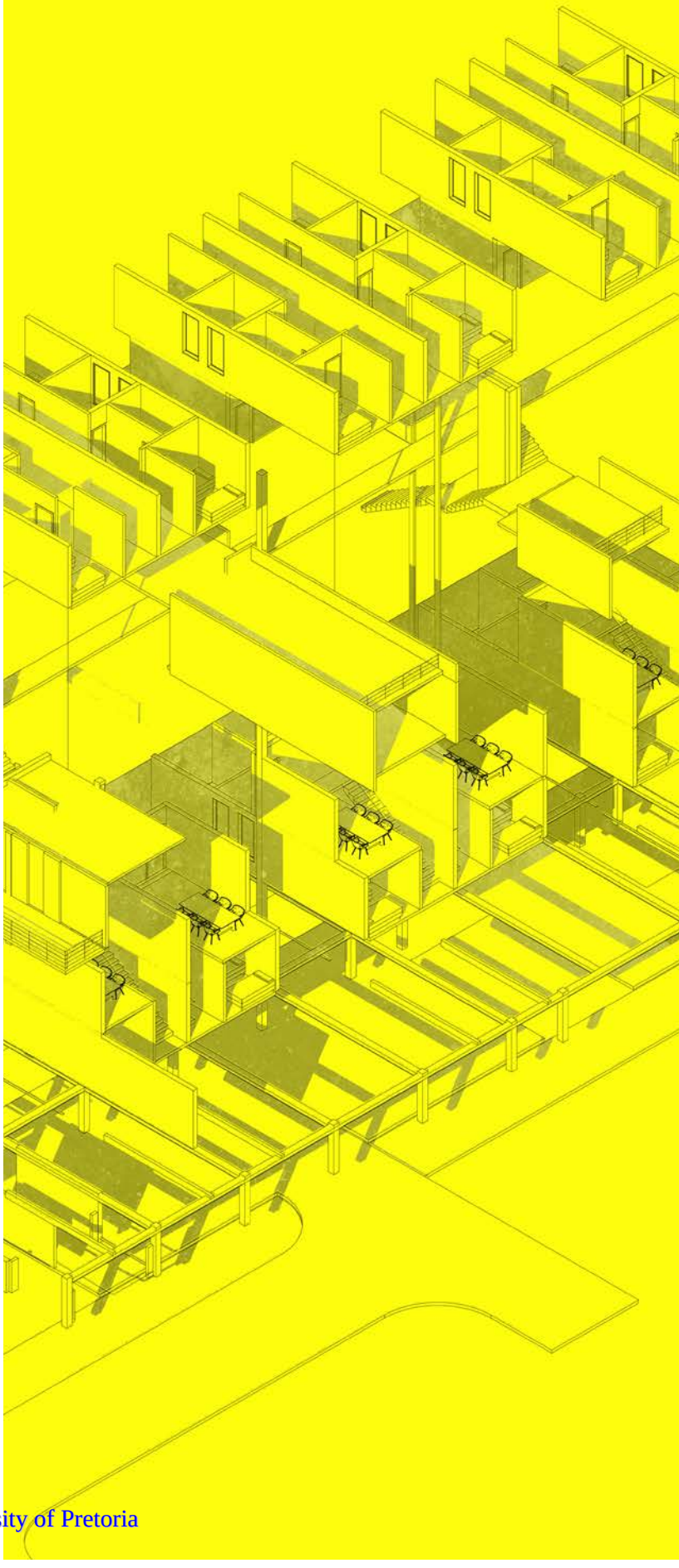

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Transition

Between the Model and The lived

A Stategy at the Interface between
Resident, Architecture and
Infrastructure

by
Marcus van der Hoven

Submitted in fulfilment of requirements
for the degree

M Arch (Prof.)

Master of Architecture (Professional)

Faculty of Engineering, Built Environment and Information Technology

University of Pretoria

November 2017

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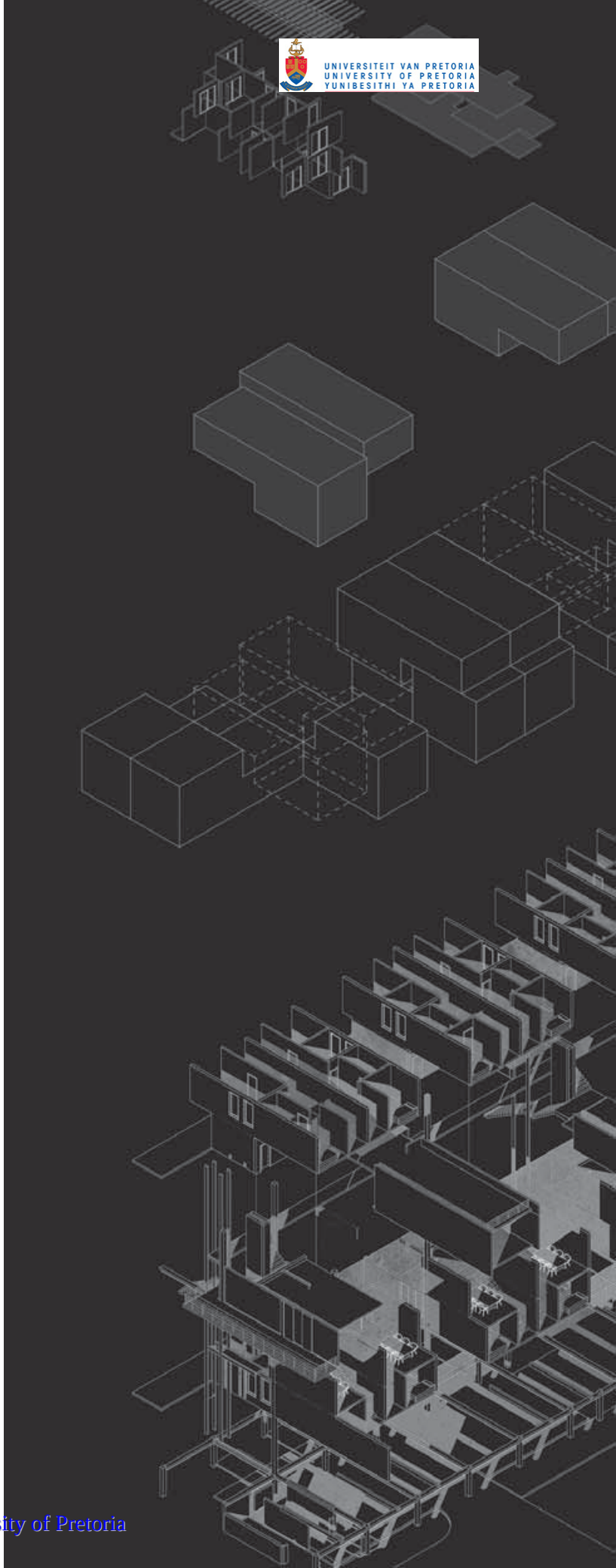

Project Location

Westbury ; Johannesburg

Programme

Social Housing and Supporting Urban Infrastructure

Research Field

Human Settlement and Urbanism (HSU)

Identity |Cognition | Structure

Client

Residents of Westbury and Surrounding Suburbs

Theoretical Background

The design and application of a rapid urban redevelopment scheme aimed at the reprogramming of exisitng spatial legacy, through the research of prefrabricated design and construction applied to social housing architecture. An intervention that will inspire a sustainable social and urban progression in critical urban regions.

Architectural | Urban Approach

This paper aims to develop a strategy at the interface between "Resident", "Architecture" and "Infrastructure" and will suggest a design approach to social architecture and supporting infrastructure in the critical context of Westbury, Johannesburg .

Declaration

In accordance with Regulation 4(c) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution. I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

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

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Marcus van der Hoven

Fig 01 _ Existing Housing Condition (Author, 2017)

Prelude

"Building processes seem best evoked in terms of various forms of endemic uncertainty which, in turn, define an essentially turbulent industrial environment. The pursuit of stability is re-interpreted as 'unstable equilibrium' in building processes, requiring constant feedback to maintain control." (Groak, 1992)

The process of addressing a troubled spatial legacy within the context of South Africa has presented a challenging atmosphere regarding the preservation or reprogramming of urban and architectural space. This becomes a prevalent issue when considering critical urban regions such as Westbury in Johannesburg, where the social and built environment remain in a constant struggle for identity and defensibility.

The need to address this reformation of urban space as well as urban programme has lead this dissertation to question the manifestation of social processes in spatial form. This dissertation hopes to propose a system of architecture and supporting infrastructure that will address existing spatial legacy, through responding to social and contextual issues; leading to a new platform for the sustainable progression of social activity and identity in the form of urban densification.

Fig 02 _ Movement through
Existing Housing (Author, 2017)

General Issue

The events of South Africa's political and social history has left a fragile and disjointed urban framework resulting from rapid re-development programs such as the Reconstruction and Development Project (RDP), the need to respond to historical, spatial and social injustice, as well as accommodate economic development has created a bureaucratic response, seeking to deliver high volumes of housing and urban development at speed (Louw, 2012). Although this process has succeeded in housing the population at a high rate, it has failed to address the spatial legacy of fragmentation, segregation and stagnation that the socialist apartheid regime created.

Urban | Architectural Issue

The urban state of Westbury remains as a palimpsest of urban layers formed through the turbulent History of South Africa. The Current urban condition is one of indefensibility, crime and dire housing conditions. Residents live in conditions that limit their ability to prosper, as there is no platform in place to aid in financial and living requirements. As such the urban realm is not conducive to sustainable urban growth in a city that continues to grow around this context.

On a macro scale the result of Westbury's Historical development has left the context hindered by its segregation from surrounding suburbs, this is also prevalent on a micro scale, within Westbury, whereby the historical programming of residential blocks and commercial zones are disconnected by ill-defined and indefensible areas, the product of this mixture of dense residential clusters and unclaimed land has manifested dangerous anit-social behaviour, harbouring illegal and un-policable activity.

Research Questions

Main Questions 'The Model'

01 As we are exposed to a call for more sustainable and appropriate approaches to large scale urban development, how do we as designers respond to the milieu of social issues caused by the densification of urban and cultural centres?

02 What are the technological approaches used in the construction of high density residential developments and how can we appropriate existing technologies into an efficient system of construction?

03 What is the impact of addressing spatial legacy in development,; how does the construction of a new development facilitate the reciprocation of new program and infrastructure in existing neighbourhoods?

Subsidiary questions 'The Lived'

04 What role will Westbury's society play in the success or failure of development?

05 How will Westbury maintain a dialogue with urban development as the growing socio-economic potential for the area increases?

06 How are the relationship between private residence and public facilities formed and how can the development of a housing scheme create defensible space, without limiting the growth of public interaction and community formation?

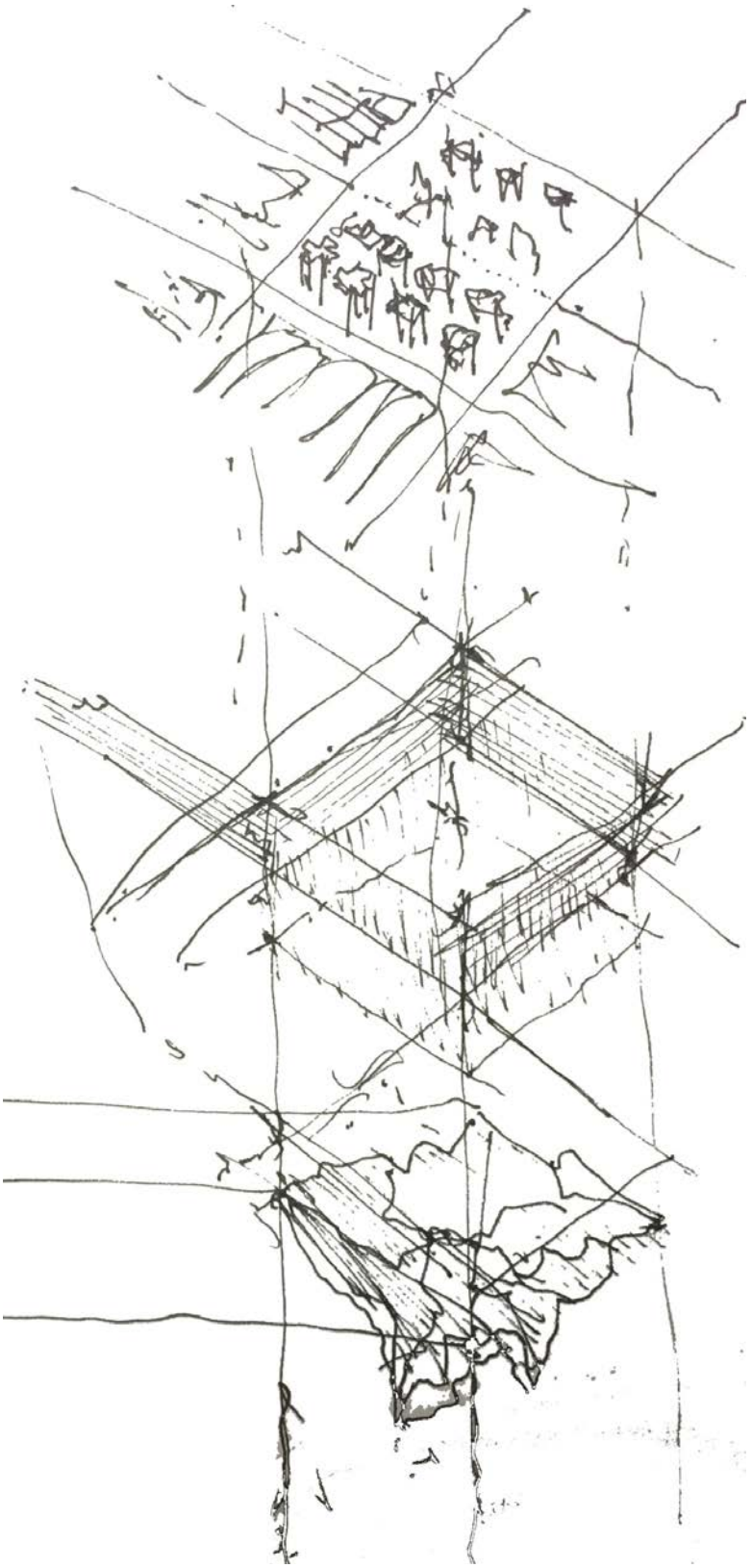

Fig 03 _ Urban Analysis of Housing Block (Author,2017)

Research Methodology

A01 Contextual Research

The process of understanding the context and all of the acting parts in the formation of physical and social atmosphere was conducted through multiple site visits as well meetings with residents of Westbury. This emersion into the 'lived' context was very important in understanding the complex milieu of social conditions as well as issues that are not prevalent from the start.

A02 Qualitative Research

The Qualitative research component is approached through the extensive photographic documentation of the context onsite visits, as well as documentation of verbal interactions on site. this research remains important in that a great deal of Westbury's social parameters extend beyond physical data.

A03 Case Studies

The process of designing the selected housing programme as well as the development of a construction method requires an understanding of what is being constructed in the past and the present, relating to the concept of high density housing. This forms and understanding of how spatial from impacts social processes in similar contexts.

A04 Theoretical | Literature Review

The process of building a theoretical framework for this dissertation will be conducted through the understanding the impact of spatial form on defensibility, community engagement and identity formation.

B01 Mapping

The mapping of Westbury took the form of a physical collection of geographic and census data. this information provided a informative backing, onto which the more qualitative information of social issues and activity could be placed. More unconventional activity could then be understood, such as the presence of Gang Related activity and their allocated territory. This data reinforced the understanding of this complex context, especially in understanding the formation of boundaries that are not physically visible.

B02 Quantitative Research

The main component of the quantitative research, besides the mapping of the context is conducted through the citing of research papers conducted by both Thomas Chapman "Spatial Justice and the Western Areas of Johannesburg" and Niel Klugg "The more things change, the more they stay the same", both of these authors have produced extensive, objective, research papers on this region of Johannesburg, these sources will form the departure point for this dissertation and provide a platform for reference and comparison of the proposed scheme formed in this dissertation.

B03 Evaluative Research

The identification of the need for a construction system proposed within this scheme will require an evaluative process to form an argument for the allocation of resources in the proposed manner. Therefore the development of iteration and the evaluation of materials must be conducted. This will take the form of material and construction method research as well as a broad overview of costing evaluation. This dissertation will consider the frameworks established by the 'Social Housing Regulatory Authority' and use the recommended parameters for comparison.

Limitations | Delimitations

Assumptions

The selected site has been chosen and approved by the required regulatory authorities for the development of a social | low income housing scheme. The existing structures (currently occupied) are structurally sound and capable of renovation.

The selected structures that are to be demolished are done so with approval and willing relocation of current residents into the new development is agreed upon. Although the zoning rules for this area will be followed for the initial phase of development, but further development in the following phases will be met with the required alterations to density and structure height.

Limitations

Due to safety considerations as well as the complex and often sensitive nature of housing in this area, site visits to this area were often done with limited access. Therefore the documentation of existing structures will be collected through cited sources.

Due to University of Pretoria policy, regarding the publication of interviews and verbally recorded information, verbal interaction and interviews cited within this dissertation were conducted by external sources under their publication rules and regulations.

Delimitations

The question of social housing maintains many opinions and regulations that span between 'National Building Regulations', the 'Social Housing Regulatory Authority' (SHRA) as well as various external parties both national and international, for the purposes of this dissertation, the parameters set out by the SHRA as well as the 'National Building Regulations' will be followed in order to produce a new typology of housing.

With regards to the chosen site, the nature of this dissertations research paper will focus on a region of site; due to time constraints the remainder of the site will follow the implied rules and resolution of the proposed model and urban vision.

The nature of housing and family structure presents a large spectrum of social and cultural contingencies, for the purpose of this dissertations argument, the researched and proposed family structures and user profiles will be used as clients within this proposed model.

Project Intentions

To consider and fulfil the '2040 Spatial Development Framework for Johannesburg' by allocating developmental resources in selected critical areas such as Westbury under the framework policies that require development to maintain a certain percentage of development funding into Low income Housing projects.

To provide a new urban vision for the reconnection of Westbury to its surrounding suburbs, as well as providing a more sustainable residential model for the context, through addressing existing spatial legacy and the issues of indefensibility on site, proposing a more secure living environment in Westbury.

This Project will propose architecture that remains ecologically sustainable as well as economically sound, in that it abides to the parameters of the SHRA and the requirements vocalised by the residents of Westbury.

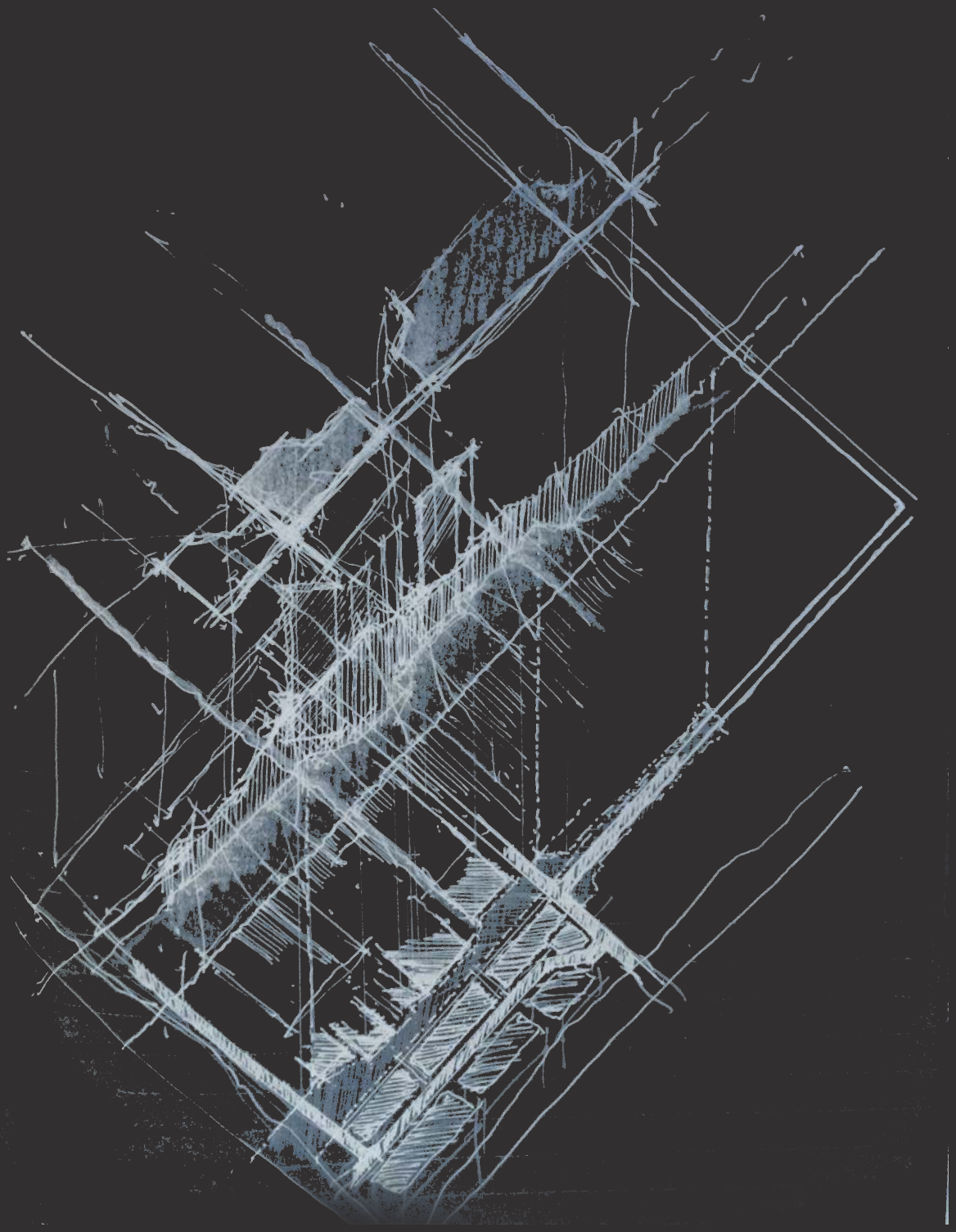

Fig 04 _ Urban Characteristics
Sketch (Author,2017)

Part A

Fig 05 Aerial Image of Johannesburg - Showing Westbury, relative to Johannesburg (Author; edited Google Earth image. 2017)

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04 A00 Westbury Location

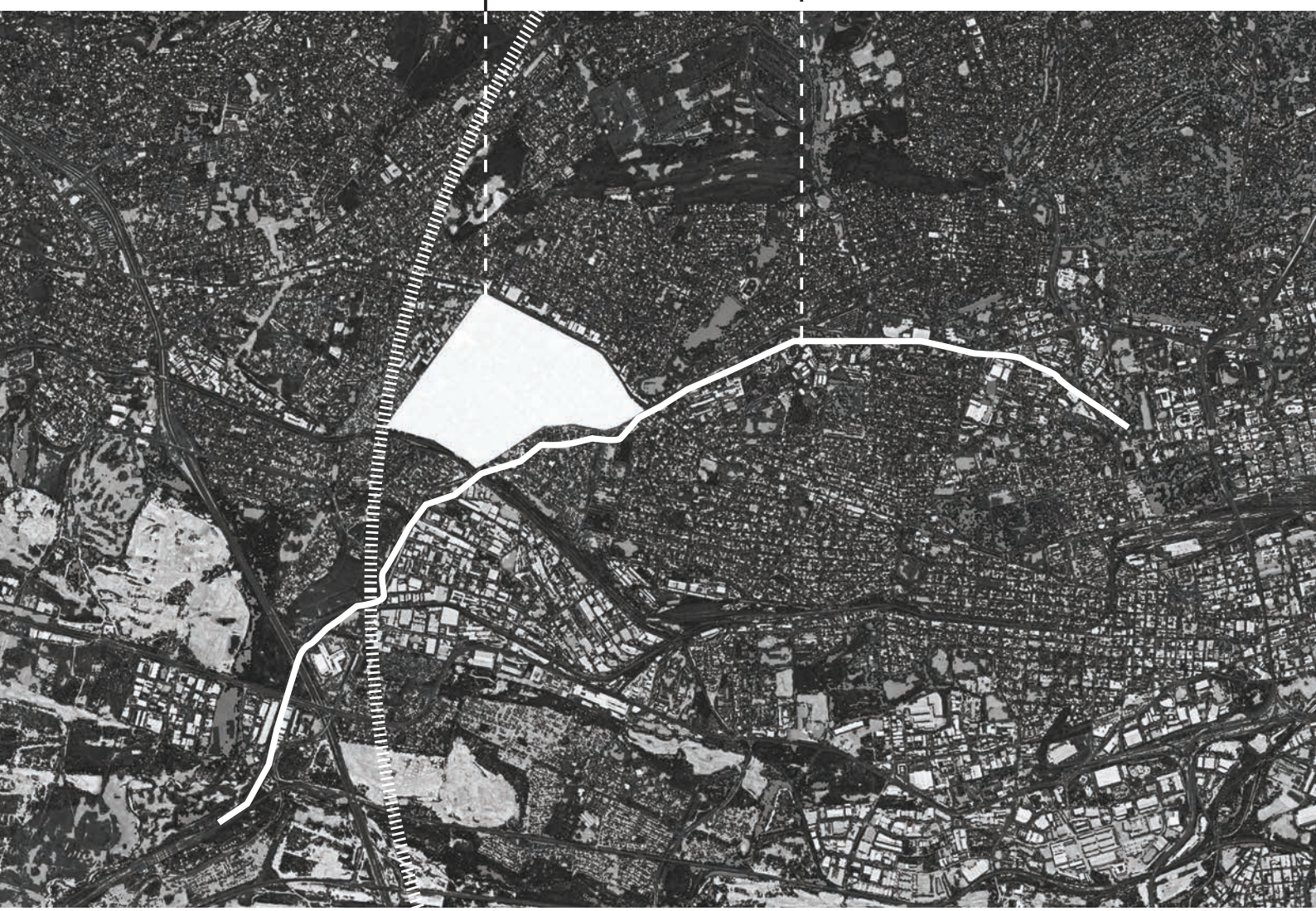


Fig 06 _ Aerial Image 02 of Johannesburg - Showing Westbury, relative to Johannesburg (Author; edited Google Earth image. 2017)

Johannesburg Central

A01 Westbury | Historical Development

The suburb of Westbury was first established in 1918 as the "Western Native Township". This urban context, which was constructed on a former Sewerage Works and dumping site, has undergone multiple radical changes in urban composition throughout its social and spatial history, a continuous shift in configuration informed by social and racial divide (Chapman, Spatial Justice and the Western Areas of, 2015).
The initial development of Westbury started in portion to serve Johannesburg CBD from 1897 (fig 20). The site was selected as portion of the farm Waterval; many of the pre Anglo Boer war farms to the west of Johannesburg were allocated as service sectors and would only later be developed into residential areas as the need for housing increased.

Between 1905 and 1918 Sophiatown and Newclare were established, both formed through similar rectangular grids, running from north to south. (fig 21) At this time the area that forms present day Westbury would remain as Non-Residential service land until 1918.

"After an outbreak of influenza within an inner city African Ghetto, the city council established its first municipal black township on the former municipal sewerage works. " (Chapman, Spatial Justice and the Western Areas of, 2015)

This led to the formation of the Western Native Township (W.N.T) between Sophiatown and Newclare, forming an urban link between the two suburbs and consolidating the area into the 'Western Areas of Johannesburg.It was between 1918 and 1948 where the non-white population of the Western Areas grew rapidly as the proclamation of Johannesburg as a white's only area took effect under the Native Urban Areas Act of 1923. This growth of population was kept in check by the Johannesburg City Council and although Sophiatown and Newclare were relatively free to develop as required, stringent regulations were imposed on the urban formation of the W.N.T; all of the civic and community provisions such as schools, sports

Fig 07 _ Central Westbury Housing Block (Author,2017)

Fig 08 _ Graffiti on Housing Blocks (Author,2017)


Fig 09 _ "Untitled, Between Dogs and Wolves"(Bieber, 2015)

Fig 10 _ “Untitled, Between Dogs and Wolves”(Bieber, 2015)

Fig 11 _ “Untitled, Between Dogs and Wolves”(Bieber, 2015)

facilities a library, and a Hospital were planned and developed by the City Council.

Around 1955 Sophiatown underwent a restructuring as result of the removal of residents to a new township, meadowlands 30 kilometres outside of Johannesburg. The reconstruction of Sophiatown led to the creation of a very dense industrial strip on the southern edge of the Suburb. (fig 22) There was also a drive in urban design paradigm post World War 2 to reconstruct the typology of housing in Sophiatown, which reconfigured its connection with surrounding suburbs as well as stand layout.

The combined effect of the impenetrable industrial strip and reconfigured connection meant that Westbury would be cut off from natural urban connections.

In 1985 Johannesburg City Council announced a new development framework for W.N.T into the new township of Westbury. This framework led to the complete restructuring of housing and stand typology, removing backyards and filling in undefined space with disjointed 3-4 storey walk-ups (fig 12). A new organic road structure was imposed to economise on infrastructure expenditure and to consolidate and define pedestrian and vehicular space.(fig 14)
The plan layout of Westbury has essentially remained the same since 1985 and reflects the impact of undefined and untested urban renewal attempts. (fig 23)

Westbury's current composition remains as a palimpsest of these historical layers, a spatial legacy characterised through; ill-defined buffer zones isolating Westbury from its surroundings, unregulated encroachment of urban space by its users and visually inaccessible and indefensible space providing safe haven for anti- social activity.

Fig 12 _ Housing Unit in Central Block (Author, 2017)

Fig 13 _ "Untitled, Between Dogs and Wolves"(Bieber, 201

Fig 14 _ Edge Conditions of Housing Block (Author, 2017)

15)

Fig 15 _ Graffiti on Housing Blocks (Author,2017)

A02 Westbury | Contemporary Development

Due to the recent completion of the "Corridors of Freedom" project within the area, as well as focused municipal engagement within Westbury, the context exhibits a developmental potential. Westbury's location in regard to the city, connectivity to arterial routes, (fig 24) unique and diverse zoning potential (fig 27) as well as focused governmental infrastructure investment, indicates that this area should be flourishing in terms of socio-economic stability and urban growth. However, the context remains as seemingly stagnant society, unemployed, uninspired and neglected.

"Despite a series of strategic spatial plans having been formulated over the past eight years in and around the study area, these have mostly focused on physical interventions and have been more vision-oriented. Due to their lack of implementation mechanisms, only minor aspects of the plans have been implemented and they have not realised any discernible socio-economic improvements" (Klug, 2017, p. 41)

Having witnessed multiple urban design frameworks within its contemporary development, yet still maintaining a critical state of mismanagement and a still degrading urban condition, how will Westbury maintain a dialogue with urban development as the growing socio-economic potential for the area increases? What role will Westbury's society play in the success or failure of development?

In order to support a framework for urban, infrastructural and architectural development, the social condition of Westbury's residents must be understood, in order to present a model for regeneration that will facilitate a social progression, allowing future development to be received and comprehensively appropriated into the social and urban fabric of the context.

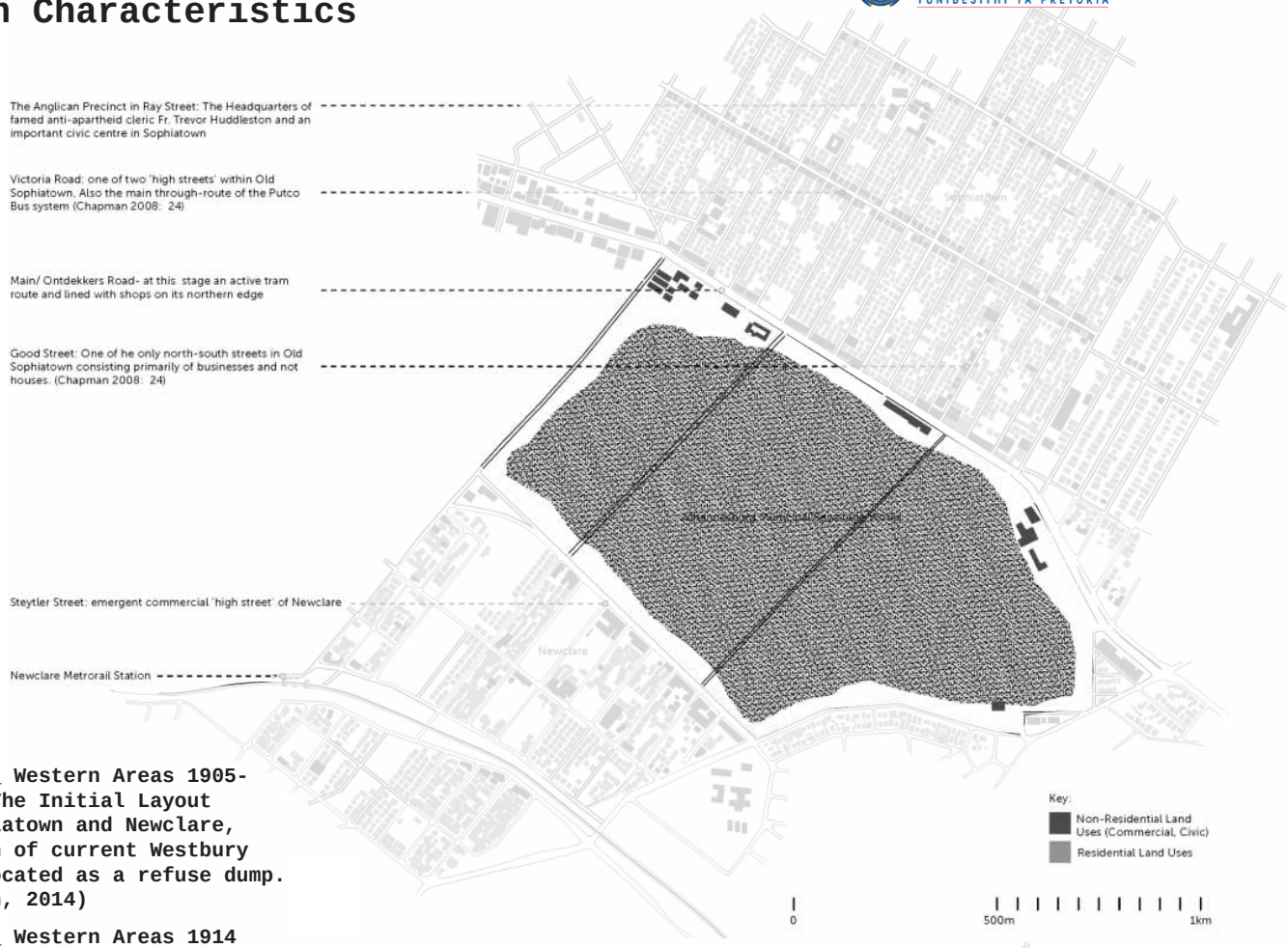
Fig 16 _ User Appropriation (Brecher, 2017)

Fig 17 _ Visual and Pedestrian Access of Central Residential Block (Brecher, 2017)

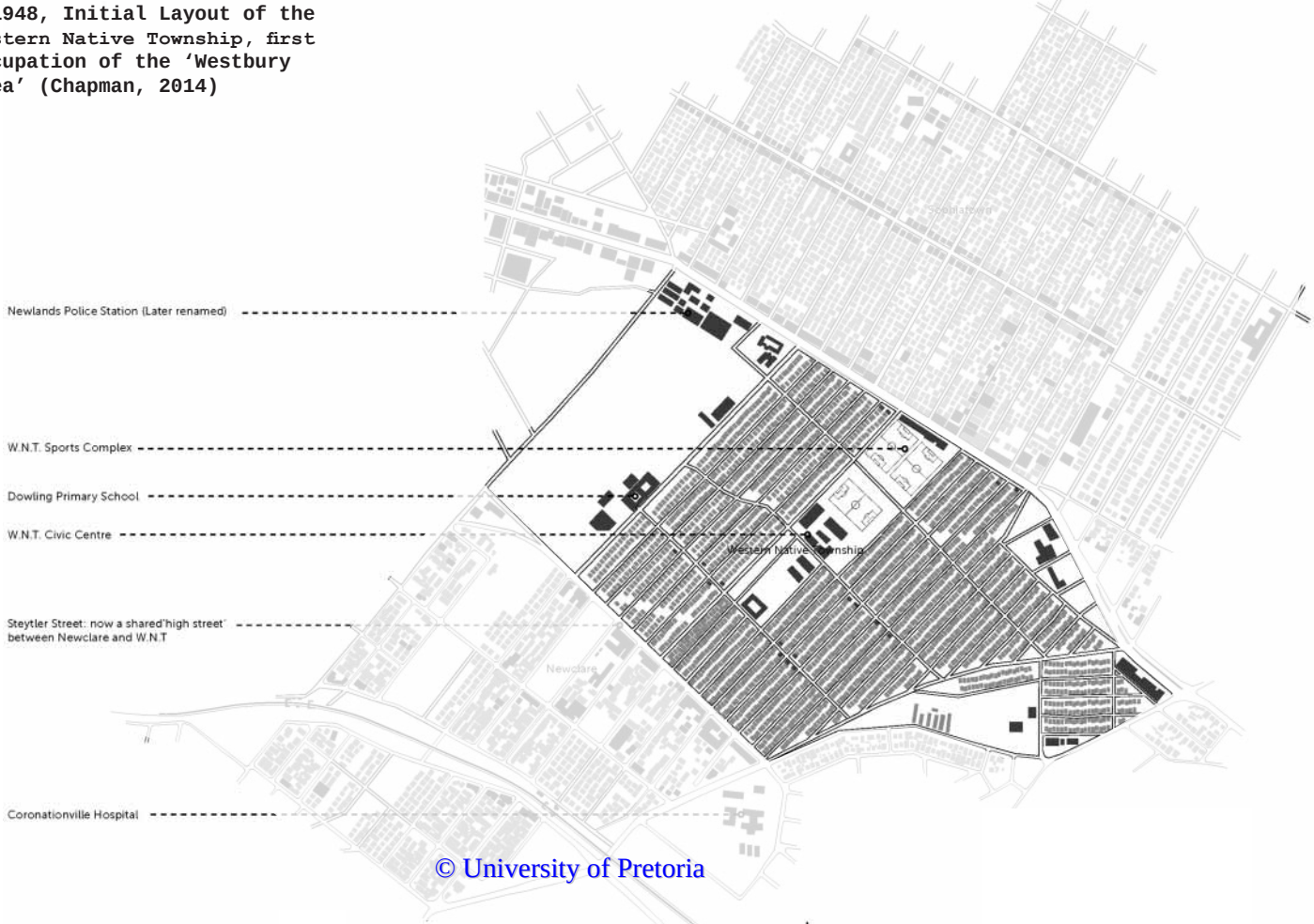
Fig 18 _ Play Facilities (Brecher, 2017)

Fig 19 _ Circulation of Exisiting Units (Brecher, 2017)

Urban Characteristics

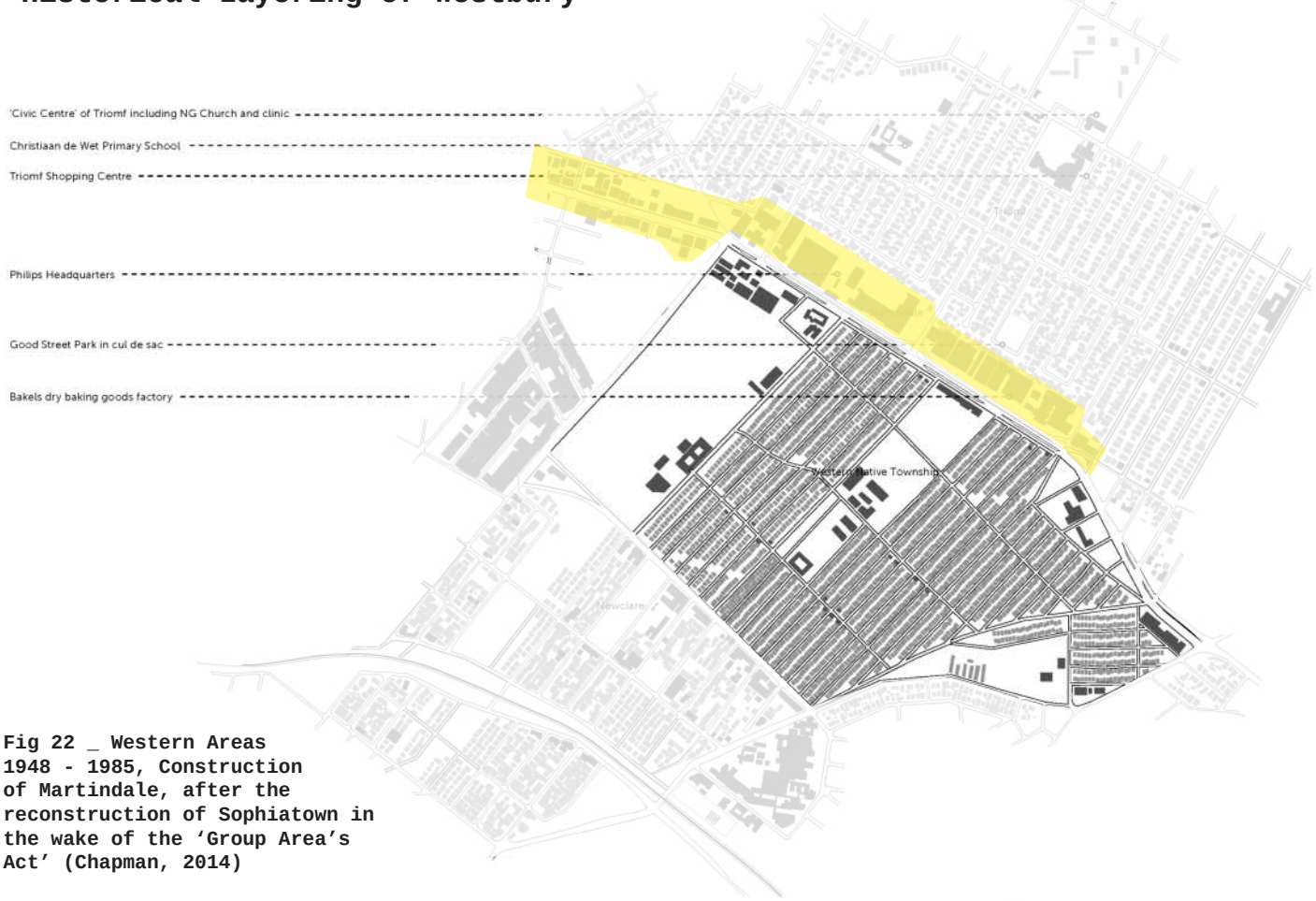


01 **Fig 20 _ Western Areas 1905-1918 – The Initial Layout of Sophiatown and Newclare, Location of current Westbury was allocated as a refuse dump. (Chapman, 2014)**

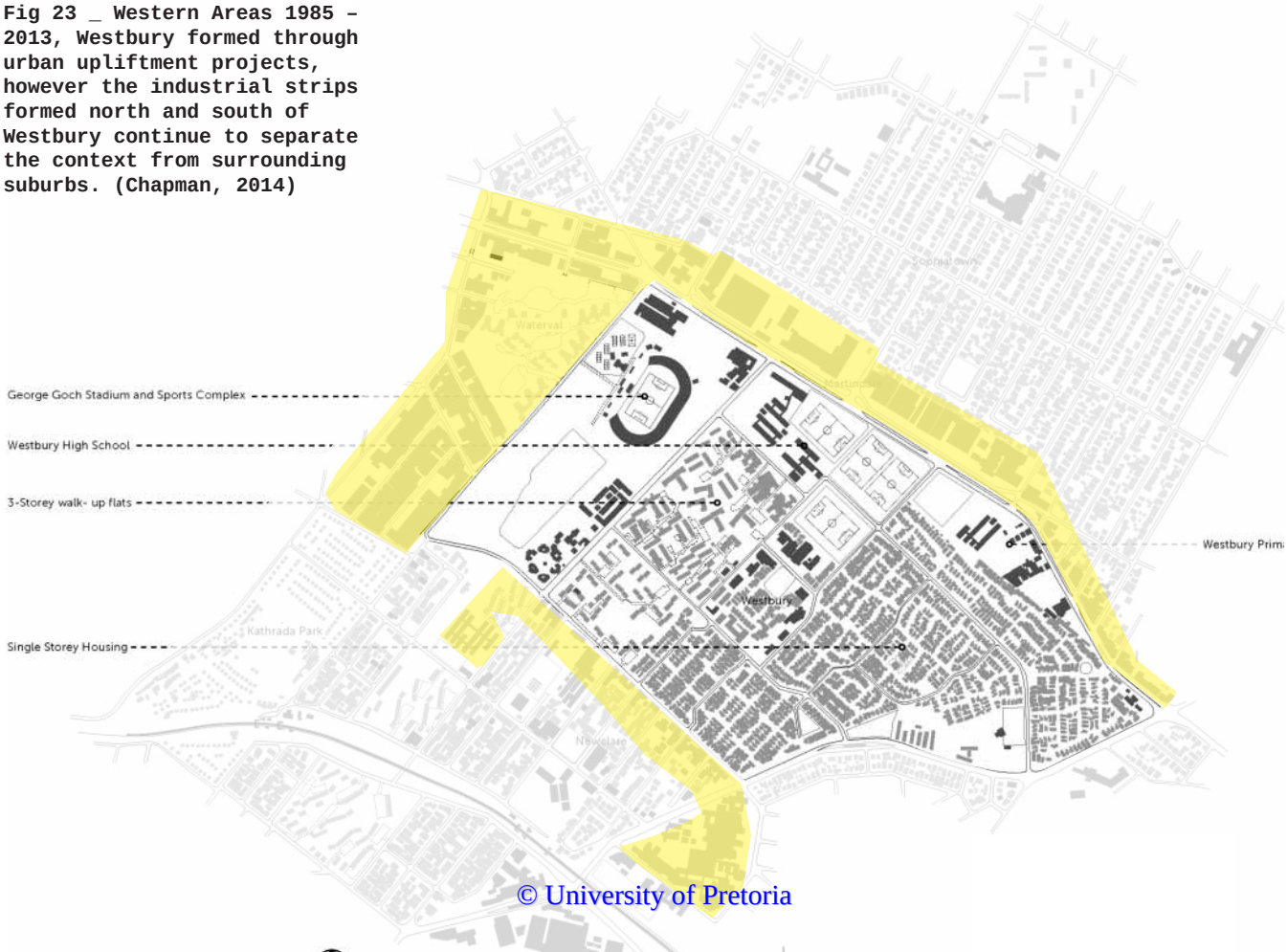


02 **Fig 21 _ Western Areas 1914 – 1948, Initial Layout of the Western Native Township, first occupation of the 'Westbury Area' (Chapman, 2014)**

Historical Layering of Westbury



03 **Fig 22 _ Western Areas 1948 - 1985, Construction of Martindale, after the reconstruction of Sophiatown in the wake of the 'Group Area's Act' (Chapman, 2014)**



04 **Fig 23 _ Western Areas 1985 – 2013, Westbury formed through urban upliftment projects, however the industrial strips formed north and south of Westbury continue to separate the context from surrounding suburbs. (Chapman, 2014)**

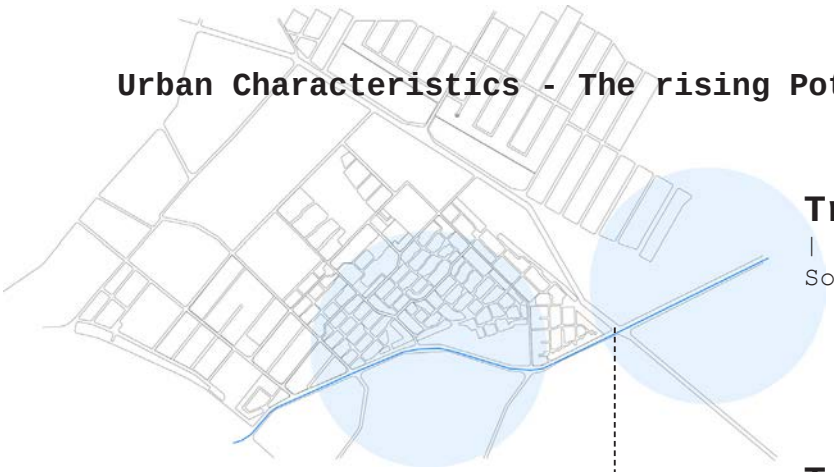


Fig 24 _ Map of Transport Nodes (Author, 2017)

Transport

| RBT Development on the Southern Edge of Westbury

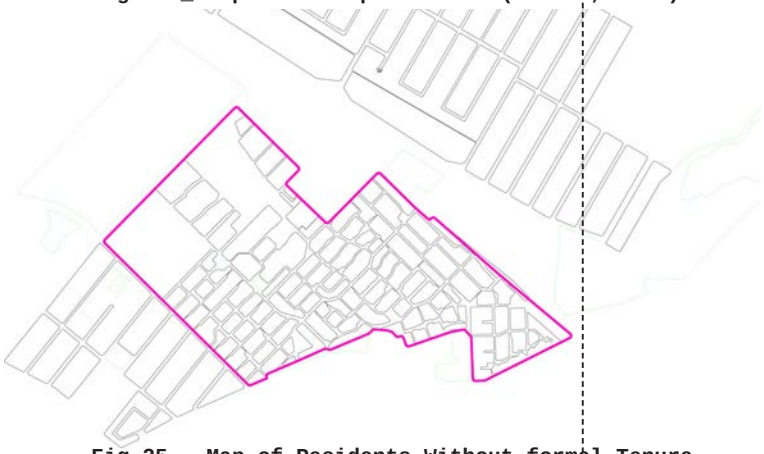


Fig 25 _ Map of Residents Without formal Tenure (Author, 2017)

Tenure

| Much of Central Westbury is Council owned land however, residents claim that their forced occupation of Westbury , through the Homelands Act of 1985 (Apartheid Regime), has left them with no other options. They have since claimed ownership of their homes and are in the process of applying for title deeds from council to formalise their ownership.|

The mapped region in (Fig_25) indicates residents who do not pay for their occupation, most of which also do not pay for services such as electricity and water. |

Fig 26 _ Map of Arterial Routes External to Westbury (Author, 2017)

Arterial Routes

| Westbury is rooted inside of two main roads running North and South, between soweto and northern Johannesburg, East and West through Ontdekkers road, one of the busiest commercial roads in Johannesbug. |

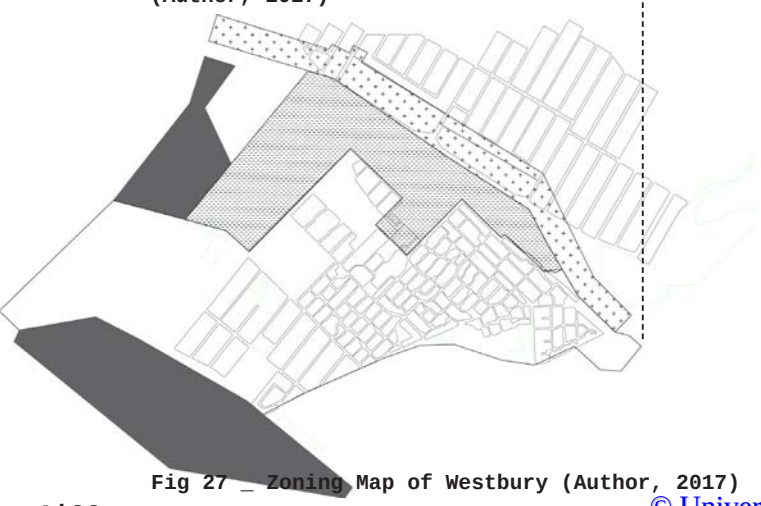


Fig 27 _ Zoning Map of Westbury (Author, 2017)

Zoning

| Westbury, unlike many of the suburban area around it, is nested within a very diverse programme and zoning layout. The Northern Boundary is entrenched in Westdene's strong commercial environment (linked to the strong commercial Ontdekkers Road Corridor) Between the Northern Boundary and the central residential area lies a buffer zone of joint communal property, thisspace is use as sports facilities although remains as an undefined boundary between the Sophiatown and Westbury. The Western and South Western Boundaries are zoned as Industrial. |

Sophiatown [1.1] and **Montclare [1.2]** These areas form the boundaries of my study area and are **delimited** to "Johannesburg Context"

North Westbury Buffer Zone [2] This Region disconnects Westbury from commericial and social activity on both the Northern and Western boundaries. The effects of this boundary forms a large compenet in my architectural reaction.

Core residential Island [3] This region will remain as the focusarea of this study

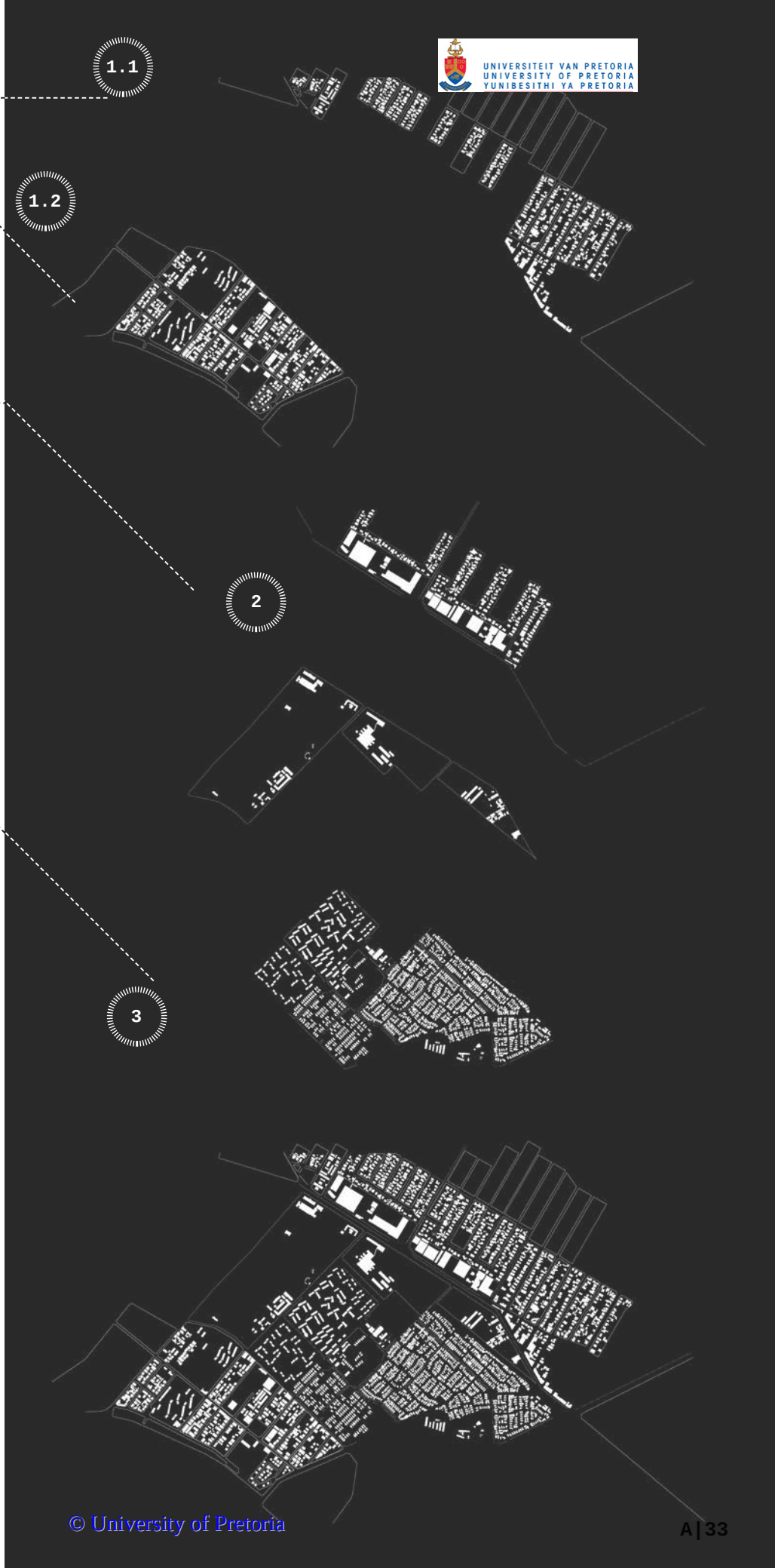


Fig 28 _ Westbury, Urban Explanation Diagram (Author, 2017)

Fig 30 _ Central Housing Block, 'In-between Spaces' (Brecher, 2017)

Fig 31 _ Refuse Dumping within the Housing Block (Author, 2017)

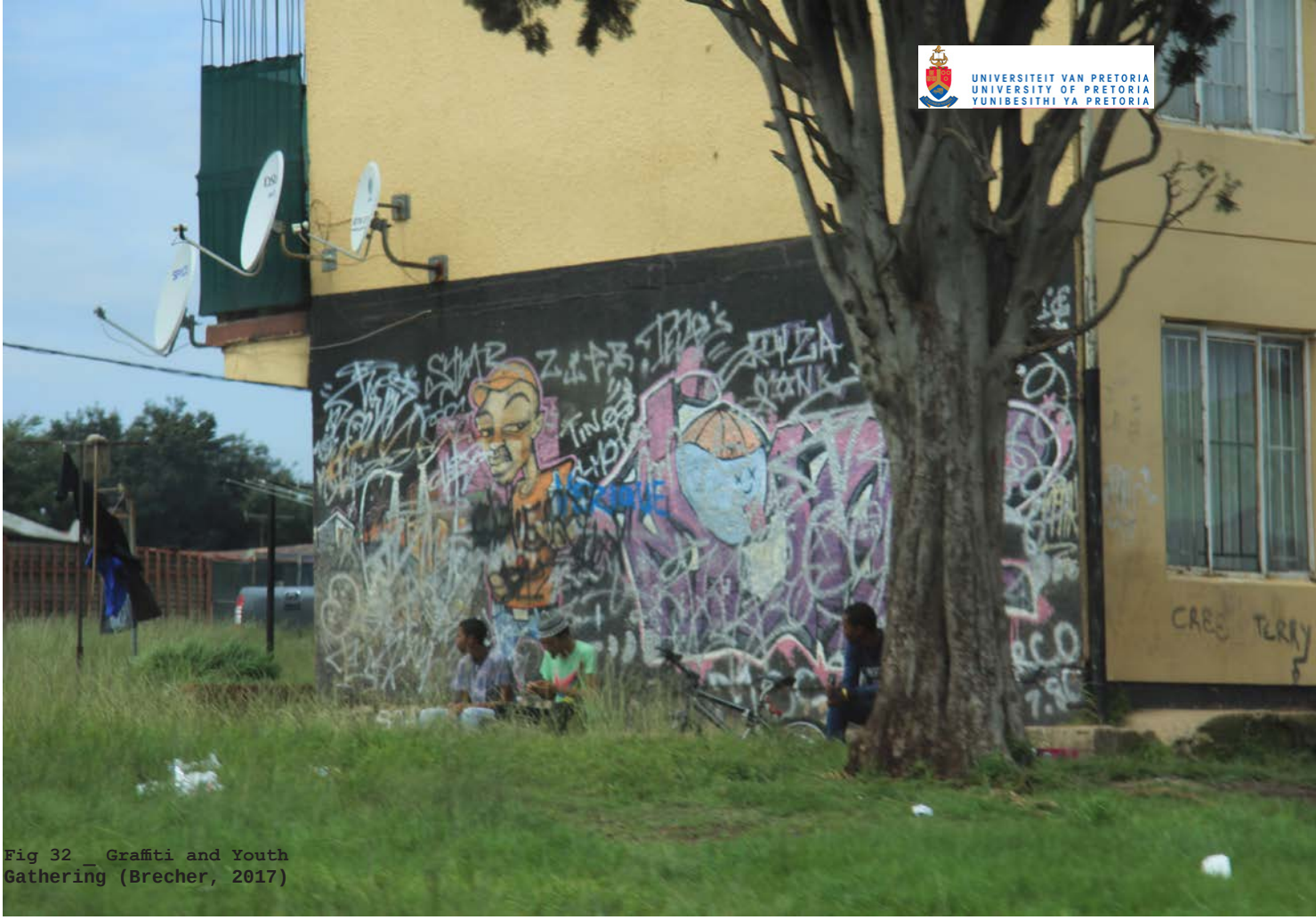


Fig 32 _ Graffiti and Youth Gathering (Brecher, 2017)

Fig 33 _ Desolate and Run down ‘Park space’ (Brecher, 2017)

A03 The Model | Architectural Context

The formation of urban and architectural space within Westbury remains a process in constant flux. The entire context has been reconstructed and appropriated 3 times to cater for political and social shifts (Chapman, 2015, p. 78). At this point, Westbury remains in a state of physical stagnation. Small acupunctural interventions such as the Westbury Clinic or RBT (rapid bus transit) Bridge by 'Local Studio' (fig 52) are found as common place within the context; however the acceptance and use of these interventions differs widely. As discussed in "social context" below, the recent developments within Westbury have not addressed the urban issues which in turn reflect in the social sphere. The Corridors of Freedom 'COF' project in its intentions aims to deal with a great number of urban and social issues, but its implementation has simply changed the surface of Westbury rather than influence its condition (fig 33). "apart from the use of the public furniture and parks, the community are not seeing how they can benefit from the COF initiative" (Klug, 2017, p. 48). The COF transport facilities still remains unaffordable for use by the residents of Westbury.

Typology & Residence

The history of Westbury's urban development has led to a culture of encroachment and appropriation. The spatial legacy of apartheid planning, meaning stasis, has led residents to fill in gaps, inform some sense of identity and in most cases increase security against activity on the street (fig 39). The initial housing models built in and around 1985 (fig 37) are constructed in a typical apartheid planning manner, whereby the structure of the home informed a level of stasis within a context. This is prevalent in the structure, orientation on site and plan configuration (Louw, 2012). Therefore the appropriation that does occur, is either large scale home reconstruction, which due to its cost is rare, or the external encroachment onto public space, fences, entrance point and wall are constructed to claim and then defend space.

There is very little definition of threshold, public and private space within the layout of the above units. Pathways are created as vernacular movement routes by the residents, however the badly defined street scape (fig 42) and private threshold has led to the layering of burglar bars and security measures, which in turn cut off the built fabric; as well as healthy visual access, from the street.

Definition of Space

Westbury Maintains multiple typological conditions as a result of its historical developement. As shown in (fig 35- 37) there are major areas of undefined and unprogramme areas disperesed within the context. This lack of definition is one of the leading issues attributed the the lack of defensibility in the area.

What remains as a concern is the prevalence of undefined area within multiple typological conditions.

The 'dense' housing block (fig 36) maintains the most indefensible regions external to their circualtion. These areas are not maintained frequently, and due to the layout of the block (fig 30) housing as well as restriction on road access, the central areas of these block become very dangerous and allow for anti social activity to manifest easily and frequently.

What also occurs frequently, to to the lack of service delivery and access, is the allocation of these spaces as refuse dumps as shown in (fig 31). This continues to build a perception of undefined space.

Fig 34

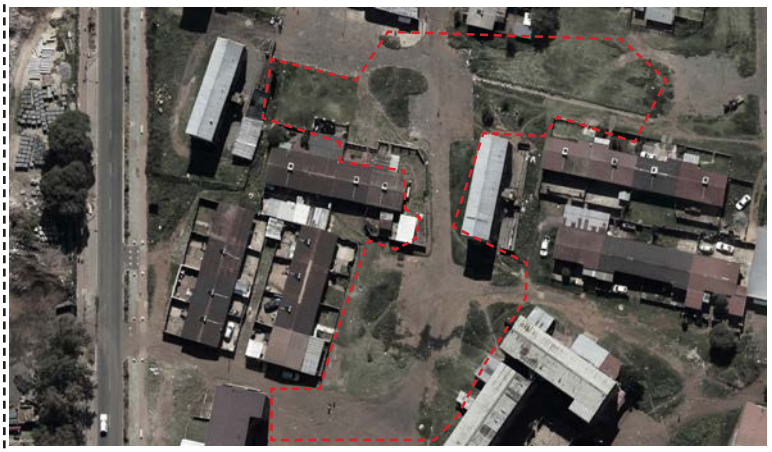


Fig 35

Fig 36

Fig 37

Fig 34 _ Interface between Residential and Commercial Spaces (Author; edited Google Earth image. 2017)
Fig 35 _ 'High Density', Dispersed Residential (Author; edited Google Earth image. 2017)
Fig 36 _ Transition between 'High density' blocks (Author; edited Google Earth image. 2017)
Fig 37 _ Low Density, fine grain urban Condition of the predominant residential typology (Author; edited Google Earth image. 2017)

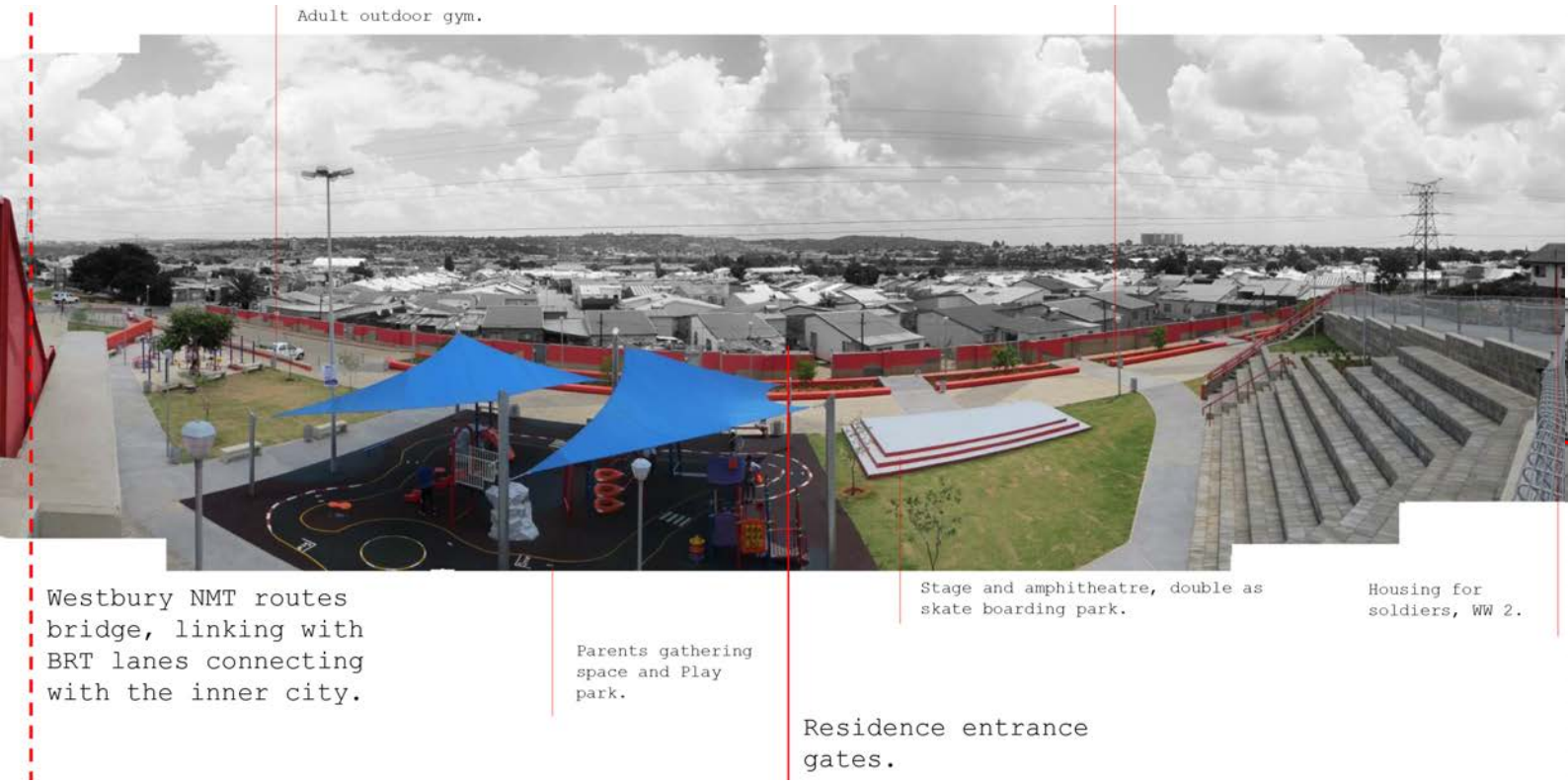


Fig 38 _ Diagram showing recently completed public facilities in Westbury (Author, 2017)

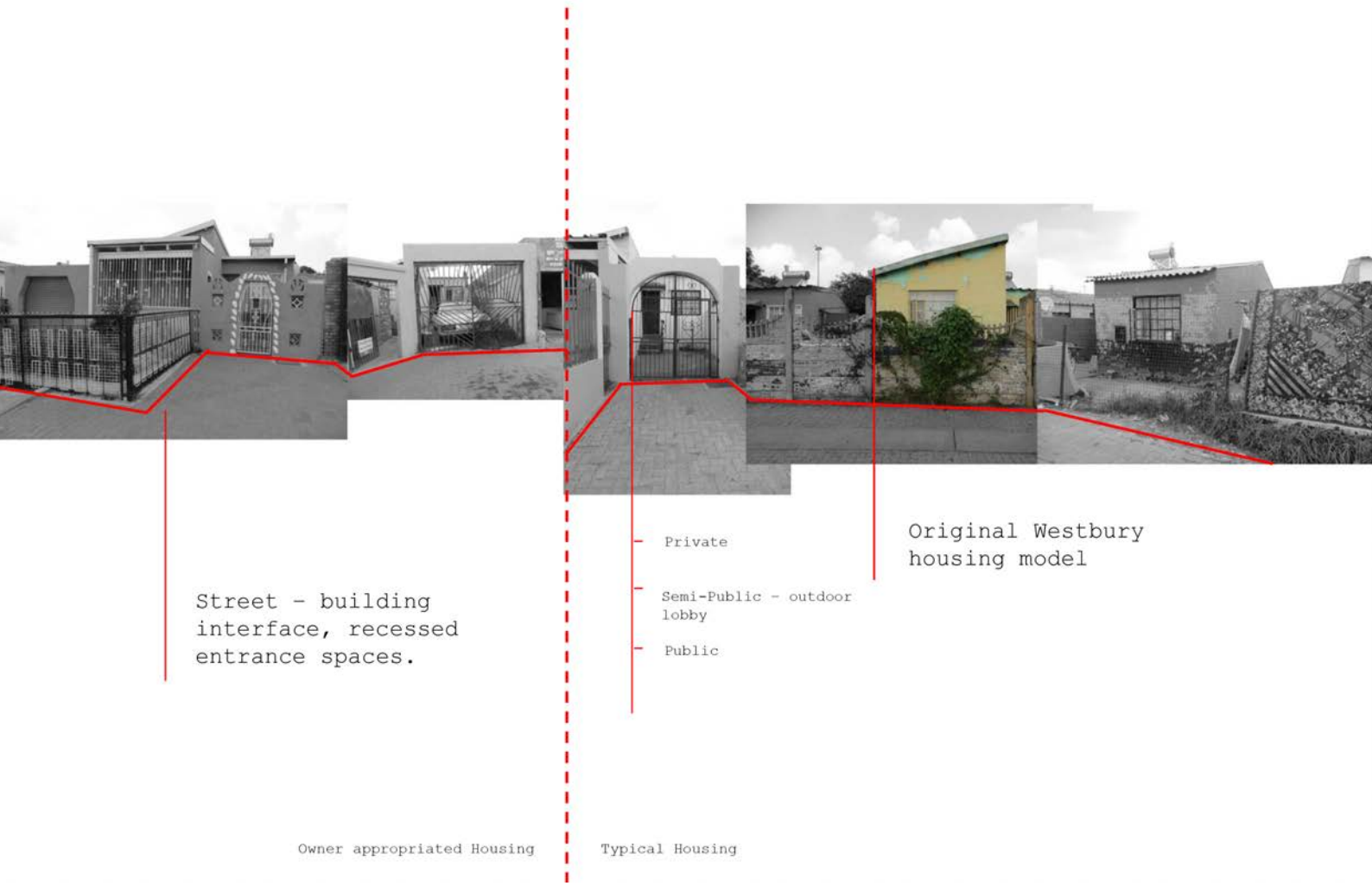


Fig 39 _ Diagram showing the typology of low density resiential unit access and frontage (Author, 2017)

Fig 40 _ Diagram showing the Component breakdown of the commercial High Street running through Westbury (Author, 2017)

Fig 41 _ Diagram showing Visual and Pedestrian access issue upon the entrance of the high density housing blocks (Author, 2017)

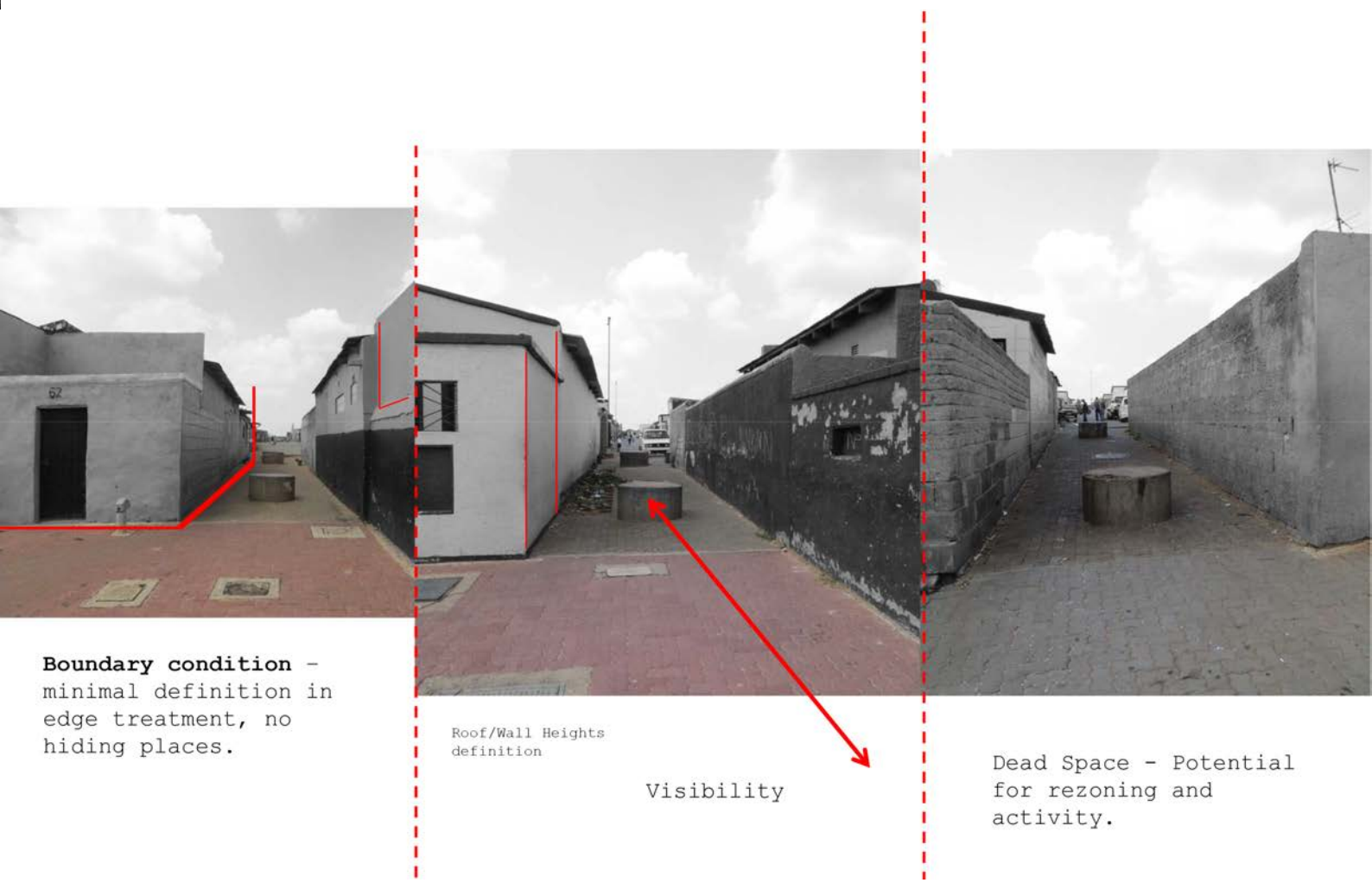


Fig 42_ Diagram showing Visual and Pedestrian access issue upon the entrance of the low density housing blocks (Author, 2017)

A04 Social Context | The Lived

The state of unemployment in Westbury as well as a general low income for those who are employed leads to harsh living conditions and the poor state of unit maintenance and densification or alteration reflects this situation. A common living typology occurs in the form of Extended families occupying single households as the economic pressure of home ownership limits the low income residents to branch out of Westbury. It is often particularly clear during periods of financial uncertainty as described in an Urban Report on Westbury by Niel Klug from the University of Witwatersrand.

"One respondent, in relating her personal circumstances and history, described how she and her husband were forced to return to her parents in Westbury due to a decline in their financial circumstances in 2014 (interview with NGO B, 1 August 2016)" (Klug, 2017, p. 30).

Much of Westbury's living condition is also determined by its almost constant battle with crime. This aspect has remained a part of Westbury's narrative since the early 1930's. Over the last few year the steady increase of crime attributed to drug abuse and gang related violence, has led the community to a breaking point, where protest and civil unrest, aimed at the local municipality, has made vocal the communities dissatisfaction with the violence that has plagued the growth of Westbury into a stable residential area (Klug, 2017, p. 33).

This constant influx of crime levels is attributed to the ability for the area to maintain such activity; once criminal activity is hindered it is not long before new criminal activity can take foothold. The multiple ill-defined create pockets of visually in defensible spaces as well as preventing any policing. It becomes an issue of urban layout and defensibility of space. The community is constantly at risk due to their inability to safely traverse the urban context. The issue extends into contemporary t projects, whereby urban upgrading of public infrastructure only provides more focused point of criminal activity and further hindering the ability for the police to effectively function.

"Another aspect the SAPS Colonel covered was that of designing for safety. The layout and design of the area and buildings allows criminals to evade people without being detected, or to see the police before they even leave the police station. According to her the upgrades done to roads as part of the 'Corridors of Freedom' project have posed challenges to police officers as some parts restrict the rapid crossing of the road by police vehicles" (interview with SAPS Officer, 7 September 2016) (Klug, 2017, p. 35).

Westbury has always managed to maintain a strong community presence and even though the difficult living conditions impact the progression of the residents, they still manage to remain highly resilient through volunteer work and the establishment of non-profit organisations aimed toward the betterment of their suburb. It remains a context where the residents are well connected with one another and participate in taking care of one another with what little resources are made available to them. This formation of community organisations may be due to a lack of faith in local municipal action, as many of the NGO's bypass municipal resources within the area.

"One business feeds over 70 children daily from their own resources, as part of their contribution to the community" (interview with Local Business" A, 17 August 2016), " while another respondent undertakes a significant amount of voluntary drug counselling work in the area" (Interview with NGO B, 1 August 2016) (Klug, 2017).

Many of the existing organisations within Westbury originated within the local church community, which maintains a strong presence in Westbury's community.

The development of Housing in Westbury will have to take account of the psychological state of living in Westbury as well as negotiate its form and its function within a changing context.

Fig 43 _ Playground as Part of the recent infrastructural upgrade to Westbury, by Local Studio Architects (Brecher, 2017)

Fig 45 _ Housing Units (Author, 2017)

Fig 46 _ Housing Units (Author, 2017)

Fig 44 _ Residents (Brecher, 2017)

Fig 47 _ Housing Units (Brecher, 2017)

Fig 48 _ Housing Units (Brecher, 2017)

Fig 49 _ Internal Block Visual Access (Author, 2017)

Fig 50 _ Block Edge Conditions (Author, 2017)

Fig 51 _ VPUU Project Public Area (Cameron, 2016)

Fig 52 _ Local Studio Bridge over Empire –Perth Corridor (Brecher, 2017)

A05 Social and Urban Regeneration

A development scheme, named, Violence protection through urban upgrade (VPUU) (fig) completed in 2012 in the Western Cape has seen the regeneration of a struggling context through urban upgrade focused on certain characteristics that tend to limit the social development of a region.

It combines three perspectives on violence prevention:

"1- Situational crime prevention focuses on the restructuring of the urban environment according to urban planning and design principles to form safe and integrated human settlements with accessibility to basic amenities such as water, electricity and social services

2- Social crime prevention facilitates social and cultural transformation, community cohesion, community participation and ownership and civic engagement, as well as victim support and other violence prevention activities that focus on youth and children

3- Institutional crime prevention centres on the 'whole-of government' approach to integrated planning and the implementation of violence prevention at all levels of government, with the required support of civil society working in this sector (GFMECD 2010)."

The process of identifying key areas within the urban context and allocating specific infrastructural interventions has led to a holistic project that manifest itself in multiple areas of social regeneration. upon recent evaluation of the project, there has been healthy growth in the prevalent social issues of the area, namely.

1- Youth Development;
2- Safety and Security;
3- Economic and Human Development;
4- Alcohol and other Drug Use; and
5- Infrastructure. Indicators within domains are currently being developed by cognate experts.

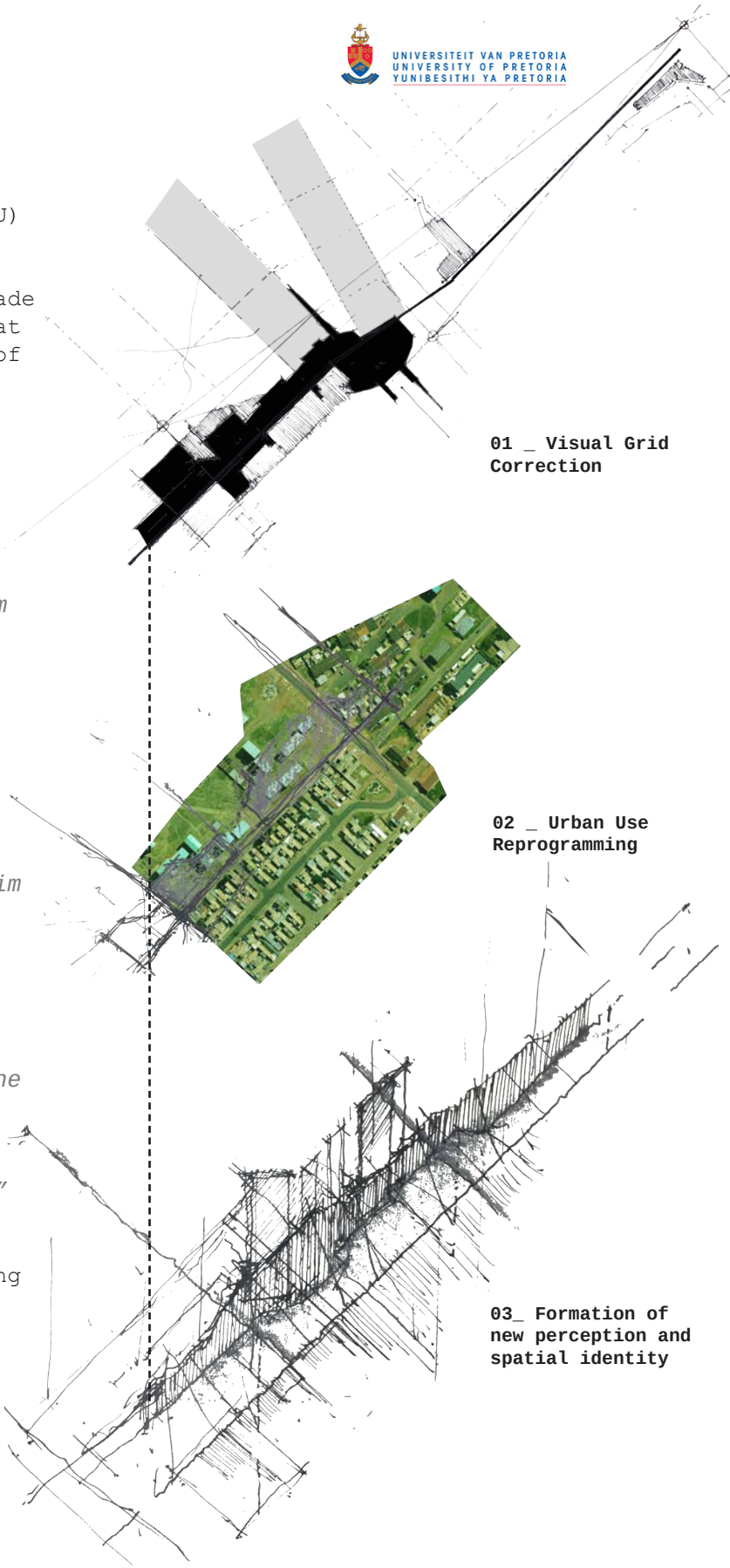


Fig 53 _ Urban Correction Concept Sketch (Author, 2017)

This project brings light to the importance of understanding the functioning of these critical contexts, as well as indicating that it is required to develop the urban sphere as well as placing physical structures.
Vision for Development in Westbury

A Vision for Developement in Westbury

The development of an Urban Link, composed predominantly of infrastructural development, housing multiple programs which mediates and defines use and interaction within Westbury, this will be followed by the development of a High Density residential model, which will act as a catalytic anchor, aiding in the reception of the larger scale infrastructural and programmatic development.

An urban Link and architectural anchor, to create a platform for the facilitation of future development.

In doing so, this intervention aims to investigate the processes of reconstructing; social identity, spatial readability and landmark through a platform of functional architecture. The process of defining space and informing threshold will aid in the rehabilitatic of a shattered urban fabric, indefensible and anti-social space.

The urban approach is positioned withir the paradigms of development practice with a focus on spatial characteristic and Identity (fig 53). The intention is to place development between the layers of existing urban form and socia activity; requiring a focus on both urban restructuring and architectural programming. Important themes influencir this direction are; firstly the spatial characteristic and learning from the exiting typology and appropriation through encroachment by understanding the interstitial spaces. Secondly, by investigating the positive-social and anti-social behaviour occurring in Westbury, and finally by understanding how the structuring of community activity will help to shape and define architectural space.

This approach considers a play between development, architecture and urban landscape, a constantly shifting process of influences and iteration, leading to a framework that will facilitate opportunities for development.

The urban approach to this development is influenced by a project proposed by Jo Noero Architects in 2006. The intention is an appropriation of an abandoned cement factory site in Philippi, Cape Town. The project aims to be a suggestion for upgrading the low income housing settlement in in that area through the use of productive landscapes, which will provide the opportunity for the settlement to become self-sufficient within a developing economy. Furthermore the project aims to insert sustainable energy systems to identify the limits of scope for such technology specific to low income housing development.

"The notion of a sustainable neighbourhood is also bound up with ideas of housing, production, consumption and exchange occurring within the same if not complementary sets of spaces. Exchange in this context occurs primarily through the idea of a productive landscape" (Noero, 2006).

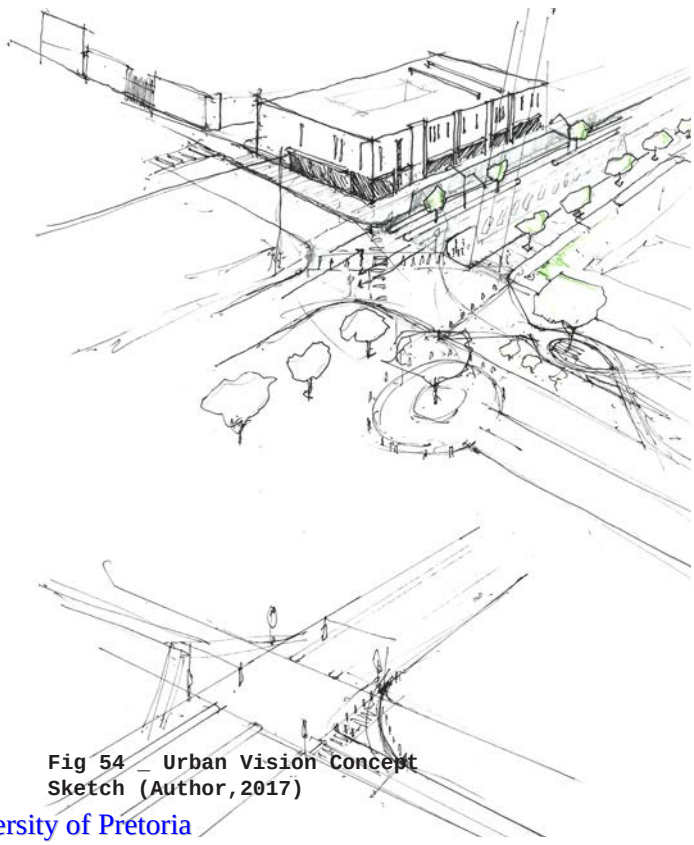


Fig 54 _ Urban Vision Concept Sketch (Author,2017)

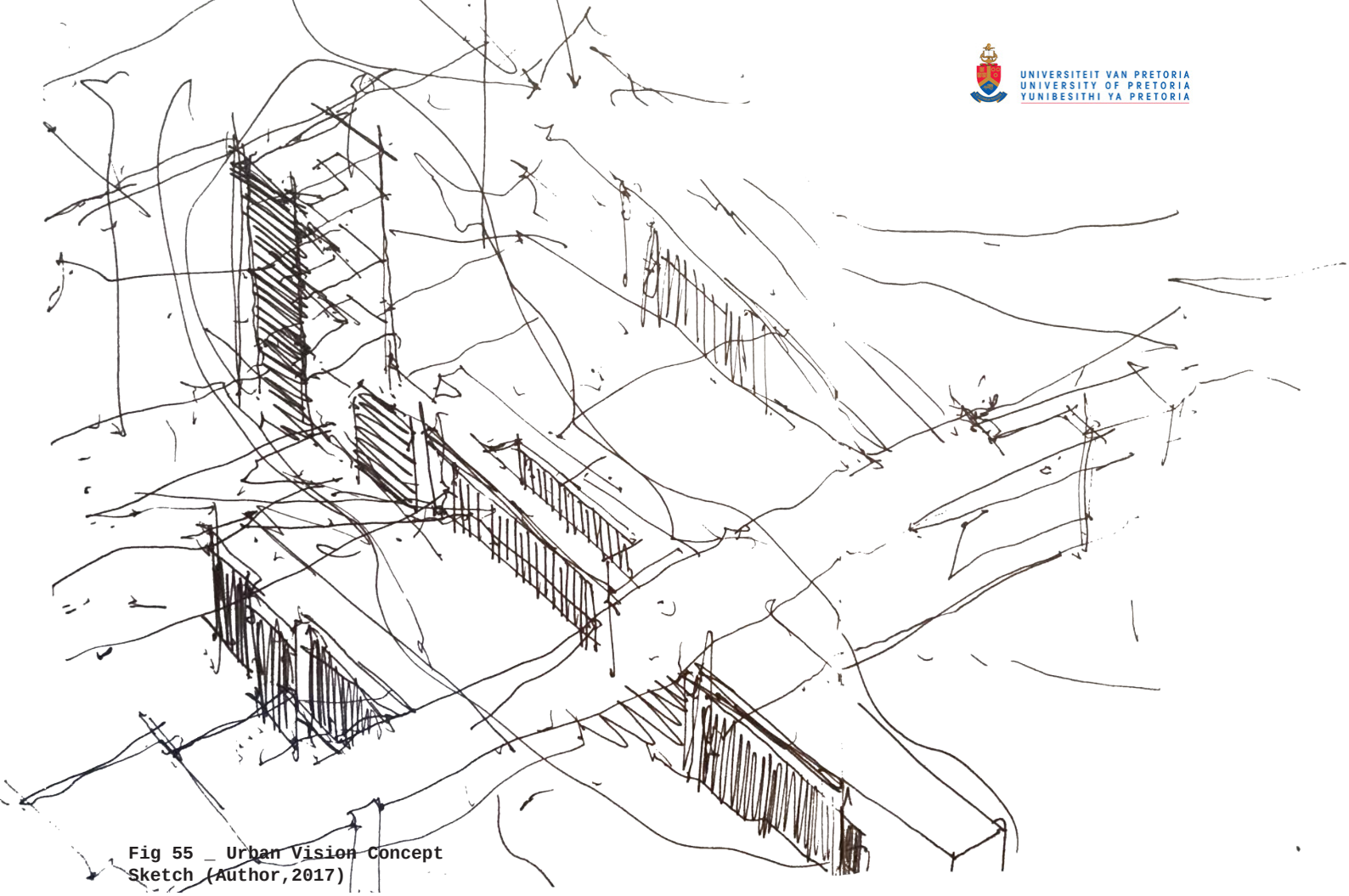


Fig 55 _ Urban Vision Concept Sketch (Author,2017)

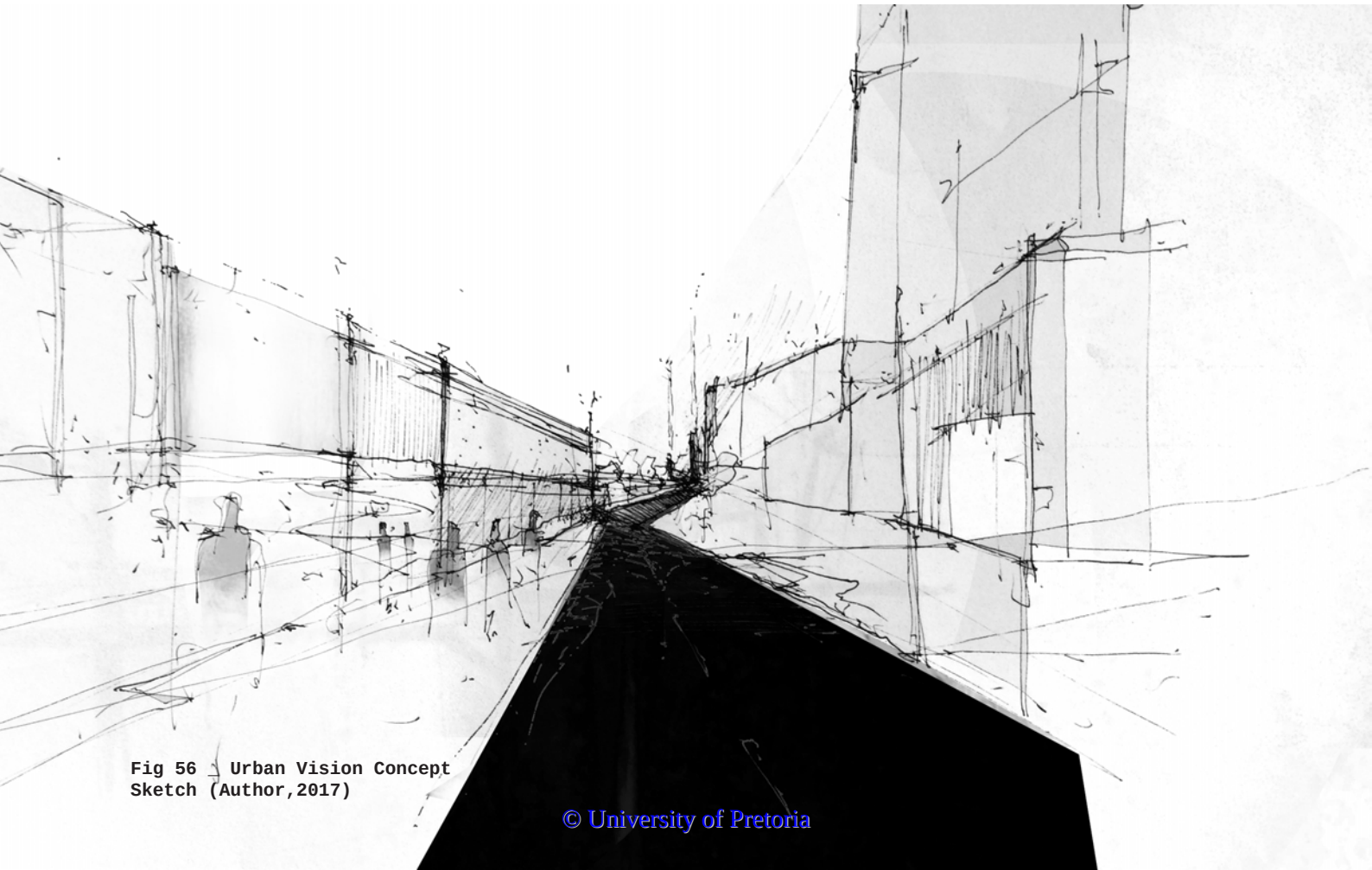


Fig 56 _ Urban Vision Concept Sketch (Author,2017)

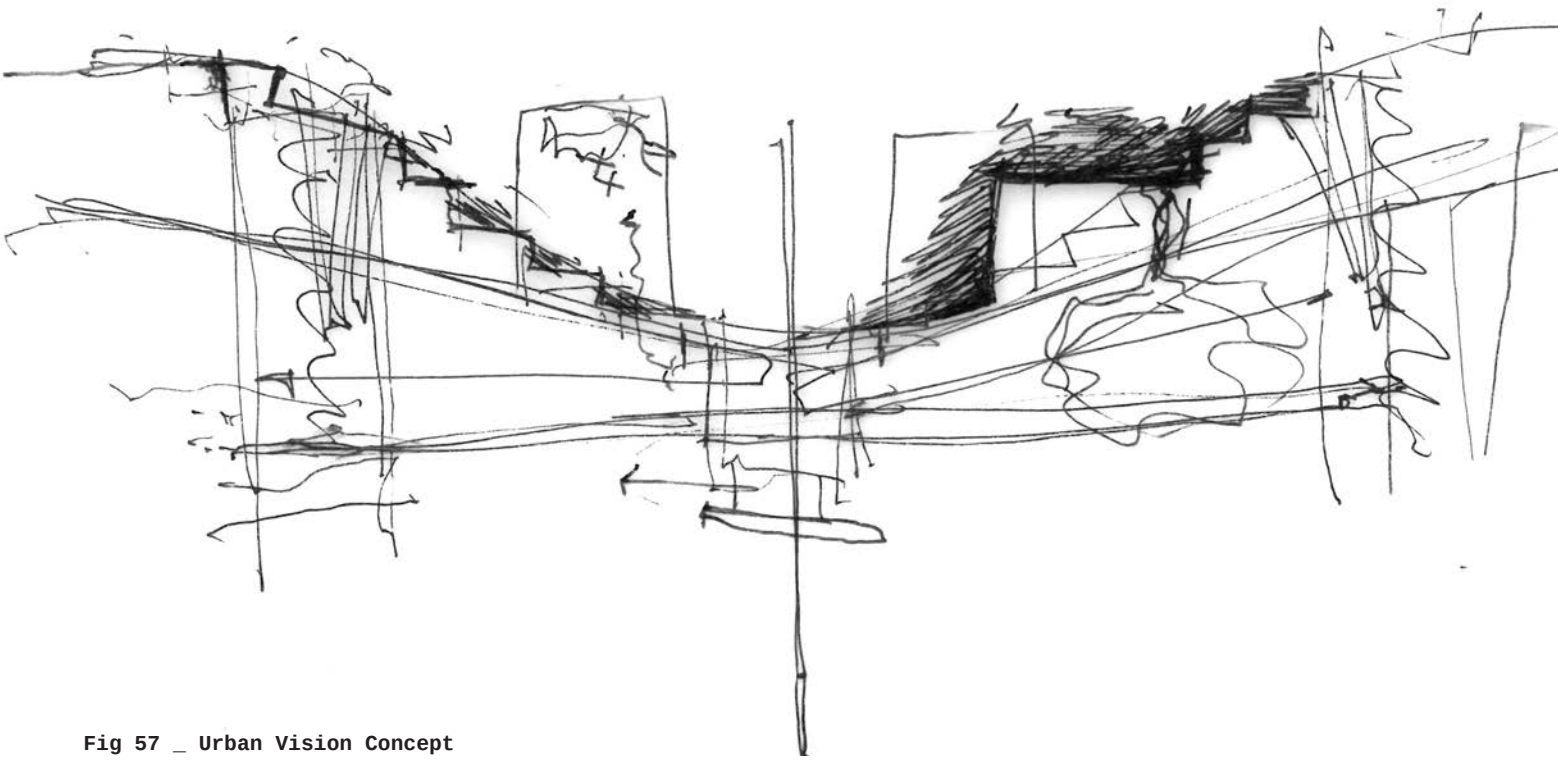


Fig 57 _ Urban Vision Concept Sketch (Author,2017)

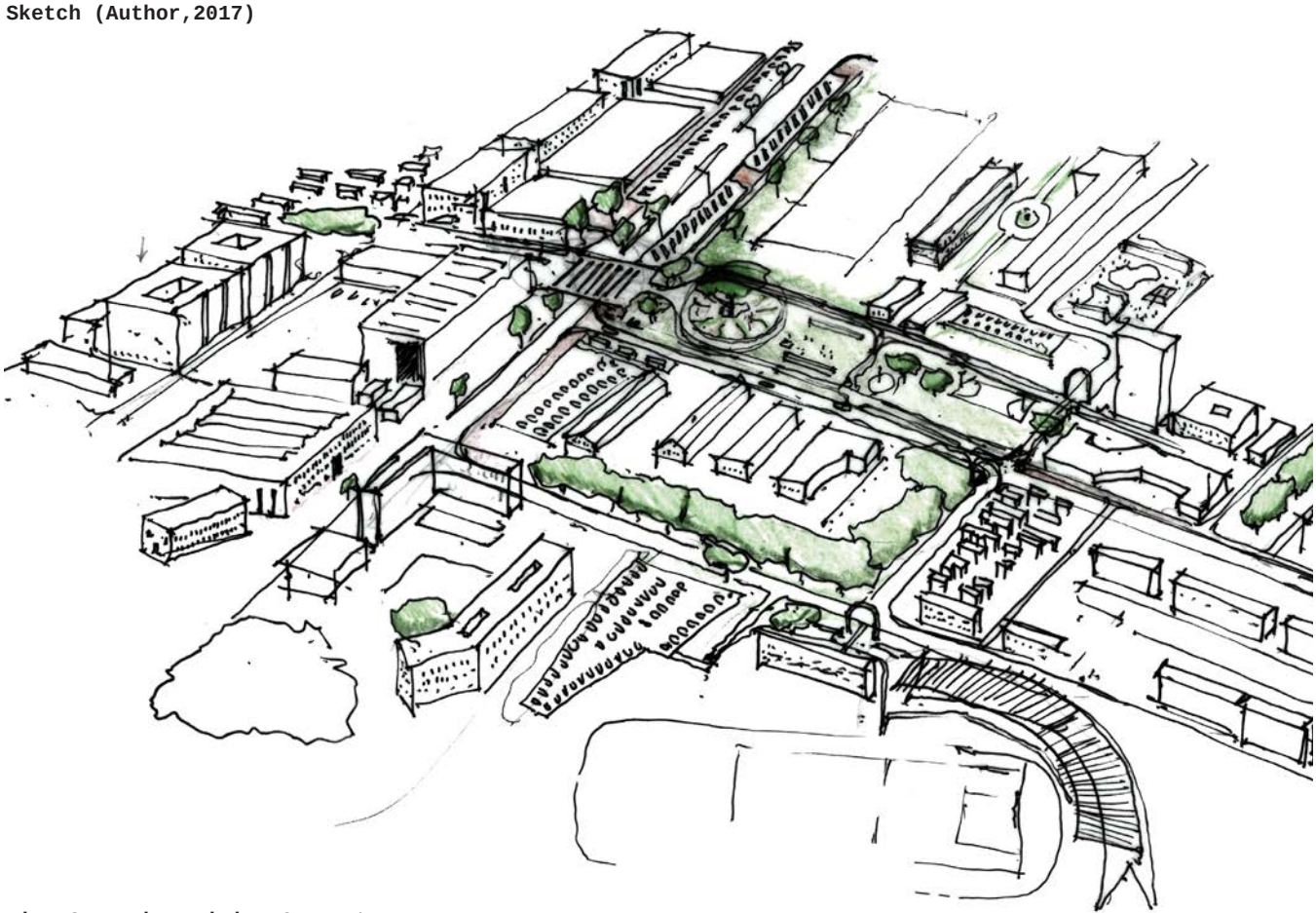


Fig 58 _ Urban Vision Concept Sketch (Author,2017)

Typology | Merging the Model and the Lived

The notable contribution that Noero makes in this proposal (fig 59-60) is to challenge the notion that low income housing must be a uniform unit typology. This project caters for the standard 'family housing typology' but also for a multiple array of different living styles, allowing for the project to adapt itself to the changes in family structure and living needs.

Two rows of housing on a singular axis through Philippi, facing the street providing interconnected social and commercial realms. The focused architectural intervention defines greater parts of the urban landscape, framing program and forming public spaces to enhance the existing landscape. (fig 61)

This focus however requires new ways of thinking about the provision of housing. We recognize that informal systems of housing provision are infinitely flexible and offer great variety. The Philippi Project addresses this issue differently, since the housing that will be built on the site is funded by the state through a housing subsidy program and demands the construction of formally designed and state-approved housing units (Noero, 2006). This requires the questioning of social housing and state funded low income typology, it's not only the manner in which the units take form, but also how we approach architecture within a larger urban and social realm.

The intention for the proposed development in Westbury, is to maintain a Dialogue between the development of architecture as well as the positive progression of the social context, as such, the process of developing this project becomes as important as the physical manifestation of the project. Springfield Terrace, in Cape town (fig 70) presents a strong precedent for the development of Low income Housing. The formation of unit typology is focused on creating a balance between developmental success as well as catering for the means of the residents.

This project, located in the Cape Town City bowl takes the form of a low income medium density housing project. The development is very well located in relation to existing public transport infrastructure and was celebrated as the first relatively large, non-racially focused infill project for the low income market.

Fig 59 _ Phillipi Sustainable Housing Axonomentric (Noero, 2017)

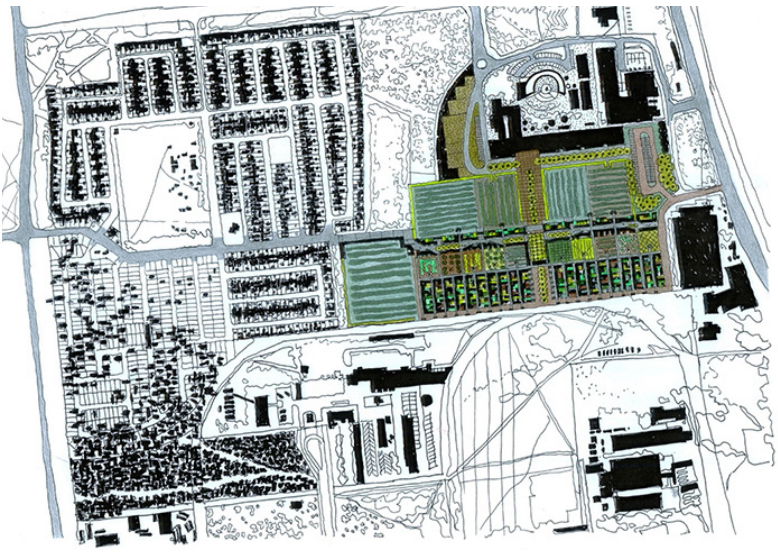


Fig 60 _ Phillipi Sustainable Housing Urban Plan (Noero, 2017)

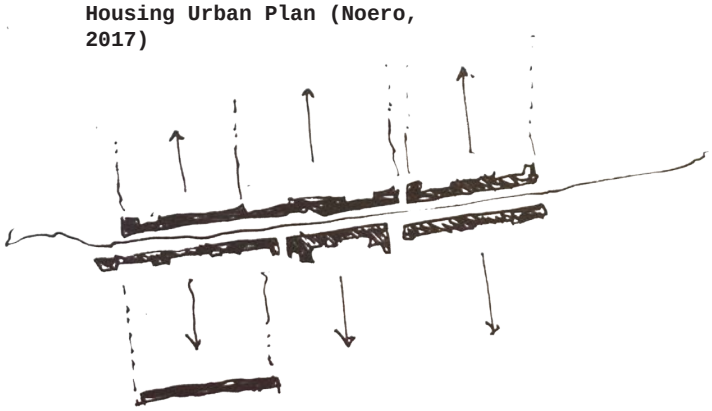


Fig 61 _ Housing Layout Concept Sketch (Author, 2017)

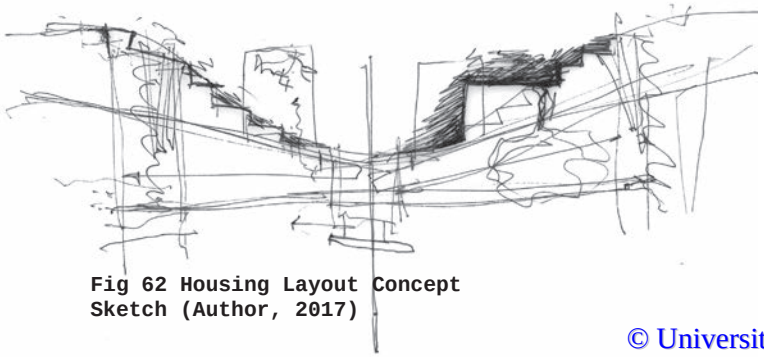


Fig 62 Housing Layout Concept Sketch (Author, 2017)

Fig 63 _ Walmer Link Social Housing, by Erik Voigt Architects (Kotse, 2014)

Fig 65 _ Walmer Link Social Housing, by Erik Voigt Architects (Kotse, 2014)

Fig 65-66 _ Walmer Link Social Housing, by Erik Voigt Architects (Kotse, 2014)

Typology | Development and the Resident

The initial focus of this pilot project was to demonstrate the possibility of densification within the urban regions of central Cape Town, through the use of a small, well located and publically owned parcel of land. Aiming to create a vibrant social and urban environment, the provision of this density would ensure the patronage of social and commercial facilities (ABIDEMI AWE, 2001).

The development of this project was also innovative through public and private partnership; this collaboration ensured that the saleability of the units would remain profitable but also maintain a low cost entry point for basic units for low income tenants. This act of cross subsidization remains in my opinion as good development practice as the stability of programme is able to manifest within a strong economic climate. This provides a high value to the development and in turn ensures the maintenance of a healthy urban space.

During the design phase of Springfield Terrace, there were multiple issues surrounding the zoning of such a project as well as policy regarding an unprecedented project such as this, however, with the regards to this study, these issues has since been attended too and there is now policy in place to cater for denser models.

A further issue within the development of this typology was the public perception of medium density housing, the local preference for housing provision was actually in line with the nominal government practice of providing the low density RDP model, as the perception of higher density models harked back to the perception of apartheid models, of controlled living blocks. This coupled with the fear of anti-social behaviour such as gang activity and overcrowding. The provision of space that did not cater for a sufficient balance between private space and shared facilities led to the homogenisation of the space and led to an idle user limiting the social growth of residents.

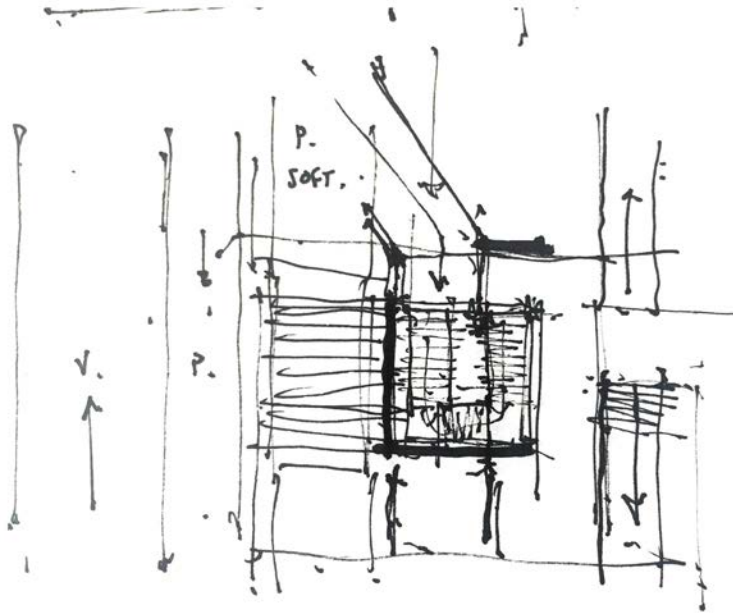


Fig 67 _ Unit Circulation Exploration Sketch (Author, 2017)

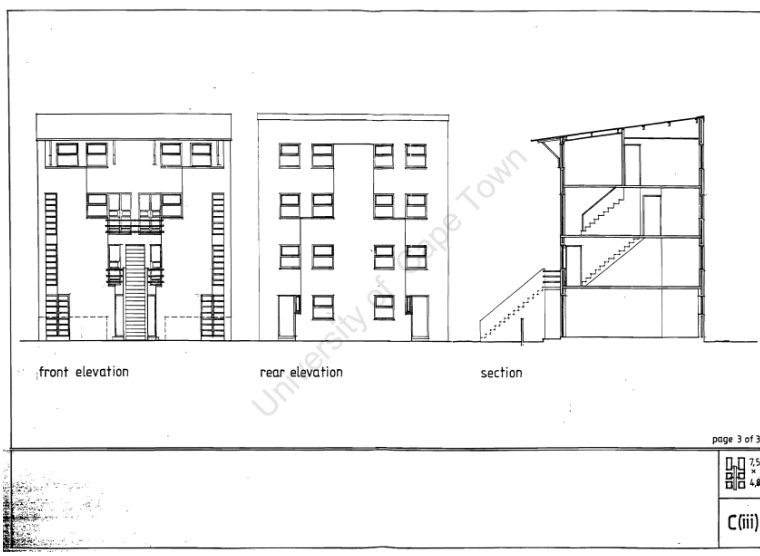


Fig 68 _ Springfield Terrace Elevation & Section (Dewar, D et al. 1998)

Fig 69 _ Springfield Terrace Urban Plan (Dewar, D et al. 1998)

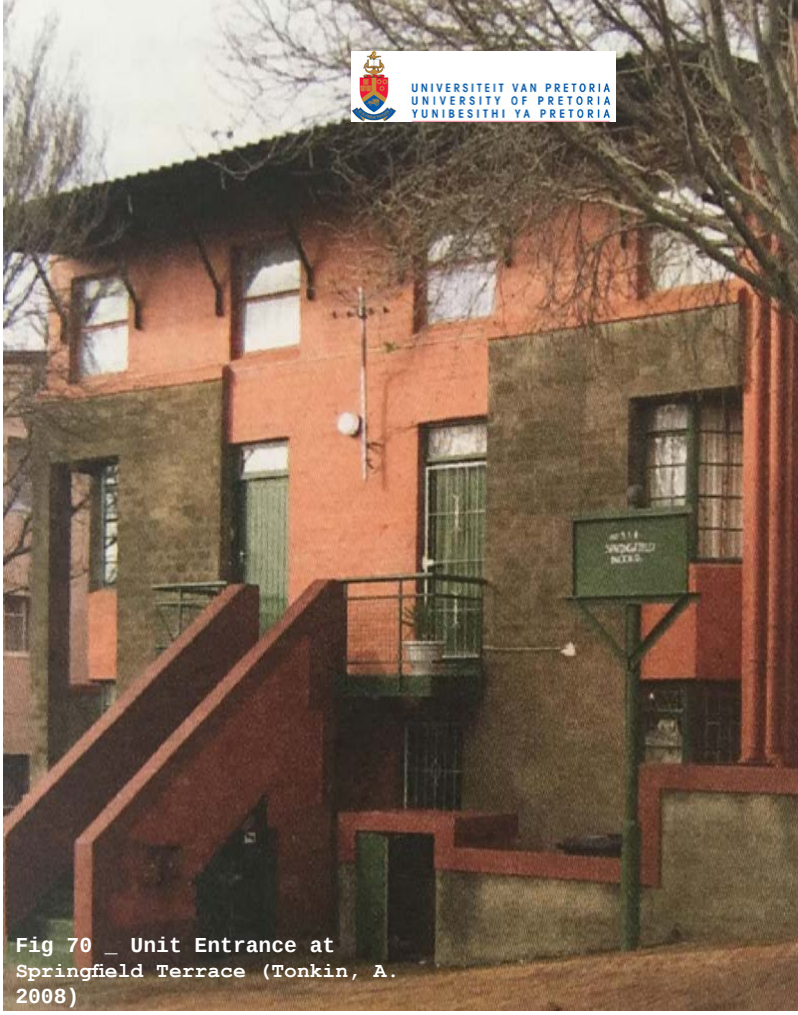


Fig 70 _ Unit Entrance at Springfield Terrace (Tonkin, A. 2008)

Fig 71 _ Springfield Terrace Site Plan (Dewar, D et al. 1998)

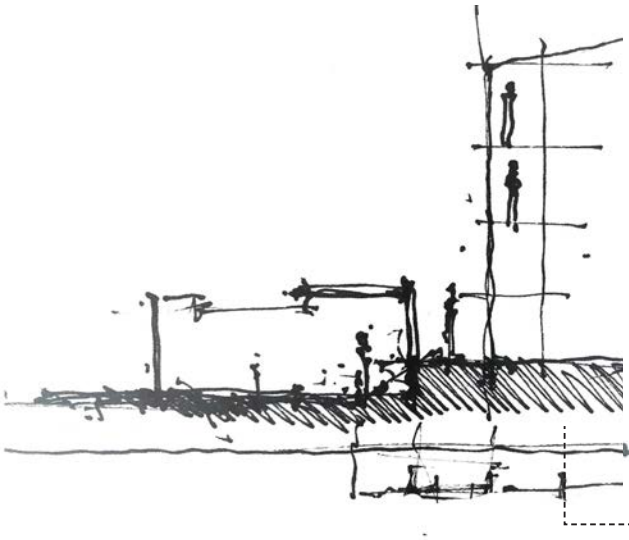


Fig 72 _ Unit Circulation Exploration Sketch (Author, 2017)

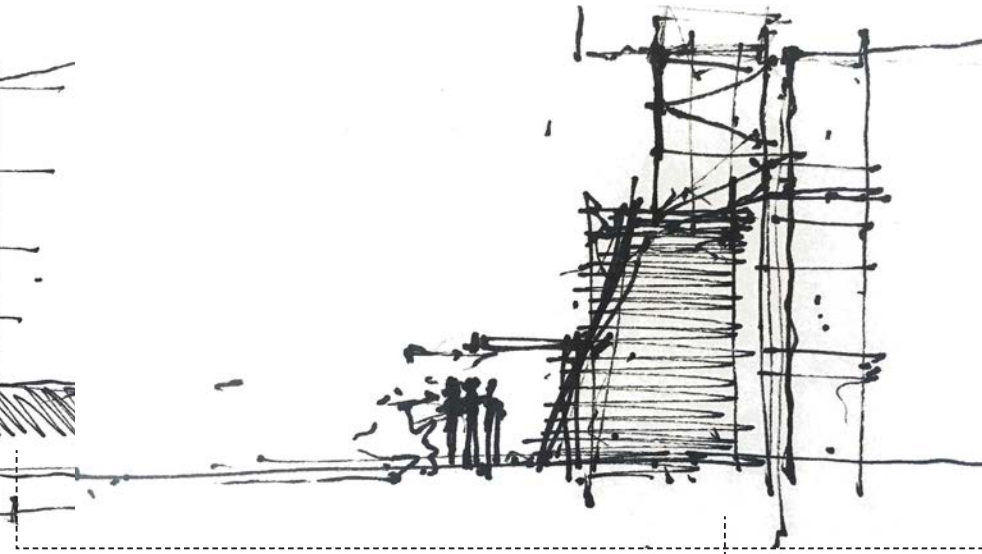


Fig 73 _ Unit Circulation Exploration Sketch (Author, 2017)

Fig 74 _ Building Programme and Form Sketch (Author, 2017)

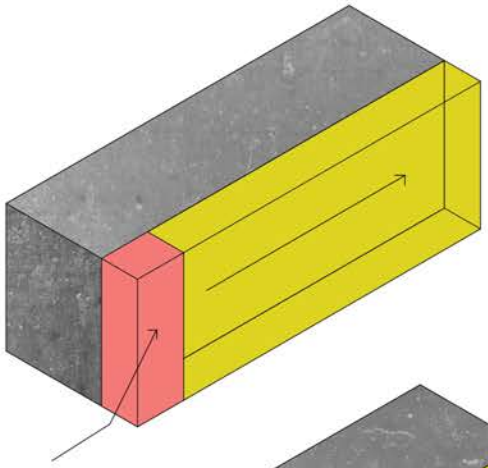
Typical Social Housing Typologies

Issues of Efficiency and Effective Impact

A _ External Circulation Units
Such as N2 Gateway project, Western Cape
A_A - Perimeter Block with external Circualation
Such as Brickfields project, Johannesburg

Unit Sizes

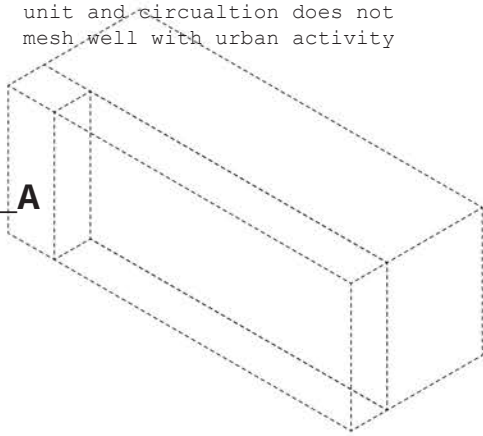
Between 30Sqm (1 Bed) - 73 Sqm (3 Bed)
10-20% Dedicated to un-programmed circulation



A Visual Access Limited to single side _ Movement concentrated on vertical circulation

Difficult to frame space as the unit and circualtion does not mesh well with urban activity

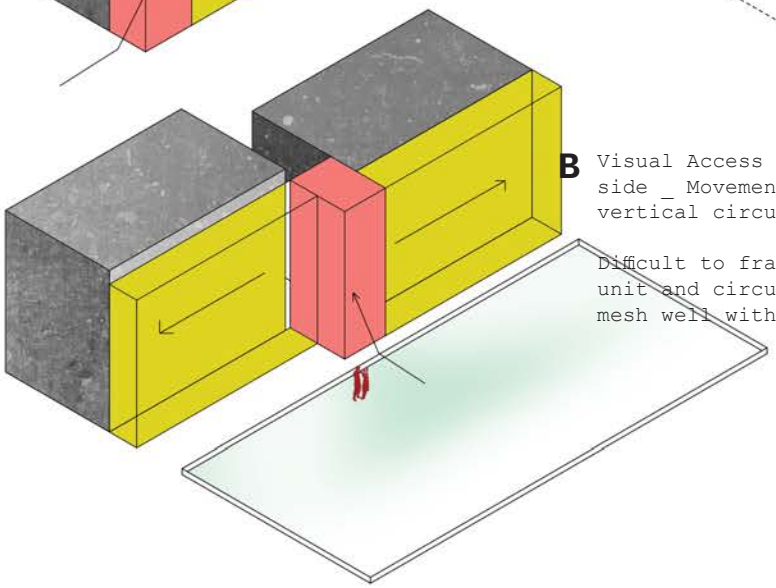
A_A



B_ Split block with extetnal circualtion

As exisiting units in Westbury, Johannesburg
Unit Sizes

Between 30 - 50 Sqm (2 Bed)
15-20% Dedicated to un-programmed circulation



B Visual Access Limited to single side _ Movement concentrated on vertical circulation

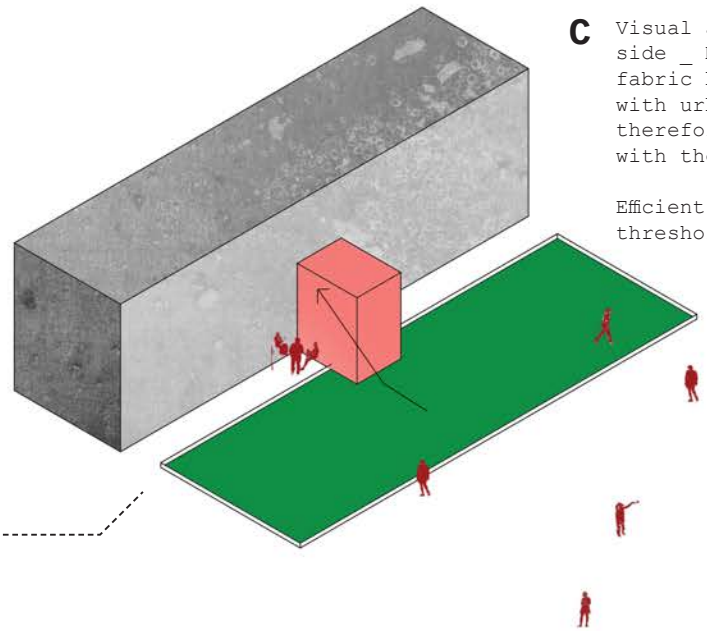
Difficult to frame space as the unit and circualtion does not mesh well with urban activity

C_ Central (Internal) Circulation

As in Springfield Terrace, Cape Town

Unit Sizes

Between 30 Sqm (1 Bed) - 75 Sqm (3 Bed)
5% Dedicated to un-programmed circulation



C Visual access limited to one side _ Movement linked to urban fabric better - Ability to mesh with urban edges is better, therefore the public interface with the public is stronger

Efficient Manner to create threshold

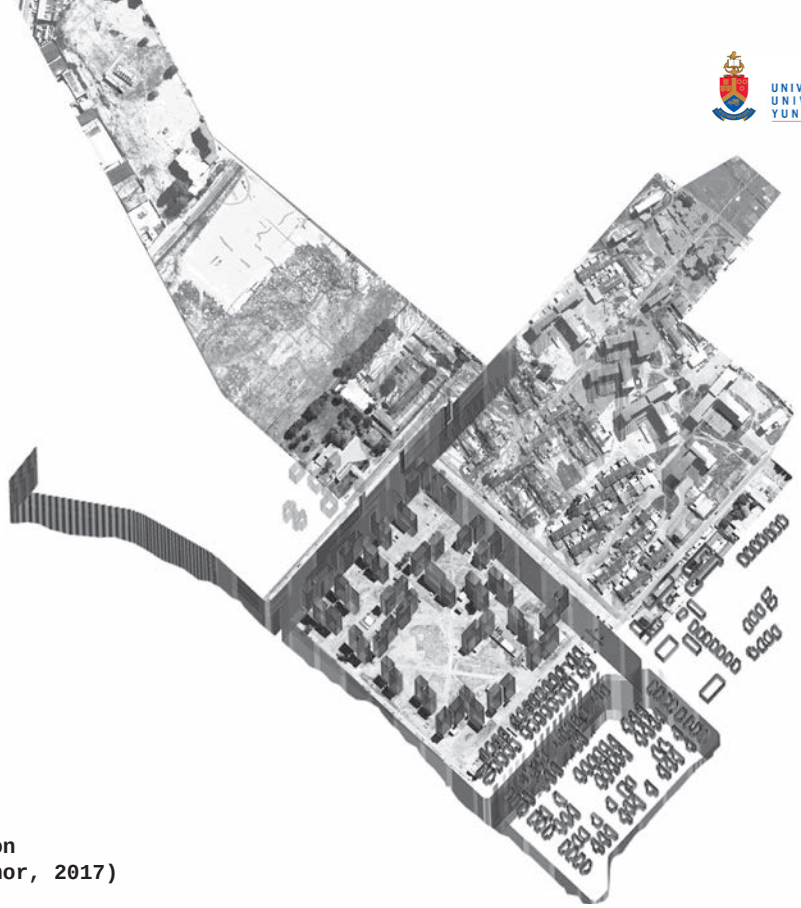


Fig 76.1 _ Urban Vision
Iteration Sketch (Author, 2017)

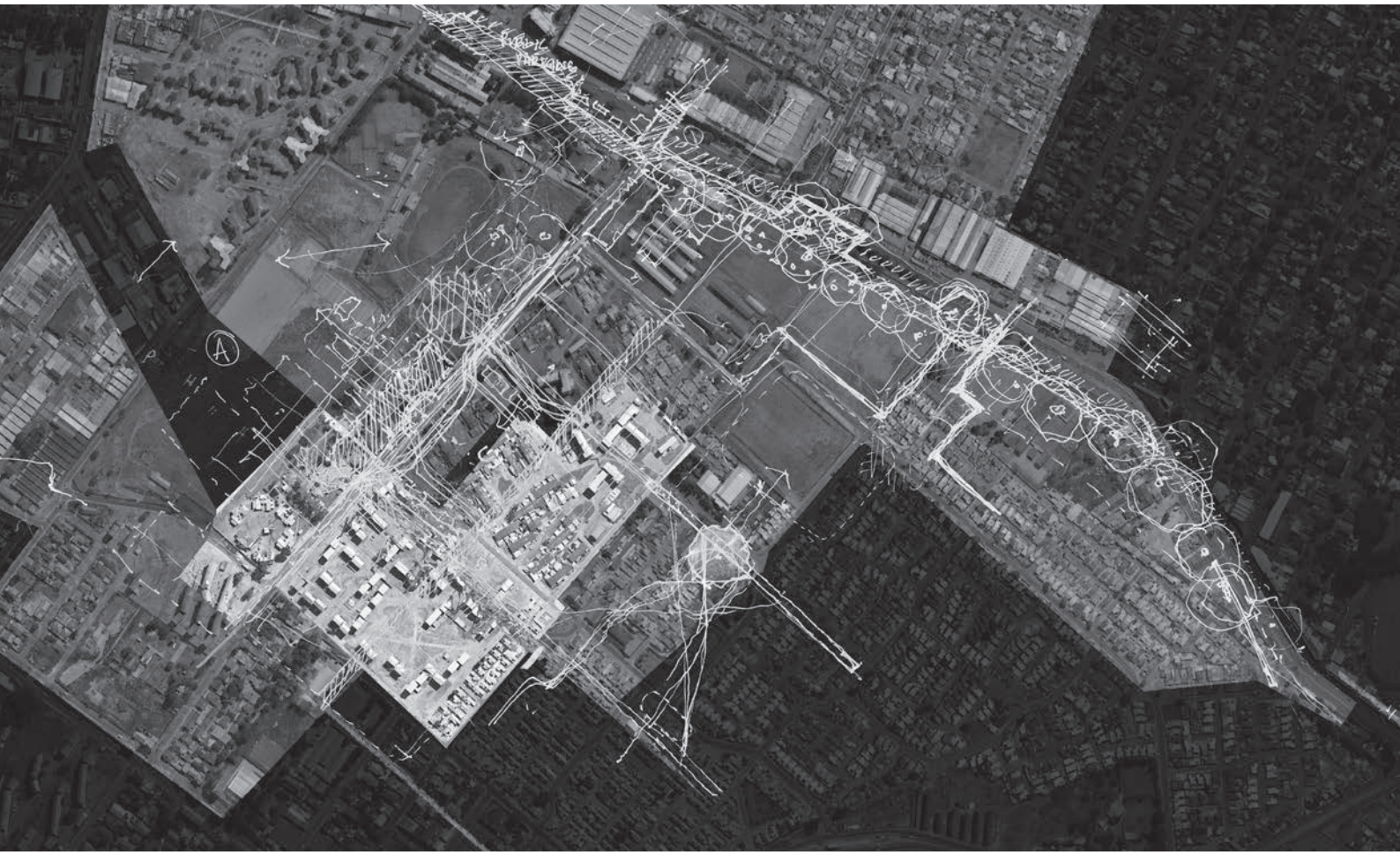


Fig 76.2 _ Urban Vision
Iteration Sketch (Author, 2017)

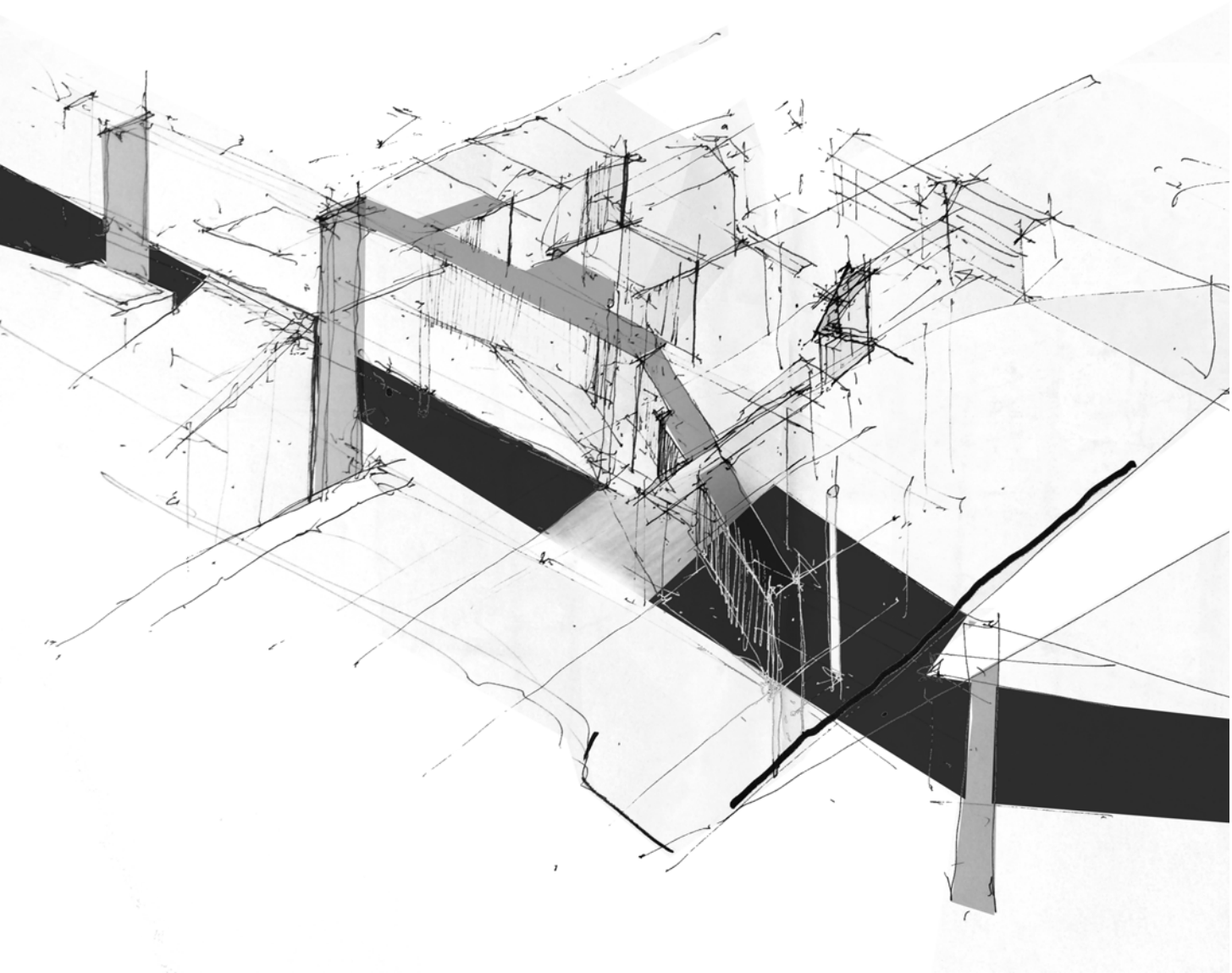


Fig 77 _ Urban Vision 3 dimensional exploration sketch (Author, 2017)

6_Merging of Multiple Programmes into a single architectural Language

5_Formation of route and defined acces through the site

4_Activation of Urban Edges to present a more legible and acccesible urban environment

3_Placement if new residential units within existing unit fabric

2_Consideratiom of topographical limitations

1_Site Analysis and understanding of contextual parameters

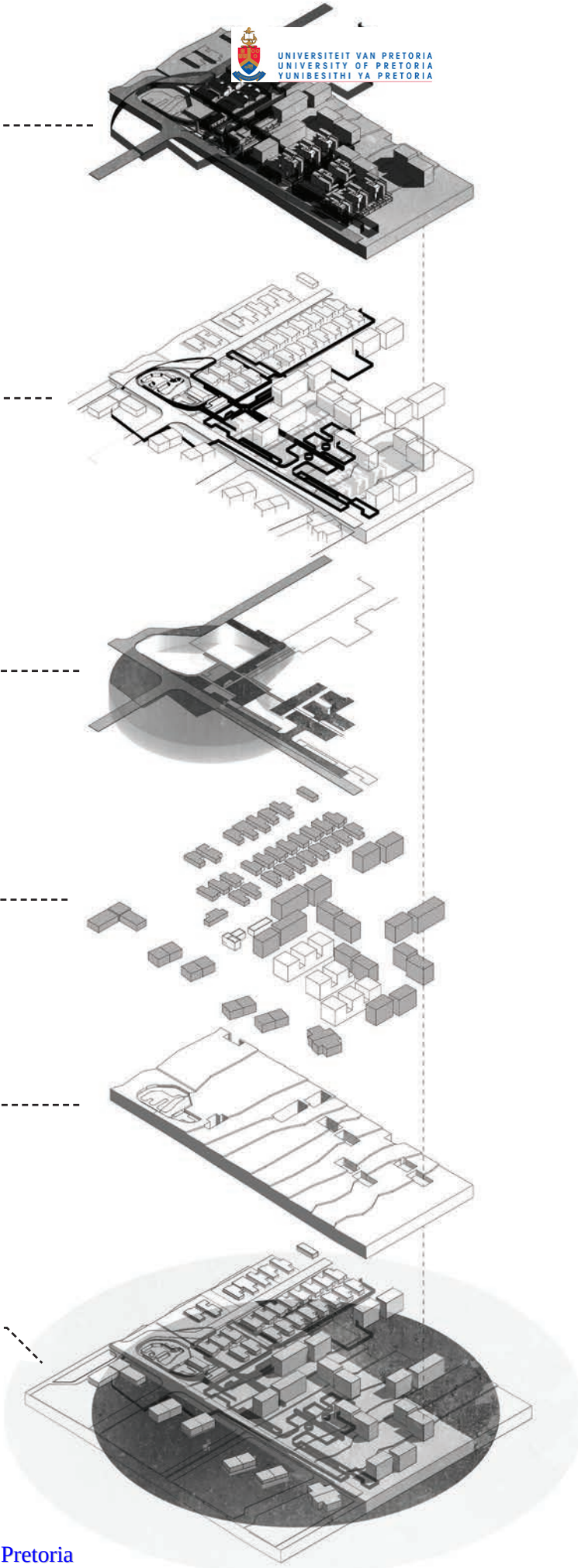


Fig 78_ Exploded Diagram of Site Programming (Author, 2017)

A06 Urban Vision | Directives

The regeneration of this context begins as a critique on current space making approaches in Westbury and the larger development strategy in critical areas. The framework seeks to link recent urban development projects such as the 'Corridors of Freedom' arterial roads, the 'Westbury Clinic' as well as the 'Civic Centre' of Westbury, bringing them into a connected, readable urban fabric. The new link will connect from North to south connecting Sophiatown and Newclare, through Westbury and the above mentioned development projects.

This will be done through considering the following binding principles

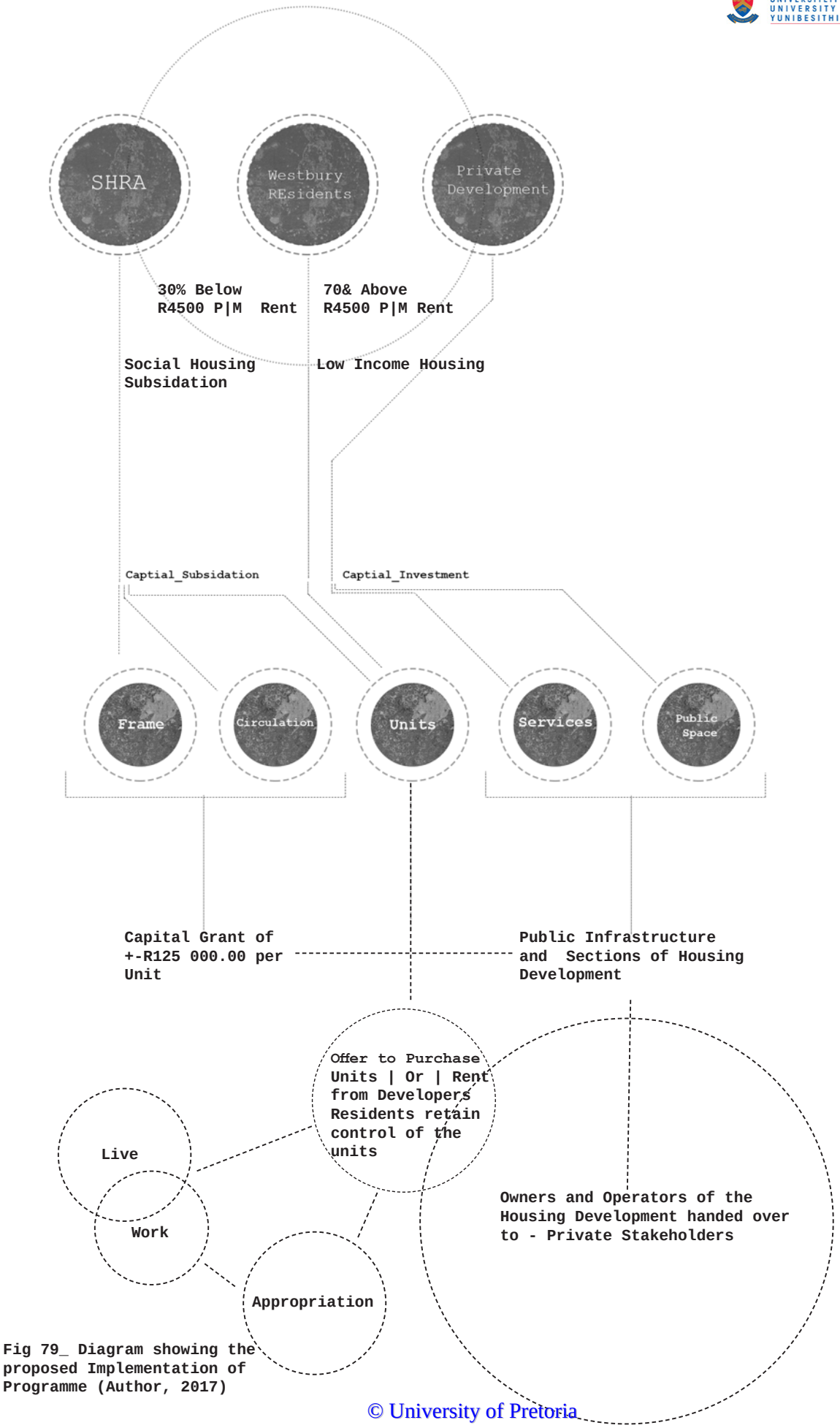


Fig 79_ Diagram showing the proposed Implementation of Programme (Author, 2017)

A06-1 Programme |

New infrastructure is placed to house new light commercial activity along the proposed urban strip, the formation of an integrated use framework will allow for multiple programs to assimilate within the provided structures.

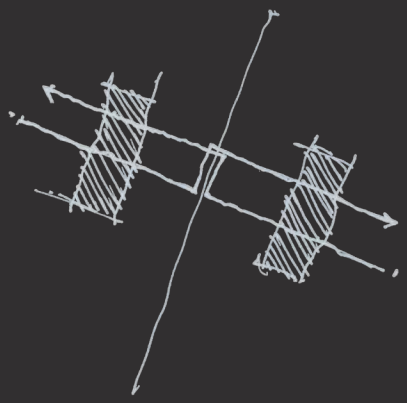
The intention is for the residents to inform the spatial characteristic of the urban space, but for design and development to aid in the framing of undefined spaces, limiting the possibility for indefensible space to exist within the area.

"Under the framework of a capitalist economy, rapid development inevitably marginalises social dimensions of dwelling. Urgency of delivery is frequently translated by reduction, acting to neutralise the specificity of local needs" (Low, 2012).

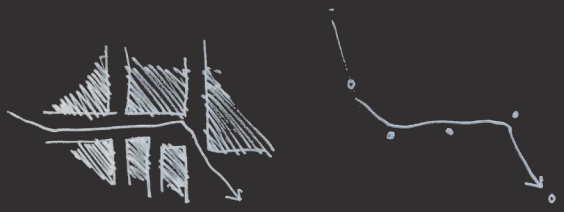
The examples of infrastructural and civic development projects within Westbury, which at great monetary, spatial and interactive cost have seemingly failed, led to consideration of the necessary applications for development to facilitate not only residential programme and to considerdevelopment of infrastructure as well, This unity of architecture and urban infrastruture should be able to house multiple programs to remain a sustainable intervention.

The current social context of Westbury is unable to facilitate development projects that are being provided. Often the process of determining issues is driven through political bias or perception, but not 'understood' need, meaning that the residents do not respond to the development or in some cases respond with negative action.

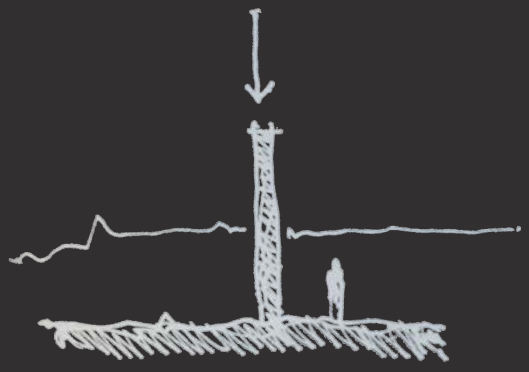
The approach to development within critical contexts such as this should be one of establishing a framework for development, making use of a series of directives in dealing with the space.



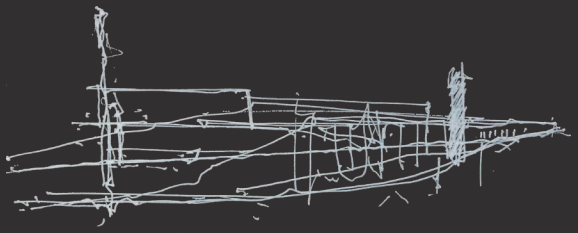
Pedestrian Access



Defined Route Programming



Visual Landmark Creation



Uniform Architectural Language

Fig 80 _ Architectural parameters of Programme Sketches (Author, 2017)

In particular the **framing of space** and **defining of threshold** must be the **initial point of contact** to inform use and facilitate growth.

1.1 Visual readability of space and programme

1.2 Landmark, placement and orientation leading to clear boundaries and congregation points

This is followed by the placement of a mixture of programmes

2.1 Social housing development

2.2 Commercial space interlinked with the residential units

2.3 Service Programmes to cater for residential housing needs, such as laundry, recreation and community centres

Allocation of public and private space must occur within space defined by the above parameters

3.1 Public courtyards and recreational space that allow residential units to live outward.

3.2 Public space provided within the circulation areas for interaction between residents and pedestrians.

Finally, circulation elements, which subscribe to the first set of parameters must contain and connect spaces.

4.1 Clear visual access to and from vertical circulation.
4.2 Circulation elements are separated from structures, house multiple programs and become clear functional entities within the urban fabric.

'Housing Developmental Policy' and the approach to the creation of sustainable housing within South Africa is a strongly debated process and subsequent failures to produce a failsafe model has led to the dissection and re-ordering of 'housing' as a concept.

There are examples of successful structural concepts programmatic solutions to better the integration of

residents into urban settings; such as in the work of "Elemental Architects" in Chile.

However, housing as a stand-alone entity, brings forwards issues of typology, participation, context and most elements of sustainability such as economics, social realms and environment. Maintaining the development of a housing scheme becomes too fragile to remain self-sufficient.

"Housing is required to 'reside' within an enabling framework or urban development that facilitates spatial integration" (Low, 2012).

It is therefore that the placement of Social Housing in Westbury will retain great benefits within the progression of not only Westbury's urban fabric but also the social condition. Housing will allow for the appropriation of space by the residents through the implied ownership of that space. Social housing is also a programme that is under control of local municipalities, the monitoring and allocation of space will therefore undergo supervision but still allow for the residents to benefit from a strong economic foundation, allowing for them to progress from their current harsh situation.

The intention to include commercial space (fig 82) will also allow for more opportunities in creation of work and economic independence, but also aid in providing a more vibrant sense of ability and activity, moving Westbury out of its state of stagnation.

Inclusion of public facilities aimed at the youth such as a skate park will also provide constructive activity in the area.

A certain number of household activities such as laundry and child day-care will also be removed from the confines of the units and placed in social spheres to allow for social interaction, commercial potential, as well as decrease cost of residential units.

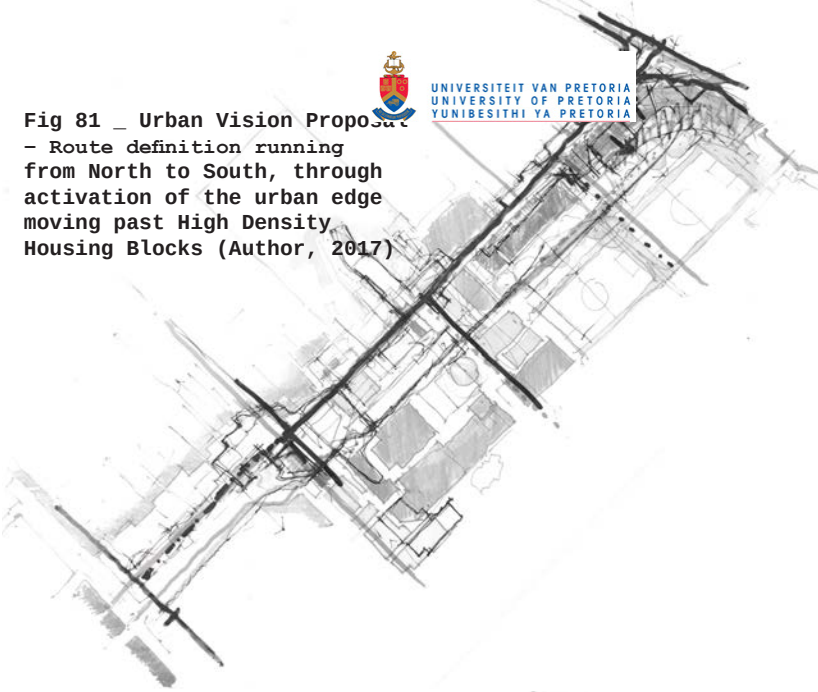


Fig 81 _ Urban Vision Proposal – Route definition running from North to South, through activation of the urban edge moving past High Density Housing Blocks (Author, 2017)

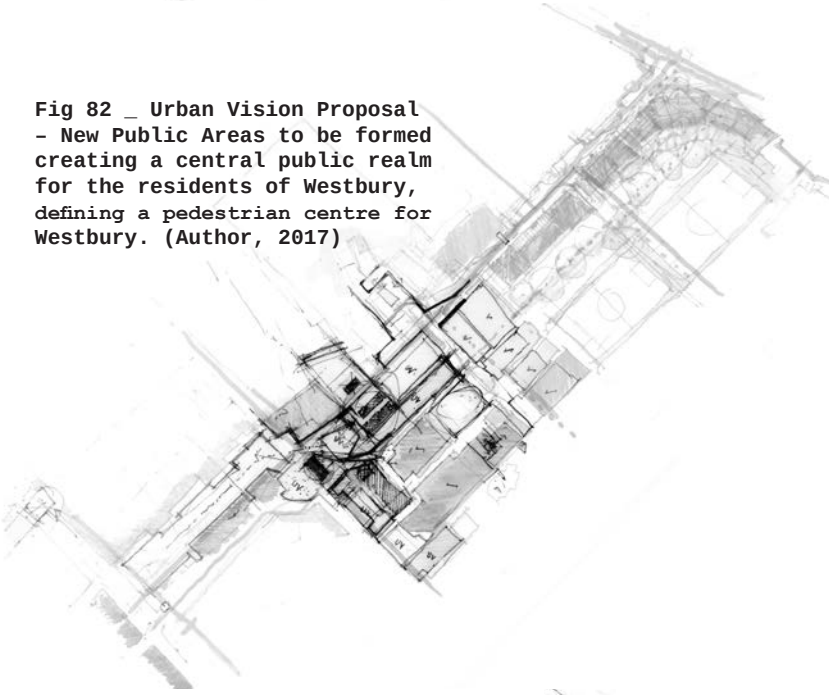


Fig 82 _ Urban Vision Proposal – New Public Areas to be formed creating a central public realm for the residents of Westbury, defining a pedestrian centre for Westbury. (Author, 2017)

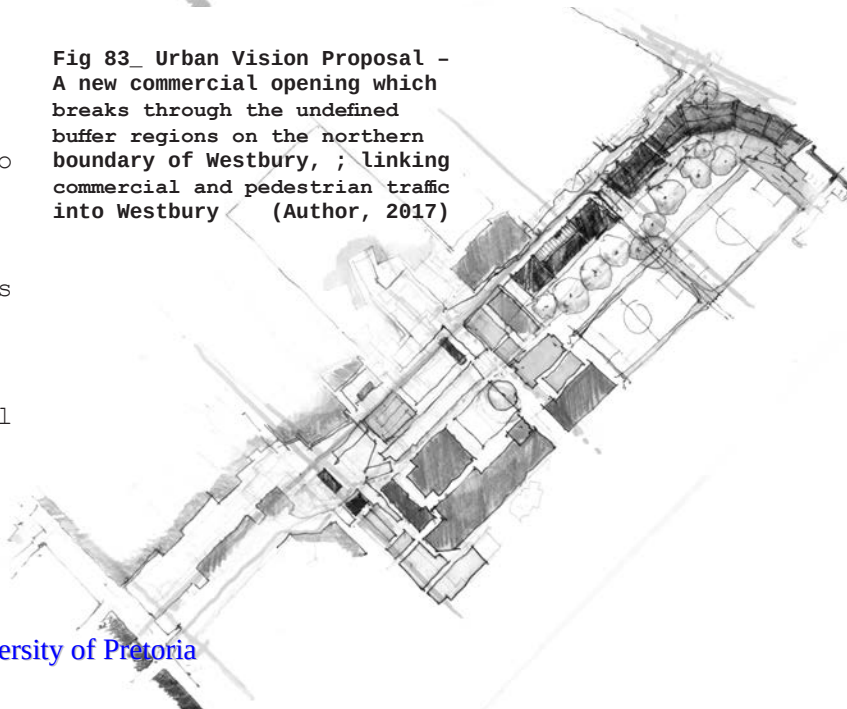


Fig 83_ Urban Vision Proposal – A new commercial opening which breaks through the undefined buffer regions on the northern boundary of Westbury, ; linking commercial and pedestrian traffic into Westbury (Author, 2017)

1_New commercial opening which breaks through the undefined buffer regions on the northern boundary of Westbury, ; linking commercial and pedestrian traffic into Westbury

2_New Public Areas to be formed creating a central public realm for the residents of Westbury, defining a pedestrian centre for Westbury

3_Route definition running from North to South, through activation of the urban edge moving past High Density Housing Blocks Connection Between Sopihiatown and Newclare Through Westbury

4_Westbury Edge _ Housing Development

5_Interior Westbury _ Housing Developement

Fig 84 _ Urban Vision Proposal (Author, 2017)

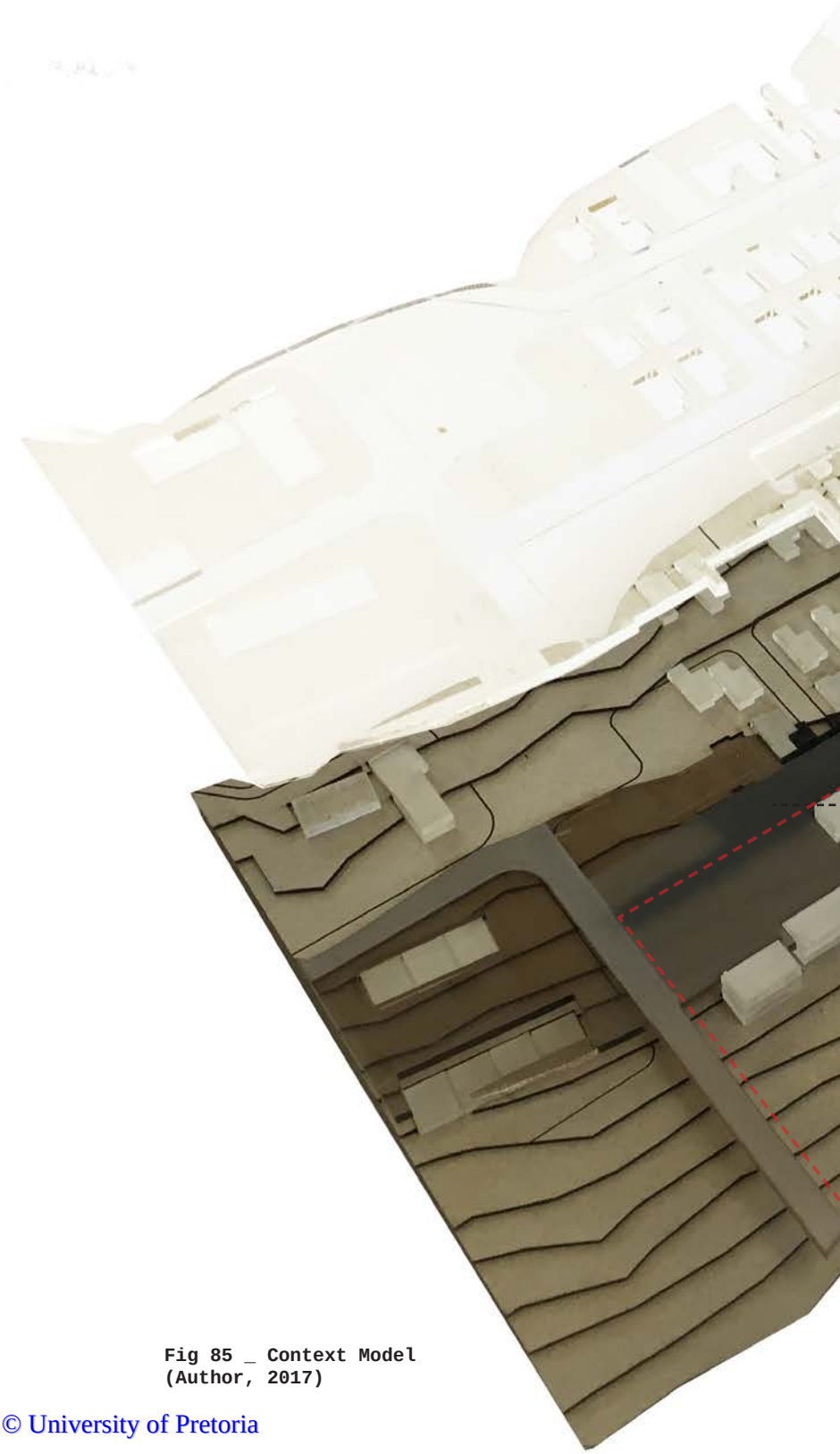


Fig 85 _ Context Model
(Author, 2017)

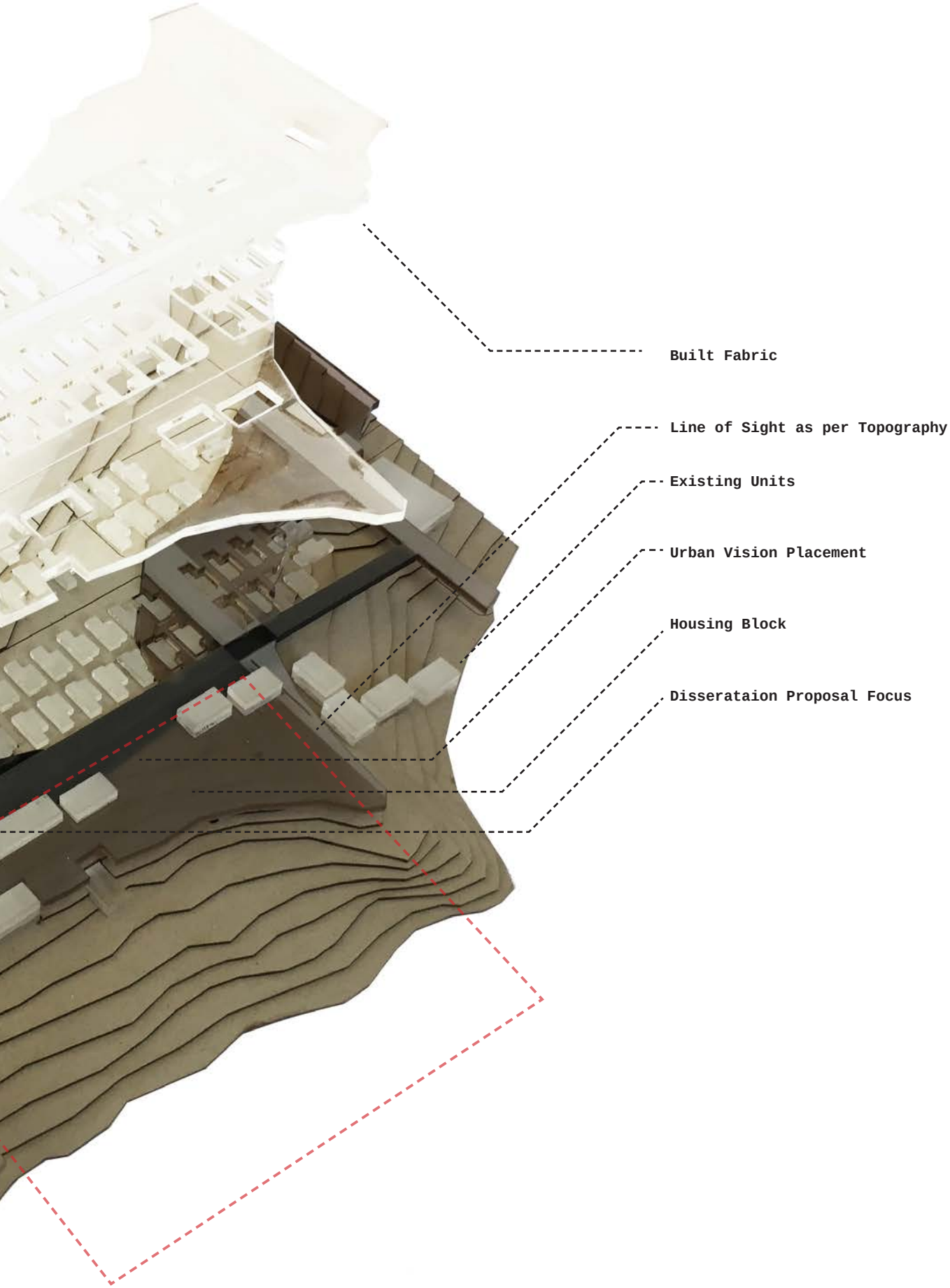


Fig 86 _ Diagram of Link Between Dissertation Proposal and Urban Vision (Author, 2017)

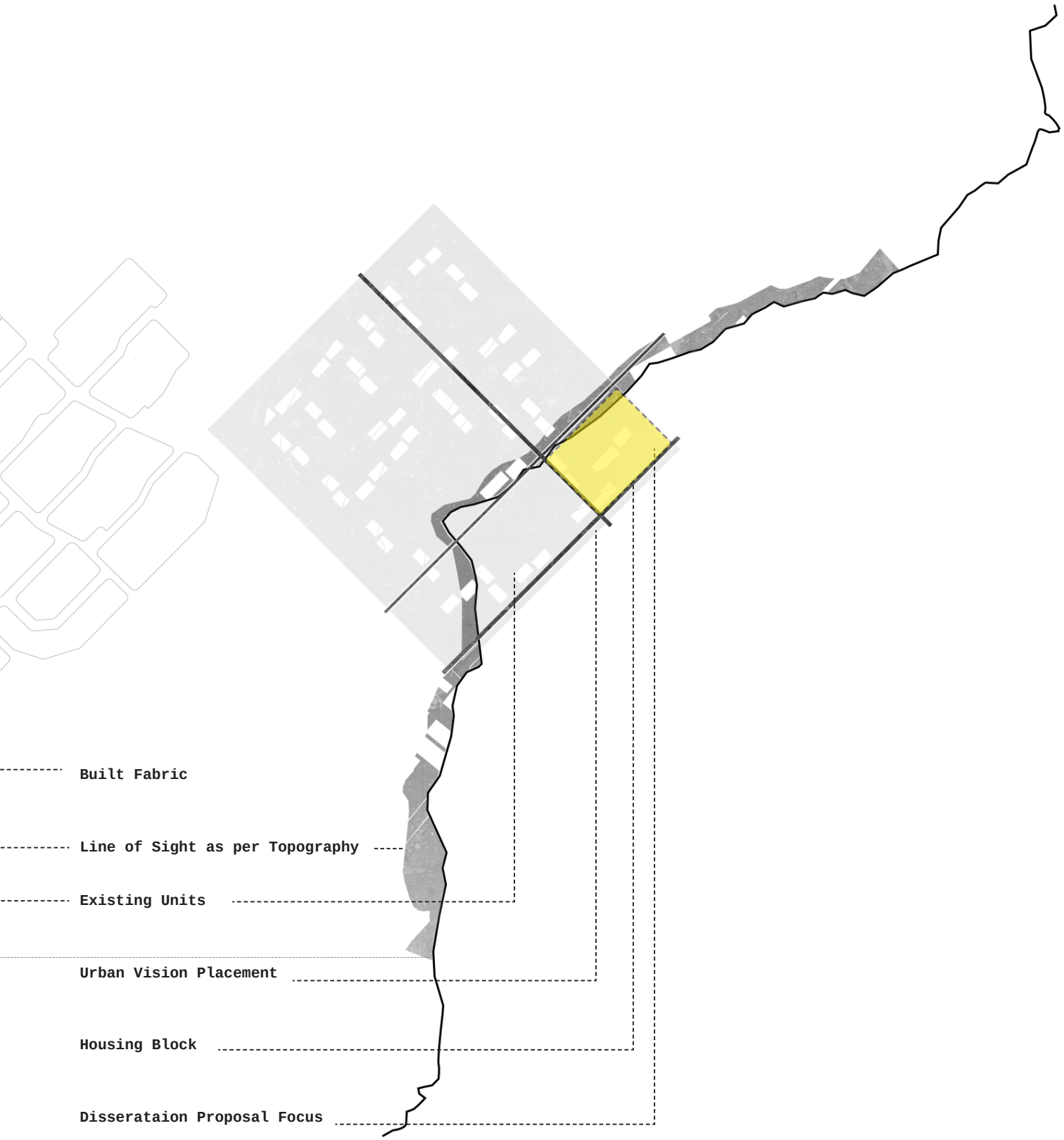


Fig 87 _ Exiting Housing Block | SITE | (Author; edited Google Earth image. 2017)

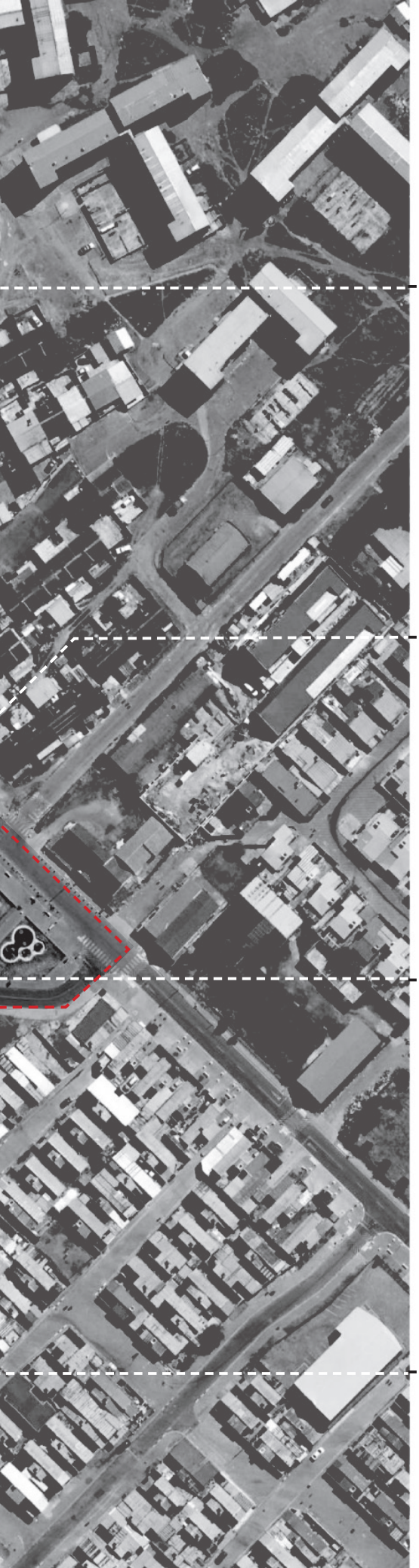


Fig 88 _ Residential Units
(Leibrandt, 2017)

Fig 89 _ Residential
Circualtion (Author, 2017)

Fig 90 _ Visual Access in
Center of housing block
(Author, 2017)

Fig 91 _ Residential Units
(Author, 2017)

A06-2-1 Infrastructure |

Circulation and Access- Defining clear pedestrian access and public space, circulation is aimed at directing pedestrian movement toward and through the core urban development. The development of this infrastructure seeks to lay down a framework for services on the intervention site, along with this service network the infrastructure aims to allow for a level of user determined flexibility. As displayed in Alvaro Siza's Malagueira Housing Scheme(fig 95), it remains pertinent that the relationship between Residential Architecture and development is rooted within the development of infrastructure, this infrastructure housing the supplementary programmes that ensure the primary residential programme function more effectively.

Within the Quinta da Malagueira Housing (1973-1977) development, Alvaro Siza used infrastructural development to effectively shape and define the new residential Architecture.
Raised channels made of exposed concrete block that are supported on columns forming a more-or-less continuous loggia structure that connects neighbourhoods while servicing each house within the neighbourhood clusters. The aqueduct system was justified on the basis of cost, but it also functions as a large-scale planning device that connects neighbourhoods and forms public arcades defining entrances to groups of shops and other public facilities. Because it is built to the height of the roof of the second floor and is left as unfinished concrete, it provides visual and formal relief to the relentless, repetitive white walls of the dwellings (Sherwood, 2002).

Infrastructure has therefore become a framing device as well as a carrier for services, this dual function allows for the development of more effective and well detailed use of material in what is a usually poorly financed project type.

The proposal for Westbury will aim to use the same means to frame public and private space. The use of infrastructure such as circulation elements to house public meeting space, service use elements to visually frame pathways and entrances and the creation of useable commercial and private spaces in-between infrastructural elements will define the formation of the architectural intervention.

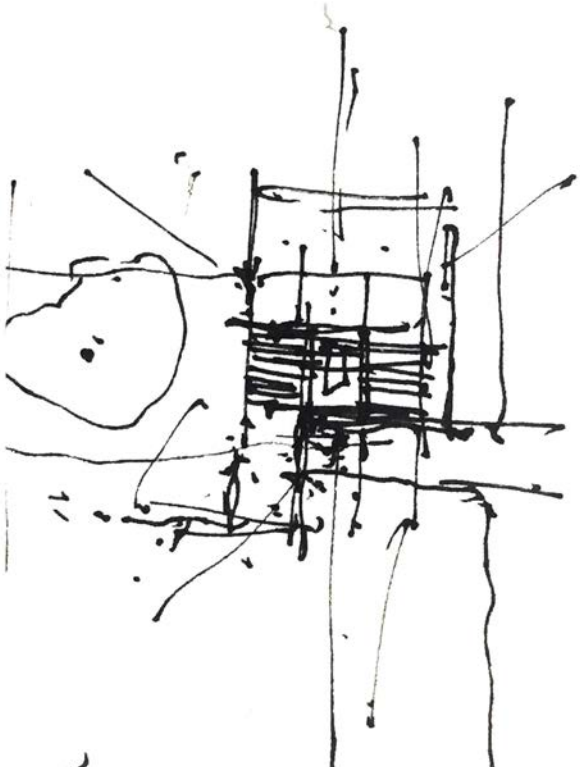


Fig 92 _ Circulation Exploration Sketch (Author, 2017)

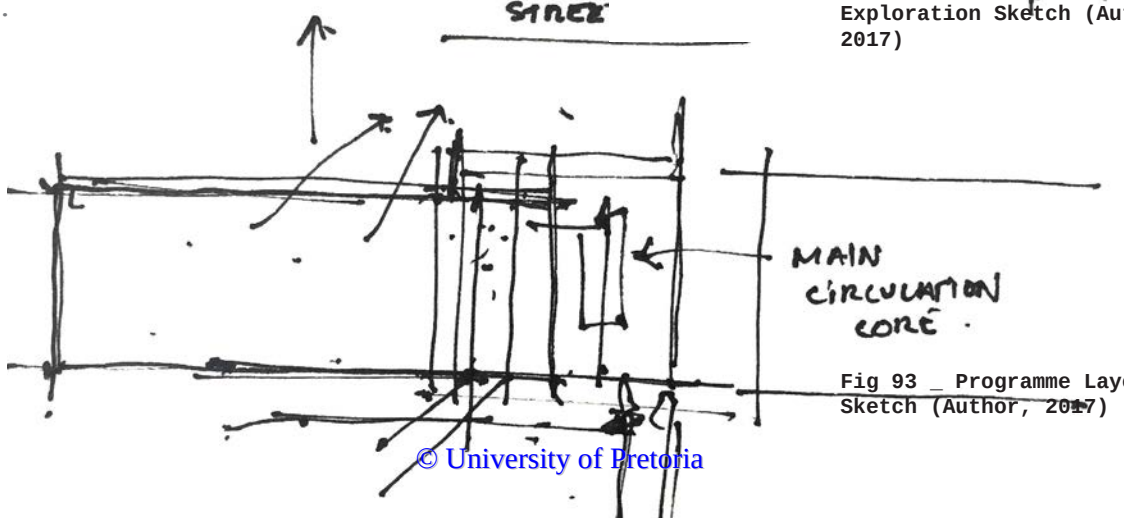


Fig 93 _ Programme Layout Sketch (Author, 2017)

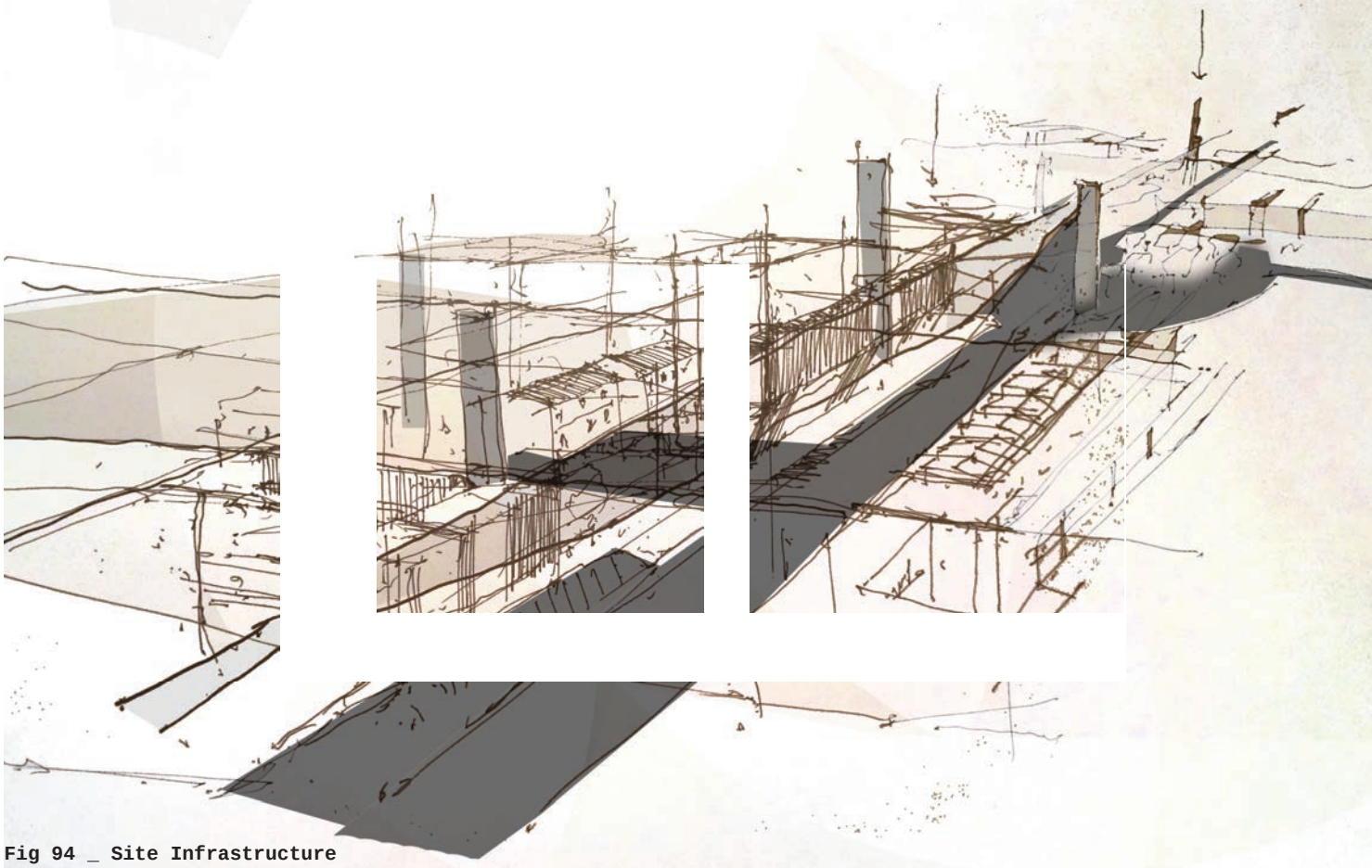
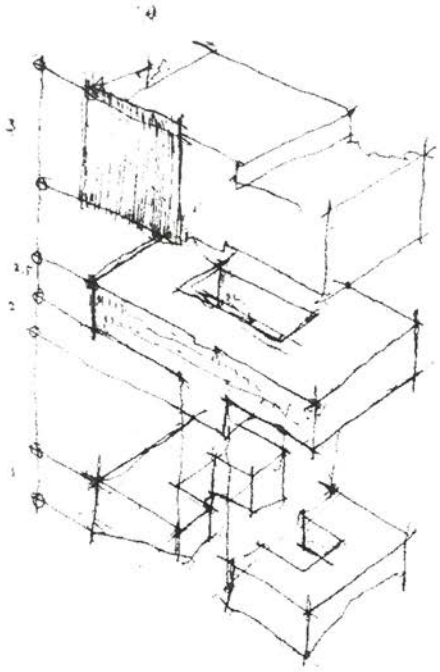
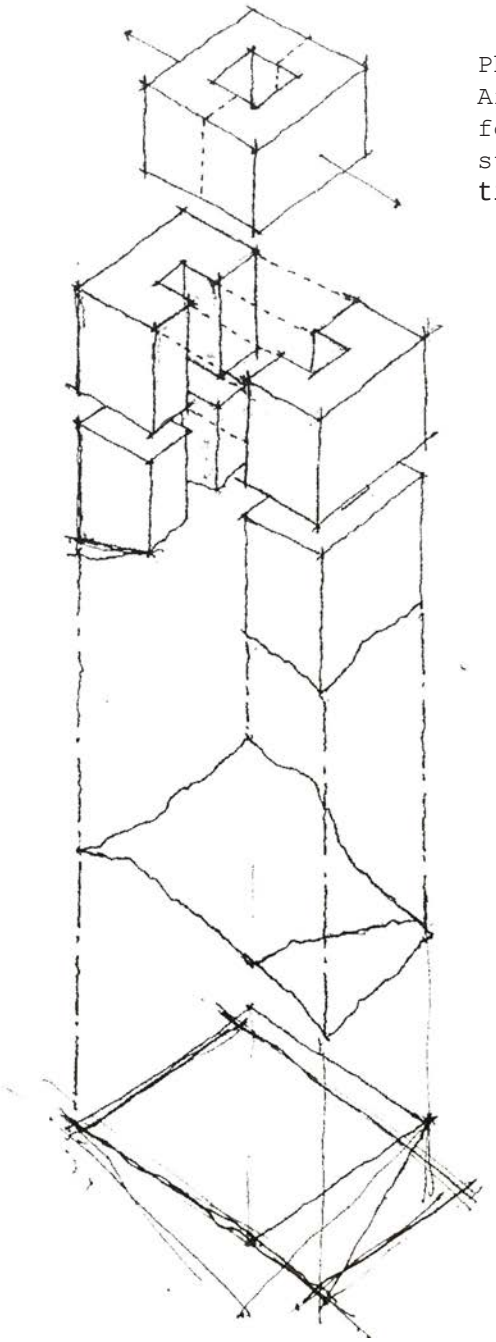


Fig 94 _ Site Infrastructure and Visual Access Concept Sketch (Author, 2017)

Fig 95 _ Quinta da Malagueira by Alvaro Siza (Sherwood, 2002)





Phased Development of Architectural Elements, forming a unified structural response over time

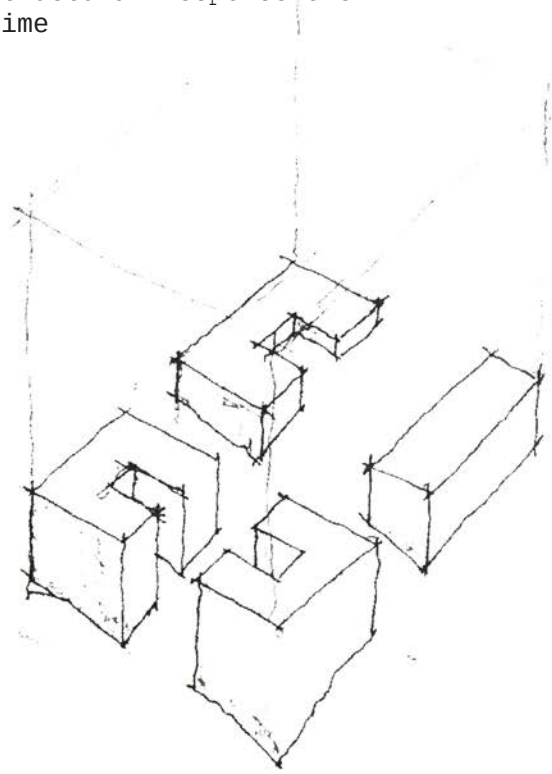


Fig 96 _ Architectural Response to Housing Concept Sketch (Author, 2017)

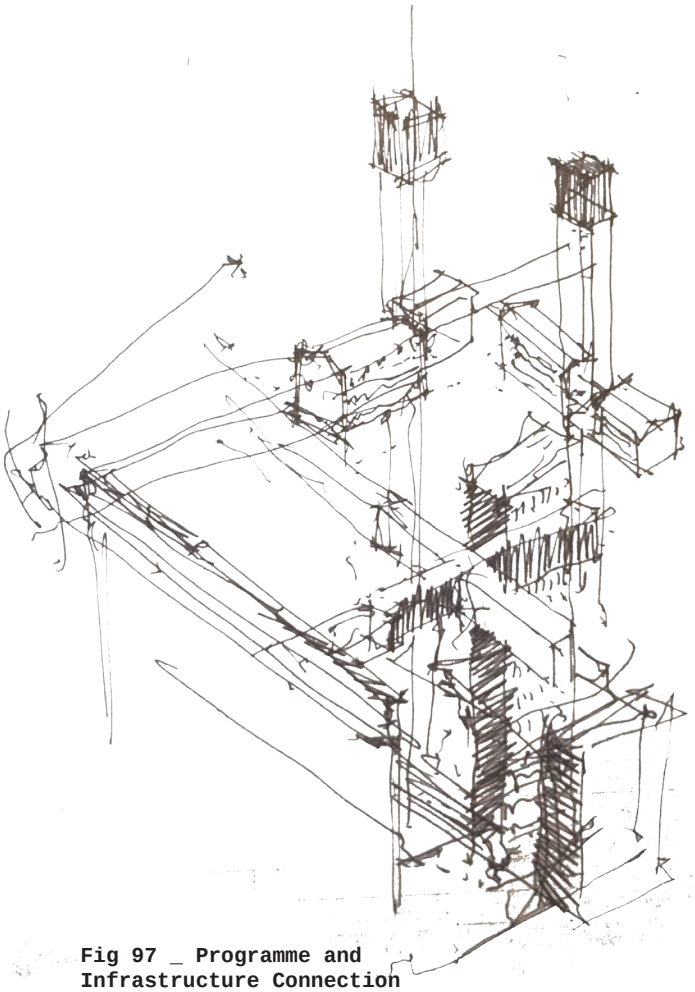


Fig 97 _ Programme and Infrastructure Connection Sketch (Author, 2017)

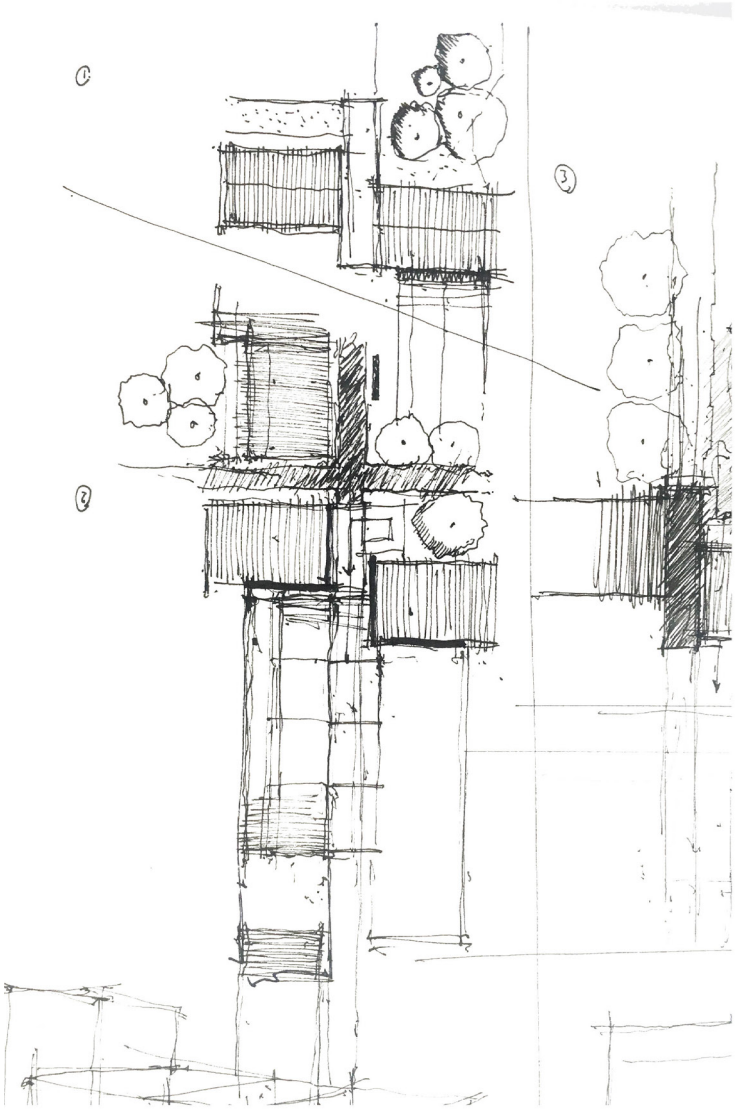


Fig 98 _ Structural Layout Exploration (Author, 2017)

A06-2-2 Architecture |

The merging of infrastructural framework and programmatic intention will manifest in the design of a housing scheme in Westbury. Acting as the anchor within the framework, further defining the blocks through which the new link connects. The role of architecture within this proposal is through connecting with an infrastructural network. Further development of the urban context will occur as the social environment develops. The intention for the architecture linked with the infrastructural, is to allow for the eventual densification of the site and the surrounding context of Westbury.

However the role of architecture, as the housing of the residents of Westbury, will also have to deal the social conditions of the urban fabric within the abilities of architectural influence. Therefore the following issues of spatial legacy, form, defensible and relational space will be addressed.

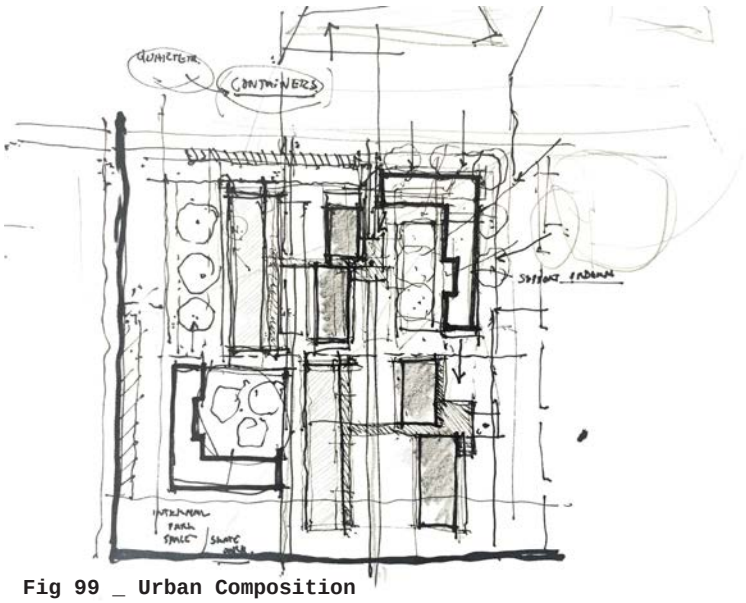


Fig 99 _ Urban Composition Exploration (Author, 2017)

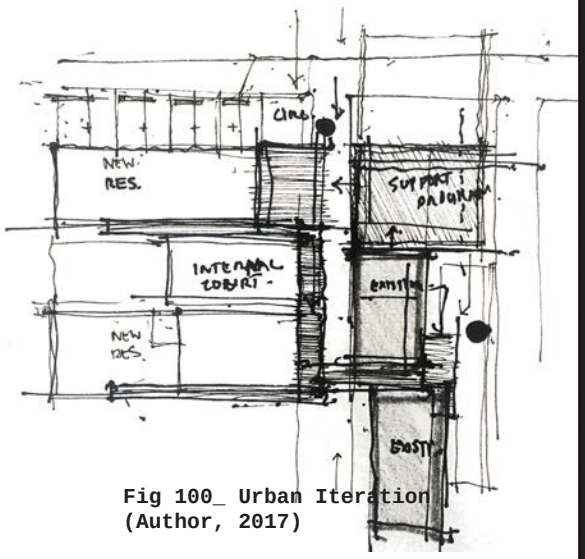


Fig 100_ Urban Iteration
(Author, 2017)

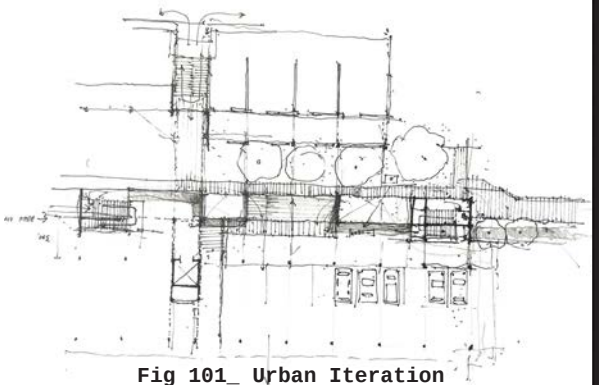


Fig 101_ Urban Iteration
(Author, 2017)

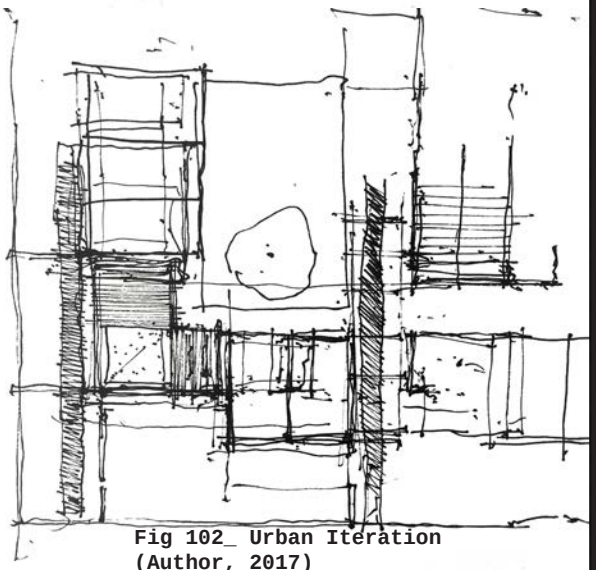


Fig 102_ Urban Iteration
(Author, 2017)

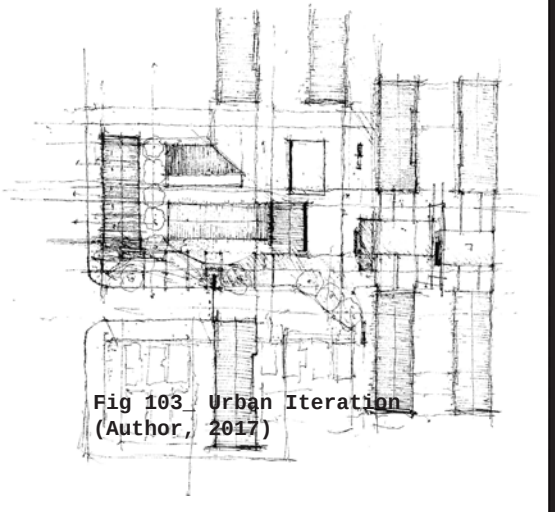


Fig 103_ Urban Iteration
(Author, 2017)

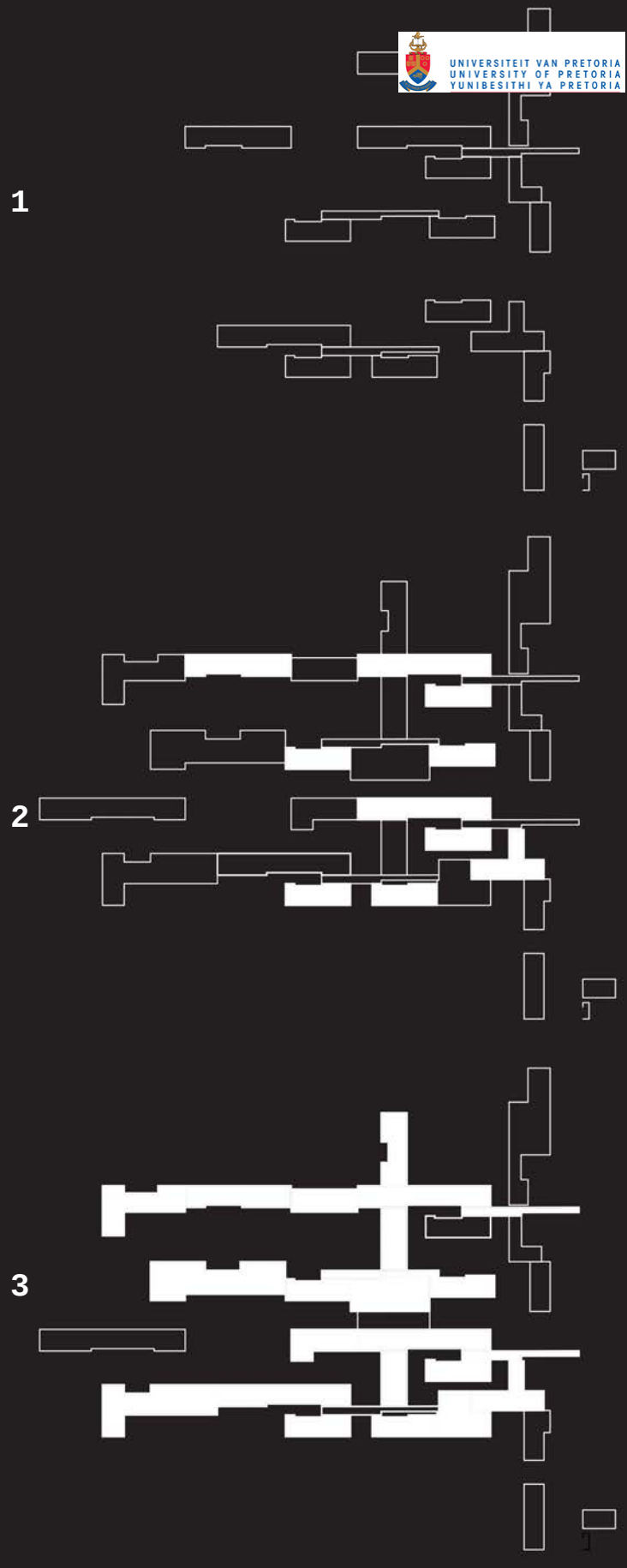


Fig 104_ Phased Development
Diagram ((Author, 2017)

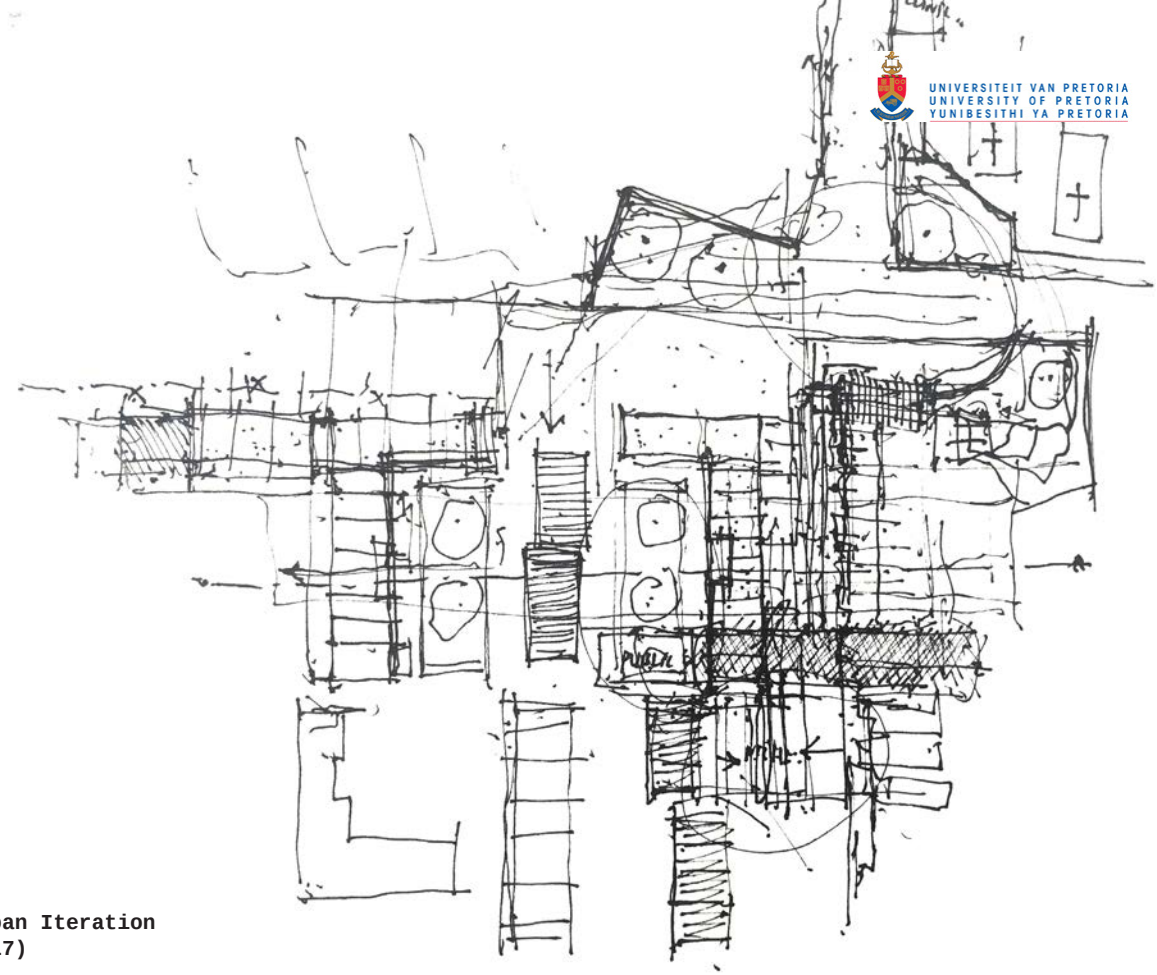


Fig 105_ Urban Iteration
(Author, 2017)

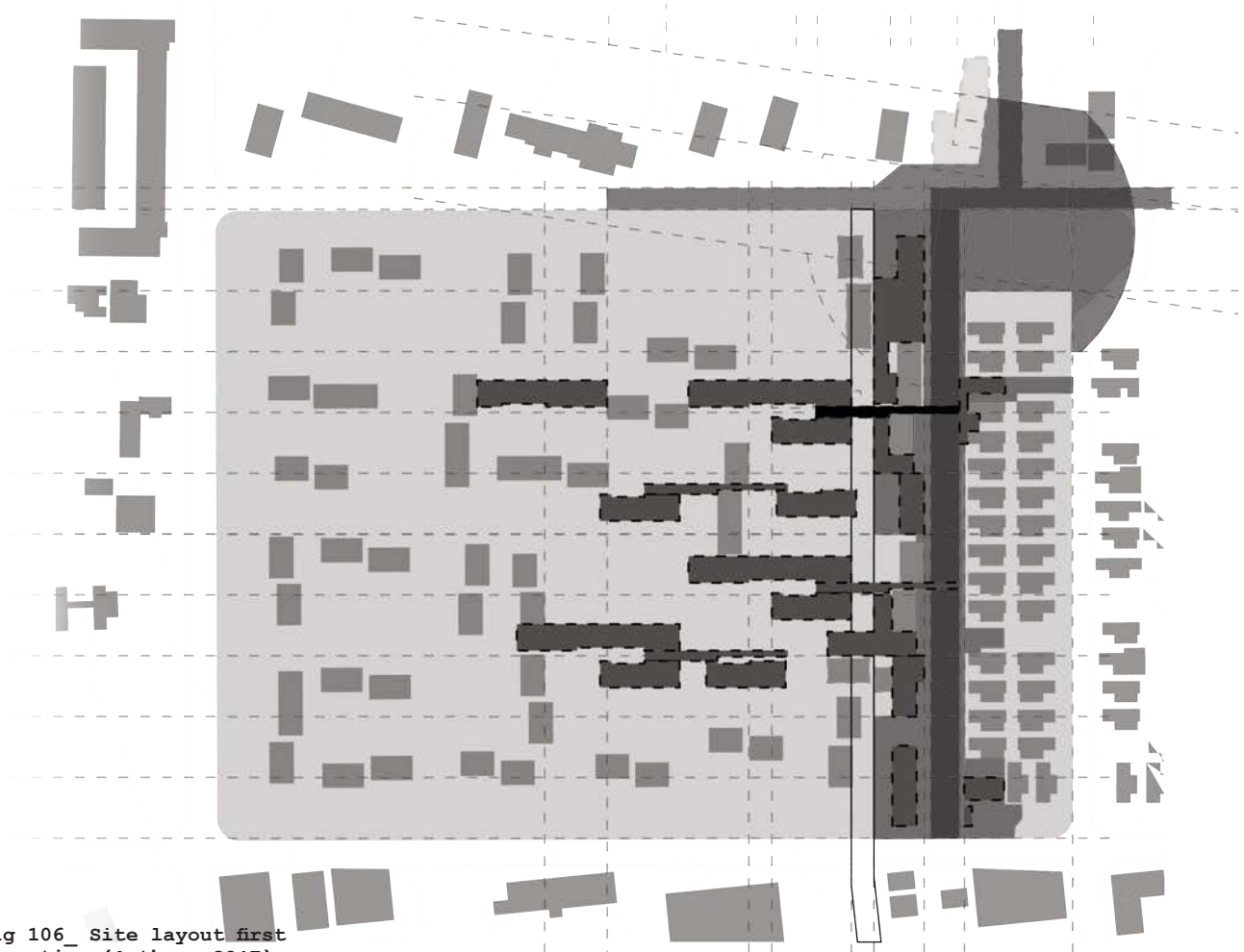


Fig 106_ Site layout first iteration (Author, 2017)

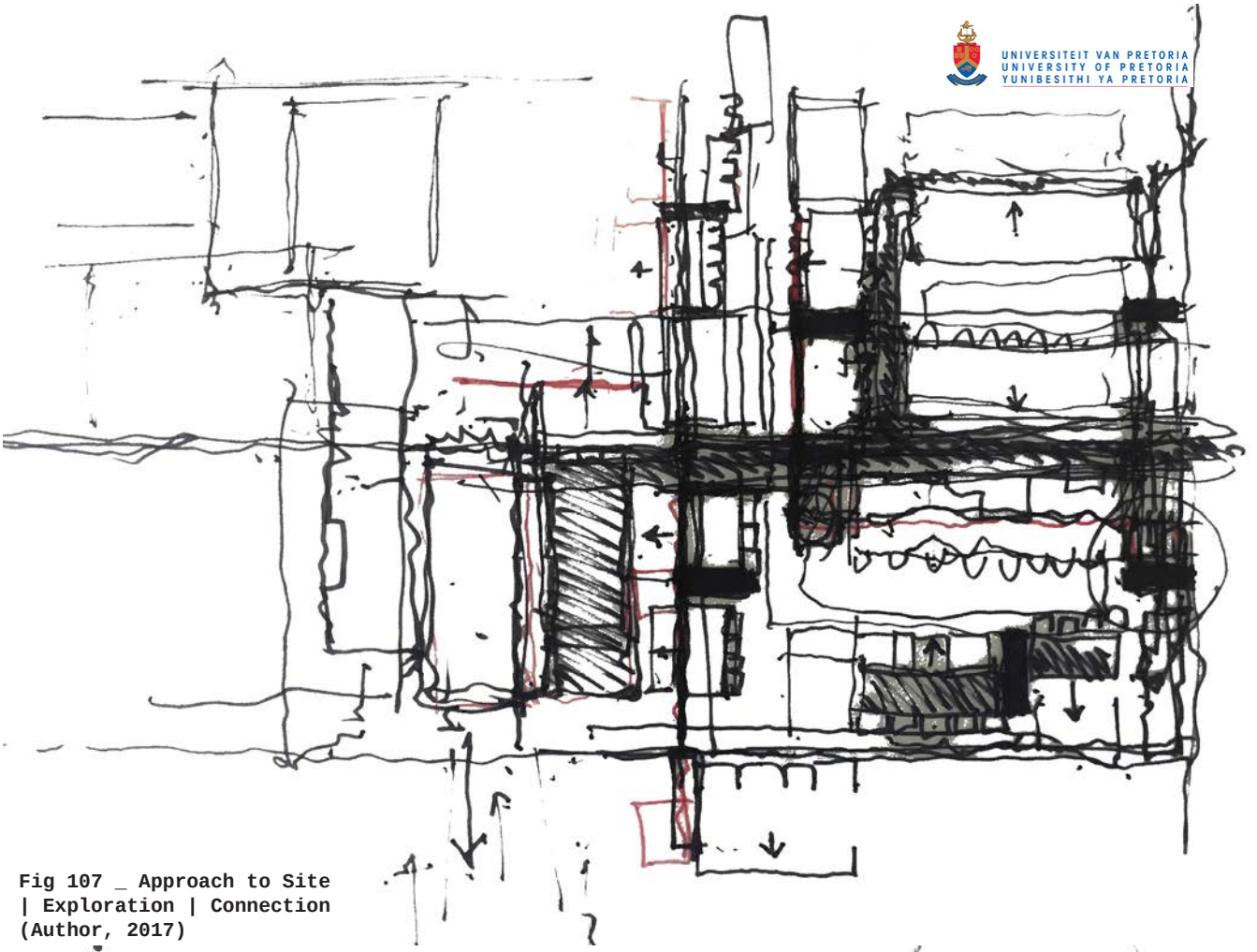


Fig 107 _ Approach to Site | Exploration | Connection (Author, 2017)

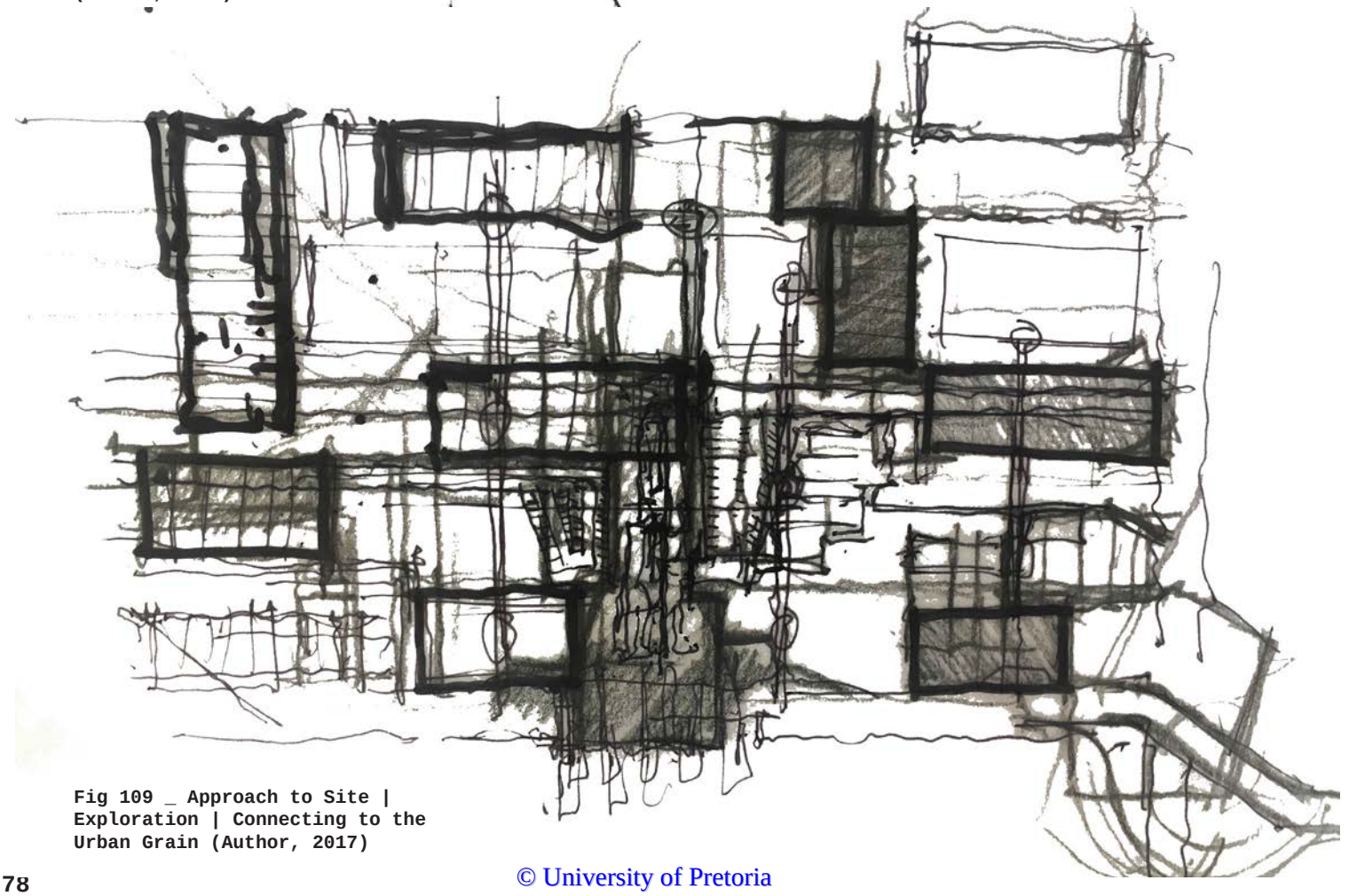


Fig 109 _ Approach to Site | Exploration | Connecting to the Urban Grain (Author, 2017)

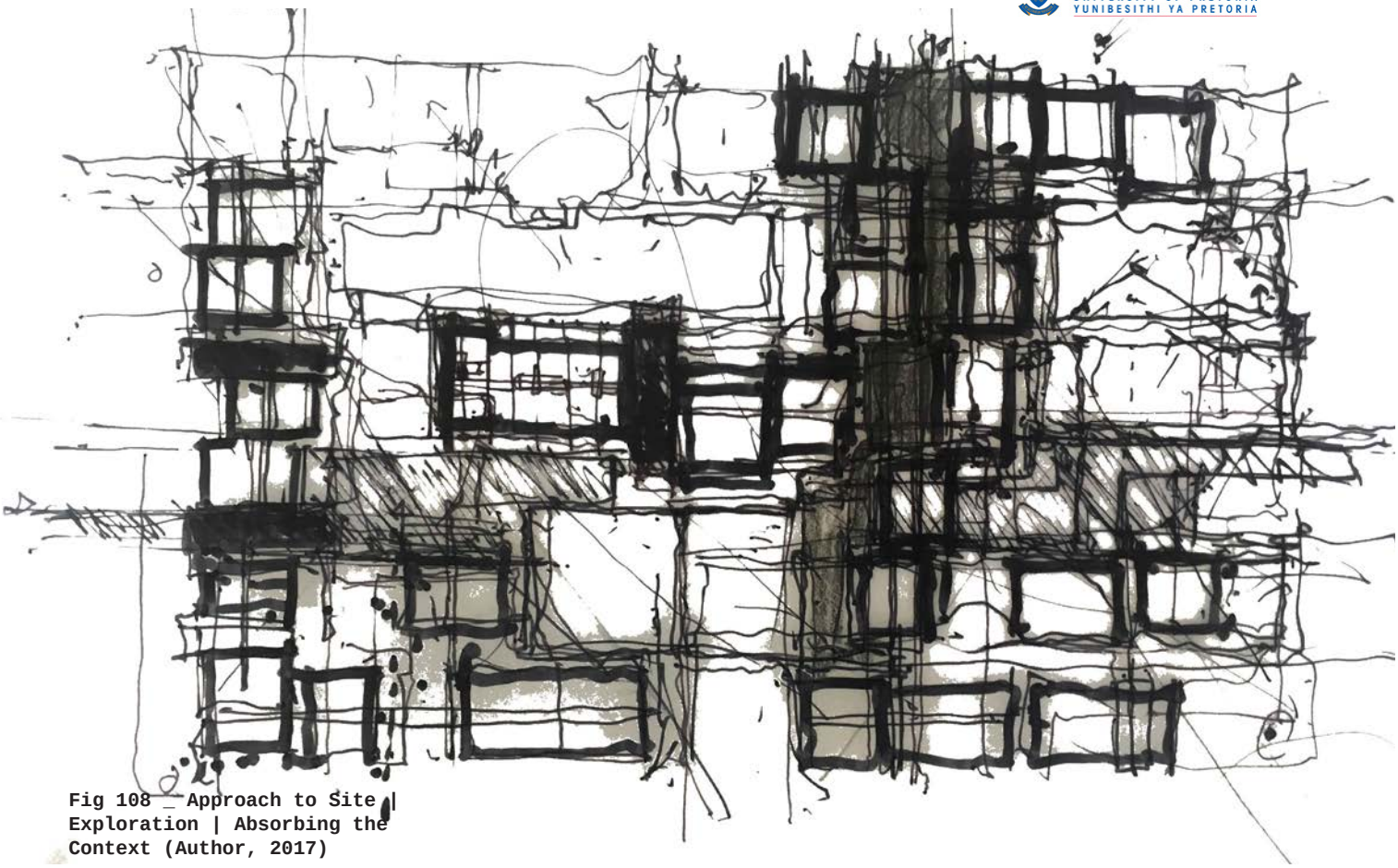


Fig 108 _ Approach to Site | Exploration | Absorbing the Context (Author, 2017)

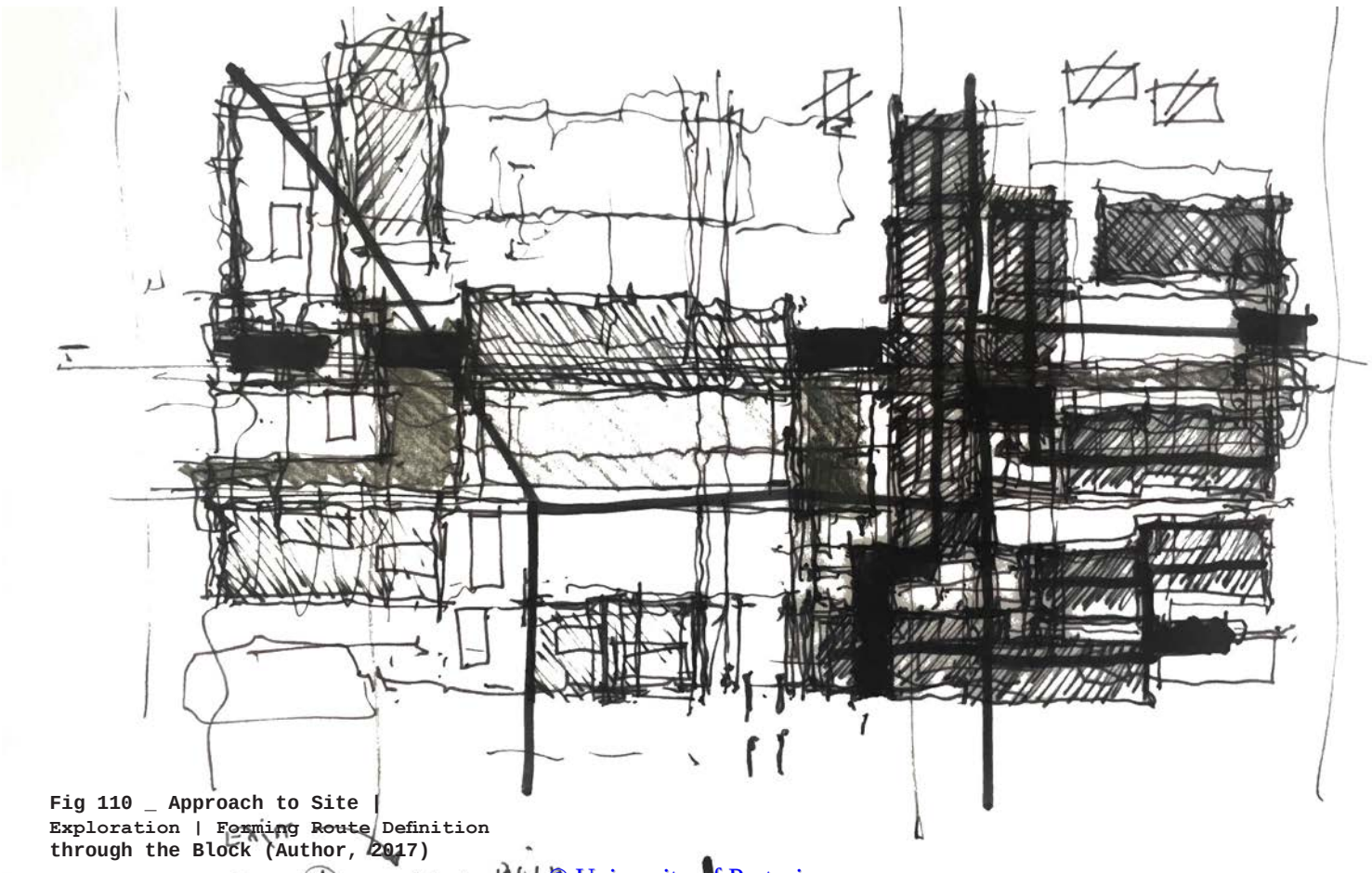


Fig 110 _ Approach to Site | Exploration | Forming Route Definition through the Block (Author, 2017)

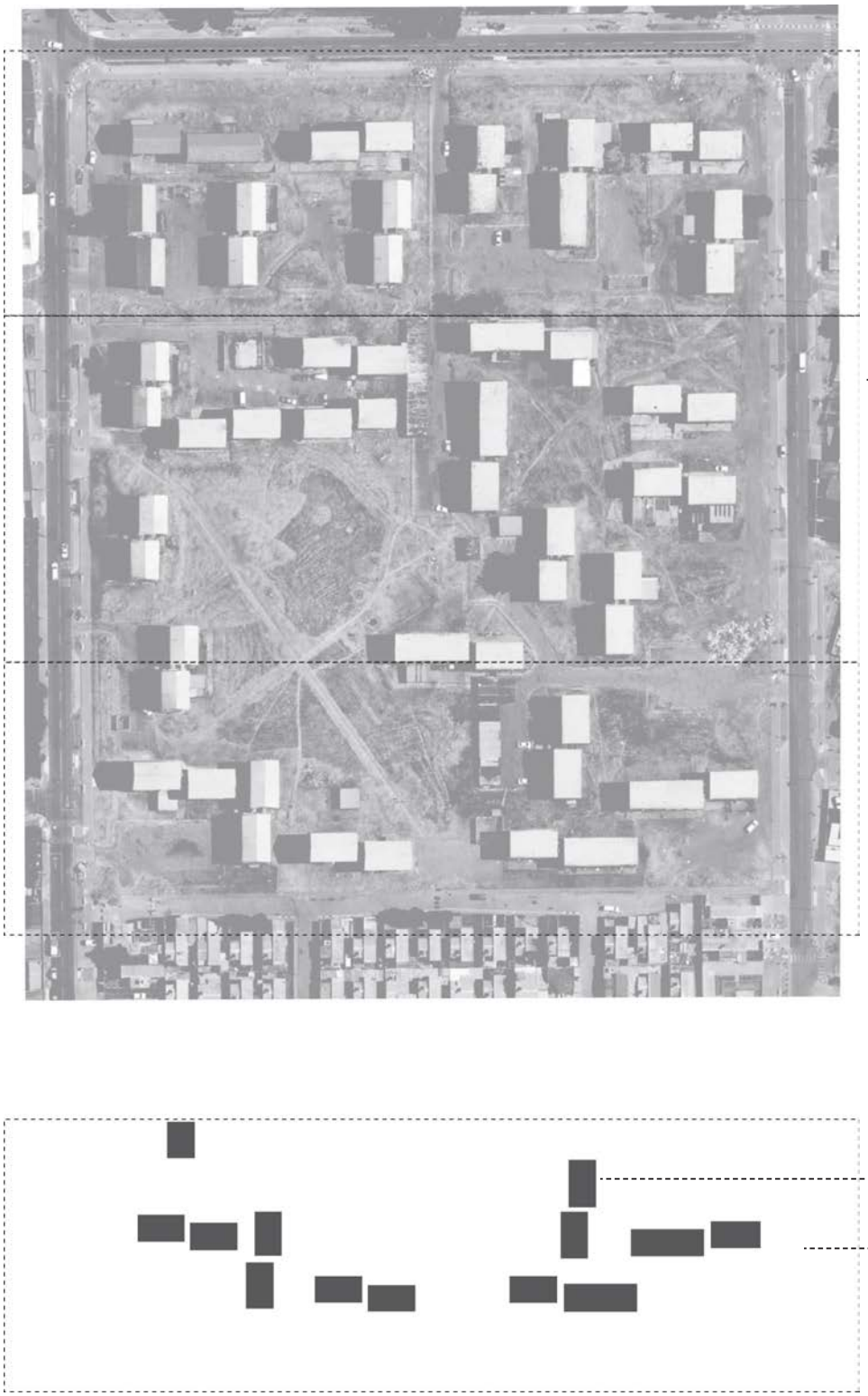
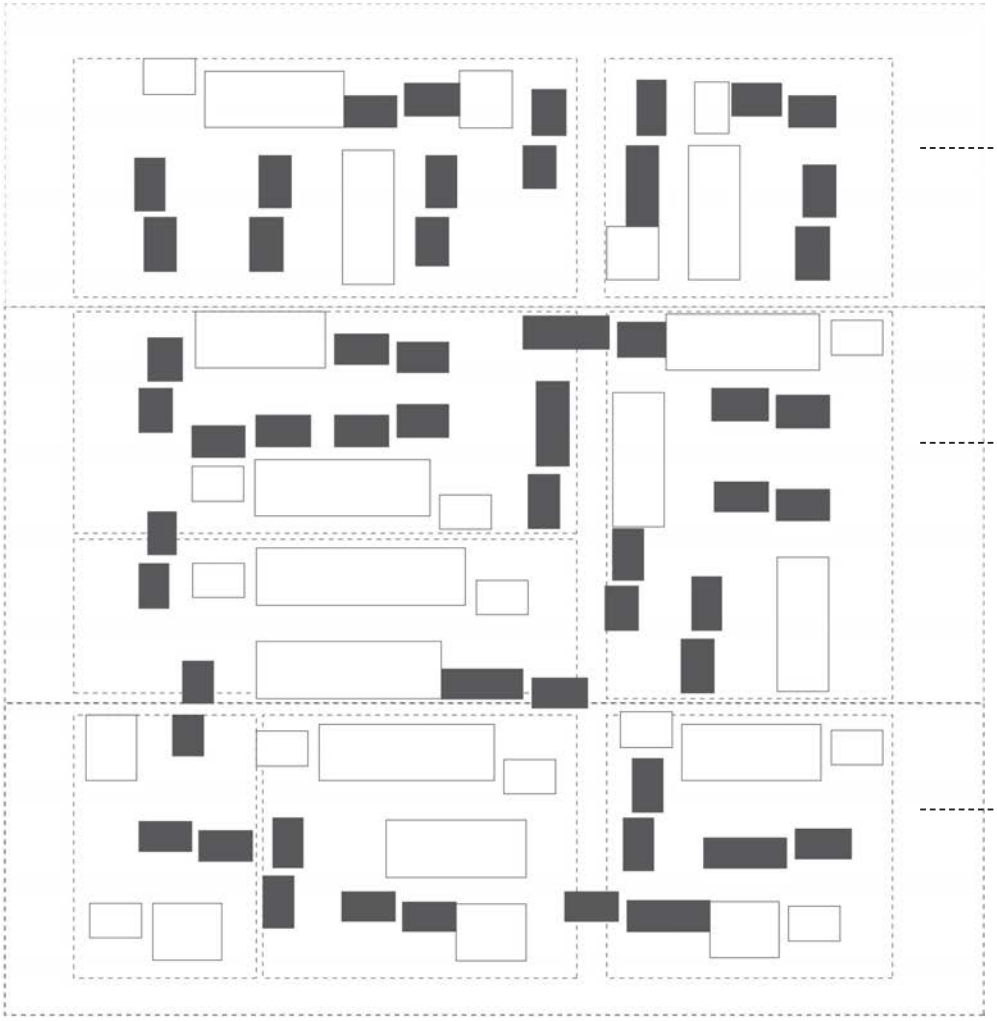


Fig 111 _ Site Development Area Diagram (Author, 2017)

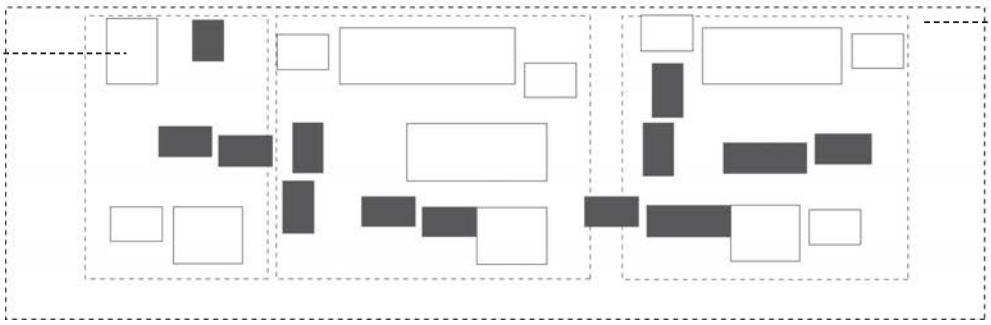
Development Phases



3_ Full Extent of site to be developed with infil Arhcitecture and Infrastructure

2_ Once the context has responded to the initial development the next section can be developed

1_ Initial development will link directly to the urban vision proposal - repurposing the exisiting structures and defining a new visual language on the site



X_Focus area for this dissertation proposal

Fig 112 _ Phases of Site Development (Author, 2017)

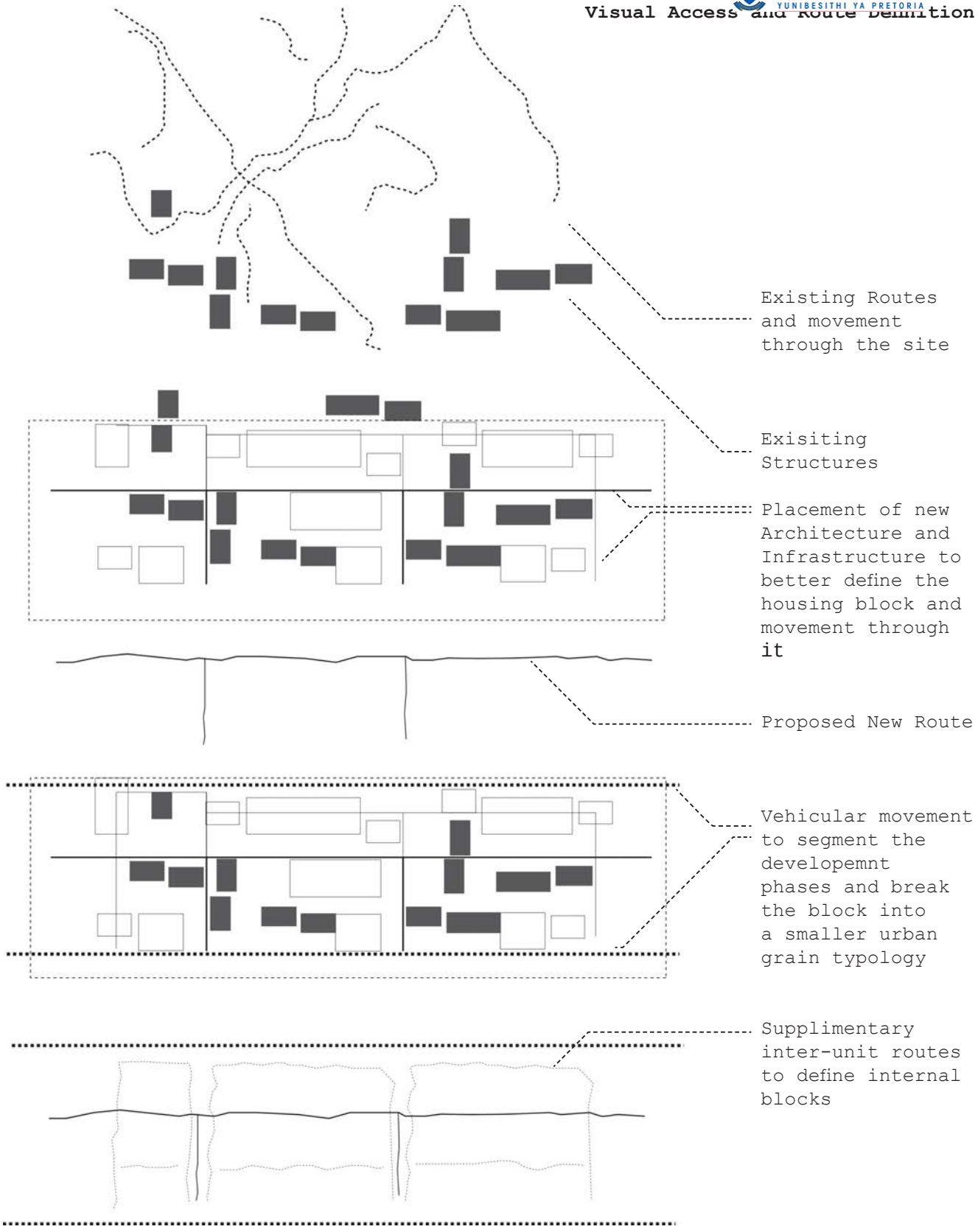
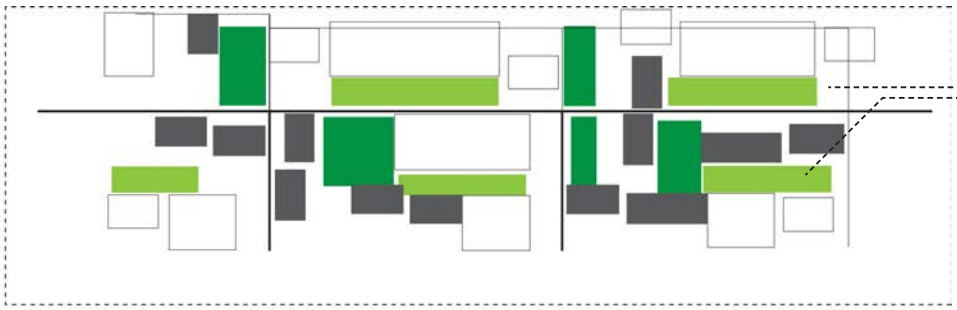


Fig 113 _ Movement and Route Definition (Author, 2017)



Block Definition through Programme

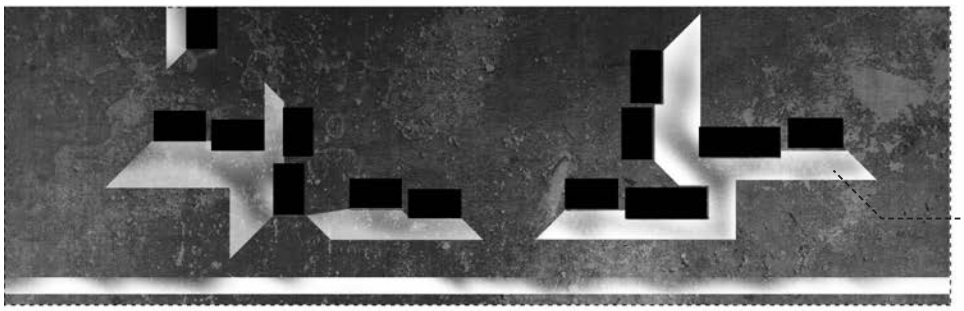
Undefined areas within the block to be reprogrammed as public 'breathing' space in the form of green ' park spaces

These green spaces are broken up into public and semi public spaces

Fig 114 _ Green Public Spaces (Author, 2017)

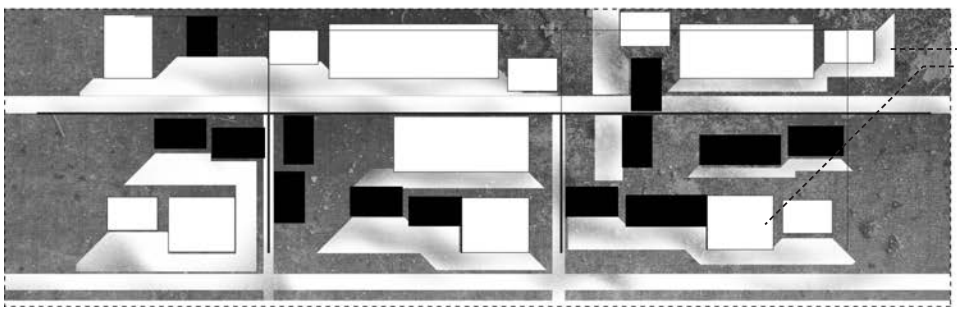
Semi Public
Limited access to residential users

Public
Full Public Acces



Visual Defensibility

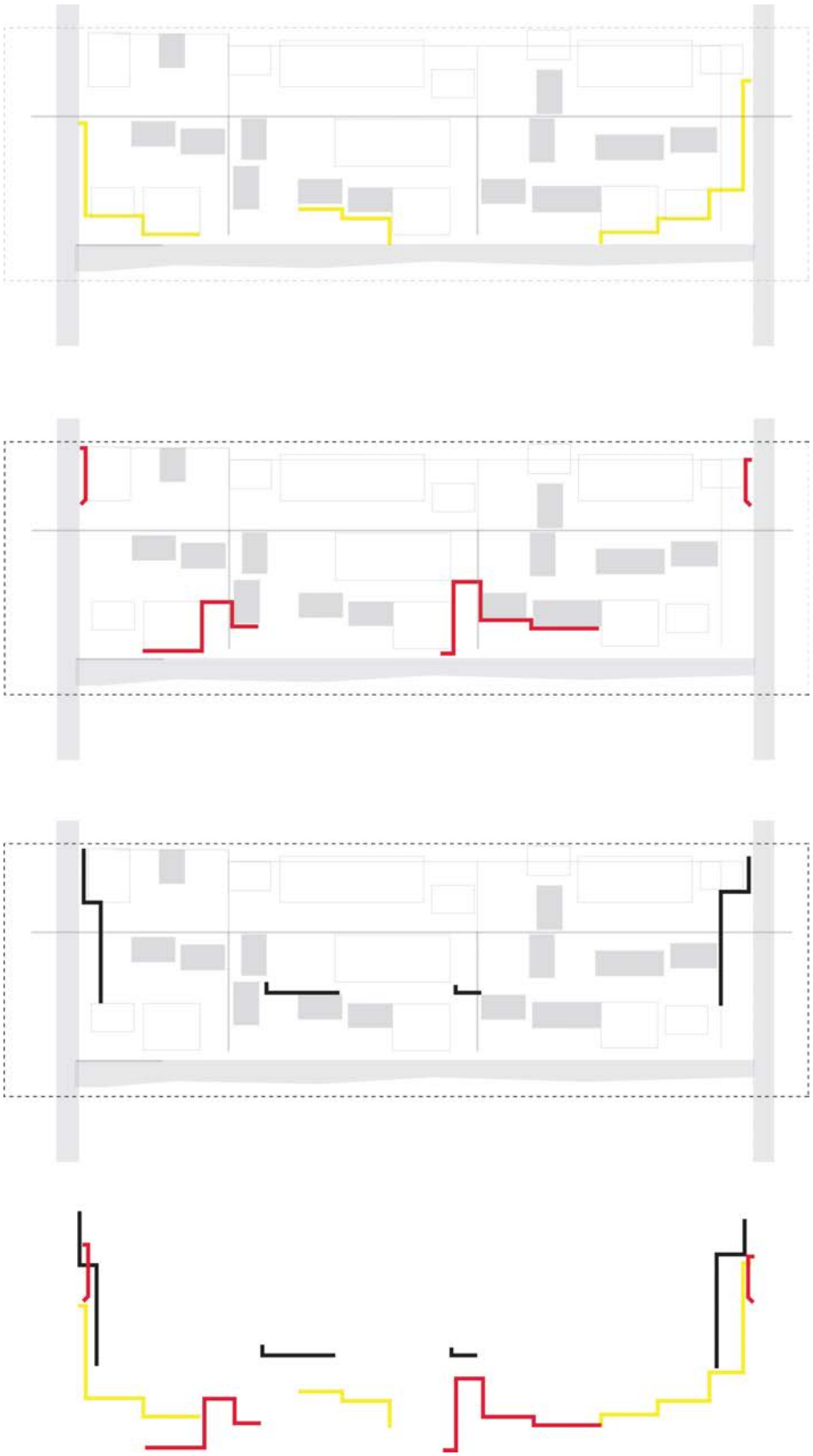
The Exisitng 'eyes on the street' is limited to the circulation areas of the units -



The new Residential units are face both directions in order to increase the the ability for space to be observed and defended

Fig 115 _ Visual defensibility as per new route formation (Author, 2017)

Activation & Definition of Urban Edges



The definintion of the edges will determain the points of access into the block as wel as program the required social activity of certain areas on the block.

The Aim of this definition is to allow visual permeability through the block, in the newly developed route, but create threshold of privacy leading up to the residential units.

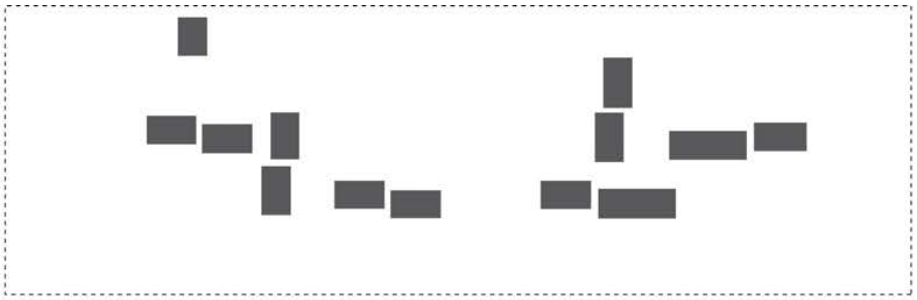
Public | Social Space

Commerical Activity

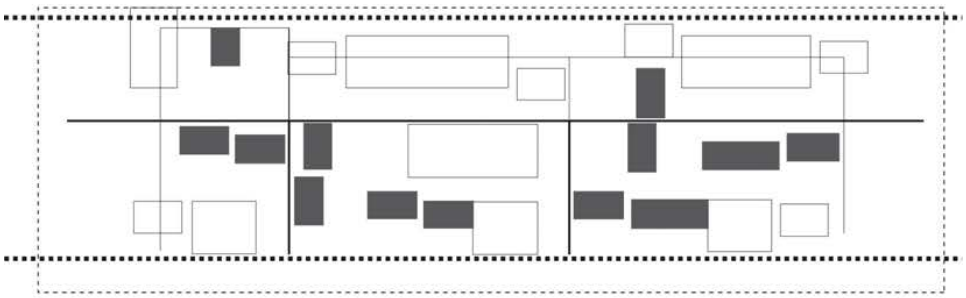
Impermeable Threshold

Fig 116 _ Activation of Urban Edges (Author, 2017)

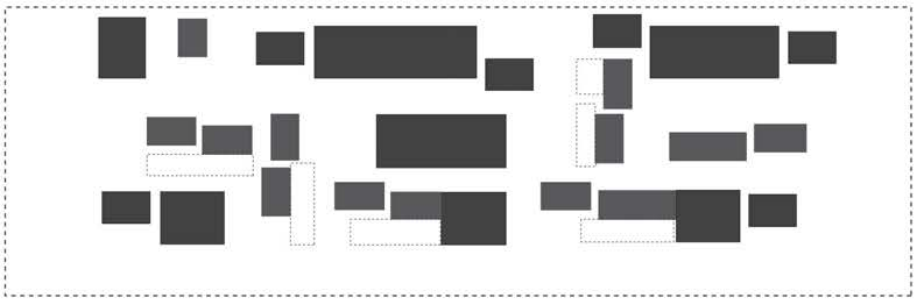
A 11 Phased Implementation



1_Existing Unit and Block Structure

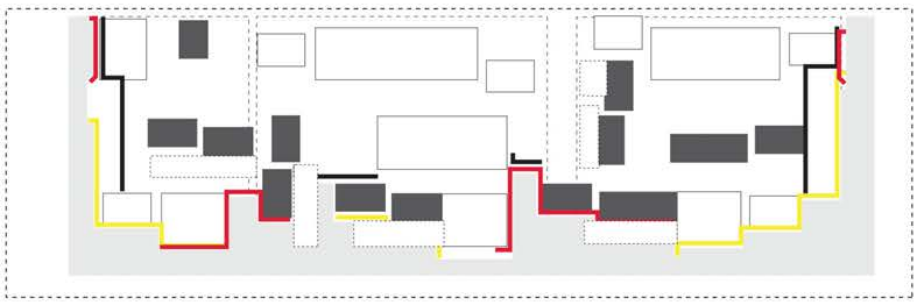


2_ Route Definition and infrastructural Placement

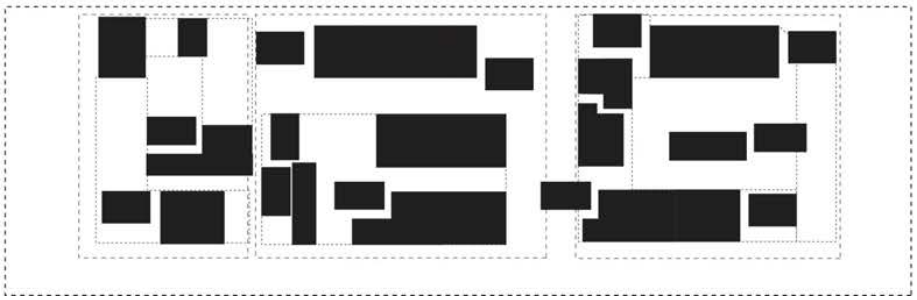


3_ Placement of New Residential Units

(Followed by the migration of exisitng residents into the New Units)



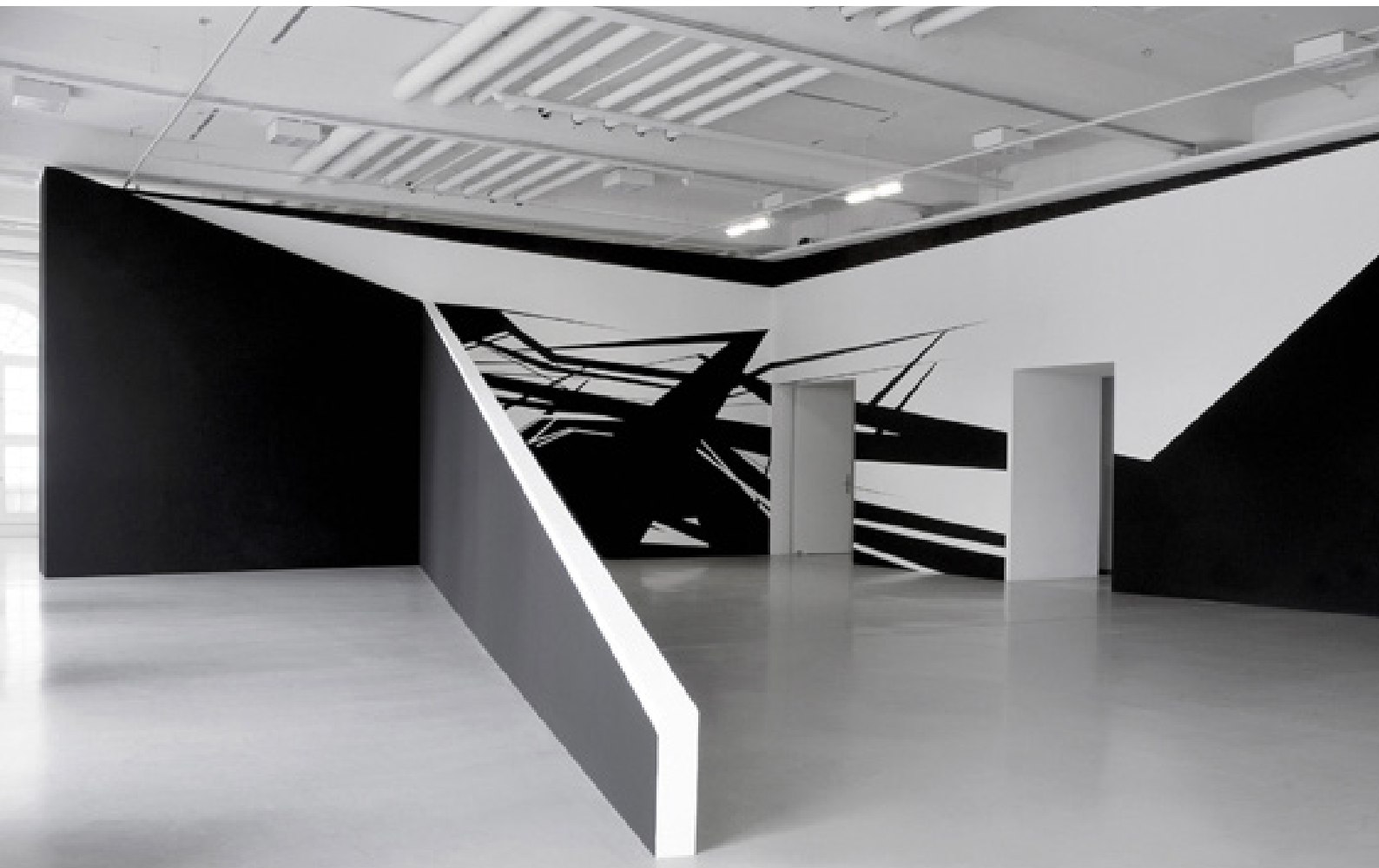
4_ Definition of Edges through the occupation of Commercial and Residential Space



5_ Approrpiation of exisitng (old) units through new extensions to define the final block typology

Fig 117 _ Development Plan | Breakdown Diagram (Author, 2017)

Fig 118 & 119 _ ‘Room Drawings’ (Rusche, 2012)



Spatial Legacy | Identity of Form

The palimpsestic nature of Westbury's urban composition discussed above, has led to major issues of spatial identity, the proposed architectural intervention aims to define space to create a better understanding of the functioning of space. The architecture therefore has to become a function of definition. This definition, as shown in the Violence protection through Urban Upgrade "VPUU" (fig 51) project will help residents to identify with their surroundings, and through subsequent ownership of that space, provide more defensible space. This was conducted through the use of infrastructure and development to facilitate the required social upgrades for the area. Therefore allowing for growth in areas such as safety and social capital in community cohesion, through urban reprogramming and upgrade linked to social requirements. (Wüst & Dyer, 2016, pp. 7-9)

The spectrum of human influence forms a major element to consider in the understanding of cognition, and in turn becomes the key limiting factor in providing a distinct answer. Often leading to one applying a psychological position based on what is perceived as a "logical" condition. "Core components of cognition include mental structures and processes involved in thinking, imagining, perception, learning, memory, linguistic and non-linguistic communication, reasoning and problem-solving. Cognition is also deeply intertwined with affect (emotion) and behaviour, because what we feel and do depends in sometimes complex ways on what we believe, and vice versa" (Montello, 2014).

Understanding the above limitation it is necessary to develop an approach to understanding and defining the relationship between spatial interaction and the process of cognisance occurring within the interaction between user and architectural space.

A study conducted by Marianne Mueller and Fran Cottell named, "Concrete Geometries – Spatial Form and Social Behaviour, 2012" suggests the following categories of study in terms of understanding the relationship in relational potential of spatial form.

The following parameters are suggested to inform the experience of architectural form and direct the subsequent perception of space.

"A | Stimulation of psychological or behavioural responses through particular aesthetic or sensory experiences potentially developing a social dimension.

B | Support through preventing or triggering inhabitation, appropriation, use and other types of direct engagement. Spatial form can provide support or obstruction for the unfolding of social situations and the production of inter subjective encounters.

C | Representation of specific social and cultural factors along with the breaking down boundaries and hierarchies. In aim to terms a space as embracing or expelling, inviting or excluding, assembling, distributing or dividing."

The above parameters aim to define architectural spatial form in terms of human elements, and will define the approach to making an effective spatial response within architecture. To define the relationship between human space and geometric form and allocate a human function to structure remains important in this intervention, as it places further value on architectural space making within a conservative construction cost framework. (Mueller & Cottell, 2012)

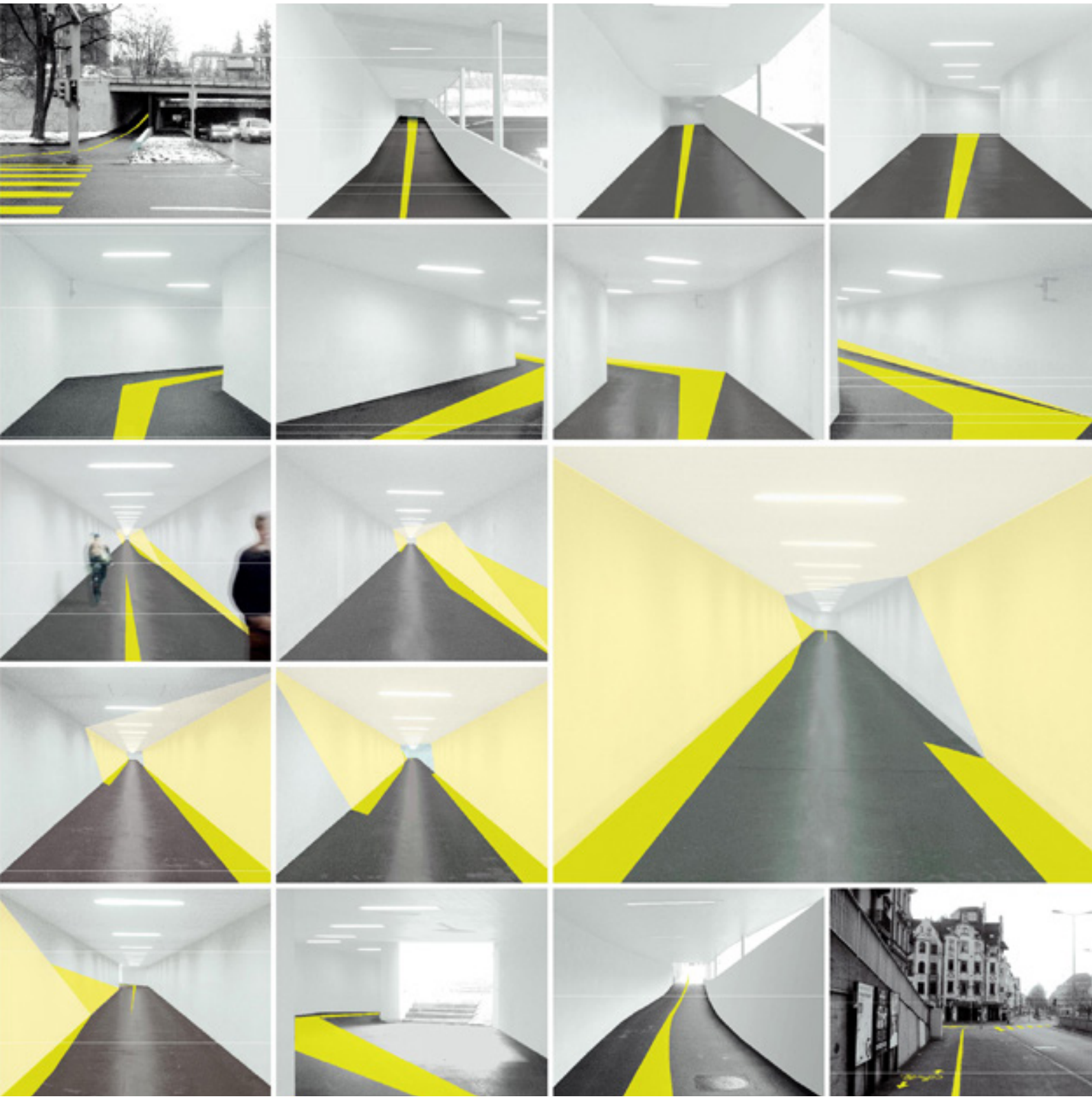


Fig 120 _ 'Saftey Yellow'
Spatial form and Social Relations. "This intervention aims to transform the spatial experience of an inhospitable underpass in Zurich through the use of colour and geometry." (Gerhold, 2014)

Form | The space between identity and defensibility

Layout complexity is a strong contributor to the experiential qualities of a space, yet it remains a poorly understood architectural attribute from a cognitive perspective. There are various formal approaches to quantifying shape or network complexity, but these considerations are often limited in their explanation of complex spatial interactions.

"Certain geometric patterns of pathways influence cognitive complexity; for example, oblique turns are more complex than straight paths and orthogonal turns" (Montello, 2014).

Articulated and broken up spaces or routes, are generally understood as being more complex spatial arrangements, however it is the way the corresponding parts are located, organised and connected which leads to the understanding of how these spaces can influence user reaction.

The above parameters place architecture as a series of connecting spaces that produce an experiential outcome. Within the proposed framework, this 'series' of spaces must remain as a very simple and understandable point of engagement. The early stages of development within Westbury will require a space that initially provides the users with a safe transition between spaces, and limits the congregation of anti- social behaviour. A strong formal precedent, designed by Jean Nouvel presents the ability for a low cost structure to housing healthy social environments outside of the required housing units, but also, through visual permeability maintain a sense of visual security.

Nemauses 1 & 2 Housing (1985-1987) was a radical experiment in applying the principles and materials of industrialized building to the construction of social housing. Consistent with other "industrial aesthetic" projects by Nouvel of this period, these two apartment slabs express maritime and aeronautical imagery within the framework of an assemblage of pre-manufactured industrial components. Built in an industrial zone in the southwest part of Nòmes as part of a program to renovate a decrepit district of 1960's public housing, Nemausus was also seen as a radical alternative model for the usual limited, desolate programs of rent-controlled, subsidized housing. In addition to providing a fresh new image for public housing the application of industrialized construction technology sought to reduce construction costs and thereby provide larger, better dwellings (Sherwood, 2002).

Jean Nouvel's innovative housing model displays some key environmental characteristics that extend beyond the industrial motif of his design style. the entire building is raised which provides space for vehicle parking, but also extends the visual access throughout the site on ground level, this allows the entire public sphere to be in constant visual surveillance by the residents.

Furthermore the circulation and access of the structure boasts ample space for residence to gather and socialise on walkways and stairways. Between the two residential buildings is courtyard space which is met in close proximity to the circulation walkways of the building, creating a level of engagement from the public sphere from the ground level, to the more private entrances of the building. Finally, the residential units extent throughout the building and open into private courtyards which face away from the public sphere, allowing for external private space as well.

Architectural design affects sensory access, memorability, knowledge, reason, behaviour and sociality
Montello writes in "Spatial Cognition and Architectural Space: Research Perspectives. Architectural Design" that there are 3 major spatial factors that influence the cognisance of space, namely

(1) Differentiation of appearance,
(2) Visual access, and
(3) Layout complexity.

The above parameters contribute to how readily space is understood, and the ability for a user to orientate within that space, and although they seem self-evident to architectural space making, understanding the impact on social behaviour becomes a complex dialogue between user and space.

Beyond physical architecture layout and visual access, the perception of a space is also determined by the programmatic layout of the development. 'Brickfields' Social Housing Precinct is located in the inner city of Johannesburg, the historically challenged area required new development as the precinct around the site was undergoing large scale regeneration. This need to develop along with the Council requirements for a portion of development zoning being allocated to low income housing, allowed for the application of this housing scheme. What set 'Brickfields' apart from other low income housing is the urban framework catering for mixed use development, as well as challenging the low density low income housing typology paradigms such as the RDP housing project. However the edge conditions present within the intervention are not addressed well, the ground floor units are placed directly onto the street edge and therefore destroy the ability for that urban transition to grow and facilitate social activity, as well as posing multiple safety and privacy issues for residents on the ground floor.

Fig 121 _ 'Social Clustering' (Coleman, 2016)

" Brickfields was Johannesburg's first inner city high rise development in 30 years and is JHC's most ambitious project so far. Comprising 742 units in a mix of low rise and high rise buildings, it was JHC's first exposure to high rise construction. It is JHC's largest single investment, and the first time that a consortium of financiers including government, private banks and private investors have come together in a social housing project. The development is part of the City of Johannesburg's Newtown urban regeneration scheme, and to date has brought approximately 1600 new residents into this section of the city. Brickfields was the second of JHC's projects to be opened by the South African president." (Dodd, 2006).

However some sections of the building's elevation face directly onto the street, and therefore exposing the private internals of some units to pedestrian movement on the street and also limiting the ability for the street environment to adapt to the structure. In moving forward this shows that the sidewalk becomes an important component to consider when placing a structure of this size.

"Like other physical environments, architecture influences human cognition, experience and behaviour by allowing, facilitating, requiring, impeding or preventing various perceptions, thoughts, emotions and acts. Architecture does this physically" (Montello, 2014)

Within the context of dense urban fabric, a set of implied rules and norms invites certain responses to the exploration of spaces; this sociocultural response indicates a cognitive social reaction in relation to physical form and order. The architecture of this proposal must maintain a dialogue between its form and the intended social reaction.

Finally the differentiation of appearance; whether spaces are homogeneous or heterogeneous in appearance, with respect to size, shape, and colour and architectural style plays a vital role in determining the

allocation of mass and void within this urban intervention.
"In general, people find differentiated environments easier to comprehend and way find in because the differentiated parts are more distinct and memorable" (Montello, 2014).

Differentiation is a key factor in the formation of relatable landmarks in terms of form and order However over complication of appearance may in fact induce the opposite and disorient users. Although differentiation is, to a degree a subjective variable, the influence of appearance change informs significant spatial characteristic and provides a platform for changes in accessibility, use and cognitive reflection (Montello, 2014).

This differentiation of space links directly to visual access; as the degree visibility of core components in the building or interior fabric, concerns the points from which people can visually locate particular sections of the structure, including elements such as the entrance, destinations and other potentially key landmarks or structural features. High visual access determines a strong ability to maintain spatial understand-ability and orientation, limiting concerns such as uncertainty and mystery.
"In a complex or unfamiliar environment, this will tend to reduce excessive stress, while in a simple or familiar environment; it will tend to reduce moderate stress to boredom. Control over visual access influences one's sense of privacy" (Montello, 2014).

In the case of Westbury's current urban layout, there is very little visual legibility and subsequent control of space, leading to regions within the urban layout that form dangerous space, there are many of these indefensible points within the chosen site of intervention and often they are the cause for the social failings of the structure present on the site. Therefore it becomes vital that defensibility is addressed, especially within the proposed public, relational spaces. The process of formulating a programmed social reaction within the existing spaces becomes a difficult component to understand and predict.

"Social space, is made up of a complex of individual feelings and images about and reactions toward the spatial symbolism which surrounds that individual. Each person, it seems, lives in his own personally constructed web of spatial relationships, Different groups within a population may therefore have rather different spatial schematic abilities, and education undoubtedly plays an important role in determining spatial ability" (Harvey, 2005).

Along with the individual nature of interaction, the complex range of experience does not only differ between individuals and groups, but also in progression of context through time. This programming of structure to inform spatial behaviour will have to adapt as the social sphere alters through occupation.

It is important then to consider the nature of common experience as a fluctuating system that may include outlying influences. With this in mind, we are challenged to form our understanding of space through mediation by consideration of symbolic value in social interaction and cognitive processes.

Therefore this proposal will lend itself to the basic understanding of social interaction within the space, but limit any deterministic placement of reaction or social control. The planned flexibility within the architecture intends to allow for the residents of the intervention to programme the space as they see fit, however, the architecture will suggest and in some cases limit possibilities in order to allow for the a set of interactions that connect to the whole.

Synthesis | Part A

The process of breaking Westbury into its various historical components has led to the understanding that definition of space will maintain the strongest proponent of its urban redevelopment. However, through understanding the social background as well as current activity, it is shown that an architecture must be created that provides for a safer urban environment, a stable platform for the growth of communities, rather than a housing system that leads the stagnation of social progress. There are many precedents that indicate viable solutions to the problem of housing; this proposal also seeks to define an approach that can be applied in multiple urban settings. However the manner in which this architecture is placed must be view as a system that remains unique to Westbury. The success of this intervention will be within the ability for this intervention to grow within this context.

The design of this model will provide a framework of facilitation. The necessity for the urban landscape to change will determine the formation of structure and the placement of programme. It remains vital that the initial phases of the intervention remains focused on dealing with the severe urban condition and anti-social behaviour. However the framework must present a possibility to grow into a more efficient high density model once the residential and commercial programmes are within full and sustainable occupation. As such emphasis is placed on the ability of infrastructure; being circulation elements, service frameworks as well as platforms for social and commercial growth start to define what has previous remained indefinite.

Preparation for development
| Physical platform
| Facilitation for future development

The contribution of this urban and architectural proposition lies within understanding and developing an approach to redefining indefensible dangerous urban spaces which remain undefined between residential programs as a part of apartheid spatial legacy, in turn allowing for a sustainable socio economic growth platform for the residents of Westbury. Redefining existing residential programmes and infrastructure on an urban level by creating a new framework to restructure and anchor stronger social programmes and finally, to consider the potential for architecture as infrastructure to connect define and programme a community driven development and for architecture as infrastructure to define the interface between the complex spectrum of living; from the intimacy of personal living, to the necessity for social interaction.

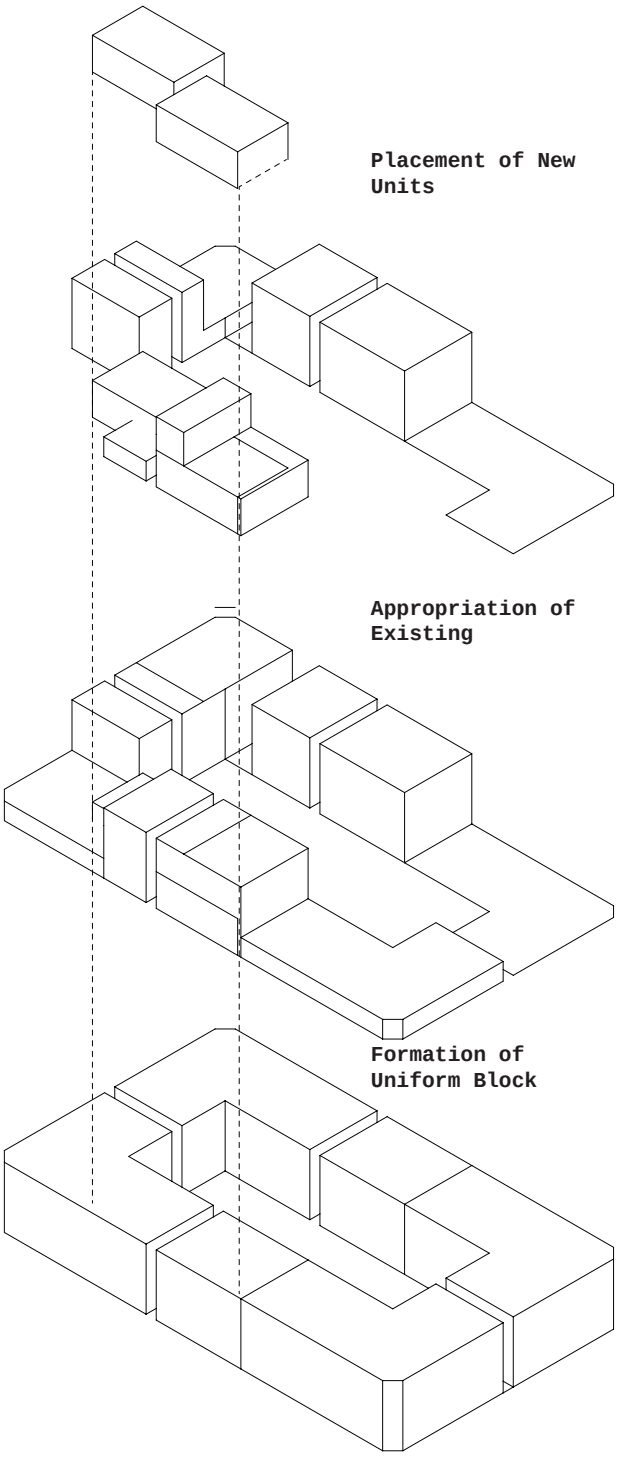
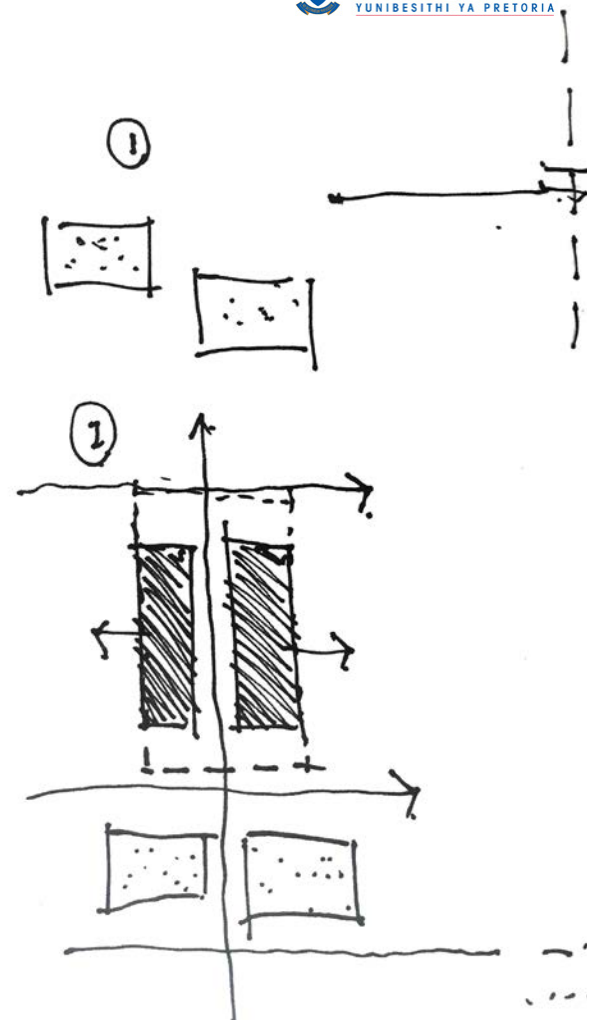


Fig 122 _ Urban Strategy Diagram (Author, 2017)



Urban Strategy

A New Urban Infrastructure - Physical Framework for Grid Redevelopment (fig 122)

The initial point of departure within the development of this scheme lies within the placement of a new infrastructural grid onto the site, which takes the form of laying down the service network for the new residential unit blocks as well as linking the existing residential units into the new system. Along with the placement of new services comes the placement of circulation elements that inform a new structure and hierarchy of movement through the site. The interlinking of services and circulation means that there is a saving on the cost to place this infrastructure as the services are housed by the circulation elements and the circulation maintains a multiplicity of uses in its formation. The design of this developmental model remains within a strict grid layout, subsequent appropriation of structure and services may occur outside of this grid, but the overall approach aims to allow for that appropriation to occur within set standards of building material sizes and practices.

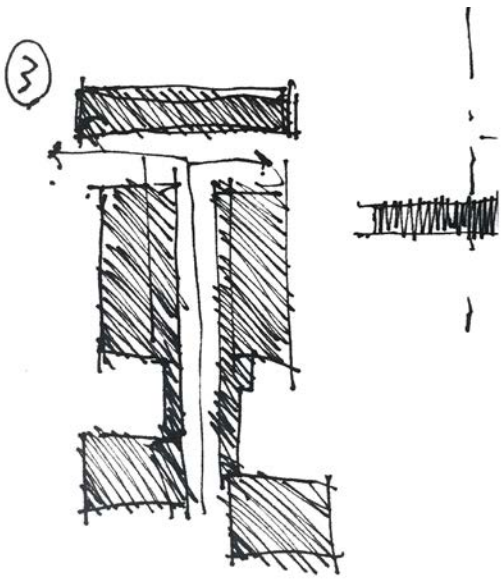


Fig 123 _ Urban Strategy Concept Sketches (Author, 2017)

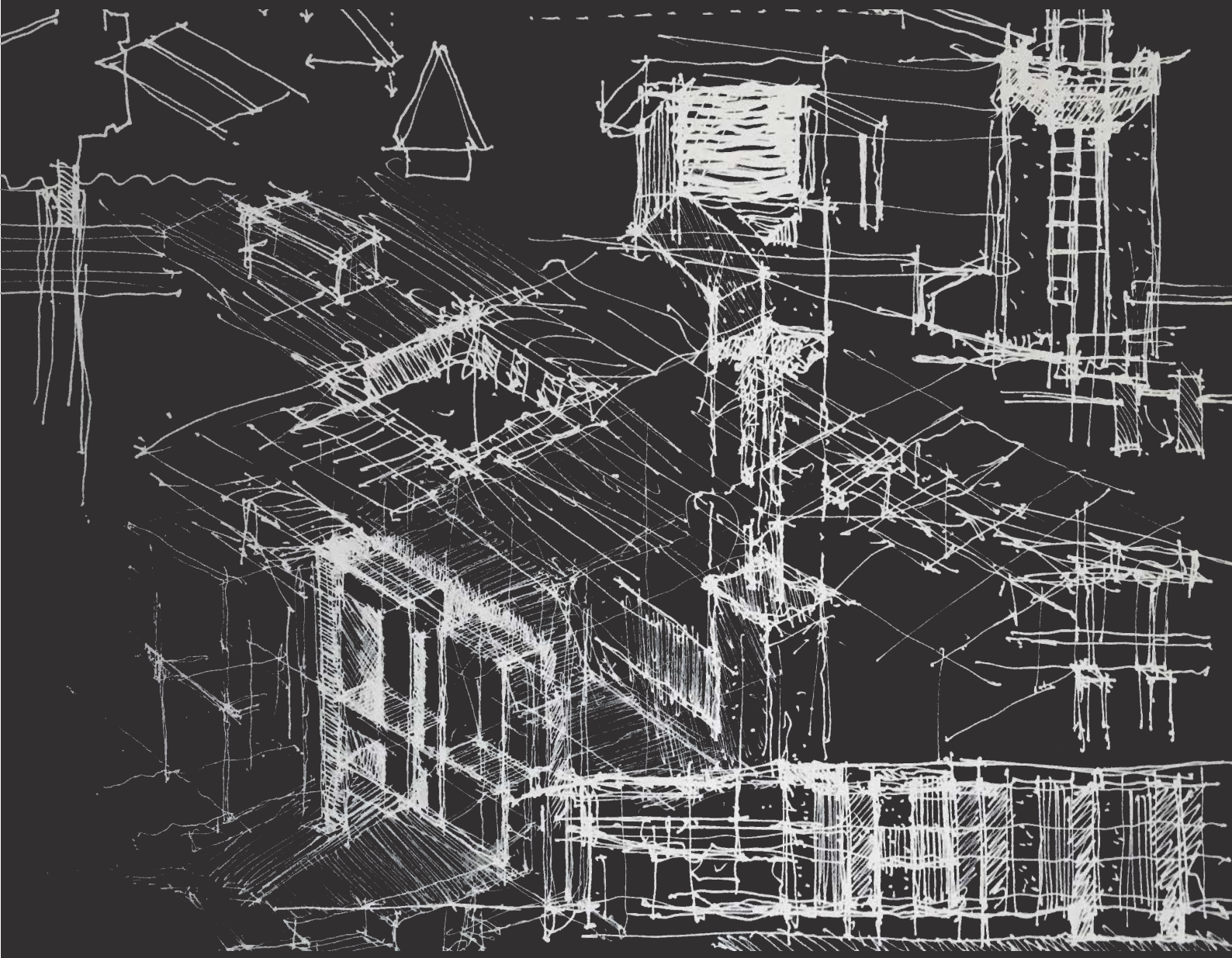


Fig 124 _ Design Development Drawings (Author, 2017)

B01 Architectural Strategy

The formation of the residential structure occurs as a set of interlinking modular parts. The selected forms are based on the iteration of unit layout as well as the understanding and testing of negative spaces formed within the arrangement of the unit blocks. This organisation of unit typology extends further into the economics and costing of the overall project, Instead of conventional housing typology which bares circulation elements on every individual floor, this intervention aims to minimise the amount of circulation that needs to be constructed. Therefore a single circulation path will run through the centre of the structure and bare all of the movement external to the units. Furthermore this allows for the circulation to be more generous in its form, allowing for multiple elements of social activity to occur external to the units. As seen in the current organisation of Westbury's housing, there is a large emphasis on the social activity on the external points of the buildings, social gathering and interaction is an element that must remain prevalent within the new development. From this central circulation element the units open up into the predominant living spaces; living space and kitchen, and then provide movement upward or downward into the private room spaces. All of the units are proposed as the bare minimum in material use, cost and finish therefore providing a framework for the units to grow as per user requirements. The overall development is phased as set of responses that aim to deal with certain site issues before further densification.

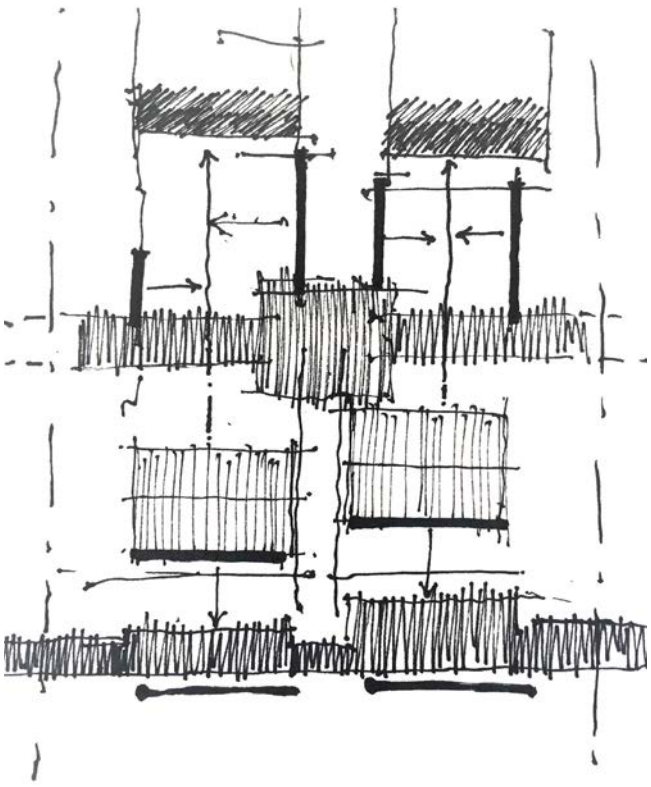


Fig 125 _ Threshold and Movement Exploration Drawing (Author, 2017)

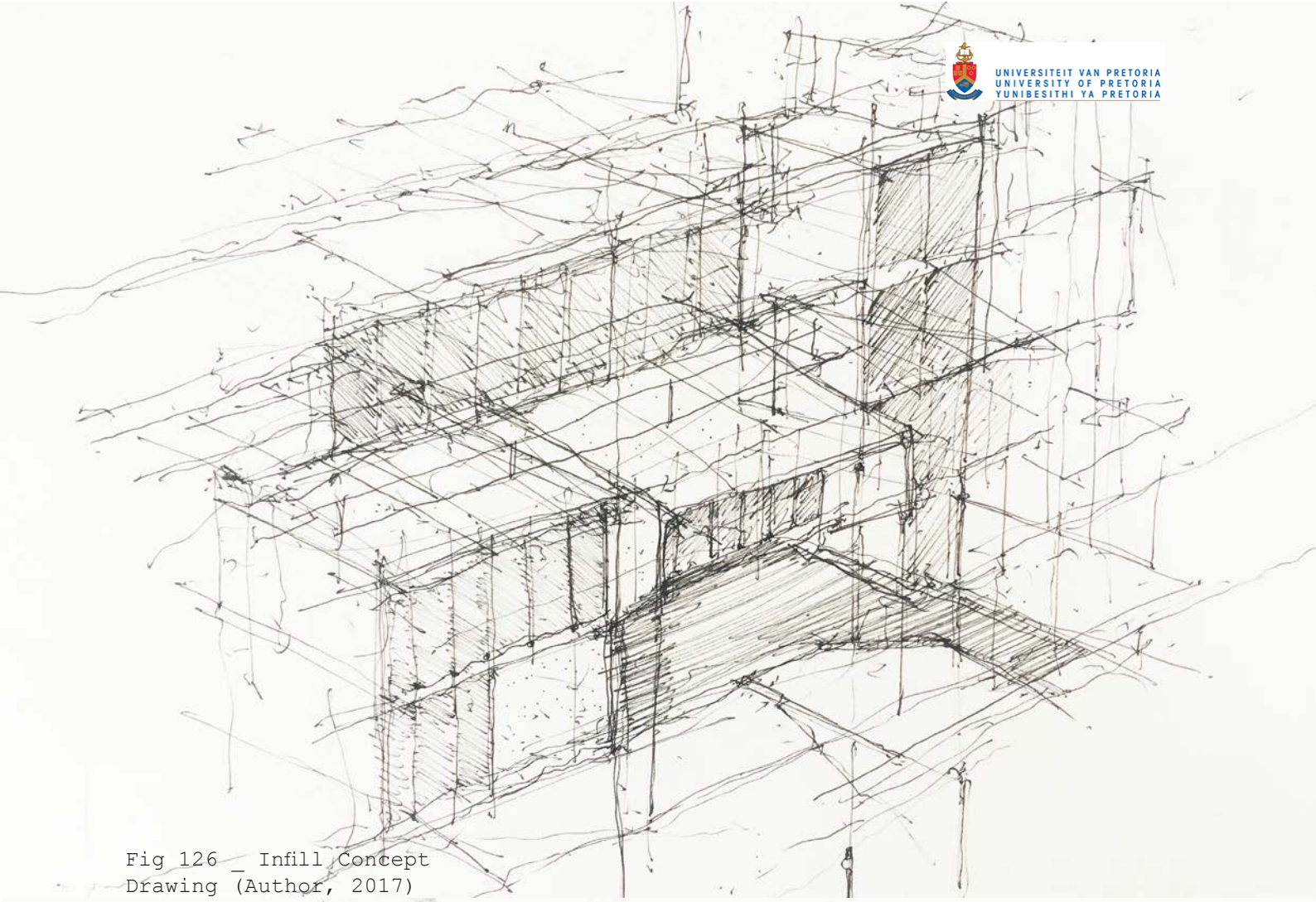


Fig 126 _ Infill Concept Drawing (Author, 2017)

Fig 127 _ Infrastructural Connection Concept Drawing (Author, 2017)

B02-1 Infrastructure as a corrective frame

The placement of the infrastructural grid is focused on the southern section of the site. At this point a new vehicular and pedestrian thoroughfare is created. The focus of the approach is to reorganise the existing urban spatial legacy within Westbury. In particular it focuses on removing elements that obstruct visual access and limit the ability for service elements such as waste removal and even visual policing of the space to occur. Therefore the removal of large bollards and walls that close off the end of the streets happen first after which the rapid placement of prefabricated elements are placed (fig 128) to form the new residential units. The construction of the 'corrective frame' defines a new grid on the site, which will house both the architectural frame for the new residential units, but also connect to existing buildings on the site in order to facilitate a new use within those structures (fig 126-127). In this manner the process of reconstructing this site will minimise the displacement of current residents on the site. Within this corrective frame lies also the provision of new services and the connection of existing services to a more efficient framework; this takes the form of site water drainage and collection of runoff, the connection of electricity grids to a larger monitor-able system and finally a new circulation and access plan.

The corrective frame acts as part of the urban vision and stays true to the layout, geometry and programme.

The process of redefining circulation holds a major role in the redefinition of the spatial condition in Westbury, in order to deal with the milieu of spatial defensibility issues access to the site and specific points to the site will be limited to certain points of the site, major access points which house large volumes of pedestrian movement are programme and situated within points of high visibility, the movement into and through these spaces is also considered so as to limit the number of blind spots. Furthermore these circulation points will house multiple uses such as laundry facilities, commercial and retail opportunities and congregational or recreational spaces, not only does the concentration of use on the circulation spaces produce a more defensible movement to and from residential units, but the multiplicity of use as well as minimising of infrastructure for services creates a more viable financial model of construction as in this case there is only 1 circulation route being created, servicing one floor instead of 3 – 4 individual storey conditions.

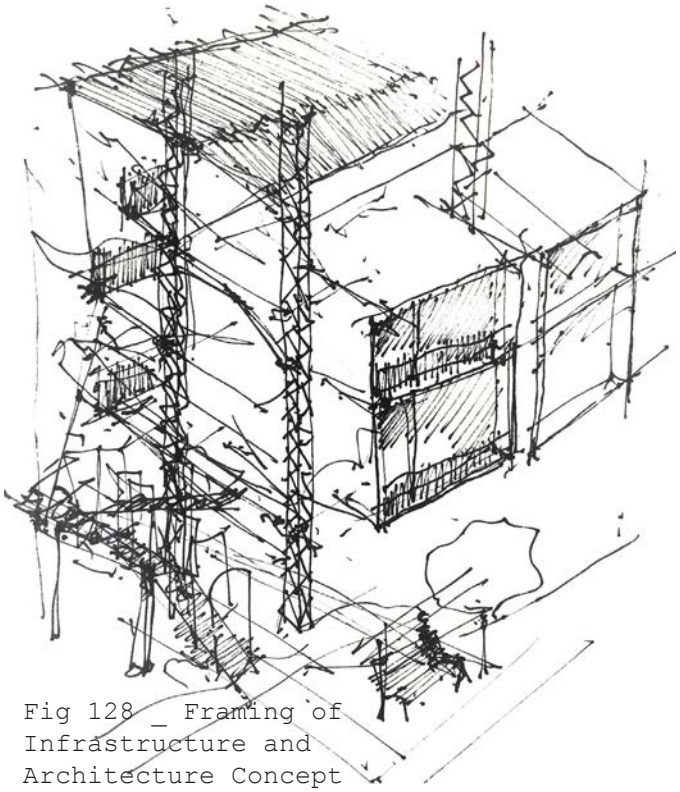


Fig 128 _ Framing of Infrastructure and Architecture Concept Drawing | Prefab Indication (Author, 2017)

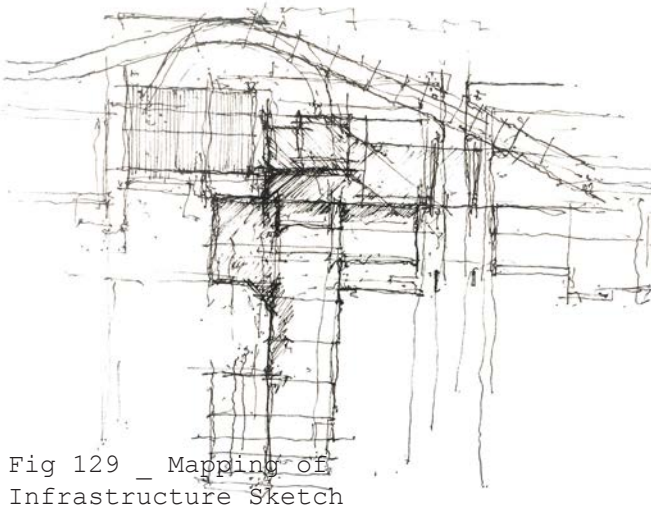


Fig 129 _ Mapping of Infrastructure Sketch (Author, 2017)

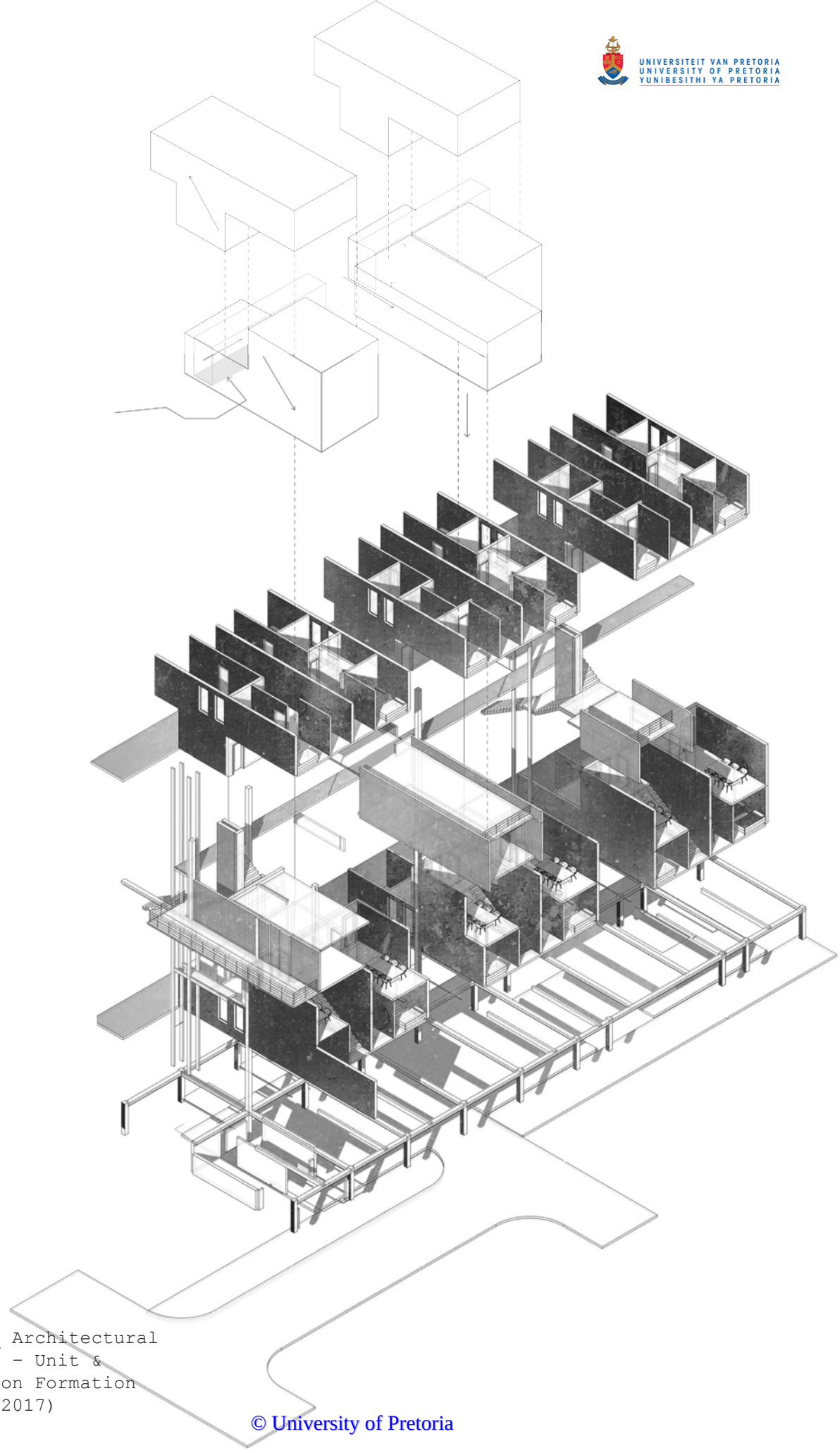


Fig 130 _ Architectural Iteration - Unit & Circulation Formation (Author, 2017)

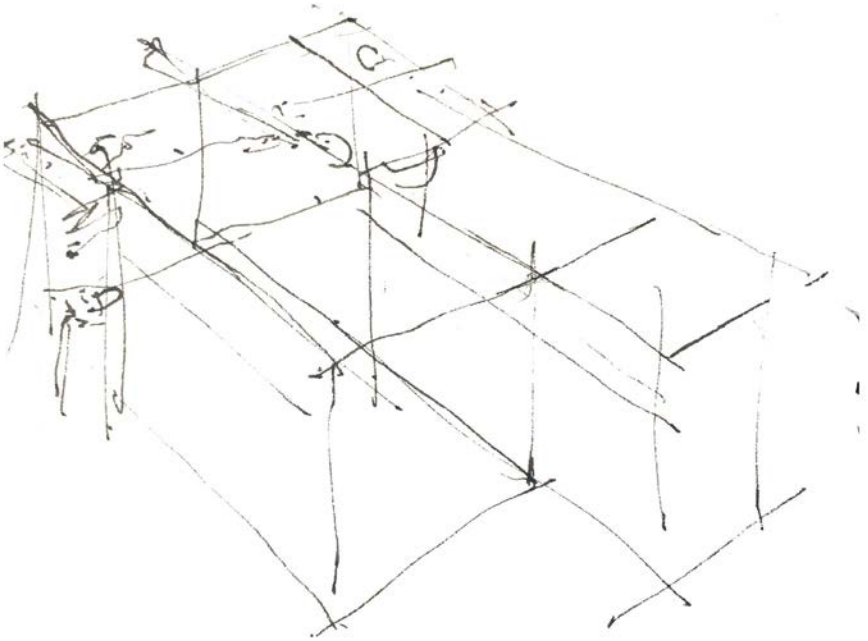


Fig 131 _ Unit Typology Concept Sketch (Author, 2017)

B02-2 Infill Architecture

The architecture on site starts with the layout of the infrastructural grid, leading to the creation of the service structures, designed as rigid elements onto which a multiplicity of service options can be placed and in future be re-programmed. The creation of the units however occurs as infill of the concrete grid structure formed on site. The units are placed in such a way that the materials used to define boundaries are shared at all points possible, the focus remaining as at what points can singular functions service multiple units whereas conventionally they are supplied individually.
Initial provision of units arrives as a base unit from which expansion can occur, the initial construction of low income housing should provide the bare necessities for sustainable residents; however provide a set of opportunities and guidelines for the appropriation by the users. (fig 130)

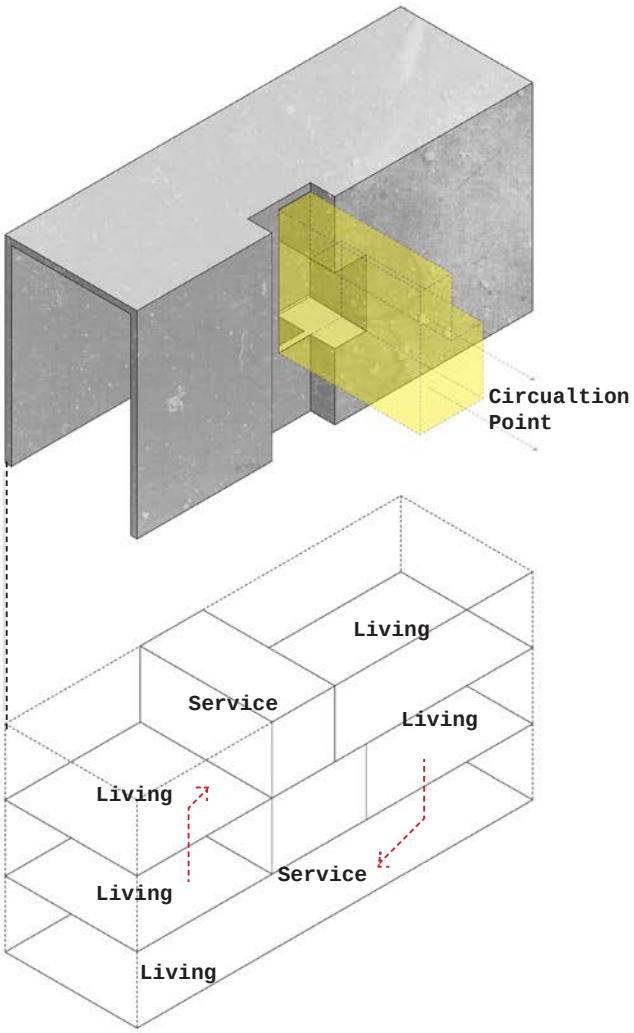


Fig 132 _ Unit Layout and Connection to Circulation

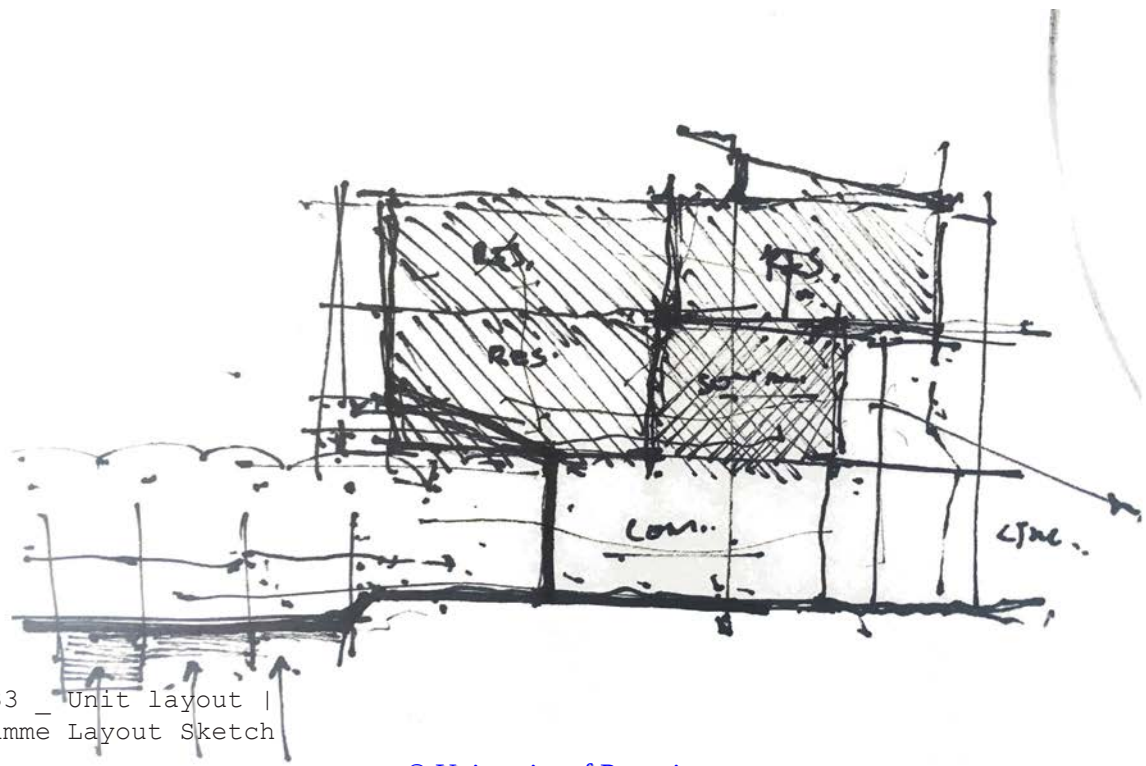


Fig 133 _ Unit layout | Programme Layout Sketch

B03-1 Unit

The major units are composed of two different levels; (fig 132) the entrance, kitchen and living level and the living level; the separation occurs as the entrance point from site circulation enters on the more open kitchen level and then moves upward or downward into the more private bedroom areas (fig 133). The structural logic of the unit is composed through a series of concrete floor slabs that web between the structural frame and then a major elements are contained within solid masonary construction, placed on the plywood modular separating the unit into serivie andliving spaces, this is the only major separation of space within the units, the horizontal walls are more flexible connections, through a series of demountable systems to allow for user approrpration .

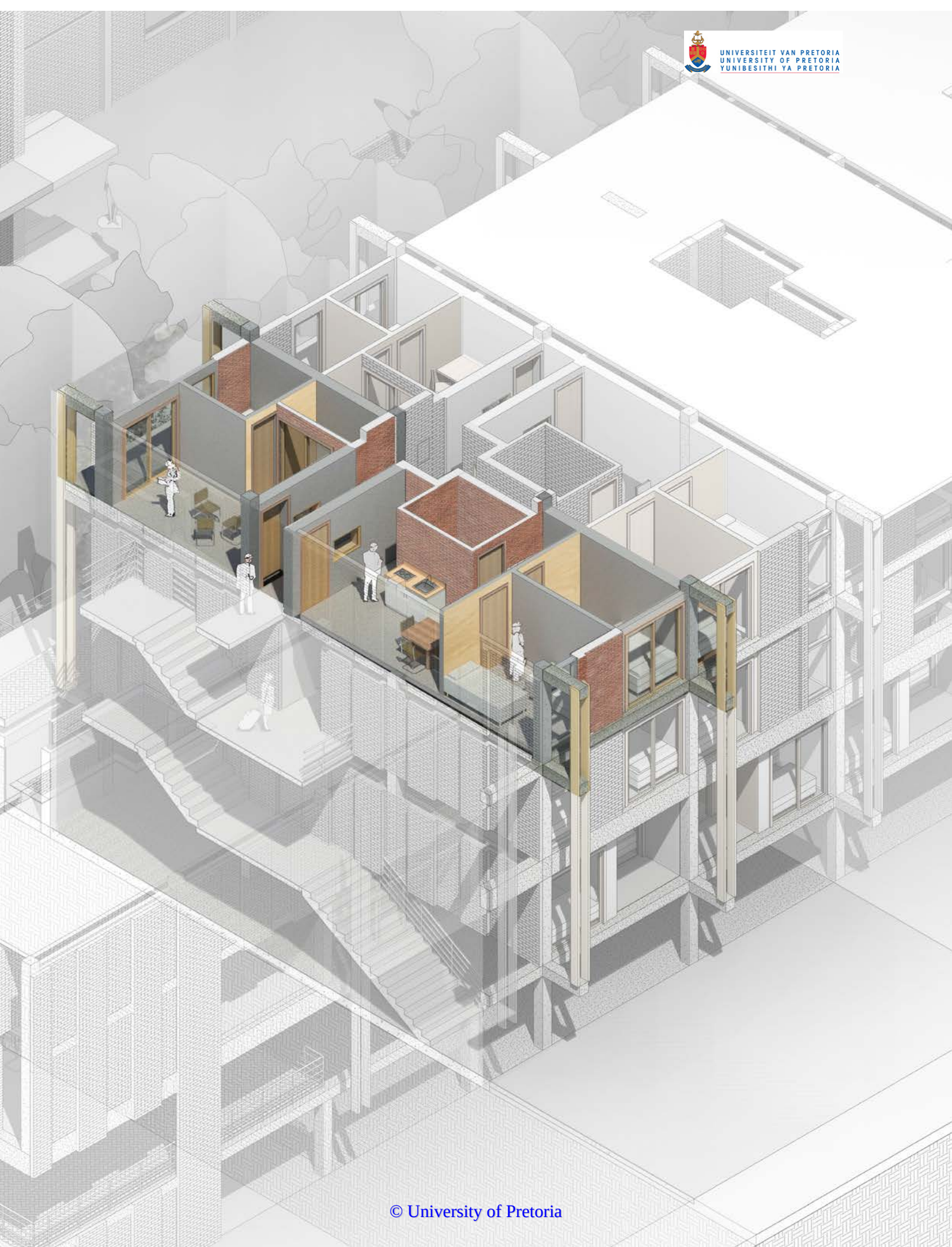
B03-2 Unit Layout | spatial formation

The units provided act as a platform to facilitate the social growth of the residents of Westbury. The starter units are provided as the bare essentials, which then allows for users to add spaces in order to cater for personal needs. The focus remains on providing a platform that is easily appropriable through means that are obtained easily and inexpensively. This relates back to the initial structural fabric of the building, whereby all the integral structural work has already been completed. Along with the structural frame, the walls and components within the site also provide for easy appropriation. The concept of providing a wall with integrated services as well as opening that contain doors and windows allows for an expensive appropriation.

The sizes of the units are aimed to provide living space for the users under 10sqm per person occupying the flat, this starts to provide an efficient model for development and subsequent material allocation per person. This also give rise to the amount of public facility external to the living units, the provision of a communal laundry space provides relief to unit space and cost requirements, whilst aiming to increase the factor of integration between users. The building provides a multiplicity of recreational spaces which cater for the functions of living which are conventionally confined to the internals of individual living units. In the case of life in Westbury and misuse and often underuse of public space, this project aims to identify a new dependence on public space and interaction, which in turn will provide a stronger platform for social integration of the residents in this scheme and ultimately inform a new typology of dense living and sharing circumstances within Westbury.

The unit material allocation is a partial reflection of the social housing requirements that are proposed by the Social Housing Regulatory Authority "SHRA", the conditions of delivery set out in the regulation suggests a bare bones approach to minimise on cost, the conventional construction platforms such as brick masonry construction indicate that providing a robust building will allow for sustainable use and allow for a long building lifetime.

The construction of this scheme aims to provide a sustainable and rapid approach to construction; however the issue of perception, especially considering timber construction is one of impermanence. I argue that timber is a more appropriate response to the construction of housing; as the material can be treated with the same surface finished that conventional masonry construction is rendered. Stability and resilience can easily be achieved through the use of manufactured board products and in most areas the material performance of timber exceeds that of conventional construction methods.



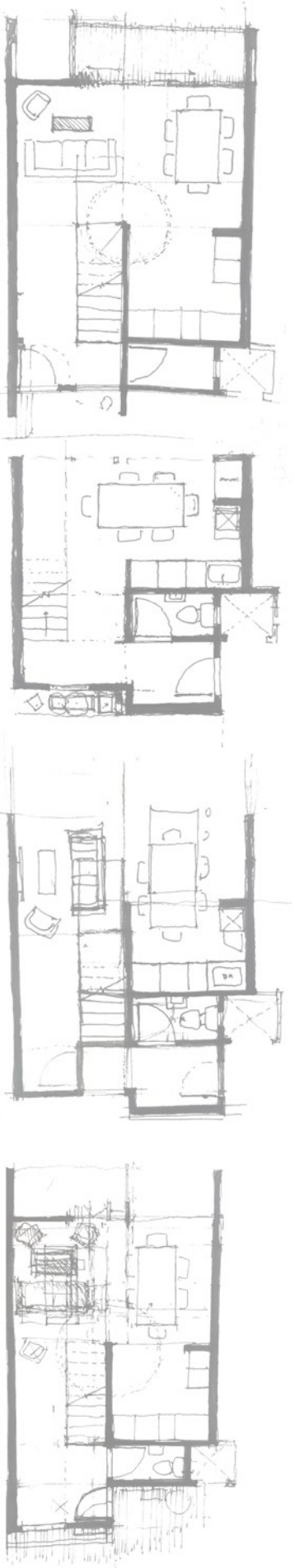


Fig 135 _ Unit Concept Sketches (Author, 2017)

Selected Unit Typologies

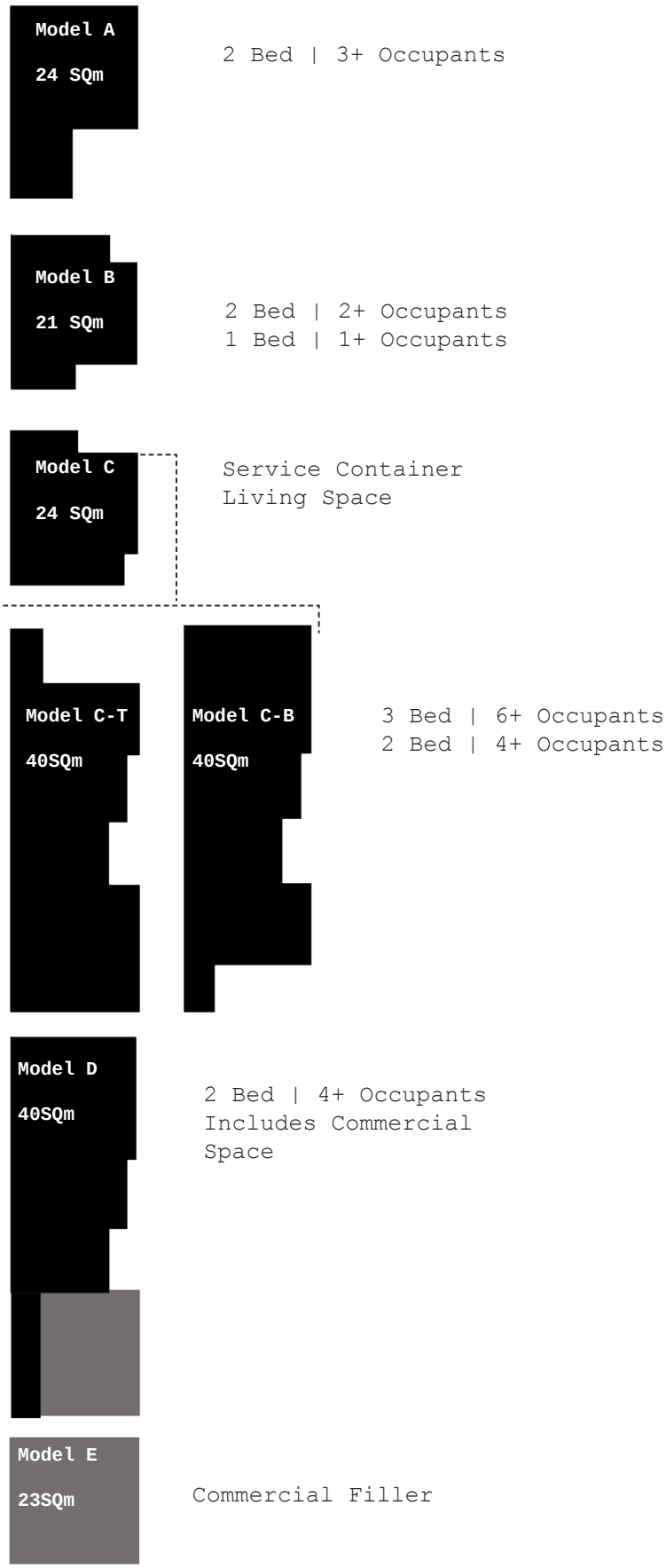
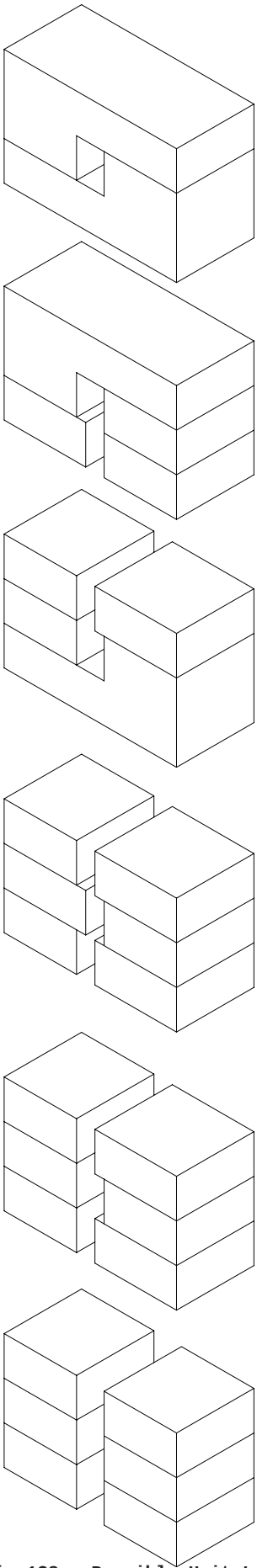


Fig 136 _ Selected Unit Typologies (Author, 2017

Fig 137 _ Model C - Model C-t Axonometric Drawing (Author, 2017)



01 _ Interlocking
Self Contained
Circulation
12+ Occupants
Placement - Centre block

1 Circulation Pathway
12+ Occupants
Access on the Ground
Placement _ -------

03_Mix 02
2 Circulation Pathways
12+Occupants
Placement - Growing
Blocks

04_Staggerd 01
Multiple Circulation
points
12+Occupants
Placement - Permeable
Points
Centre Block

05_Staggerd 02
Multiple Circulation
points
12+Occupants
Placement - Permeable
Points
Centre and Edge Blocks

05_Bachelor Units
Mulitple Circulation
Points
12+ Occupants
Placement - Site Edges -
Buffers

Fig 138 _ Possible Unit Layouts
(Author, 2017)

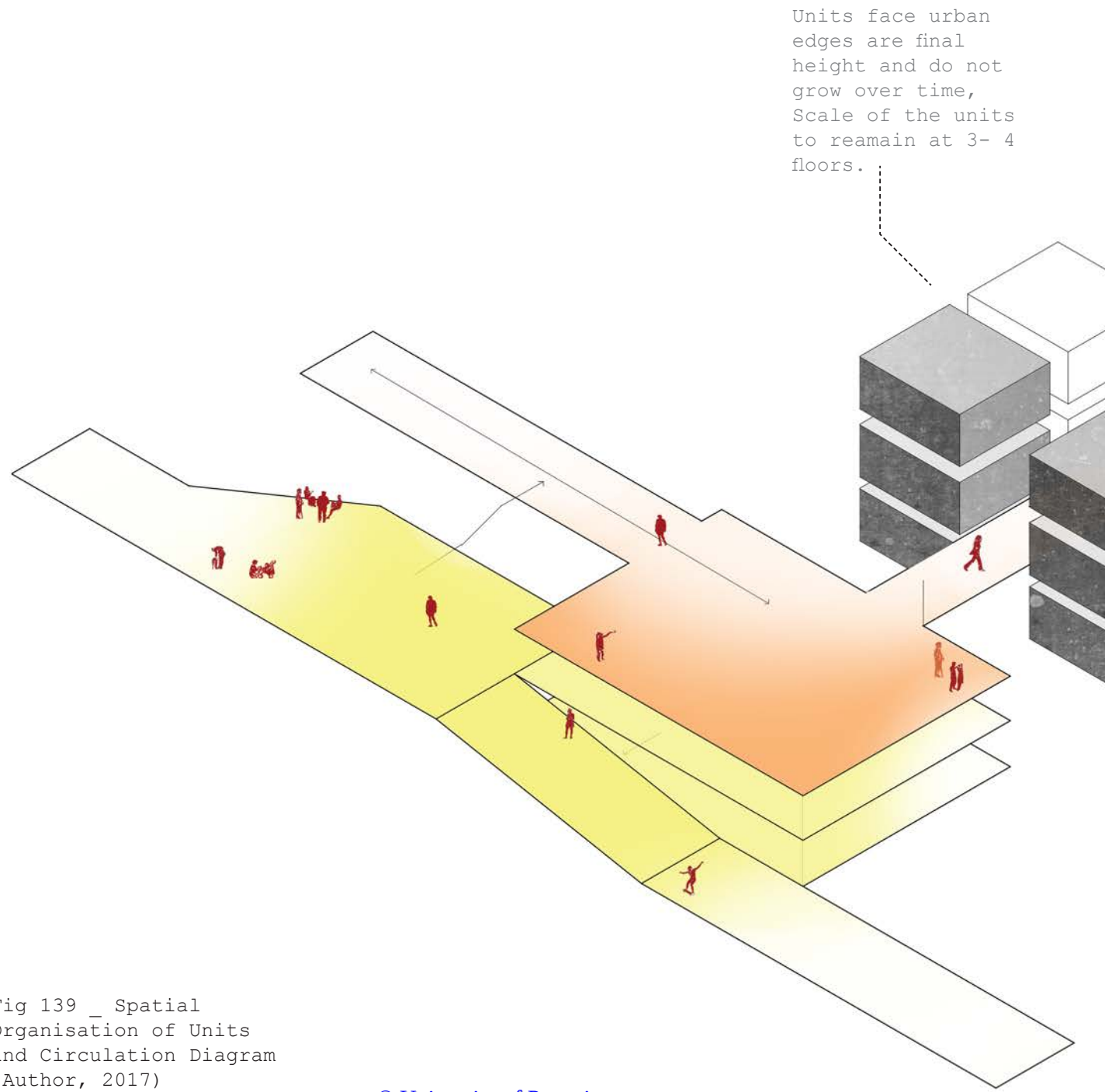
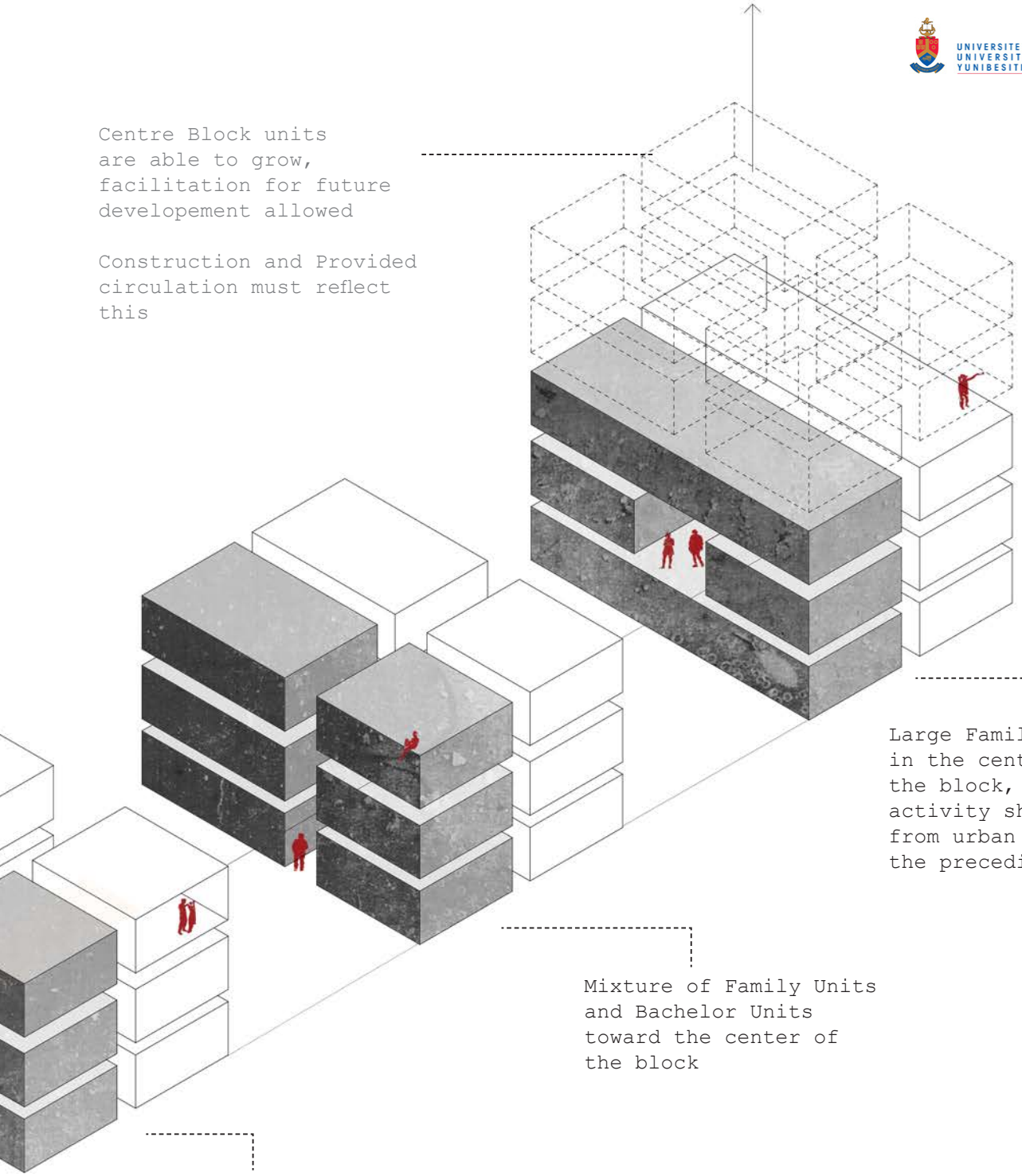


Fig 139 _ Spatial Organisation of Units and Circulation Diagram (Author, 2017)

Centre Block units are able to grow, facilitation for future developement allowed

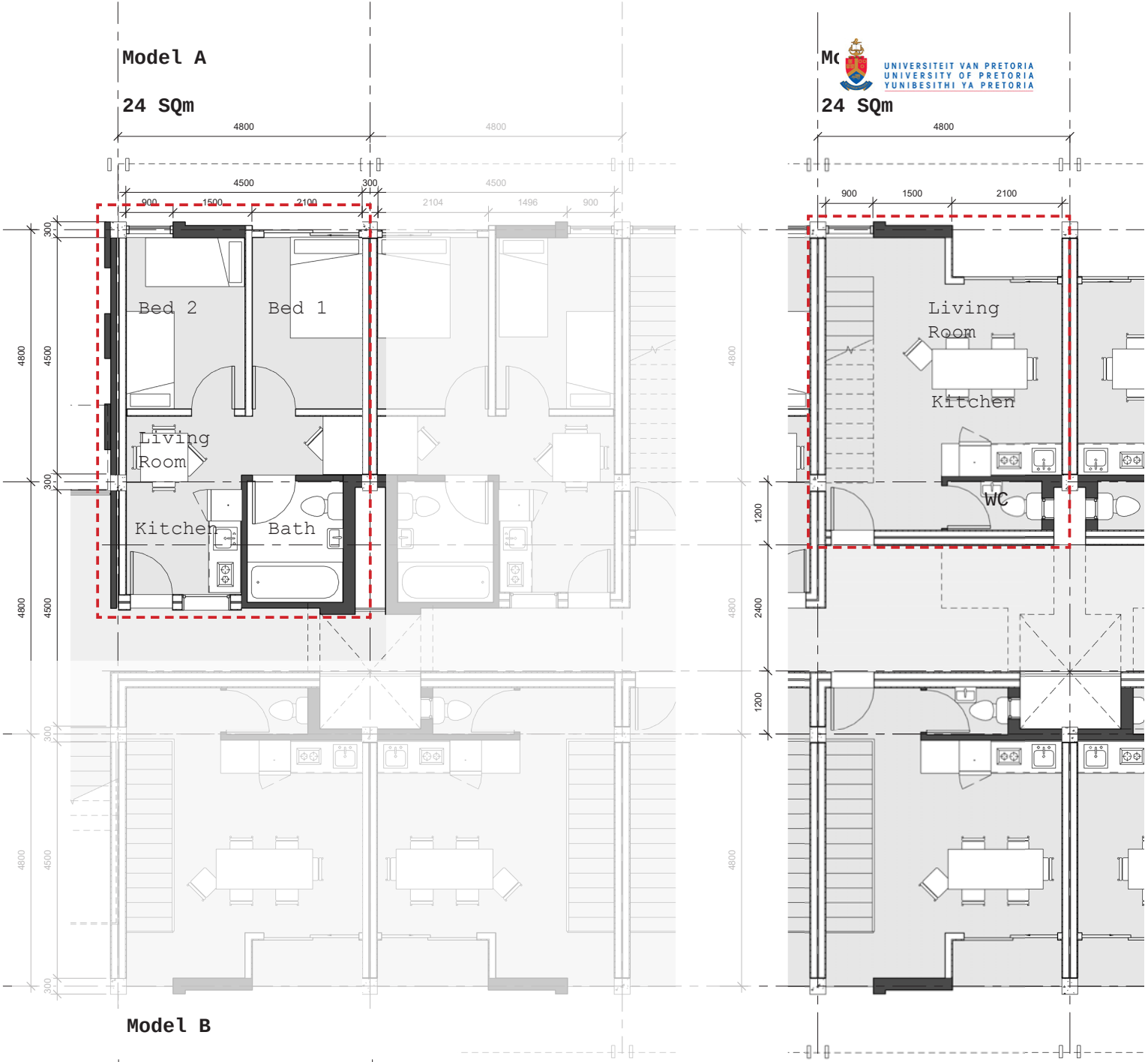
Construction and Provided circulation must reflect this



Large Family units in the center of the block, family activity sheilded from urban edges by the preceding units

Mixture of Family Units and Bachelor Units toward the center of the block

Bachelor Units to face High Traffic Areas.



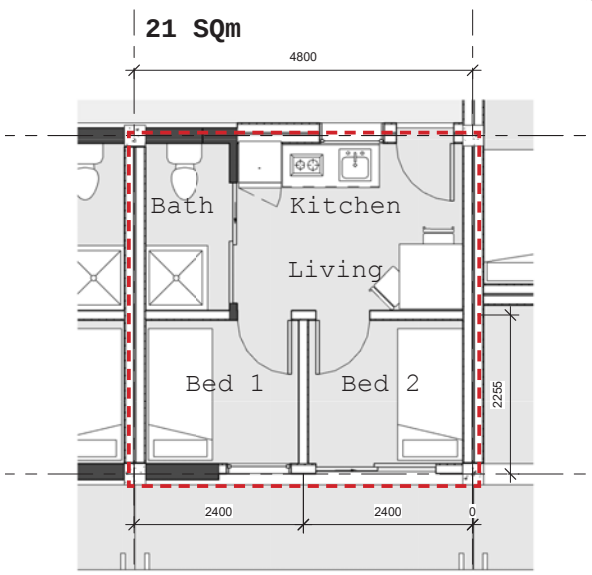
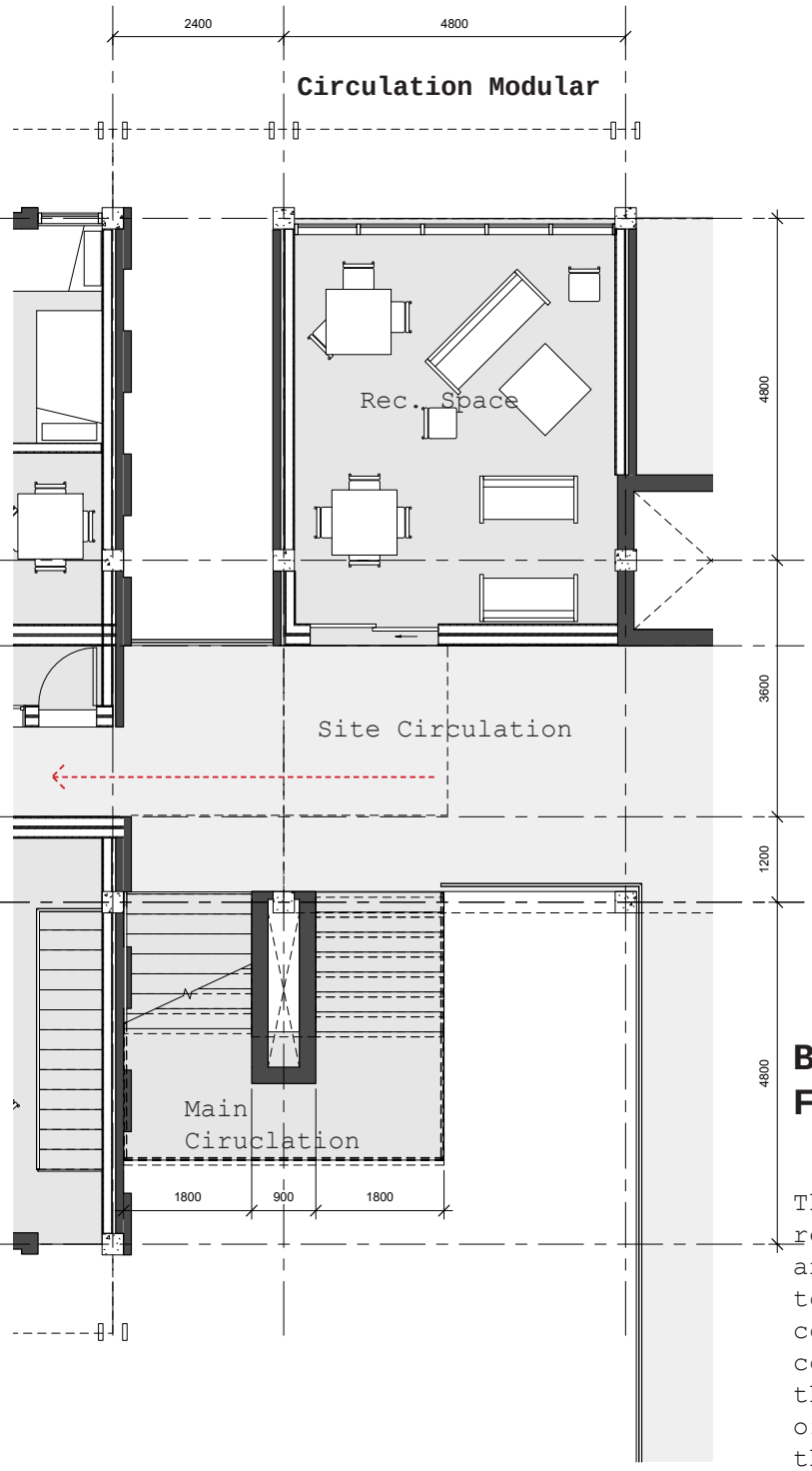


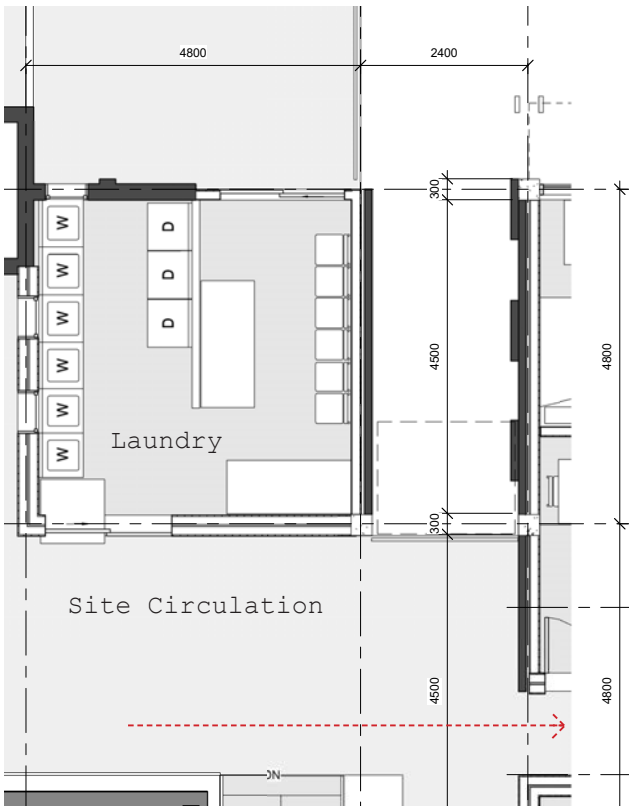
Fig 140 _ Unit Plans (Author, 2017)

B03-3 Private Space

Within a housing project such as this it is important to consider the privacy of the users, not only due to the fact that the project aims to develop a much denser environment than what the context is accustomed to, but also to consider the impact that privacy has on the user in terms of safety. It is an unfortunate reality that low income housing projects have to maintain awareness on issues of theft and abuse. The issue lies in the fact that too much privacy may harbour internal issues such as anti-social and criminal activity on the internal of the unit. Finding a balance between the two points of privacy and accessibility forms much of the reasoning behind the placement of this unit's typology as well as the manner in which the units are pointed to live out onto public spaces in certain points. (fig 139)

Fig 141 _ Unit Plans Supplementary (Author, 2017)





B03-4 Public Space | Facilitated Realm

The process of establishing a working relationship between the living units and the infrastructural realm external to those units remains a strong component of this proposal. The initial concept is to pull out the services that are non-essential to the workings of the individual units and to place those services to external shared facilities. This facilitated space such as the laundry and recreational lounge space has been moved to parts of the 'negative space' (fig 152) formed by the initial placement of the units. They are also placed in such a way to form a transition barrier between the strictly private and public spaces; this process allows for a system of pedestrian vetting to occur as people move through the transition space. This focus of public interaction of residents in key points of the building will provide the defensibility of the units as well as the circulation elements.

Fig 142 _ Circulation Layout
Concept Sketch (Author, 2017)

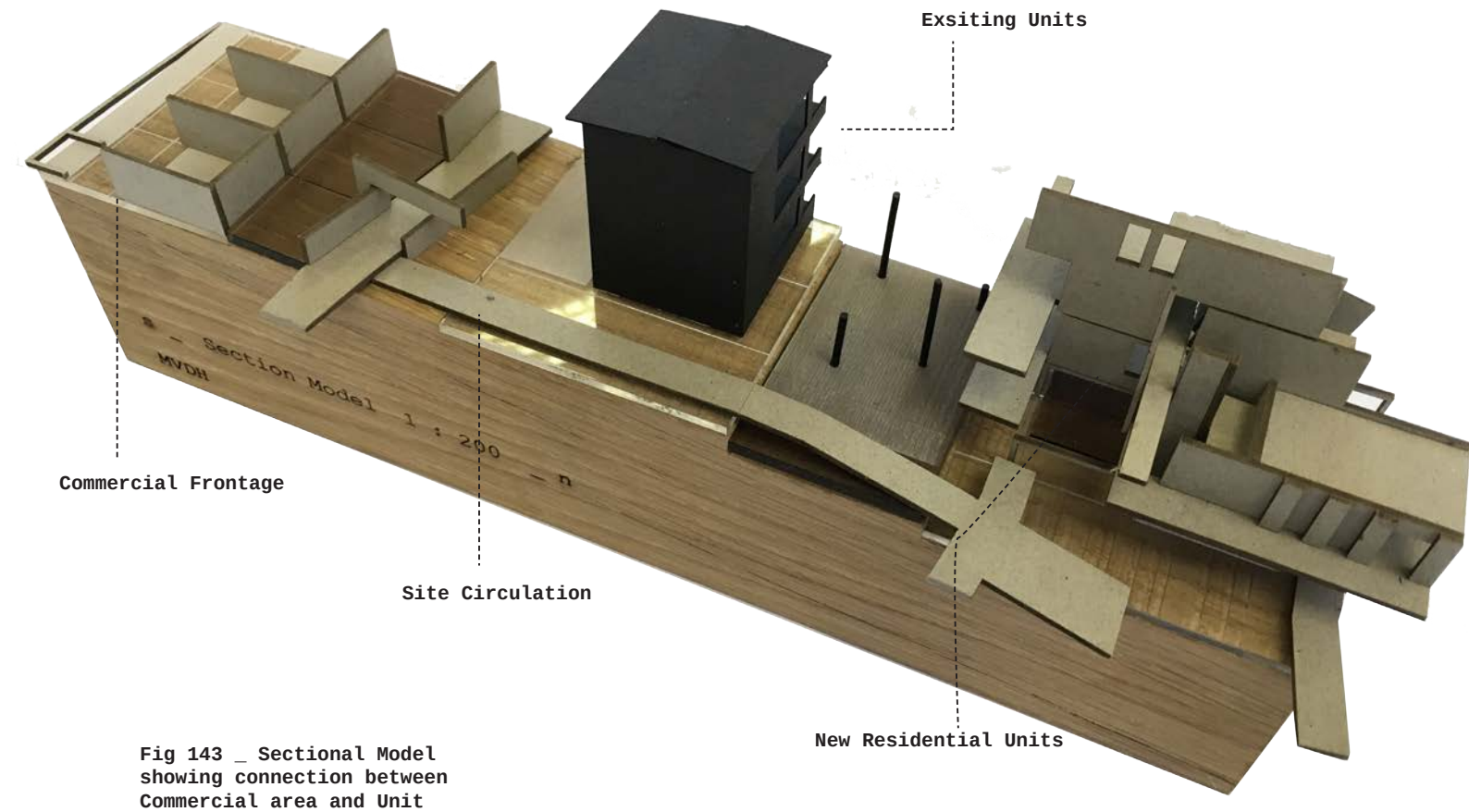


Fig 143 _ Sectional Model
showing connection between
Commercial area and Unit
Circulation (Author, 2017)

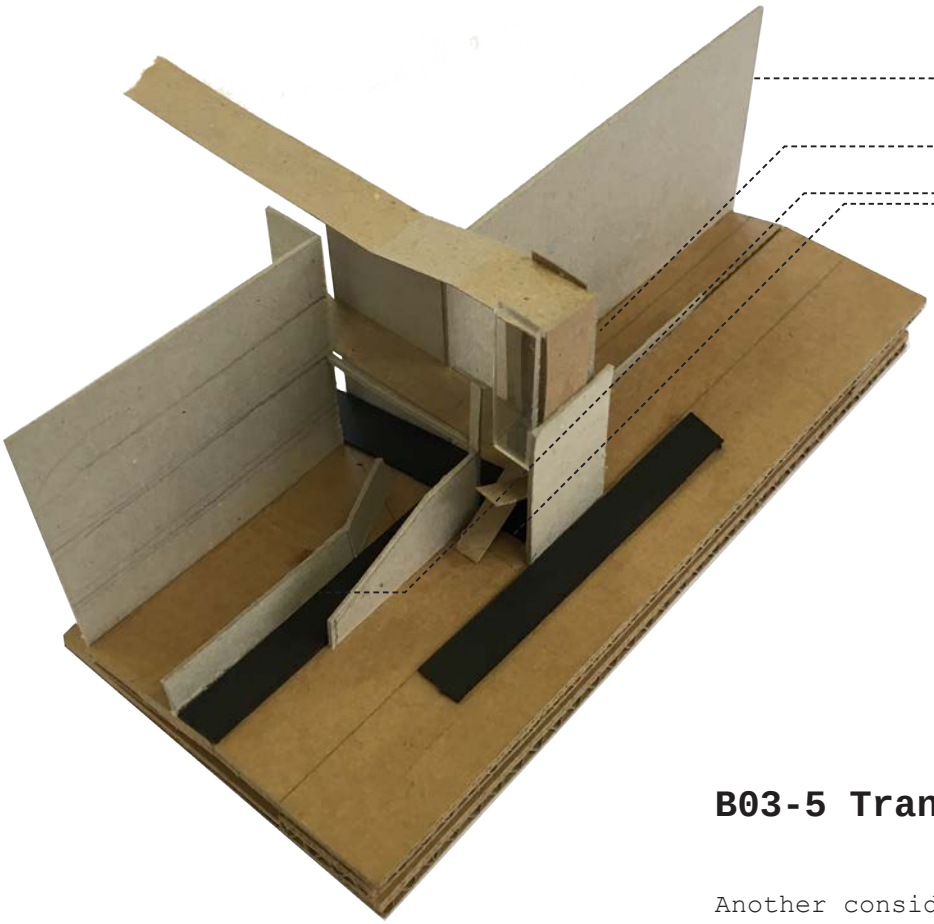


Fig 144 _ Circulation Maquette (Author, 2017)

B03-5 Transition of Space

Another consideration in terms of public space is the realm outside of the units leading to public park space. Each unit will open up onto an outdoor space that provides a private "back yard" this element however is shared by multiple residents, the space will maintain limited pedestrian movement and the intention is to provide a safe outdoor space for children and families. The manner in which the circulation elements are placed will form the frame of these spaces, visual access will therefore still be allow for all users, however strict access will maintain the user safety. This intervention provides the necessary definition to the site, and although the provision of a larger public outdoor space will be created, the allocation of this space to individual units will in turn increase the ability for users to appropriate the space and increase the quality of life that the units provide to the residents. The provision of these outdoor spaces as well as the facilitated service elements will be serviced by the site systems. These systems aim to harness the water runoff on site and provide the necessary resources to maintain these spaces, without incurring an unrealistic financial burden on the users.

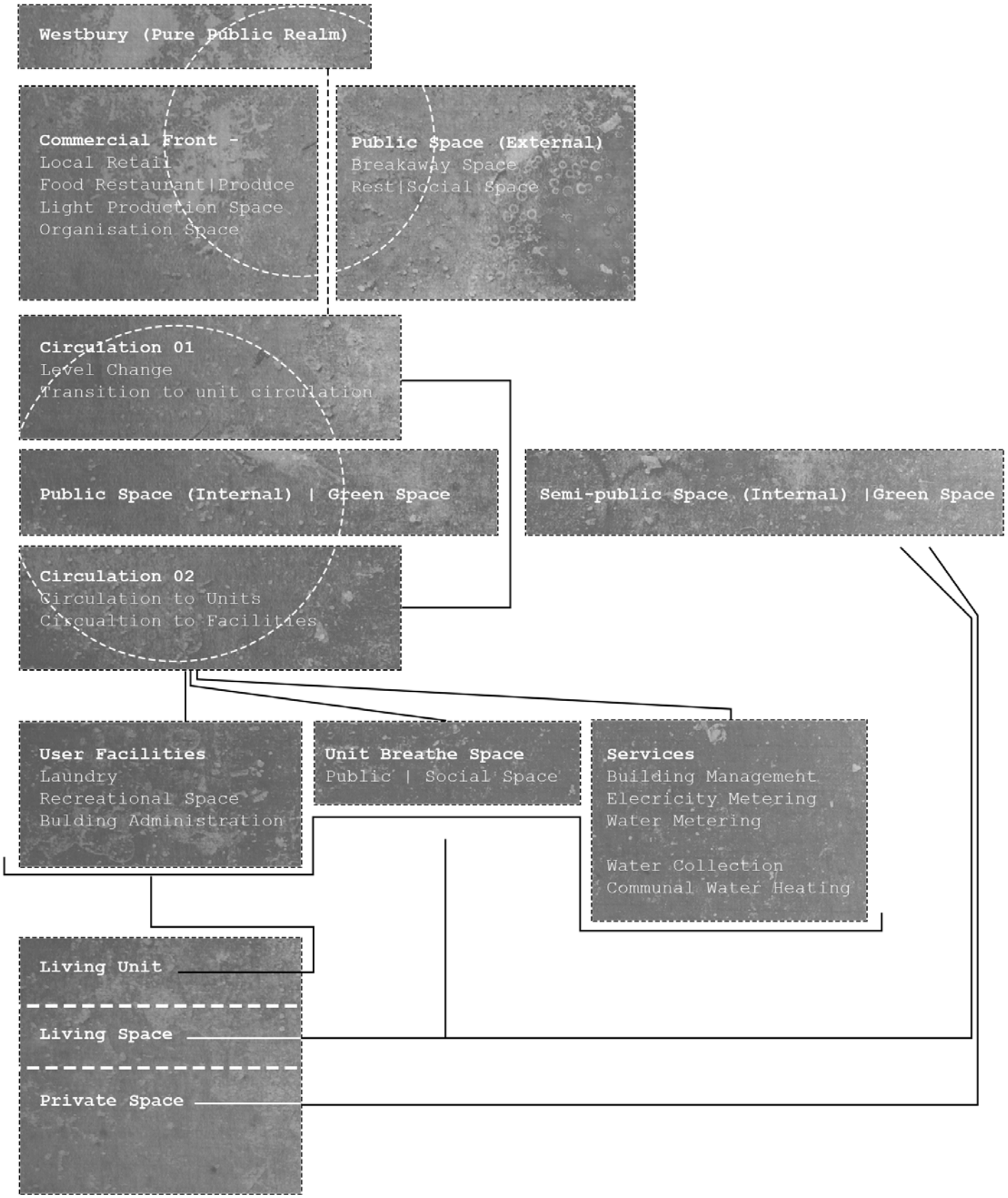


Fig 145 _ Spatial Programme Diagram (Author, 2017)

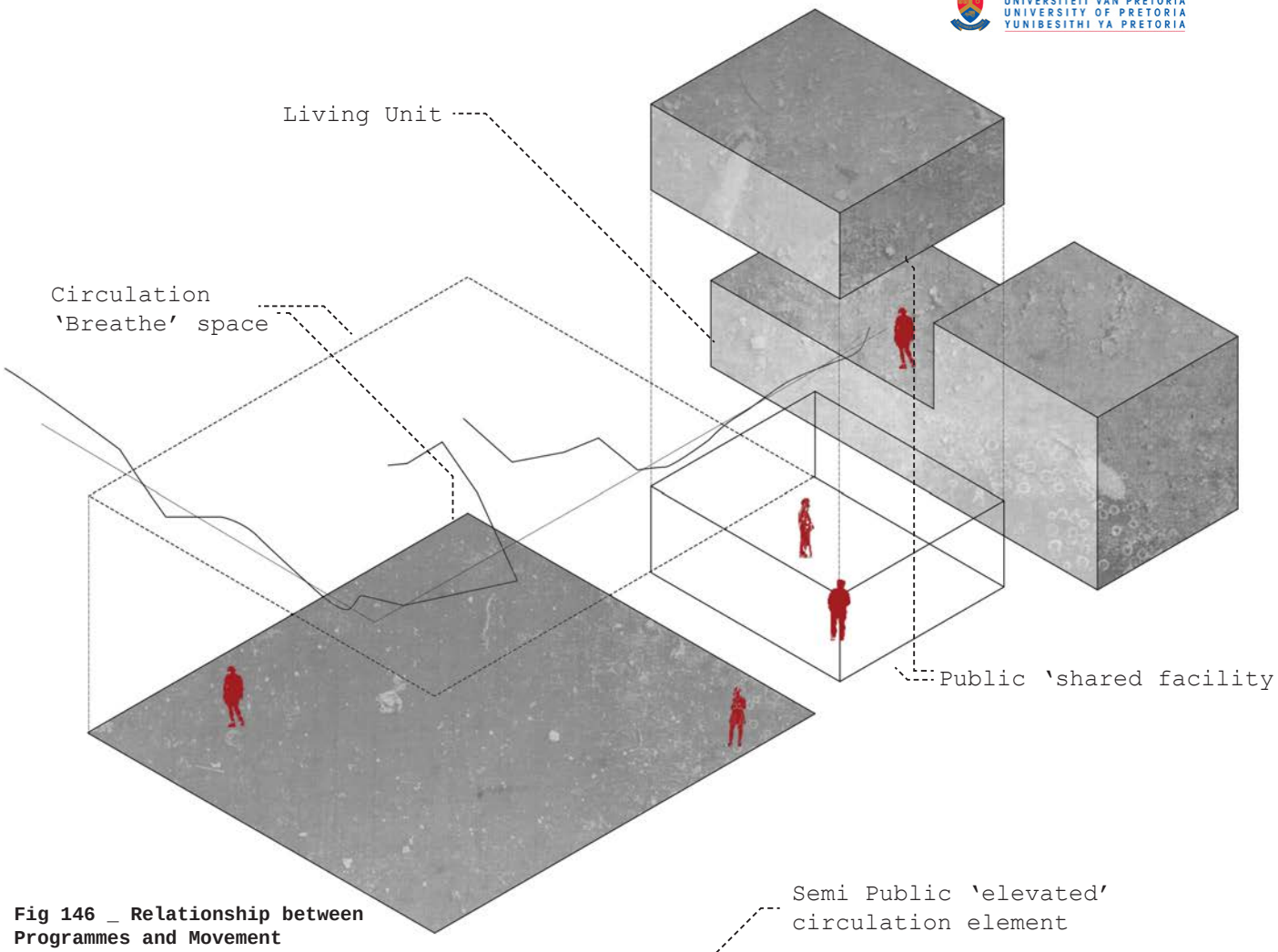


Fig 146 _ Relationship between Programmes and Movement (Author, 2017)

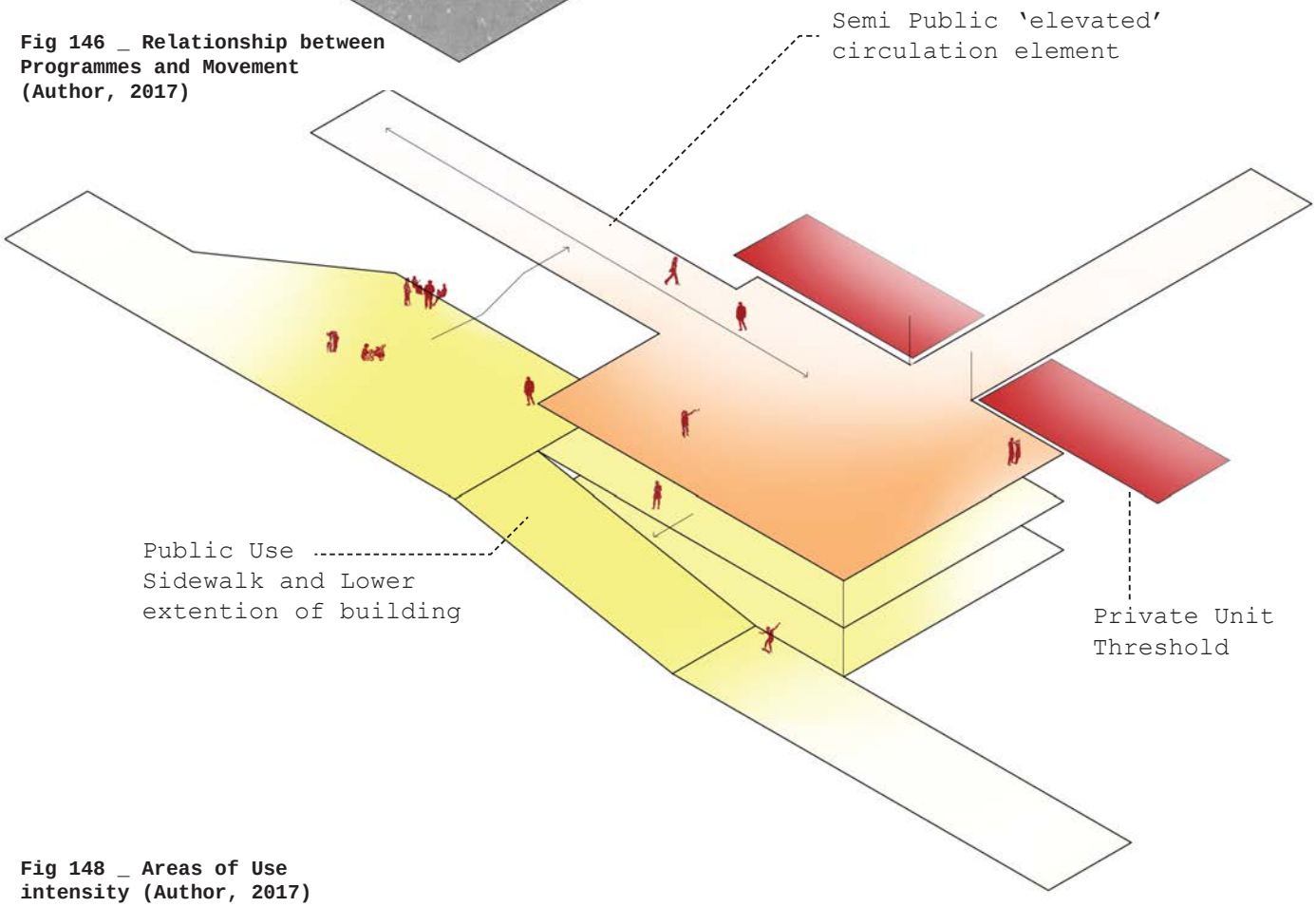


Fig 148 _ Areas of Use intensity (Author, 2017)

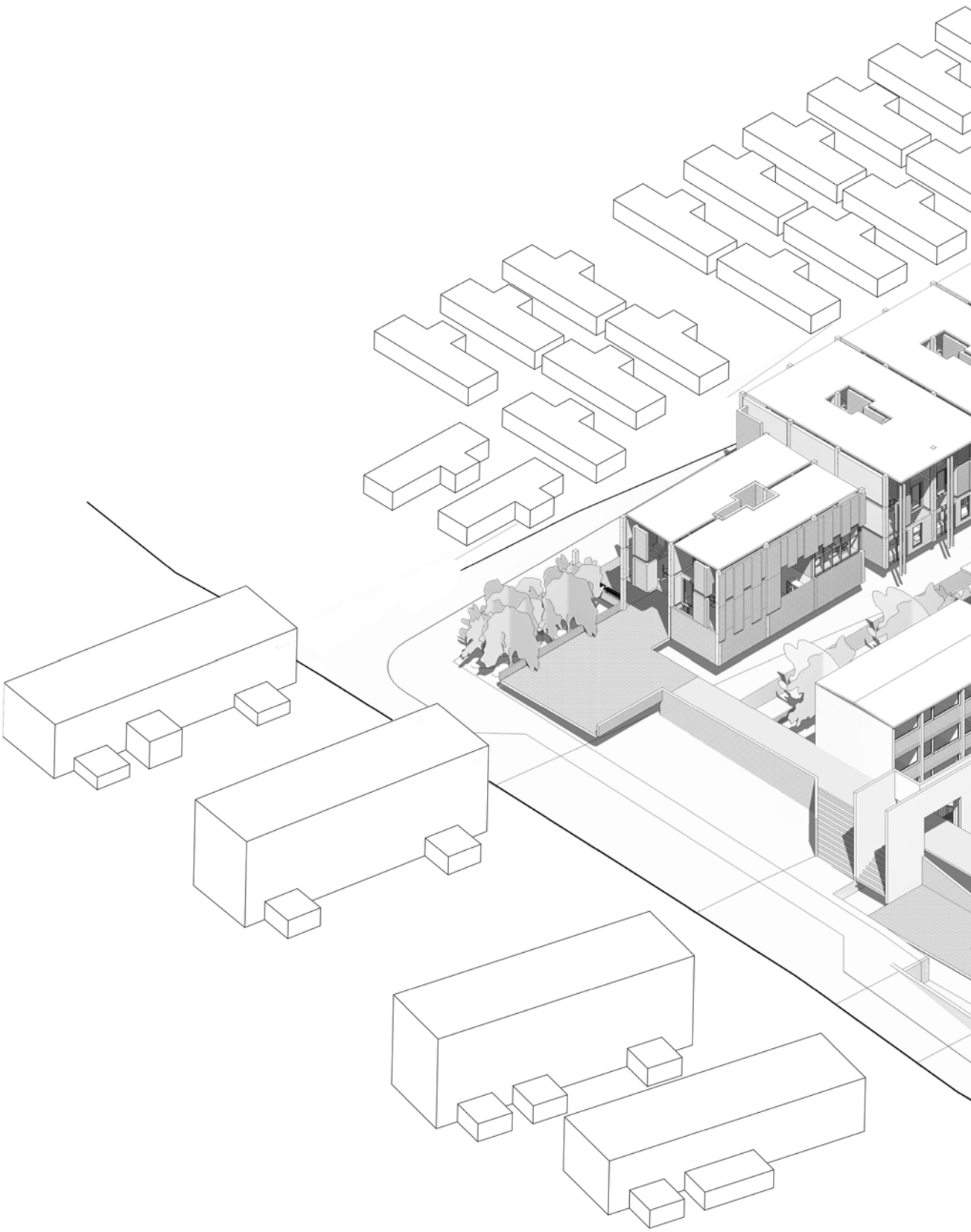


Fig 149 _ Architectural Infill in Context (Author, 2017)

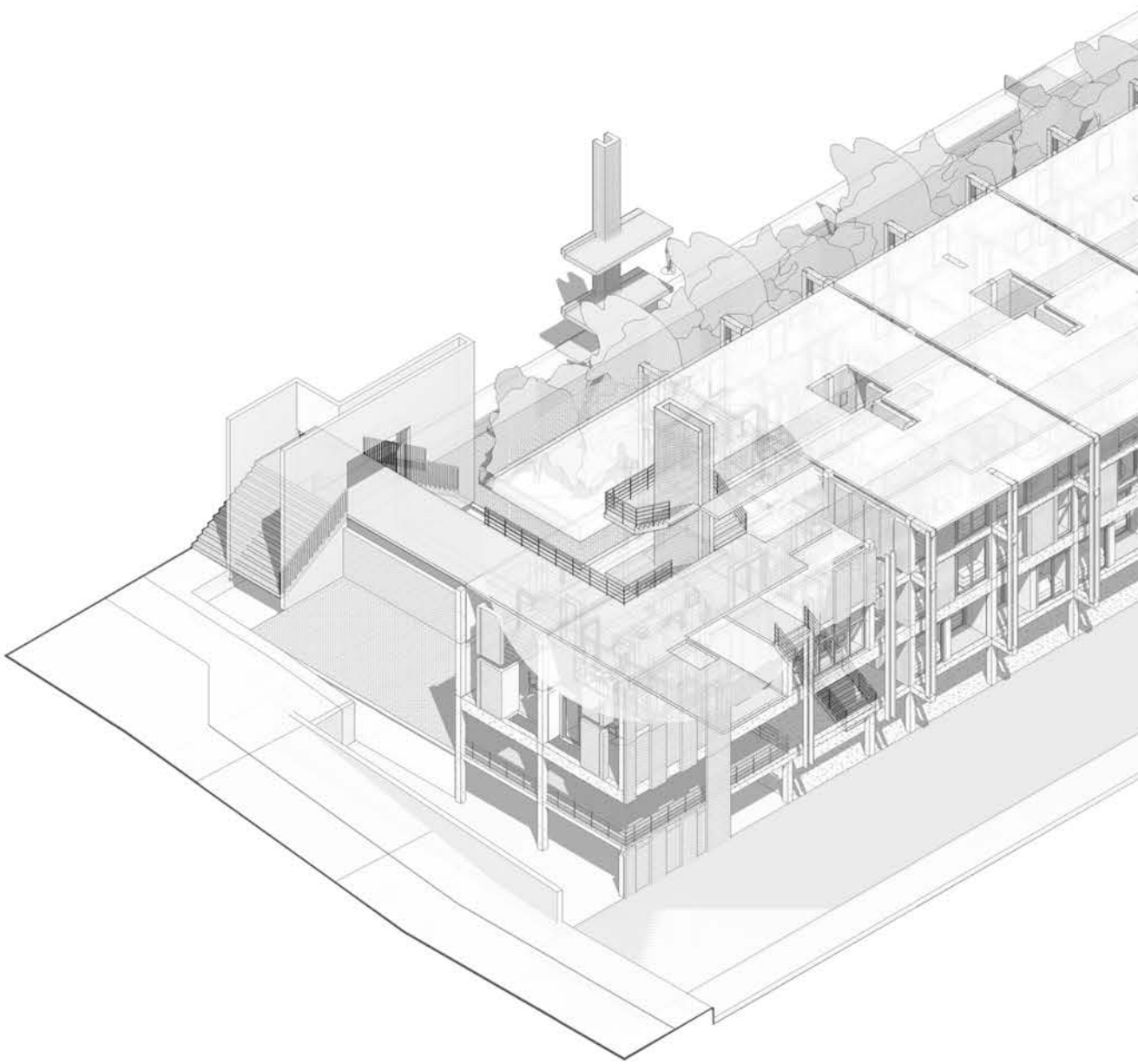
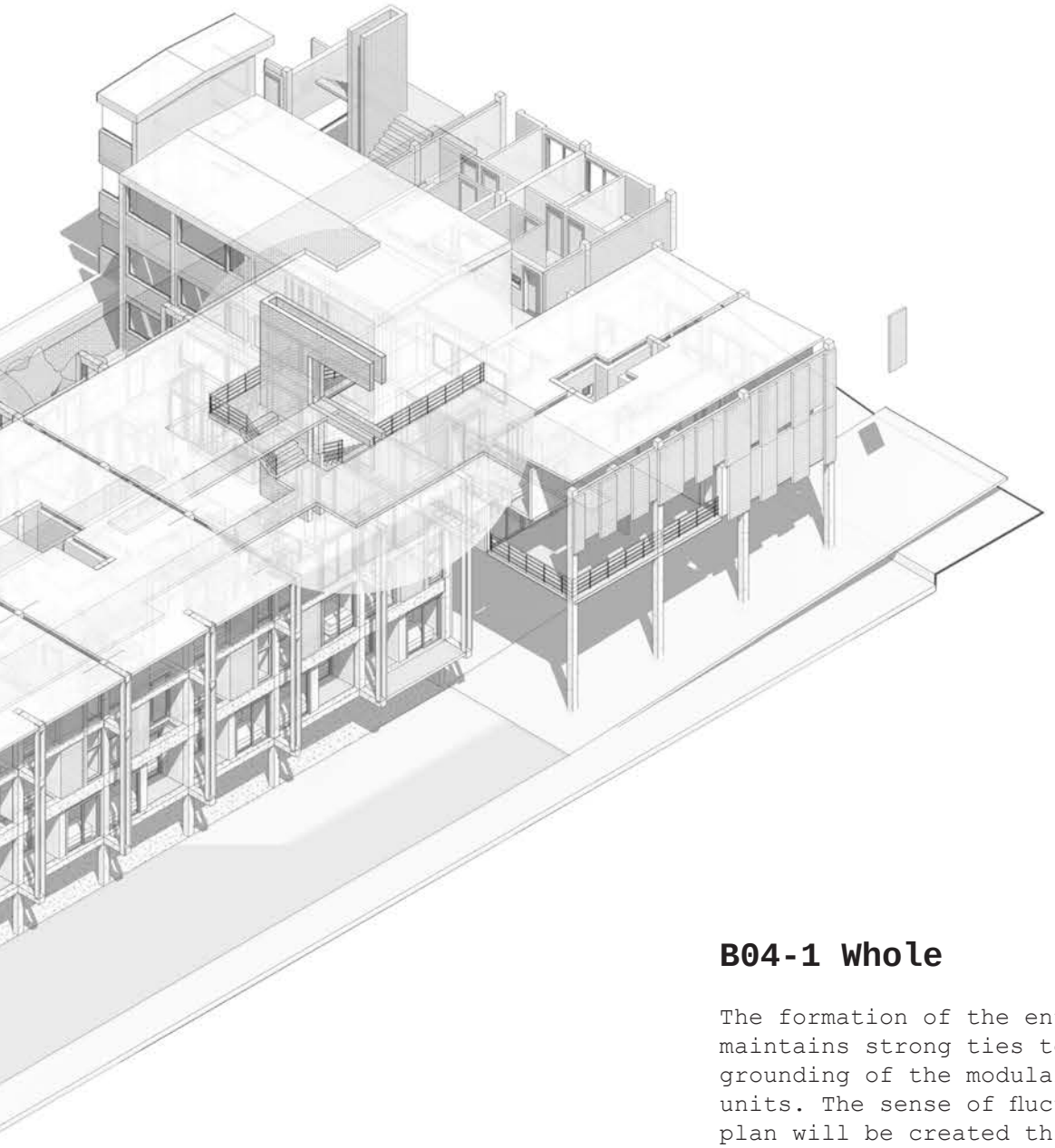


Fig 150 _ New Residential Units
Axonometric (Author, 2017)



B04-1 Whole

The formation of the entire structure maintains strong ties to the conceptual grounding of the modular layout of units. The sense of fluctuation in plan will be created through the different rates of appropriation of the building and the subsequent effect on the elevation of the structure will be prevalent in a series of recessed, open and closed faces.

The overall structure comprised of multiple unit typologies which aim to cater to different use and family structures. These different typologies are organised in such a way to program the progression of privacy and determine the predominant programs of certain sections on site.

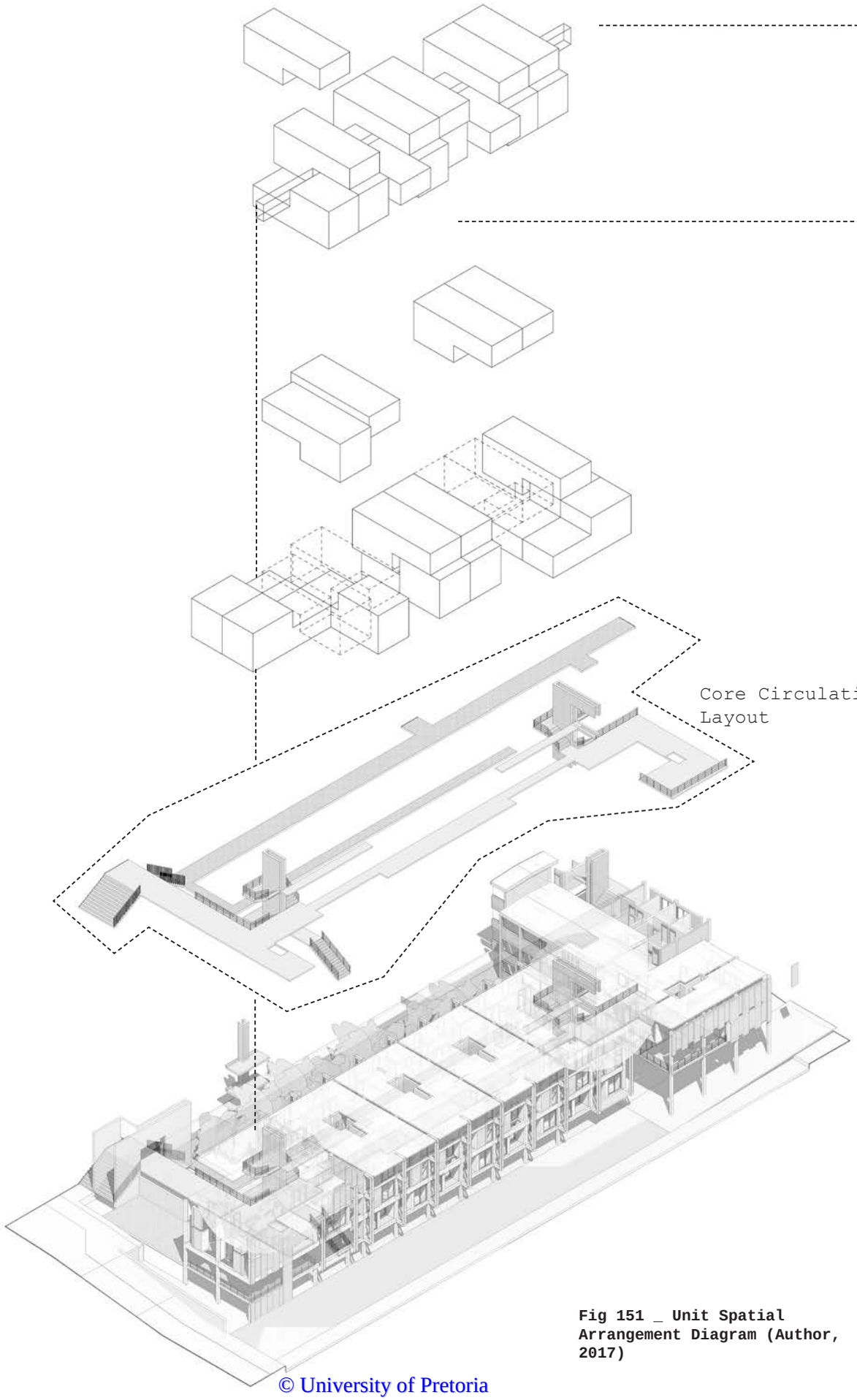
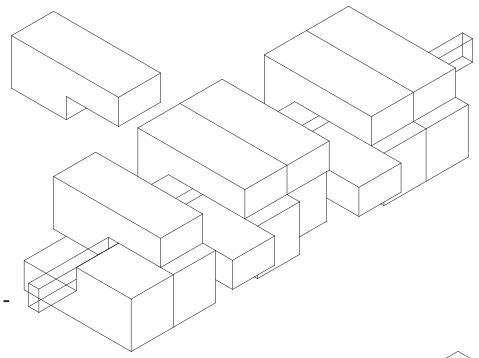
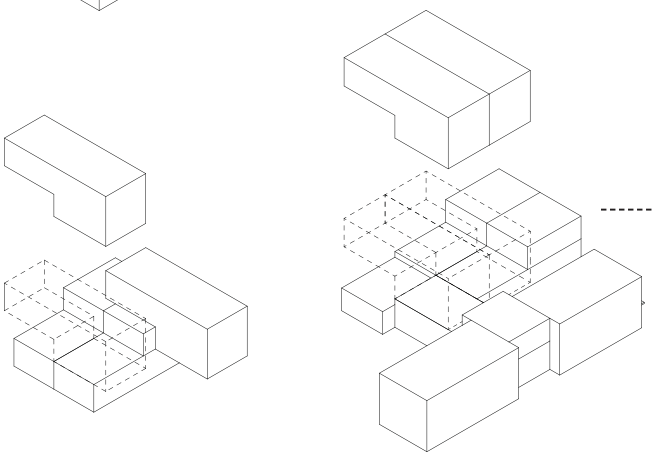


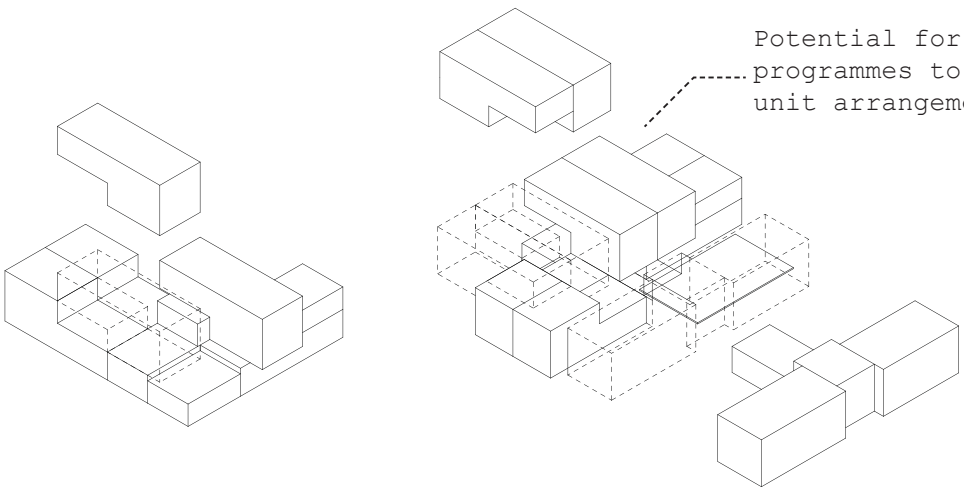
Fig 151 _ Unit Spatial Arrangement Diagram (Author, 2017)



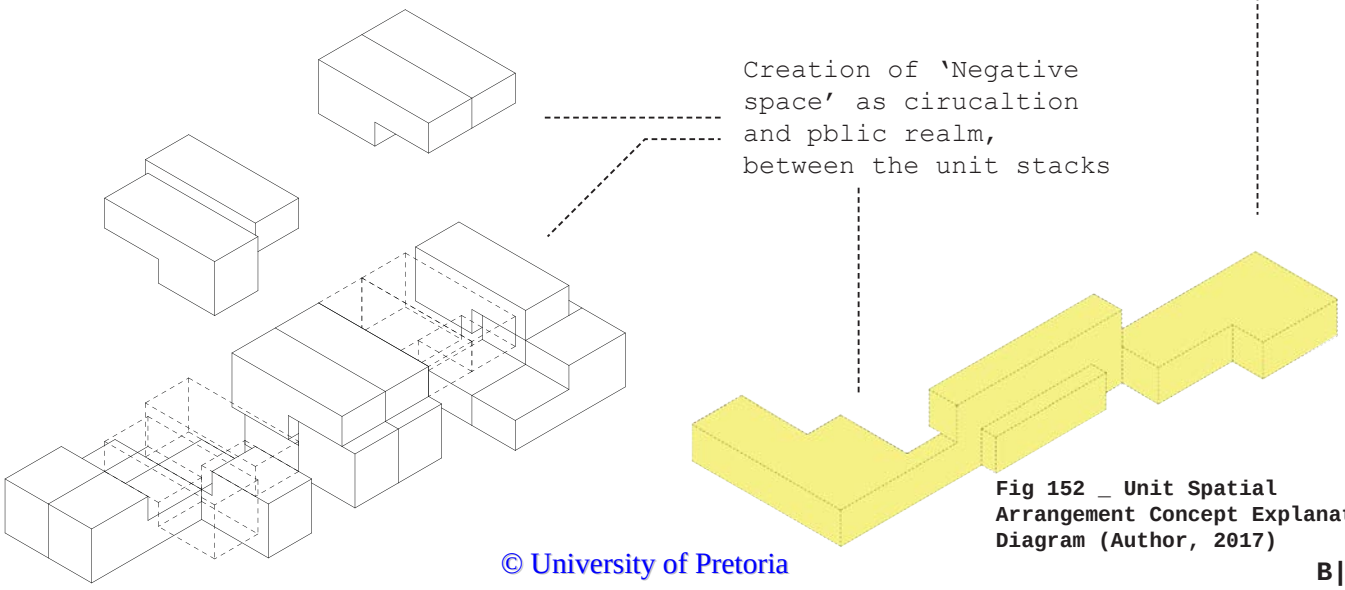
Circulation threaded throughthe center of unit stack arrangement



Formation of public space in 'stack overlaps'



Potential for external programmes to slot into unit arrangement



Creation of 'Negative space' as cirucaltion and pblic realm, between the unit stacks

Fig 152 _ Unit Spatial Arrangement Concept Explanation Diagram (Author, 2017)

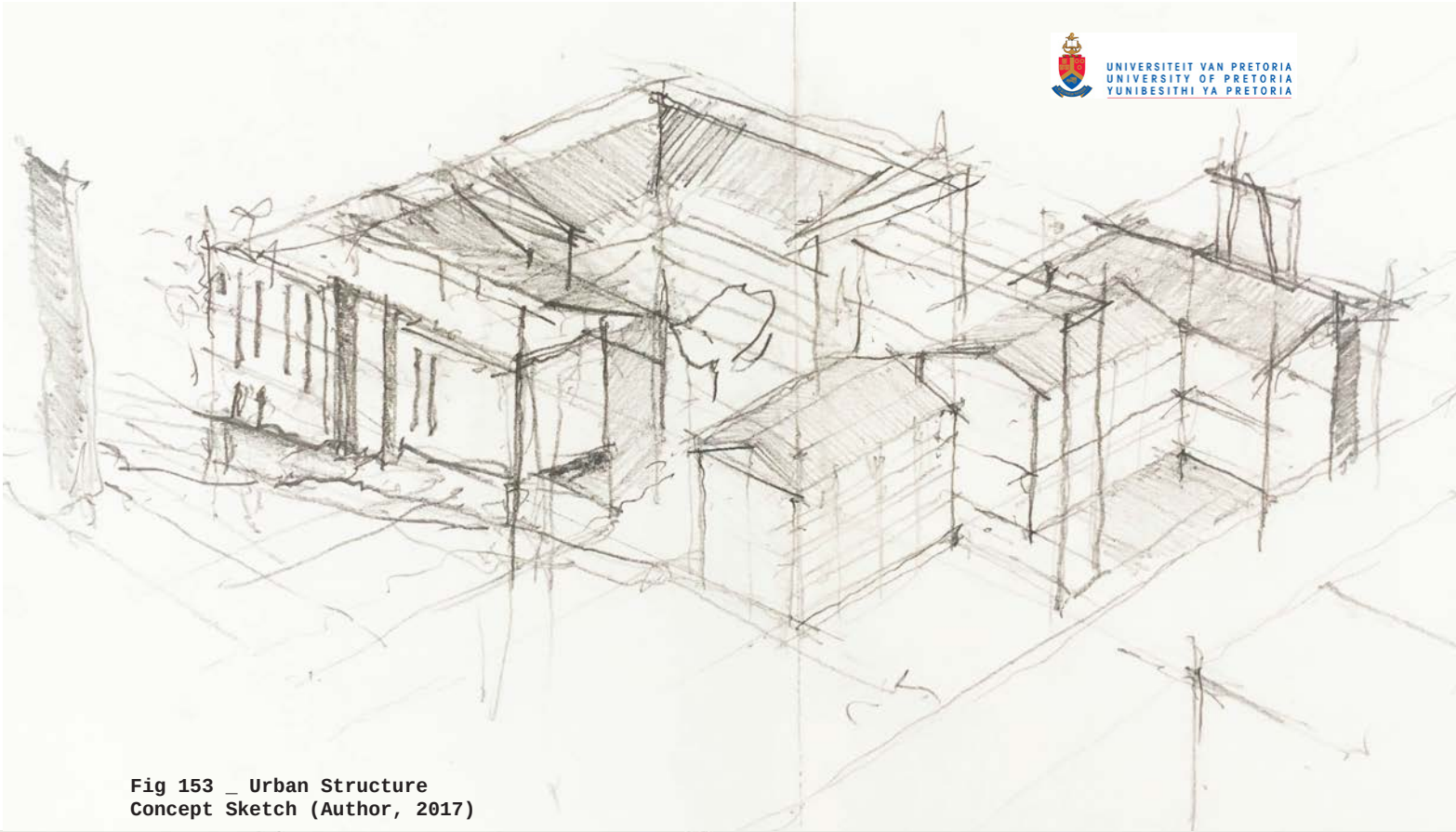


Fig 153 _ Urban Structure
Concept Sketch (Author, 2017)

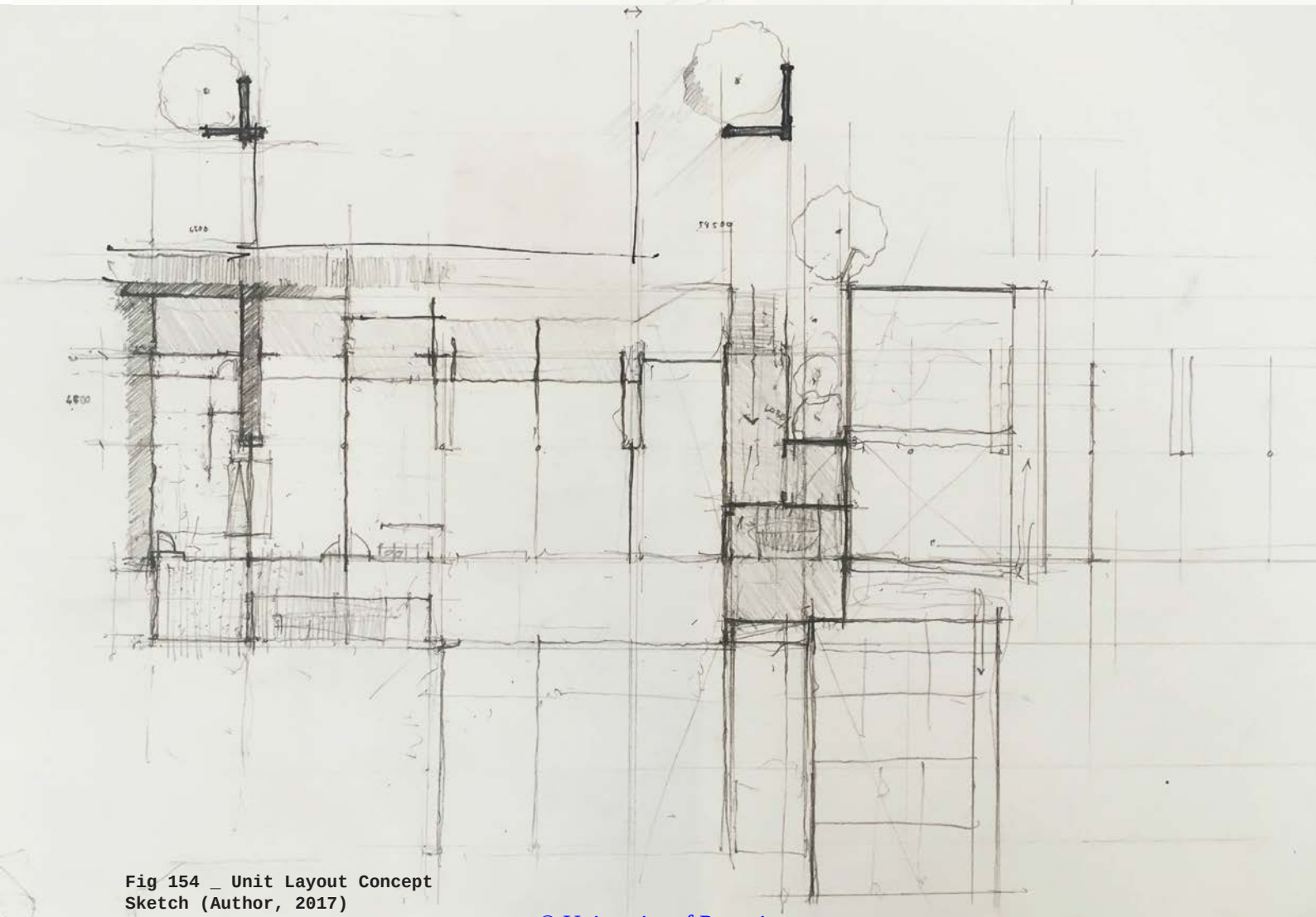


Fig 154 _ Unit Layout Concept
Sketch (Author, 2017)

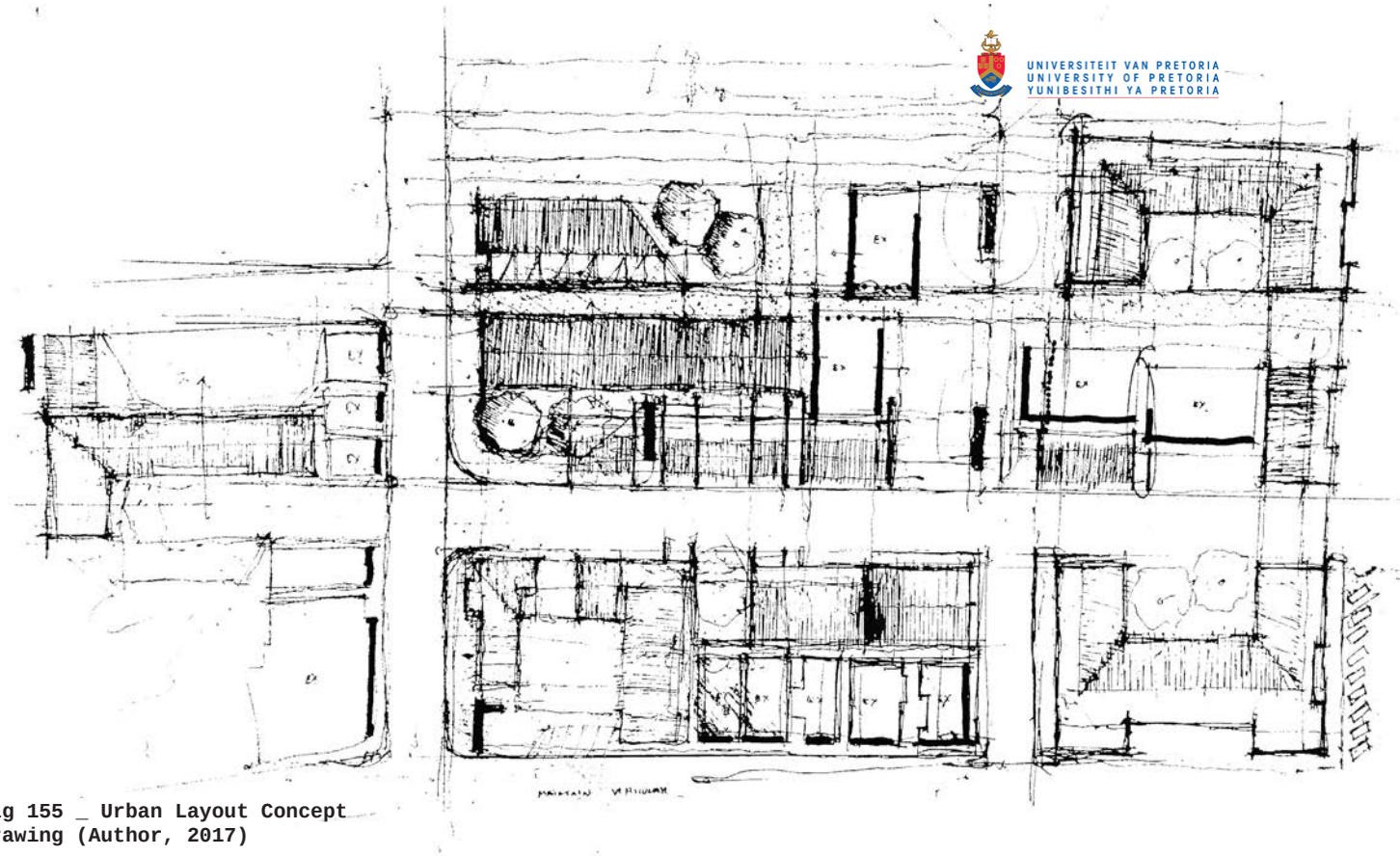


Fig 155 _ Urban Layout Concept Drawing (Author, 2017)

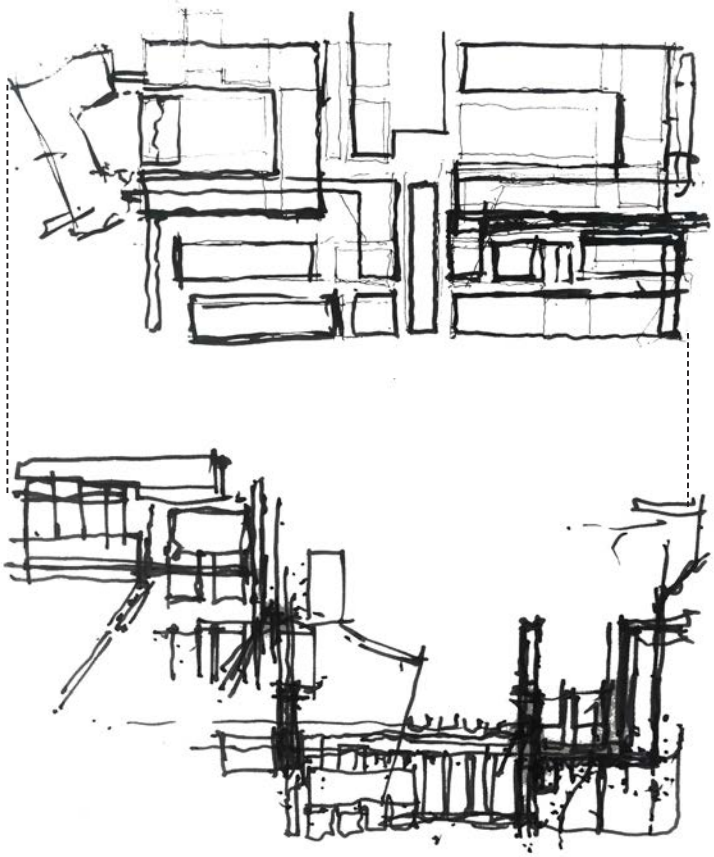


Fig 156 _ Urban shift concept Drawing (Author, 2017)

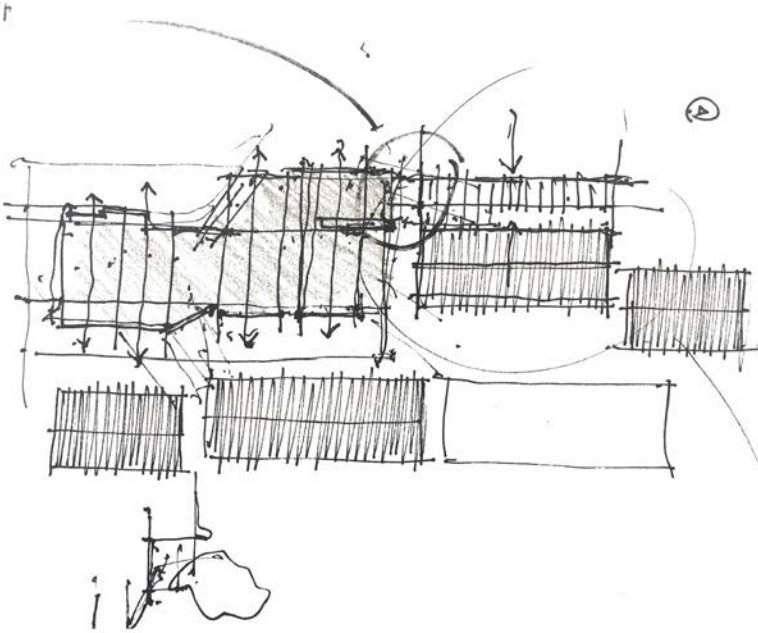


Fig 157 _ Circulation Containment Concept Drawing (Author, 2017)

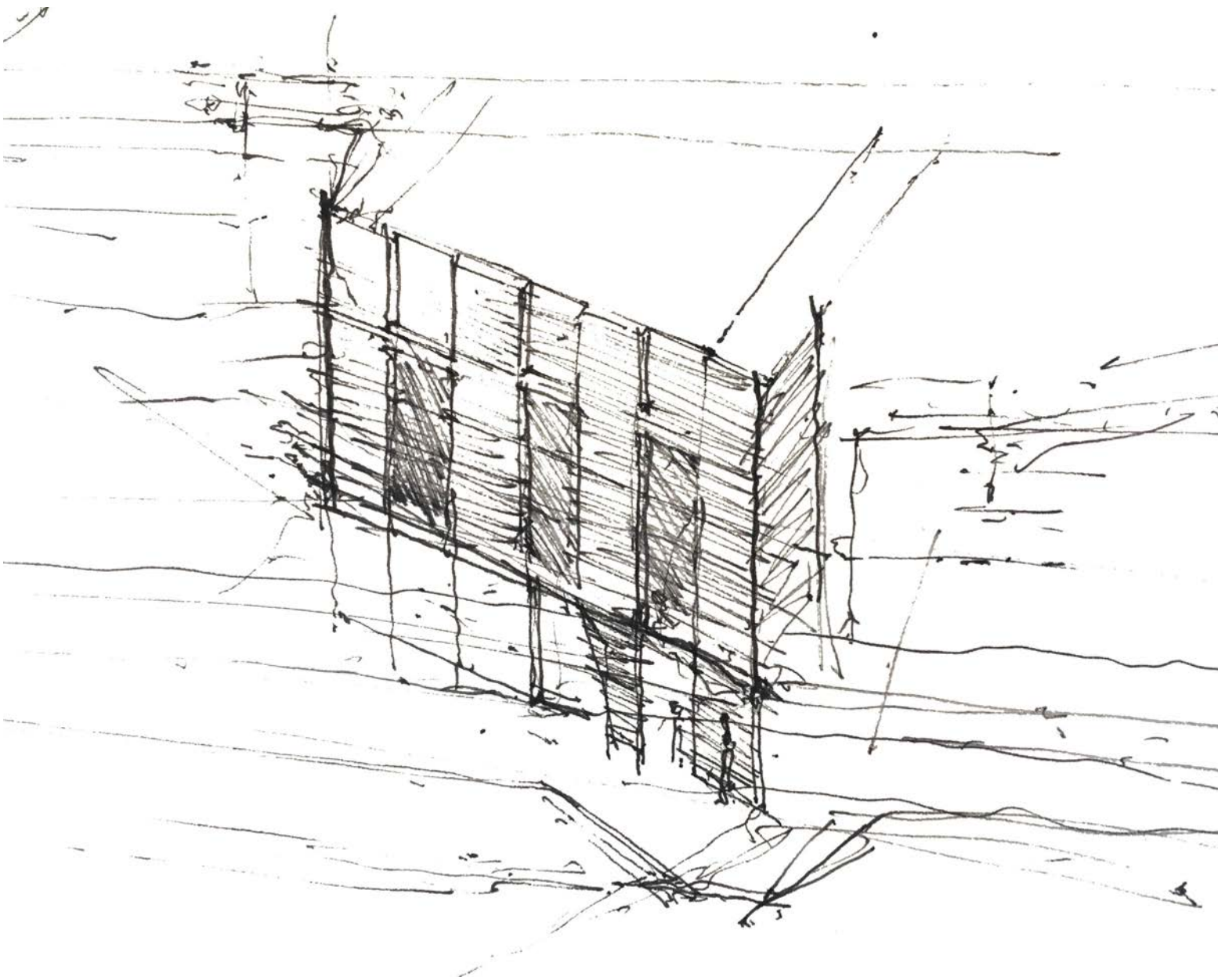


Fig 158 _ Visual Threshold
Concept Sketch (Author, 2017)

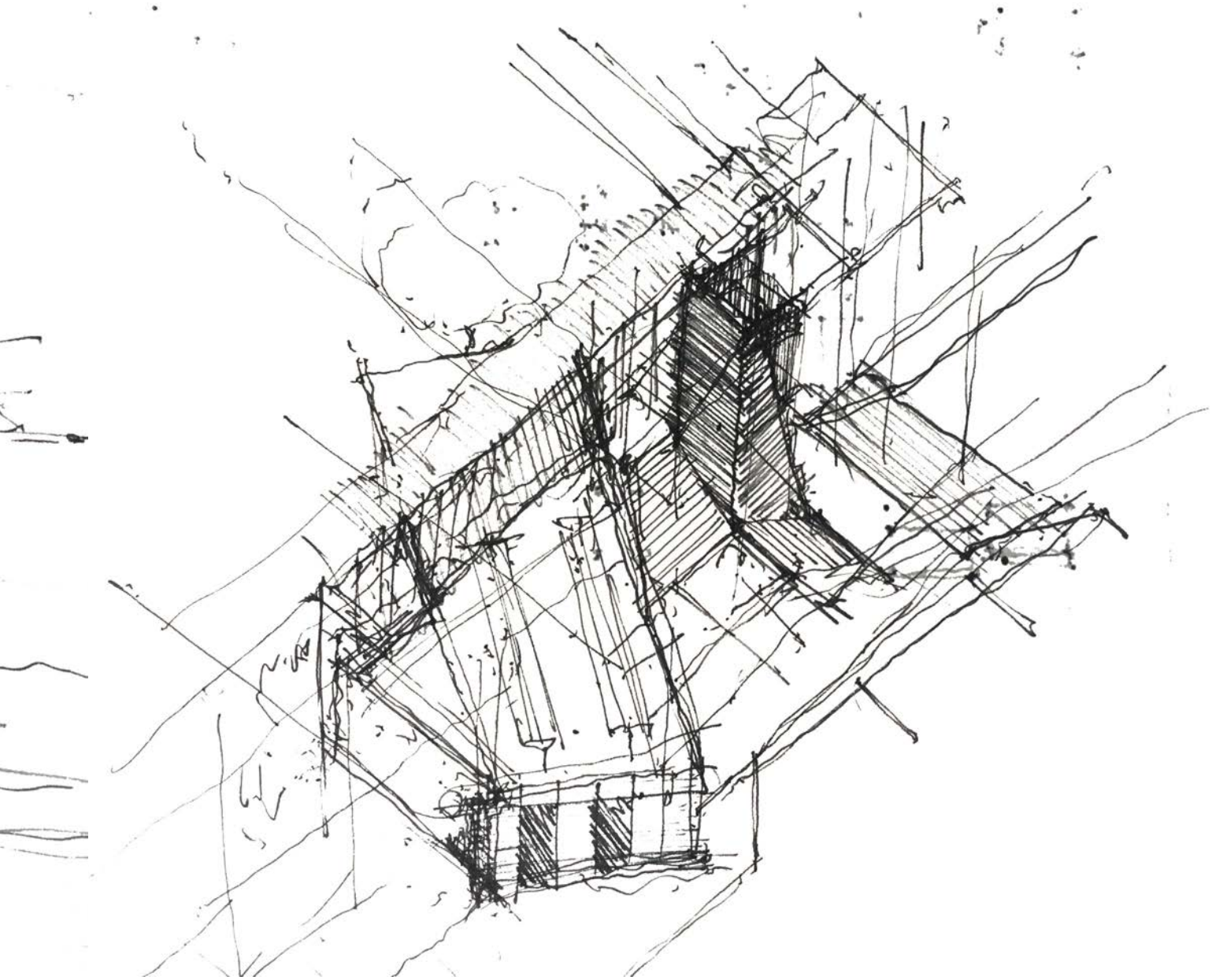


Fig 159 _ Infill Rotation Sketch
(Author, 2017)

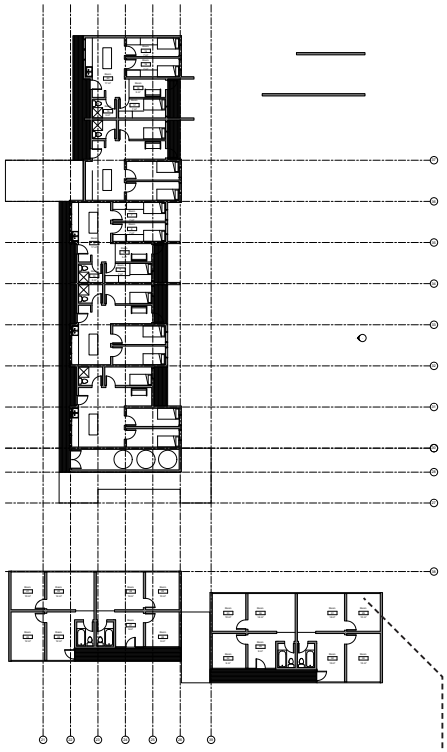


Fig 160 _ Initial Block Iteration – A North to South Building Orientation (First Iteration) (Author, 2017)

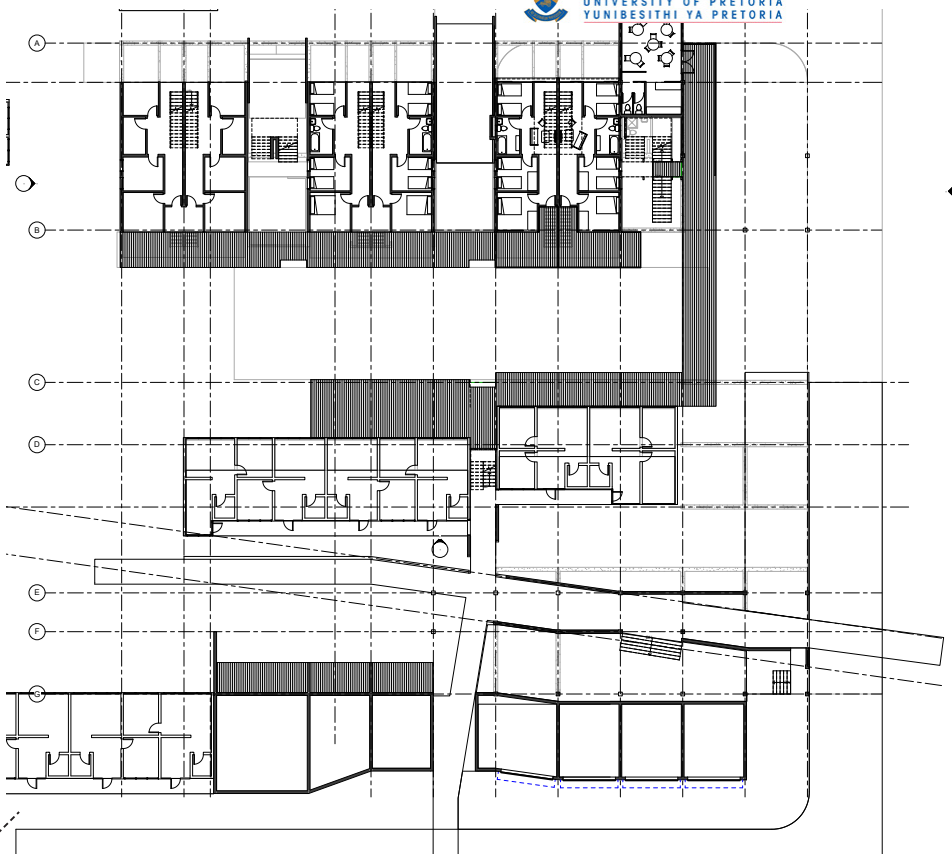


Fig 161 _ Initial Block Iteration – Building orientation changed and route development starting (Second Iteration) (Author, 2017)

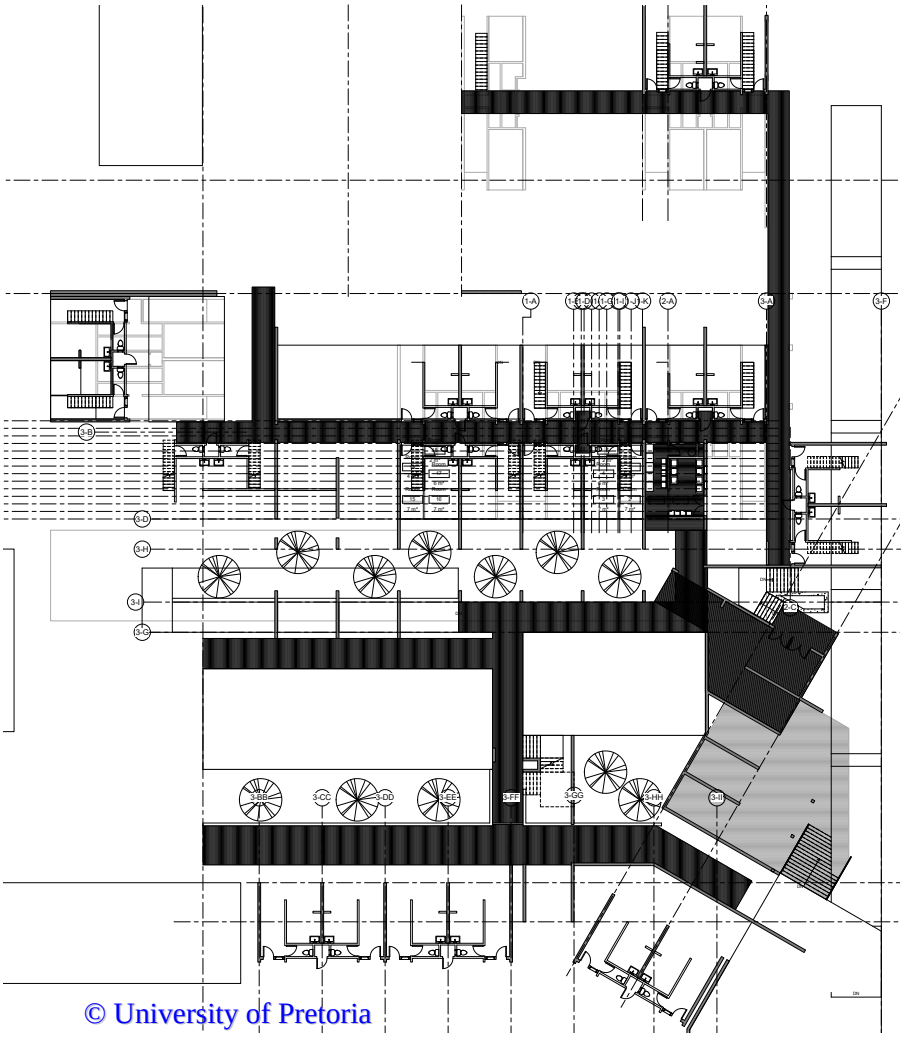


Fig 162 _ Initial Block Iteration – Building typology changes route and threshold developed (Third Iteration) (Author, 2017)

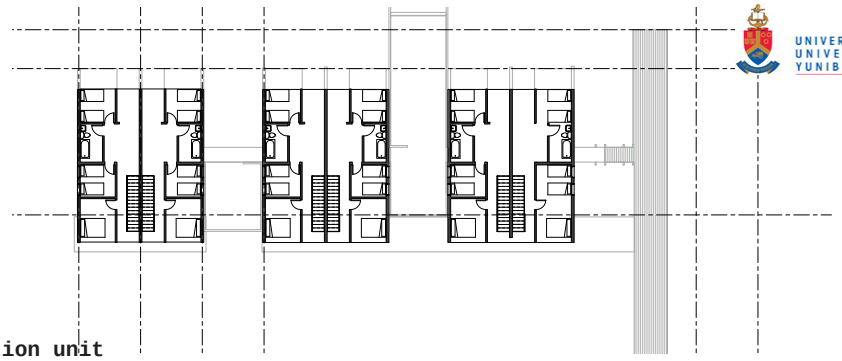


Fig 163 _ Second iteration unit layout (Author, 2017)

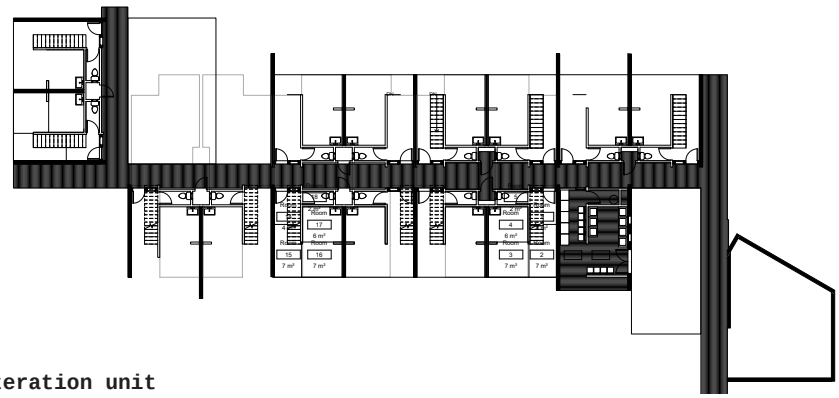


Fig 164 _ Third Iteration unit layout (Author, 2017)

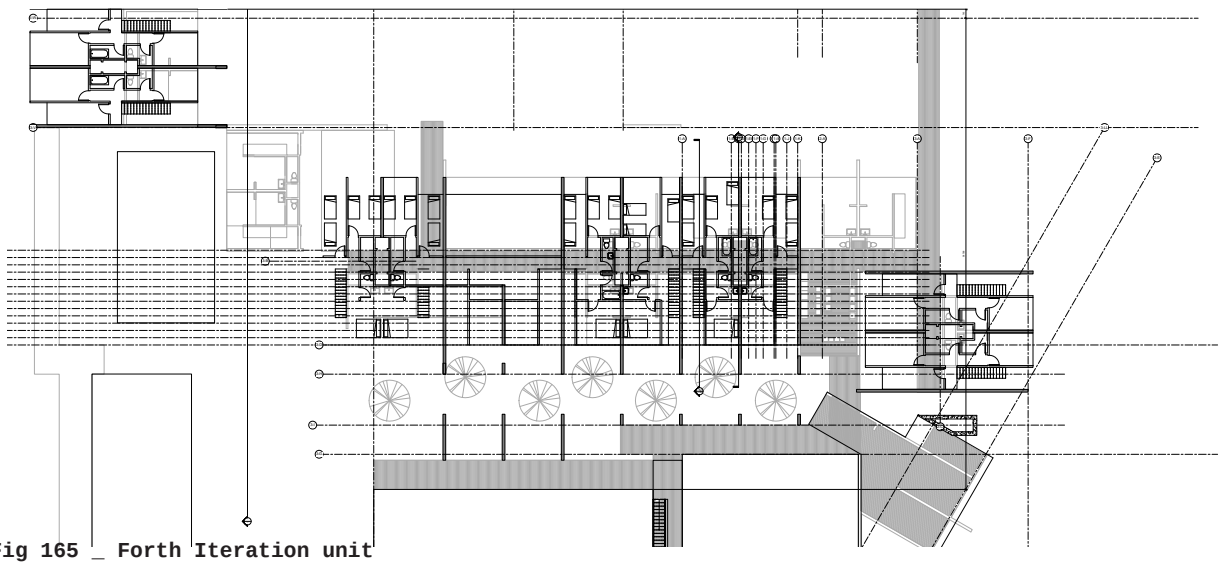


Fig 165 _ Forth Iteration unit layout (Author, 2017)

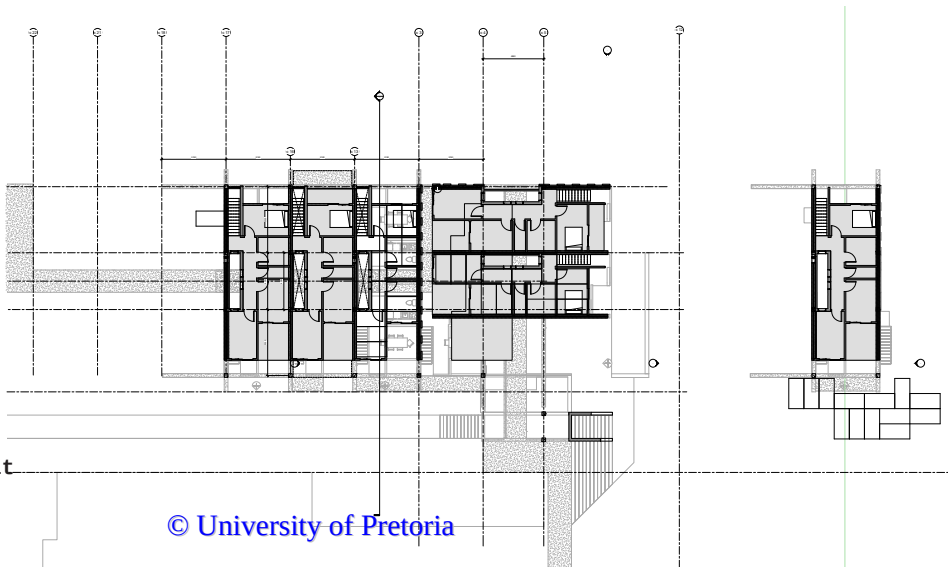


Fig 166 _ Fifth Iteration unit layout (Author, 2017)

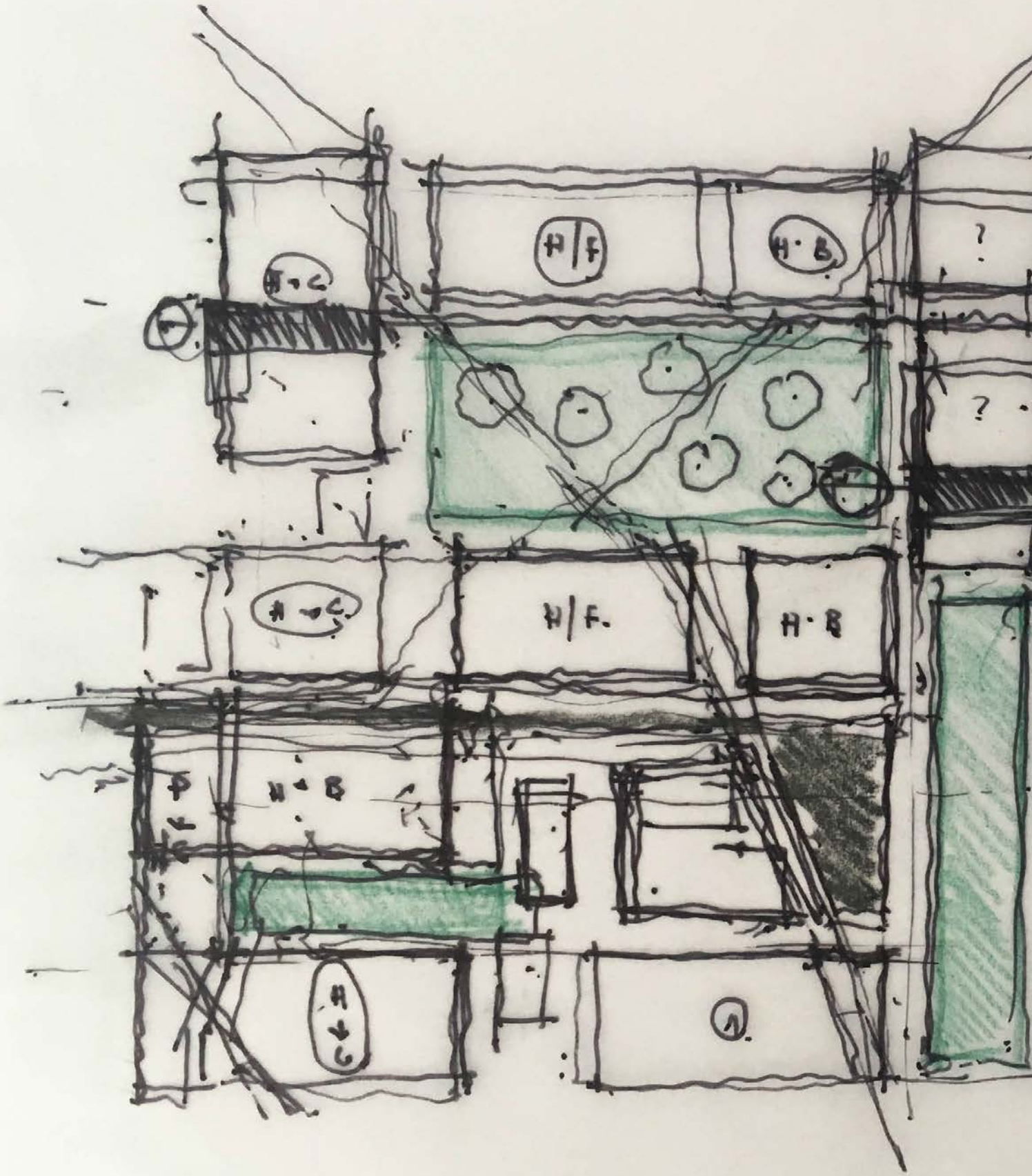
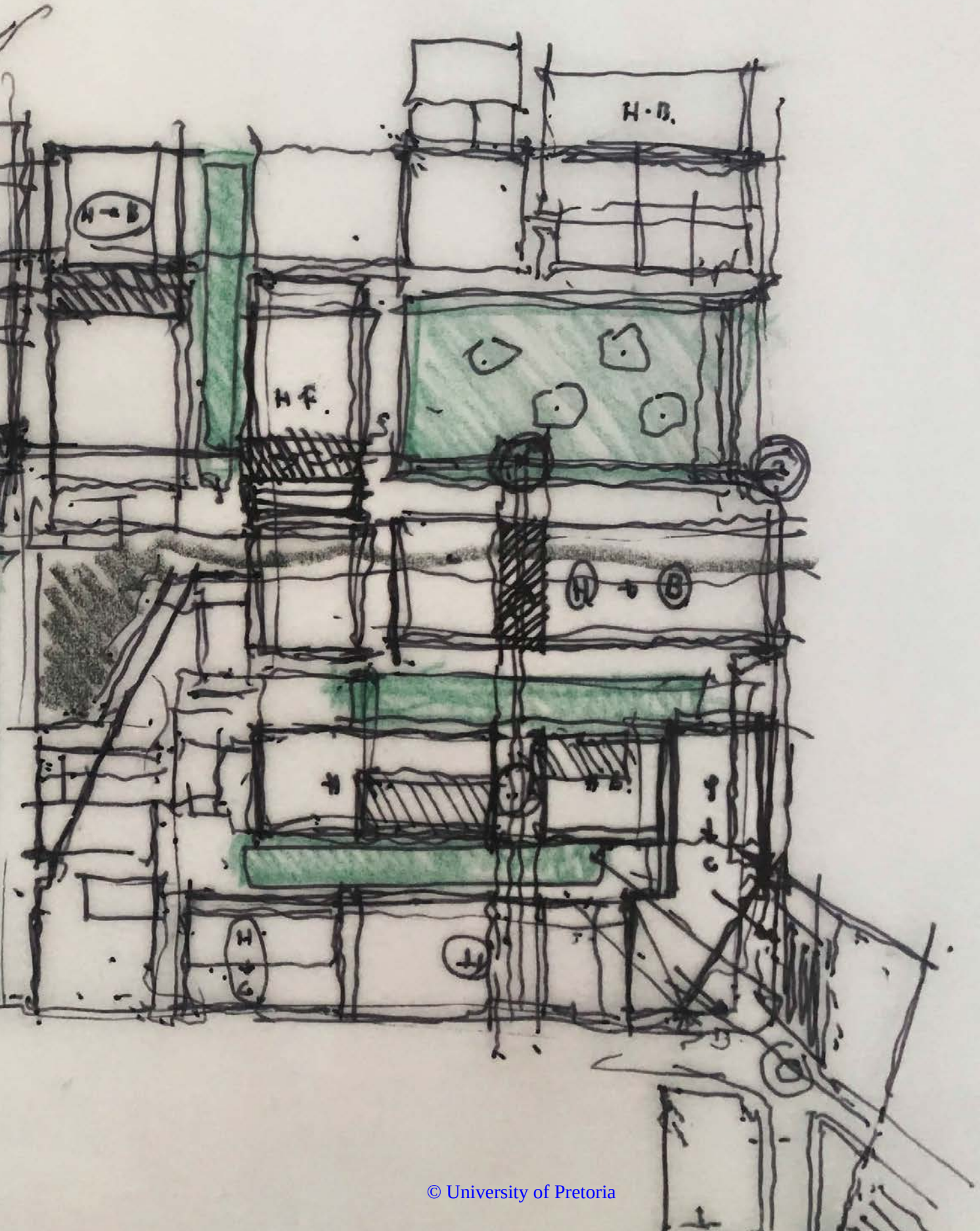


Fig 167 _ Final Block Layout
Concept Drawing (Author, 2017)



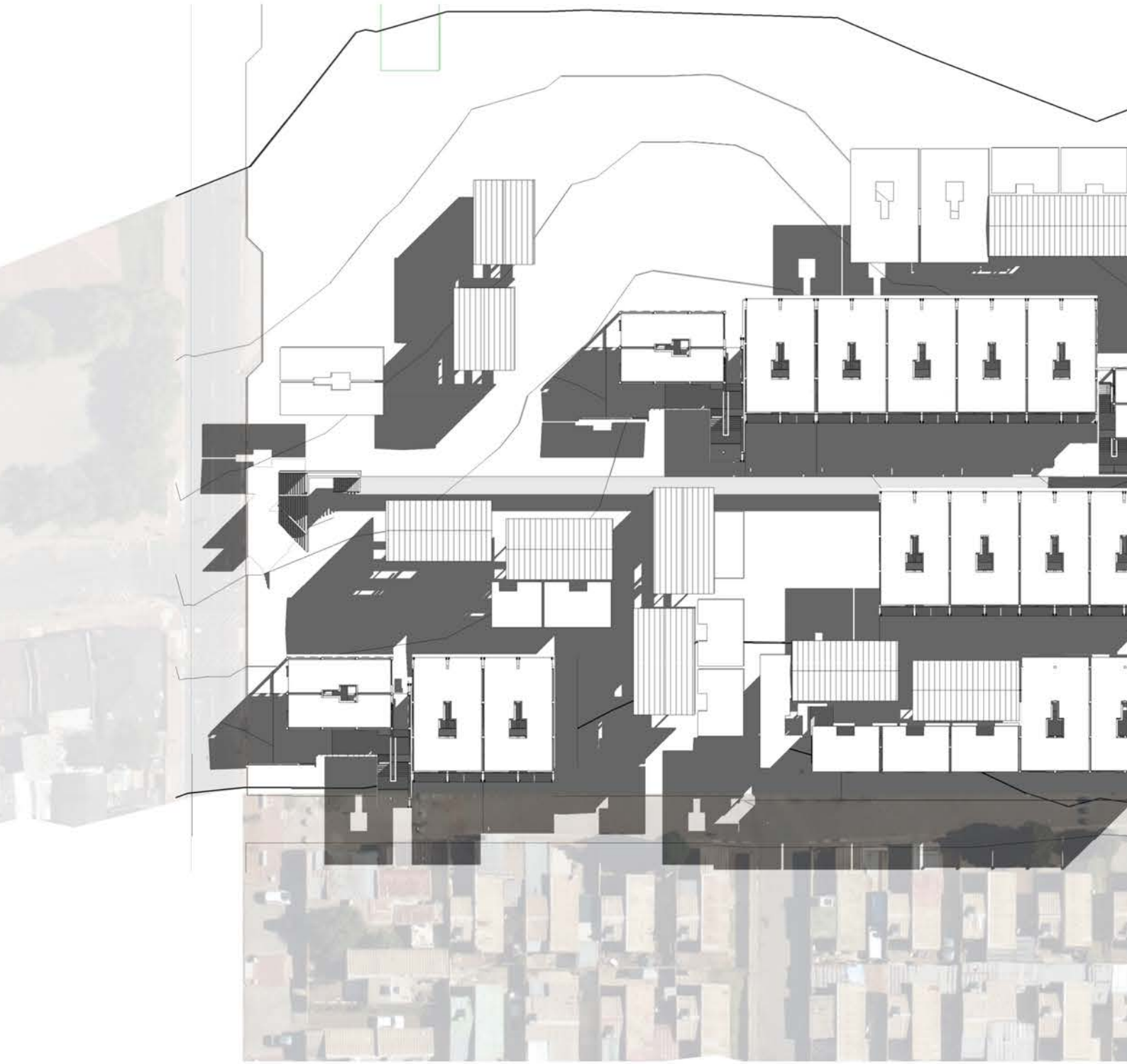
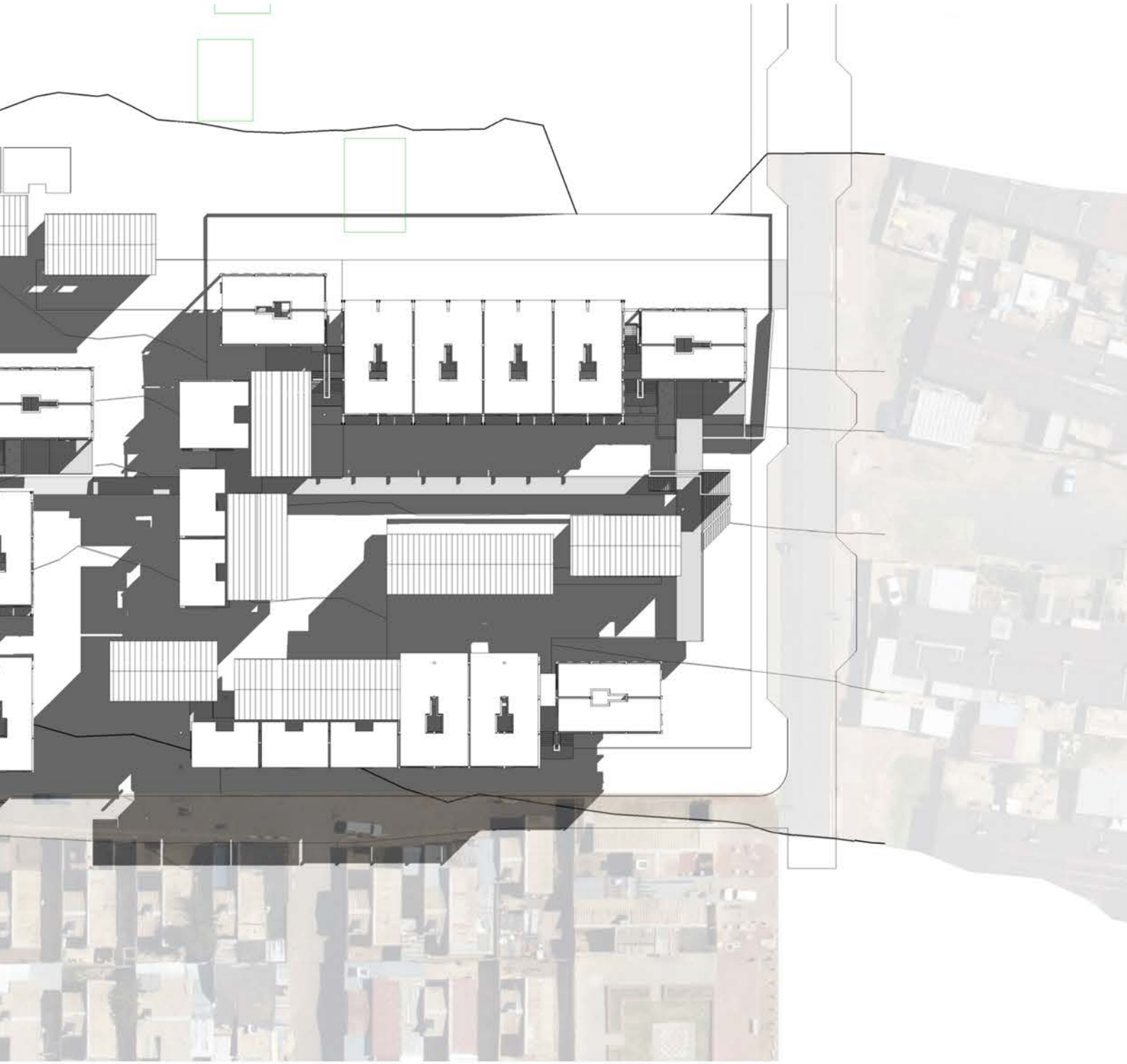


Fig 168 _ Final Urban Plan
(Author, 2017)



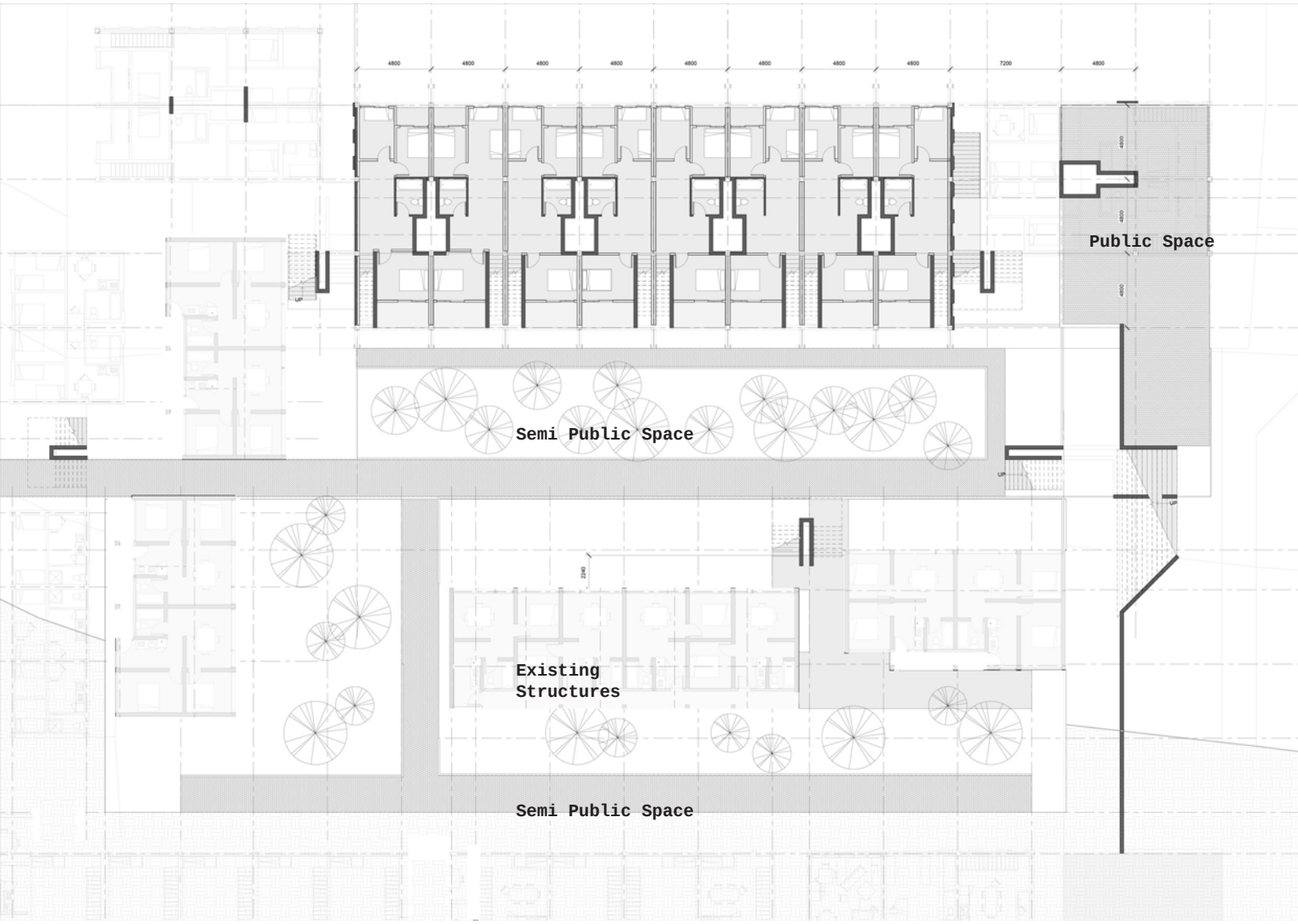


Fig 169 _ Selected Site Area Plan (Ground - First Floor) (Author, 2017)

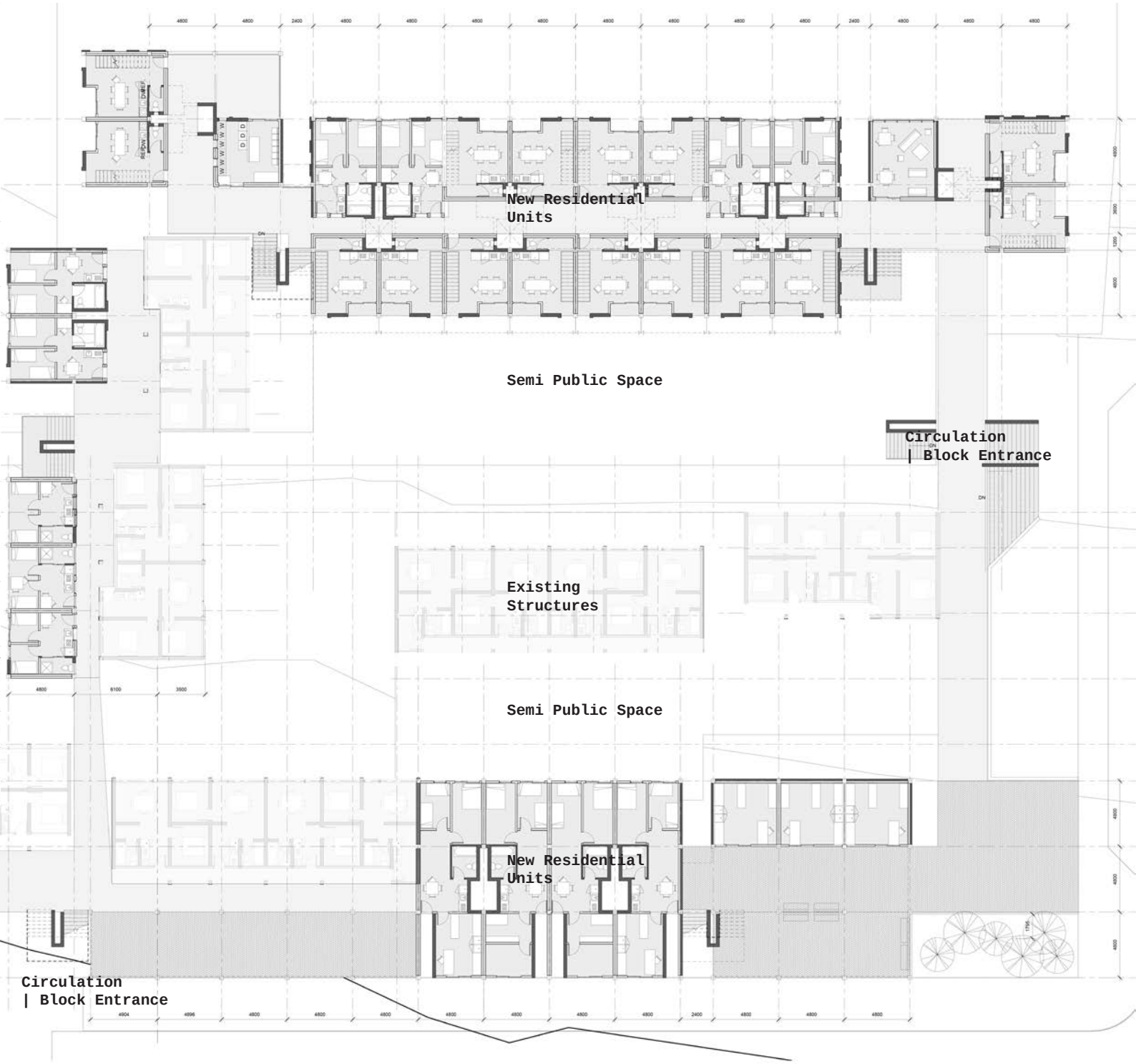


Fig 170 _ Selected Site Area Plan (First - Second Floor} (Author, 2017)

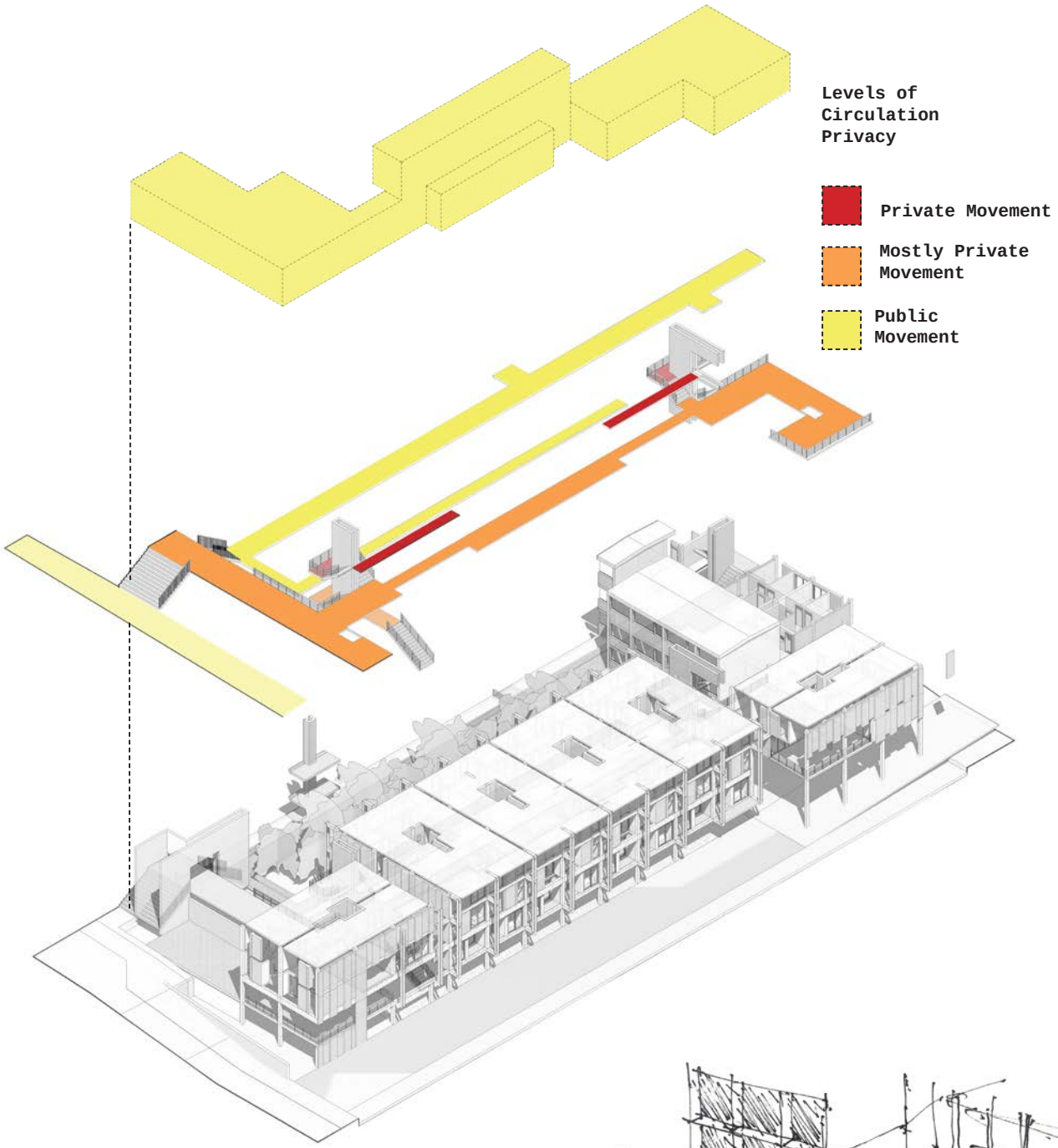


Fig 171 _ Circulation Axonometric Diagram (Author, 2017)

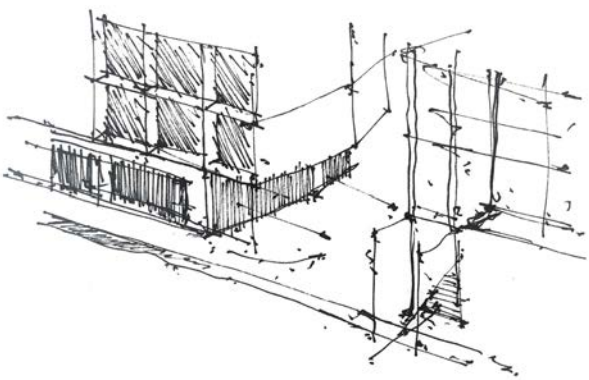


Fig 172 _ Visual Access Exploration Sketch (Author, 2017)

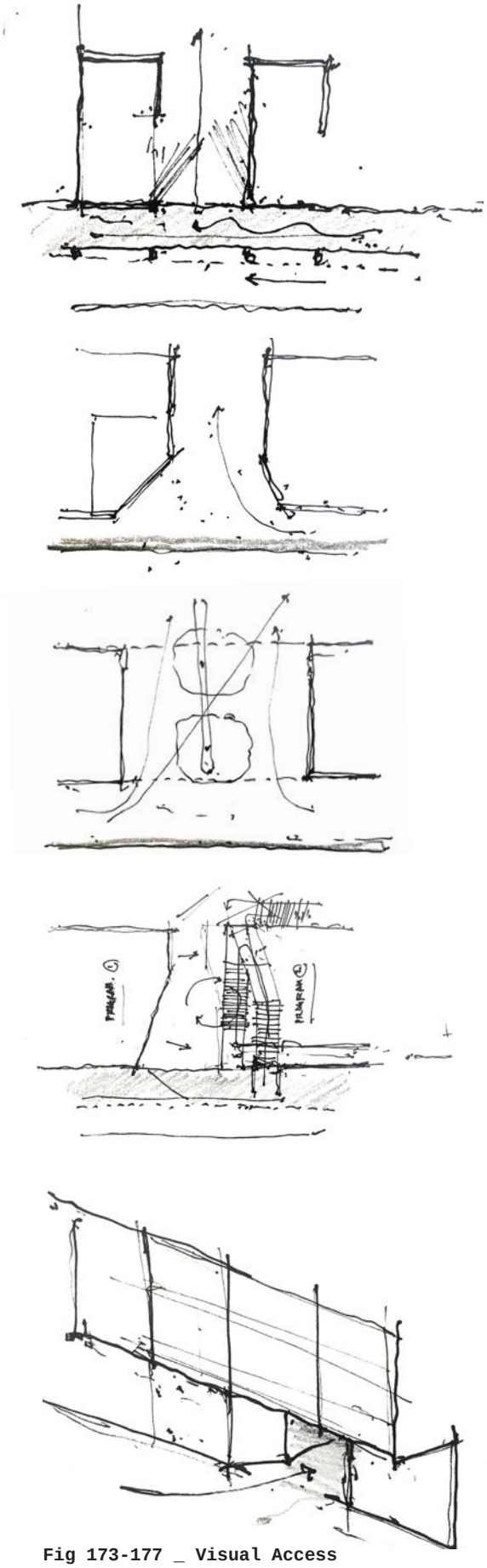


Fig 173-177 _ Visual Access Exploration Sketch (Author, 2017)

Fig 178 _ Visual Access & Circulation Exploration Sketch (Author, 2017)

B04-2 Vision and Movement

Visual access remains as a key function in reforming the urban conditions on site. The design of pedestrian movement through the site is based on existing structure location and the new infrastructural grid that is placed in relation to the existing structures. There is a single level that links to the core entrances of the structures so as to maintain a single visual level throughout the site. The formation of hierarchical elements; such as the towers which connect the stairway access between the street, the circulation path and the interior park section, act as the visual and physical point of permeation into the site. Having these elements read strongly will allow for the users to place themselves within the context and provide a more directional movement pattern through the site, the placement also minimises any blind spots of hidden corners that may facilitate criminal activity, the main circulation points, now limited to certain areas will condense foot traffic through less possible entry points, this means that an increase of public activity at these key points will increase the defensibility of movement through the space.

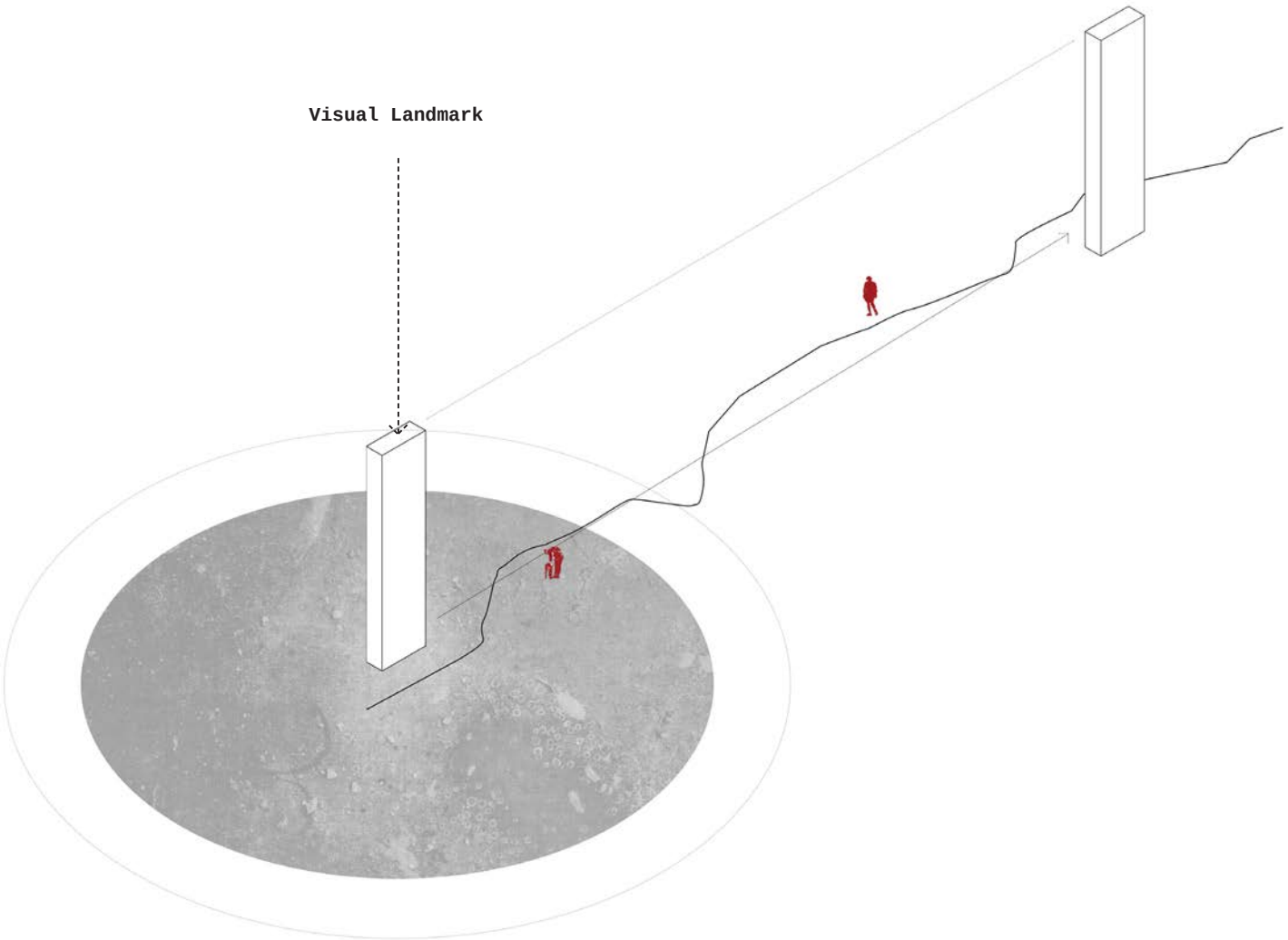


Fig 179 _ Programmed Movement
and Visual Route (Author, 2017)

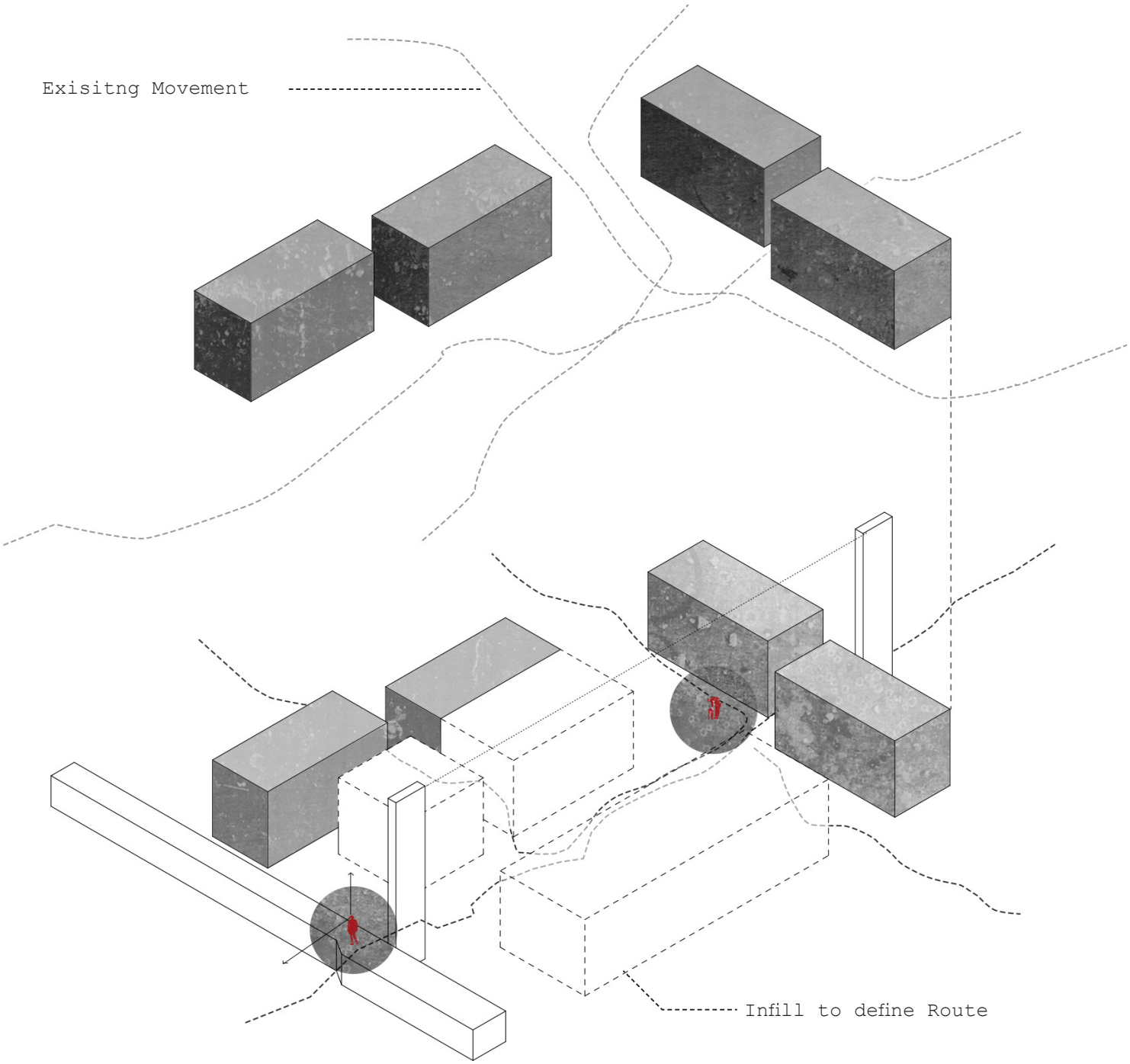
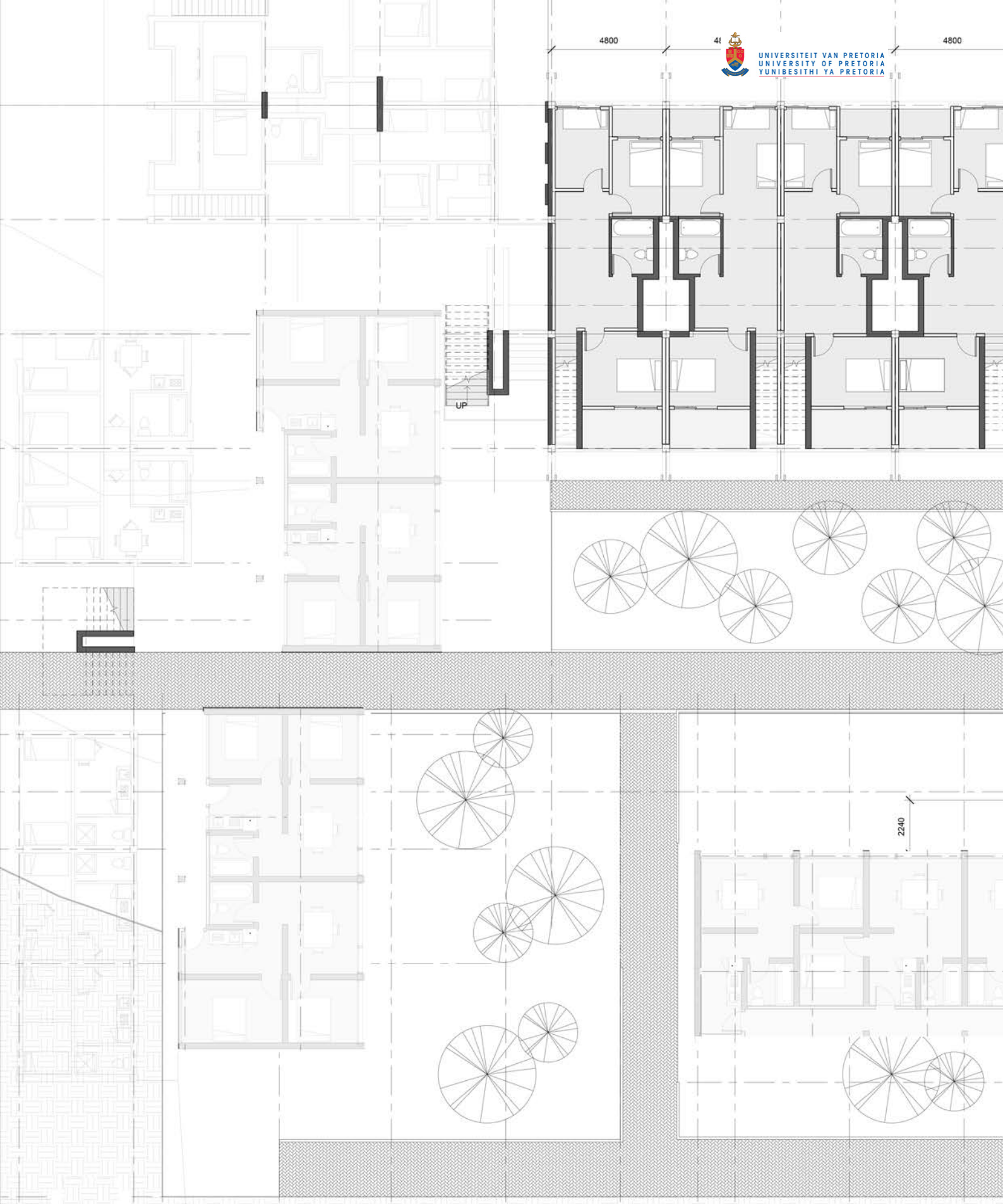


Fig 180 _ Infill Route Creation
(Author, 2017)



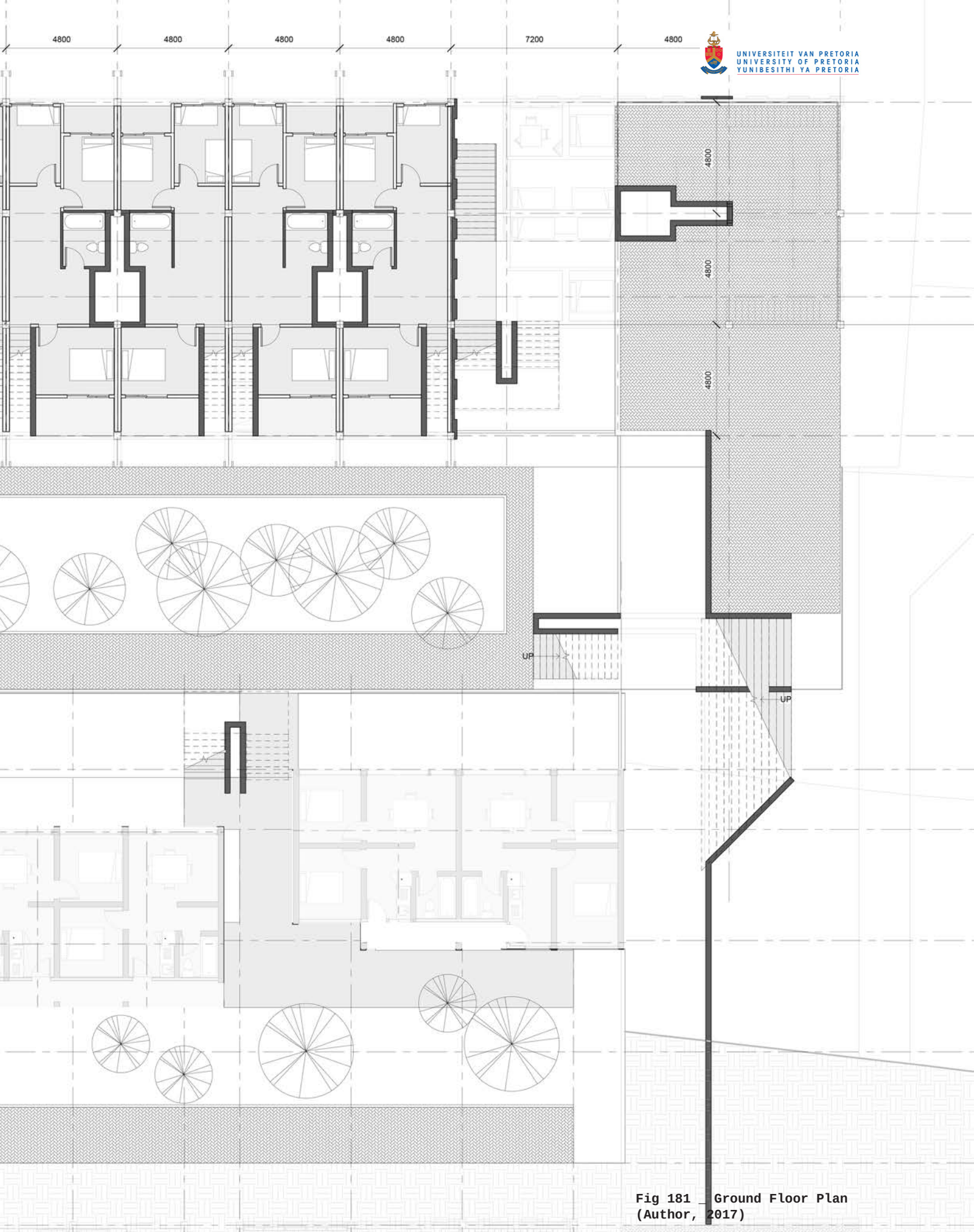
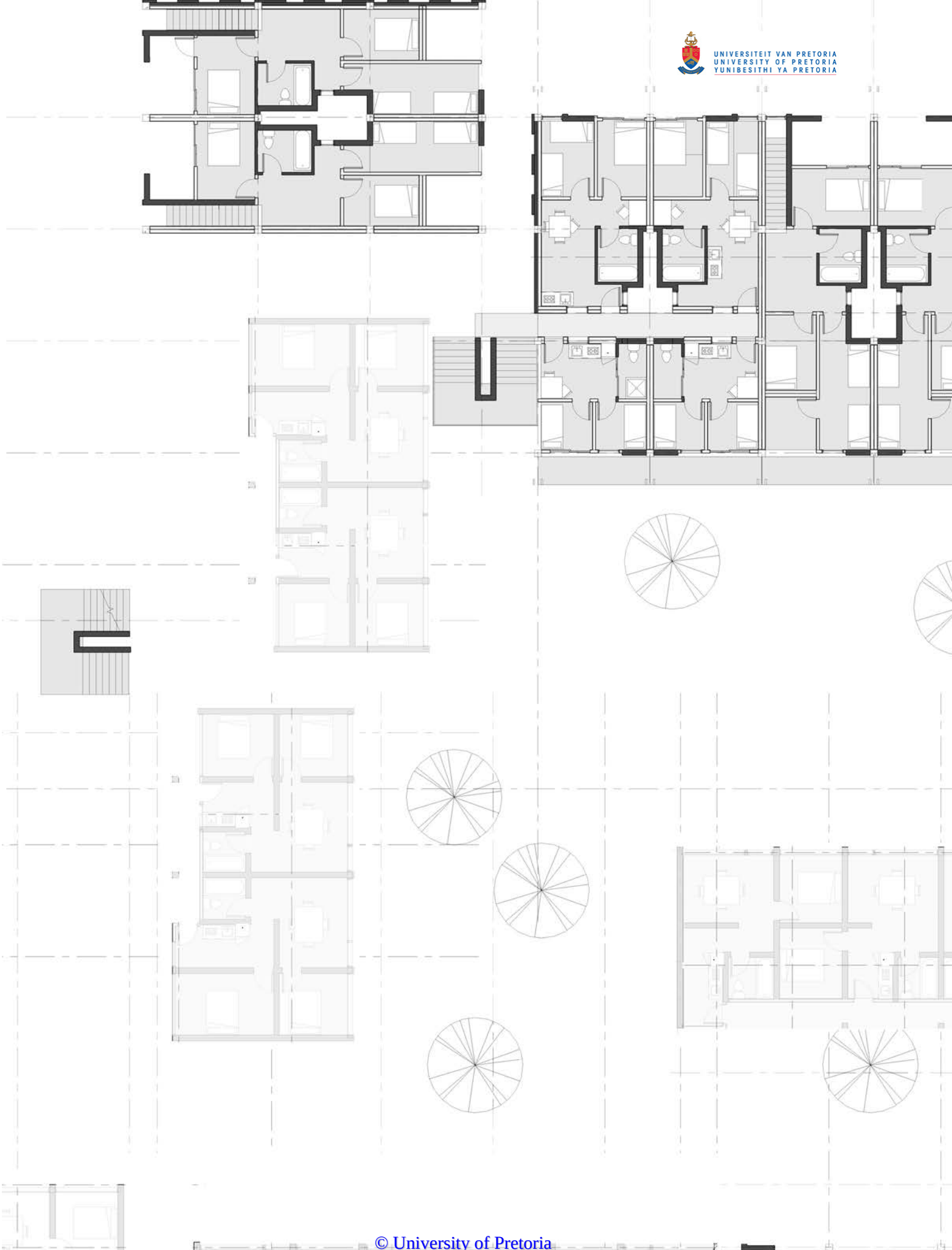


Fig 181 _ Ground Floor Plan
(Author, 2017)

Fig 182 _ Second Floor Plan
(Author, 2017)



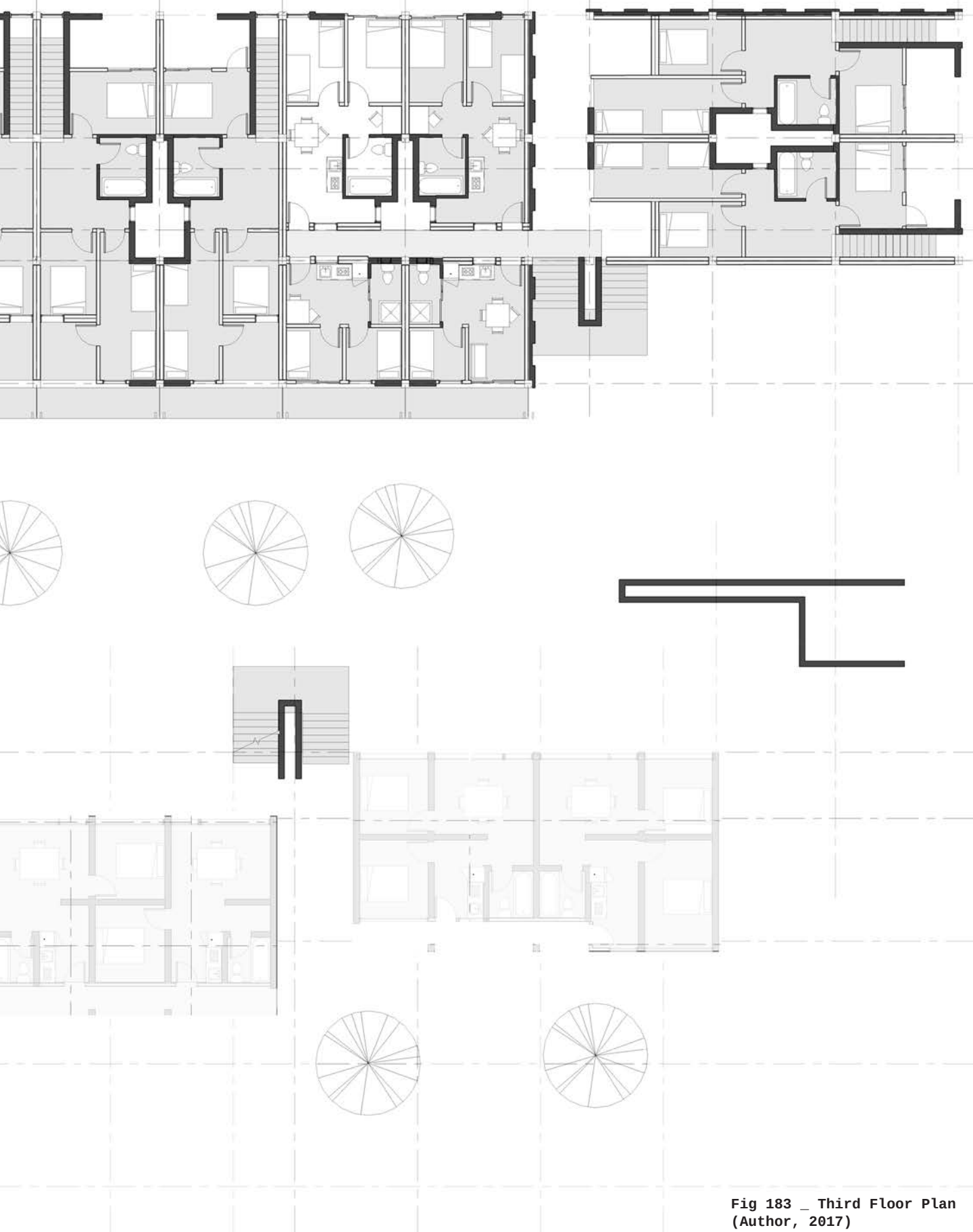
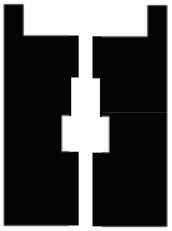


Fig 183 _ Third Floor Plan
(Author, 2017)



Shared Services |

Unit layout and Shared service elements, unit core that serves up to 6 units upon initial development and will maintain the next phase adding a further 4-6 units .

Roof surfaces drain into a single channel and there are no gutters.

Layout limited to 900x900 and 2400x1200 stadards limiting structural and comonent waste upon appropriation.

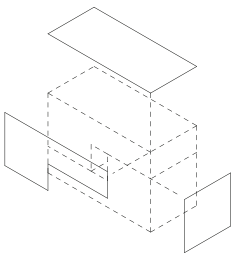
Modular Prefabrication

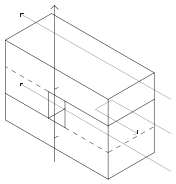
Construction process will remain ecological and economical, in that there will be limited on-site waste due to prefabricated parts -

Site impact will remain limited due to rapid and non-invasive construction

Material Selection also limited to minimisation of material mass - timber panels will maintain bulk of architectural and material space formation. This Contruction process also limites the required trades on site during construction

AB

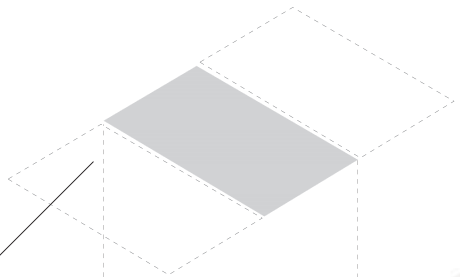




Natural Ventilation

Ventilation of units must occur Naturally _ Openings will allow and depth of deeper units remain considered within this intervention.

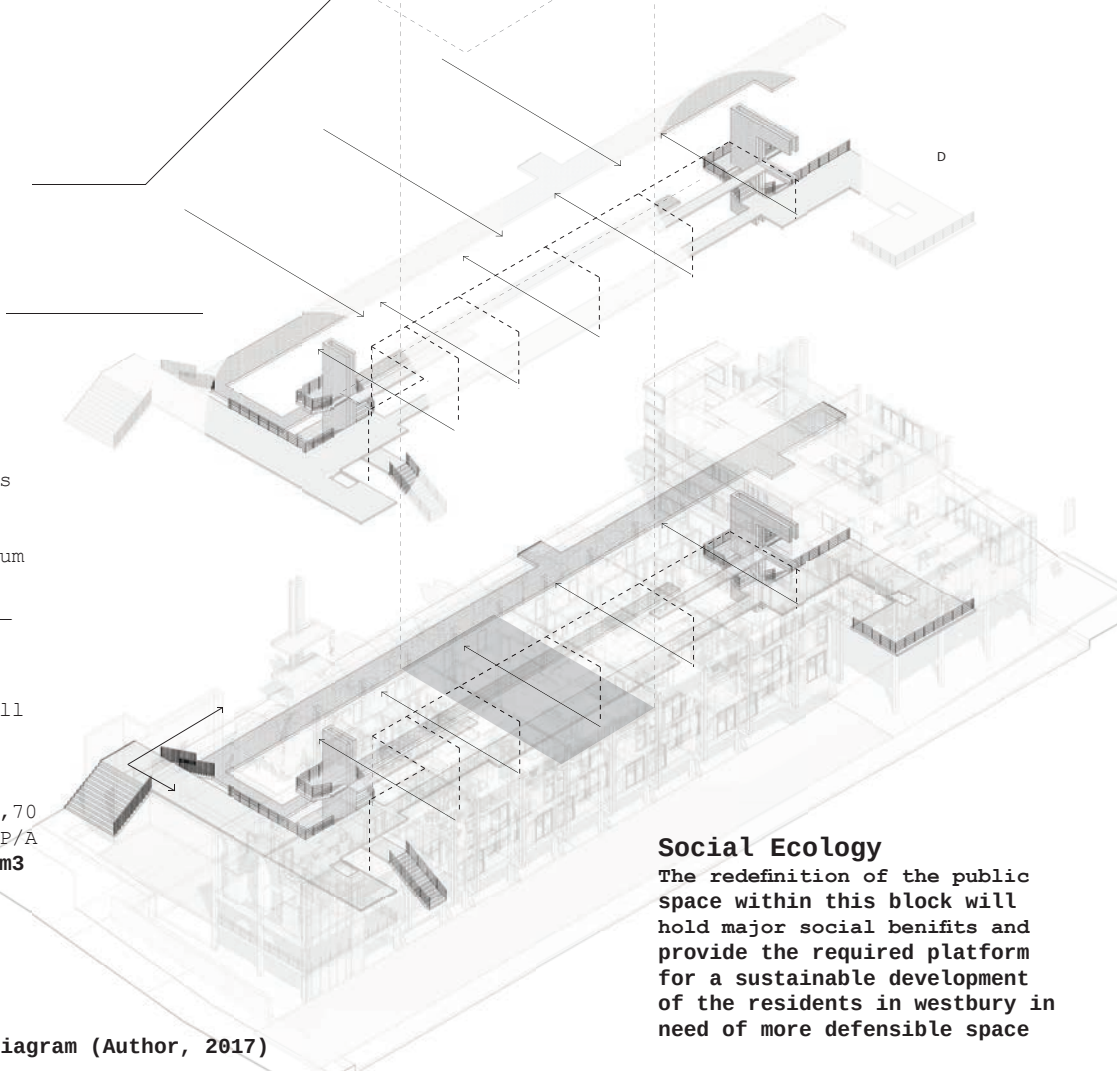
C



PhotoVoltaic Panels

Initial installation will bee too expensive for development return, considerations must be made for expansion of the structure.

D



Rainwater Harvesting

Requirements

Cistern Flushing

Max 12 Cisterns per block configuration - @6LCisterns and 6 Flushes per day.

Total - 157 680 L per Annum
___ 158m3 Per Block P/A
13 Blocks per segment ____
2054m3 P/A

Harvested Regions
Using Johannesburg Rainfall Statistics

Roof Area Per Block -
56sqm Runnoff co-efficient 0,70
Yeild per block 26.42 m3 P/A
Total Roof Yeild _ **1393.7m3**
Site Drainaige
1380sqm co-efficient 0,50
(Mixed Surface)
Total SIte Yeild_**657.15m3**
Total Yeild _2050.8m3 P/A

Social Ecology

The redefinition of the public space within this block will hold major social benifits and provide the required platform for a sustainable development of the residents in westbury in need of more defensible space

Fig 184 _ Site Services Diagram (Author, 2017)

B05 Service and Sustainability

A further integration of infrastructure into the architecture of this project lies within the formation of regenerative systems on site. this is also coupled with the intention of the structure to house as many financially aiding services as possible, in order to mediate the financial stress of the users.

The process of integrating systems with the architecture is possible due to the manner in which the service ducts are laid out as well as the connection of the residential grid to the infrastructural grid is formed. The spaces provided remain flexible and addition and upgrading of services are possible and will present minimal changes to the envelope of the structure, even considering later points of development or further densification

B05-1 Platform for Photovoltaic Panels -

The process of providing electricity at this point remains expensive and will therefore not be included within the provided base unit, instead the roof surface will be created in such a way that installation of photovoltaic panels will be possible. The growth of the building will deem the feasibility of such a system as well as provide a more accurate requirement for the service.

B05-2 Site Rainwater collection -

Water is collected and stored beneath the ground in a Collection channel under the circulation platforms, once filtered through a particle filter; it is pumped to an elevated holding tank which feed the water through gravitational forces into a ram pump. The rainwater will not be potable as the systems required to purify water are not within the financial framework of this project and due to the large scale of this development, will not provide a cost benefit that deems the service necessary, instead the collected water will service the cisterns of the residents, service the communal laundry spaces as well as provide the resource for site irrigation and upkeep, therefore catering for the conventional need of potable water which is simply wasted and lowering the cost and use of large amounts of water in water intensive services. (fig 184)

B05-3 Communal Water Heating

The process of heating water is a very energy intensive process and therefore a system of communal heat pumps, 1 pump per 4 units will aid in lowering the energy requirement. The warm water will be stored in a large insulated container within the service ducts and be measured and monitored as it is used. It is possible for the heat pumps to be powered by photovoltaic panels, and the negation of ‘per unit geysers will provide a major cost saving over the re-construction of the site.

B05-4 Half the services

Another approach to service provision within this project is the aim to limit the amount of infrastructure placed so as to minimise material use, therefore the aim to half what is conventionally used to service the same amount of units will establish the process of technification. For example this leads to a single down pipe servicing a roof surface that shelters 4 units. Much of this is made possible through vertical densification; however the challenge lies within the provision of floor by floor services. The units are in turn reflected over the service axis allowing for connections to be made to singular points of service such as waste water and electricity.

Daylight

‘Sefaira’ Evauation was conducted throughout iteration of the strucuture, with aim to provide the maximum required light per living area even though square meterage is minimised to gain efficiency (fig 185)

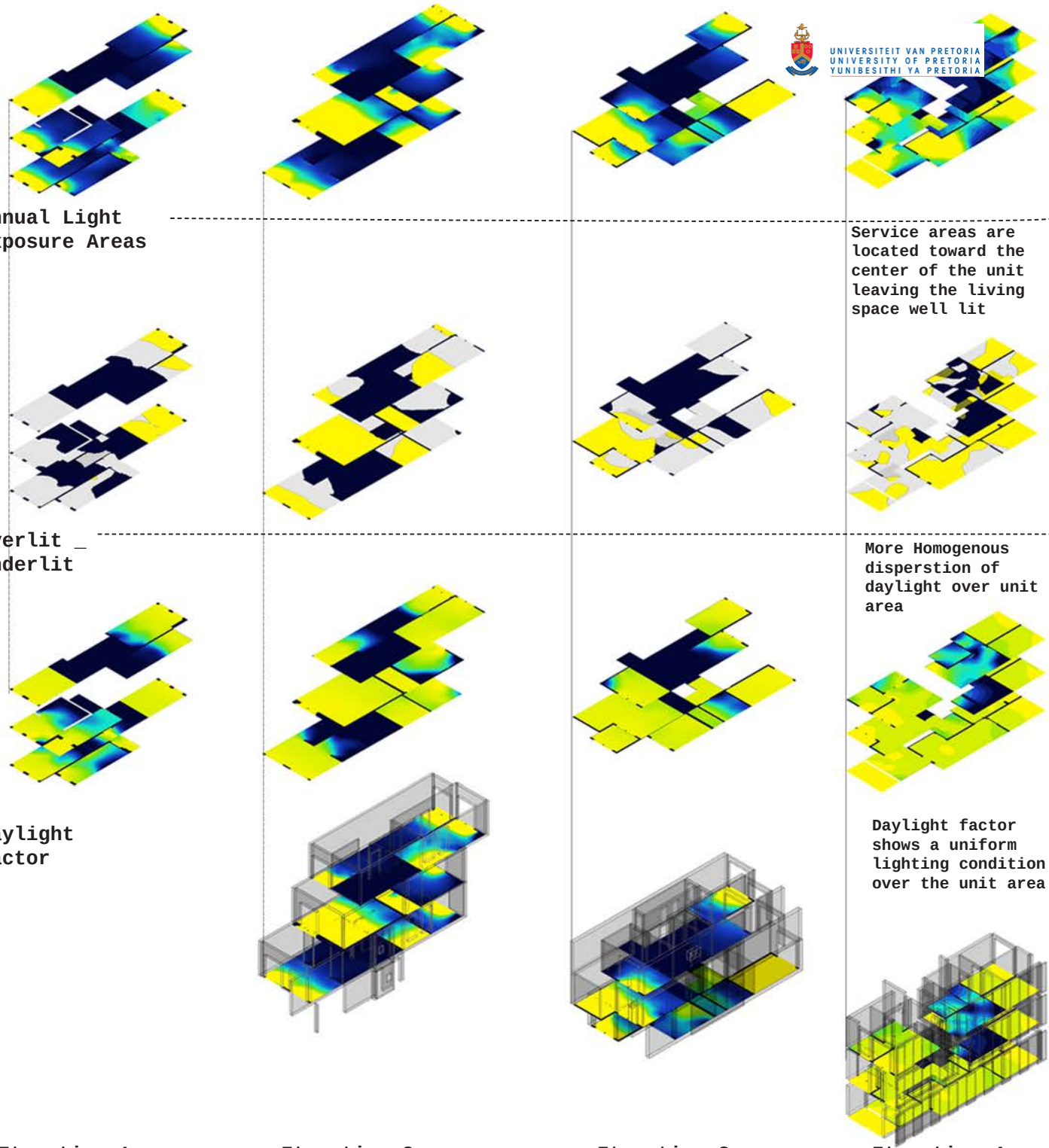


Fig 185 Sefaira Iterations (Author, 2017 Edited from Sefaira)

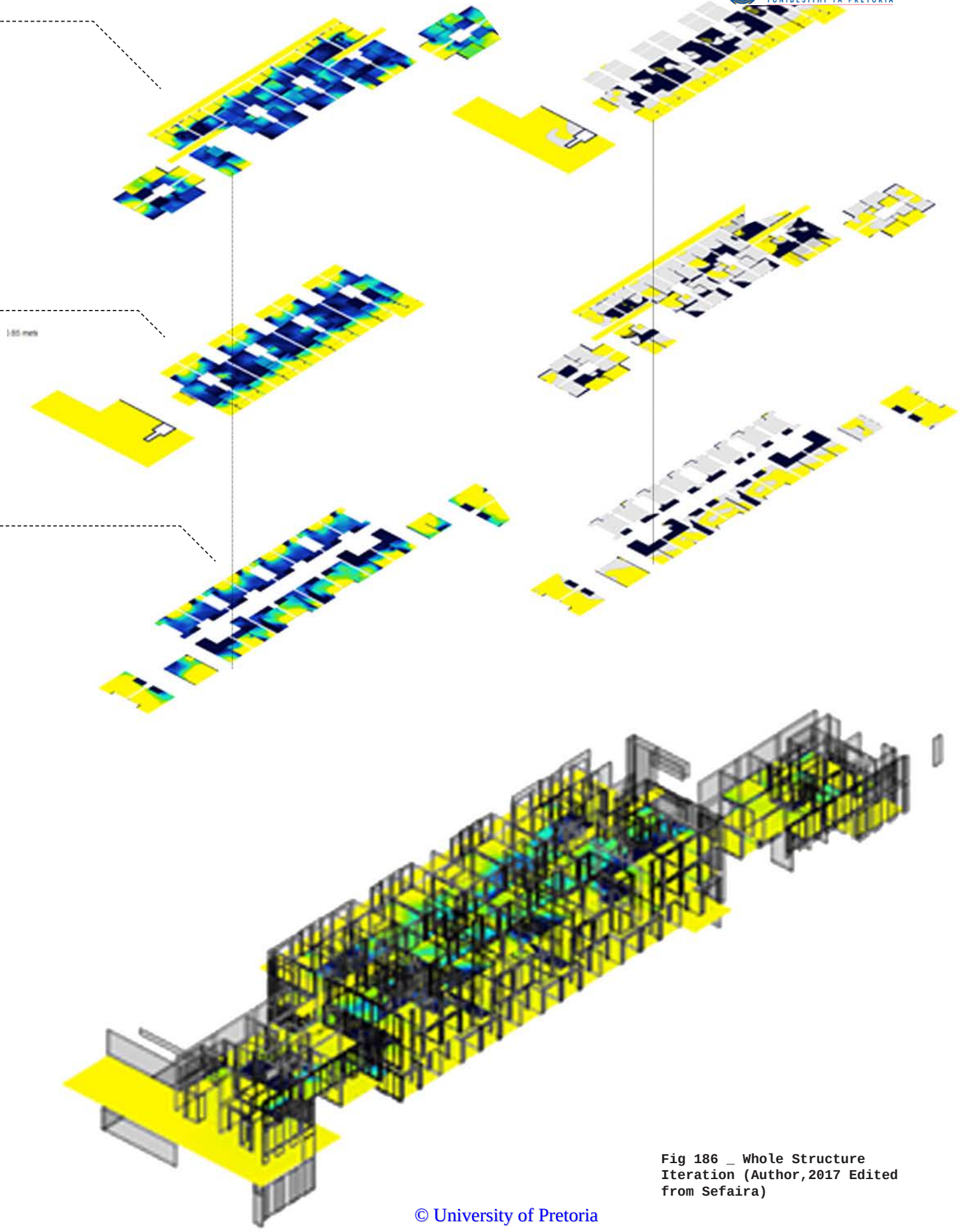
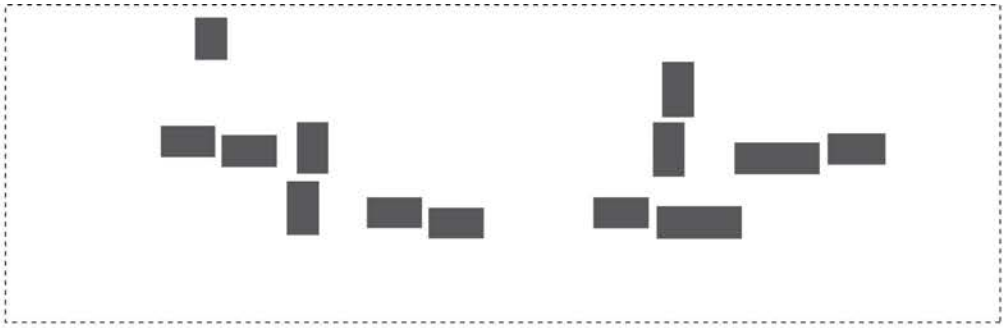
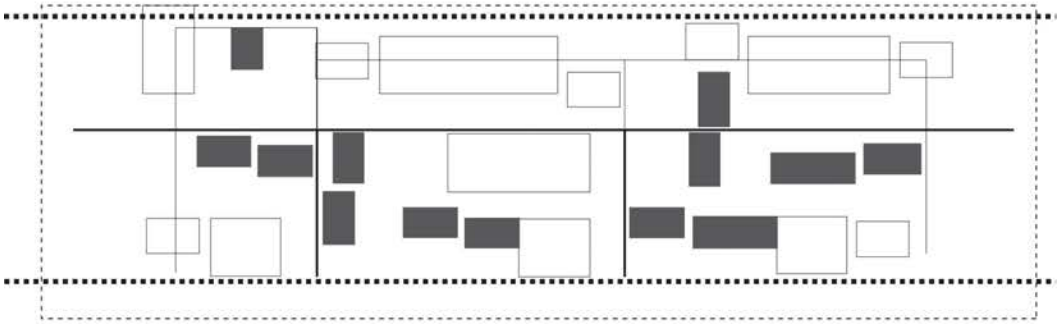


Fig 186 _ Whole Structure Iteration (Author,2017 Edited from Sefaira)

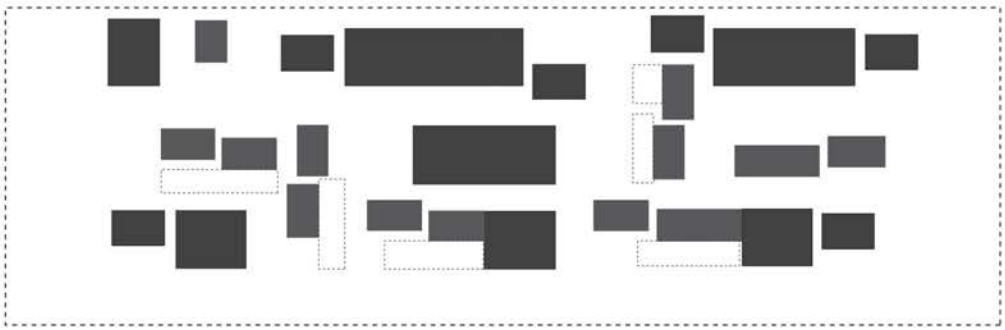
Initial Phased Implementation



1_Existing Unit and Block Structure

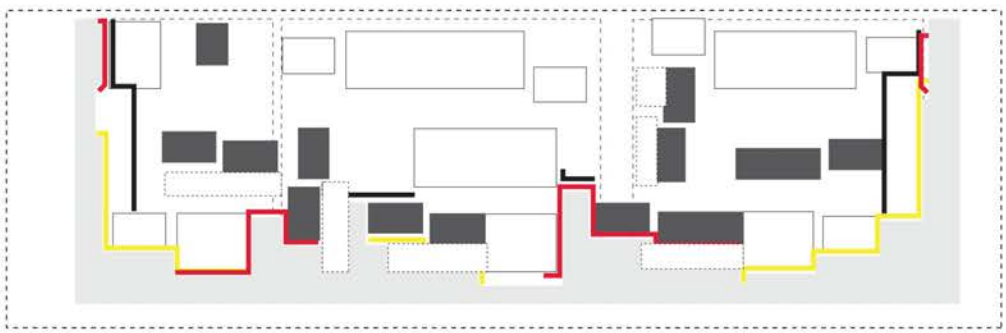


2_ Route Definition and infrastructural Placement

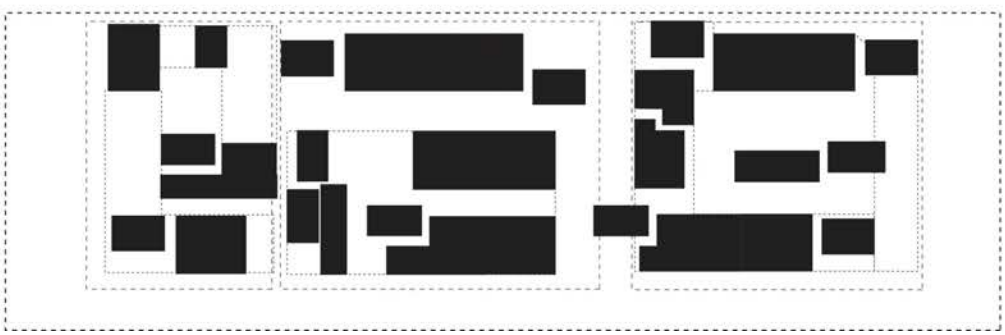


3_ Placement of New Residential Units

(Followed by the migration of exisitng residents into the New Units)



4_ Definition of Edges through the occuplation of Commercial and Residential Space



5_ Approrpiation of exisitng (old) units through new extensions to define the final block typology

Fig 187 _ Phased Development Diagram (Author, 2017)

B06 Urban Growth Through a Phased Development

As explained within the analysis of Westbury's social context, the urban realm will need to undergo a transformation that allows for a more sustainable developmental foundation, the definition of space must occur in a way that does not strip the site from Westbury's urban fabric the process of redefining the urban legacy aims to link the rest of Westbury into a more readable fabric. Therefore the process of natural growth must be respected in the formation of this new space, allowing for the residents to root themselves into the space before densifying even further. The initial construction process will occur rapidly.

Projected Development Implimentation

Phase -1 (project timeline 12-18months)
Construction of the new units
Infrastructural framework and circulation network
Creation of new and defined shared spaces

Phase -2 (Project timeline 18 – 24months)
Relocation of the existing residents into the new residential structure
Refurbishment and alteration of existing units on site

Phase -3 (2-10years)
Natural growth and appropriation of development by the users

Phase -4 (10-12 years)
At natural point of necessity material and structural refurbishment must occur, analysis of urban realm and subsequent densification can occur.

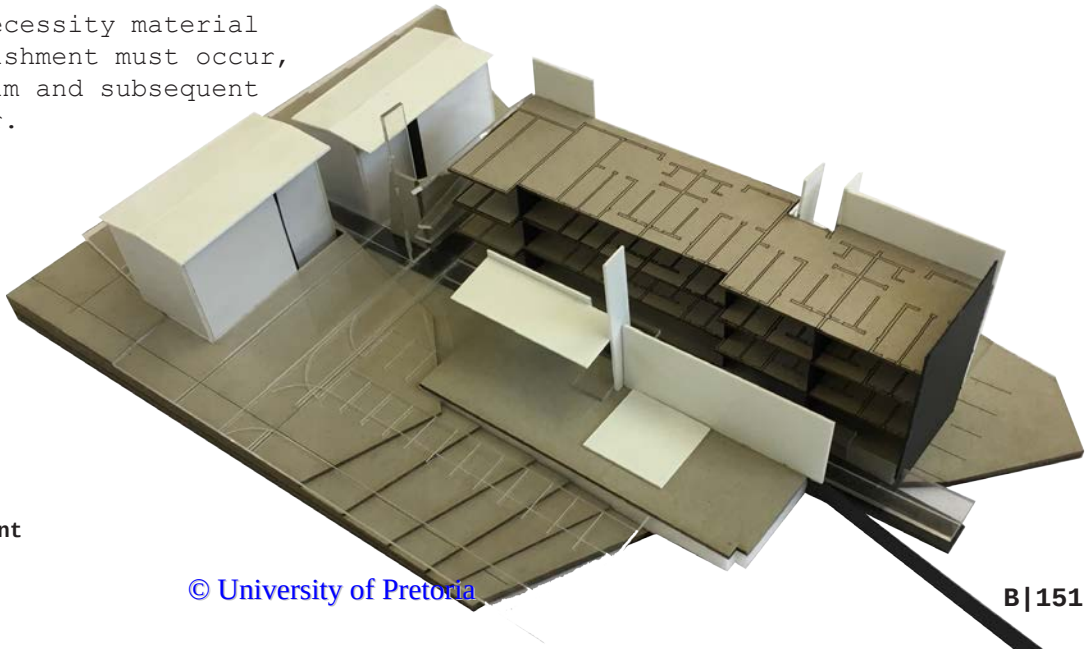


Fig 188 _ Unit Iteration – Initial phased of development (Author,2017)

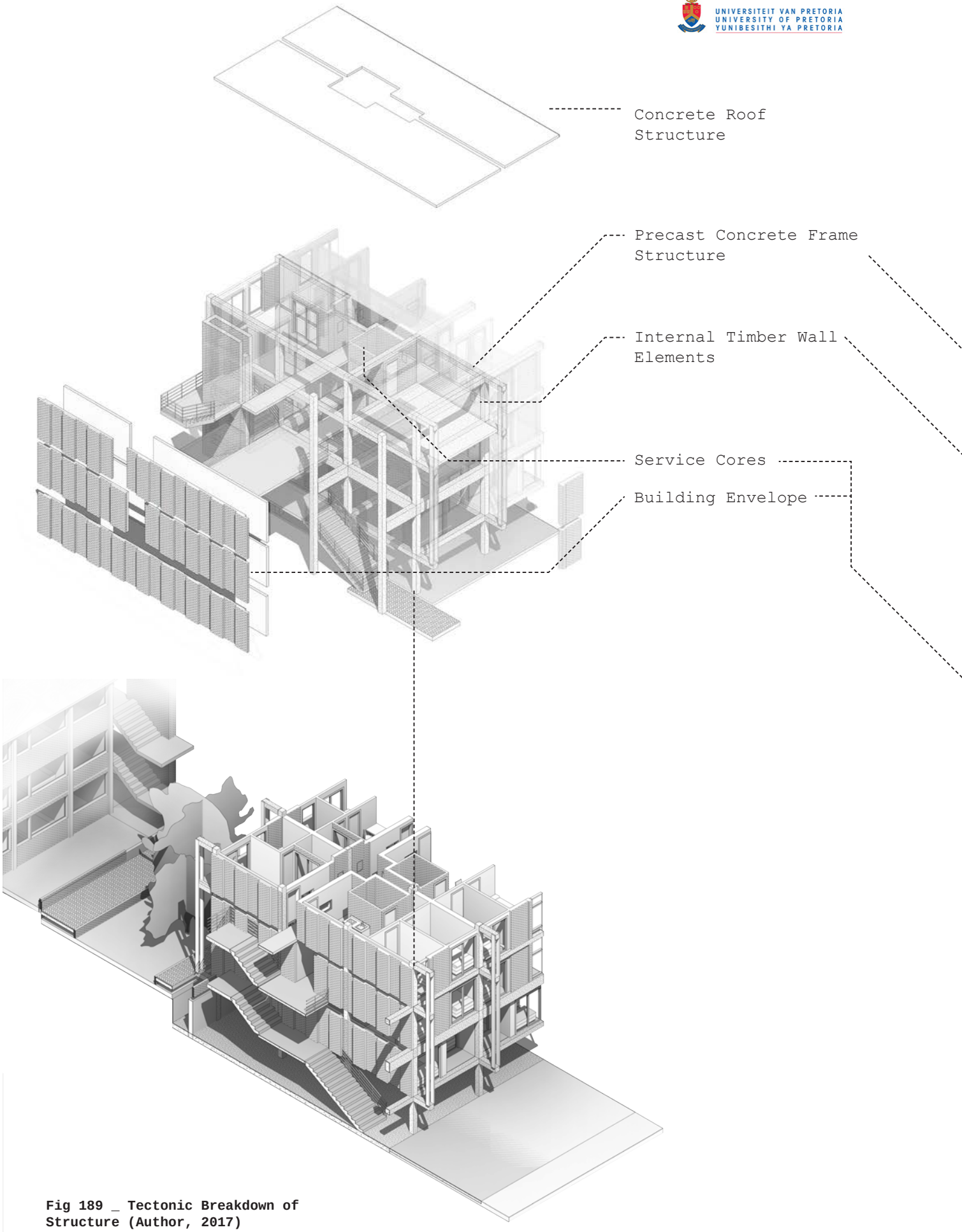


Fig 189 _ Tectonic Breakdown of Structure (Author, 2017)

Design | Technology

B07-1 Frame and Services | Tectonic Programme

The material selection for this scheme is based on the ability for them to form sections of the structure as pre-fabricated elements, selection of materials therefore must be considered for durability in a program which demands high resistance, whilst remaining economic and limiting he need for high material mass.

Precast concrete framework
Hollow core floor slab with structural screed, cast offsite and formed into a single floor slab element which seats in the precast concrete frame
Prefabricated timber wall system, consisting plywood sheets, internal insulation and finished with a surface of cement based plaster.
Concrete roof, constructed in the same way as the floor slabs allowing for extension upon further development but contains waterproofing system upon initial assembly.
Doors and windows and services constructed into the timber wall system
Prefabricate brick wall system, placed into concrete framing structure housing connection points for unit services.

Layout of Site | Grid structure

The chosen grid layout has been selected through the consideration of material allocation that forms the interior spaces. Therefore the modular allows for both a 900x900mm grid as well as a 1200x2400mm grid to mesh within the frame, the frame also allocates the allotted space for modular units and exterior service spaces to replicate over the entire site, allowing for units and services to rotate 90 degrees and be placed within the system without changing the layout of the grid.

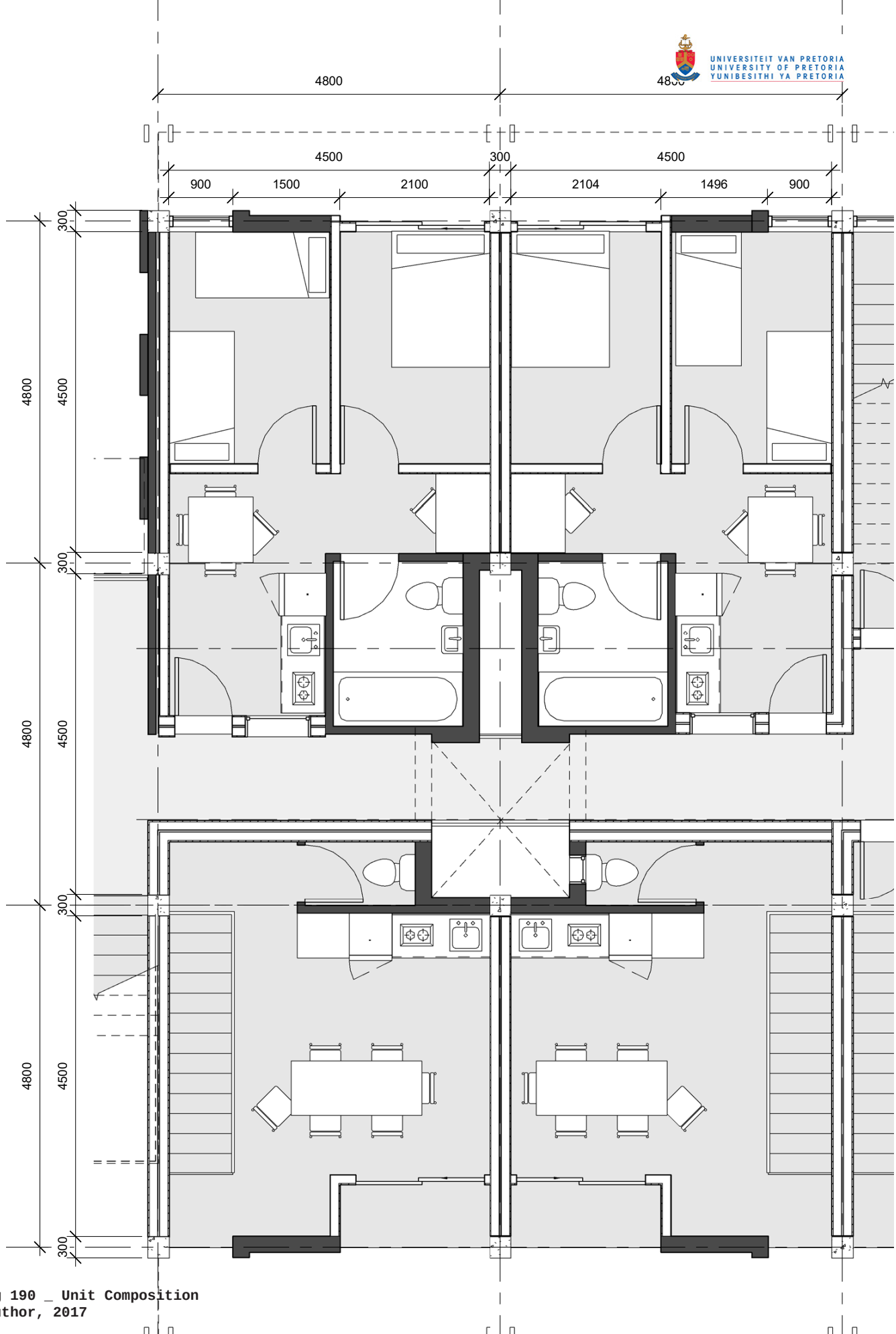


Fig 190 _ Unit Composition
(Author, 2017

B07-2 Appropriation & Facilitation of Future Development

Systems of Manufacture

The construction of this housing development should maintain a fast pace so as to not impede on the functioning of the site. The infrastructural frame as well as the architectural infill takes the form of prefabricated elements, the overall structure will be assembled without any in situ works, besides the assembly of components. This structural framework also provides the platform for all future development and acts as the anchor point for the definition of the grid of the new development. The process of constructing this frame is unhindered by the complex procedure casting of floors or services and in turn will be a rapid process of large scale structural formation with minimal impact on the site. The formation of the unit's acts as infill of this structural frame and the grid itself intend to make use of standard material sizes in such a way that there is minimal waste in the production process. The intention is for the infill structure to be manufactured completely off site under well controlled production facilities and assembled on site, as such, components such as doors and windows as well as internal electrical and wet services can be pre placed off site, again allowing for less onsite waste. The process of manufacturing these components will occur in a manner whereby standard components in wide use on projects related to low income housing can be used, allowing for later maintenance to be undeterred by complex fixtures. (Underground services)

Prefabrication as Rapid Developmental System

Material Sustainability

Sub-assemblies constructed within a controlled environment, extra material recycled within factory conditions instead of conventional on-site waste. Quality of unit construction within controlled conditions leads to better performing units; insulation and services.

Financial Cost |Savings

Material acquisition within industrial practice occurs at a lower price-point compared to conventional building practice, whereby materials are required in phased processes. Coupled with minimal waste and more reliable manufacturing/construction programs, overall costs are radically lowered. A stricter timeline can be imposed and overall time spent is lowered, aiding in further cost savings.

Flexibility

Design of modular prefab units will allow for flexibility of use over a large site area, flexible programming as well as flexible connections provides a multitude of design options and solutions for site conditions.

Consistency

Controlled manufacturing processes will aid in the production of consistent and quality driven units, the act of laying out an efficient assembly line will provide at very short time intervals higher quality units as conventional in situ construction methods. Mechanisation of many of the processes also aid in the process of high quality at low time and cost presenting a new level of quality construction than previously available.

Reduced Site impact

The design of this particular model will maintain a very low impact on site, minimal foundation work and site preparation will occur on site, after which the assembly of the structure will occur without major construction requirements. leading to a low impact on site. Material storage and material preparation as per conventional methods lead to major site damage which in turn requires rehabilitation at later stages, whereas within this model materials are placed upon delivery.

Rapid Intervention

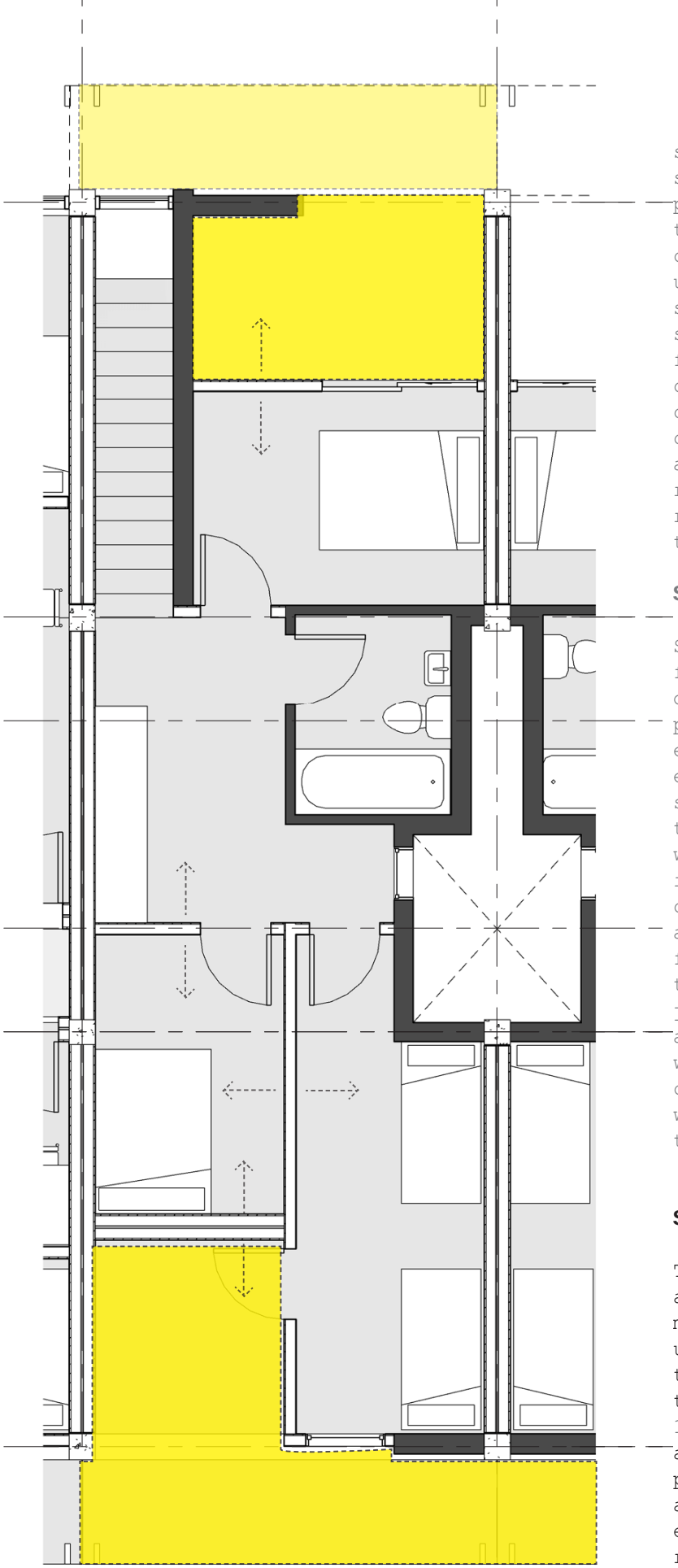


Fig 191 _ Areas of Appropriation (Author, 2017)

Portable construction takes significantly less time to build than on-site construction. In many instances, prefabrication takes less than half the time when compared to traditional construction. This is due to better upfront planning, elimination of on-site weather factors, subcontractor scheduling delays and quicker fabrication as multiple pieces can be constructed simultaneously. Shorter construction times allows construction companies to take on multiple projects at once, allowing businesses to grow rather than putting all their focus and resources on one or a few projects at a time.

Safety

Since sub-assemblies are created in a factory-controlled environment utilizing dry materials, there is less risk for problems associated with moisture, environmental hazards and dirt. This ensures that those on the construction site, as well as a project's eventual tenants are less likely to be exposed to weather-related health risks. Also, an indoor construction environment presents considerably fewer risks for accidents and other liabilities. There are strict factory processes and procedures that protect the worker from on-the-job injury. At a construction site, although safety is of utmost importance, workers are subjected to weather-related conditions, changing ground conditions, wind and other crew members who are at the site"(Construction World, 2017).

Systems of Appropriation

The provisions of a wall which houses a door and a window, but is still moveable increase the ability for the user to appropriate said wall to inform their own space; as such the manifesto toward provision for appropriation (fig 191) is that of allowing for positive and easy appropriation through the provision of items that cannot be afforded by the user. Therefore all the expensive elements are provided and the remaining growth is the responsibility of the user. This is well illustrated in the successful projects designed by

Elemental Architects and their defining principles for low income housing.

"1. Good location: dense enough projects able to pay for expensive well located sites.

2. Harmonious growth in time: build strategically the first half (partition structural and firewalls, bathroom, kitchen, stairs, roof) so that expansion happens thanks to the design and not despite it. Frame individual performances and actions, so that we get a customization instead of deterioration of the neighbourhood.

3. Urban layout: introduce in between private space (lot) and public space (street), the collective space, not bigger than 25 families, so that social agreements can be maintained.

4. Provide structure for the final scenario of growth (middle class) and not just for the initial one.

5. middle-class DNA: plan for a final scenario of at least 72m2 or 4 bedrooms (3x3m) with space for closet or double bed, bathrooms should not be at the front door (which is the typical case to save pipes) but where bedrooms are; they may include a bathtub and not just a shower receptacle and space for washing machine; there should be possibility of parking place for a car. none of this is even close to be the case in existing social housing projects the appropriation of the units presents an efficient model especially regarding the typology of living within Westbury, the concept of extended families that are housed together is a strong platform for social support and provides a platform for care taking as well as a more comfortable sharing of integral spaces such as the kitchen and lounge space but separates the more private proponents of life to separate quarters." (Stevens, 2016)

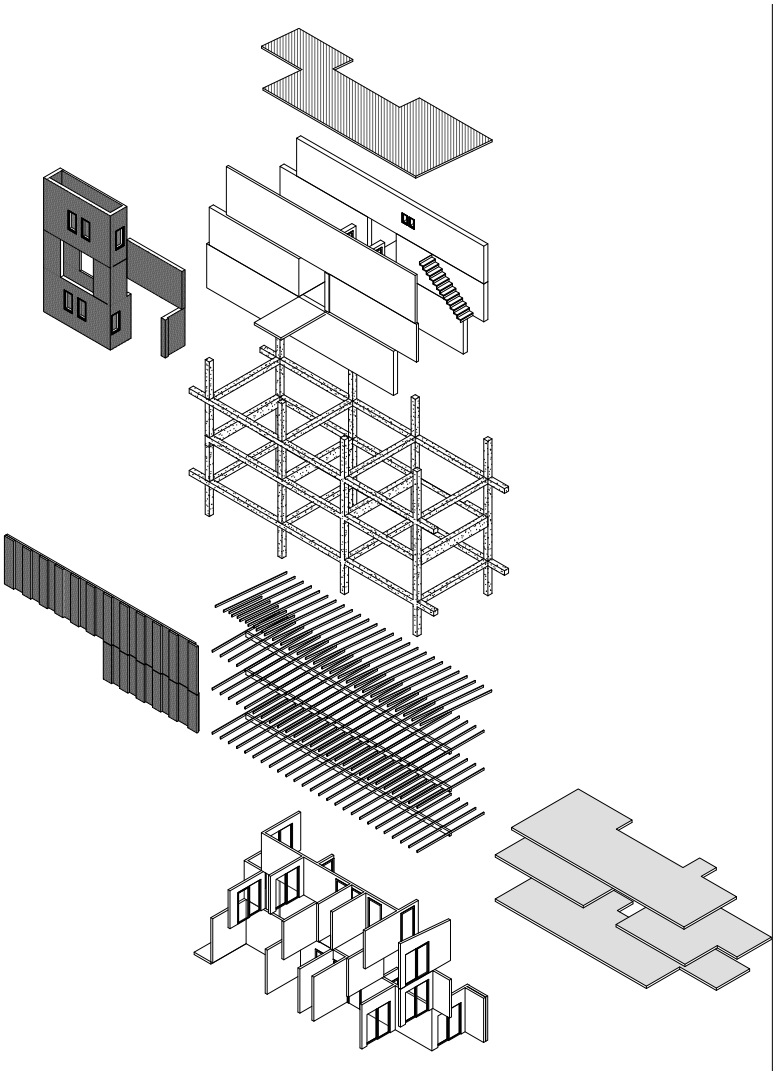


Fig 192 _ Concept Breakdown of Units and Structure (Author, 2017)

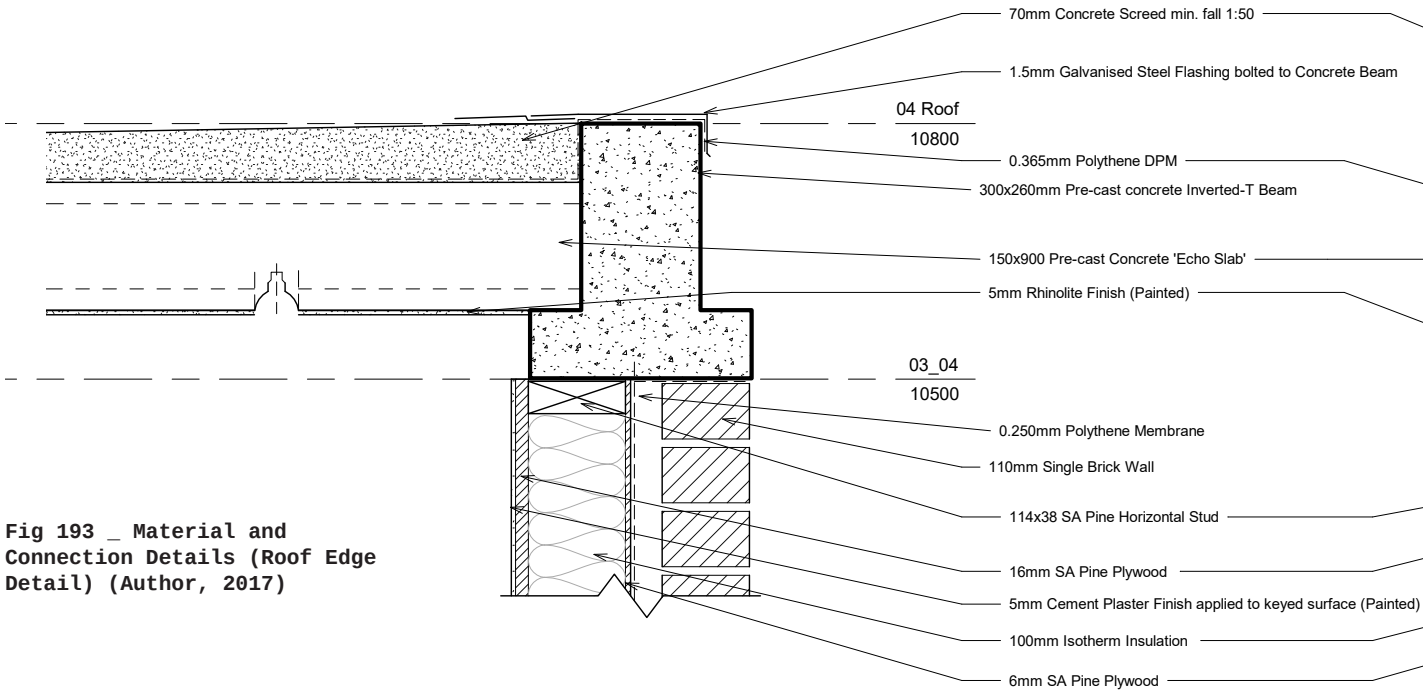


Fig 193 _ Material and Connection Details (Roof Edge Detail) (Author, 2017)

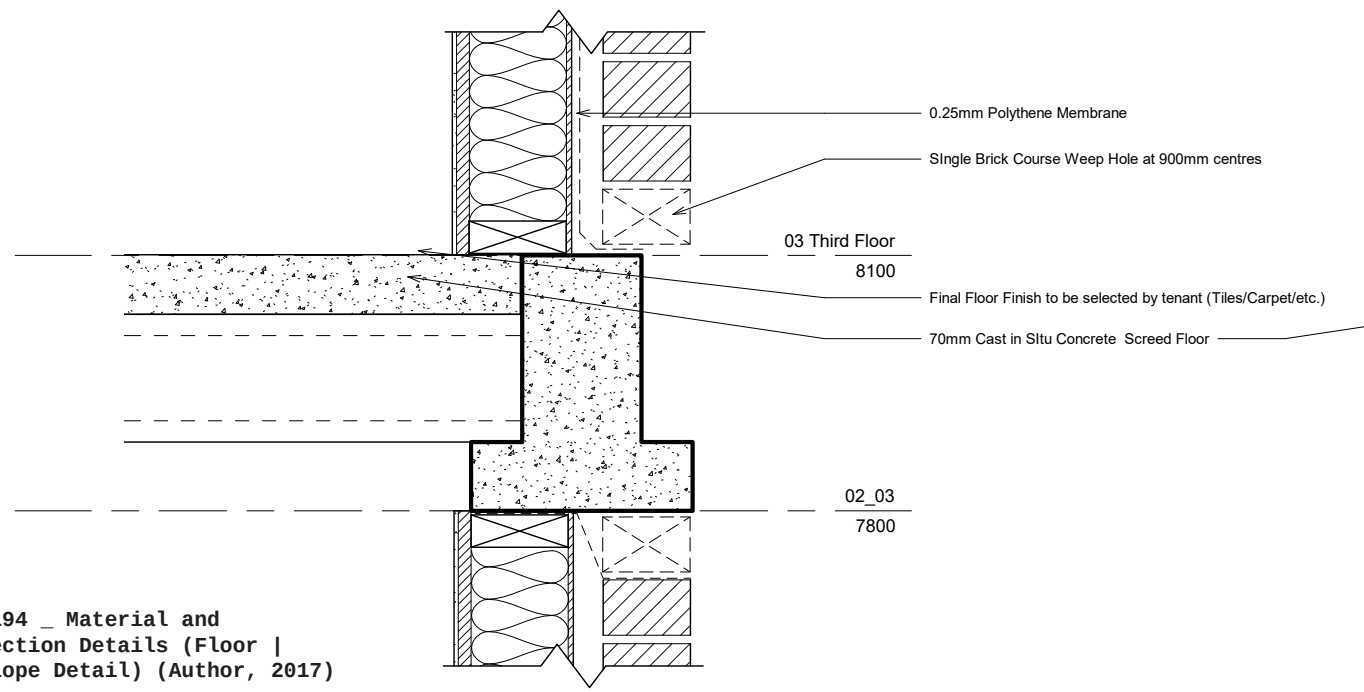


Fig 194 _ Material and Connection Details (Floor | Envelope Detail) (Author, 2017)

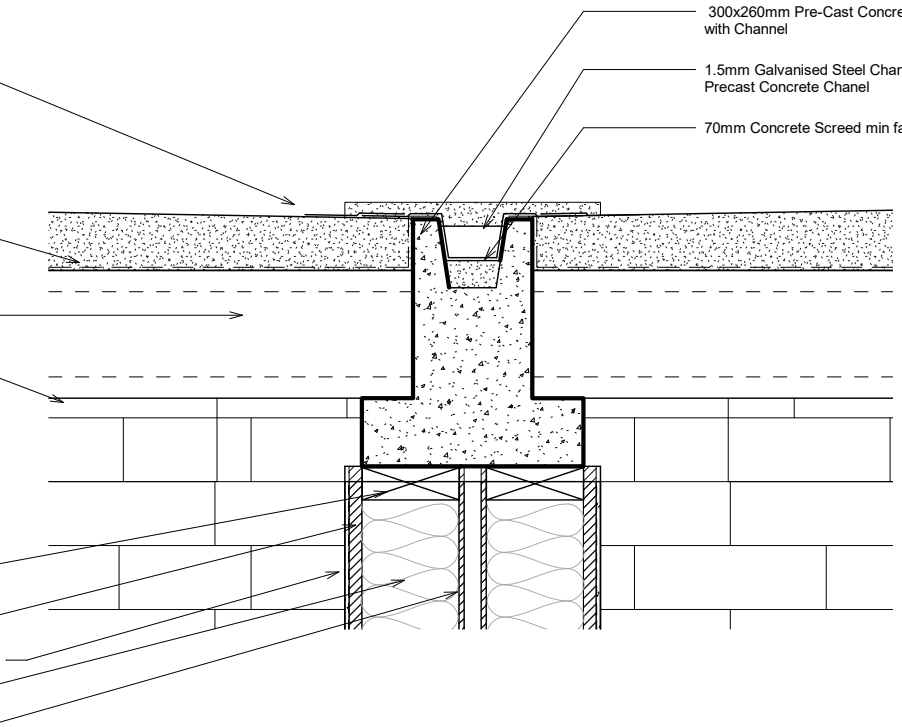


Fig 195 _ Material and Connection Details (Roof Centre Detail) (Author, 2017)

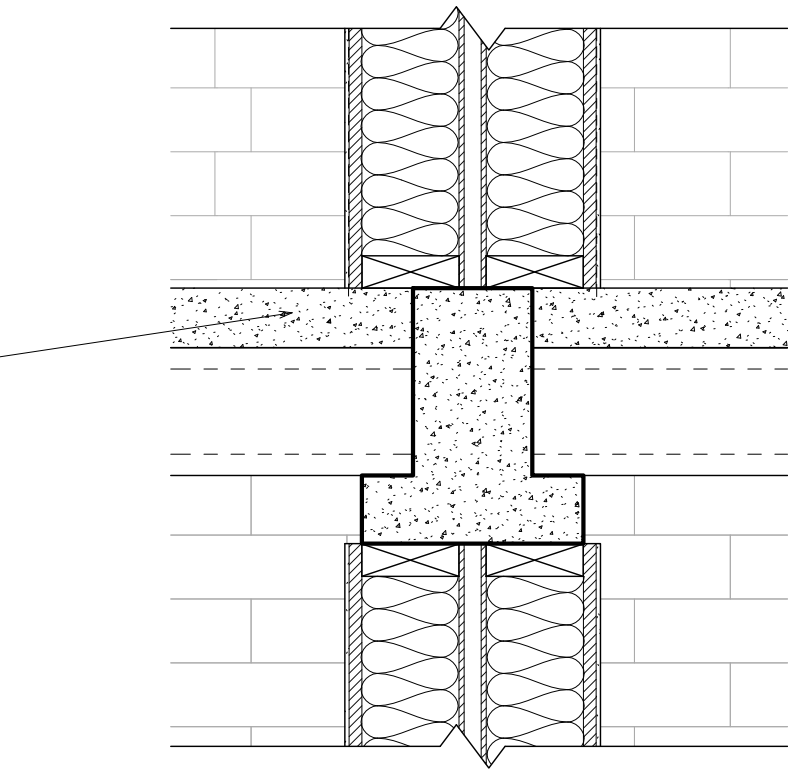
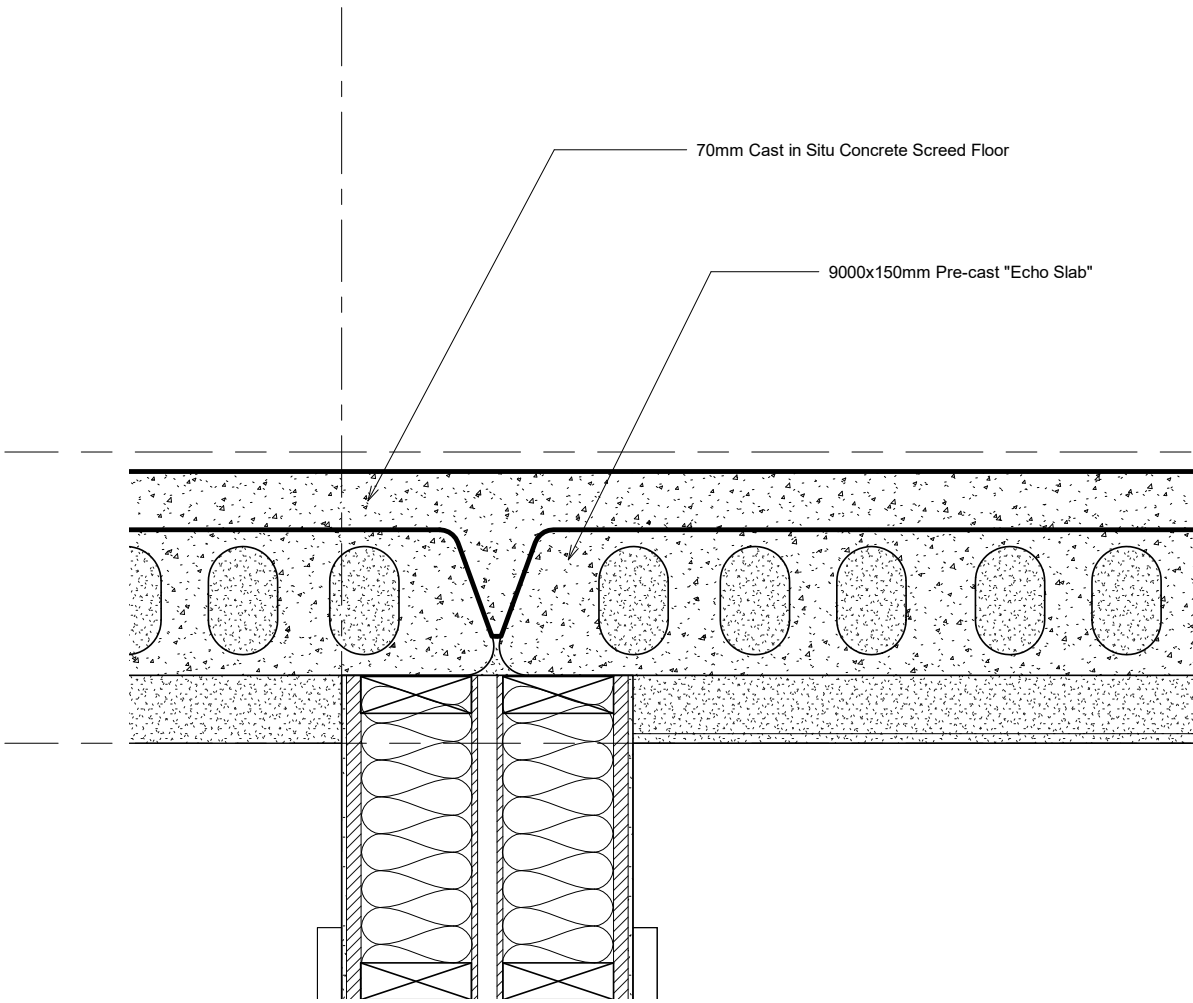


Fig 196 _ Material and Connection Details (Floor | Wall Detail) (Author, 2017)



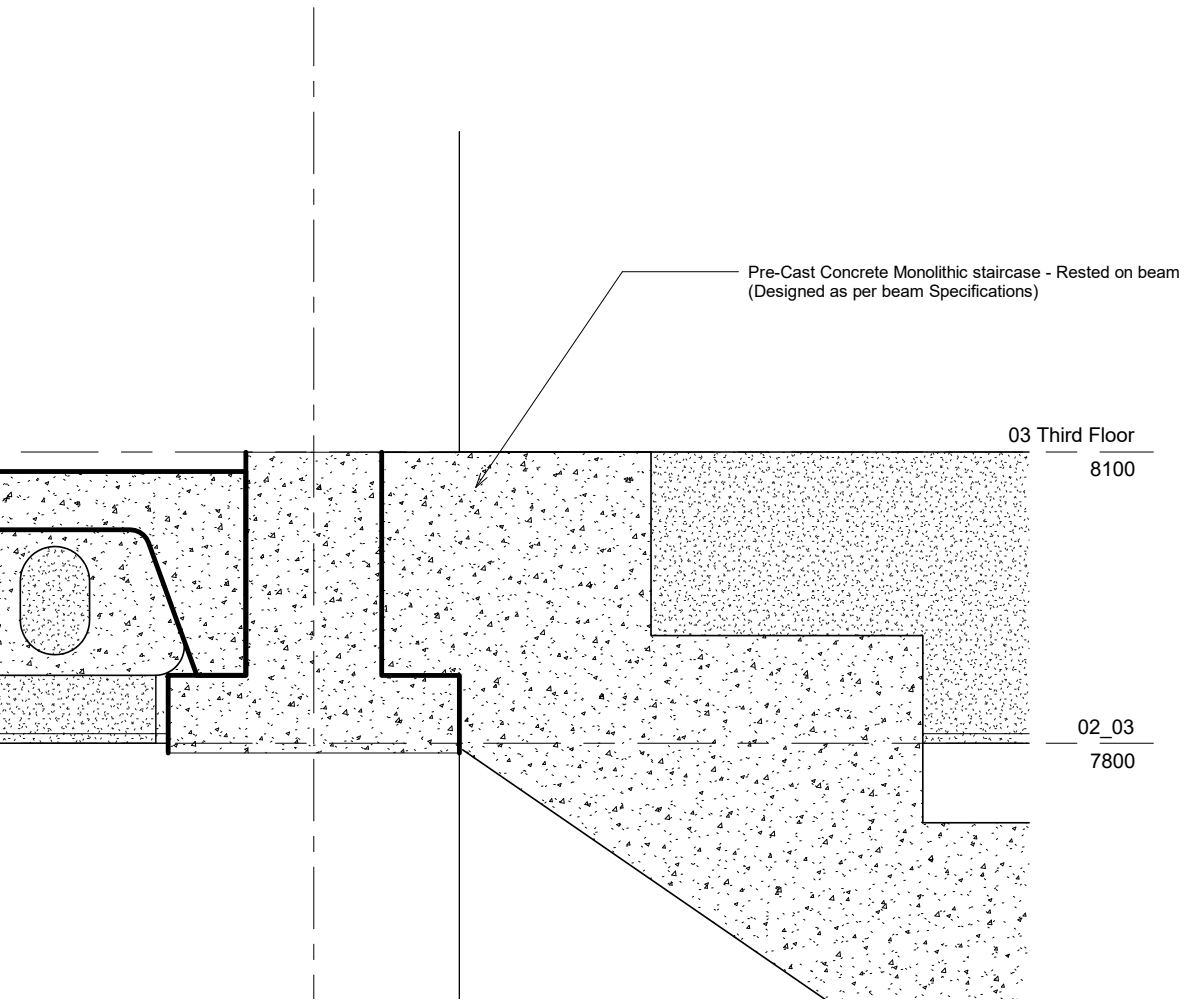
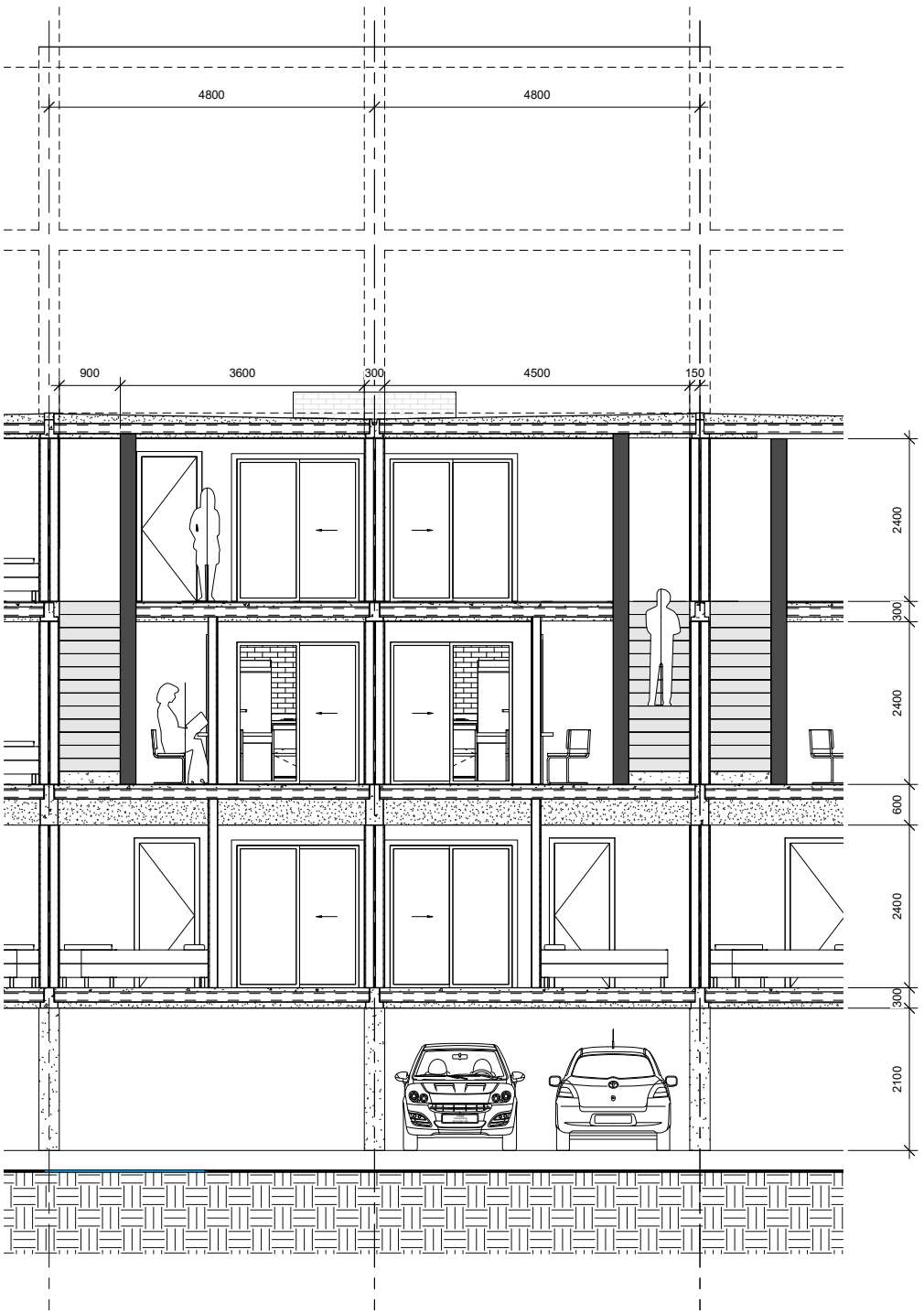


Fig 197 _ Material and Connection Details (Floor | Stair Detail) (Author, 2017)



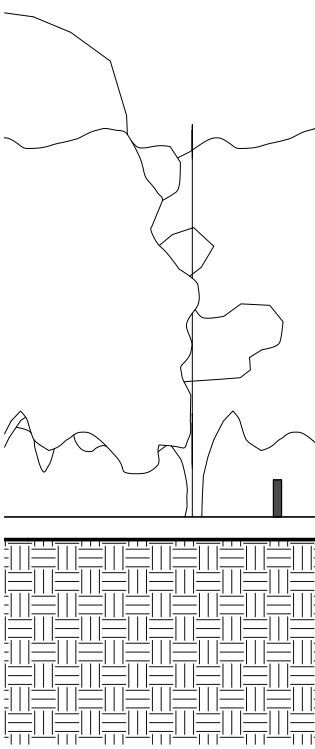


Fig 198 _ Construction Section – East – West through units (Author, 2017)

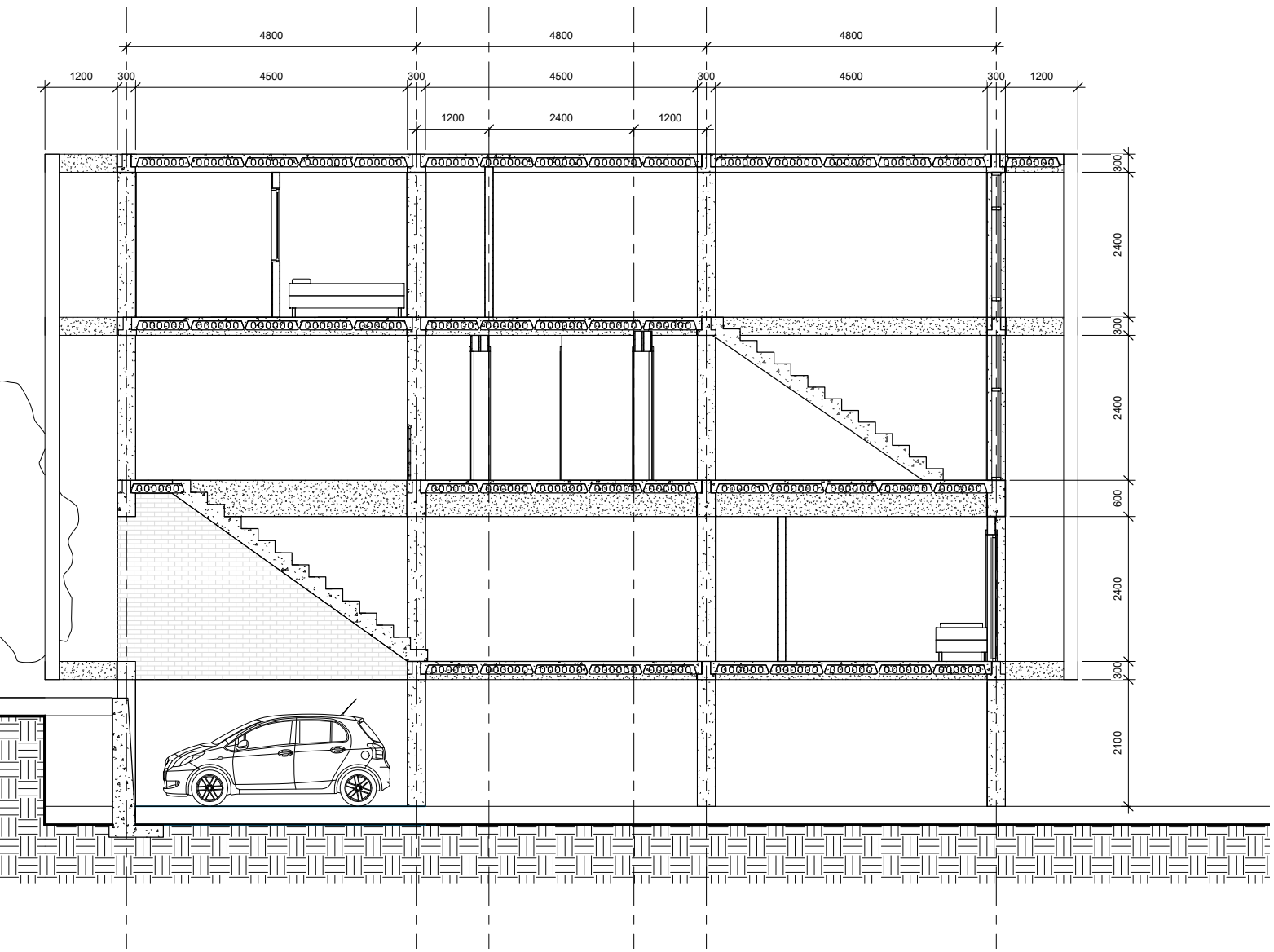


Fig 199 _ Construction Section – North –South through units (Author, 2017)

Fig 200 _ Material Connections Diagram (Author, 2017)

Fig 201 _ Selected Material Composition (Author, 2017)

Wall units (fig 193 - 196) - The wall units of that fill in the concrete frame are also produced off site, there are a set number of wall iterations that are either protective wall elements which for the outer skin of the structure and the internal wall that define the perimeters of the living units. These wall units are also integrated will wet and electrical services, onsite assembly will simply require the connection of these services to those on site.

Precast floor slabs (fig 197) - The floor component is a mixture of readily available hollow core floor slabs which are then connected and cast together into floor units off site, the subsequent assembly of the floor slabs on site will require no in-situ work and present a ready to use floor finish upon assembly

B07-3 Visual framework | Programmatic Aesthetic

The infrastructural framework provides the functional layer of the development focusing on the circulation of elements and delivery of necessary services to the users on site, followed by the infill of liveable space between the infrastructure, a final layer; being the visual framework aims to blend the two layers of architecture and infrastructure into a seamless structure. The core functions if his physical layer is to act as a layer of emphasis, on a more visually understandable platform.

This external skin also acts as a robust layer onto the systems which serve the overall structure.

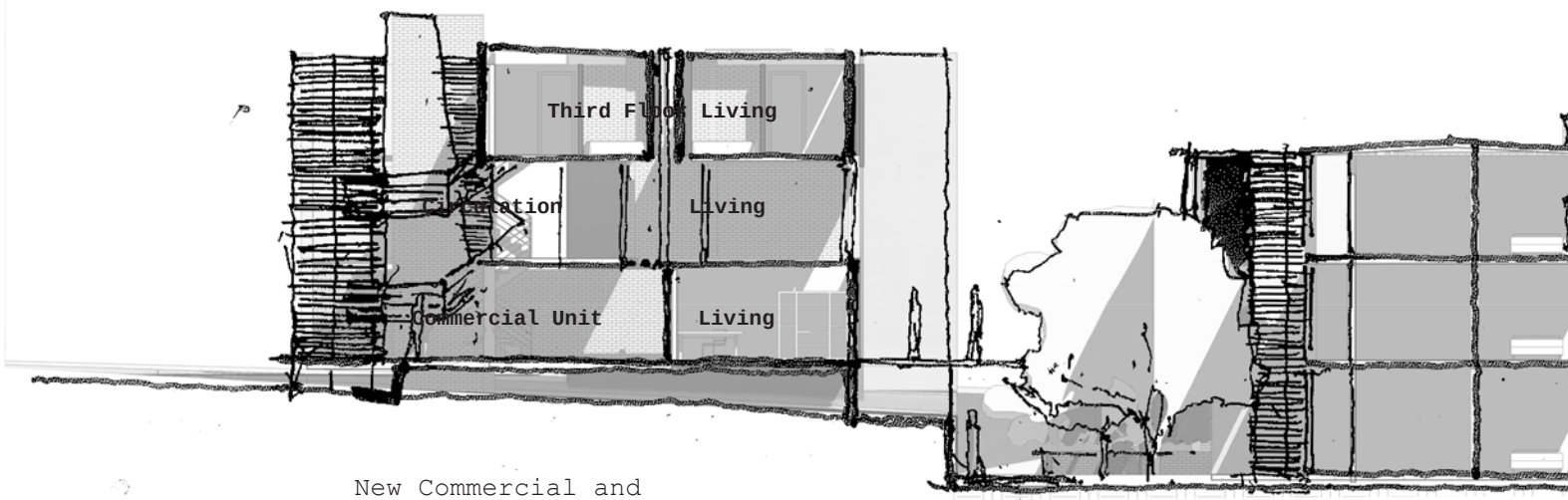
The use of material that is not strictly structural or as primary contributors to the actual residential unit in the intervention have to be considered as their own category within this proposal, as the use of material that is not directly linked to a measurable function within this type of development of low income housing brings up questions of affectivity, efficiency and necessity.

This brings up a multitude of issues when considering the envelope and visual communication of the structure. as such, within this developmental model, the use of material that visually ties the structure together, namely brining the urban realm, the infrastructural grid as well as the unit composition into one building, has to maintain a multiplicity of uses. This is broken down further into elements that act as visual control devices as well as cladding systems that contain and protect the building envelope through creating a homogenous shell for the structure.

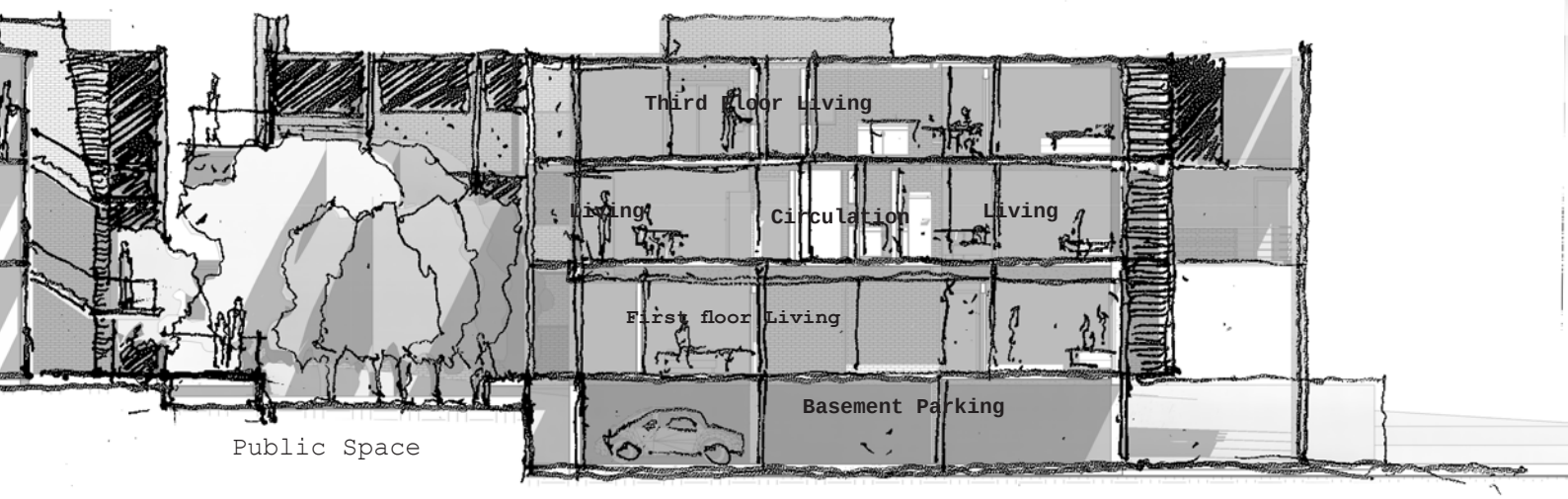
The use of pre manufacutred patterned brick work is a reflection of a low cost cladding platform that can start creating visual depth and texture, provide a sense of mass and permanence and also act as a robust protective skin for the structure. The brickwork is treated differently at different points on the site, this is a device of suggestion, whereby the brickwork seams to invite movement or deny it. The treatment of brick in this manner also aids in the merging of materials to create a single building language. The fine grain of brick allows for it to treat large surface areas but with fine grain details.

The elevation of the structure is a good point of material representation as the concrete frame acts as a visual frame as well, the points of permanence are indicated clearly and the unit typology is clearly indicated through the meeting of the frame, the permanent elements as well as the flexible timber walls.

The shifting of the building created by the fluctuation in orientation of the living units also creates a visually stimulation change in elevation. in this case the use of brick is also suitable as the extension of the frame create large monolithic openings hat are emphasised by the mass of the brickwork structure.



North – South (Author, 2017)



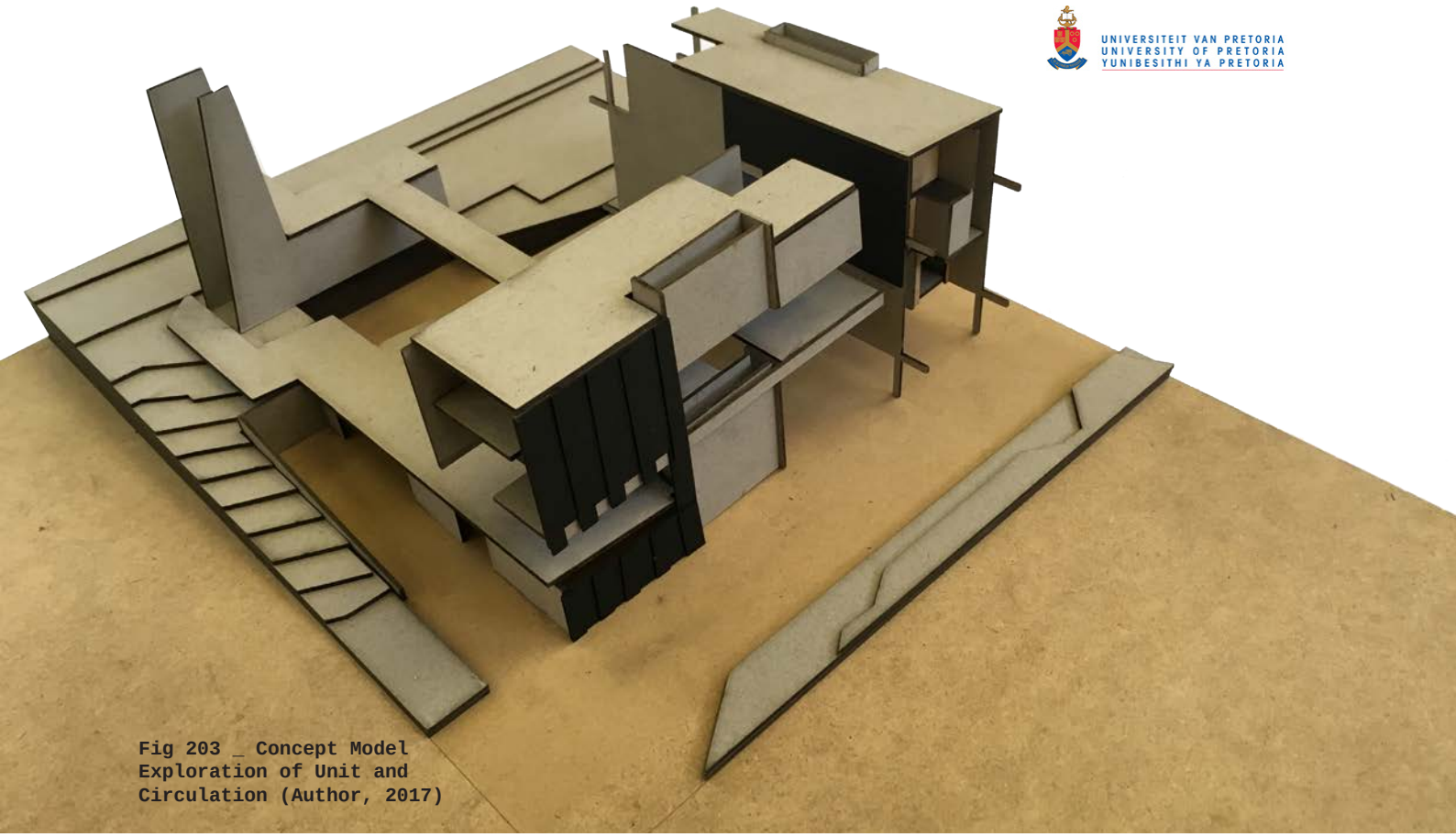


Fig 203 _ Concept Model Exploration of Unit and Circulation (Author, 2017)

Fig 204 _ Concept Model Exploration of Unit and Circulation (Author, 2017)

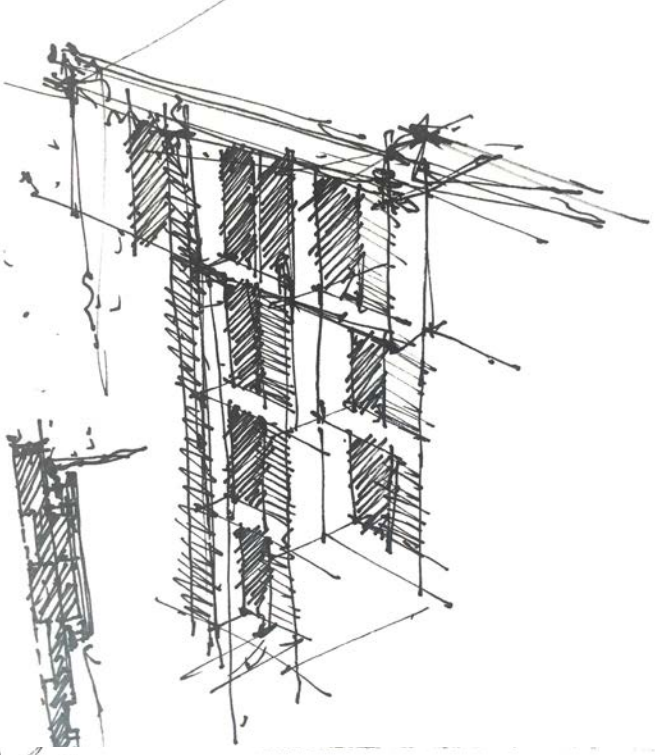


Fig 205 _ Material Aesthetic concept Sketch – Units Façade (Author, 2017)

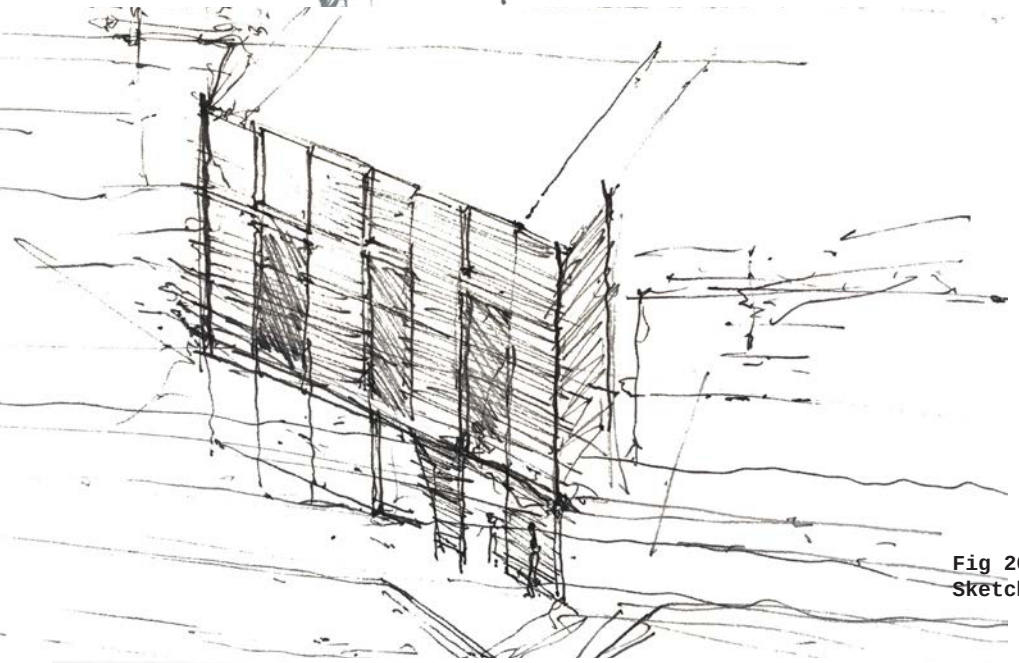


Fig 206 _ Feature wall concept Sketch (Author, 2017)

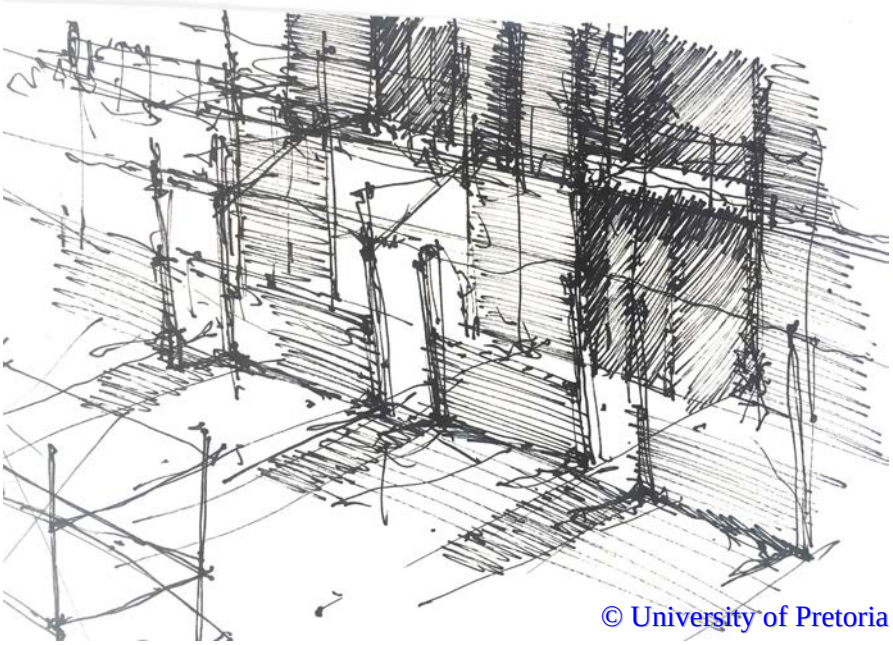


Fig 207 _ Ground Threshold between unit and public space concept sketch (Author, 2017)

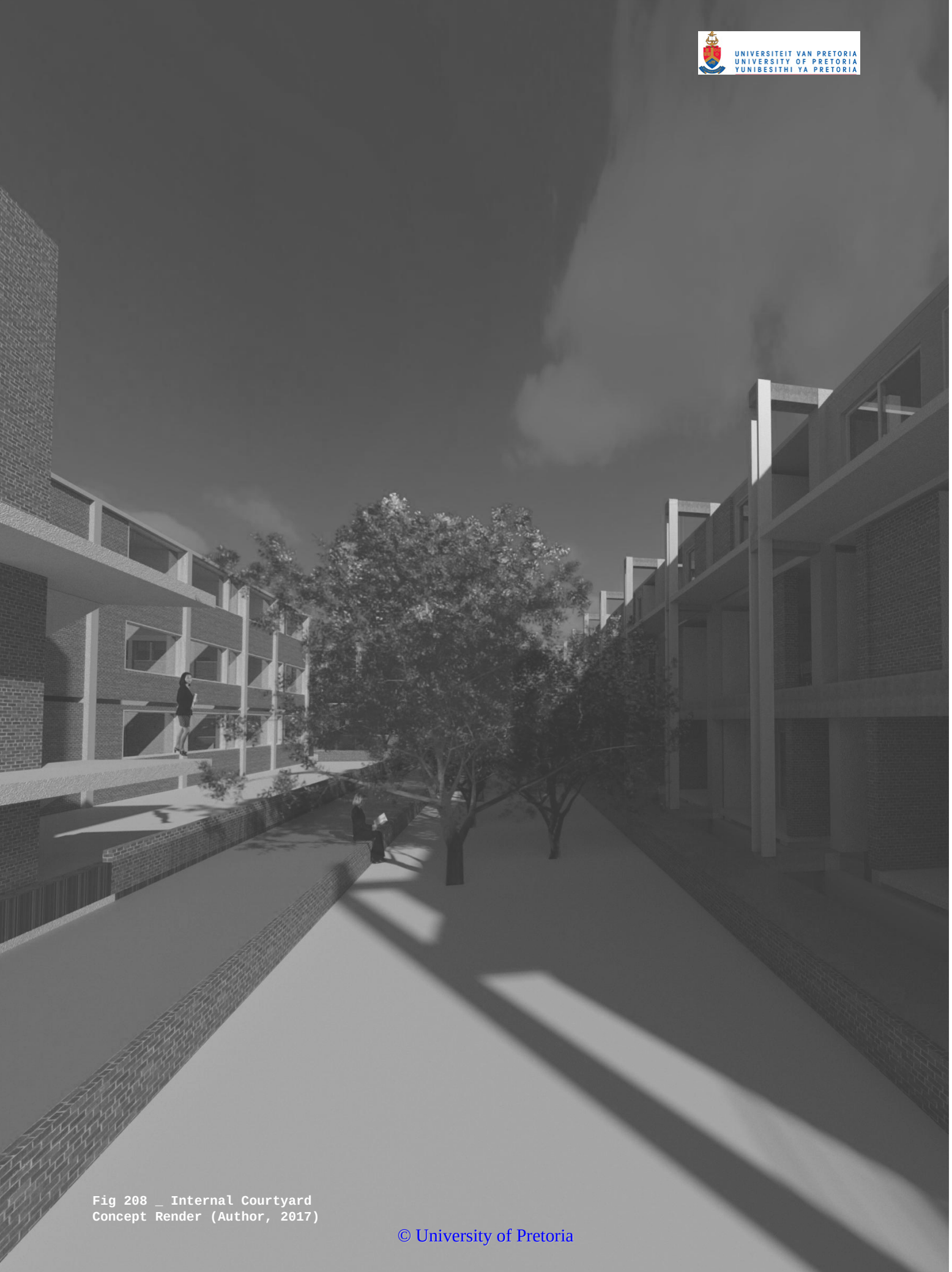


Fig 208 _ Internal Courtyard
Concept Render (Author, 2017)

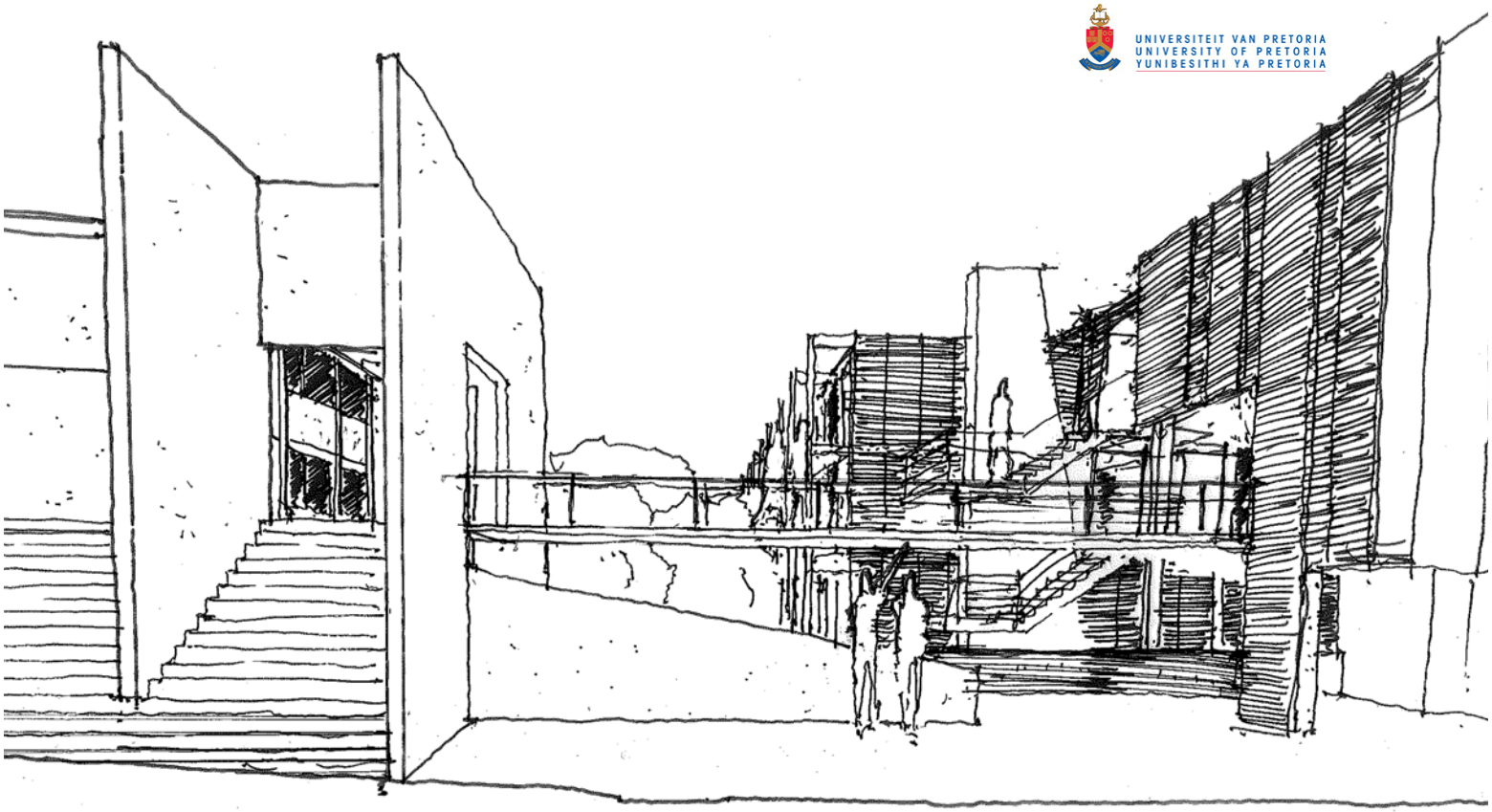


Fig 209 _ Public Interface Concept Render
(Author, 2017)

Fig 210 _ North Façade Concept
Render (Author, 2017)

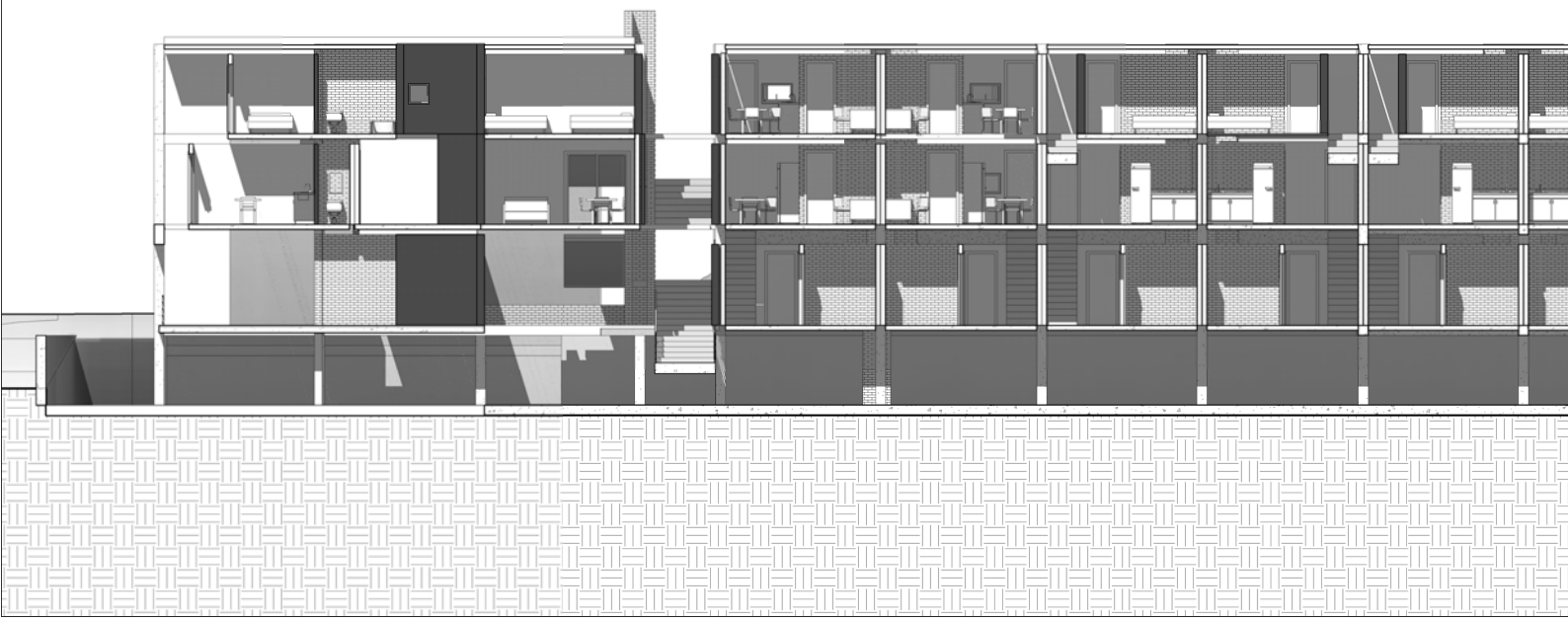
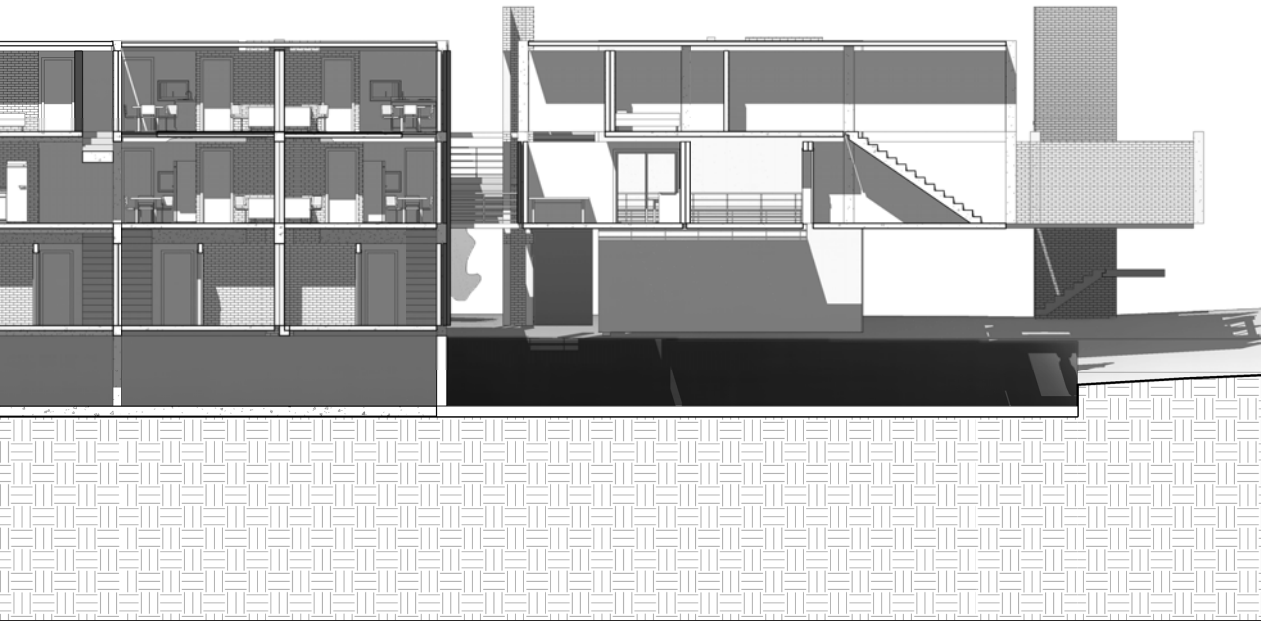
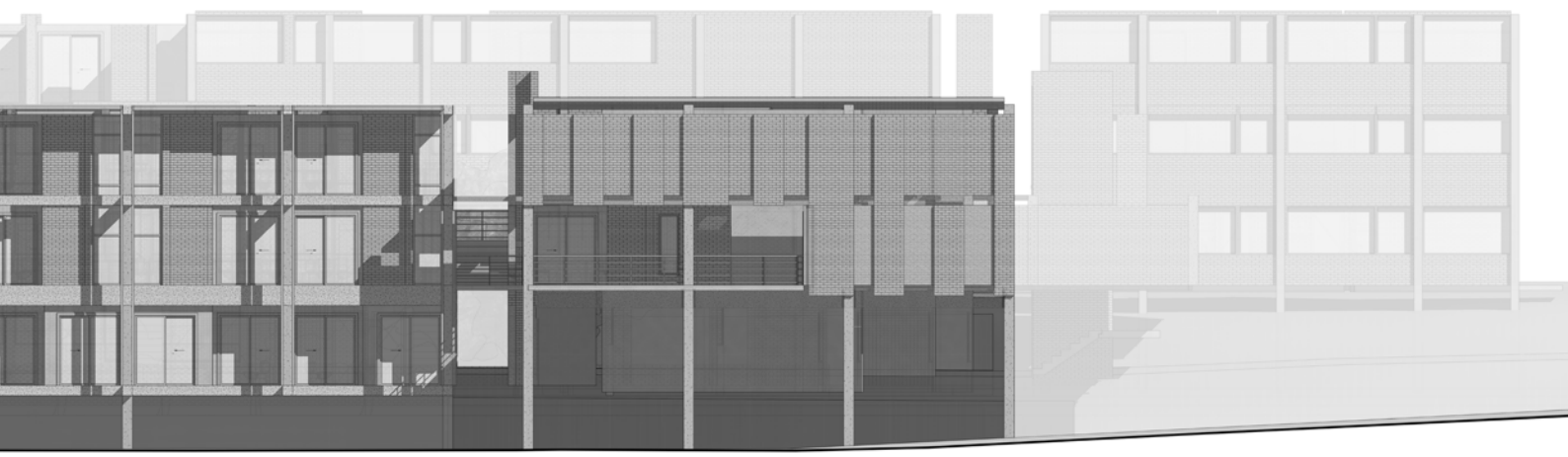


Fig 211 _ Section through Site – East – West (Author, 2017)

Fig 212 _ North Elevation (Author, 2017)





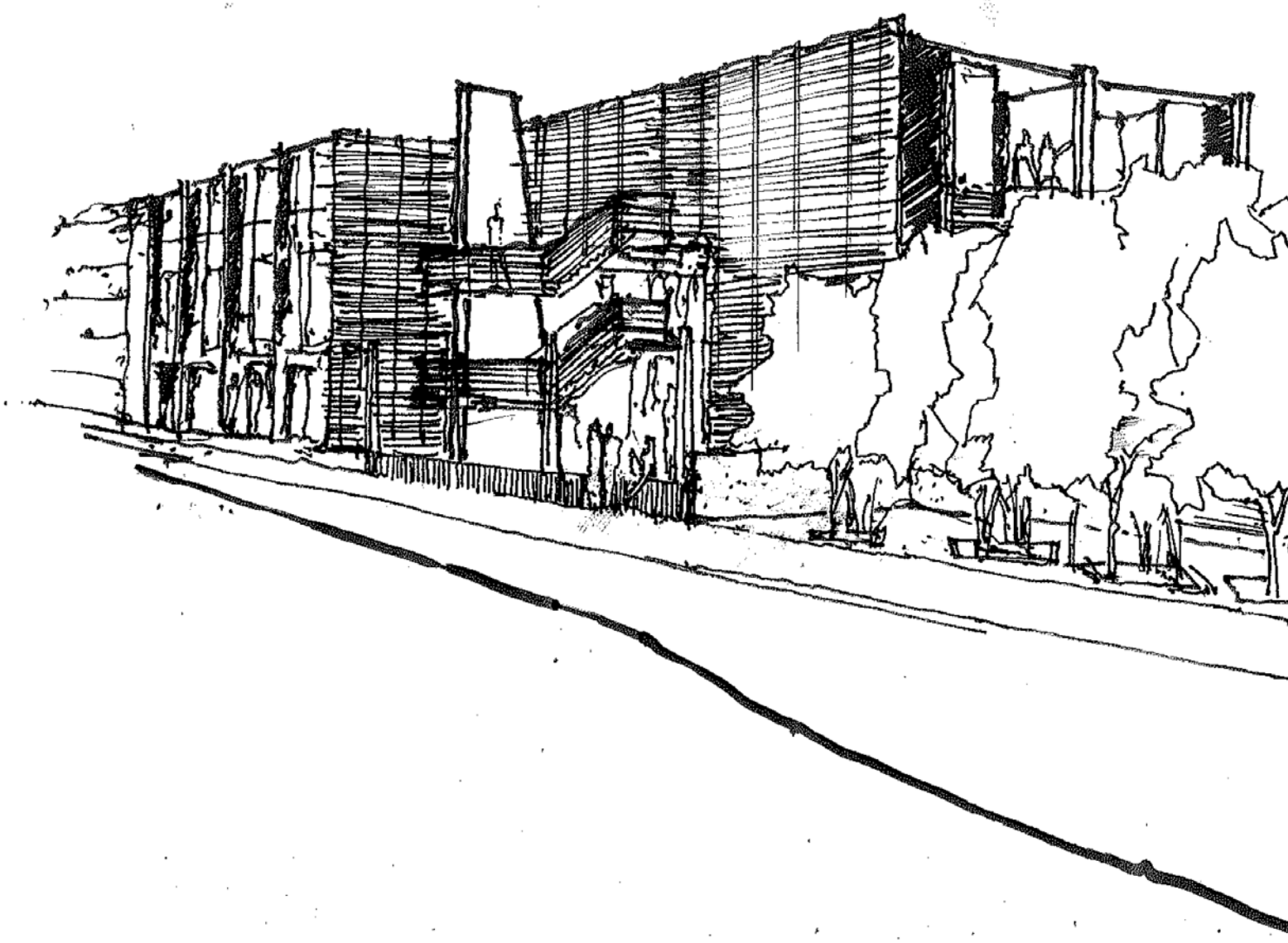
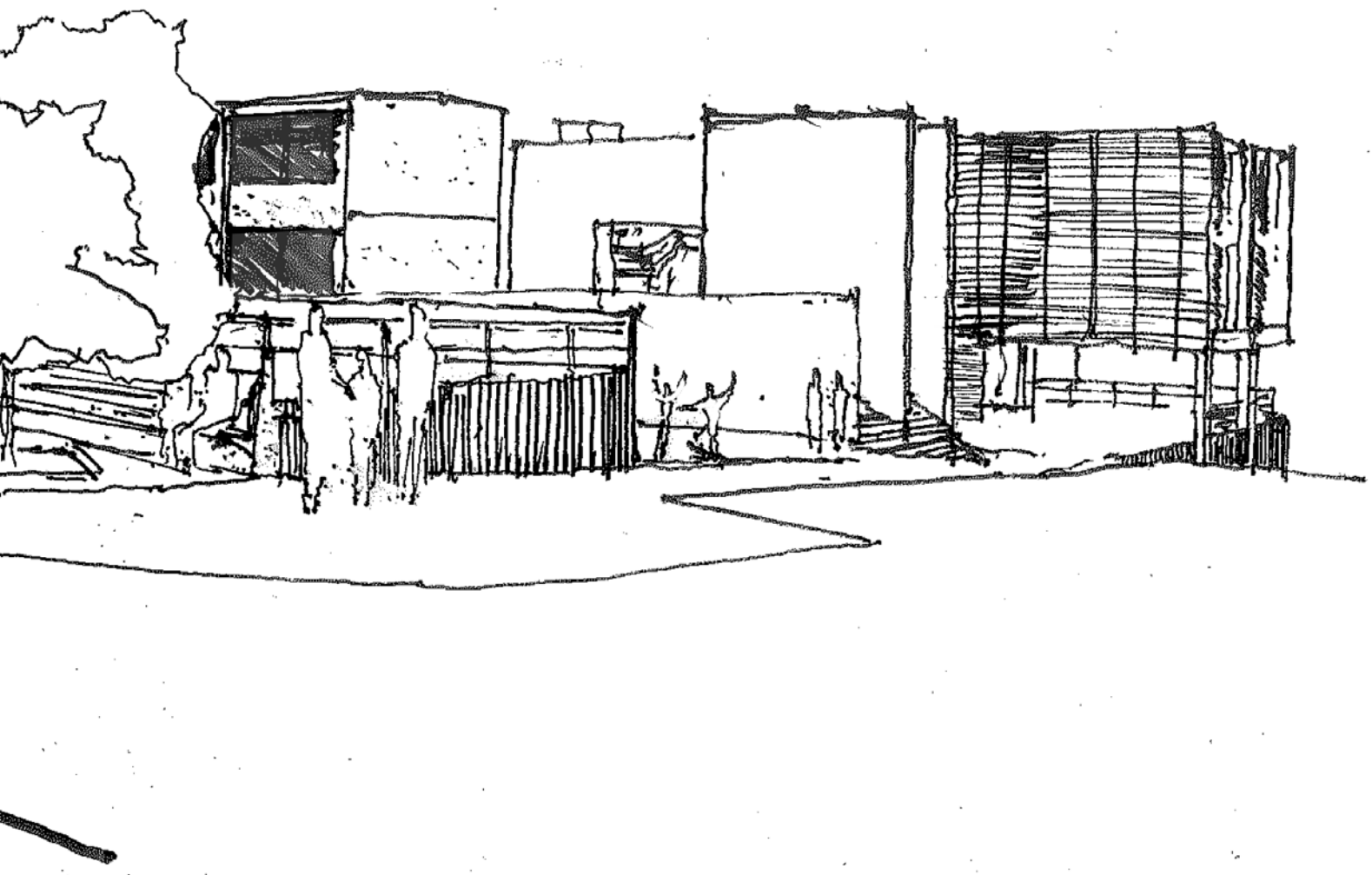


Fig 213 _ Public Interface
Concept Render (Author, 2017)



Conclusion | Synthesis of part B

This scheme aims to provide a platform for the social growth of the residents of Westbury; as such it is required to establish a stable form of housing and economic opportunity. The ability for this scheme to manifest itself over a large site area and address issues of urban spatial legacy establishes the first point of sustainable growth. The current condition of housing proposal and construction is limited to common building practice and therefore the outcome is limited to conventional spatial condition. Westbury presents an urban fabric condition that holds multiple layers of urban and social conditions; however Westbury is not the only urban realm where this housing proposal is applicable. As such this scheme should be considered beyond its visual representation but also the process of placement, urban formation and ability to maintain flexibility.

The following themes form the conclusion of this paper, in that the initial research question maintains a broad spectrum of potential answers, architecture alone is unable to address the issues on site, however formation of a structure that houses the required stakeholders identifies the contribution of architecture.

Prefabrication as rapid systemic urban redress

The formation of this structure through prefabricated elements provides a low cost and low impact construction process. This low impact on site will direct the necessary impact of the intervention into addressing the urban issues. The ability for this prefabricated structure to appropriate itself as per the requirements of the site over a longer period of time is where this scheme breaks apart from convention. The impact of urban intervention has shown itself to present opportunity for anti-social behaviour and often limited the ability for the context to progress. This is partially due to ill-considered urban design but also due to the limitations for the

context to appropriate itself based on the current social condition present.

The systemic reprogramming of the block will redefine the use of the block, without displacing the residents of the block; the focus of this reprogramming will limit the ability for criminal activity to occur as frequently as in present conditions. Placement of programmes that secure public space and increase the ability for visual access through the site will provide a more defensible context for the users.

social housing as an element of parts that form space and meaning in space

Due to the modular nature of this scheme, the placement of components can occur over the entire site in specifically programmed ways, the ability for edge structures to house more vibrant and commercial activities presents an edge that is able to communicate with the context rather than form a wall. The site will still remain permeable, visually; however the containing of space and social activity is maintained at a urban fabric that resembles a more intimate public space, a space for communities to form rather than a dispersion of community elements.

The realm of intimacy and public in density _ Urban to Unit

The essential component of creating a more defensible urban context is addressed through the progression of users from the urban context, to the intimate realm of the units contained within the structure. The focus of this scheme is to limit the emphasis of internal space, but rather focusing capital and material on the circulation elements, the limitation of circulation is pushed further in that there is a single, large circulation route that serves all the units. This is followed with the focus of public, shared spaces programmed at key points in the circulation route. The programming of this flexible structure essentially creates a progression of programmatic boundaries rather than physical boundaries, the progression of public and private occurs through the use of space rather than physical boundary, therefore allowing for a continuous visual access through the site, while maintaining an ability to defend the space as a collective.

Model for multiple contexts |

As the need for housing grows, the ability for a context to respond and density as required will play a major role in the application of housing models, the current spatial legacy of areas such as Westbury are most at risk of forming social and spatial problem areas, due to the high need for density and problematic urban conditions. The contribution of this report extends beyond the single residential unit model that serves a multitude of housing initiatives, but rather presents a new model of flexibility in density, a model that can be applied in most contexts in rapid procession, aiming to stabilise and then grow the contexts in which they are placed.

List of figures

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Unpublished Photos _ From Students | Colleagues

Brecher, E (University of Pretoria) Westbury Study Group, MArch(prof) 2017

Leibrandt, A (University of Pretoria) Westbury Study Group, MArch(prof) 2017

Appendix Items

01 _ SBAT Rating for New Development

02_ Final Presentation (Design and Technology)

03_ Final Model

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

1,04

Achieved

SB SBAT REPORT 4,3

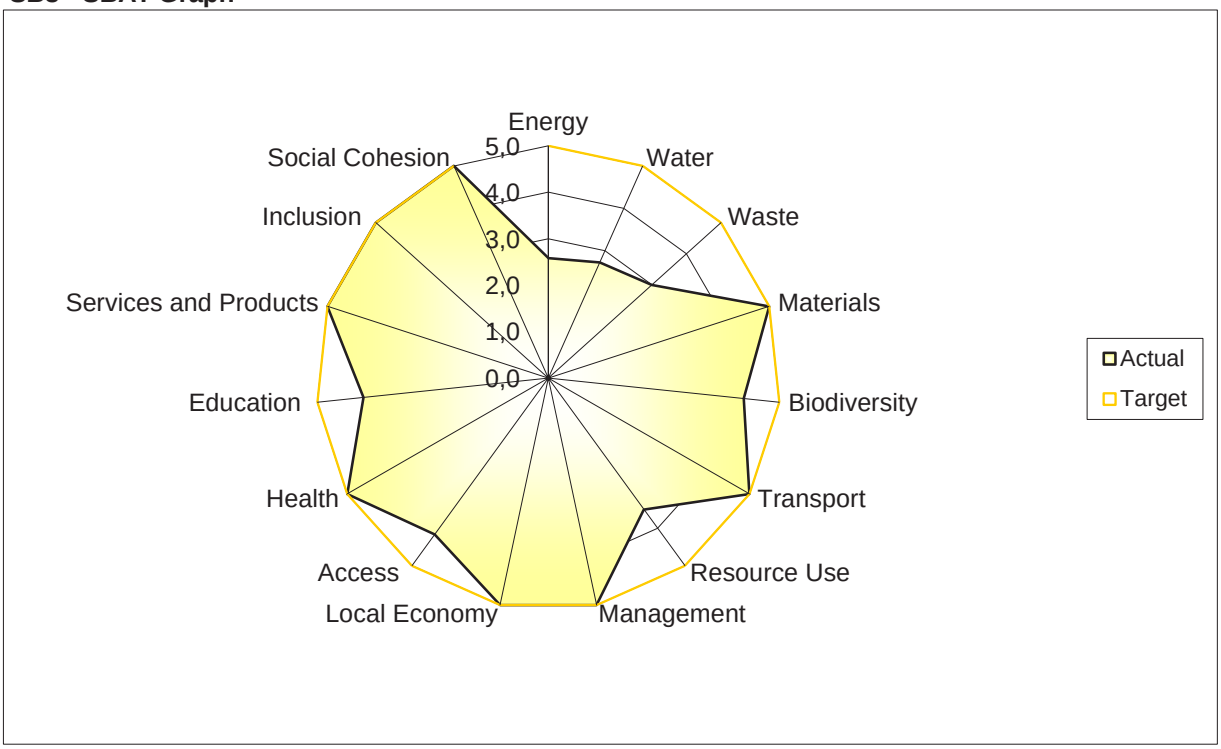
SB1 Project

0

SB2 Address

0

SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance	Score
Environmental	3,5
Economic	4,5
Social	4,8
SBAT Rating	4,3

SB5 EF and HDI Factors	Score
EF Factor	4,0
HDI Factor	4,8

SB6 Targets	Percentage
Environmental	70
Economic	91
Social	96

SB7 Self Assessment: Information supplied and and confirmed by

Name	Date
Signature	

SB8 Validation: Documentation validated by

Name	Date
Signature	

SB9 Validation Report Version

IVR

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

EN Energy — Achieved: **2,6**

Objective
built environment is energy efficient and uses renewable energy

Indicators		Potential	Achieved
EN1	**Orientation** Buildings are orientated within 15 degrees of North	1	1
EN2	**Building Depth** Building depth does not exceed 10m	1	0
EN3	**Roof Construction** Roof construction achieves a minimum total R-value of 2.7 K•m²/W and the roof colour has solar absorbance of 0.55, or less	1	1
EN4	**Wall Construction** Wall construction achieves a minimum R-value of 1.9 K•m²/W	1	1
EN5	**Floor Construction** Floor construction is exposed high thermal mass material such as tiles or concrete	1	1
EN6	**Window to Wall Ratio** Glazing is less than 40% of the North and South elevations and less than 20% of the East and West elevations	1	1
EN7	**Ventilation openings** A minimum of 10% ventilation opening area per room floor area is provided for each useable room	1	1
EN8	**Daylight** Over 90% the useable room area within the building is within 2h, where h is ht of head of window and internal light reflectance values are met 80 to 89 % the useable room area within the building is within 2h, where h is ht of head of window and internal light reflectance values are met	2 1	1
EN9	**Internal Lighting** Internal lighting power density within the building does not exceed 5W/m2.	1	1
EN10	**External Lighting** External lighting power density within the building does not exceed 0.75W/m2, or is totally powered by renewable energy	1	1
EN11	**Installed Equipment Power Density (not including lighting)** 0-4W/m2 installed equipment power density 5-14W/m2 installed equipment power density 15-19/m2 installed equipment power density 20-24W/m2 installed equipment power density 25-29W/m2 installed equipment power density	5 4 3 2 1	5
EN12	**Food Cooking** A solar cooker, biogas stove or a hotbox is provided to support reduced energy consumption associated with food cooking	1	0
EN13	**Water Heating** All hot water heating requirements met through renewable energy sources with no electrical back up All hot water heating requirements met through renewable energy sources with electrical back up	4 2	2
EN14	**Renewable Energy Generation**		

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

BI Biodiversity — Achieved: **4,2**

Objective
The building supports biodiversity.

Indicators		Potential	Actual
BI1	**Brownfield Site** Site has already been built on and a green-field site is avoided	4	4
BI2	**Municipal Boundary** Site is within a defined municipal boundary	2	2
BI3	**Vegetation** Vegetation area equivalent to over 60 % of site area Vegetation area equivalent to 50 - 59% of site area Vegetation area equivalent to 40 - 49% of site area Vegetation area equivalent to 30 - 39% of site area Vegetation area equivalent to 20 - 29% of site area Vegetation area equivalent to 10 - 19% of site area	6 5 4 3 2 1	4
BI4	**Ecosystems** Vegetation area has over 10 species of plants	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

WE Waste — Achieved: **3,0**

Objective
The building minimizes emissions and waste directed to landfill.

Indicators		Potential	Actual
WE1	**Recycling Area** Covered recycling area of at least 1 x 0.5 x 0.5m provided in, or near, the kitchen	1	1
WE2	**Recycling Collection** Recycling depot within 2000m of site on regularly used route or at location such as a school / shopping centre / post office / sports facility	1	1
WE3	**Organic Waste** Organic waste is recycled on site and a 1 x 1 x 1m space for composting provided per household	1	0
WE4	**Sewage** Sewage is treated on site, or in within the neighbourhood, to provide useful by-products such as irrigation water and fertilizer	1	0
WE5	**Construction Waste** Contract documentation and refurbishement policies require at least 50 % of construction waste to be recycled or reused on site	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

WA Water — Achieved: **2,7**

Objective
The building minimises the consumption of mains potable water.

Indicators		Potential	Actual
WA1	**Toilets** Non-waterborne sanitation system is used or only greyitrain harvested water used All to lets are dual flush with maximum flush rates of under 3L (half flush) and 4.5L (full flush)	2 1	2
WA2	**Wash Hand Basins** All taps have a maximum flow rate of less than 6L/minute	1	1
WA3	**Showers** All showers have a maximum flow rate of less than 10L/minute	1	1
WA4	**Hot Water** The distance between the source of hot water and useage does not exceed 6 running metres	1	1
WA5	**Landscape** Landscaping does not require irrigation or all requirements met from greyitrain water harvested water. No swimming pools or all requirements met from rainwater harvesting	1	1
WA7	**Rain Water Harvesting** 40+ L of rainwater harvesting capacity per m2 of GIA 30-39 L of rainwater harvesting capacity per m2 of GIA 20-29L of rainwater harvesting capacity per m2 of GIA 10-19L of rainwater harvesting capacity per m2 of GIA 5-9L of rainwater harvesting capacity per m2 of GIA	5 4 3 2 1	3 0

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

MA Materials — Achieved: **5,0**

Objective
Construction impacts of building materials are minimized

Indicators		Potential	Actual
MA1	**Building Reuse** Over 60+% of an existing building structure is reused Between 40-59% of an existing building structure is reused	4 2	4
MA2	**Timber Doors and Windows** Over 80% of the windows and doors (by number) used in the building are made of timber. Timber must be certified from sustainable sources.	1	1
MA3	**Timber Structure** Over 80% (by weight) of the roof or floor structure is made of timber. Timber must be certified from sustainable sources.	1	1
MA4	**Refrigerants** No refrigerants which contribute to global warming are used in products such as HVAC or refrigeration equipment or insulation	1	1
MA5	**Volatile Organic Compounds** No paints, varnishes, glues or carpets that include Volatile Organic Compounds are used	1	1
MA6	**Formeldehyde** Materials, such a timber based boards, that contain, or use formeldehyde in their production, are not used	1	1
MA7	**Locally Sourced Materials** over 60 % of the materials and products by value used in the building come from within the country	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

MN Management — Achieved: **5,0**

Objective
The building is managed to support sustainability.

Indicators		Potential	Actual
MN1	**Manual** Building manual developed and applied	2	2
MN2	**Energy Metering** Energy meter provided for each unit and can be readily accessed and read	1	1
MN3	**Water Metering** Water meter provided for each unit and can be readily accessed and read	1	1
MN4	**Recording** Monthly management reporting system	1	1
MN5	**Residents Association** Residents association with a mandate to manage or to influence the management of the local area is in place	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

RE Resource Use — Achieved: **3,5**

Objective
The building makes efficient use of resources.

Indicators		Potential	Actual
RE1	**Site Density** Site density is equivalent to 150 + persons per hectare Site density is equivalent to 125 -149 persons per hectare Site density is equivalent to 100 -124 persons per hectare	3 2 1	3
RE2	**Area per occupant** Gross internal area per occupant is 10 - 19 m2 Gross internal area per occupant is 20 - 29 m2 Gross internal area per occupant is 30 - 39 m	3 2 1	3
RE3	**Renewable Energy Generation** Renewable energy generation equivalent to over 5 % of site area Renewable energy generation equivalent to over 2-4% of site area	2 1	1
RE3	**Food Production** Food production area equivalent to over 10 % of site area Food production area equivalent to over 5% of site area	2 1	0

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

LE Local Economy — Achieved: **5,0**

Objective
The building supports the local economy.

Indicators		Potential	Actual
LE1	**Locally Sourced Materials and Products** 60+% of the materials and products by value are from the country. 60-79% of the materials and products by value are from the country 40-59% of the materials and products by value are from the country 30-39% of the materials and products by value are from the country	4 3 2 1	4
LE2	**Small Enterprise Support** One small enterprise is supported every 5-9 units. One small enterprise is supported every 10-14 units. One small enterprise is supported every 15-19 units. One small enterprise is supported every 20-24 units. One small enterprise is supported every 25-30 units.	6 4 3 2 1	5
LE3	**Construction Workers** construction and maintenance workers employed on site to live within 50km of site	2	2

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

TR Transport — Achieved: **5,0**

Objective
The building supports energy efficient transportation.

Indicators		Potential	Actual
TR1	**Pedestrian Routes** Dedicated,safe and easily used pedestrian paths are provided from public highways to main entrance of the building	1	1
TR2	**Cycling** At least one covered bicycle parking speces with locking point is provided per unit	1	1
TR3	**Public Transport** Building is within 400m walking distance of public transport node Building is within 800m walking distance of public transport node Building is within 1200m walking distance of public transport node	3 2 1	3

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

AC Access — Achieved: **4,2**

Objective
The building supports access to facilities.

Indicators		Potential	Actual
AC1	**Internet Access** Low cost or free internet access is provided	1	0
AC2	**Banking** ATM or Bank can be accessed within 2000m	1	1
AC3	**Groceries** General food groceries can be purchased within 2000m	1	1
AC4	**Post Office** Post office services are available within 2000m.	1	1
AC5	**Creche** Creche facilities are available within 2000m.	1	1
AC6	**Primary Schools** Primary schools are available within 2000m.	1	1

SUSTAINABL… IL
1,04

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

SC Social Coh… — Achieved: **5,0**

Objective
The building supports social cohesion.

Indicators		Potential	Actual
SC1	**Occupants** Space where all occupants of the building can be seated for communal meals	2	2
SC2	**Community space** Covered space that is available for community events within 2000m of the building and can accommodate 5% of the population who live within 2000m	2	2
SC3	**External Facilities** Open space that is available for community events within 2000m of the building and can accommodate 5% of the population who live within 2000m	1	1
SC4	**Residents Association** There is an active residents association	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

IN Inclusion — Achieved: **5,0**

Objective
The building is inclusive of diversity in population.

Indicators		Potential	Actual
IN1	**Public Transport** Accessible walking route of less than 400mm to public transport node	1	1
IN2	**Groceries** Accesible walking route of less than 400m to food grocery retail	1	1
IN3	**External Routes** Accessible walking route within site, from public highway to entrance of the building	1	1
IN4	**Entrances and Exits** Entrances and exits into the buildings are accessible	1	1
IN5	**Lobby** A space of at least 1500 x 1500mm is available immediately inside front door from which main rooms can be accessed	1	1
IN6	**Window, door and lighting controls** All controls, such as light switches and door and window handles are within accessible locations and are 1000 - 1200mm from the finished floor level	1	1
IN7	**Doors** All doors between rooms have accessible controls and a minimum clear opening width of 750mm.	1	1
IN8	**Bathroom** The bathroom is a minimum of 1500 x 1500mm and is accessible	1	1
IN9	**Inclusive Employment** Construcuion worker includes at least 10% women, 20% youth and 1% people with disabilities	1	1
IN10	**Kitchen** The kitchen is a minimum of 1500 x 1500mm and is accessible	1	1
IN11	**Affordability** Housing is affordable. Affordable housing is located within 2km of site.	2 1	2

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

ED Education — Achieved: **4,0**

Objective
The building supports education

Indicators		Potential	Actual
ED1	**Primary Schools** There is a primary school within 2000m walking distance from the building	2	2
ED2	**Secondary Schools** There is a secondary school within 2000m walking distance from the building	1	1
ED3	**Ongoing education** There is a facility for ongoing learning within 2000m walking distance from the building	1	0
ED4	**Internet** Low cost or free internet access is provided.	1	0
ED5	**Noticeboards** Physical notice board at central location with notices about education course and opportunities and is within 2000m walking distance of the	1	1
ED6	**Space for Learning** An equipped space of at least 2m2 space within the building is available to support learning	2	2
ED7	**Building User Manual** Comprehensive building user manual has been developed	1	1
ED8	**Construction Worker Education** Contract documentation requires contractors to ensure that all construction workers receive accredited training for a minimum of 5% of working hours	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

SP Services and Products — Achieved: **5,0**

Objective
The building supports use sustainable products and services.

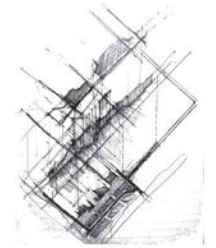
Indicators		Potential	Actual
SP1	**Fruit and Vegetables** Fresh fruit and vegetables producec within the country are available within 2000m walking distance of the building	2	2
SP2	**Bakery Products** Fresh locally baked bakery products are within 2000m walking distance from the building	1	1
SP3	**Bean and Pulses** Beans and pulse products are within 2000m walking distance from the building	1	1
SP4	**Milk and Eggs** Milk and eggs produced within the country are available within 2000m walking distance of the building	1	1
SP5	**Clothing** Locally made hard wearing clothing available within 4000m walking distance of the building	1	1
SP6	**Furniture** Locally made hard wearing furniture available within 4000m walking distance of the building	1	1
SP7	**Equipment Hire** Gardening and maintenance equipment available for hire within 2000m walking distance of the building	1	1
SP8	**Notice Board** Physical notice board at central location which advertises local products and services and is within 2000m walking distance of the building	1	1

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1,04

HE Health — Achieved: **5,0**

Objective
Built environment supports a healthy and productive environment

Indicators		Potential	Actual
HE1	**Excercise** Exercise facilities are available within 2000m.	1	1
HE2	**Health facility** Health facilities are available within 2000m.	1	1
HE3	**Fruit and Vegetables** Fresh fruit and vegetables producec within the country are available within 2000m walking distance of the building	2	2
HE4	**Bean and Pulses** Beans and pulse products are within 2000m walking distance from the building	1	1
HE5	**Milk and Eggs** Milk and eggs produced within the country are available within 2000m walking distance of the building	1	1
HE5	**Water** Clean drinking water is available within or near the building	3	3
HE6	**External Views** All useable rooms have glazing on external walls which provide a view (no obstructions within 5m of the window)	1	1
HE7	**Daylight** Over 80% the area within the building is within 2h, where h is ht of head of window	2	2
HE8	**Openings** A minimum of 10% opening area per internal useable floor area is provided in each room respectively.	1	1
HE9	**Roof Construction** Roof construction must achieve a minimum total R-value 4.1 K•m²/W	1	1
HE10	**Wall Construction** Wall construction must achieve a minimum R-value for walls of 2.8 K•m²/W	1	1
HE11	**Volatile Organic Compounds** No paints, varnishes, glues or carpets that include Volatile Organic Compounds are used.	1	1
HE12	**Formeldehyde** Materials, such a timber based boards, that contain, or use formeldehyde in their production, are not used.	1	1
HE13	**Construction Worker Health** Construction contract / refurbishment policy requiring all construction workers to have received comprensive health and safety training including a component on HIV/AIDs	1	1



Transition |^|
Working Between the Model & the Lived

Structure | Identity | Cognition

Marcus van der Hoven 12027776

M|Arch 2017

Study Leader

Arthur Barker

Context _ Urban | Social Regeneration

Function _ Residential | Movement | Infrastructure

Form _ Scale_Impact

The events of South Africa's political and social history has left a fragile and disjointed urban framework resulting from rapid re-development programs such as the Reconstruction and Development Project (RDP), the need to respond to historical, spatial and social injustice, as well as accommodate economic development has created a bureaucratic response, seeking to deliver high volumes of housing and urban development at speed (Louw, 2012). Although this process has succeeded in housing the population at a high rate, it has failed to address the spatial legacy of fragmentation, segregation and stagnation that the socialist apartheid regime created.

The urban state of Westbury remains as a palimpsest of urban layers formed through the turbulent History of South Africa. The Current urban condition is one of indefensibility, crime and dire housing conditions. Residents live in conditions that limit their ability to prosper, as there is no platform in place to aid in financial and living requirements. As such the urban realm is not conducive to sustainable urban growth in a city that continues to grow around this context.

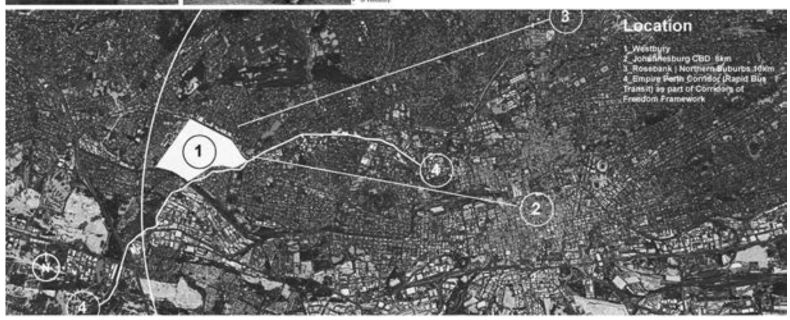
On a macro scale the result of Westbury's Historical development has left the context hindered by its segregation from surrounding suburbs, this is also prevalent on a micro scale, within Westbury, whereby the historical programming of residential blocks and commercial zones are disconnected by ill-defined and indefensible areas, the product of this mixture of dense residential clusters and unclaimed land has manifested dangerous anit-social behaviour, harbouring illegal and unpolicable activity.

The need to address this reformation of urban space as well as urban programme has lead this dissertation to question the manifestation of social processes in spatial form. This dissertation hopes to propose a system of architecture and supporting infrastructure that will address existing spatial legacy, through responding to social and contextual issues; leading to a new platform for the sustainable progression of social activity and identity in the form of urban densification.

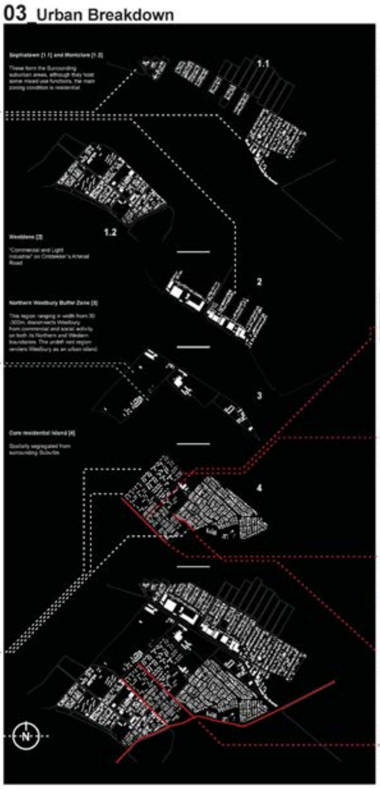
Social Context | The Lived

The development of Housing in Westbury will have to take account of the psychological state of living in Westbury as well as negotiate its form and its function within a changing context.

The Model | Architectural Context

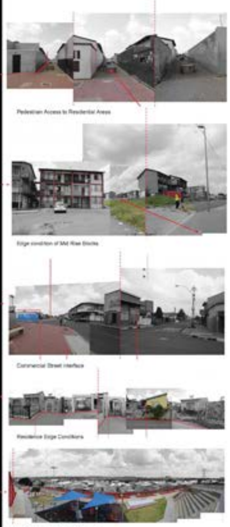


03_Urban Breakdown



Architectural_Spatial Context | The Model

The formation of urban and architectural space within Westbury remains a process in constant flux. The entire context has been reconstructed and appropriated 3 times to cater for political and social shifts (Chapman, 2015, p. 78). At this point, Westbury remains in a state of physical stagnation. Small acupunctural interventions such as the Westbury Clinic or RBT (rapid bus transit) Bridge by 'Local Studio' (fig 52) are found as common place within the context; however the acceptance and use of these interventions differs widely. The recent developments within Westbury have not addressed the urban issues which in turn reflect in the social sphere. The Corridors of Freedom 'COF' project in its intentions aims to deal with a great number of urban and social issues, but its implementation has simply changed the surface of Westbury rather than influence its condition . "Apart from the use of the public furniture and parks, the community are not seeing how they can benefit from the COF initiative" (Klug, 2017, p. 48). The COF transport facilities still remains unaffordable for use by the residents of Westbury.



05_ Site | Focus Area

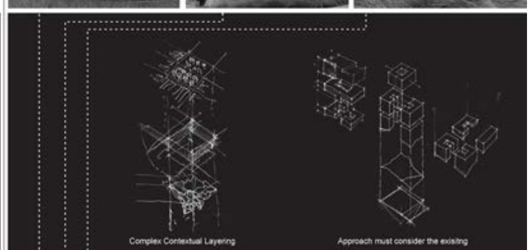
The current social context of Westbury is unable to facilitate development projects that are being provided. Often the process of determining issues is driven through political bias or perception, but not 'understood' need, meaning that the residents do not respond to the development or in some cases respond with negative action.
The approach to development within critical contexts such as this should be one of establishing a framework for development, making use of a series of directives in dealing with the space.

In particular the framing of space and defining of threshold must be the initial point of contact to inform use and facilitate growth.

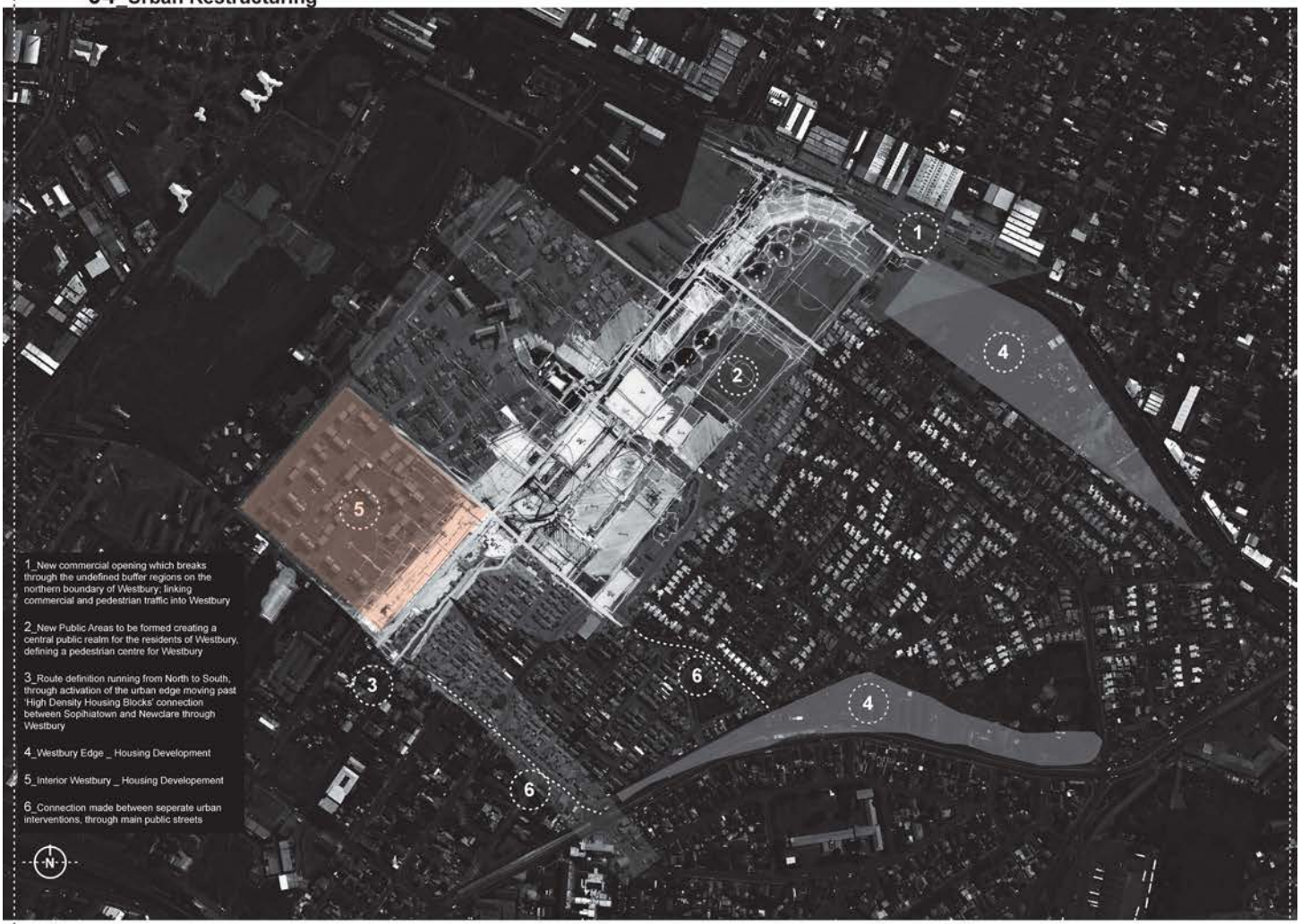
This is followed by the placement of a mixture of programmes.

Allocation of public and private space must occur within space defined by the above parameters.

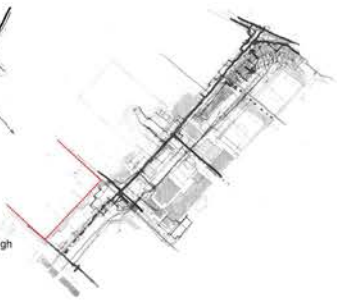
Finally, circulation elements, which subscribe to the first set of parameters must contain and connect spaces.

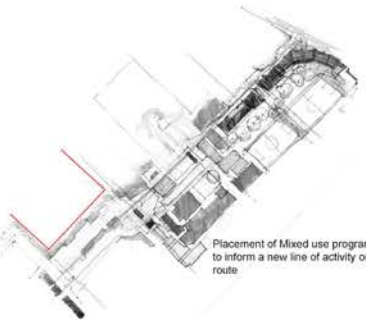


04_Urban Restructuring

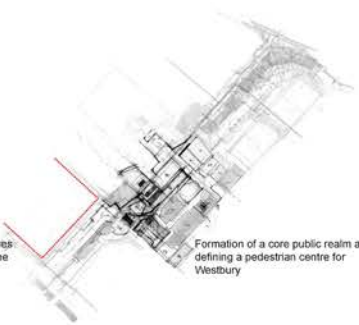


New Routes and Urban Links Through the Centre of Westbury



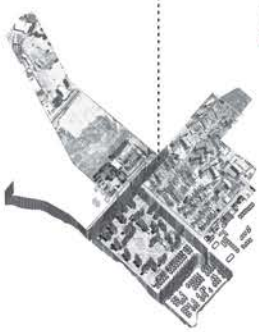


Placement of Mixed use programmes to inform a new line of activity on the route

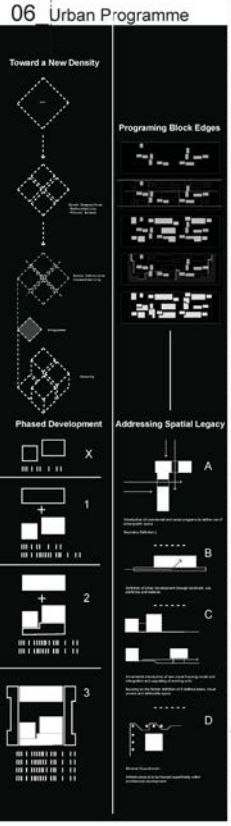


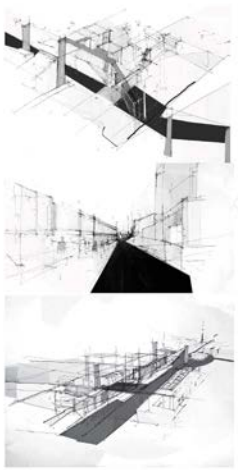
Formation of a core public realm and defining a pedestrian centre for Westbury

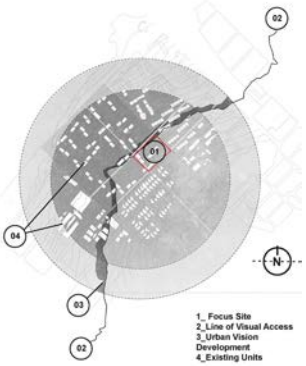
Through the incremental development of this Urban Vision, the activation of edges and definition of space will bleed into surrounding sections of the urban fabric _ The focus of this proposal it to progress to the North -Western edge of the selected site, Aiming to redefine the major urban problem areas



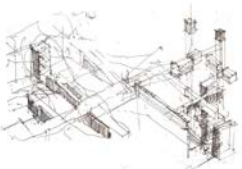
06 Urban Programme



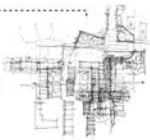


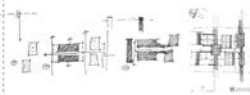


Visual Access as Defensibility & Urban Identity |
The palimpsestic nature of Westbury's urban composition discussed above, has led to major issues of spatial identity, the proposed architectural intervention aims to define space to create a better understanding of the functioning of space.



Infrastructure |
Circulation and Access- Defining clear pedestrian access and public space, circulation is aimed at directing pedestrian movement toward and through the core urban development. The development of this infrastructure seeks to lay down a framework for services on the intervention site, along with this service network the infrastructure aims to allow for a level of user determined flexibility.





Architecture |
The merging of infrastructural framework and programmatic intention will manifest in the design of a housing scheme in Westbury. Acting as the anchor within the framework, further defining the blocks through which the new link connects. The role of architecture within this proposal is through connecting with an infrastructural network. Further development of the urban context will occur as the social environment develops. The intention for the architecture linked with the infrastructural, is to allow for the eventual densification of the site and the surrounding context of Westbury.

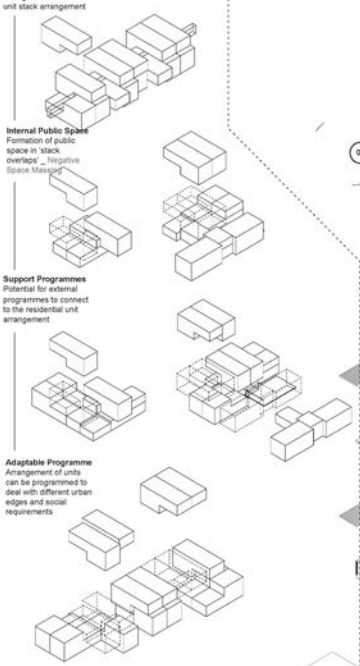
Conceptual Unit Massing

Consolidated Circulation
Circulation threaded through the center of unit stack arrangement

Internal Public Space
Formation of public space in 'stack overlaps' _ Negative Space Massing

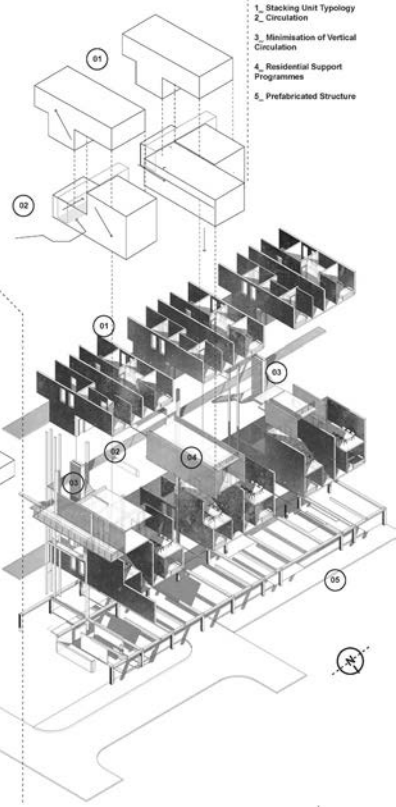
Support Programmes
Potential for external programmes to connect to the residential unit arrangement

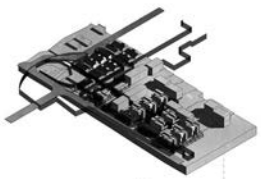
Adaptable Programme
Arrangement of units can be programmed to deal with different urban edges and social requirements

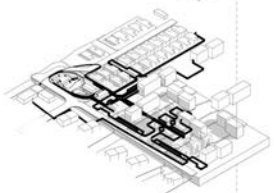


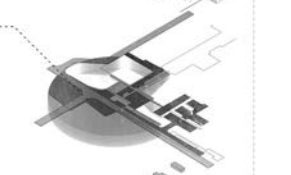
Conceptual Form

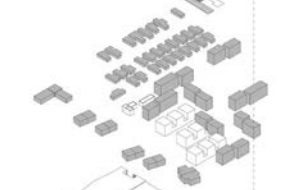
1_ Stacking Unit Typology
2_ Circulation
3_ Minimisation of Vertical Circulation
4_ Residential Support Programmes
5_ Prefabricated Structure

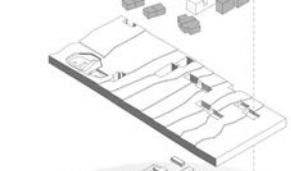


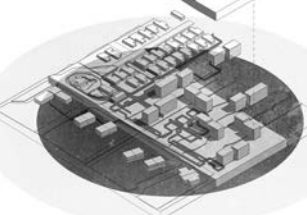












07_Infrastructure | Urban | Architecture

6_Merging of mulitple urban and social programmes into a unifrm architectural language

5_Formation of new routes and defined access throught he site

Infrastructure

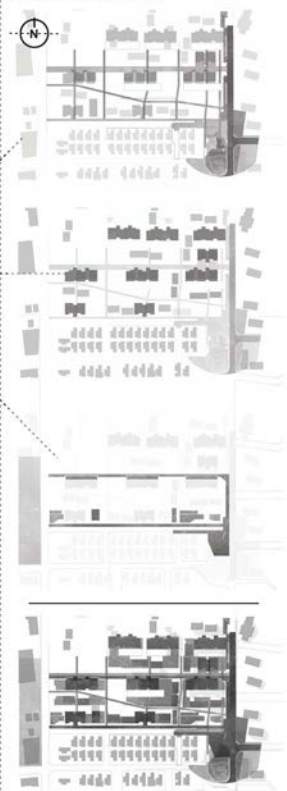
4_Activation of urban edges to present a more legible and accessible environment

Architecture

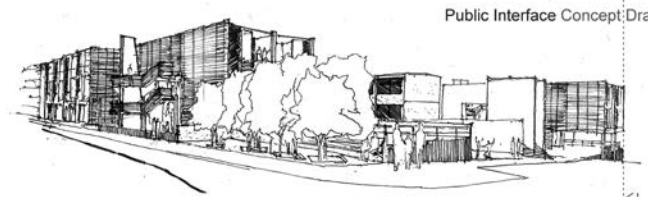
3_Placement of new residential units within existing fabric

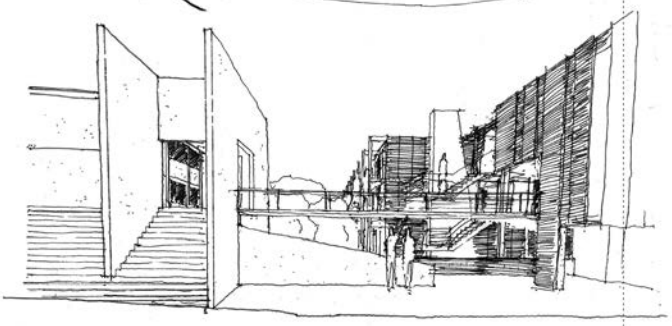
2_Topographical Constraints

1_Site Analysis and Understanding of contextual parameters



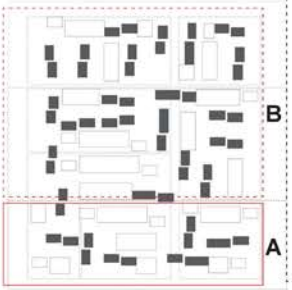
Public Interface Concept Drawings



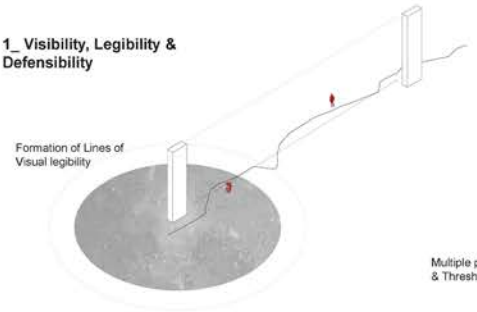


Public Edge Render

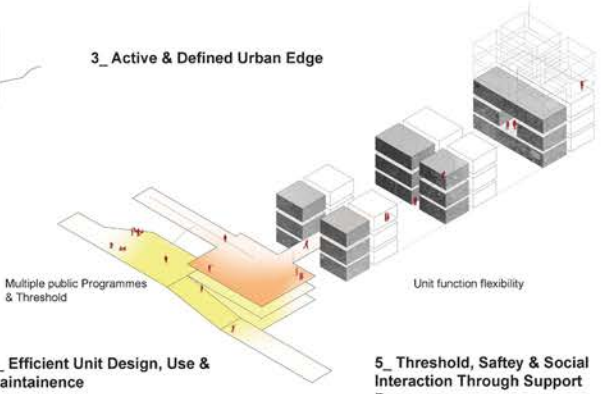
Implementation & Site Development



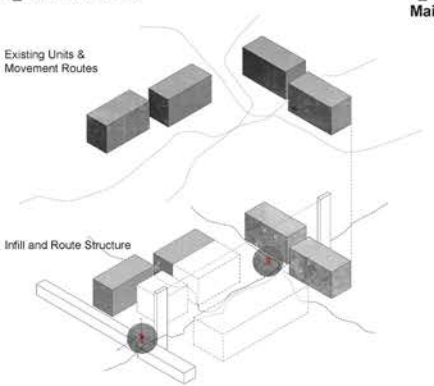
1_ Visibility, Legibility & Defensibility



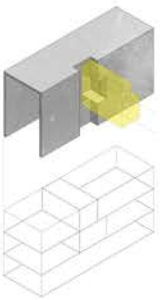
3_ Active & Defined Urban Edge



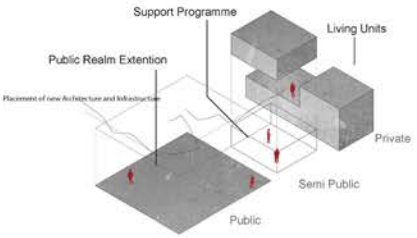
2_ Block Structure



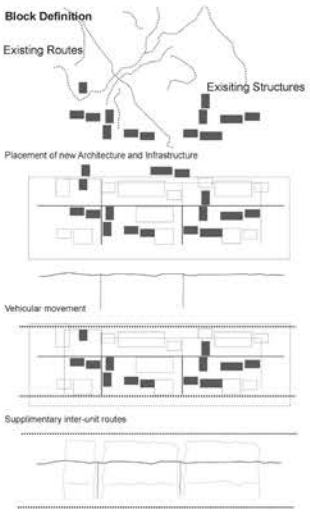
4_ Efficient Unit Design, Use & Maintainence



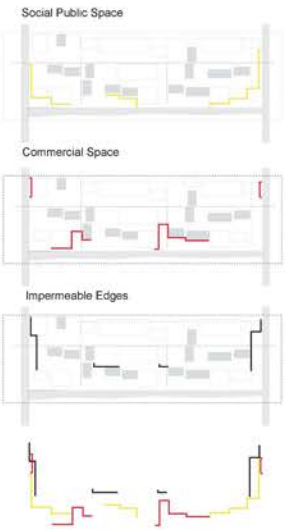
5_ Threshold, Saftey & Social Interaction Through Support Programmes

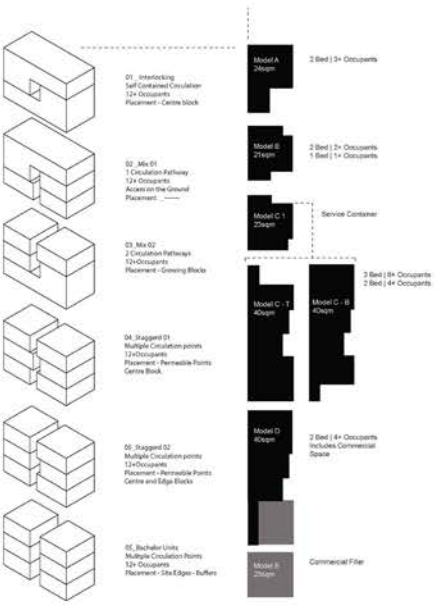


Block Definition



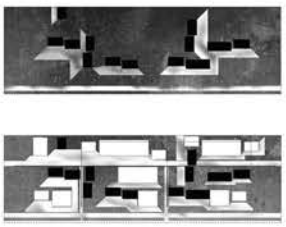
Edge Definition

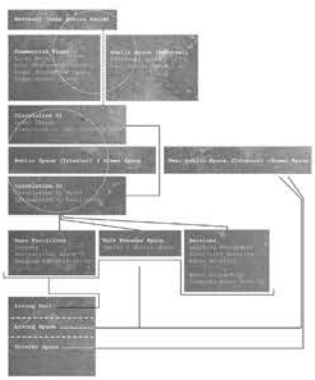


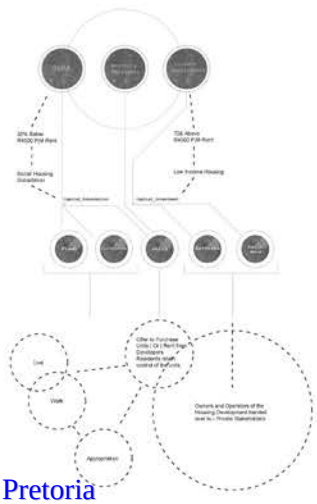


Internal Block Definition

Visual Defensibility







Phases of Development

Section of block _A

Phase 1 - Construction of new standalone units and definition of public space through the upgrade and placement of new public infrastructure

Phase 2 - Adaptation of existing units with new 'partial' typology model and definition of public edges

B_Phase 1

Phase 3 - Demolition of 'old' units and completion of extention units into a consolidated urban block with a new internal courtyard

B_ Phase 2

Phase 4 - Further densification and vertical extension of units

B_Phase 3

Densification of the block

Current [A]

+- 252 Occ.

Phase 1 [A] (Additional 280 Occ.)

+- 532 Occ.

Phase 2 [A] (Additional 150 Occ.)

+- 682 Occ.

Phase 3 [No increase]

Phase 4 [A] (projected 30% increase in structure)

+- 800 Occ.

Cost Feasiblilty (Estimated)

Intended Build cost +-R5000.00 per SqM at 'SHRA' finish standards

Subsidisation at R135 000.00 per unit

Subsidised Units

21SqM Unit - R105 000.00 at 2+ Occ.

Subsidised rent target below R4500.00p/m

Development Agency Units

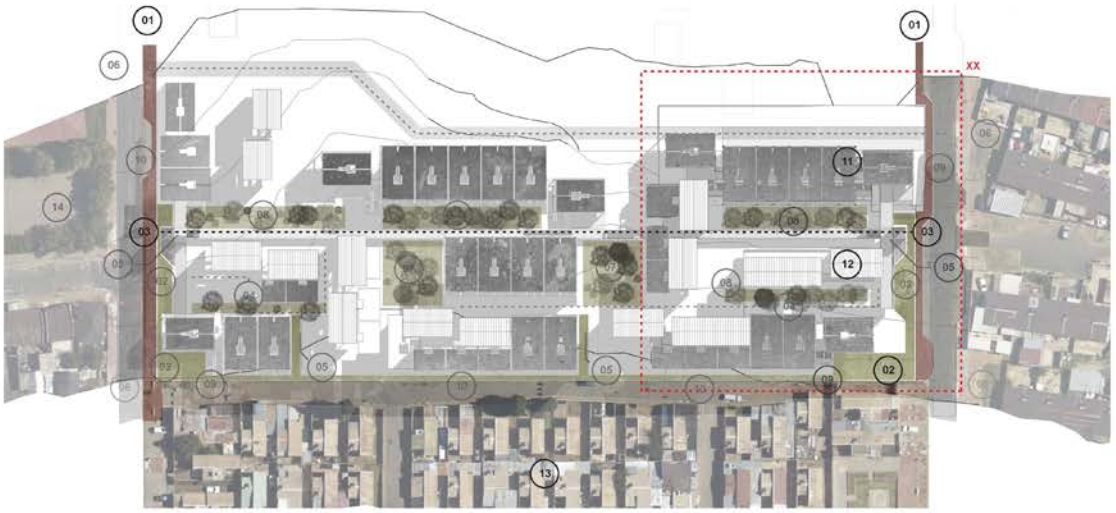
Low income Build cost +-R5000.00 per SqM

64SqM Unit - R320 000.00 at 6+ Occ.

Low Income rent above R7500.00p/m

Site Plan _ Urban Approach

Scale 1|500



XX _ Planned 'FOCUS' Area

1 _ 'Corridors of Freedom' Developement Links

2 _ New Public Edges

3 _ Main Site Circulation

4 _ Semi Public Circulation Routes

5 _ Main Complex Entrance Points

6 _ Vehicular Movement Through Complex

7_ Public Internal Courtyard Spaces

8 _ Semi Public Internal Coutyard Spaces

9_ Commercial Interface Points

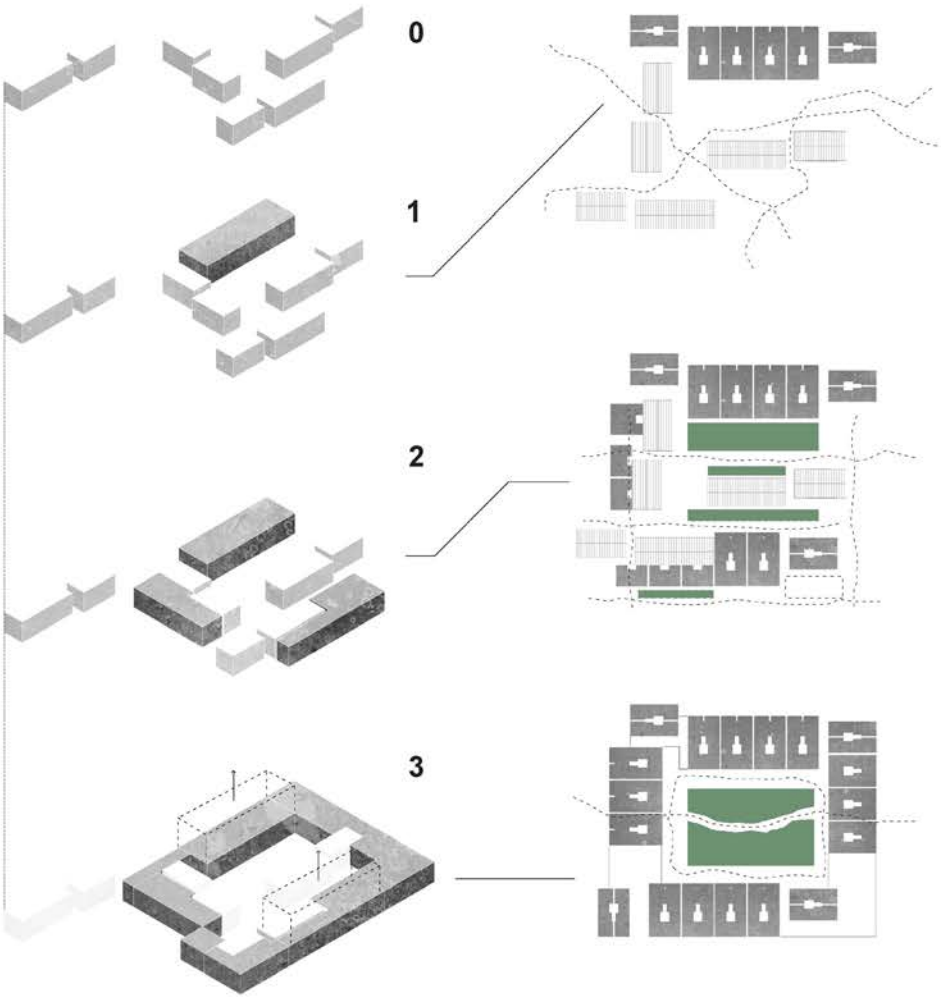
10 _ Residential Edges

11 _ New Residential Structures

12 _ Exisitng Residential Structures

13 _ Low Rise Residentail

14 _ Public Facilities



Urban Structural Placement

0_ Exisitng structures do not define urban space or threshold and limit defenisble movement and visual access through the site.

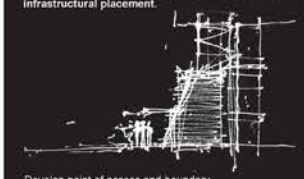
1_ Placement of New Residential units to define the initial urban theshold and limit movement and visual access in a more structured direction

2_ Continued developement of the block will see the placement of internal public space which will further direct the flow of pedestrian movement and activity through the site.

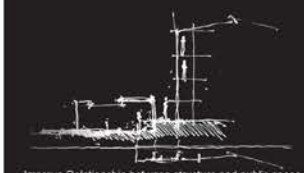
Exisitng structures are maintained within this process so as to limit the impact on exisitng residents and social structures

3_ Upon depleting their structural lifespan, exisitng structures will be demolished and replaced with the proposed new typology, allowing for further densification and larger internal courtyard space.

Movement patterned will be maintained from the Initial infrastructural placement.



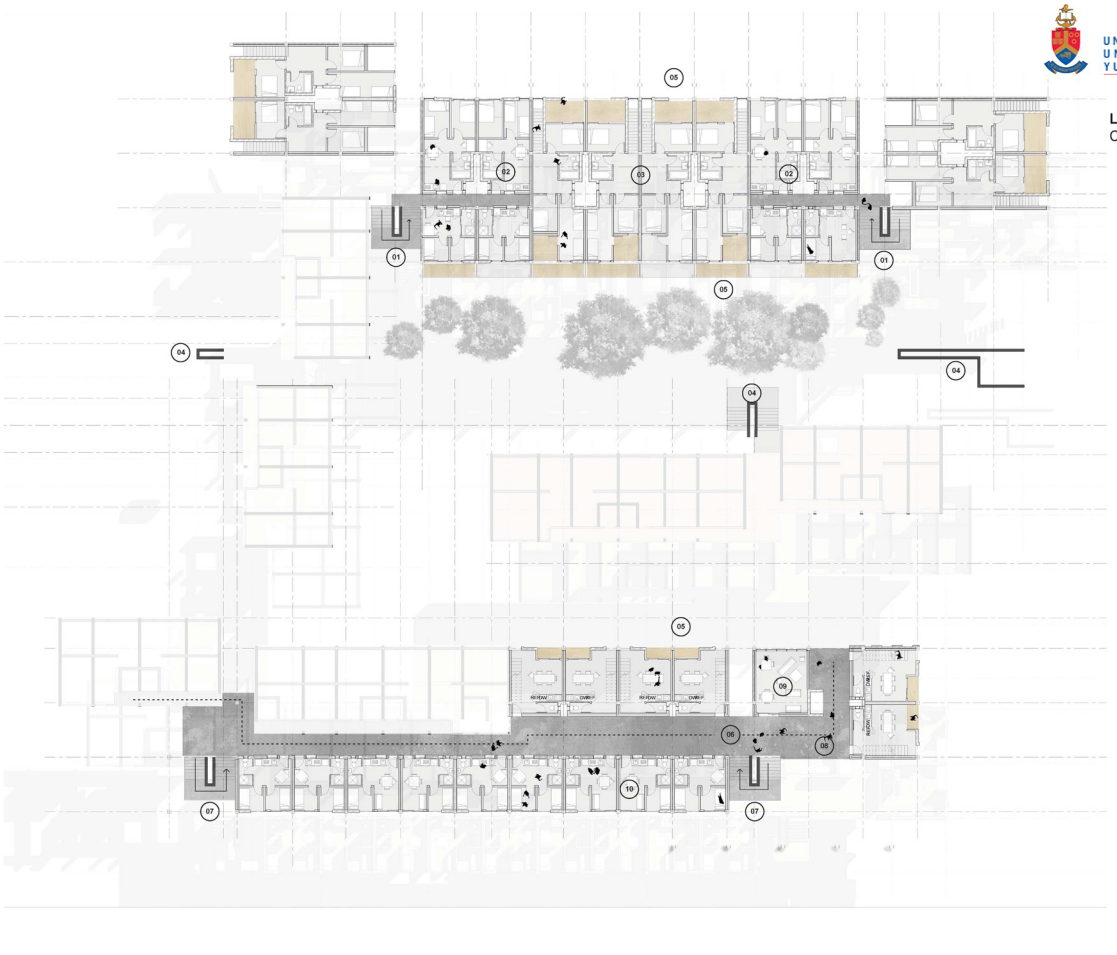
Develop point of access and boundary



Improve Relationship between structure and public space

Identify structured movement routes through the site

Allow for the development to grow and remain resilient in its ability to adapt to social change



Living Level_03 Scale 1|100
Circulation Level_02

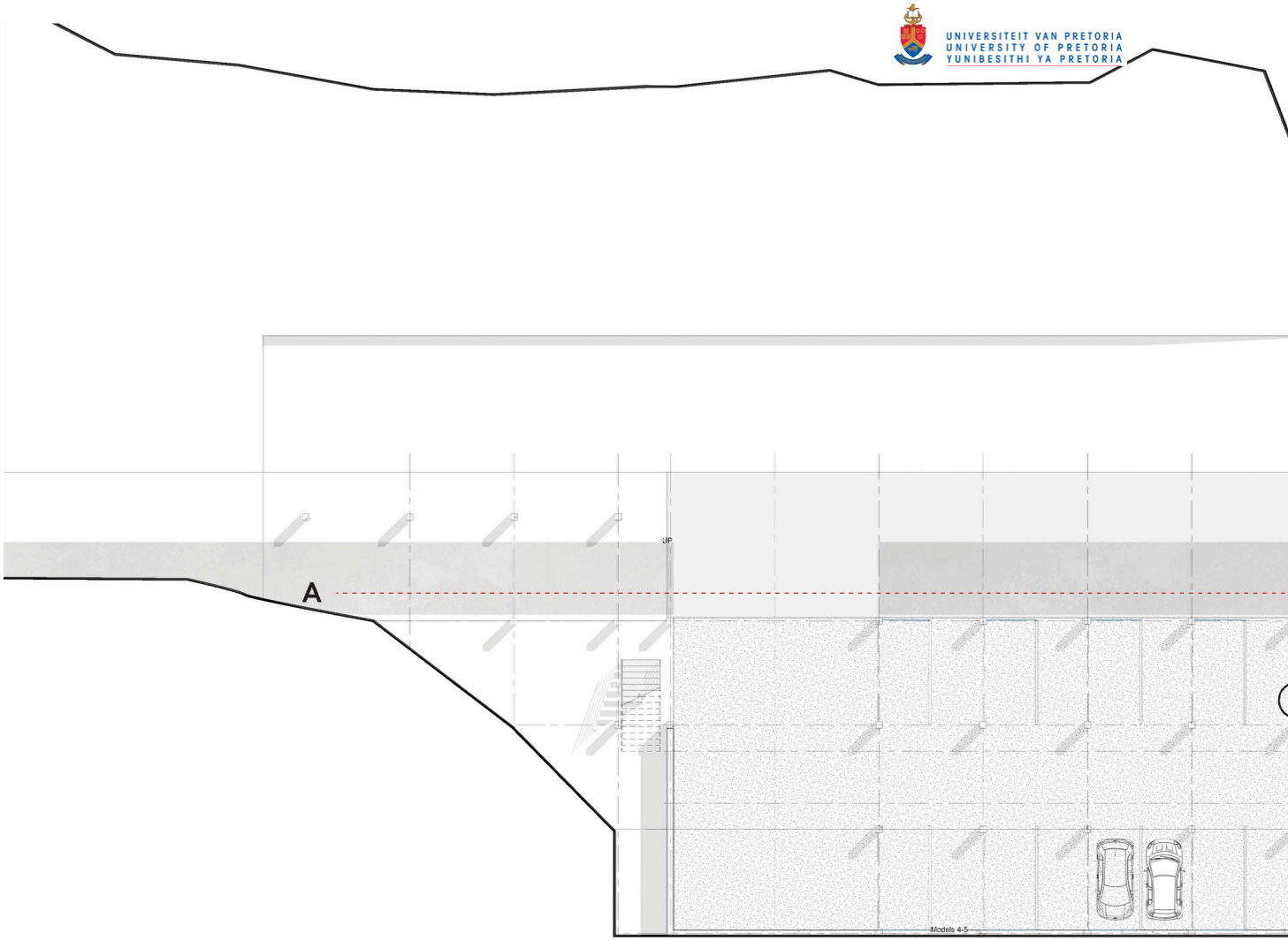
01 _ Vertical Circualtion
02 _ Bachlor 'Type' Units
03 _ Family 'Type' Units
04 _ Circulation Points 'Visual Landmarks'
05 _ Unit Balcony's

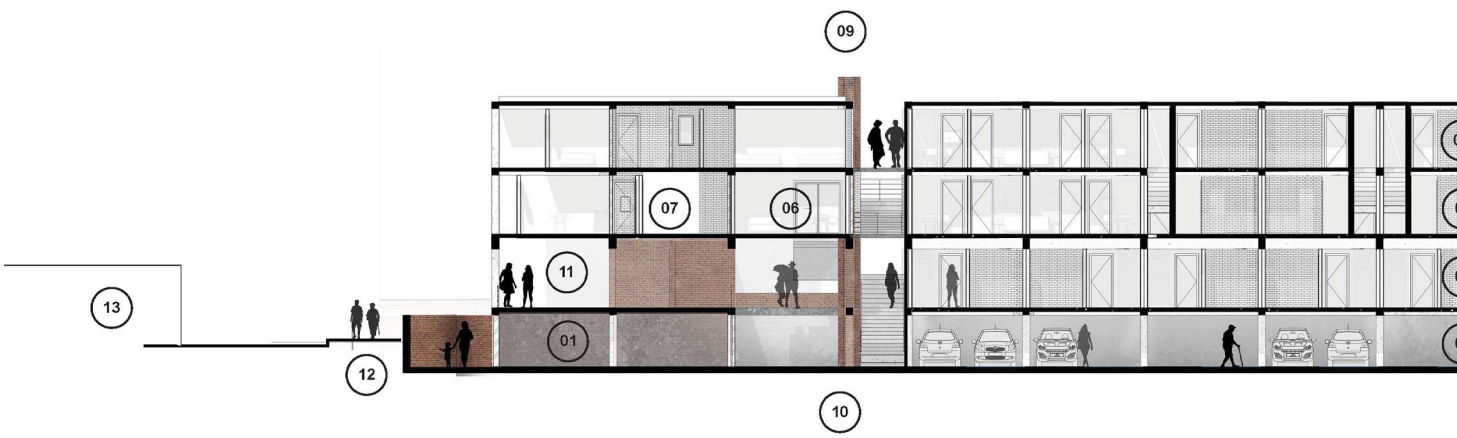
06 _ Main Living Level Circulation
07 _ Vertical Circulation
08 _ Circulation Breathe Space
09 _ Recreational Space
10 _ Bachelor 'Type' Units

Circulation Level_02 Scale 1|100
Ground Level_01

01 _ Public Interface & Complex Access
02 _ Sidewalk Extension
03 _ Main Residents Circulation
04 _ New Residential Units
05_ Circulation Breathe Space
06_ Recreational Space
07 _ Laundry
08 _ Washing Drying Area
09 _ Bachelor 'type' Units
10 _ Family 'type' Units
11 _ Refuse 'Units'
12 _ Refuse 'Complex'

13_ Side Walk Recess - Public Space
14 _ Complex 'Public Corner Edge'
15 _ Commercial Programme
16 _ Circulation to 'Living Level'
17 _ Semi Commercial Living Units
18 _ Exisitng Residentail Structure
19 _ Visual Permeation
20 _ Soft Privacy Edge





00000

Basement Level_00 Scale 1|100

01 _ Public Interface

02 _ Resident Parking

03 _ Building Circulation Access

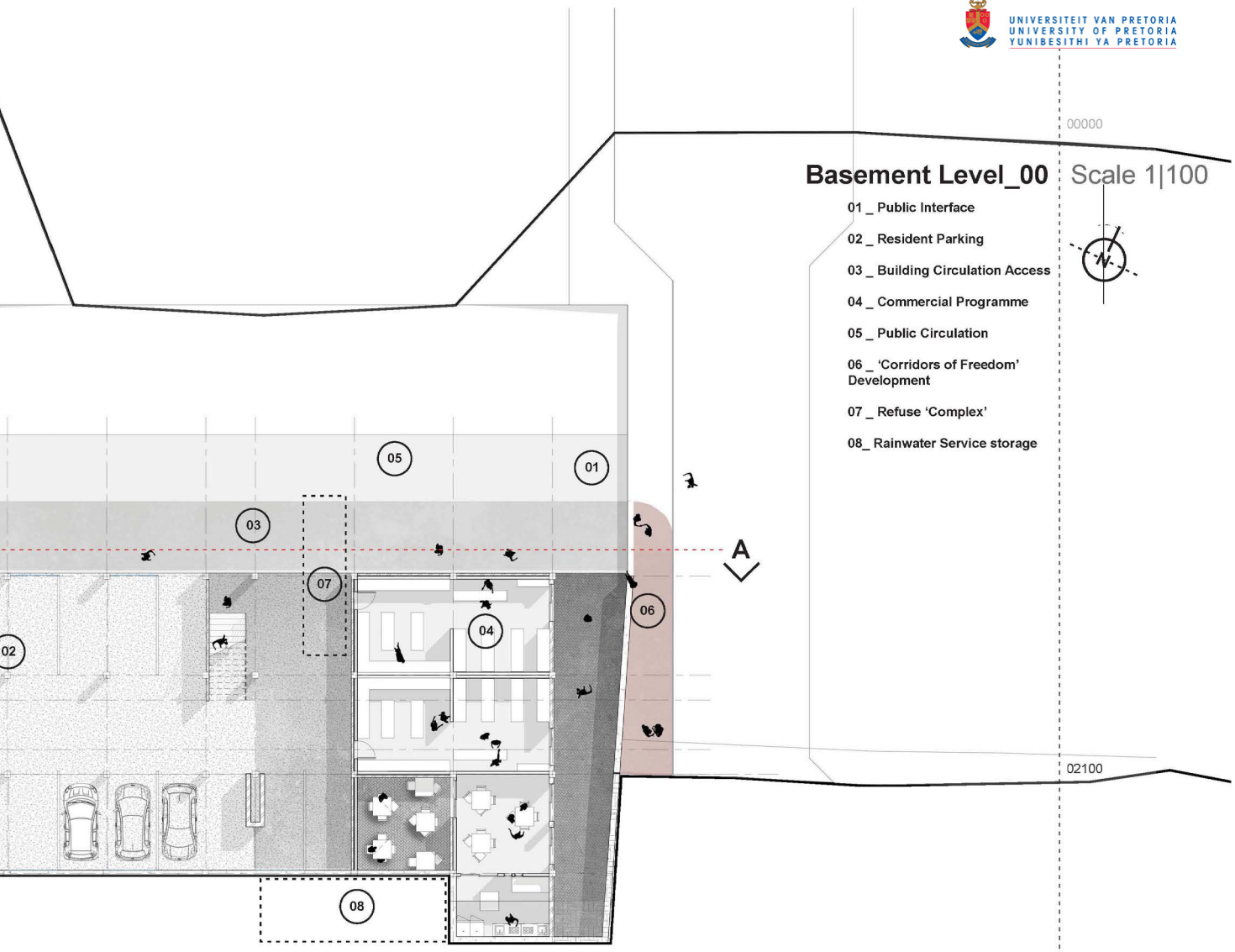
04 _ Commercial Programme

05 _ Public Circulation

06 _ 'Corridors of Freedom' Development

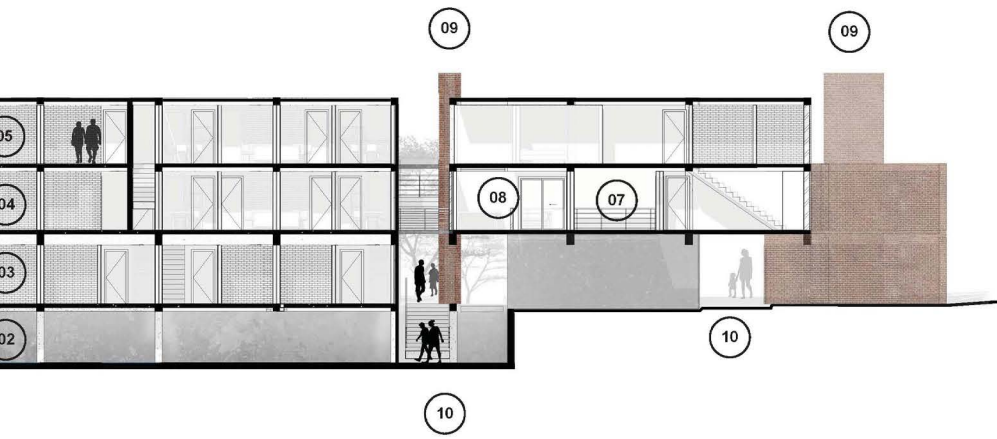
07 _ Refuse 'Complex'

08_ Rainwater Service storage



02100

Section A_A Scale 1|100



01 _ Public Edge Unit

02 _ Parking Level

03 _ First Floor Living

04 _ Second Floor Living

05 _ Third Floor Living

06 _ Recreational Space

07 _ Circulation Breathe Space

08 _ Laundry

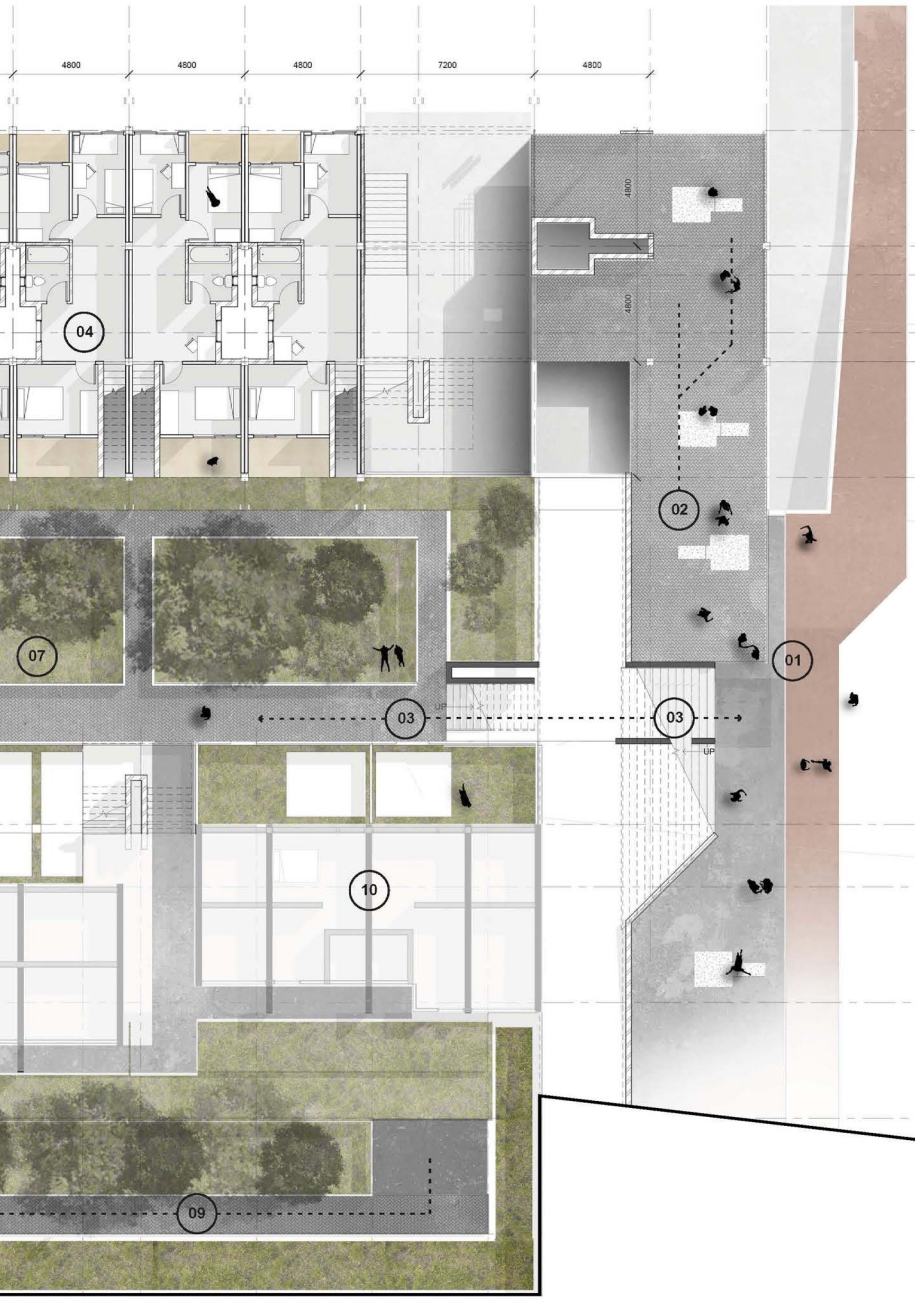
09_ Vertical Circualiton

10 _ Visual Permeability

11 _ Sidewalk Extention

12 _ Sidewalk

13 _ Context Building Scale



Living Level_01 Scale 1|100

01 _ Public Interface

02 _ Sidewalk Extension

03 _ Main Complex Circulation Access

04 _ New Residential Units

05 _ Public Circulation

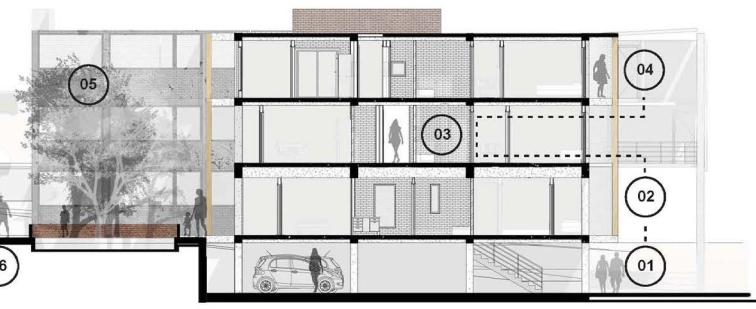
06 _ Circulation 'Break' Space

07 _ Internal Semi-Public Space

08 _ Private Garden Extension (Multiple Programmes)

09 _ Semi Public Circulation

10 _ Existing Residential Units



Section B_B Scale 1|100

01 _ Public Edge & Parking

02 _ First Level Living Units

03 _ Main Complex Circulation Access and Units

04 _ Third Level Living

05 _ Semi Public Internal Courtyard

06 _ Main Complex Circualtion

07 _ New Circulation Element for Existing Units

08 _ Commercial Interface

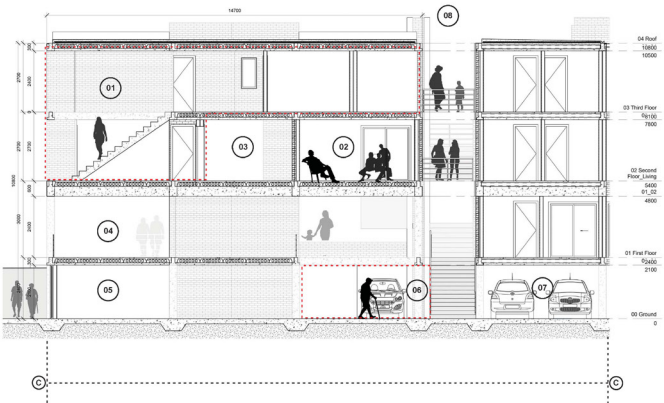
09 _ Verticl Circulation

10 _ Sidewalk

11 _ Context building Scale

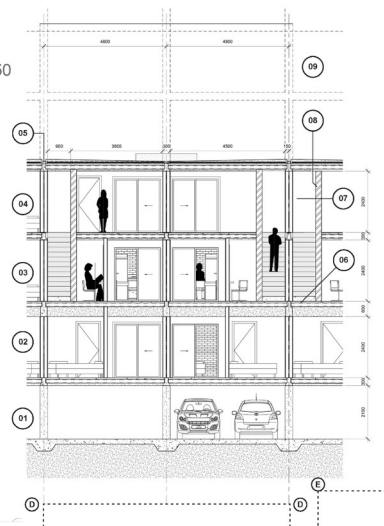
Section C_C Scale 1|50

01 _ 'Overlap Unit'
02 _ Recreational Area
03 _ Circulation Breathe Space
04 _ Sidewalk Extension
05 _ Precast Concrete Structure
05 _ Commercial Interface
06 _ Service Area - Consolidation of services within circulation structure
07 _ Parking Level
08 _ Vertical Circulation Element



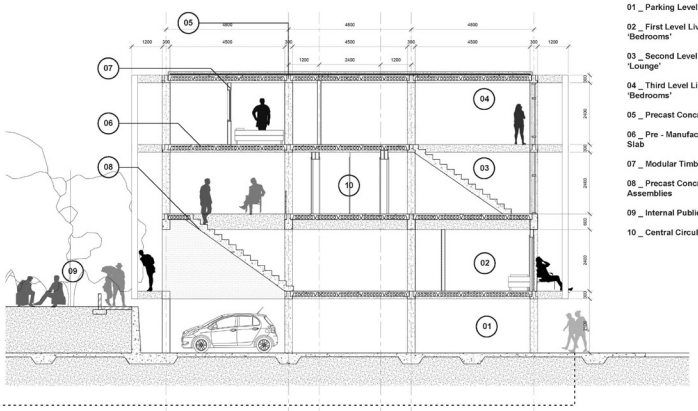
Section D_D Scale 1|50

01 _ Parking Level
02 _ First Level Living Unit 'Bedrooms'
03 _ Second Level Living Unit 'Lounge'
04 _ Third Level Living Unit 'Bedrooms'
05 _ Precast Concrete Structure
06 _ Pre - Manufactured Concrete Slab
07 _ Modular Timber Panel Walls
08 _ Rigid Brick Masonary Panels
09 _ Building Projected Development (Phase 2 of densification)



Northern Elevation Scale 1|50

Section C_C Scale:1|50



01 _ Parking Level

02 _ First Level Living Unit 'Bedrooms'

03 _ Second Level Living Unit 'Lounge'

04 _ Third Level Living Unit 'Bedrooms'

05 _ Precast Concrete Structure

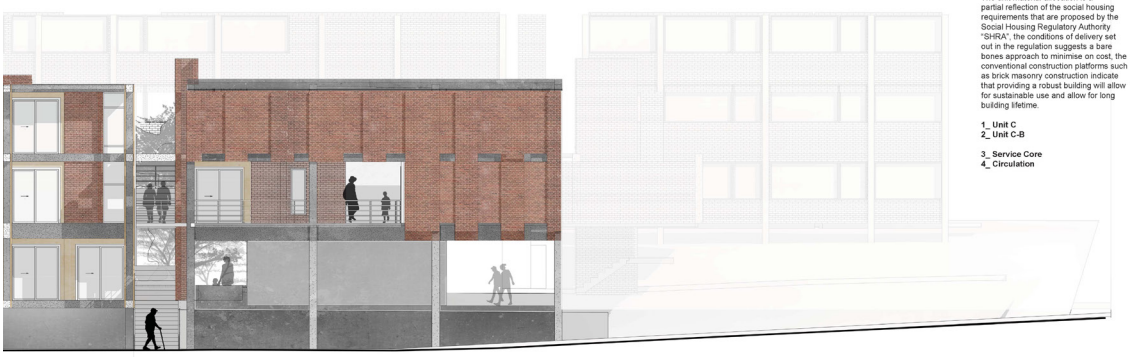
06 _ Pre - Manufactured Concrete Slab

07 _ Modular Timber Panel Walls

08 _ Precast Concrete Stair Assemblies

09 _ Internal Public Courtyard

10 _ Central Circulation Route



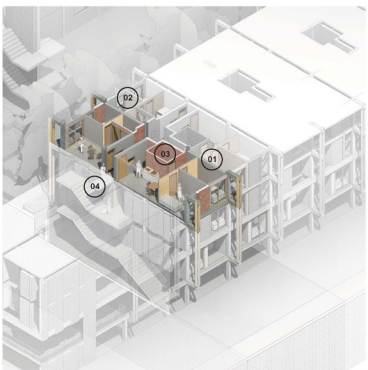
Unit Axonometric Drawings

Third Floor Single Units A & B

The units provided act as a platform to facilitate the social growth of the residents of Westbury. The starter units are provided as the bare essentials, which then allows for users to add spaces in order to cater for personal needs. The focus remains on providing a platform that is easily appropriable through means that are obtained easily and inexpensively. This relates back to the initial structural fabric of the building, whereby all the integral structural work has already been completed. Along with the structural frame, the walls and components within the site also provide for easy appropriation. The concept of providing a wall with integrated services as well as opening that contain doors and windows allows for an inexpensive appropriation.

1_ Unit A
2_ Unit B

3_ Service Core
4_ Circulation

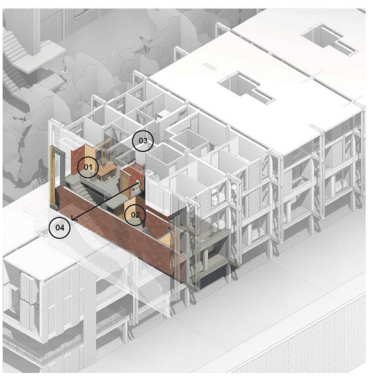


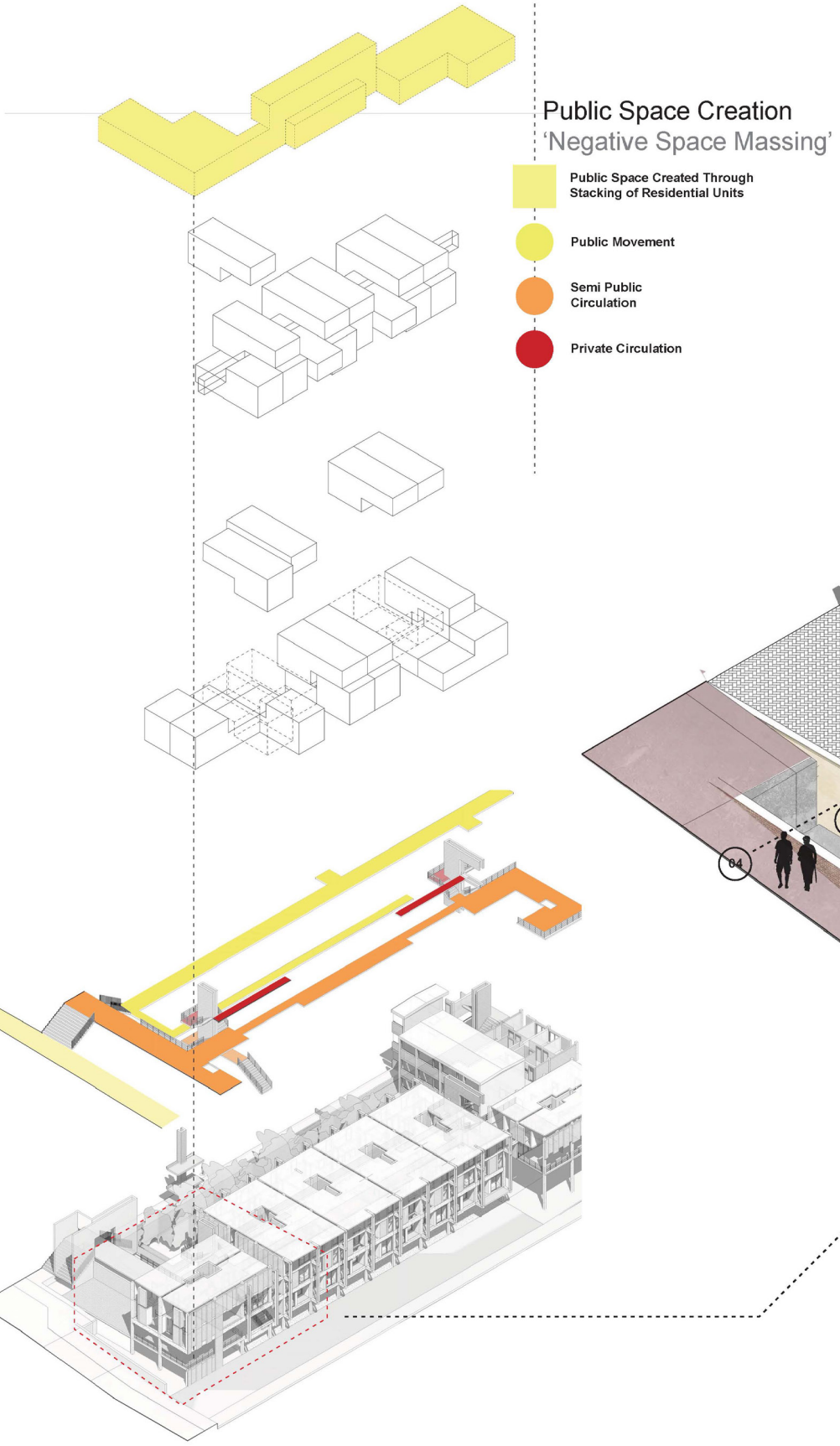
First and Second Floor Units C & C-B

The unit material allocation is a partial reflection of the social housing requirements that are proposed by the Social Housing Regulatory Authority "SHRA", the conditions of delivery set out in the regulation suggests a bare bones approach to minimise on cost, the conventional construction platforms such as brick masonry construction indicate that providing a robust building will allow for sustainable use and allow for long building lifetime.

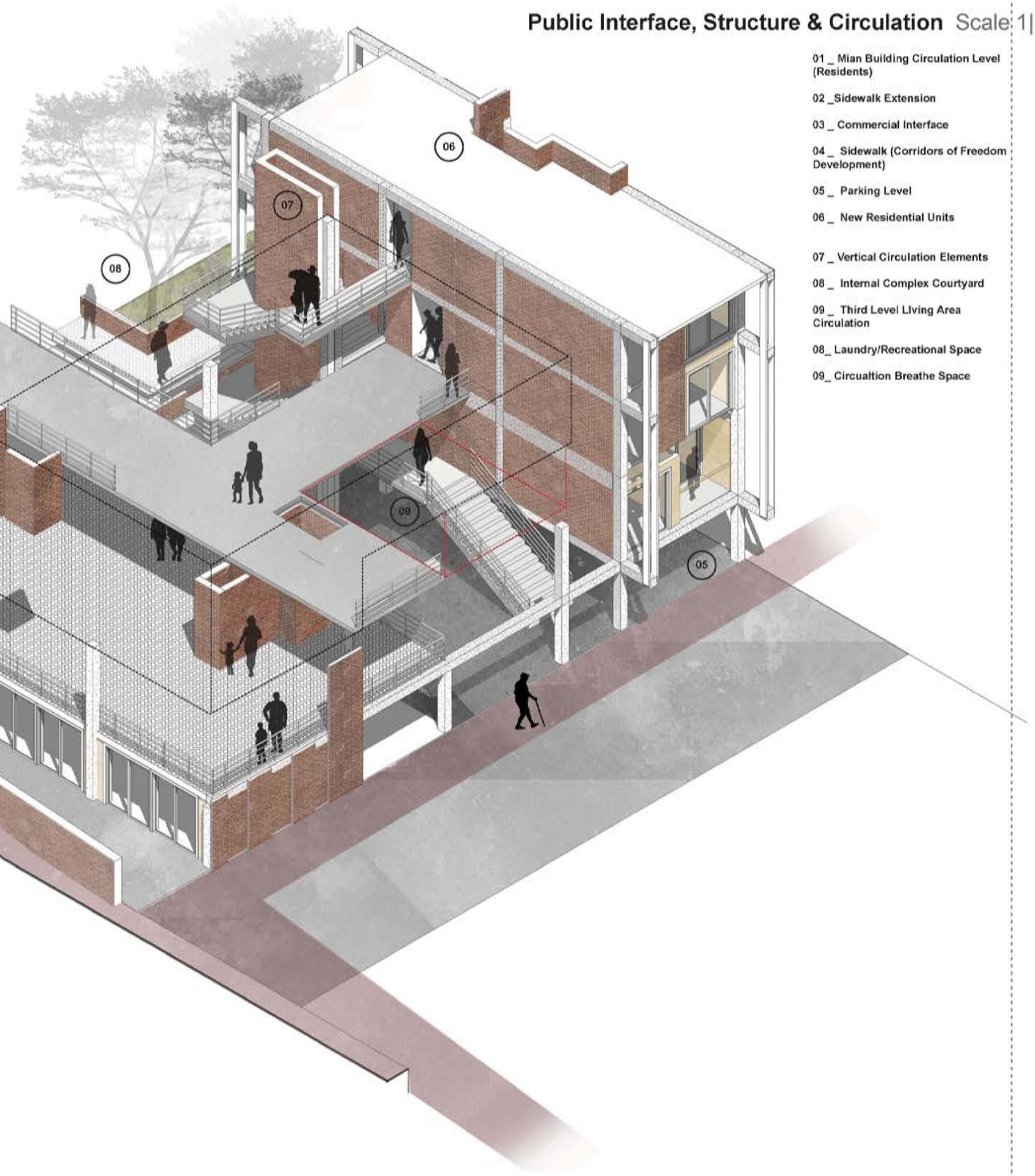
1_ Unit C
2_ Unit C-B

3_ Service Core
4_ Circulation





Public Interface, Structure & Circulation Scale 1|50



01 _ Mian Building Circulation Level (Residents)

02 _Sidewalk Extension

03 _ Commercial Interface

04 _ Sidewalk (Corridors of Freedom Development)

05 _ Parking Level

06 _ New Residential Units

07 _ Vertical Circulation Elements

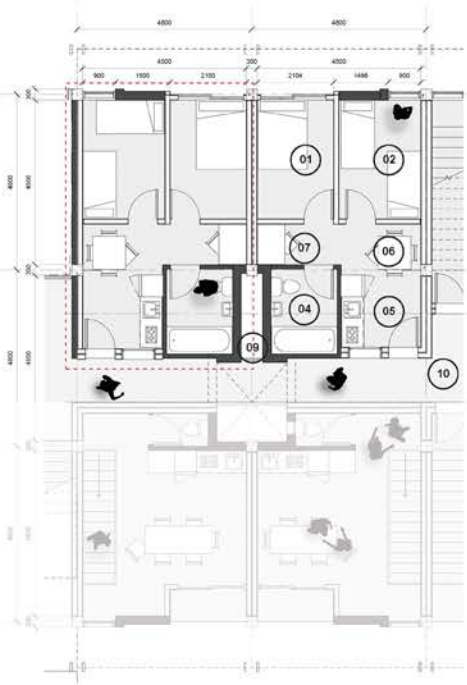
08 _ Internal Complex Courtyard

09 _ Third Level LIving Area Circulation

08_ Laundry/Recreational Space

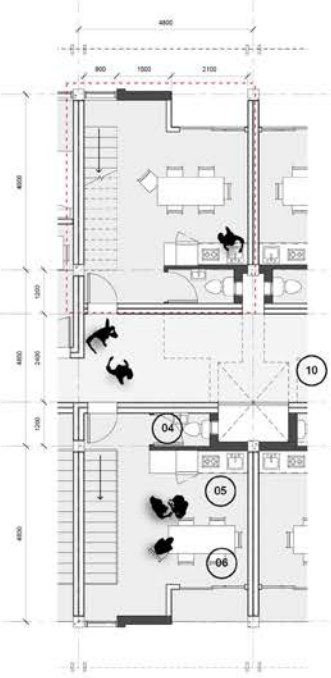
09_ Circualtion Breathe Space

Unit Plan Typ



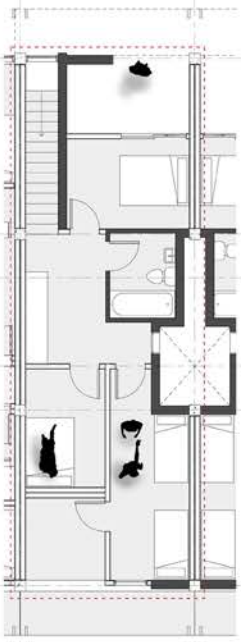
Model A _ 24 SqM

2 Bed | 3+ Occupants



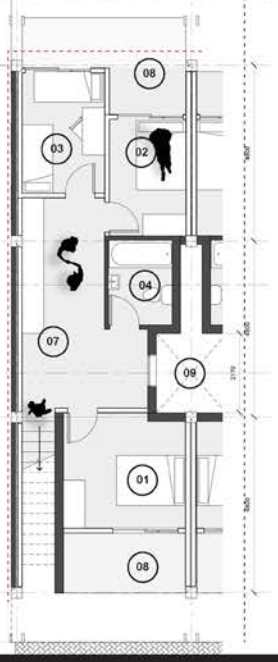
Model C _ 21 SqM

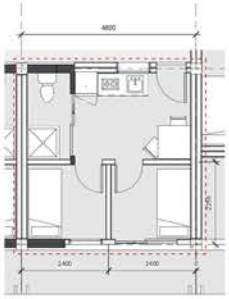
Service Container
Living Space and Access



Model C -T/B _ 40 SqM

3 Bed | 6+ Occupants
2 Bed | 4+ Occupants



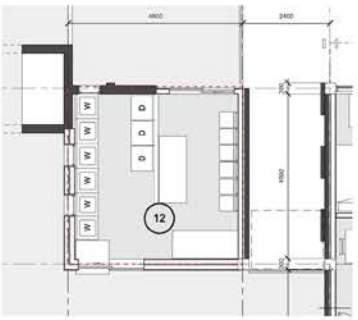


Model B _ 21 SqM

2 Bed | 2+ Occupants
1 Bed | 1+ Occupants

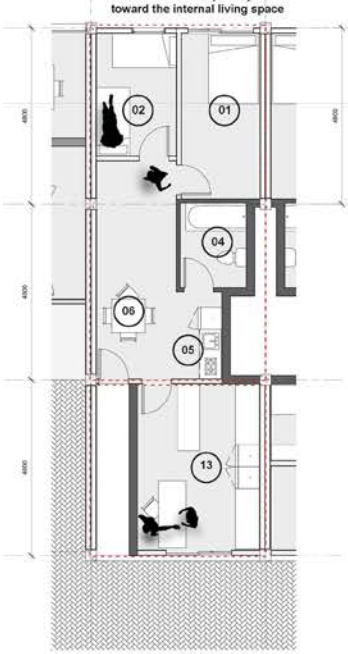
Auxilary Units

The process of establishing a working relationship between the living units and the infrastructural realm external to those units remains a strong component of this proposal. The initial concept is to pull out the services that are on-essential to the workings of the individual units and to place those services to external shared facilities. This facilitated space such as the laundry and recreational lounge space has been moved to parts of the 'negative space' formed by the initial placement of the units. They are also placed in such a way to form a transition barrier between the strictly private and public spaces; this process allows for a system of pedestrian vetting to occur as people move through the transitional circulation space.



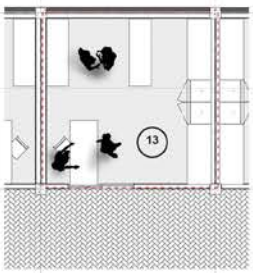
Semi Commercial Unit

Units that are located on ground level and face directly onto a public realm will maintain a commercial front to create a screen of privacy toward the internal living space



Commercial Unit

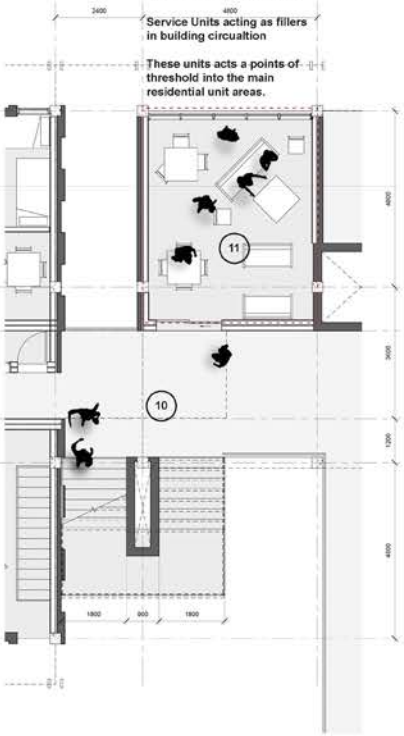
These units house sole commercial functions and provide a threshold on ground level activity



Laundry & Rec Units

Service Units acting as fillers in building circualtion

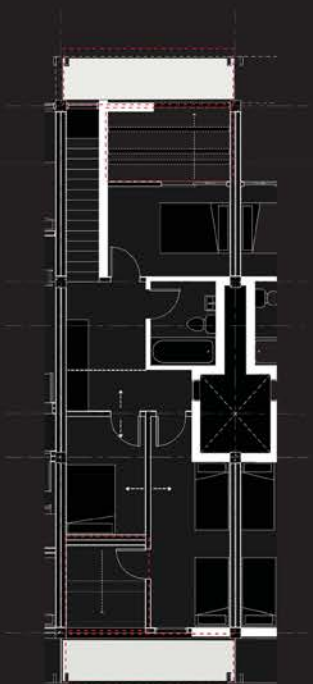
These units acts a points of threshold into the main residential unit areas.



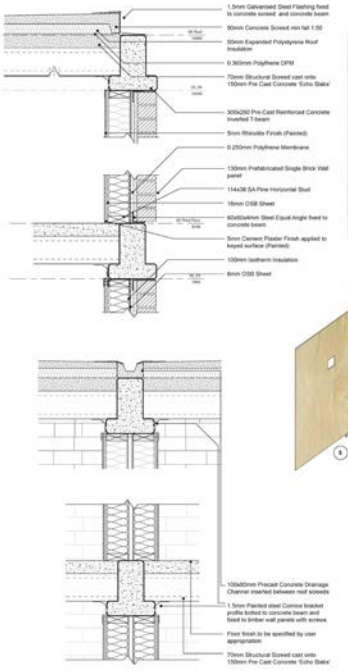
Unit Functions

1 _ Main Bedroon
2 _ Secondary Bedroom
3 _ Tertiary Bedroom
4 _ Bathroom
5 _ Kitchen
6 _ Lounge
7 _ Study Area
8 _ Outdoor Area
9 _ Service Core
10 _ Building Circulation
11 _ recreational Space
12 _ Laundraumat
13 _ Commercial Space

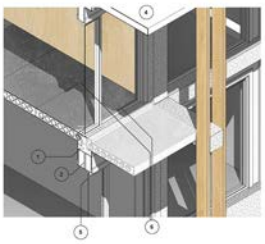
Unit Appropriation Platform



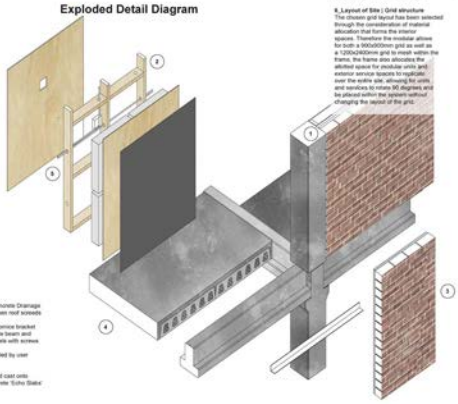
Detail _ Drawings Scale 1|5

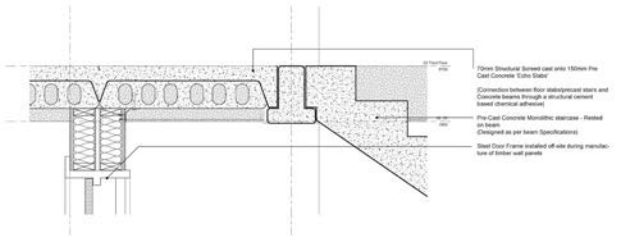


Material Connection Diagram



Exploded Detail Diagram





Tectonic Programme

The material selection for this scheme is based on the ability for them to form sections of the structure as prefabricated elements, selection of materials therefore must be considered for durability in a program which demands high resistance, whilst remaining economic and limiting he need for high material mass.

1_Precast concrete framework
Hollow core floor slab with structural screed, cast offsite and formed into a single floor slab element which seats in the precast concrete frame

2_Prefabricated timber wall system,
consisting of OSB sheets and internal insulation, finished with a surface of cement based plaster.

3_Prefabricated Brickwork Panels
are used to provide the aesthetic framework of the structure as well as providing the protective envelope of the structure.

Brickwork is usually an expensive an time consuming component of construction, however the panels in this scheme simply slot into the pre cast structure and held in place by steel angles fixed to the concrete structure

4_Concrete roof and floor slabs
constructed in the same way allowing for extension upon further development but contains waterproofing system upon initial assembly.

5_Doors and Windows and Services
constructed into the timber wall system and placed into concrete framing structure housing connective points for unit services.

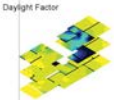
6_Layout of Site | Grid structure
The chosen grid layout has been selected through the consideration of material allocation that forms the interior spaces. Therefore the modular allows for both a 900x900mm grid as well as a 1200x2400mm grid to mesh within the frame, the frame also allocates the allotted space for modular units and exterior service spaces to replicate over the entire site, allowing for units and services to rotate 90 degrees and be placed within the system without changing the layout of the grid.

Daylight Studies

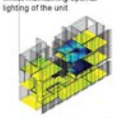
Annual Light Exposure Areas at 0.8m

Overlit _ Underlit

Daylight Factor



Sefaira Energy Analysis per Unit shows sustainable energy requirements are met whilst maintaining optimal lighting of the unit



On-Site Services

X _ Modular Prefabrication

Modular Prefabrication Construction process will remain ecological and economical, in that there will be limited on-site waste due to prefabricated parts .
Site impact will remain limited due to rapid and non-invasive construction.
Material Selection also limited to minimisation of material mass - timber panels will maintain bulk of architectural and material space formation.

This Contruction process also limites the required trades on site

XX_Natural Ventilation
Ventilation of units*must occur Naturally _ Openings will allow for shallow units to ventilate and of deeper units maintain direct flow routes for cross ventilation

1_Half the services

The units are arranged in such a way that they share a service core, the units will therefore be able to share the required services needed to maintain the units.

3_Communal Water Heating

2_Platform for Photovoltaic Panels

4_Site Rainwater Collection

Cistern Flushing

Max 12 Cisterns per block configuration - @6Cisterns
and 6 Flushes per day.

Total - 157 680 L per Annum ___ 158m3 Per Block P/A

13 Blocks per segment ___ 2054m3 P/A

Harvested Regions

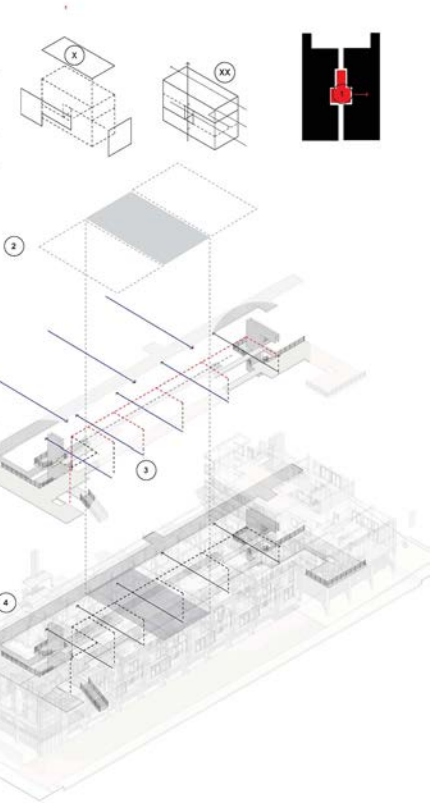
Using Johannesburg Rainfall Statistics

Roof Area Per Block -
36sqm Runnoff co-efficient 0.70
Yeild per block 26.42 m3 P/A
Total Roof Yeild _ 1383.7m3

Site Drainage
1380sqm co-efficient 0.50 (Mixed Surfaces)

Total Site Yeild_657.15m3

Total Yeild _2058.8m3 P/A



Sidewalk & Structure Render

Street Interface Render

Internal Courtyard Render

Internal Courtyard Render