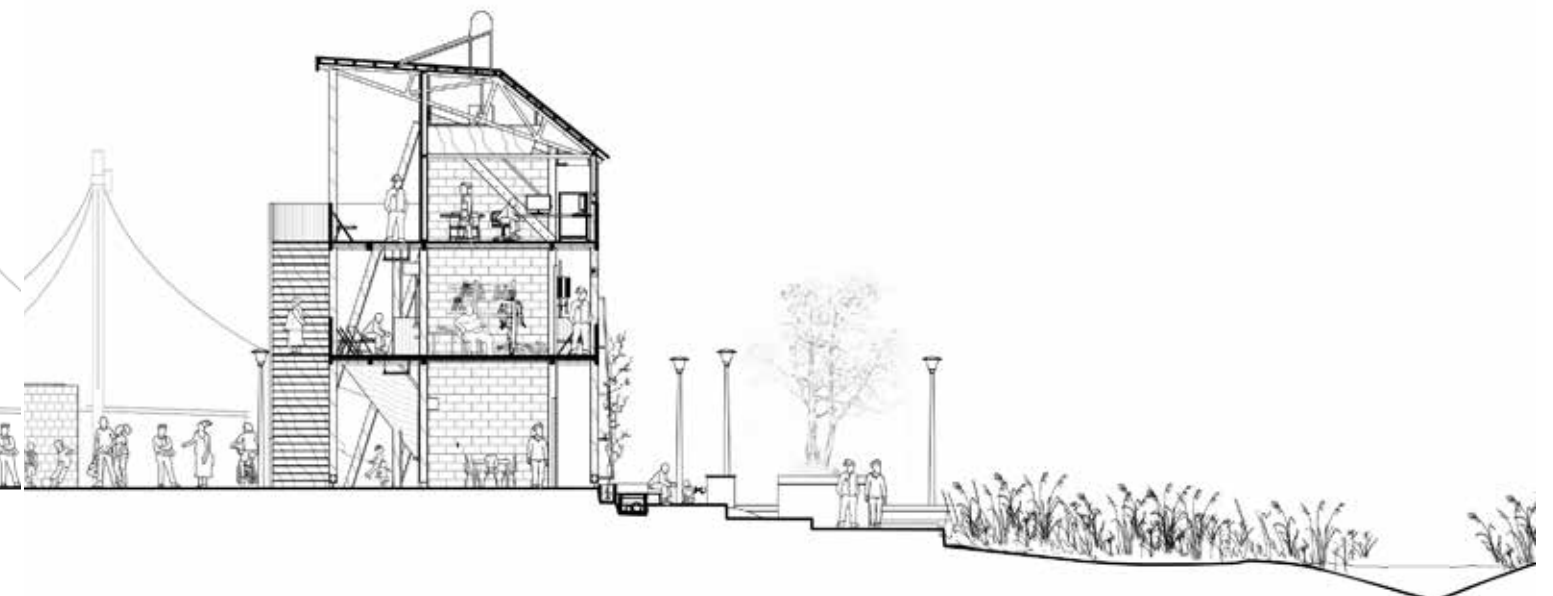
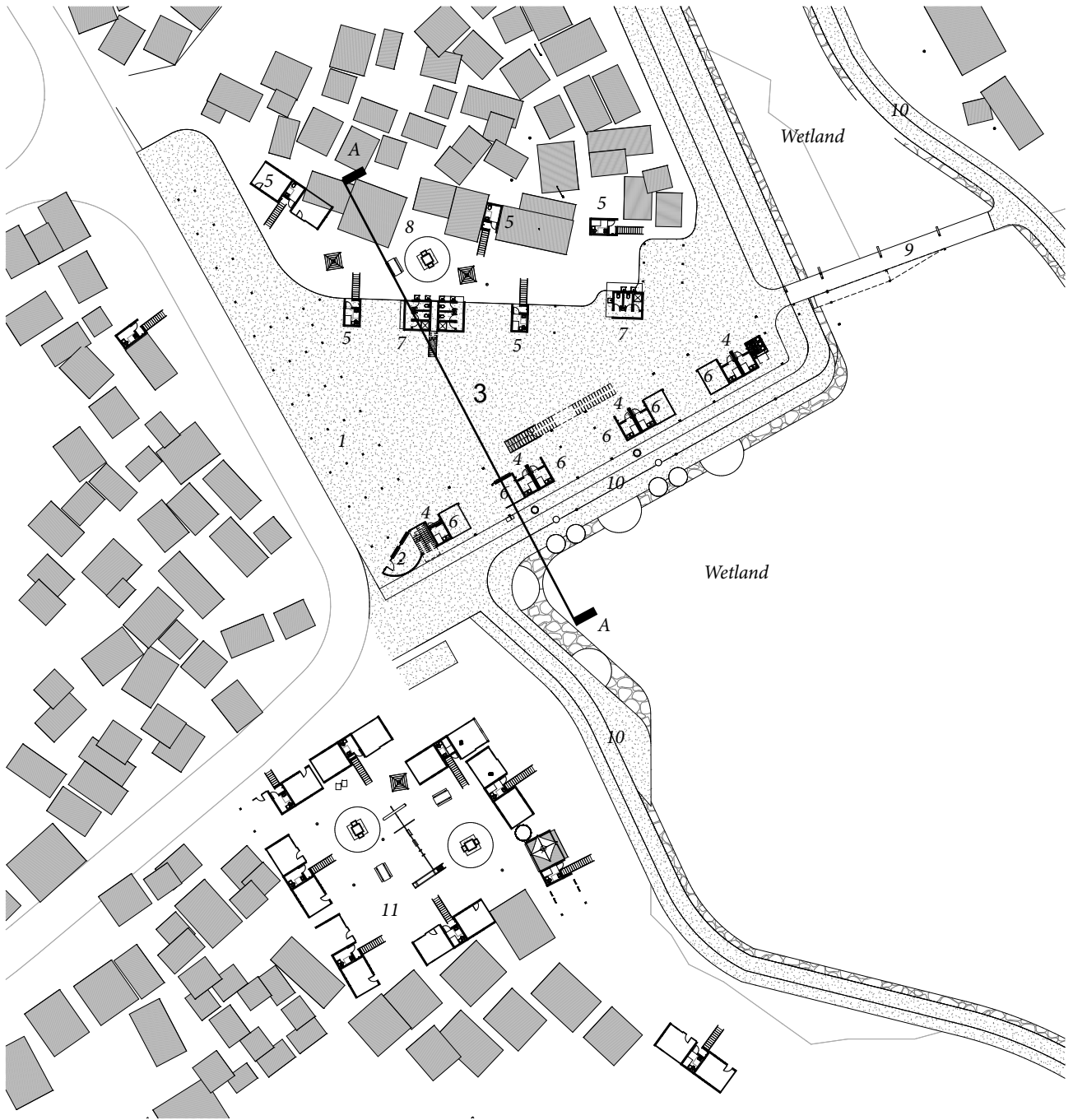
GROUND FLOOR PLAN

- Trader armature -1
- Corner spaza shop -2
- Public plaza -3
- Civic service core -4
- Housing service core -5
- Informal infill -6
- Public ablutions -7
- Enhanced community pocket -8
- Bridge crossing -9
- Wetland terracing and promenade -10
- Housing cluster -11



SECTION A - A



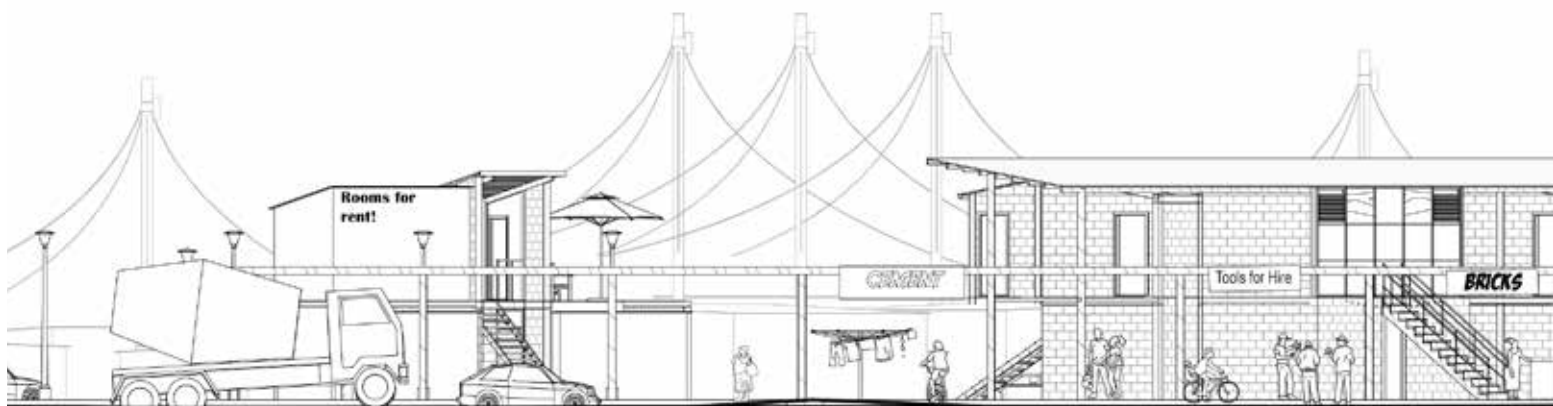


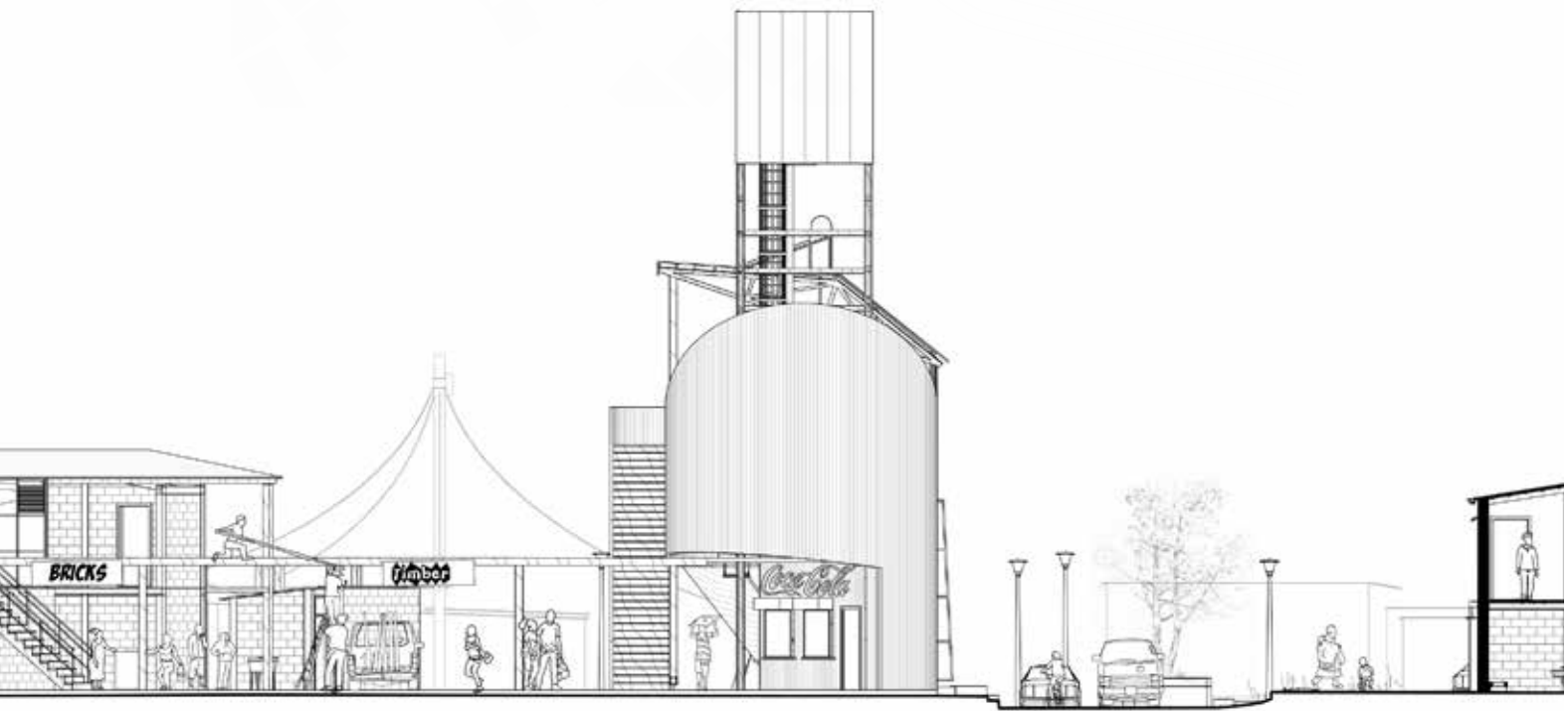
FIRST FLOOR PLAN

- Plant room, rain water storage -1
- Janitorial office -2
- Trade spill out spaces -3
- Civic service core -4
- Housing service core -5
- Informal infill -6
- Ramp to first floor-7



SECTION B - B



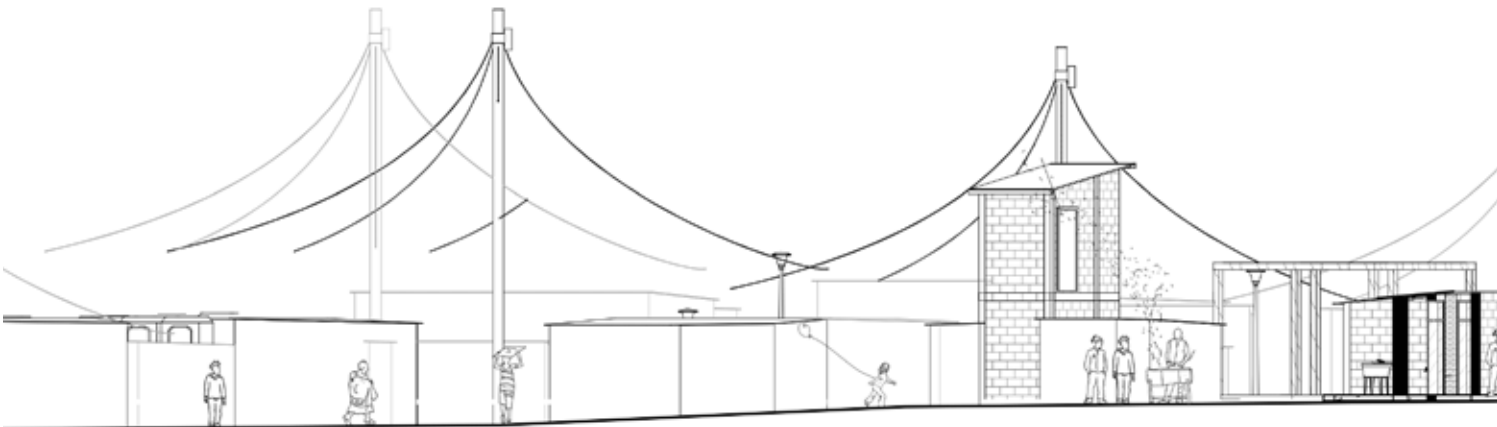


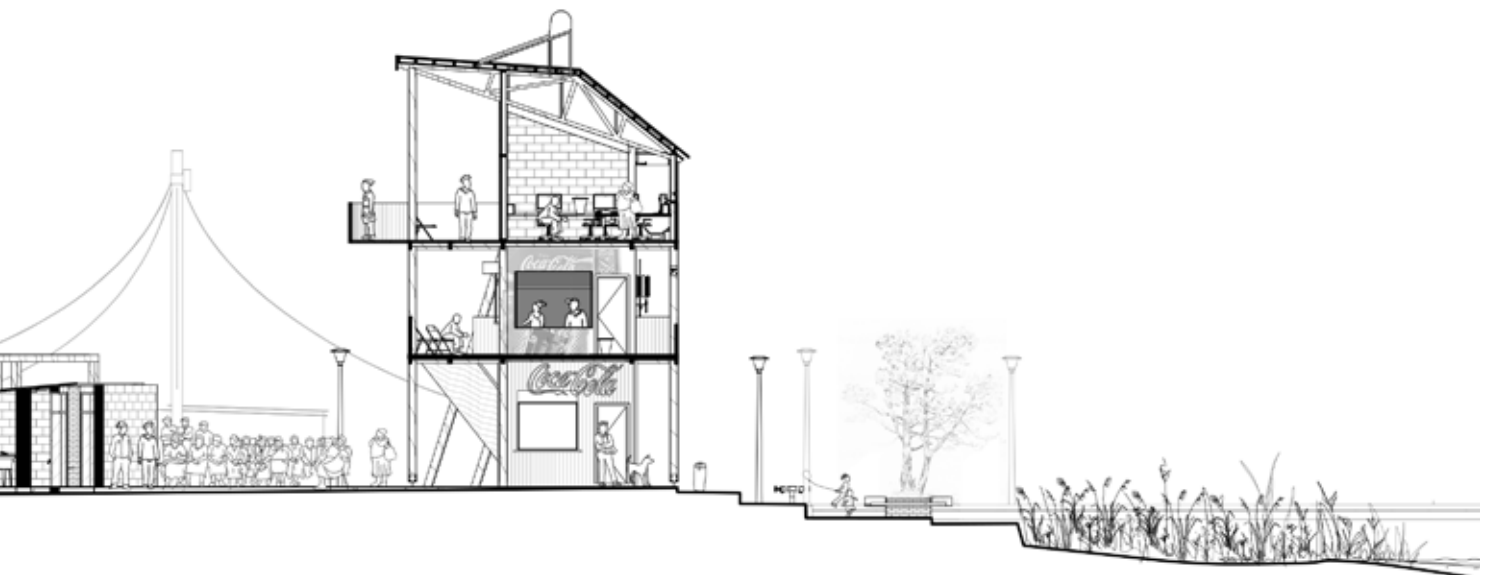
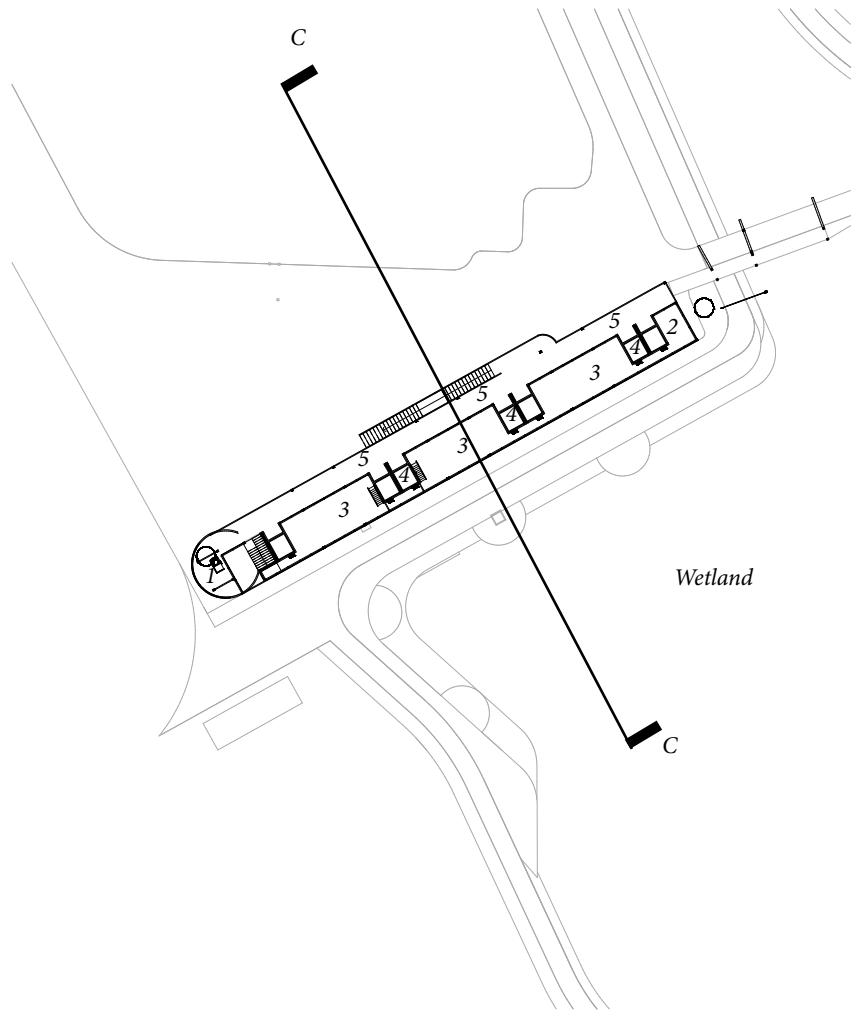
SECOND FLOOR PLAN

Plant room, rain water storage -1
Caretakers office -2
Office spill out spaces -3
Civic service core -4



SECTION C - C







***Appropriate Control and Ownership:** The permeable perimeter building creates a safe public enclave for free use of the settlements residents, however the necessary control and ownership is achieved through the careful ordering of support structures, infill and hierarchy of programmes. The interconnectivity of these ordering devices will ensure the sustainable use and growth in and around the precinct.*



Moments: *The spill out spaces between the informally constructed trading areas allow the patrons moments of pause, places to socialise or eat something made by the traders.*



Second floor circulation: *Spill out space from the offices which facilitate informal gathering, meeting and surveillance over the surrounding area. The circulation also opens up new view towards Table mountain..*

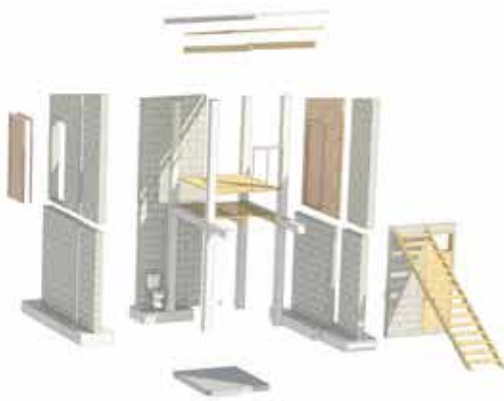


***Community meeting:** The office spaces are designed to have a double volume roof height, firstly to facilitate a large range occupations, secondly to allow for additional office space to occupy the roof area and third to passively cool the spaces.*

Prefabricated elements: *The nature and availability of labour within informal settlements is perfectly suitable for the small to medium scale production of building materials. The use of prefabrication is common to informal settlements in the form of concrete toilets, concrete palisade fences as well as vibracrete walls.*

Housing service core unit.

Incremental development of the service core.



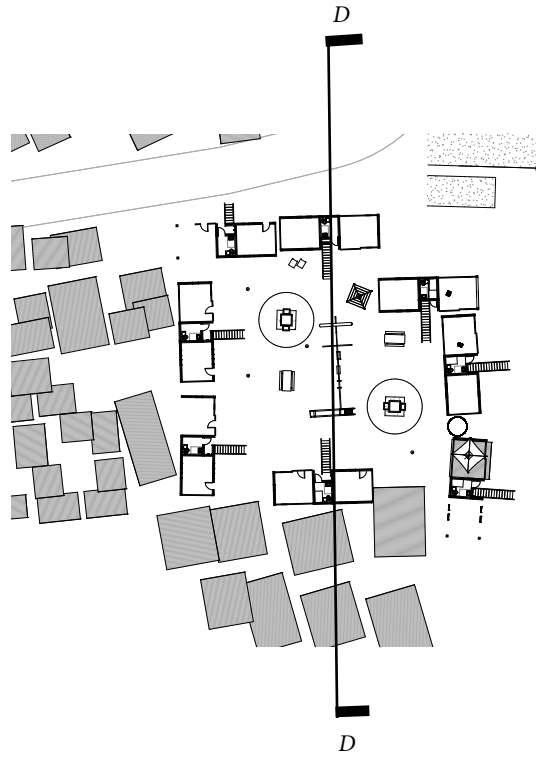
HOUSING CLUSTER AS OPTIMAL INFORMAL SETTLEMENT PATTERN

According to the research done by the Indian National Academy of Engineering, cluster settlement patterns are best suited for the user's evolution in incremental growth and everyday livelihoods. The physical form is based on affordability, cost-effectiveness and the means in which it is serviced. These semi-urban settlements need to be designed to fully address the before mentioned issues, thus the architect needs to design low-rise high density schemes. The benefit is that these schemes can be developed without using highly skilled labour and expensive building materials. Thus the 2-3 story developments can be designed to incrementally grow on and around controlled and sociable open spaces. Historically, the most appropriate and successful settlement patterns are based on street and open space cluster housing.

In these physical patterns much of the everyday activities occur outside the house itself. The activities emerge in the open spaces either in creatively occupied work spaces, and around community made/planted structures. These patterns are affordable and contribute to the community interaction while still allowing each individual dwelling to adapt and change independently. This puts people and their needs at the center of the development as opposed to the engineer's needs. Furthermore an effective infrastructure network can be easily implemented (Indian National Academy of Engineering 1994).

Objectives in Cluster Designed Layouts (Indian National Academy of Engineering 1994)

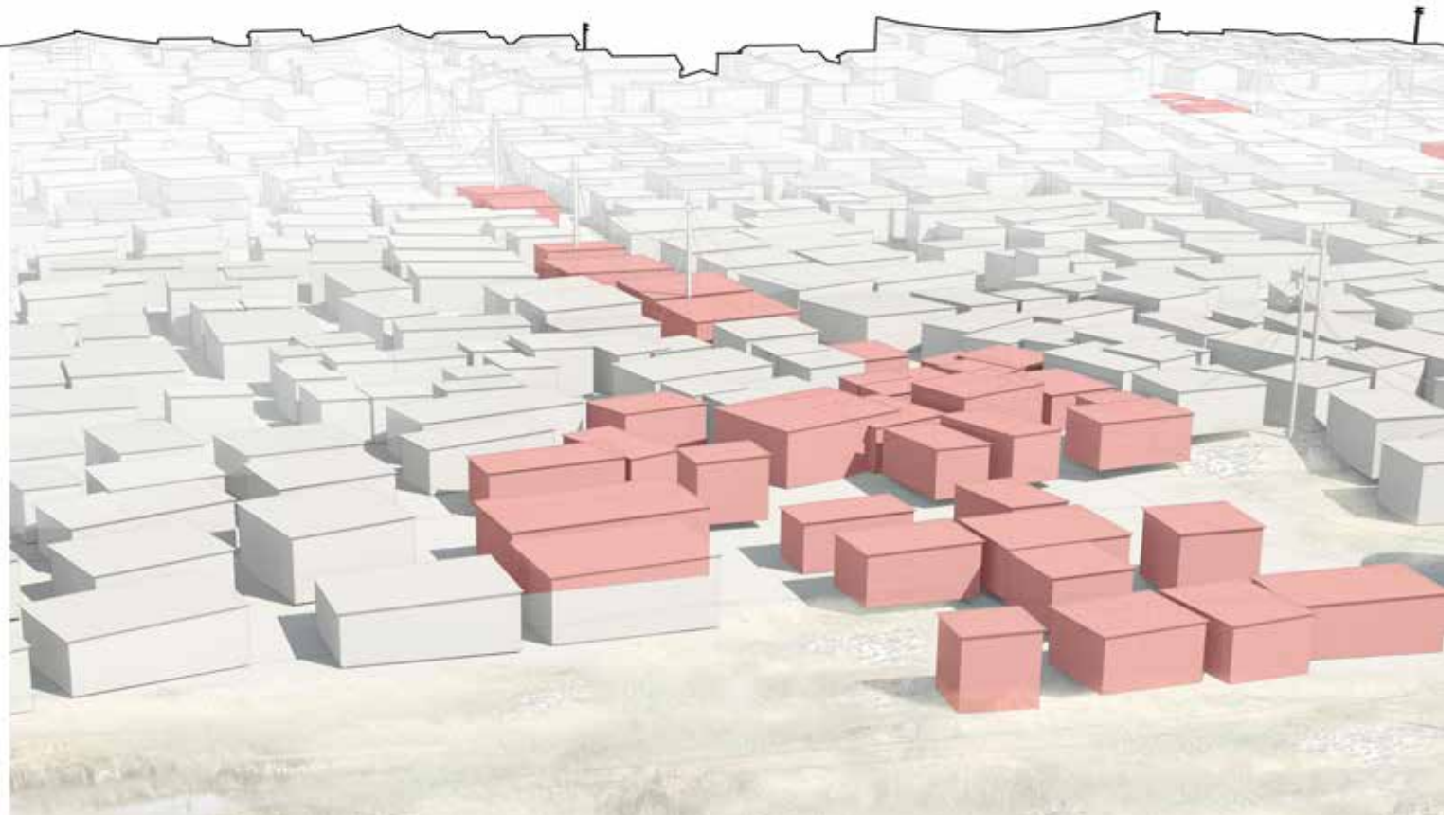
- Appropriately sized grouping of residents who can know and recognise their neighbours.
- Cluster must be designed to be culturally acceptable.
- Clusters should be in walking distance to community amenities.
- Design for productive and work areas
- Cluster houses should face open space to encourage meeting and interaction of residents.
- The services provided should be optimised to be used communally and provide opportunity for connection to individual dwellings.



SECTION D - D



Phase 1: Year 1, Selection of shacks which need to be relocated out of the flood line and to make way for infrastructural proposal. Shacks are relocated to newly reclaimed wetland edge.

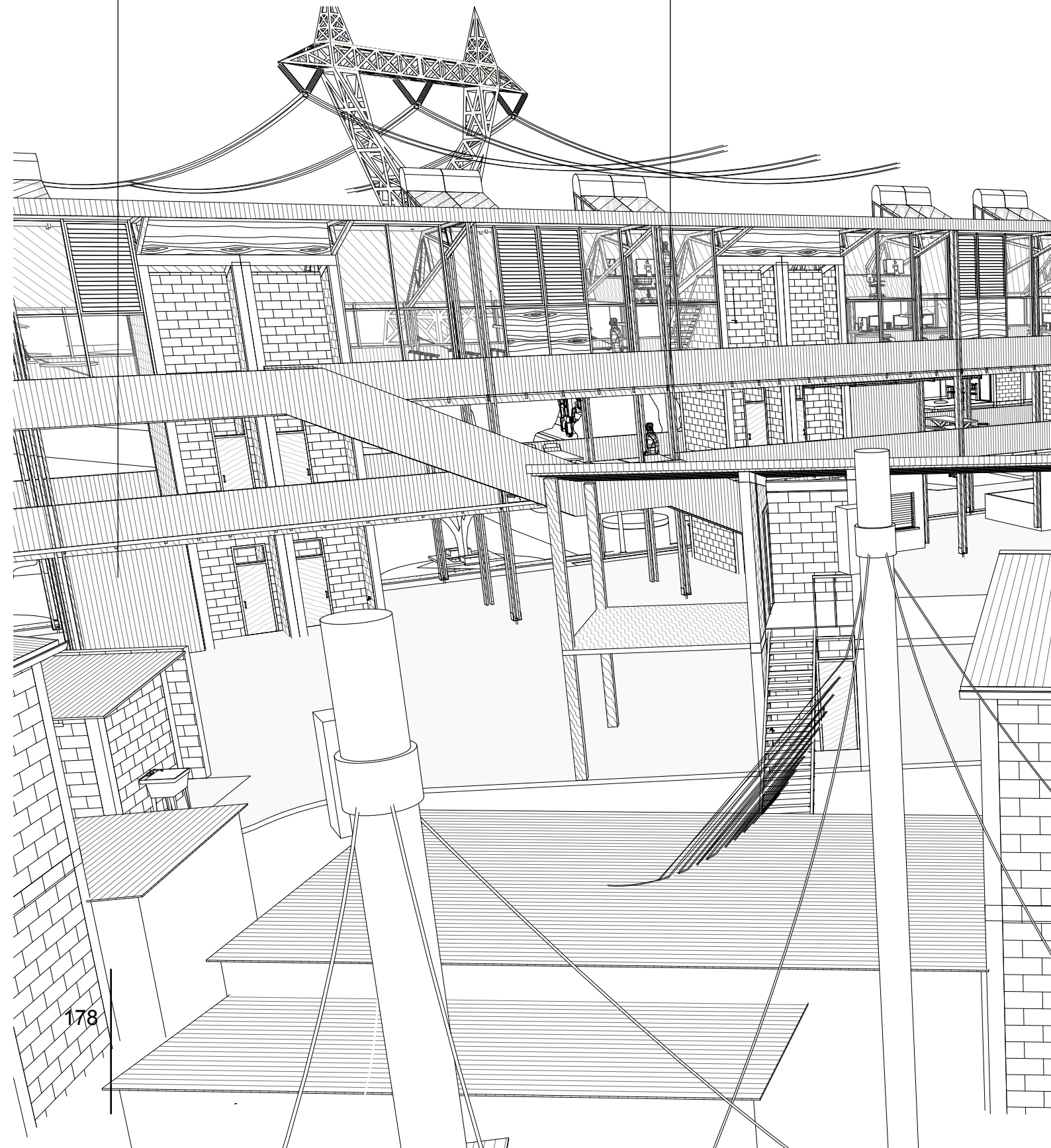


Phase 3 / Year 3: A pilot community cluster of the settlements housing programme.



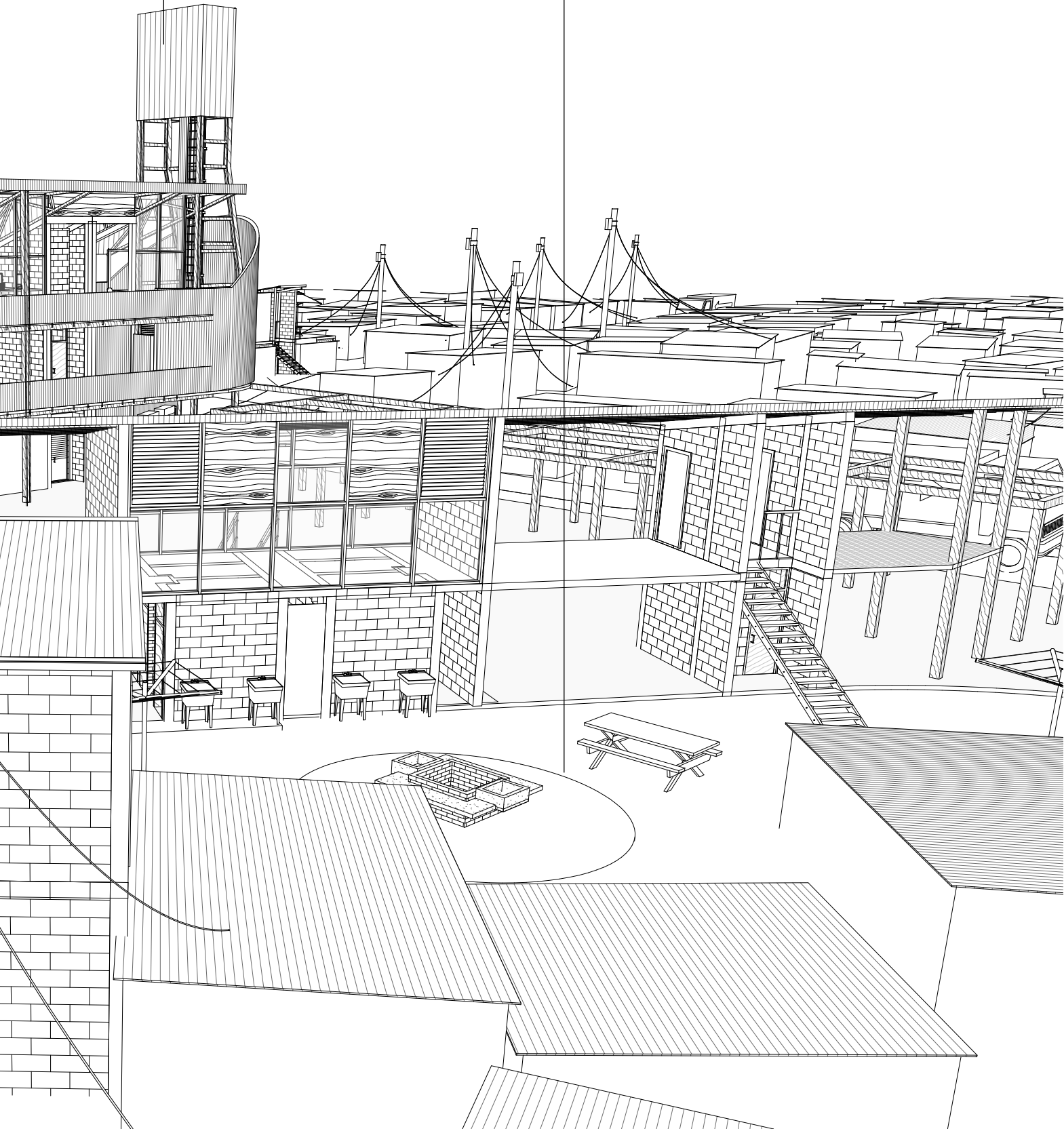
The building is designed to receive the infill, without challenges relating to waterproofing or climatic conditions. Additionally the user has access to a service core for storage and sanitation.

Colonnade: traditionally used for defining a public space, and allowing for permeability to the building beyond. Articulates the edge of the building and its verticality



Historically vertical elements have been used to define a particular space or demarcate a meeting place, much like an obelisk. The land mark element being the light tower not only expresses the corner but also the confluence point of infrastructure, public space and the informal settlement.

Multifunctional public spaces with water and sanitation points, spaces for gathering, economic opportunities and play



End

REFERENCES

al., Fiori et. 2000. URBAN POVERTY ALLEVIATION THROUGH ENVIRONMENTAL UPGRADING IN RIO DE JANEIRO: FAVELA BAIRRO. London: Development Planning Unit, University College, London.

Alliance, South African SDI. 2014. Our Work. 2 November . <http://sasdialliance.org.za/projects/>.

Armitage, N. 2009. "Planning for Water Services in a Low-carbon City." City of Cape Town World Planning Day. Cape Town: CoCT.

Asian Institute of Technology. 1977. Low-Income Housing Technology and Policy. Bangkok: Asian Institute of Technology.

Bethany Bouchard, Ashley Goncalo, Michael Susienka, Kevin Wilson. 2007. Improving Flood Risk Management in Informal Settlements of Cape Town. Cape Town: Worcester Polytechnic Institute.

Bolnick, Andrea. 2009. Informal Settlement Upgrading; Towards an Incremental People centered Approach. Cape Town: Ikhayalami.

CoCT - Fire and Rescue. 2015. "Public Education Pamphlets." Fire and Rescue Service. <http://www.capetown.gov.za/en/FireAndRescue/Pages/Publiceducation.aspx>.

CoCT – Fire and Rescue Service. 2013. "Challenges - Informal Settlement Incidents." Fire Safety Symposium - Goodwood. Cape Town: City Of Cape Town.

Cooke, Julian. 2014. "Architecture In The Townships." Journal Of The South African Institute Of Architects 50-52.

Cooke, Julian. 2013. "Fire Walls - The first step to better housing." Journal Of The South African Institute Of Architects 51-52.

David Jordhus-Lier, Pamela Tsolekile de Wet. 2013. City Approaches to the Upgrading of Informal Settlements. KwaZulu-Natal: Chance2Sustain.

Davis, Mike. 2007. Planet Of Slums. London: Verso.

Department of Human Settlements. 2009. INCREMENTAL INTERVENTIONS: UPGRADING INFORMAL SETTLEMENTS. National Housing Code, South Africa: Department of Human Settlements.

Egan, M. David. 1978. Concepts In Building Firesaftey . New York: John Wiley and Sons.

Eicker, Karen. 2012. The South African Informal City. Johannesburg: Architects Collective.

Gossmann, Melody Tulier & Christina. 2014. "SLUM UPGRADING IN RIO DE JANEIRO: FAVELA BAIRRO." [PDF] from Berkeley Edu, Healthy Cities Studio.

Gouverneur, David. 2014. Planning and Design for Future Informal Settlements: Shaping the Self-Constructed City. Routledge.

- Habraken, N. J. 1976. Variations: The Systematic Design of Supports. The MIT Press.
- Habraken, N. John. 1999. Supports: an Alternative to Mass Housing. UK: Urban International Press.
- Hamdi, Nabeel. 1991. Housing Without Houses: Participation, Flexibility and Enablement. Chicago : Practical Action.
2014. UN Urban lecture series: Participation in Practice. Directed by UN Habitat. Performed by Nabeel Hamdi.
- Habraken, John. 1999. Supports: an Alternative to Mass Housing. UK: Urban International Press.
- . 1998. Structure Of The Ordinary. London: MIT Press.
- HDA. 2012. South Africa: Informal Settlement Status. Research Report, Johannesburg: Housing Development Agency.
- Huchzermeyer, Marie. 2010. "Pounding at the Tip of the Iceberg – the dominant politics of informal settlement eradication in South Africa." *Politikon: South African Journal of Political Science*, Vol.37 129-148.
- Ikhayalami.org. 2012. O.R. TAMBO RE-BLOCKING FIRE RESPONSE. Accessed July 7, 2015. <http://www.ikhayalami.org/projects/or-tambo-re-blocking/>.
- Indian National Academy of Engineering. 1994. Low Cost Housing and Infrastructure. NewDelhi: Indian National Academy of Engineering.
- Isandla Institute . 2014. Managing the Interface: Exploring the need for intermediation in informal settlement upgrading. Educational Pamphlet, Cape Town: Isandla Institute.
- Jack, Olwethu. 2014. "Reblocking - An Exercise In Community Planning." *The Journal of The South african Institute of Architects* 28-29.
- Marie Huchzermeyer, Aly Karam, eds. 2008. Informal Settlements: A Perpetual Challenge? Cape Town: Juta Academic.
- Miller, Dylan. 2013. "A BURNING ISSUE." *SWARTLAND*. March. <http://www.swartland.co.za/in-the-news/single/25>.
- Misselhorn, Mark. 2008. Position Paper on informal settlement upgrading. Strategy paper for the office of the South African presidency, Urban LandMark.
- Napier, M. 2008. Strategies to help people access urban land markets. Pretoria: Urban Landmark.
- Ngwane, Trevor. 2010. "We, The Protestors." *Amandla Magazine* 17-23.
- Parry. 1987. Shanty Upgrading: Technical Handbook. Technical Handbook, London: Intermediate Technology Workshops, Cradeley Heath.
- Pieterse, Edgar. 2010. Counter Currents: Experiments in sustainability in the Cape Town region. Cape Town: Jacana

Pieterse, Edgar. 2009. Post Apartheid Geographies in SA: Why are urban divides so persistent? African Centre for Cities.

Public Housing Directorate. 2003. "2003 Appendices ." Parliamentary Monitoring Group. <https://pmg.org.za/docs/2003/appendices/030611ct.pp>.

Roads and Stormwater Department. 2009. Management of Stormwater Impacts Policy. Cape Town: Catchment, Stormwater and River Management Branch, CoCT.

Royden-turner, shannon. 2012. "From Eradication to Intervention: Urban Informan Ecosystem." Research Report.

SACISIS. 2014. 'Protest Nation': What's Driving the Demonstrations on the Streets of South Africa? 14 Febuary. <http://sacsis.org.za/site/article/1930>.

SDI Alliance. 2014. Partners. 1 November. <http://sasdialliance.org.za/>.

Settlements, Human. 2013. Draft Policy To Inform The Proactive Re-Blocking Of Informal Settlements. Cape Town: City of Cape Town.

Sheuya, Shaaban. 2004. Housing Transformation and Urban Livelihoods In Informal settlements. Spring Research Series No. 45, Dortmund: SPRING Center.

South African SDI Alliance. 2014. Partners. 1 November. <http://sasdialliance.org.za/>.

Turner, John F.C. 1991. Housing By People. New York: Rizzoli.

UN Habitat. 2003. "Slums of the World: The face of urban poverty in the new millennium? Working Paper, United Nations Human Settlements Programme ." UN Habitat.

Ward, Peter M. 1982. Self-Help Housing, A Critique. London: Mansell Publishing Limited.

Ziblim, Alhassan. 2013. "The Dynamics of Informal Settlements Upgrading in South Africa: Legislative and Policy Context, Problems, Tensions, and Contradictions." Habitat for Humanity International.

TABLE OF FIGURES

Fig 1 : Conceptual diagram by author.

Fig 2 : Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.

Fig 3 : Collage showing the juxtaposition between the formal and informal by author.

Fig 4 : Blikkiesdorp is a so-called 'temporary relocation area' for poor South Africans evicted
Taken on April 8, 2010 Source: www.flickr.com

Fig 5 : Serviced plots for tented accommodation in the Blikkiesdorp Temporary Relocation Area at Delft 34km north-east of Cape Town with Table Mountain in background, Photo by Kerry Chance

Fig 6 : UN Habitat's Gini Coefficient that depicts the levels of income inequality in the worlds cities
Source: UN Habitat, Global Urban Observatory, 2009

Fig 7 : Service delivery protest, Source : www.timeslive.co.za, photo by Siphwe Sibeko

Fig 9 : Westonaria Borwa Mega Project RDP housing, Source: <http://westonariaborwa.co.za/housing-2/bng-housing/>

Fig 10 : Graphic illustration of task team adapted by author.

Fig 11 : Graphic illustration of professionals working adapted by author.

Fig 12 : Graphic illustration of infrastructural construction adapted by author.

Fig 13 : Graphic illustration of housing and tenure adapted by author.

Fig 14 : Graphic illustration of community leaders by author.

Fig 15 : Graphic illustration of City of Cape Town logo by author.

Fig 16 : Graphic illustration of new types of tenure arrangements by author.

Fig 17 : Graphic illustration of new types of housing consolidation by author.

Fig 18 : Photograph of kinetic sculpture as conceptual artefact for this dissertation, by author.

Fig 19 : Drawing of existing Langrug Settlement for CORC by author.

Fig 20 : Drawing of proposed reblocked area of Langrug Settlement for CORC by author.

Fig 21 : Community participants, Mtshini Wam Reblocking 2013, Source: SDI Alliance

Fig 22 : Community members designing their new structures, Mtshini Wam Reblocking 2013, Source: SDI Alliance

Fig 23 : Reblocking Strategy adopted by the city of Cape Town 2013.
Source: <http://sasdialliance.org.za/city-of-cape-town-adopts-reblocking-policy/>

Fig 24 : Design of Clusters, Mtshini Wam Reblocking 2013, Source: SDI Alliance.

Fig 25 : The demolition of Pruitt igoe, Source: politecture.wordpress.com

Fig 26 : Torre de David - Vertical slum and infill in existing structure. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 27 : Torre de David - Recreational Space. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 28 : Torre de David - Informal grocery store.. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 29 : Torre de David - Incremental apartments. Source: Iwan Baan 1996 - 2010. Source: http://iwan.com/photo_index

Fig 30 : Image showing supports and infill make dwellings. Source : Low-income housing, technology and policy, International Conference on Low-income Housing (1977 : Bangkok, Thailand)

Figure 31: Cooperativa Diagrams of Chacara Del Castilho. Source: Favela - Bairro Uma outra historia da cidade do Rio de janeiro.

Fig 32 : Progressive development using open solutions. Source: Self-help Housing, a critique / edited by Peter M. Ward.

Fig 33 : The Placemaker's Guide To Building Community work plan. Source: Nabeel Hamdi

Fig 34 : The RDP house as asset for income generation. Source: Authors own

Fig 35 : Variations of the RDP house figure ground as asset for income generation. Source: Authors own

Fig 36, 37 : *The rapid expansion of Du Noon Township between 2004 - 2014* Source: authors own

Fig 38: *Variations of the RDP house adaptations and means of income generation.* Source: authors own

Fig 39 : *Christopher Alexander, Participation, The Oregon Experiment ,1975, 44.*
Oxford University Press. Source: <http://www.mcgill.ca/files/mchg/chapter3.pdf>

Fig 40 - 46 : *Photographs are authors own*

Fig 42 : Source :Google Earth

Fig 47 : *Illustration of Cape Town by author.*

Fig 48: *Photograph of community meeting by author.*

Fig 49 : *Illustration of Cape Town by author.*

Fig 50 : *Photograph of the Empower Shack by author.*

Fig 51 : *Illustration of Cape Town by author.*

Fig 52 : *Drawing of spaza shop by Alex Coetzee.*

Fig 53 - 56 : *Drawings of various informal businesses by author.*

Fig 57 : *Drawing of residential thresholds by Bayo Windapo.*

Fig 58 : *Drawing of degrees of privacy by Bayo Windapo.*

Fig 59 : *Photograph of the Empower Shack by author.*

Fig 60 : *Aerial photo of an informal settlement: UCT, Submitted City and Regional Planning Report 2015*

Fig 61 : *Illustration of the BM Section informal settlement context in relation to Cape Town by author.*

Fig 62 : *Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.*

Fig 63 : *BM Section 2013 new years day fire devastation. Source: <http://www.ikhayalami.org/>*

Fig 64 : *Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.*

Fig 64 : *Site Planning diagram. Source: Concepts in Building Fire Safety*

Fig 65 : *Fire truck turnaround layout options. Source: Concepts in Building Fire Safety*

Fig 66 : *Julian Cookes phasing of firewalls in Informal settlements. Source: ASA Edition 59*

Fig 67 : *Axonometric drawing of firewalls between houses. Source: Concepts in Building Fire Safety*

Fig 68 : *Concrete block and brick wall fire ratings and detail. Source: Concepts in Building Fire Safety*

Fig 69 : *Encroachment of Informal dwellings into wetlands. Source: Worcester Polytechnic Institute. 2007*

Fig 70 : *Detention pond will become a 'wetland amenity': <http://thecitizen.com/news-government-city>*

Fig 71: *Plan and section of a constructed wetland. Source: Ethekewini Municipality. 2008*

Fig 72 : *Storm Water Detention Pond construction. Source: 2013 Blue Ridge Engineering PLL*

Fig 73 : *Cross-section of a bio-retention area. Source: Ethekewini Municipality. 2008*

Fig 74 : *Cross-section of a permeable pavement. Source: Ethekewini Municipality. 2008*

Fig 75 : *Drawing of the implementation process of firewalls after fire has occurred. Source: Authors own*

Fig 76 : *Drawing of incremental development of settlement after fire has occurred. Source: Authors own*

Fig 77 : *Aerial photograph of the reblocking of the BM section. Source: City of Cape Town Human settlements department.*

Fig 78 : *Aerial photograph of the BM section. Source: Arc GIS*

Fig 79 : Statistics and infographics of the BM Section. Source <http://wazimap.co.za/profiles/ward-19100089/>

Fig 80 - 83 : Photos of the BM Sections communal flush toilets, conducted for a social audit. Source: The SJC and Ndifuna Ukwazi

Fig 84 : Map by author.

Fig 85 : Photograph by author.

Fig 86 - 88 : Source Google Street View.

Fig 89 : Map by author.

Fig 90 : Map by author.

Fig 91, 92 : Photograph by author.

Fig 93 : Map by author.

Fig 94, 95 : Photograph by author.

Fig 96 : Map by author.

All Images in Parts 6 and 7 are authors own.

Holmes
