

# [IN]FORMAL PRODUCTION NETWORKS

by J.G. van der Merwe (2017)



A special thank you to my Father, my Mother and  
Maxine for your support during my studies.  
Thank you to Johan for editing this document.  
Thank you to my study leader for guiding me through  
this year.

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I further state that no part of this dissertation has already , 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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J.G. van der Merwe  
October 2017



## ABSTRACT

*The relationship between industry and the city is a damaged one. However, with its existing mix of residents, industry and commerce (albeit segregated from one-another) Pretoria West holds the potential for a unique relationship between industry and the citizens of Pretoria. Only by understanding the role that these industries play within the greater context of the city can the rich character and culture of a place be amplified and solidified in a development plan. Catalyzed by its heritage, development becomes a manifestation of the character of place that will attract further growth and simultaneously embrace the existing stakeholders.*

*The existing industrial built-environment is often misshapen and illegible and whilst it is difficult to organize (and navigate) the seemingly disorganized site, it is possible to resolve; through understanding historic boundaries and development patterns that can be utilized as organizational grids. In this case historic erf divisions and consolidations can be utilized as an organizational tool at a large scale and should serve as a guide to where future structures should be erected in order to maintain a legible built environment.*

*When designing future additions, understanding the historic expansion of these industrial buildings holds the key to a harmonious relationship between old and new. With minimal architectural intent these buildings supply little for the architect to grapple onto, but with material spans and structural repetition forming the underlying ordering principle; it is possible to create a logical and ordered extension of the past.*

## SAMEVATTING

*Die verhouding tussen industrie en die stad is beskadig en as gevolg word industriële stelselmatig verwyder van die stad. Die mengsel tussen inwoners, industrie en handel in Pretoria Wes (albeit geïsoleer van mekaar) gun egter die potensiaal tot 'n unieke verbandskap tussen industrie en die inwoners van Pretoria. Slegs deur die rol te erken wat die industriële speel ten opsigte van die stad se groter konteks, kan die karakter en kultuur van so 'n omgewing versterk en vasgevang word in 'n ontwikkelings plan. Erfenis dien as katalisator vir ontwikkeling van die karakter van plek wat in beurt verdere finansiële groei sal aanhits.*

*Die bestaande industriële bou-omgewing is misvorm en onvoorspelbaar. Alhoewel so 'n omgewing nie aan die individue toeleen om weg te vind of organiseer nie, is dit moontlik deur die ontginning van historiese grense en ontwikkelings patrone wat kan dien as organiseerings mates. Historiese erf indelings en konsolidasies kan gebruik word om te dien as 'n gids vir toekomstige toevoegings, om sodoende die nuwe argitektuur uit die bestaande te laat vloei. Die resultaat is 'n leesbare en geordende bou-omgewing.*

*Die ontwerp van die nuwe verbeelding steun op die morfologie van die bestaande omgewing om 'n harmoniese verhouding tussen oud en nuut te skep. Materiale se span afstande neem die rol van die onderliggende orde stelsels aan as gevolg van die gebrek aan aansienlike argitektoniese bedoelings in die bestaande omgewing. Sodoende is 'n leesbare en logiese uitbreiding van die verlede en na die toekoms moontlik in 'n omgewing wat ontstaan het sonder ontwerp vir ervaring van mense.*

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Submitted in Fulfilment as part of the requirements of the degree Master of Architecture (Professional) in the faculty of Engineering, Built Environment and Information Technology at the University of Pretoria

Pretoria, South Africa  
2017

Project Summary  
Adress

RCL Sugar and Milling Division  
Cnr President Burger & Carl Street  
Pretoria West,  
Pretoria.  
South Africa.  
S25 45 20.90. E28 10 04.50

Program: Industrial food production & Street Market

Client: RCL Foods Pty, Ltd.

Theoretical Premise: Cross-programming of Lost Urban Space

Study Field:  
Human Settlements and Urbanism

Key Words:  
Food Production, Food Refinement, Community, Cross-Programming, Industry, City, Pretoria West, West Capital, Urban Corridor, Formal, Informal.

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Fig. 0.1 Theme Image (Author, 2017)



# INTRODUCTION



Fig. 1.1 Industrial Food Production Theme (Author, 2017)

## INTRODUCTION

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## INTRODUCTION

Presently, there is a significant divide between existing food production industries and the everyday occupants of cities. Historically these industries were integrated within a city in the form of marketplaces and was a celebrated part of urban life. The divide seems to be widening drastically as production and refinement facilities are abandoning inner cities and re-establishing in satellite developments on the urban outskirts.

The relationship between Industrial zones and the city is further plagued by the legacy of apartheid planning as the segregation policies used industrial areas as buffer zones between neighbourhoods (Breed, cited in Burmeister, M 2012). Instead of continuously widening the divide, we should rather attempt to reintroduce existing industries into the city with the aim to reduce the urban footprint to a more sustainable form. (Rafeeq Jabareen, 2016)

The divide between the existing industrial realm and the public realm can rather be occupied by a community setting for production. Logically this correlation can be achieved by introducing commerce in which architecture can facilitate a reintroduction of industry into the city. This would significantly shorten the supply chain to the end consumer in a more sustainable model for food production.

The industrial infrastructure of the older industries can be utilized as the backbone for multiple individually-driven future industries to attach to as a communal network. As a result, these smaller industries can easily adapt once they become outdated instead of the entire production line being threatened once a product fails in the market.

## CONTEXT

In 1870 Pretoria West became one of the first expansions from the historical city centre and until the 1930's showed promise into developing steadily alongside the rest of the city. The development at that time took a drastic shift towards an industrial nature as large scale industries such as ISCOR (now Arcelor Mital) established further West on the outskirts of the city. The Railway lines to the South of the Pretoria West precinct then served as catalyst for industrial development along the Southern Border of the precinct. This industrial redevelopment has had profound implications on the livability of the area until the current day.

Whilst major densification and commercial development has taken place towards the East of Pretoria, the future vision for Pretoria West seems to be unclear. Whilst there is a clear drive towards the densification of the area due to its proximity to the CBD the area still seems to be far less desirable than areas such as Hatfield and Menlyn.

With the rapid improvements made in information technology, industry seems to be down scaling into smaller and varied operations than the massive industrial sites that were brought on by Henry Ford's production-line concept. Whilst these large scale industrial sites can define not only the skyline but also the character of an entire area, these industries are mostly disjointed from the city and form hard edges with no interface with users.



## PROBLEM STATEMENT

Many South African Industries are isolated from the city and are therefore quickly becoming out-dated.

The age of Information Technology has brought forth an industrial revolution that is restoring the function of production and fabrication to a community driven state that is driven by and accessible to the individual (Rifkin, J., 2012). A large scale industrial development in Pretoria West has however isolated itself from the city and eradicated the human interaction from its environment almost entirely.

The most concerning of which is the fragmentation of the food industry, that has been a visible and integral part of communities since ancient times in all forms of settlement. These industries took the form of markets and often encapsulated as the most used and celebrated public spaces within the settlements (Komarzyńska-Świeściak, E. 2010). During the height of the production line era, the social and cultural value of the activities related to food production and refinement were traded for scale of production, that would prove more profitable than the traditional models.

A blatant disregard for the social, cultural and urban impacts of these large-scale industries and the isolation of production has led to a damaged and segregated relationship between the city and its Industry. Over time this relationship has changed and it is possible to project a future relationship due to technological changes as industrial development and technological advancement are inherently linked.

## RESEARCH QUESTION:

Can Architecture serve as a tool to address the interface between the food processing industry and the city?

## DELIMITATIONS

Defining the Precinct Fig 1.4

The railway lines to the West and South serve as hard boundaries whilst the West Capital development to the East is projected to encourage development similar to the density of the current state of Sunnyside neighbourhoods. This is based on a similar travelling distance to and from the CBD. The northern Boundary is defined by the natural topography that contained the original expansion of Pretoria in an East-West Direction.

### Food Production Focus

Even though this proposal encompasses the entire realm of living, playing and working in the city, this project will be Specifically Focussing on Food Production and serves to catalyse further development (including the entire spectrum and variety of residential, commercial and industrial buildings) as a future vision. These aspects of a future vision will merely be outlined and not designed in order to focus in on the industrial aspects of the design.

### Agricultural Delimitation

Although agriculture forms a part of the overall supply chain, the existing industries only deal with the refinement of these food products. This then falls beyond the scope of the specific project although reference to agriculture is made these systems are not designed and rather a connection is implied through the railway system and Carl street transit system.



Fig. 1.2 Pretoria Figure Ground (Author, 2017)



Fig. 1.3 Development of Industrial Belt, Shown in Red (Author, 2017)



Fig. 1.4 Precinct (Urban Vision Group, 2017)



## ASSUMPTIONS

This project aims to re-imagine 21st century food production in a world class African city. The theoretical premise in which this project is based utilizes the freedom and creative licence that comes with the singular author hypothesising multiple role-player's interests that is unique to the theoretical scope in which Architectural dissertations reside.

It is thus assumed that within this theoretical environment, consensus has been met between the Tshwane municipality and major food industries in Pretoria West specifically the RCL Foods Pty Ltd company, to retain industry in the city.

The Industrial Complex under investigation is vast and although emphasis was placed on the overall operations, assumptions have been made in terms of certain internal functions and workings as could best be derived from the existing program and the architectural manifestation.

## RESEARCH METHODOLOGY

A methodical analysis is used that identifies an optimal opportunity to integrate industrial heritage sites into the urban fabric. The Process is broken up into 6 Stages:

1. Mapping data- physical mapping of the precinct
  - a) Data Set 1: Public Interfaces
  - b) Data Set 2: Urban Sustainability
2. Overlaying of data sets to identify the potential for different areas. Differentiating between high and low potential for positive interaction.
3. Identifying patterns, adjacencies networks, etc. in order to set up a framework for the Pretoria West



Fig.1.5 Urban Corridors (Author, 2017)



Fig. 1.6 West Capital Development (Author, 2017)



Fig. 1.7 Urban Usage (Author, 2017)



precinct. This gives the opportunity to theorize the greater implications of the scheme. A narrative is established that connects the specific site to the urban scale proposal.

4. From the narrative the specific site is identified as the most appropriate site to condense the argument into a single architectural manifestation. The physical mapping is repeated on a smaller scale.

5. A design solution is proposed that responds to the analysis, data, and theory.

6. The proposal is re-evaluated in terms of its urban sustainability and the design is re-iterated multiple times until the project intentions are satisfied and leads to the final design.

#### DATA SET 1: PUBLIC INTERFACES

During the initial mapping phase, the following data was gathered from the Pretoria West precinct, with a focus on possible interfaces between industry and the public

- Streetscapes as mediators between public and industry
- Urban Usage
- Existing functions of structures
- Morphology of the site and structures

#### DATA SET 2: URBAN SUSTAINABILITY

In order to quantify the degree of success of the proposed solution as an urban interface project, a rating scale was adopted, namely the Urban Sustainability Rating proposed by de Schiller and Evans (2006). The Rating tool addresses urban sustainability (see Appendix A for a detailed description of each category and its considerations).

The measured categories are:

- Permeability
- Vitality
- Variety
- Legibility
- Robustness

These categories apply not only to buildings but streets and entire areas as well. After a final design had been proposed these categories were once again analysed and the results compared to the original rating. This showed the impact on the surrounding area and the improvement that the intervention made. The ratings were plotted on a graph showing existing ratings in Fig 1.8

### THEORETICAL APPROACH

A reflection on the development of food processing industries initiates the theoretical narrative. The shortcomings and contributions of various industrial models are highlighted and a future for industries is projected in light of the current industrial revolution. The narrative is established as a scope and aim for architectural theory.

Theories are selected that address the projected issues that industries will face in future and these are supported by case studies. The Cross-programming theory (Ebert, 2008) addresses the isolation of industrial processes and places the project within the Post-Modern movement in the continuum of architecture.

By addressing the urban disjunction between industry and the city, the entire theoretical approach is scrutinized under the Urban Sustainability Theory that outlines and the research methodology.

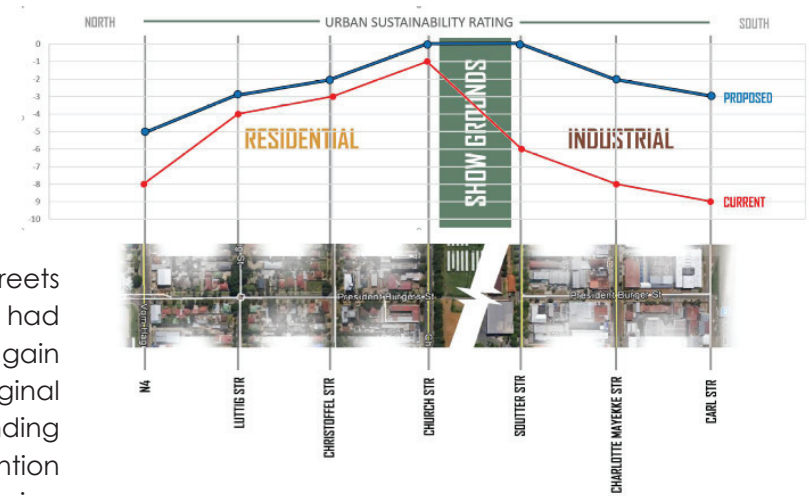


Fig. 1.8 Urban Analysis Graph (Author, 2017)

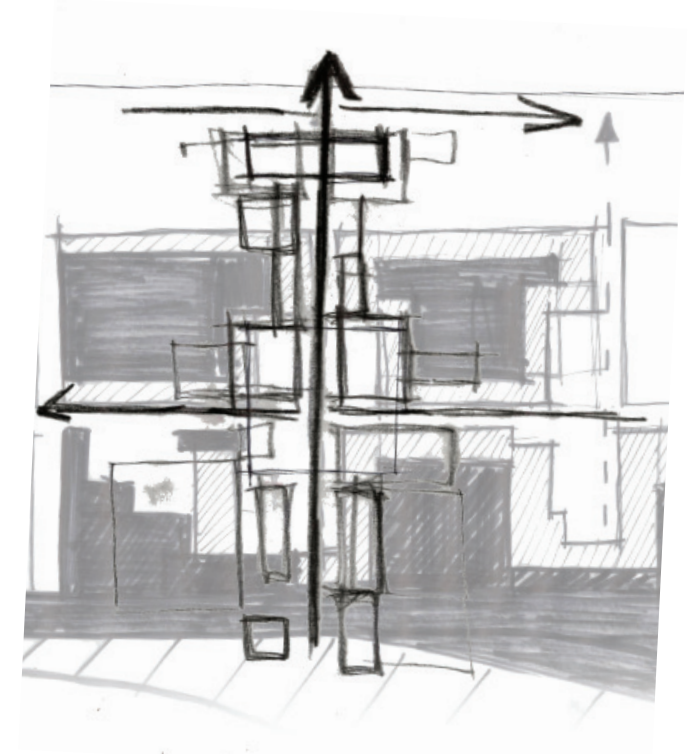


Fig. 1.9 Urban morphology sketch (Author, 2017)



## PROJECT INTENTIONS:

The relationship between industry and the city requires a physical intervention that addresses the future of industry, apartheid buffer zones and informal food processing industries' place within a larger context of Pretoria.



Fig. 1.10 Pretoria Rapid Transit Systems (Author, 2017)



Fig. 1.11 Pretoria West Urban Heat Island effect (Author, 2017)



Fig. 1.12 Pretoria Income Intensity (Author, 2017)



Fig. 1.13 Pretoria Urban Heat Island Effect (Author, 2017)

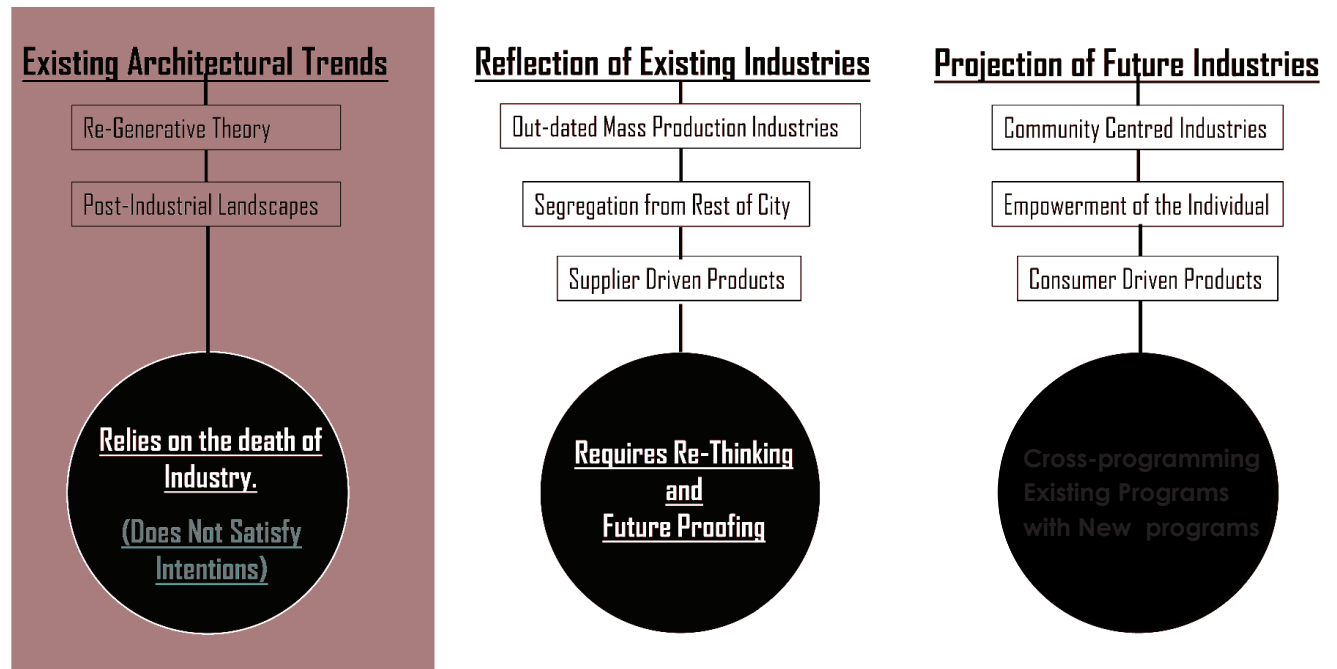


Fig. 1.14 Theoretical Considerations (Author, 2017)

# -----[ II ]----- INDUSTRIAL ADVANCEMENT



## **INDUSTRIAL ADVANCEMENT**

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Fig. 2.1 Site Infrastructure Collage (Author, 2017)

## REFLECTION ON INDUSTRIAL DEVELOPMENT: THE CULTURAL ORIGINS OF FOOD PROCESSING

Initially food production and processing originated around a community setting that formed an integral part of any society. Food processing in particular formed an integral part of the rituals of everyday life, in so far as everyone took part in the process of supply, refinement and consumption of food. These practices inherently embraced the culture of the urban settlement supporting it and shared not only its products but also its craft with the community. Ancient Ghana, Mali and Carthage holds examples of the cultural richness of early African settlements. (Davidson, 2013) The Southern African settlement of the Shona people in Mapungubwe, Great Zimbabwe shows how craft spanned between art and food culture. Artefacts clearly display how art traversed the culture surrounding food as depicted in the Ancient Shona pots in figure 2.2 (Tiley-Nel, 2014).

This symbiotic relationship between the above-mentioned crafts continued through the introduction of maize into the Shona culture. A new addition to the staple diet of the people, locally known as Sadza lead to the development of a new technique which is used to depict scenes of everyday life and continues the cultural bridge between food and art.

This productive condition was heavily centred on a community setting and proved to be a viable model for processing food throughout human existence prior to the industrial revolution. European settlement in Southern Africa however aimed to establish new trade posts. Firstly, for the Portuguese, then later for the Dutch-India Company (Wilson, 1969) and these colonial trade routes brought with it new materials

and products and amplified the existing economy centred around trade. Due to Southern Africa's unique abundance of natural and human resources, mining interests later increased and saw a rapid growth in population (Wilson, M. 1969). Food production hence shifted from a collection of individuals towards a labour relation that had to address food security on national scale.

Global technological advancements brought about new farming techniques and a new way of refining food through the mechanization of the First Industrial Revolution c.1817 and 1861. (Trew, A. (2014). Later with the enhancement of technological discoveries Industry, as a whole, became increasingly mechanized and quickly traded the art of hand crafting for mass production. These new production methods held great financial gains as the production lines became refined towards profit and thus quickly became monopolized, leaving the individual largely unable to compete against the industrial tycoons.

The individual had lost the ability to compete and much of the culture surrounding food preparation as integrated spaces in the city, had been lost to the monotonous machines.

## MECHANICAL DEVELOPMENT OF FOOD PROCESSING

Production and manufacturing outcomes increased substantially as a result of mechanization during the late 18th century and became known as the industrial revolution first Industrial Revolution after the invention of the . In 1913 during what became known as the second Industrial revolution (1870-1914) Henry Ford adapted the concept of mechanized industry into Assembly lines (Mokyr, 1998). This new process



Fig. 2.2 Patterns on Mapungubwe Artefacts (Tiley-Nel, 2014)



Fig. 2.3 Ramses iii bakery depiction (ANWAR, N. 2017)



Fig. 2.4 Ancient African Community (DEXTER COLOR INC. 1946-1960)



was first employed in automotive manufacturing but could be adapted to suite many different products including the food. This process separated production into separate consecutive stages with raw ingredients (materials) entering at one end and a product leaving at the other.

The process was dominated by large repetitive processes and thus a long, drawn-out structure that served only as a shell to accompany the processes within, manifested itself within cities without concern for the urban fabric and social implications. This architectural manifestation of the production line (Weber, 2013) was purely process driven and became large warehouse type structures that spanned over the moving production line. Production companies including food processing industries adopted this model and shifted refinement from a single small business between the farm and the market towards a large-scale process between multiple farms and multiple markets.

The second industrial revolution was further contributed to by the refinement and streamlining of the production line into a vision for scientific management of production and supply chains by Fredrick Taylor (Merkle, 1980: 7 - 15). Numerous production lines could be linked through scientific management. Where assembly lines prepared ingredients into products, supply chains increased the scope to dominate the entirety of supply, production, refinement and sale. Various industries were physically linked as the output of one would become the input of another. Cities saw large complexes of industries establish with infrastructure connecting complexes to national and international suppliers of raw materials. Whilst the economy benefits from vastly increased

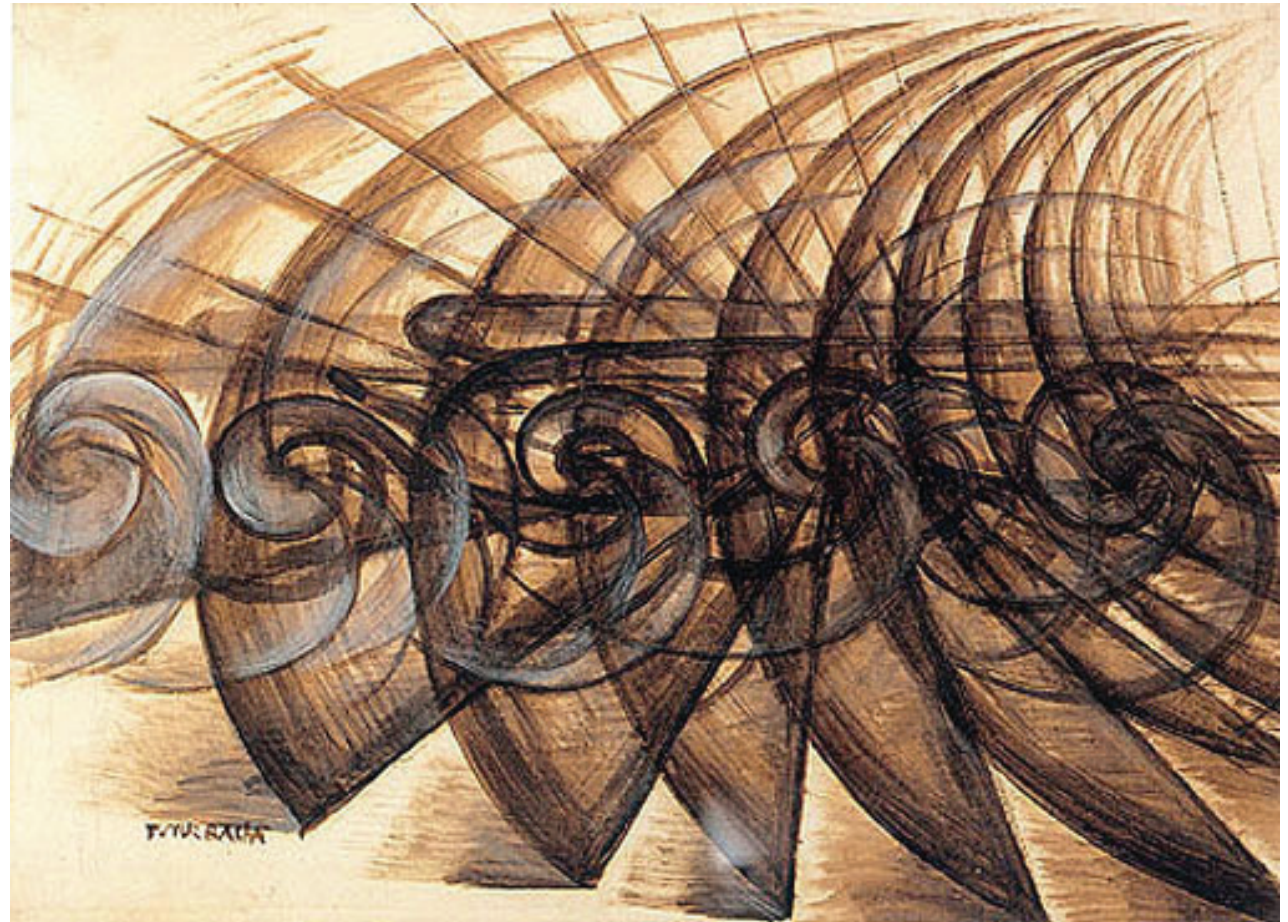


Fig. 2.5 Speed of a motorcycle (Giacomo Balla, 1913)

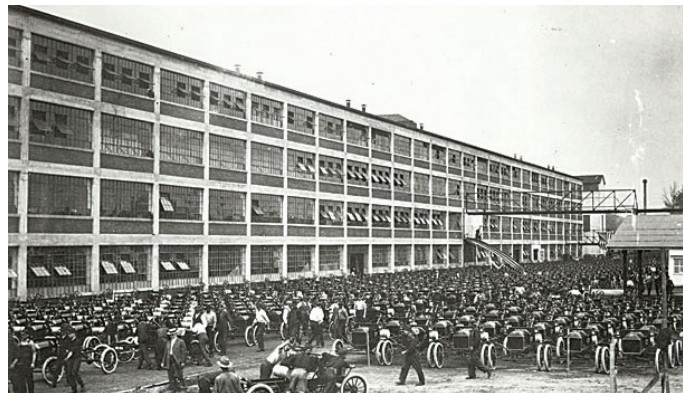


Fig. 2.6 Ford motor company factory. Weber, A. (2013)



Fig. 2.7 Ford's moving Production line. Weber, A. (2013)



GDP (Gross Domestic Product) the large mono-functional complexes left the individual unable to compete with complete end-to-end production.

*“From a purely economic point of view, it could be argued that the most important invention was not another chemical dye, a better engine, or even electricity, since, with the exception of steel, most of the inventions described had serviceable albeit less efficient and more expensive substitutes, if not as efficient or as cheap. There is one innovation, however, for which “social savings” calculations from the vantage point of the twentieth century are certain to yield large gains. The so-called American System of manufacturing assembled complex products from mass-produced individual components. Modern manufacturing would be unthinkable without interchangeable parts.”*

- (Mokyr,1998: 8)

### INDUSTRIAL FUTURE (THE THIRD REVOLUTION)

Recently a third industrial revolution has taken place in the form of information technology, extending the ability of production to individuals through new methods such as 3D printing and CNC machining (Rifkin, J., 2012). Most valuable of this latest revolution is the connective platform supplied by the wide use of the internet. This has not only led to the availability of specialist equipment and machinery in the food industry but also to a database of shared knowledge, methods and recipes. This is leading to extremely flexible production methods with large varieties of possible products for home industries.

The Third industrial revolution is often discussed surrounding personal manufacturing and distributed manufacturing (Leitão Paulo, 2009) that uses information technology as a new industrial infrastructure for manufacturing. This decentralized

model competes against the second industrial revolution’s concepts of an isolated production line.

.These newer and smaller individual-driven industries hold financial opportunities and it also brings with it the opportunity form groups of individuals to form a distributed manufacturing networks that can compete against the existing industries. (Srai, 2016) By returning to a human driven process the producer or manufacturer is required to engage with the product and the issues that arise throughout the process as a unique process and product.

Existing industries, through their connections to the rest of the supply chain and the sheer scale of operations, result in fixed systems that are rigid and resistant to change.

This process produces a single product as quickly and as my times as possible to achieve economy, but leaves the entire operation at risk of becoming absolute should that specific product fail in the market place. The scale of operation has led in the past to an uncompetitive advantage and the inability for newcomers to truly question the status-quo and inspire change – leaving visions such as urban agriculture, individual food production to search for alternative structures instead of latching onto the existing models.

Existing production focuses on supplying on a national scale and operations are usually isolated on the outskirts of the city and far away from consumers with large transportation networks in between.

Individuals, on the other hand, can create new products each time the production process commences, leaving flexible outcomes tailored to

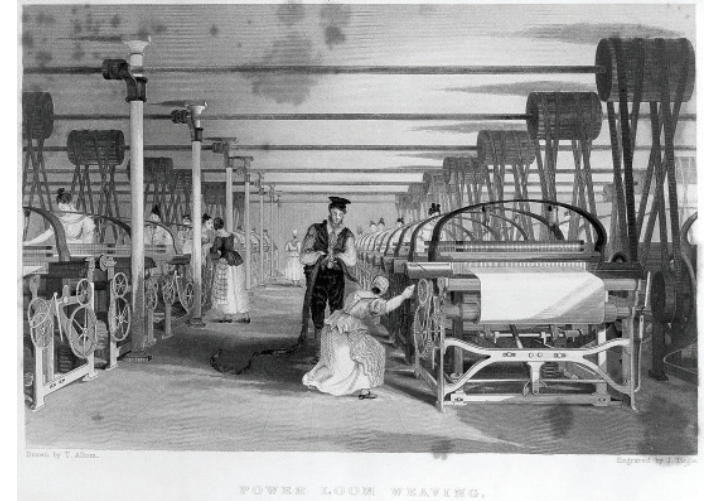


Fig 2.8 Power loom weaving (ANON. 2017)

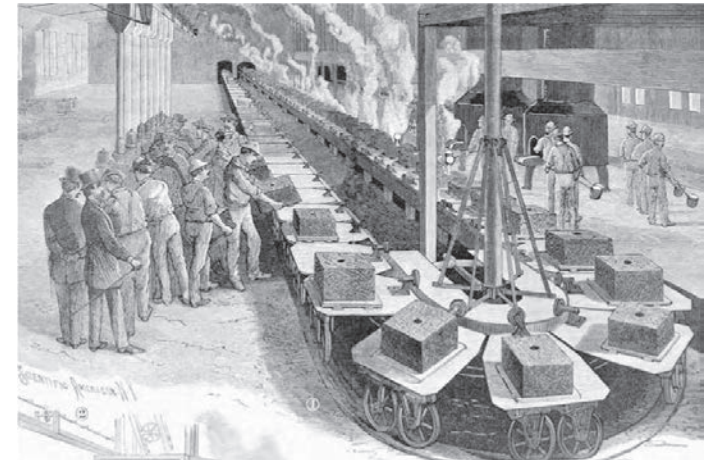


Fig 2.9 Mechanical Industry (Muhutdinova, 2015)

each consumer's specific dietary requirements. Smaller scale, individually driven industries, however have the ability to establish in close proximity to clients and relocate should the need arise.

These benefits that the individual now holds over large scale monotonous industries are negligible when comparing the number of products produced, but as the third industrial revolution brought connectivity through the introduction of the internet individuals now find themselves able to connect to a wider client base and form networks large enough to compete. As large industrial complexes are slowly becoming abandoned and as the rigid systems are unable to adapt and incorporate newer technologies, individual production holds the potential for change.

### PLANNING FOR THE FUTURE

Previous industrial revolutions have required vast infrastructural developments to support the relevant technologies and concepts that allow production operations to function. As the third industrial revolution gathers momentum it too brings changes in infrastructure and sees the abandonment of existing complexes as these industries are abandoned or relocated in rapidly changing times. While newer industrial extensions flourish, the historic industrial areas are becoming abandoned. These buildings were designed to accompany machines and as production halts, it becomes difficult to repurpose them for human habitation. Where core functions that supply a network of other industries with raw materials are removed the entire network is at risk, including the infrastructure surrounding it. Currently the vast majority of architectural theories surrounding Industrial heritage, such as Post-Industrial Landscapes (TICCIH, 2012: 208) focus on post production scenarios, while

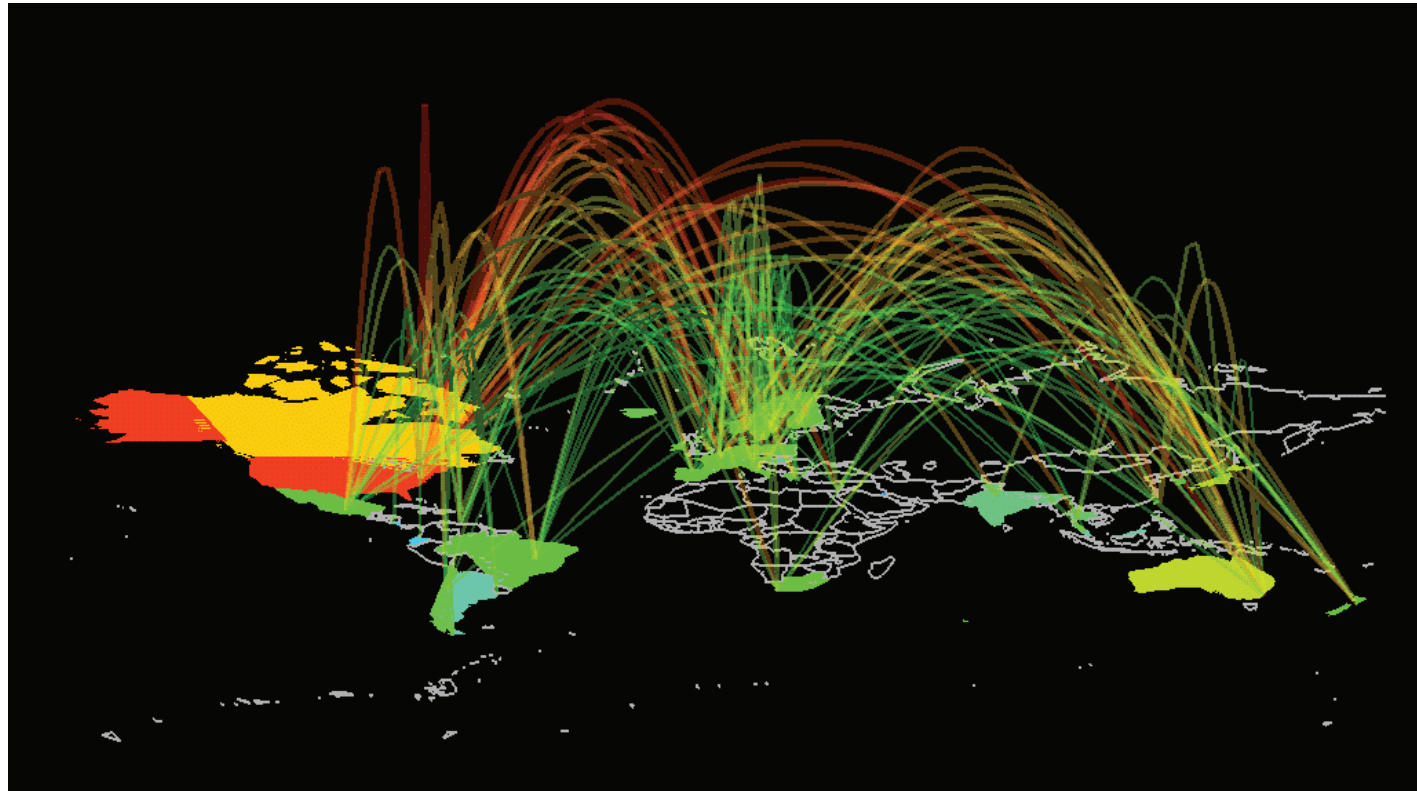


Fig 2.10 Global Internet traffic (Arabiya, 2016)

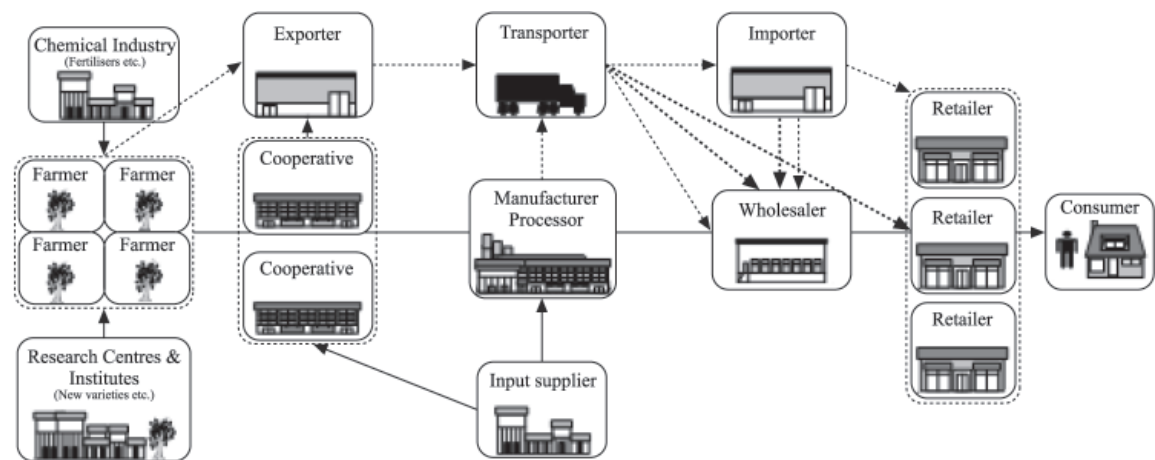


Fig 2.11. A conceptual framework for supply chain collaboration (Matopoulos, 2007)



allowing these industries to die before attempting to address the connection between industry and city.

The question therefore arises should we allow these core industrial complexes to die?

The cost of the supporting infrastructure should be acknowledged that would as a result also become negated when these industries ceases to produce. This includes massive railways, roads, freight lines and well-established trade networks that needs to be re-established once these industries move and change. The Silverton industrial area is an example of industrial relocation whilst many of the industries in Pretoria West lies abandoned.

In contrast to the value in infrastructure, is the difficulty to repurpose these rigid production driven buildings that were not designed with the human condition in mind. It can therefore be concluded that these original functions should not be completely be removed but that it should rather be adapted to project these industries towards future production models.

### **A THEORY FOR THE FUTURE: ECO-INDUSTRIAL PARKS**

A contemporary approach to industrial development includes the theory pertaining to Eco-Industrial Parks. (Hein, 2015) The shift in thinking is driven not only by a more environmentally friendly approach, but also of economic opportunity, shortening the supply chain and ultimately causing a more eco-systemic and holistic world view.

Industry should be integrated into the city as well as other natural systems. The connection between industry and community becomes an integral part

in the regulating and management of produce and waste. (Anja-Katrin Fleig 2000: )The adaptation of community-based planning within the industrial development sector in order to build relationships and interdependencies is fundamental to this model. This aligns directly with the historical reflection and projection of industry mentioned throughout this chapter. The return towards a community centred industrial platform could reunite the city with industry.

The most relevant shortcomings of the Eco-Industrial Parks Theory is the co-operation model for industries which could hinder technological advancements. This issue is a result of the implementation of a rigid system within the network of companies that creates a steady flow of materials with predetermined methods to dispose of waste. Opposed to the Tsukiji Market in Japan, this creates an integrated yet noncompetitive relationship between companies and results in a stagnation of technological advancement.

### **AN IDEA FOR THE FUTURE: MANUFACTURING MAKERSPACES : A POSSIBILITY FOR FOOD INDUSTRIES?**

A makerspace is defined as a communal environment with shared resources where individuals can participate and engage in the production process. These spaces are often used to educate newcomers in a specific manufacturing trade where they can learn to make things in a hands-on approach. (van Holm, 2017) Fig 2.12 & 2.13 highlights the contrast between the interactions and craft of makerspace and the current food production lines. Larger manufacturing businesses often offer makerspaces as an extension of their training and education system, this allows the aspiring artisans direct experience and access to its established infrastructure and tools, whilst reducing

the burden of remunerative training on the host.

These aspiring artisans often establish small enterprises that would not have been possible without the shared equipment and space that is offered by makerspaces. They are not required to accept or be offered employment but after a given training period they their places are taken up by new trainees. To the trainee this model allows for sufficient training and a start-up potential for a small business, but for the host it offers an opportunity to scrutinize how a trainee operates in a productive environment before employment and training without remuneration.

Whilst small-scale manufacturing industries are latching onto existing infrastructures in the form of makerspaces in the latest industrial revolution, the future for the most accessible informal industry is not yet defined. The food industry offers economic empowerment to millions of South Africans ranging from street merchants to home industries but often lack the supporting network that could shift food processing from financially supporting a household to a thriving formalized business. A parallel can be drawn between the manufacturing industry and the food industry.

Initially formal large-scale assembly line industries completely overshadowed hand-crafted manufacturing, however during the third industrial revolution the individual became increasingly empowered through the information technology.

The individual however still lacked the physical connection to the supply chain. The industries that once threatened the individual soon held the key to thriving individual manufacturing, housing a multitude

of individual crafters in a communal space or makerspace encouraging collaboration, community and the trading of skills - all of which are principles outlined by the eco-industrial park theory. (Hein, A.M., Jankovic, M., Farel, R. and Yannou, B., 2015)

Is it possible that the large-scale food industries could host the informal food sector that it once threatened?

If possible, this could cease the abandonment of these large industries as evident in the abandoning of inner city silos and milling operations across the globe. Additionally, small food processing entrepreneurs can connect to established networks and grow their businesses.

### PRECEDENT: DISTRIBUTED FOOD PRODUCTION THE TSUKIJI FISH MARKET, JAPAN

The Tsukiji Market in Japan offers a food processing example for a similar symbiotic relationship that exists between host and guest industries in makerspaces. The market is interwoven into the city, provides an integral function to the city and requires the participation of its inhabitants in order to function.

*"As the distributional centre for the domestic and international fishing industries that feed Japan as an entire nation the market provides an interface between multinationals suppliers and producers, the small-scale shopkeepers that still hold a large stake in Tokyo's food retail, and members of the public. For this reason, Tsukiji as it is now appears doubly paradoxical in the context of contemporary urban economic logics: it is both distributional warehouse and farmer's market exactly where we would not expect to find them: in the centre of the city."* (Colverd and McLean, 2013)



Fig 2.12 Manual Tinkering Makerspaces (Design Engine, 2015)



Fig 2.13 Mechanized Food Production (Flowers Foods, 2017)



Although the market was established around large scale existing rail and fishing infrastructure, it relies largely on cart based deliveries. The functional unity between the regulated inner market and unregulated outer market shows the possibility of collaboration that is allowed by government policy in embracing the informal sector. While each merchant constructs their own facilities within the infrastructural frame, the visual chaos is regulated by means of a grid of columns that defines a modular set of stalls.

The outer market embraces a mixed residential community and market as workplaces. This enriched the relation between families and individual shopkeepers that they supplied. The Tsukiji market offers a unique mixed-use development and an integrated model for city and industry in the 20th and 21st century. It expresses the relationship between the formal(host) and informal(feeder) industries at varying scales.

“These implied boundaries are studied and agreed upon between adjacent stallholders and encourages comradery. In pursuit of fairness stall locations are reassigned every 4 years by means of a lottery, as proximity to anchor points such as auction houses grants an essential spatial advantage. This contradiction between formal and informal maintains a mutually beneficial relationship through both respective permanent and temporal existences.”(Colverd and McLean, 2013)

“Tsukiji plays host to a spatial consolidation of the multiple stages of exchange in urban food supply: stages that are elsewhere growing increasingly

separate, disparate, and invisible. Tsukiji's connection to trade at all levels and its openness to the public still play a crucial role in its urban identity as both guardian and heir to a conception of pre-industrial mercantile Tokyo.” (Colverd and McLean, 2013)

### SOUTH AFRICAN INDUSTRIAL CONDITION

South Africa has a unique relationship with industry, especially considering its historic labour relations and spatial planning policies during the apartheid period. The discovery of natural resources in the country saw a rapid growth in population and saw the development of industries surrounding mining and refinement of coal, diamonds, gold and various other natural elements establish. (Wilson, 1969)

Businesses and other industries further down the refinement process moved in and workers settled close by with all the amenities of a city accompanying them. Infrastructure linked cities and their industries to where raw materials were required. Railway lines serviced many of these industries and assisted in transporting raw materials such as coal to supply power stations and maize to be milled into flour. The established rail infrastructure and growing workforce also allowed for new industries to attach to it and saw the forming of industrial areas.

During Apartheid times, South Africa applied spatial planning tactics to segregate the white population from the non-white population. This was achieved by relocating the non-white population to the outskirts of the city and by controlling their transport into and out of the city. The segregation was largely assisted by using industrial areas and its infrastructure to further strengthen the barrier between neighbourhoods.



Fig. 2.14 Interior Tsukiji Market (Chris, 2017)



Fig. 2.15 Tsukiji Fish Market (Chris, 2017)

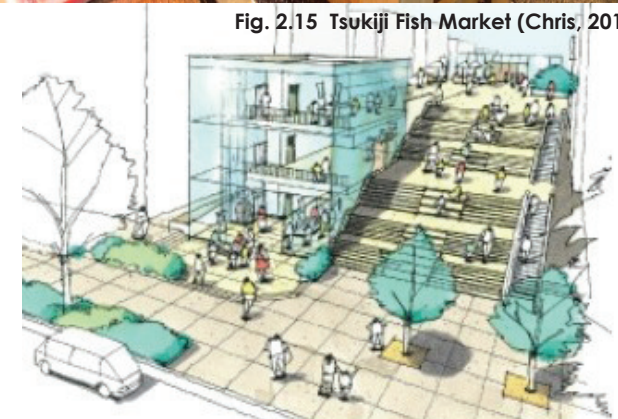


Fig. 2.16 Tsukiji Redevelopment Plan (Johnny, 2015)

Figure 2.20 (*Giraut, F. 2009*) The effects of this planning scheme ultimately lead to a strained labour relationship and later social unrest within the country.

After the abolishment of apartheid in 1994, many of these industrial zones are underdeveloped and remain as undissolved barriers between segregated communities. The third industrial revolution is causing industries to relocate and abandon these zones, with large portions of valuable infrastructure deteriorating and large portions of the city wilting away, thereby severing the connection between communities even further. When relocating, the overall footprint of our cities increases and the urban as well as environmental sustainability decreases as more transport, building materials, energy and space is required. This relocation results in a city that is further detached and allows industry and the city to function as separate entities without dissolving the apartheid city.

Whilst formalised industries seek greener pastures, the informal sector has since been embraced and many previously disadvantaged entrepreneurs are establishing informal food processing businesses instead of seeking direct employment. (*Christie, 2017*) South Africa boasts a cherished street culture surrounding these informal street traders and in many instances the streetscape is a celebrated public space. The empowerment of the individual is present in legislation that seeks to promote economic growth and can potentially be amplified through the latest industrial revolution as industries of the future will rely more on networks of individual based operations.

These flexible yet competitive industries can once again embrace the culture of a society as home



Fig. 2.17 Tsukiji Urban Context (Colverd, 2014)

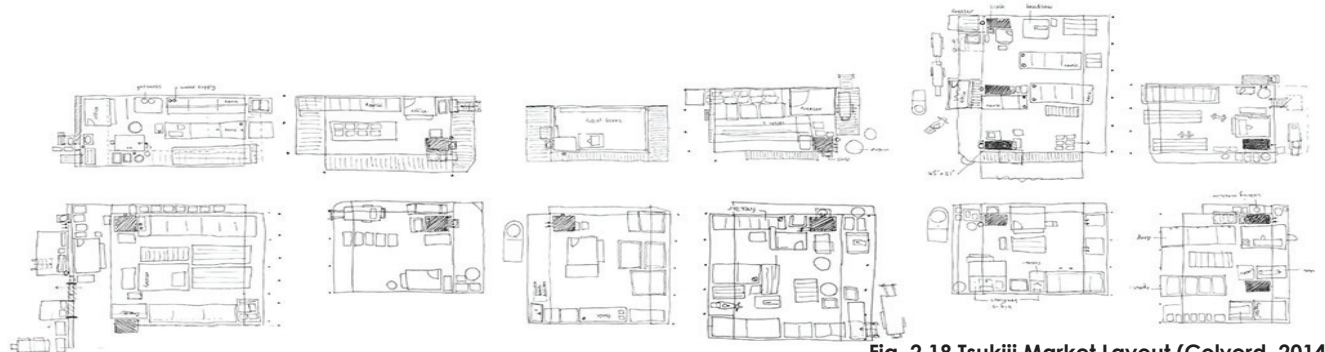


Fig. 2.18 Tsukiji Market Layout (Colverd, 2014)

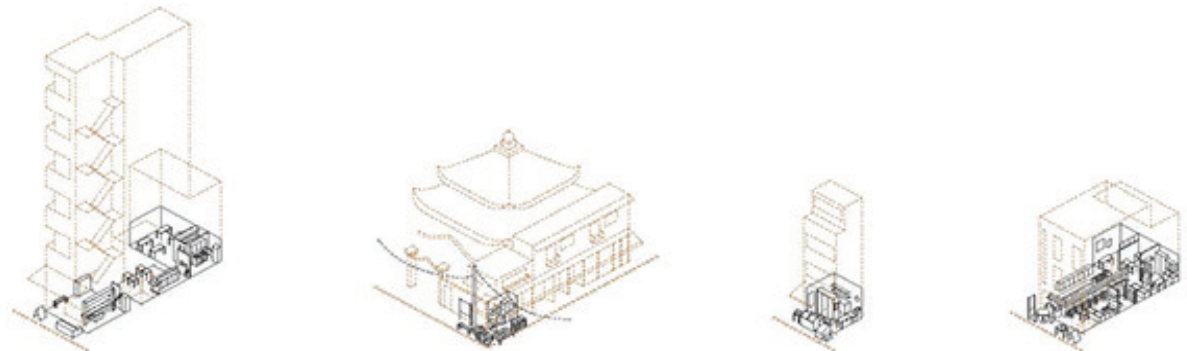


Fig. 2.19 Tsukiji Ground Floor Activation (Colverd, 2014)



industries catering to individual needs. Without the supporting network that surrounds larger operations, the informal entrepreneurs still rely on the formal trade sector for the supply of raw materials and in some instances as marketplace to sell their products.

**PRECEDENT STUDY  
WARWICK JUNCTION: INFORMAL MARKET**

The post-apartheid stance embraces informal trade as a vibrant and celebrated enterprise that promotes culture and economic growth. Warwick junction is a manifestation of this embrasive stance. After it was established by Indian traders an influx of African traders began trading on the sidewalks. A distinct culture and character developed around the market, but the traders were violently harassed by police (Skinner, C. 2008: 233).

The existing market occupies an abandoned highway overpass and connects various markets between transport nodes in a linear progression. The transport infrastructure that spans the market dominates the environment but in the lower market, also offers traders escape from the elements Fig. 2.24. Between these nodes entrepreneurs process meat, grain, fresh produce and various other products that are bought in bulk from surrounding food industries before being processed and distributed by various traders.

Today the street culture is celebrated and used to attract tourists and customers but ultimately designers were tasked with addressing safety and enhancing the livelihoods of traders (Snow 2012).

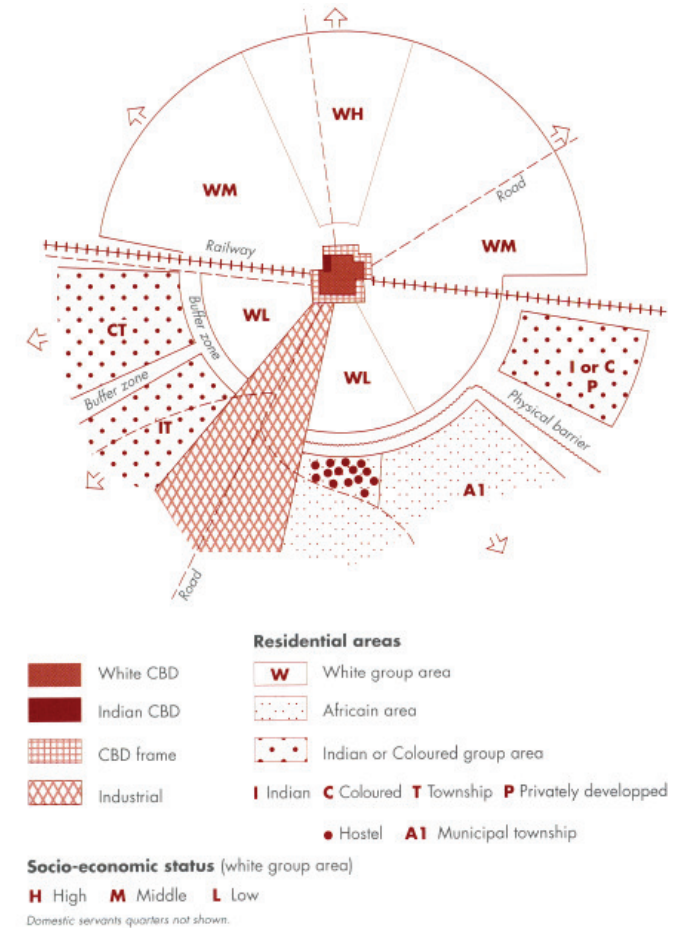
Emphasis was placed on connectivity instead of control and isolation and while circulation routes were clearly defined, the programming of spaces

were largely left to be filled by the traders themselves. This alternative to achieve safety and security through community participation resulted in spaces that were recognized and controlled by the community that used them and not by external policing. The priorities in design was shifted from the needs to police and govern, to rather satisfying the needs of the traders, who as a result found unique solutions to problems and turned that into businesses. For instance, small informal food processes were linked by transportation via wheelbarrow and became a flourishing business. Open air food markets and traditional medicine are amongst the largest commodities sold in the markets and unique products are produced through informality, that contributes to the character and culture that is connected to Warwick Junction.

**THEORETICAL CONCLUSIONS**

Just as those preceding it the third industrial revolution will force large industries to adapt and change. It is necessary however that established core industries not relocate and leave surrounding networks to wilt, but rather to seek alternative methods to adjust for change. Through the precedent study of Warwick Junction and Tsujiki Market, I conclude that theories pertaining to the coexistence of multiple formal and informal industries can be successfully applied to existing food processing industries. A mutually beneficial relationship would allow for core industries to adapt for future changes whilst smaller industries can form competitive networks that connect to established infrastructure.

A host and guest relationship could potentially address the tear between city and current food processing industries and could assist in dissolving the industrial buffer zones of apartheid city planning.



**Fig. 2.20 Racial Divide through Apartheid Planning (Giraut, Frederic 2009)**



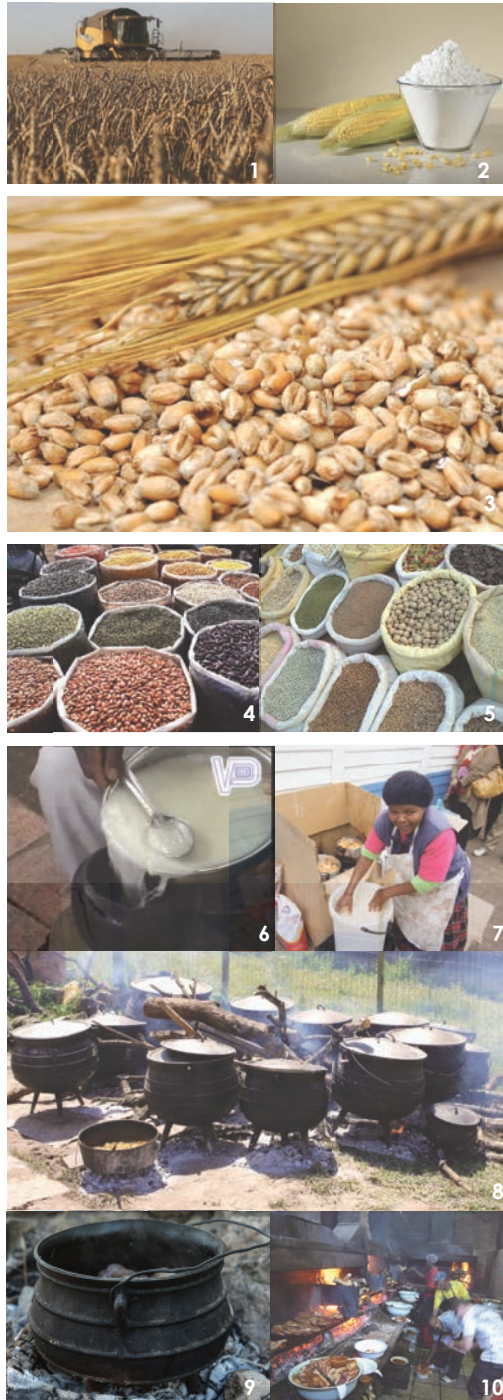


Fig. 2.21 Informal Food Collage (Collated by Author)



Fig.2.22 Urban infill in lower market (Snow 2012)



Fig.2.23 Road infrastructure as informal market (Battista 2017)



Fig.2.24 Urban infill in lower market (Battista 2017)



# -----[ III ]----- P R E T O R I A W E S T



## **PRETORIA WEST**

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3.3 Urban Sustainability Mapping	page 28
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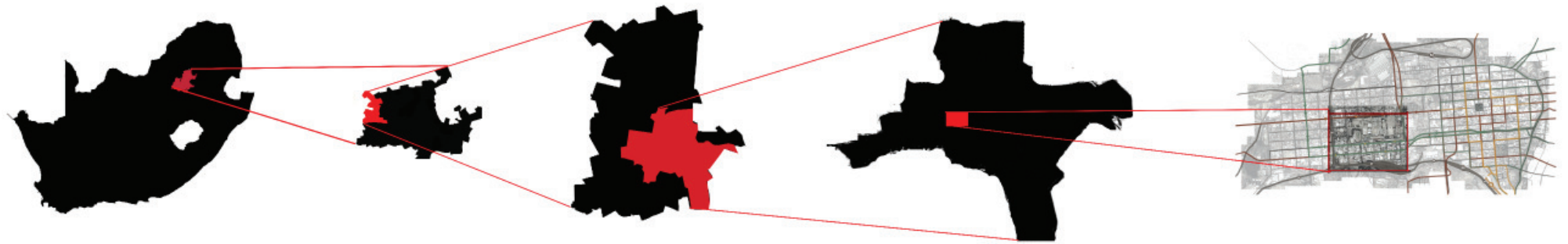


Fig. 3.1 Precinct Location Within South Africa (Urban Vision Group)



Fig. 3.2 Precinct location within Pretoria (Urban Vision Group)

## PRETORIA WEST IN A SOUTH AFRICAN CONTEXT

The abundance of natural resources such as iron ore and coal shaped the way that energy is generated and attracted large refinement industries to establish within South Africa. Coal power stations were erected on the outskirts of cities and railway infrastructure connected mines to the power stations to supply them with coal. These infrastructural systems allowed for private industries to connections and industrial development. The development of Pretoria is marked with the settlement of a mayor stakeholder establish onto the existing infrastructure, namely Iscor (currently Mital steel Pty. Ltd)

Various industries established on the Western outskirt of Pretoria in systematically an industrial belt formed along the railway lines. The creep of industry imposed itself onto existing residences who were unfortunate enough to see industries such as the Ruto Mill silos be erected next door. To this day some original dwellings are present on the industrial complex as it slowly grew beyond the erf boundaries.

Figures 3.3 and 3.4 Show areal photographs of the mital complex and powerstation. The initial development of the Proclamation Hill Suburb is evident as an extension to the workforce that accompanied these industries. The railway infrastructure later saw the development of industries to spreading to the East.

## WEST CAPITAL DEVELOPMENT

Up to date no significant development has taken place within the precinct since the previously mentioned influx of industries to the area. As the eastern suburbs of Pretoria West saw rapid development spawning from the CBD, the residential fabric of Pretoria

West remained largely underdeveloped. Formal commerce and informal trade did established along main arteries. but seldom past the original single dwelling density. Pretoria West's dormancy period will soon be disrupted as the Tshwane 2055 Vision proposes the redevelopment of West Capital (Western outskirts of the CBD) and inhabitants should see Pretoria West reach a similar density as current day Sunnyside, due to similar distances from the City Centre. Refer to Figures 3.6 and 3.7

By redeveloping the precinct the industrial presence needs to be addressed as the existing informal trade. Pretoria West exists as a typical historic buffer zone (Giraut, F. 2009) that still segregates Atteridgeville from the CBD. The social impacts of the apartheid regime is particularly visible in the Marabastad Markets to the North of the precinct, where informal traders were forcefully removed during police raids.

Pretoria West offers a unique opportunity due to the current mix of residential, commercial and industrial uses. Relevant to the research question; Can architecture serve as a tool to reintegrate industry into the city? Is the proximity of this industrial belt that will no longer find itself at the outskirts of the city, but rather at the heart of it.

## URBAN ISSUE

The industrial morphology of Pretoria stems from the establishment of the industrial infrastructure from the Power Station, mining activity, cement factory and other large scale industrial operations that were allowed to be erected to the far West of the original zoning for Pretoria's suburbs. Most notably, in terms of infrastructure, is the presence of Iscor that saw the extension of the railway system to

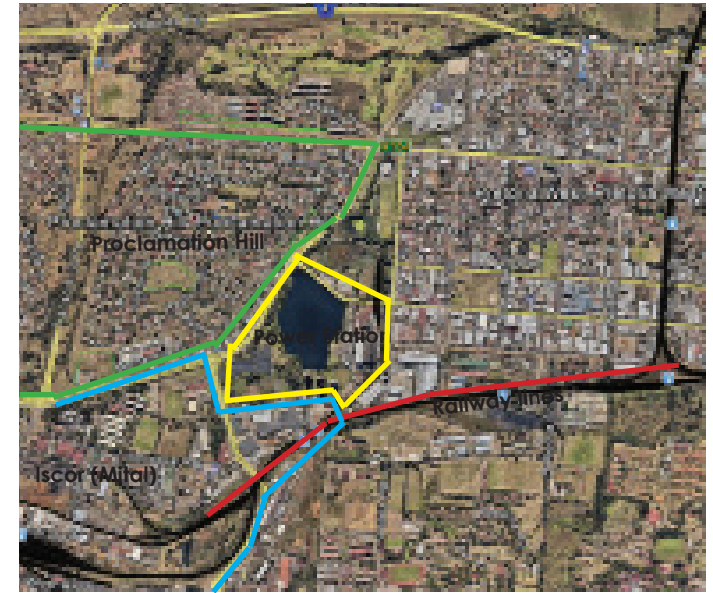


Fig. 3.3 Current day Pretoria West Aerial Photo (Google Earth, 2017)

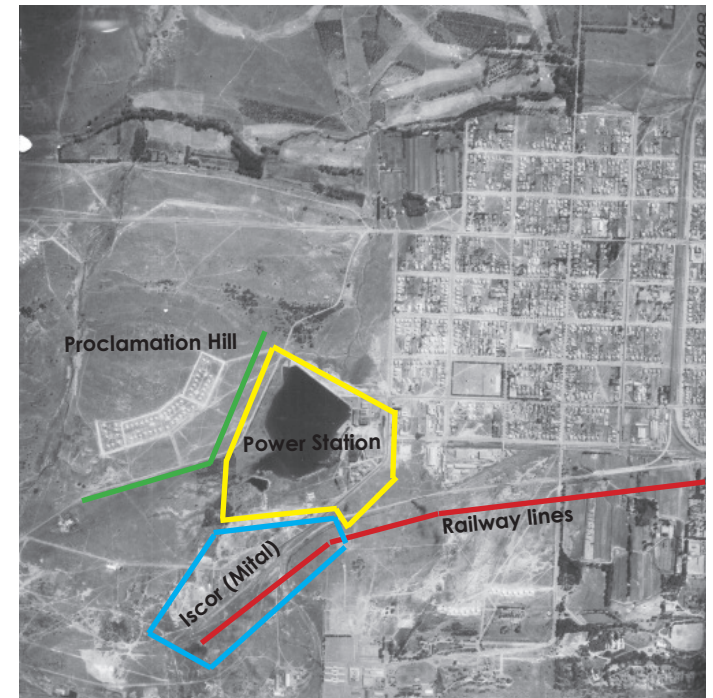


Fig. 3.4 Pretoria West Historic Industrial Development Photo, (Tshwane GIS, c. 1955)



accommodate its needs. This infrastructure led to the further establishment of industries in Pretoria West and ultimately the sprawl of the food industries along the railway lines, a few blocks South of the Pretoria Showgrounds.

Industrial areas, railway lines and highways were often utilized as buffer zones between white and black neighbourhoods in the apartheid city (Giraut, Frederic 2009). In this case the industrial area in Pretoria West formed a barrier between the CBD and Atteridgeville, leaving the Western part of Pretoria underdeveloped. This tactic by the apartheid government initiated a segregative relationship between industry and city rather than a relationship that is supportive to each other.

The imposition of industry over the then existing residential fabric put a further strangle hold on development in the area as large barricaded industrial complexes formed. The new industries eradicated the residential gardens along with most of the landscape. The informalities of everyday life was lost as these overly engineered environments became solely focussed on a Fordian\* production line. (\*Modelled on the industrial process utilized by Henry Ford) Any and all aspects that do not directly contribute to this purpose were thus eradicated from the site.

## URBAN ANALYSIS URBAN SUSTAINABILITY METHOD

Given the implied scale and urban integration required to fulfil the project intentions, it is necessary to measure the impact on the urban fabric. As described in Chapter I : Research Methodology Evans and Schiller serves as a design tool to measure

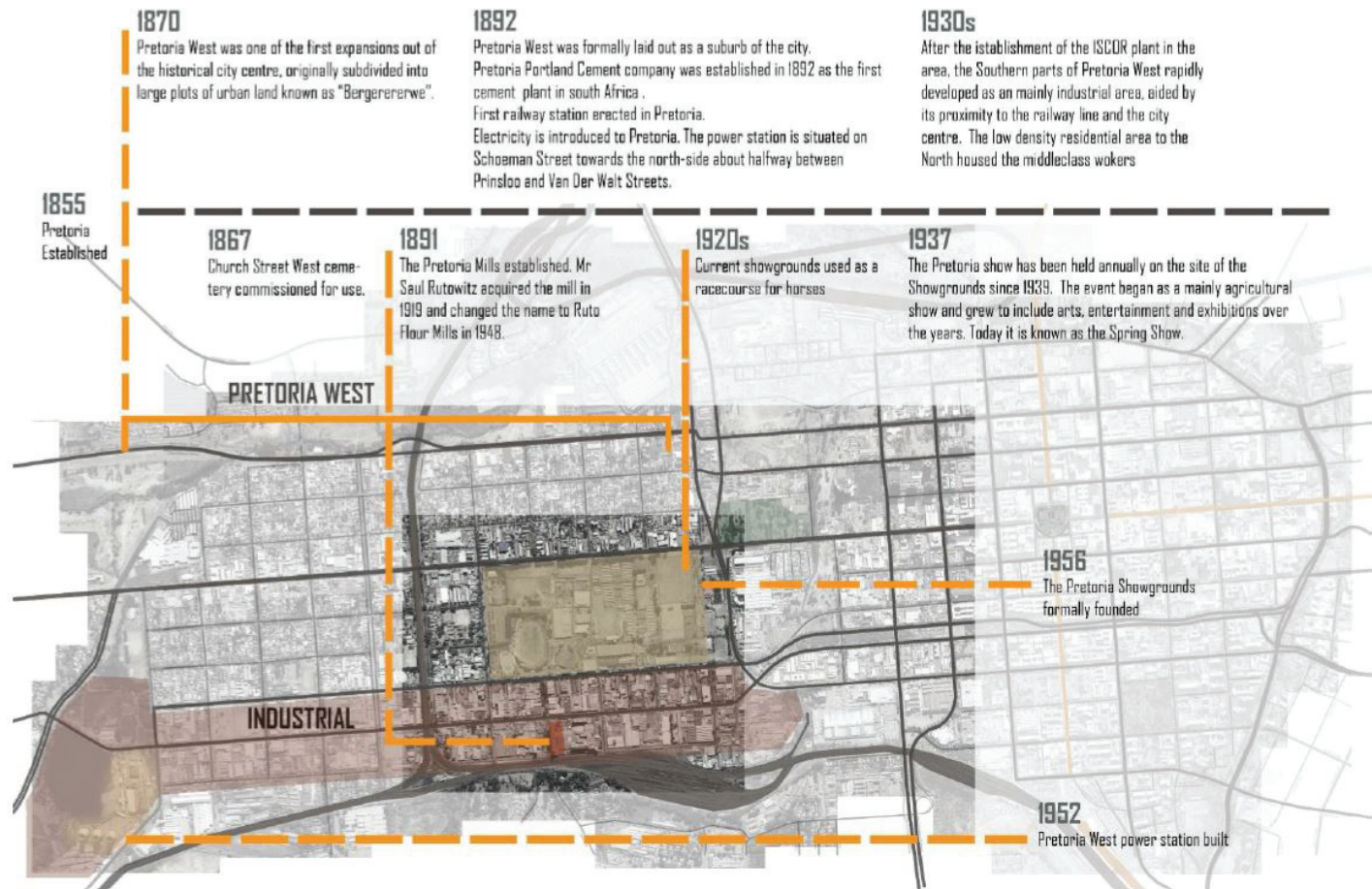


Fig. 3.5 Precinct Development (Urban Vision Group)



Fig. 3.6 Pretoria West Density (Author, Google earth, 2017)



Fig. 3.7 Sunnyside Density (Author, Google earth 2017)



the success of urban interventions, in 5 categories (De Schiller, S. and Evans, J.M., 2006). These being:

- Permeability
- Vitality
- Variety
- Legibility
- Robustness

The application of this urban sustainability strategy requires a measure of the condition before and after the proposal and can be utilised as a theoretical tool for measuring design decisions. Each category was scored according to the specific criteria before any design solution was proposed. This gave a quantifiable benchmark for the current integration or lack thereof, between the city and industry.

Above is an example of the scoring table for Robustness according to the Urban sustainability theory. Each street was intersecting with President Burger street (the proposed establishment of the production corridor) was assessed in these terms and then the collected data displayed in a graph that represents the overall sustainability of the area. (Fig 1.8 - Fig 1.12)

The negative impact on the urban fabric caused by the heavy industry in the form of the RCL milling operation between Carl Street and Charlotte Mayekke Street (Mitchel street) is clearly visible in the above graph. Simultaneously the positive effect of the Showgrounds and more residential fabric to the northern side of the Pretoria Showgrounds is

also evident. This Graph along with Figure: xx (Street elevations) clearly indicate that the industrial belt to the South of the precinct, although scoring less in urban sustainability, is purely industrial based and would collapse once these industries move out.

Henceforth, if industries are to remain in our cities and in future become increasingly integrated into the urban fabric that they would be subject to the same scrutiny as commercial and residential developments in terms of public duty, sustainability and architectural appropriateness. The contribution of the informal setting to the wellbeing and richness of the streetscape should also be incorporated into the architectural solution and would promote economic empowerment for individuals.

This would become important to the functioning of the entire precinct as the ingress of users is largely contributed by the train station. It must be noted however that the overwhelming factor for the industrial sector scoring so low is the fact that it is extremely isolated from the rest of the urban fabric, with only the informal traders contributing to any notable form of variety and mixed use.

In the graphic below the industrial complex is entirely walled without even visual permeation on street level. The street merchants, informal container squatting and light industrial supply of goods to the train station creates a street culture based around trade, softening the harsh surroundings posed by the formal industry.

The relationship between these industries and the street

merchant is also notable. I supply the street merchants with ingredients at a substantially discounted price as bulk distribution between vendors is commonplace. Merchants would then supply the industry's workforce with high protein and high carbohydrate content meals such as Mague\*

\* a favoured traditional African drink amongst industrial labourers. At the end of the day the unsold produce is packaged and travels by train to the various townships surrounding Pretoria.

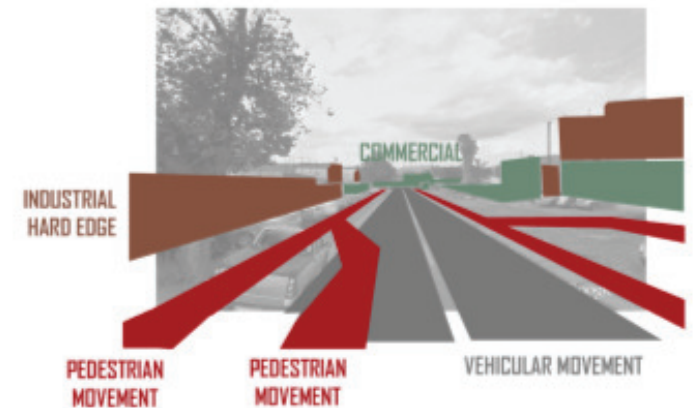


Fig. 3.8 President Burger Str Streetscape (Author, 2017)

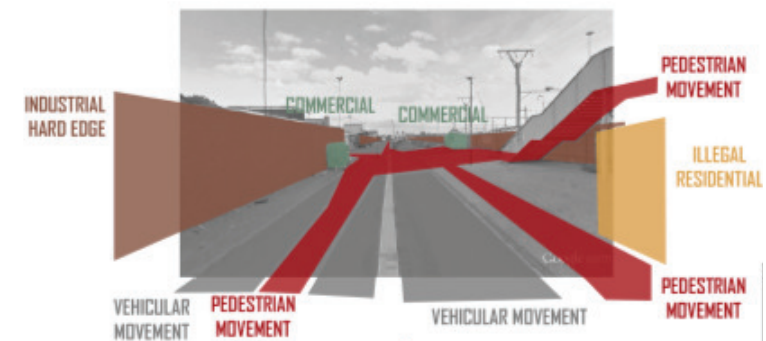
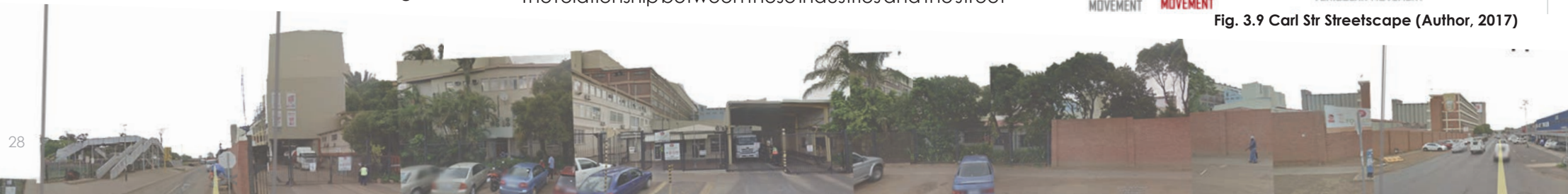


Fig. 3.9 Carl Str Streetscape (Author, 2017)





### STREETSCAPES AND URBAN SUSTAINABILITY RATING

The productive corridor spanning between the RCL Sugar and Milling operation and the Tshwane Market extends across varying streetscapes. With the streets surrounding the Pretoria Showgrounds being the most pedestrian friendly whilst the Northern and Southern most streets giving way to heavy motor vehicular traffic. The varying urban sustainability ratings is plotted in Fig. 3.10.

The overall pedestrian experience and public function of the streetscape is devised into separate elements that each facilitates a single use. The heavily ordered streetscape functions efficiently in transportation of and circulation but leaves little for the user to engage with.

All along President Burger Street informal traders offer interaction to pedestrians and crosses the interaction between the pedestrian, vehicular, and infrastructural movement. The informal sector adds to the variety, vitality and robustness, whilst the formal sector adds to the legibility and permeability of the streetscape.

It is notable that the urban use of the city blocks directly translate into the sustainability of the streetscape. The industrial and heavy infrastructural presence along the Southern streets receives a low score due to the hard edges that are formed by industrial developments. The streets surrounding the showgrounds fair far better due to the presence of commercial buildings that invites the public in.

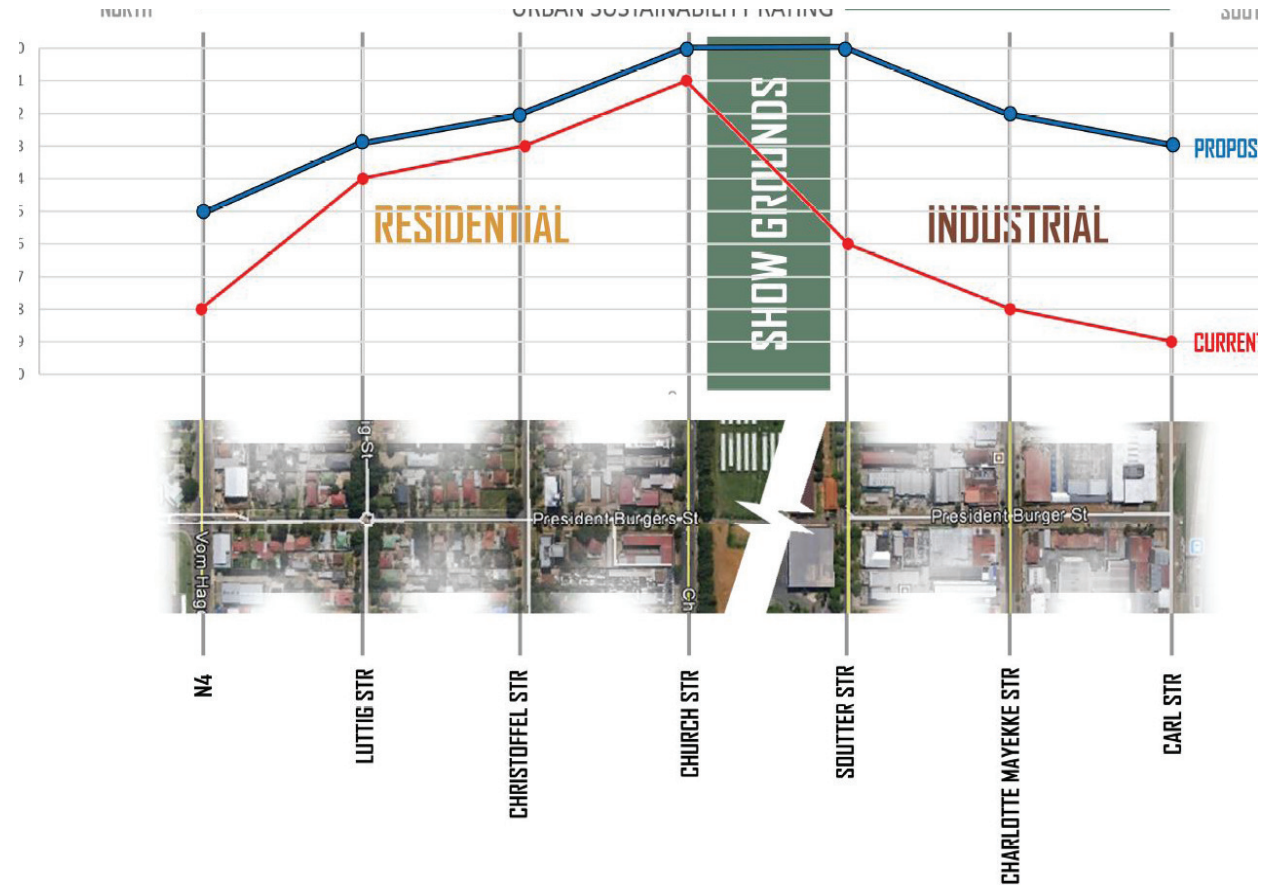


Fig. 3.10 Urban Sustainability Rating (Author, 2017)

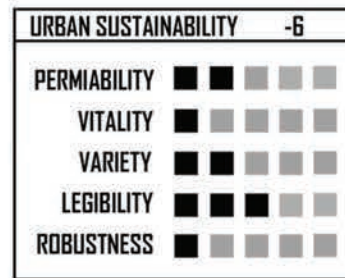


Fig. 3.11 President Burger Sustainability Rating (Author, 2017)

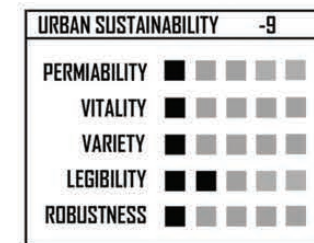
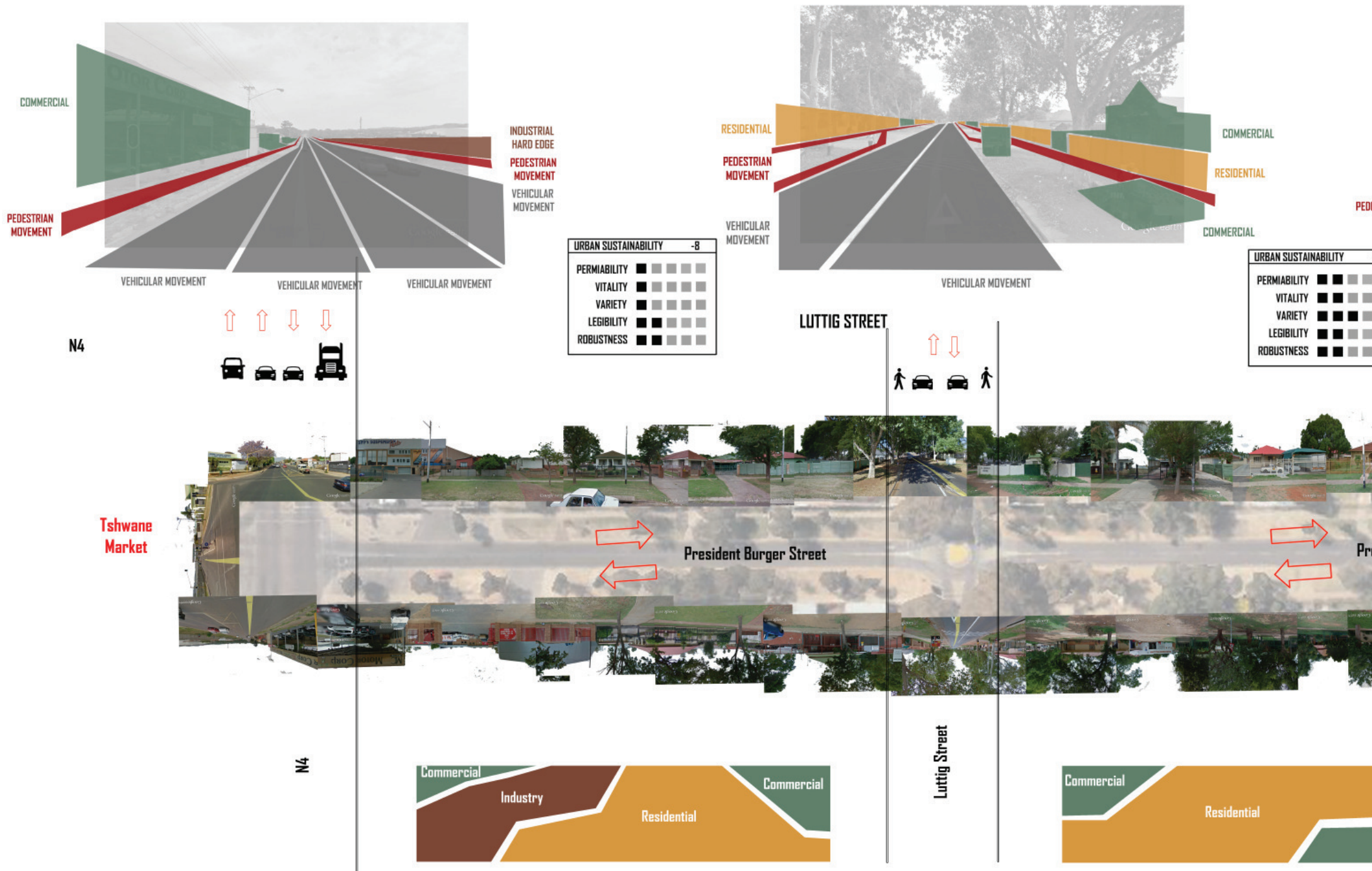


Fig. 3.12 President Burger Streetscape (Author, 2017)



Fig. 3.13 President Burger Street Elevation (Author, 2017)





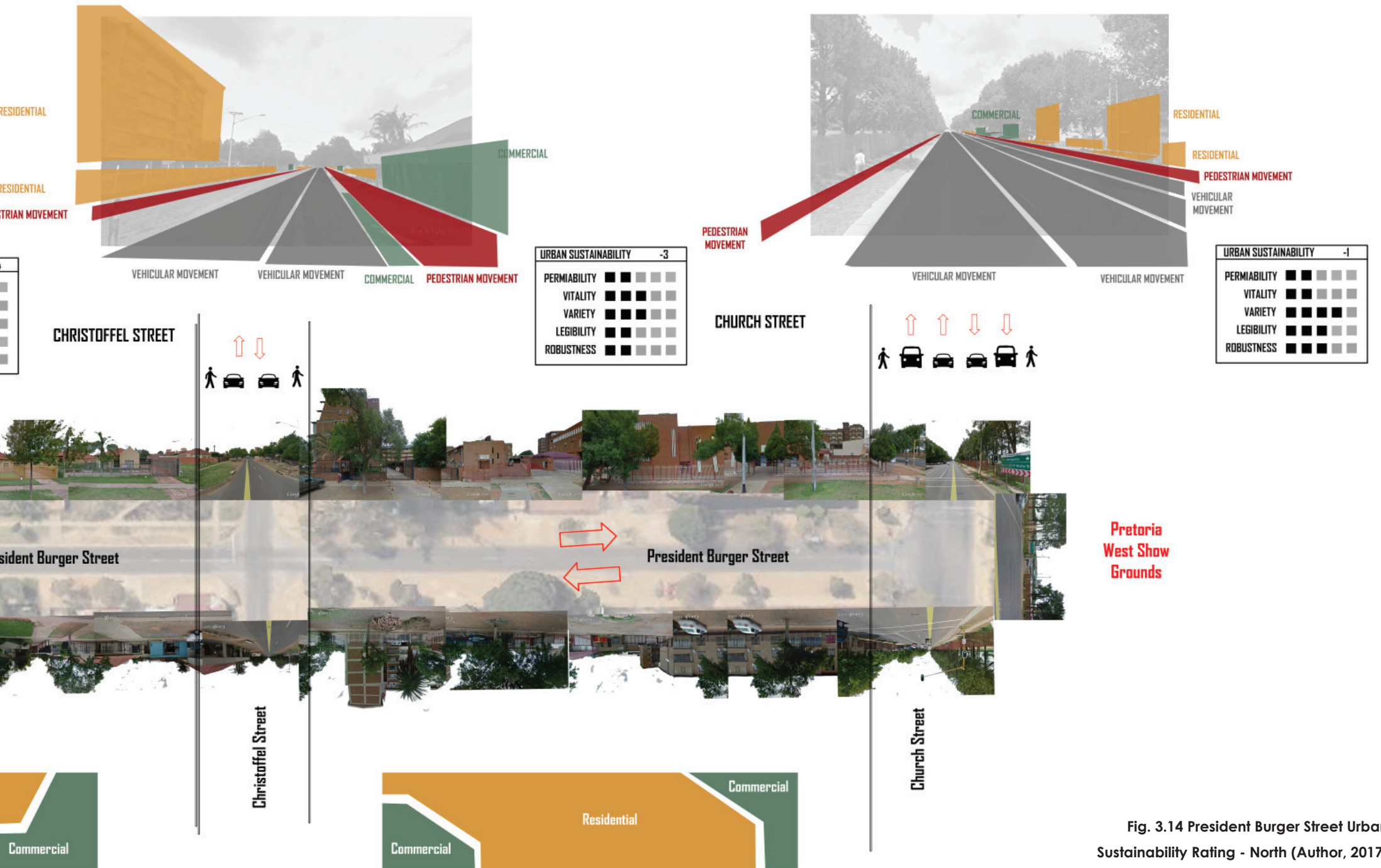
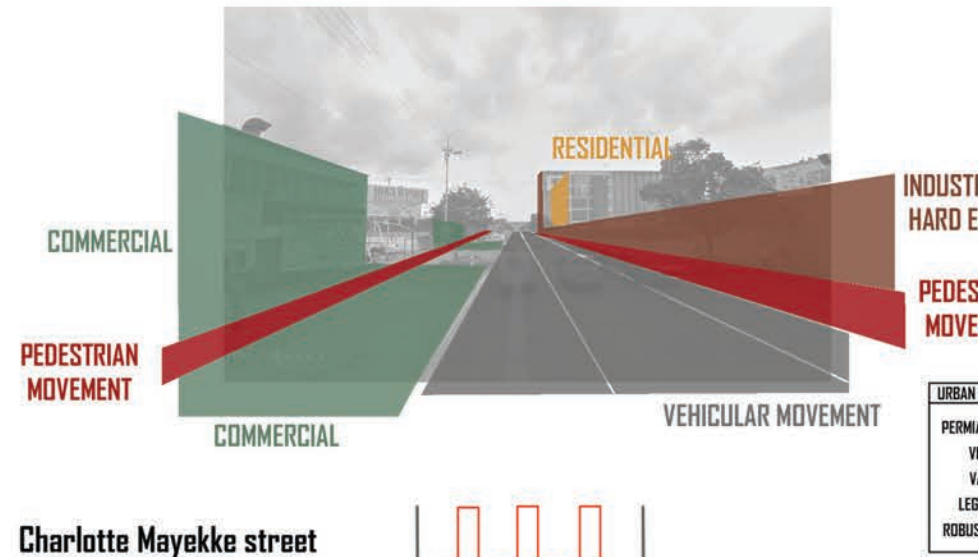
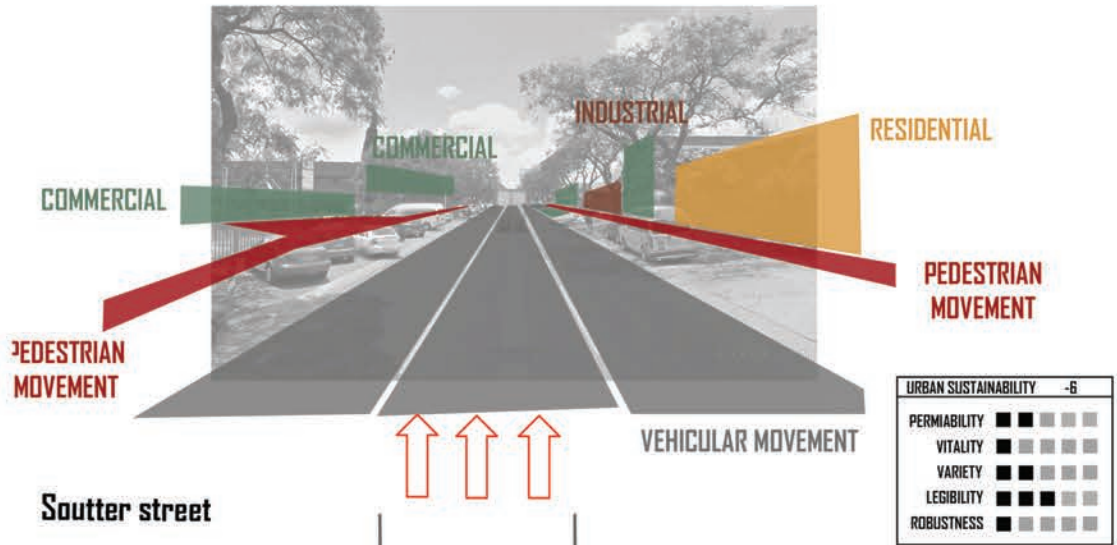
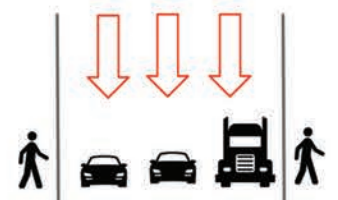


Fig. 3.14 President Burger Street Urban Sustainability Rating - North (Author, 2017)



Soutter street

Charlotte Mayekke street



Pretoria Show Grounds



President Burger Street

President Burger St

Soutter street

Charlotte Mayekke street





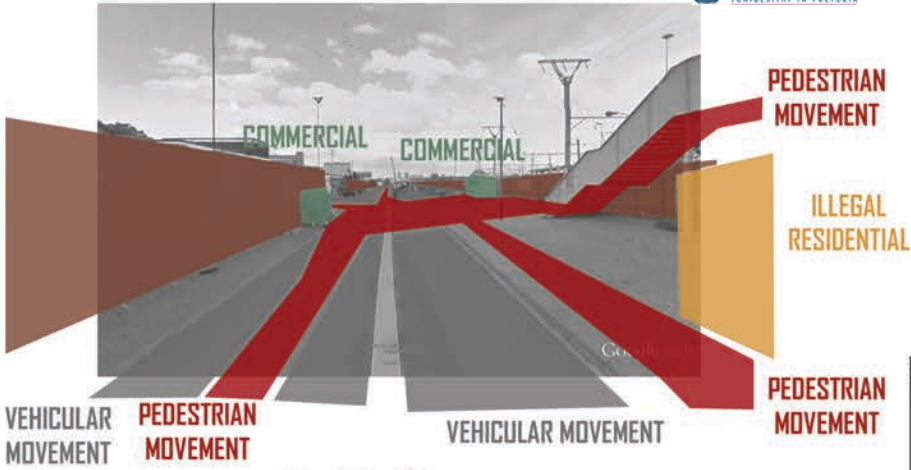
RIAL  
DGE

TRIAN  
MENT

SUSTAINABILITY -8

PERMIABILITY	■	■	■	■	■	■	■	■	■
VITALITY	■	■	■	■	■	■	■	■	■
VARIETY	■	■	■	■	■	■	■	■	■
LEGIBILITY	■	■	■	■	■	■	■	■	■
ROBUSTNESS	■	■	■	■	■	■	■	■	■

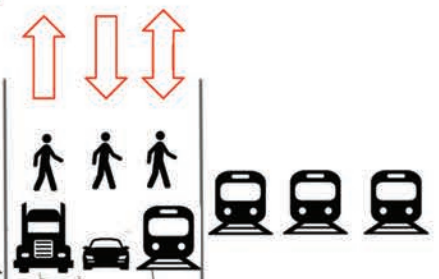
INDUSTRIAL  
HARD EDGE



URBAN SUSTAINABILITY -9

PERMIABILITY	■	■	■	■	■	■	■	■	■
VITALITY	■	■	■	■	■	■	■	■	■
VARIETY	■	■	■	■	■	■	■	■	■
LEGIBILITY	■	■	■	■	■	■	■	■	■
ROBUSTNESS	■	■	■	■	■	■	■	■	■

Carl street



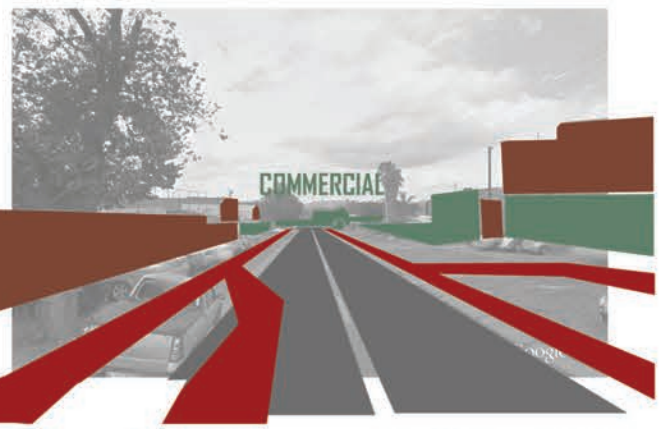
President Burger Street

Pretoria  
West Train  
Station

Industry

Carl street

INDUSTRIAL  
HARD EDGE



PEDESTRIAN  
MOVEMENT

PEDESTRIAN  
MOVEMENT

VEHICULAR MOVEMENT

PRESIDENT BURGER STREET

Fig. 3.15 President Burger Street Urban Sustainability Rating - South (Author, 2017)

## EVOLUTION OF URBAN FRAMEWORK A PRODUCTION CORRIDOR

An urban analysis study of existing uses and programs was developed into a master plan that establishes a productive corridor between the RCL FOODS milling industry and the Tshwane Market. The productive corridor connects various other food industry to the market and to the raw materials supplied by the rail system and milling industry.

The concept is derived from the urban morphological study that traced industry in Pretoria West back to the establishment of Iscor's steel industry. Feeder industries that refine and manufacture steel products located themselves as close as possible to the Iscor, which supplied them with raw materials, i.e. steel.

The systematic flow of materials from one industry to the next in an end to end fashion suggested routes that materials could flow down from the railway deeper into the precinct until dispersing into the city into various different products.

Just as the production models of the second industrial revolution were adopted from one industry to the next, the feasibility of applying this feeder routes was tested. By tracing separate industries related to the supply, production and processing of food within the precinct two definite anchor points were established. A high number of related food industries were discovered within the precinct and it was concluded that the proximity to other industries is intentional.

This concept extracts the essence of the role that Pretoria West plays by supplying the rest of the city with the products it requires. Marabastad in turn can be viewed as portraying a trading role through

the richness of informal markets that source most of their produce from the Tshwane Market. With its role defined the character of Pretoria West starts to take shape. By celebrating this character, the influx from the West Capital development can be organised to spur small business growth.

As Pretoria has grown far beyond its historic footprint the food industries of Pretoria West no longer find themselves on the outskirts of the city, With the West Capital expansion of the CBD, these food industries will find themselves right in the heart of the city.

## URBAN VISION PRETORIA PEDESTRIAN ROUTES

Due to Pretoria's historic East-West expansion, defined by the topographical constraints to the North and South a recurring model for pedestrian movement is present in the city. This can be observed in the pedestrian movement on Paul Kruger Street spanning from Pretoria Central Station to Church Square in the CBD of Pretoria. The above-mentioned model is adopted and implemented as a precedent specifically relevant and historically bound to Pretoria's morphology. By implementing this model in Pretoria West it establishes a physical connection between the RCL Milling Industries (as well as the Pretoria West train station) in the South to the Tshwane Fresh Produce Market in The North. Due to existing infrastructure of the food networks in the area there seems to be an abundance of existing large depots, for instance Kingsley Depot and food production industries, for instance Theron's Meat Market and Pretoria Cold Storage in the area. I propose that these industries could benefit from adopting a similar architectural in so far as that they connect to the industrial street market.



Fig. 3.16: West Capital Development (Author, 2017)

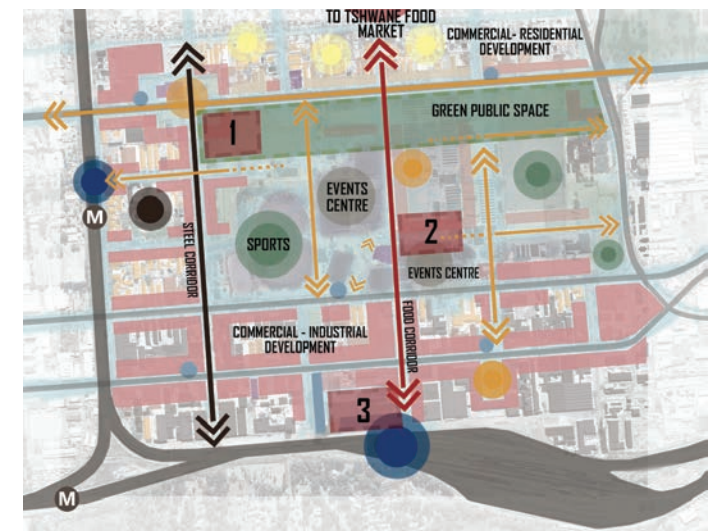


Fig. 3.17: Urban Density (Urban Vision Group, 2017)





## THE ROLE OF PRETORIA WEST: SUPPLYING PRODUCE TO THE MARABASTAD MARKETS

On an urban scale the role of Pretoria West can be defined as the industrial supply chain. Firstly, a supply chain to the Informal markets of Marabastad and secondly to the formal traders throughout Pretoria.

The Tshwane Market and RCL Milling Division is currently supplying both nationally and internationally, but research in terms of future food production industries have indicated supply chains should be reduced to a regional level in order to become sustainable and stay competitive (Srai, 2016). It is therefore important to isolate and focus on the impact that these industries can have on their direct environment.

Environment in this subject matter is not limited to the natural environment but should include the city's citizens, its economy and built environment into an ecosystem.

Often when referring to sustainability and the impact of the built environment we only consider limiting the negative effects that our buildings have on the natural environment. The aim should rather be to extract the

potential positive effects that our buildings could have on the entire eco-systemic understanding of the city instead of focusing on merely limiting its negative impacts. With the understanding that buildings can have both negative and positive contributions to the city, one can start to design appropriately.

## FOOD PRODUCTION AS AN ACTIVITY

Within the current models of food industries, production is isolated and increasingly mechanized. Food production can be viewed as an activity in itself and could catalyse a wide spectrum of activities, as can be seen in the street markets in Japan (Colverd and McLean, 2013) as well as the South African example of Warkwick Junction (Skinner, C. 2008: 233)

The existing structures contain a potential catalytic activity that could be extended towards the public. The design opportunity, when coupled with the research question, requires that the architectural solution lie between the existing structures and the public space, in this case the street. The intention is to extend the current production line towards the street



Fig. 3.19 Informal production corridor through Pretoria Showgrounds (Author, 2017)

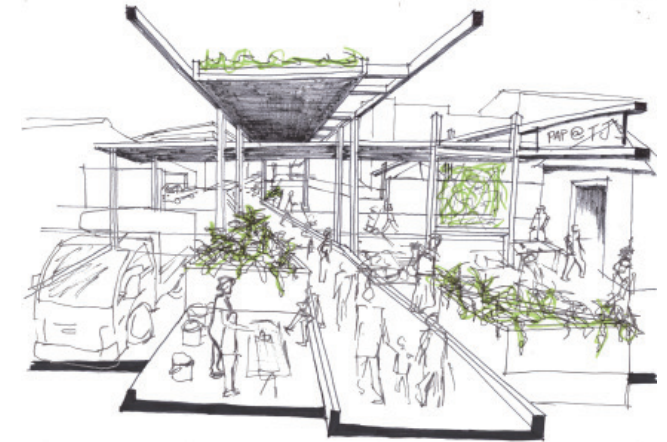


Fig.3.20 Early vision for President Burger street (Author, 2017)

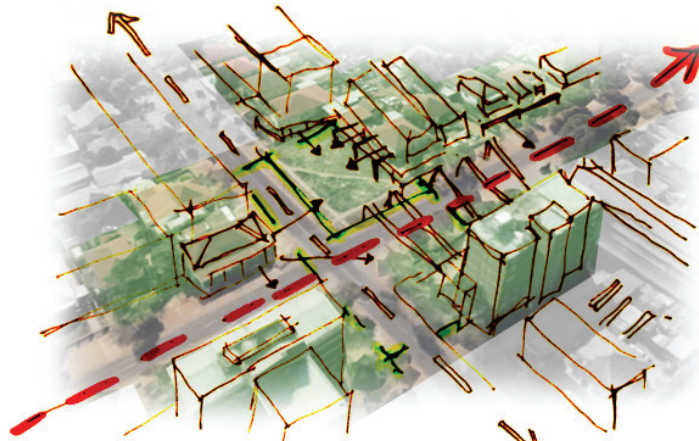


Fig.3.21 2 Brothers Square Design (Author, 2017)

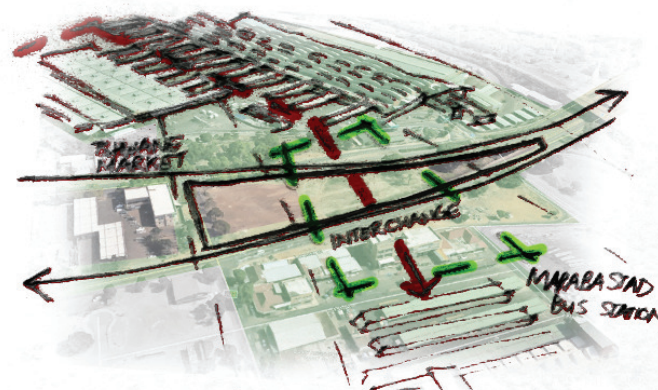


Fig.3.22 Tshwane Market/Marabastad Connection (Author, 2017)

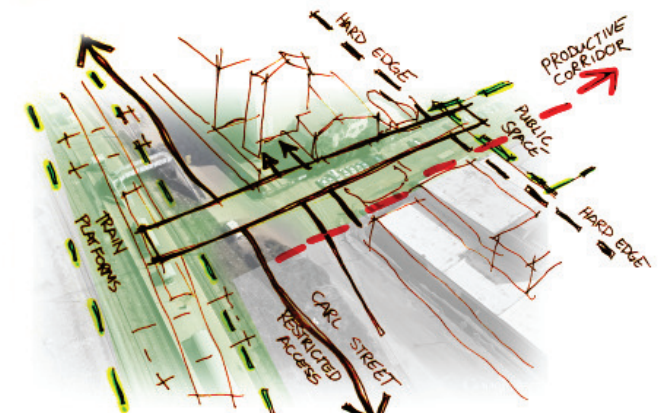


Fig.3.23 Carl Street Bridge (Author, 2017)



and in doing so bleed the activity out from the formal industry to the informal industry.

Informal trade in Pretoria is most prevalent in close proximity to transportation interchanges and along the streets. It is therefore important to incorporate the relevant streetscape and train station into the design in order to fully embrace the street culture that these vendors bring with them. My intention is to align the outcomes more accurately to reflect the legislative shift that the post-apartheid strive has brought; from an oppressing the informal traders towards embracing and uplifting them. (Skinner, C. 2008: 233)

### PRODUCTIVE CORRIDOR AS URBAN CONTRIBUTION

It is possible that just as the informal and formal relationships exist, that a rigid and flexible relationship can exist between the larger and smaller industries. The intention is thus not to completely protect these industries from changes in the market place or from technology, but rather to allow portions of the intervention to cease to function as they become outdated and be replaced by newer more efficient parts.

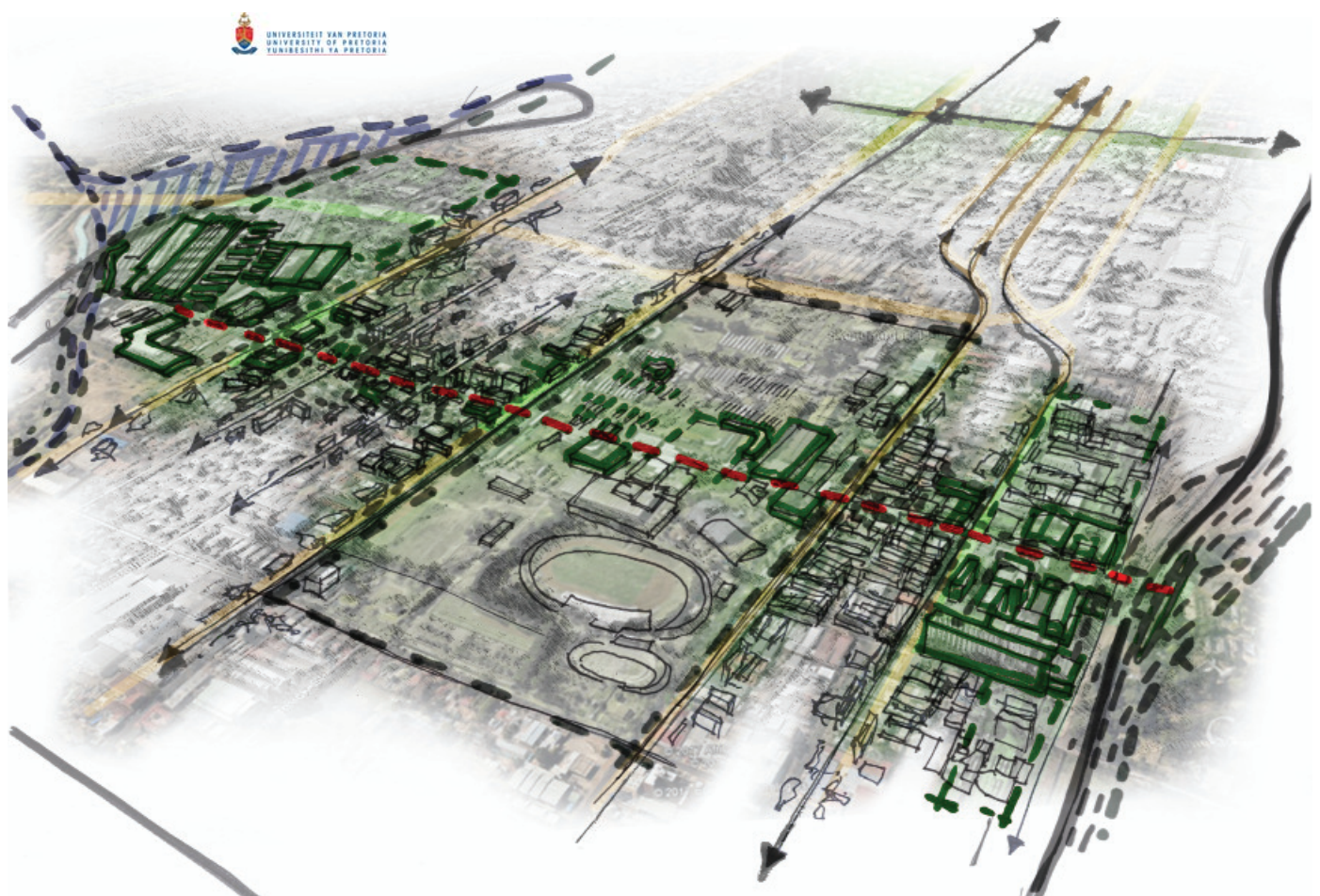


Fig. 3.27 President Burger St. Proposed productive corridor (Author, 2017)

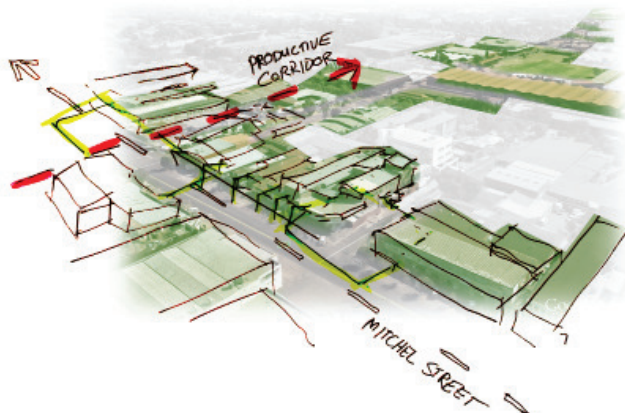


Fig. 3.24 Meat Market Connection (Author, 2017)

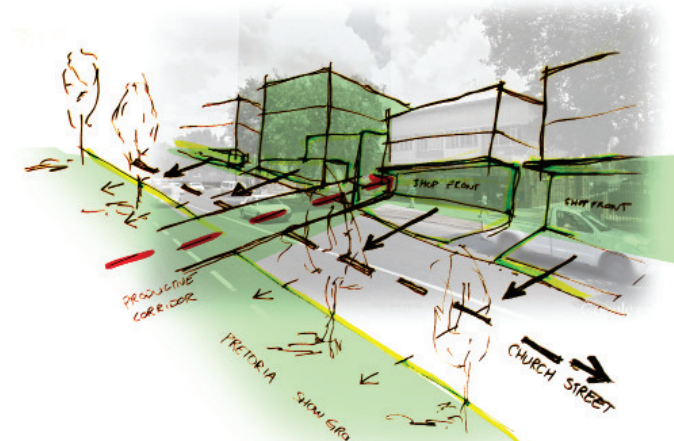


Fig. 3.25 Church Street Commerce (Author, 2017)

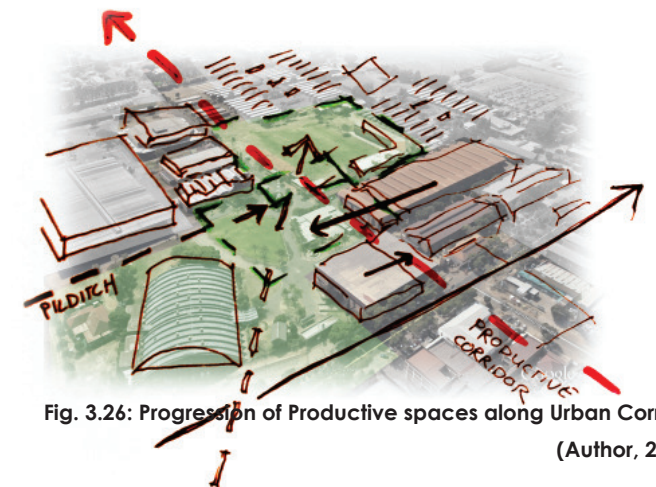


Fig. 3.26: Progression of Productive spaces along Urban Corridor (Author, 2017)

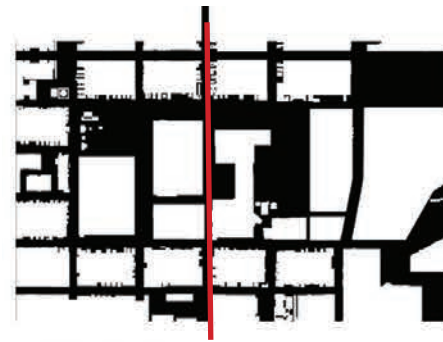


This effectively solves one problem with another problem. Stagnation in technological advancement is combated by the introduction of a economically "hostile" market place that requires constant adaptation.

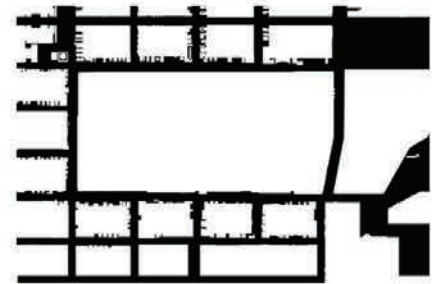
This notion is continued through the planning of interdependent industries as well as the attitude towards technification and systems. Just as industries are allowed to be replaced, systems and technologies should also be allowed to be upgraded and replaced.

This adaption of the eco-industrial parks theory relates to an eco-systemic world view wherein the city is seen as a constant developing organism. Nothing can thus be viewed as a stagnant object, and must be allowed to be developed and adapted. The future thus only becomes a moment of continuation from the past.

The acknowledgement of the dimension of time as it relates to space directly implies a dynamic, evolving and fluctuating built environment. The implication of time on space has two distinct implications: Firstly, the user experiences the built environment as a progression through three-dimensional space, where the journey from point A to B is not the same as the journey from point B to point A. Secondly, the building itself progresses in time through various iterations as it is constantly adapted to suite ever changing needs.



PROPOSED PUBLIC SPACE



CURRENT PUBLIC SPACE



OPTIONAL PUBLIC SPACE

Fig. 3.28: Figure ground study of Pretoria West Showgrounds as Public Space (Author, 2017)



Fig. 3.29: Food Production Corridor Vision (Author, 2017)







Fig. 3.30 Initial Envisioning of President Burger Street as a Connective Route (Author, 2017)



Fig. 2.31 President burger Existing Street Elevation (Author, 2017)



-----[ IV ]-----  
P R O G R A M



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**PROGRAM**

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Fig. 4.1 Existing Grain Drop off Area (Urban Vision Group, 2017)



Fig. 4.2 End Production line (Urban Vision Group, 2017)



Fig. 4.3 Fresh Produce Being sold at the train station (Urban Vision Group, 2017)



Fig. 4.4 Fresh produce being re packaged and loaded onto the train (Urban Vision Group, 2017)



Fig. 4.5 On Site Grain Storage Silos (Urban Vision Group, 2017)



## CROSS PROGRAMMING THE LOSS OF PUBLIC SPACE

Empty and unused spaces within the city are often difficult to address due to the lack of activity. Bernard Tschumi's proposes that through heavy programming (cross-programming and deprogramming) that these spaces can become revitalised (Komarzyńska-Świeściak, 2010).

*"New contexts for architecture of contemporary city – apart from physical (infrastructure layer, city roofs, ect.) – are the cultural and sociological conditions like dynamic and interlaced life patterns (living/working/leisure) mobile and flexible life style. Density (concentrated layouts of functions) and integration/cooperation of preciously separated functions are the tools to deal with all these contexts."* (Komarzyńska-Świeściak E. 2013)

Infrastructure often poses a specific challenge to cities as it occupies large pieces of land through a singular function. Within these areas the individual becomes alienated whilst the city itself is fragmented by it. Highways, Railway lines and industrial infrastructure all contribute to this condition, and all are necessary to the overall function of the city.

Elzbieta Komarzynska-Swiesciak (2010) proposes that these neglected spaces can become a new kind of public space. This movement relies directly on Tschumi's theories on cross-programming, and has proven to be successful in regenerating lost space within the cities such as areas below railways, roads with heavy vehicular traffic and projects such as the NY Highline linear park project. (Komarzyńska-Świeściak 2013)

These projects are a result of a shift towards continuous architecture, wherein we have become aware of the quality of the entirety of the built environment instead of singular/isolated pockets of architectural quality within the built environment. As a result of this shift, Komarzynska-Swieciak concludes that streets, although public in nature, can no longer be considered as being public spaces.

*"Mobility and high-car dependence are signs of modern lifestyle. As a result car traffic takes over the city. Streets and many old squares which in the past were part of public realm became just necessary links to get from point A to B. Street is no more public as it's used mostly by cars instead of people. In well-known Nolli plan of Rome from 1748 private spaces such as dwellings are rendered as black solids and public spaces such as streets and squares, church interiors as white. If we would draw Nolli Plan of contemporary Rome, there would be much less white voids than before- the heavy-traffic streets would have to be rendered as solid blocks. Part of public realm was taken."* (Komarzyńska-Świeściak 2013)

From these theories, it can thus be concluded that heavy cross programming of the space, it would be possible to reinvigorate a lost piece of the overall public capital of the city. Within the Pretoria West precinct, it is possible to extract existing programs – although these are heavily isolated currently. Although the industrial presence for instance is segregated from the streetscape, it is possible to extend the function towards the street and thus the public realm. The informal presence and trade environment should be amplified and incorporated as it brings with it the social and cultural richness that would allow public space (and entire development) to thrive.



Figure 4.6: New York Highline Areal view (Open Projects, 2001)



Fig 4.7: New York Highline Linear Park: (OPEN PROJECTS, 2001)



Fig 4.8 New York Highline, Section: (Rosenfield, K. 2014)



The reimagining of the train-station holds the key to a successful intervention as it brings an influx of pedestrian movement and as a result-the potential to reclaim the lost streetscape that has been dominated by heavy motor vehicles. Poor design of the existing station has led to the dispersal of the potential pedestrian energy and the overwhelming dominance of the heavy motor vehicles. By utilising the train station as an ingress of the public back into a lost space, it is possible to activate and invigorate this space.

Furthermore, as the specific proposal relies on the densification that would result from the West Capital development as proposed by the Tshwane Town planning scheme (Tswane vision 2055) The design solution would exist within the outline of an increased residential fabric (largely student accommodation for UNISA and Tshwane University of Technology). The Bus Rapid Transit system (Areyeng) will include increased pedestrian movement in conjunction with the train station.

The influx of residents would ultimately lead to an increase of amenities to serve the growing population including restaurants and commerce. By creating a platform for a unique trade system, these restaurants could be included in the planning scheme and character of the new development. Giving rise to economic and spatial potential.

### CROSS PROGRAMMING PRECEDENT

LE FRESNOY NATIONAL STUDIO FOR CONTEMPORARY ARTS, TOURCOING, FRANCE 1997 By Bernard Tschumi  
The relationship between old and new exists harmoniously and the formal integrity of the old is kept intact whilst the contrast between these states is clearly expressed (Astrup, 2005).

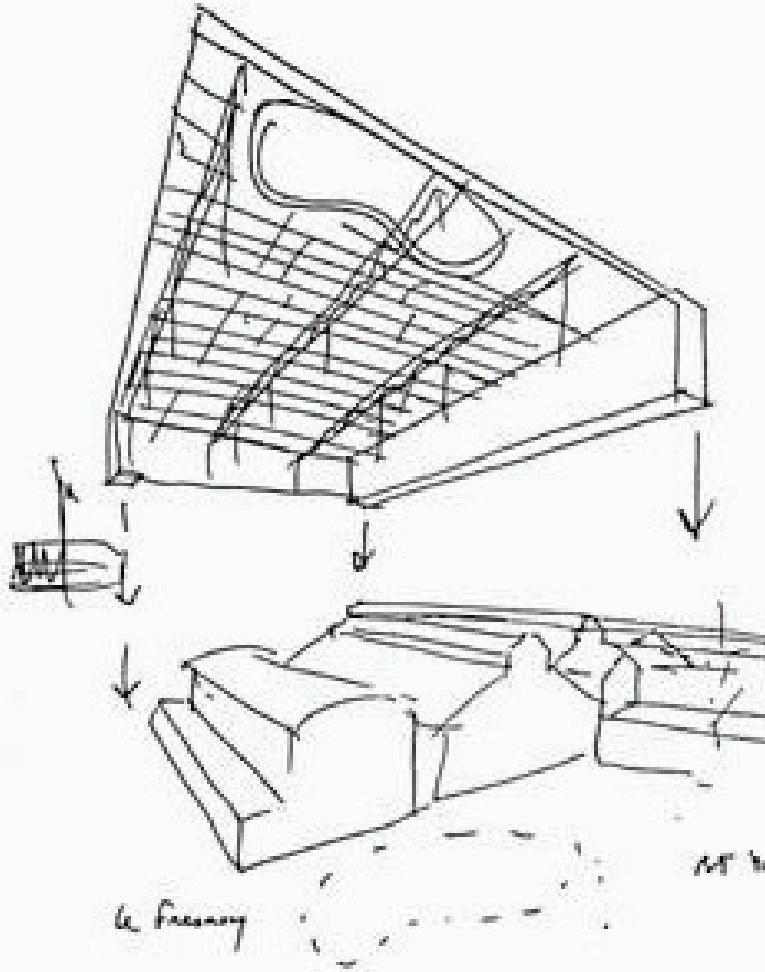


Figure 4.9: Conceptual Sketch of Le Fresnoy National Studio for Contemporary Arts (Tschumi, 1991-1997)

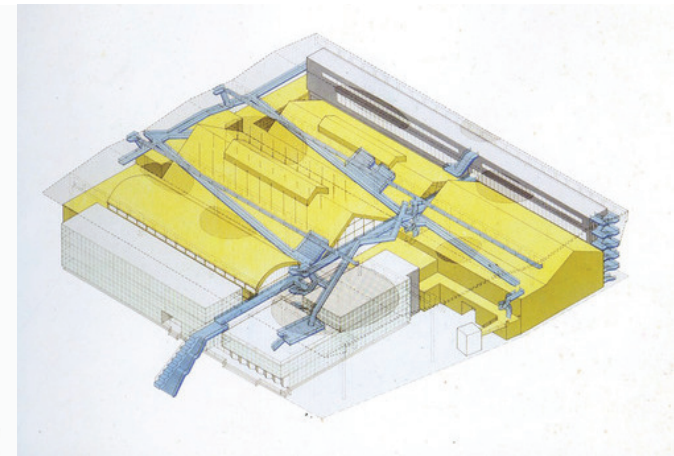


Figure 4.10: Added Movement Between Existing Structures and New Roof: (TSCHUMI, 1991-1997)



4.11: Occupying the Space Between the Existing and the New (Tschumi, 1991-1997)

The building, through heavily de-programmed space and its transition through architectural programme and art forms, exists without a central/descriptive categorization. Great emphasis is placed on the "in between" spaces, with area such as the zone between the old roofs and the new technologically advanced being disrobed as a cloud. (Astrup 2005) The Le Fresnoy building by Tschumi is based on his theories relating to Events City (Ebert, Carola, 2008).

*"Many empty and unused zones in contemporary cities can be heavily programmed in order to fill the urban fabric with diversity and missing integrated services. There is a huge potential in (cross programming these spaces as it could lead directly to higher efficiency and lower costs."*

-(Komarżyńska-Świeściak, 2010)

Superimposition plays a large role in Tschumi's decision making as each "layer" adds a blanket of complexity and program with it. Separating these layers out during the design process creates a simplified understanding of each of the programs in isolation before consolidating them into a unified whole. Only after the consolidation of these layers can the junctions between them be addressed.

Thereafter a constant feedback loop between isolation and consolidation leads to the resolution of the program. The post-modern deconstructive architect's critique on modernism is that due to its mono-functional design it eradicates all but a singular program. This results in a stale and bland environment that does not allow for accidental programs to be achieved in the in-between spaces of the built-environment.

Where Modernists relied on a single coherent thought, Tschumi re-lies on a multitude of influences, programs, geometric collisions and artistic expression to catalyse a rich and vibrant social and cultural environment. Within this post-modernistic environment precedence is given to the activities of people instead of the perfect realization of a building. He thus relies on the notion that if one aspect of the program or architecture fails the overly sufficient complexity of the project would not allow the entire project to fail-rather the other programs would take over that specific space as the building evolves and as the user's natural incentive to take ownership of a space and adapt it according to their needs ultimately overrides the architect's original intent.

The success of the cross-programming theory is directly reliant on this complexity and the implications that it has on the in-between spaces as an outflow for program into unprogrammed spaces. In this instance Tschumi relies on this outflow of program in order for the artists/actors to "take over" the clouds in between the old and new roofs. (Astrup, 2005)

### EXTENDING PROGRAM TO ENCLUDE INFORMAL PRODUCTION

By Cross-Programming the informal (Public) production with the formal (Private) production waste products can be combined into innumerable products that adds a layer of flexibility to the existing rigid production. The Formal Production line would supply raw materials to the informal market whilst the informal market produces a variety of products and shortens the proximity to the consumer drastically. The divide between production (industry) and consumer (city) thus starts to dissolve.

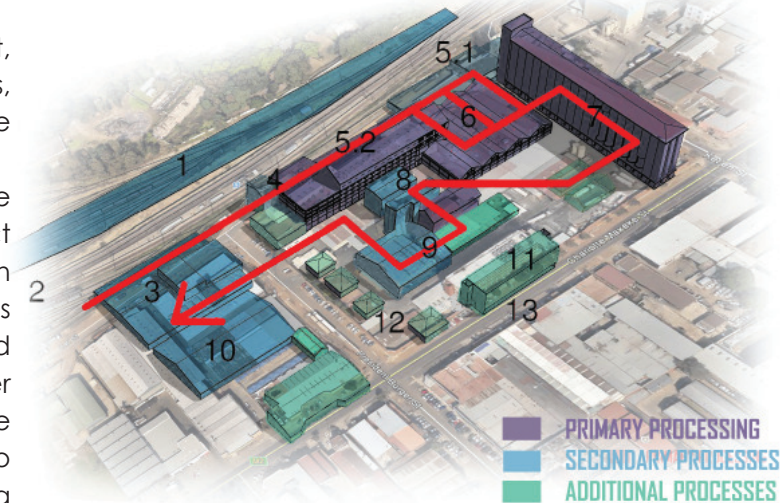


Fig. 4.12: Current Milling Site (Author, 2017)

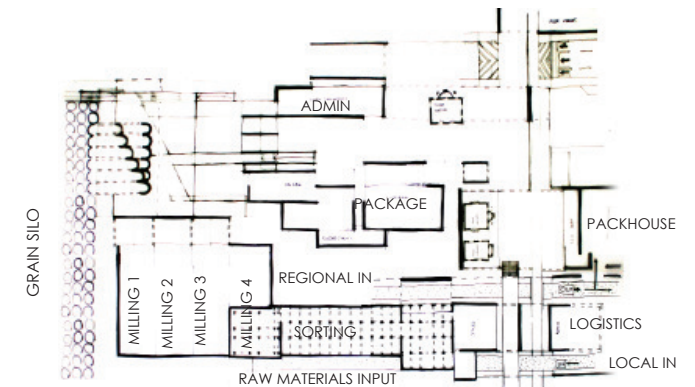


Fig. 4.13: Current Milling Site usage diagram (Author, 2017)

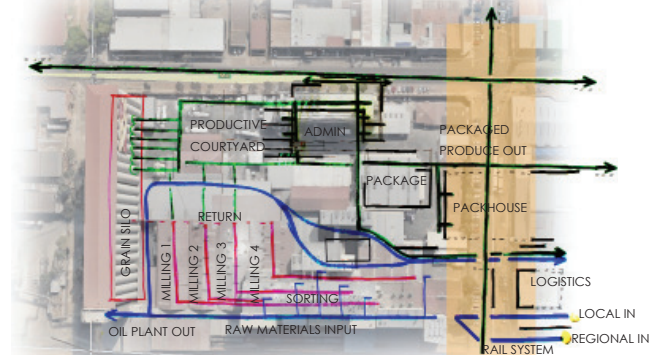


Fig. 4.14: Current Milling Site usage diagram (Author, 2017)



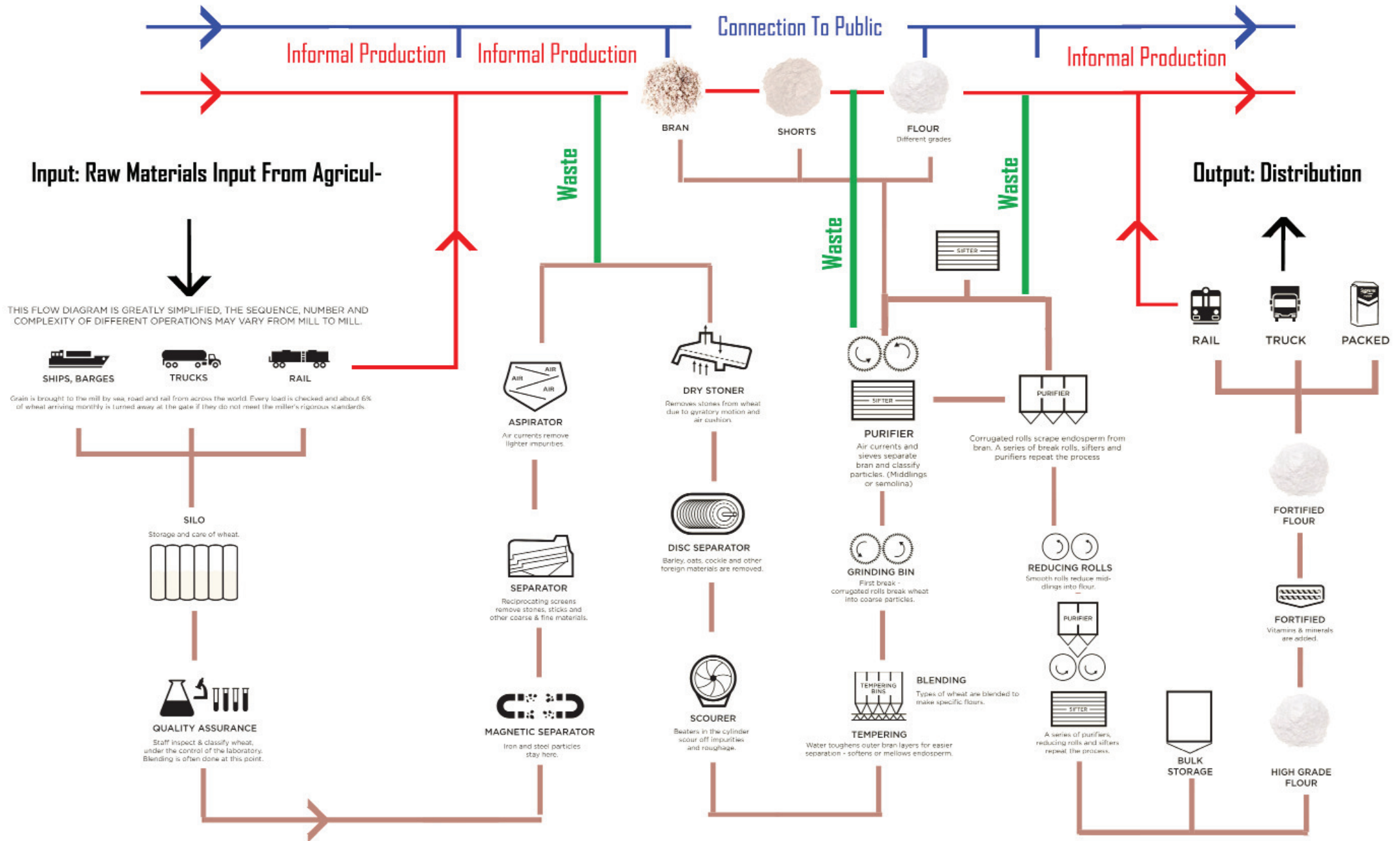


Fig. 4.15: Industrial Flour Milling Process (Supreme Flour, 2017) Adapted by Author

## EXTENDING EXISTING PROGRAMS

The site boasts the largest single site milling operation in the Southern Hemisphere. The Ruto Mill heritage article> and due to the historic development and the monumental scale of the silos as a defining element in the skyline, the relevance of industrial heritage should be analysed. According to SAHRA buildings that express technological advancement should be preserved and thus qualifies this site as a prime example for food production during the 19th and 20th centuries. Although various inner city milling operations throughout the country have shut down as these industries re-establish elsewhere, the Pretoria West site is still operational and functions 24 hours a day.

Although these industrial relics are being repurposed, their adapted uses do not utilize the supporting infrastructure, do not fulfil the original purpose and in no way reflects the heritage of the involved structures. I conclude then, that because of the above mentioned facts, these re-appropriations are unsuitable.

## PRIMARY (EXISTING) PROGRAM

### Anchor Programs

Although the existing model for food production and its impacts on urban life has been thoroughly scrutinized throughout this dissertation the intention is not to reimagine, remove or replace this model but rather to adapt industries to rather attach onto outdated industries in a way that future objectives can be achieved through the relationship between old and new.

### Industrial Maize Meal Production

Large scale existing refinement of maize meal through

an established milling operation. The current milling complex falls under the ownership of RCL Foods Brand PTY Ltd and is the largest of its kind in the Southern Hemisphere and one of the largest in the world.

### Industrial Logistics

Inflow and outflow of raw materials and processed goods to the industrial processes. Includes vast rail and HVM fleet networks across South Africa and serves as the physical (albeit distant) connection between farming and refinement enterprises.

### Public Transport

Areyeng BRT  
Prasa Train Station

### Secondary (connective) Program

#### Industrial Mague production

Indigenous, slightly alcoholic, maize food drink originated in Latin America (known as Maguey) and became a prevalent source of fibre and made significant cultural impact in South Africa. (Holzapfel, W.H. and Taljaard, J.L., 2004)

### Tertiary (Infill) Programs

Informal, on foot, street traders

Semi-formalised, established street traders

## EXISTING ROLE-PLAYERS

### RCL FOODS

The instigating client is the owner of the industrial milling operation in Pretoria West, the RCL Foods company. With the realization of industrial abandonment evident all around the land-mark milling operation (The largest single site milling operation in the Southern Hemisphere) the directors are forced to consider the viability of their current operations. Multiple food

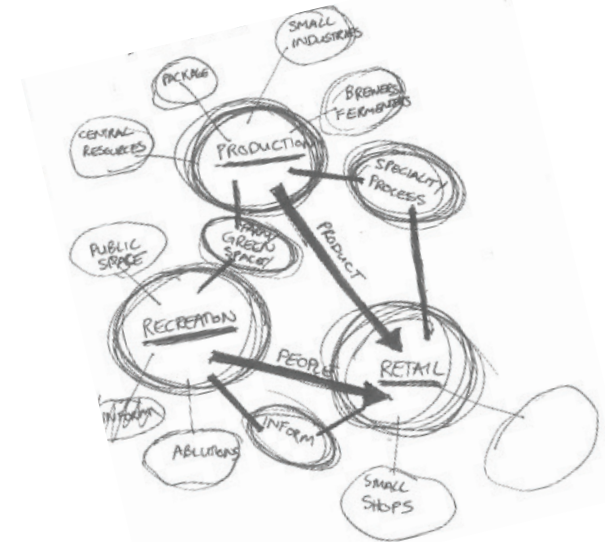


Fig. 4.16: Initial anchored program linkages sketch (Author, 2017)

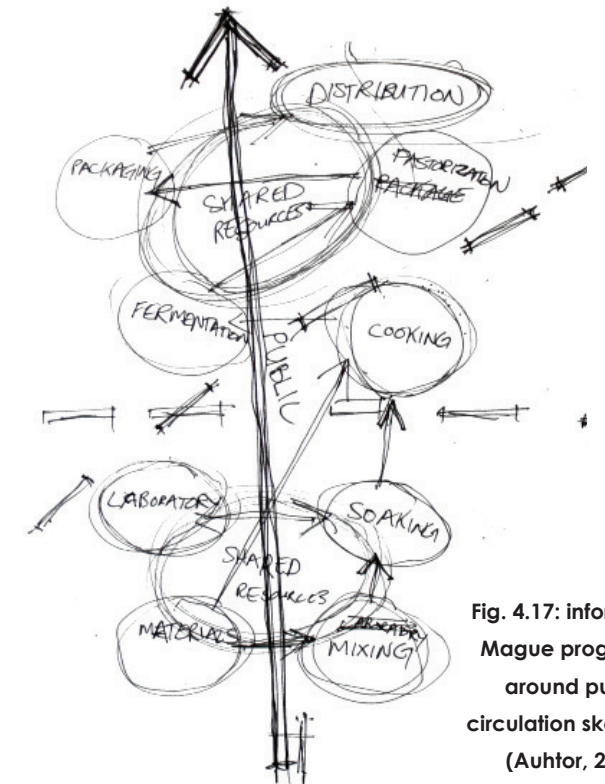


Fig. 4.17: informal Mague program around public circulation sketch (Auhfor, 2017)



### EXISTING PROCESS DRIVEN STRUCTURES:

- 1 - TRAIN STATION: PUBLIC TRANSPORT/WORKFORCE COMMUTE
- 2 - CARL STREET: TRUCK STACKING & ACCESS
- 3 - LOGISTICS: GRAIN SUPPLY & DISTRIBUTION CENTRE
- 4 - INDUSTRIAL RAIL: TRAIN CAR STACKING & GRAIN SUPPLY
- 5.1 - SORTING PLANT: GRAIN DROP-OFF
- 5.2 - SORTING PLANT: GRAIN SORTING/HUSKING
- 6 - MILLING PLANT: GRAIN PROCESSING/SEPARATION
- 7 - SILO: PROCESSED GRAIN STORAGE
- 8 - FEEDER STACKS: PREPACKAGE OPERATION
- 9 - PACKAGING STATION:
- 10 - PACK HOUSING: PACKAGED PRODUCE STORAGE

### NON PROCESS DRIVEN STRUCTURES:

- 11 - ADMINISTRATION
- 12 - OFFICE SPACE
- 13 - TAKEAWAY OUTLET
- 14 - BOUNDARY WALL
- 15 - PARKING SPACES

### INTRODUCED PROCESSES:

- 16 - WASTE PRODUCTS INDUSTRIES
- 17 - PRIVATE INDUSTRY PRODUCTION
- 18 - PRIVATE INDUSTRY SHOPFRONTS
- 19 - LABOURER'S DWELLINGS
- 20 - PACKHOUSE DEPOT
- 21 - PRETORIA COLD STORAGE (EXISTING)
- 22 - THERON'S MEAT MARKET (EXISTING)
- 23 - EXTENDED MEAT MARKET (CURRENTLY UNOCCUPIED)

\*INCLUDING INFORMAL STREET VENDORS

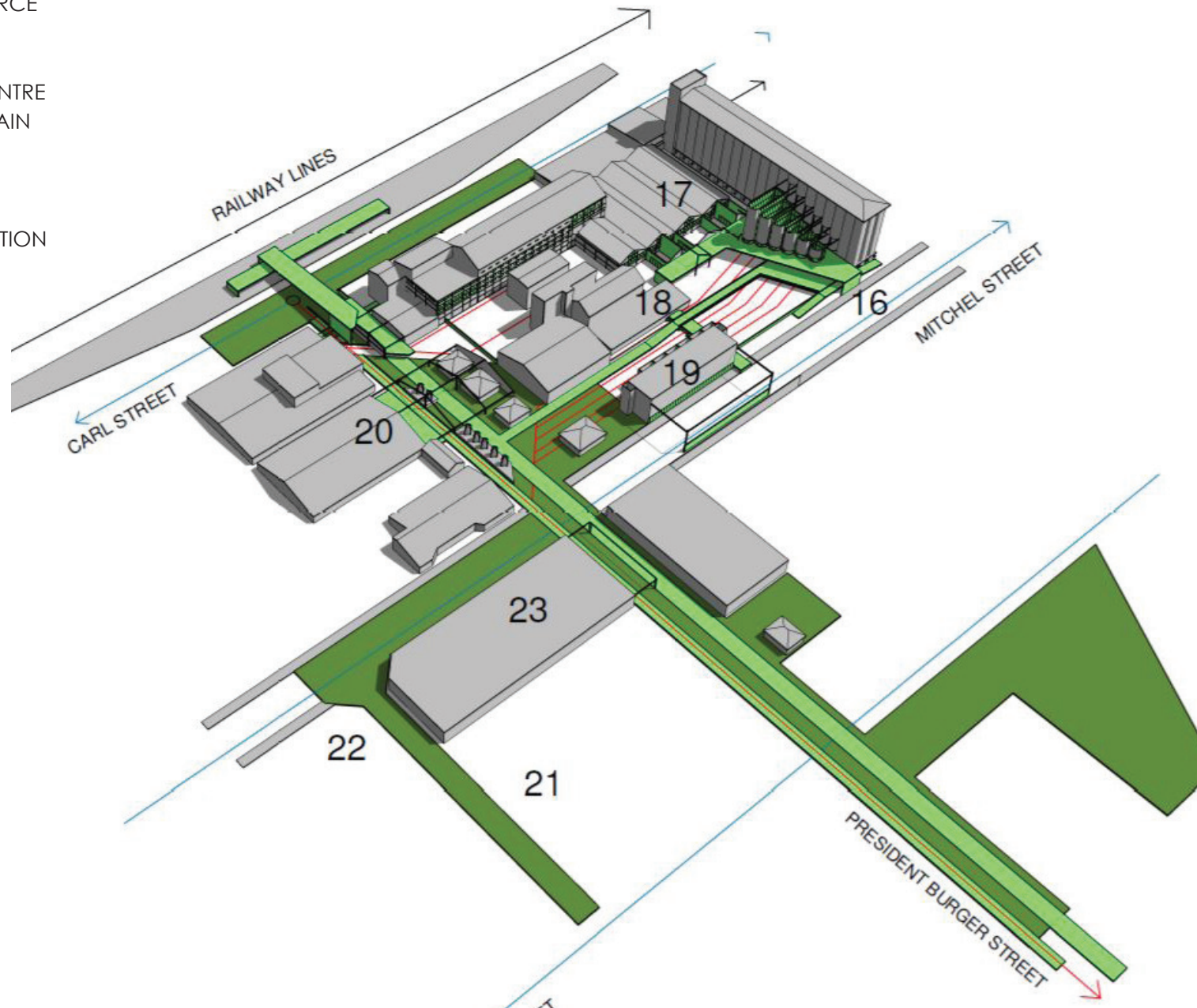


Fig. 4.18: Introduced Programs and Spaces diagram (Author, 2017)

brands exist under the umbrella of RCL FOODS PTY LTD, and it is thus necessary to view the concerns of the individual brands as well as the company as a whole.

### Stakeholders

Tshwane Municipality

Firstly, the spatial planning and development outline for Pretoria West is currently uncertain, as the Tshwane 2055 vision proposes a nonspecific "intense development" for the area surrounding the Pretoria showgrounds. A master plan for the development of this area needs to be compiled.

Secondly, the abandonment of large industries in the city (and the costs that result) needs to be addressed in order to attract investment and mitigate costs towards new infrastructure by rather upgrading existing infrastructure. Multiple stakeholders are present in a wide spectrum of formality. The variety and diversity of stakeholders is evident on all scales ranging from urban to the final design proposal.

Although this proposal serves to catalyse further (non-industry-based) development these stakeholders fall outside the scope of the specific intentions of this dissertation.

### New Food Industries

The establishment of the Industrial Street Market should attract smaller food industries to attach to existing infrastructure through discounted bulk produce and the proximity to suppliers and traders. These industries will be of varying scale and forms the mitigator between the RCL Foods group and the informal traders.

Individual street vendors and the Public

As a concern for public safety the existing public transport facilities need to be upgraded as it is currently unsafe, requiring that pedestrians cross the industrial rail and a dangerous road dominated by trucks to reach their workplace. Accessibility issues are also of concern and labour relations should be addressed as we shift from the notion that labourers should be segregated and transported into the city by train, bus or taxi-towards the notion that the city should be accessible to all. The events of everyday activities should be amplified and a public space for community and economic opportunities is desperately required.

### CONCLUSION:

By intensely programming a series of nodes with interactions between, informal programs could be catalysed to settle along the interactions between these nodes. The informal process is then free to change as the requirements of production change, whilst the formal (existing) nodes remain stagnant. By incorporating spill out spaces for informal programs that cannot be predicted, the existing programmes can serve as a host and be activated by the informal programs in a symbiotic relationship.

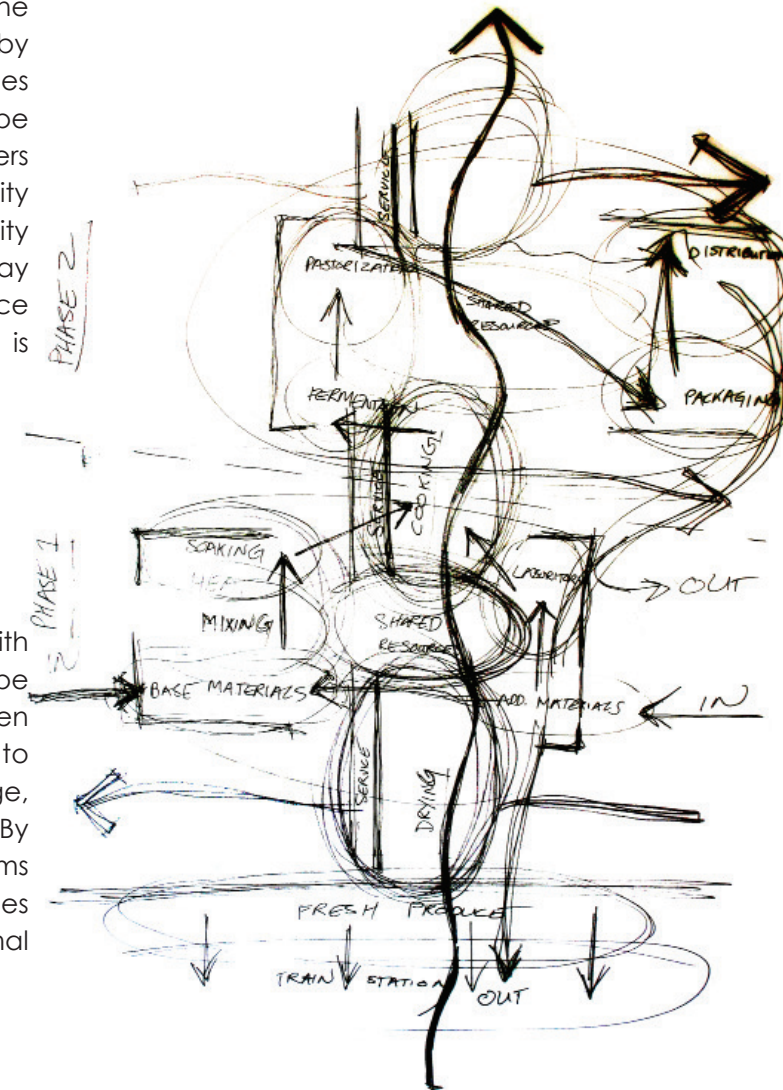


Fig. 4.19: Cross programming and over population of route (Author, 2017)



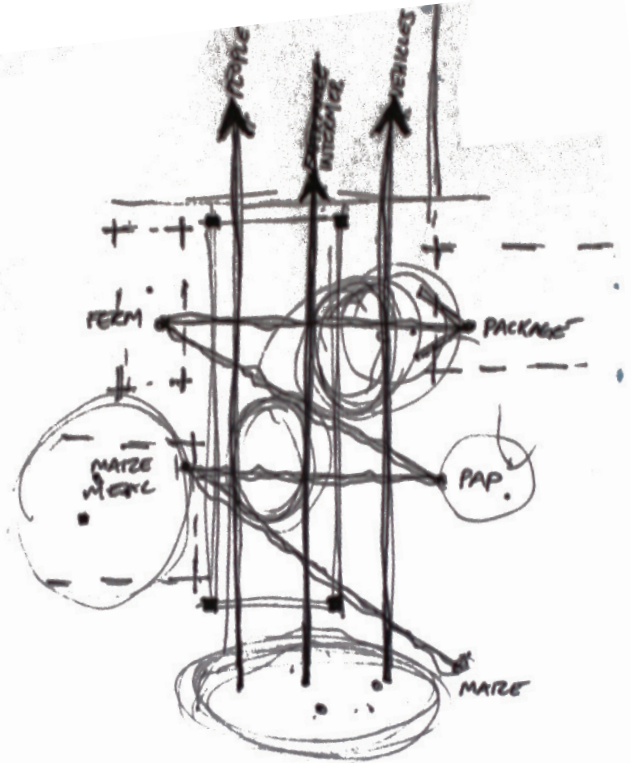


Fig. 4.20: Spaces for collision between circulation and program  
(Author, 2017)

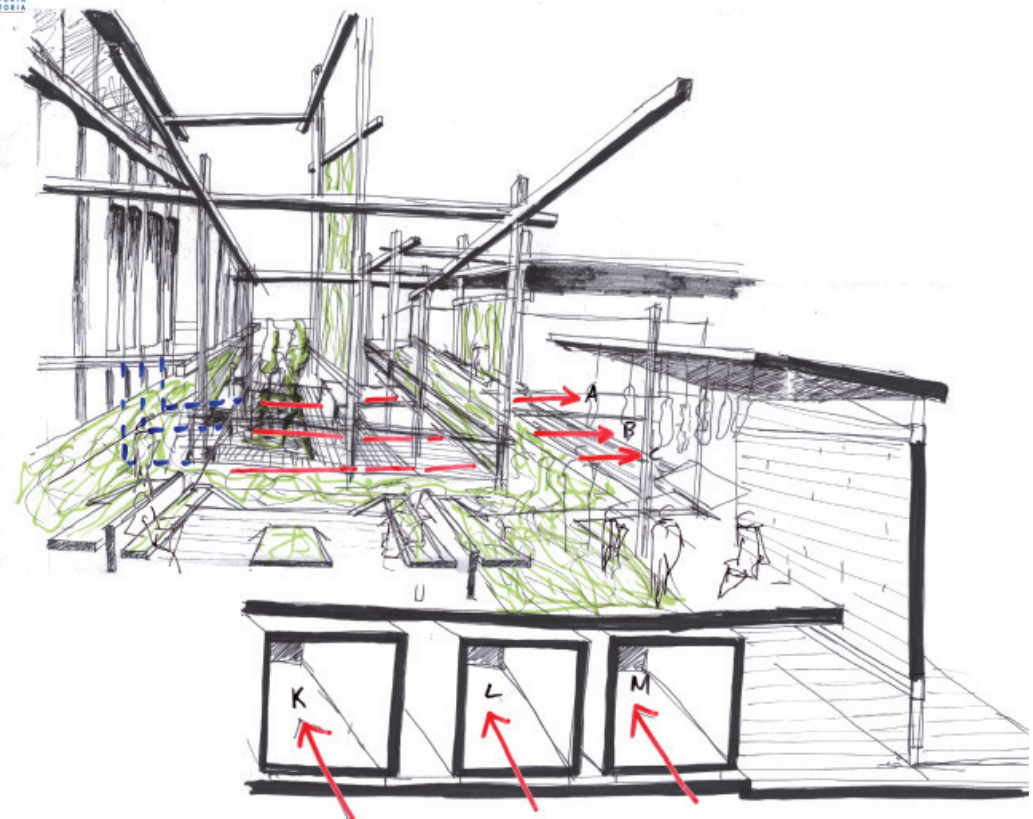


Fig. 4.21: Sketch design for space making around Industrial process and movement (Author, 2017)

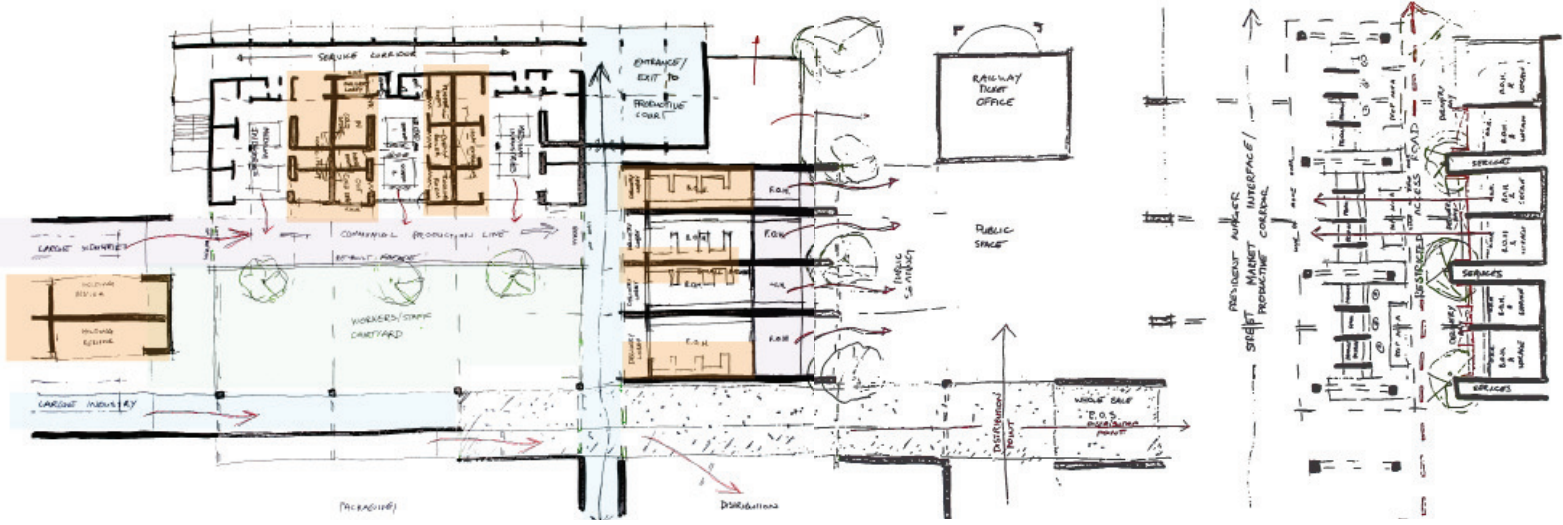


Fig. 4.22: Sketch plan for productive courtyards as spill out spaces (Author, 2017)

# -----[ V ]----- MODEL FOR ADDITIONS



## **MODEL FOR ADDITIONS**

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Fig. 5.1 View from raised train platform (Author, 2017)



## NARRATING THE MORPHOLOGY OF ADDITIONS

Industries in South Africa are quickly becoming outdated as the latest industrial revolution, brought forth by the introduction of information technology, radically decentralized production and ultimately forces vast industrial production lines that are too rigid to compete against the flexibility and variety of new smarter industries to close.

This industrial abandonment is prevalent especially in Pretoria West, where the largest development since its original establishment came from the industrial sector. This development was spurred by the establishment of Iscor (now known as Mital steel), the Pretoria west Power Station and other large industrial plant defining the skyline. These industries were dependant on infrastructure and later the large scale food production would start attaching itself to the railway lines.

The Milling and food production industries quickly overshadowed the residents dwellings, and the character of Pretoria West was forever changed. The Massive Silo's dominating the skyline. Tshwane 2055 is envisioned with large developmental projects that would finally develop the western part of the city.

Along with the West Capital development envisioned for Thswane 2055 Pretoria West is said to be redeveloped. The development can be compared to the density of Sunnyside due to its proximity to the CBD. My project aims to address industrial food production and industry's relationship to the City.

Through the study Area's relationship with the city correlations between various industries are found and an envisioned a food production corridor spanning from the Pretoria West Railway station towards the Tshwane Market. This artery will embrace the informal markets in Marabastad as end user and distribute the products throughout the city by means of the Tshwane Market. This productive corridor is based on a recurring theme found in Pretoria, where the pedestrian movement becomes amplified in the North South direction as a result of the linear development of Pretoria. The most prevalent example is the connection between Pretoria Central Train station and the CBD with Paul Kruger street as the connective artery.

This market addresses the citizens relationship to industry as well as solidifying the role and character of Pretoria West around which development can attach. The public spaces gradually changes as it is influenced by its context the overall themes being of production in the South, Informative in the Showgrounds and Retail in the north.

Due to my research question addressing industry and its relationship to the city I chose the RCL foods Milling division as a design testing area for the establishment of the Productive corridor. Understanding the morphology of the city block and the establishment of production, forms the first part of a layered understanding of heritage. The displaced and misused houses on site thus form an important role in telling of a narrative and unveiling of the development.

The development and extension of production lines in the structures themselves are deeply visible in the layers and additions of the buildings. The extension



Fig. 5.2 Site photo of original facade construction (Author, 2017)



of the Silos continues on the exact structural rhythm, but also less obvious is the repetition of structure in the Milling buildings as the operation grew in both directions. The structure thus becomes extension of the old as the rhythm and expression thereof is continued, with services added to the exterior.

As for newer additions the same principles were used wherein structure orders and is expressed with a direct use of materials. Concrete frames with brick infill and high level windows as seen in the administration block. These buildings bear no relation to outside as they exist for the mere purpose of accommodating a function or production that is completely internalised. From these understandings I started to develop a design approach. The erven boundaries as can be seen in the historic photo, is used as the largest scale of ordering in making sense of a very cluttered and seemingly disorganized site. Structure and functions are not only respected but rather amplified by extending towards the street to create a market. The development against the railway line is mimicked as the road is acknowledged as the new infrastructure backbone with its key component being public space.

The design is mostly limited to ground level as existing interactions almost exclusively happen between buildings on ground level with the facades representing the vertical activity that lies behind it.

## MODEL FOR ADDITIONS

Architectural Issue

Urban planning principals alongside the industrial model for food production had a direct impact on the architectural environment of the study area. Whilst the formalized and functional production was



Fig. 5.3 1968 Aerial Photo of the Milling Site <https://supremeflour.co.za/why-supreme/heritage/2017>



Fig. 5.4 Current Milling Site (Google Earth, 2017)



Fig. 5.5 Photo of Original Milling Structure <https://supremeflour.co.za/why-supreme/heritage/2017>



Fig. 5.6 Additive Extension to Original Structure (Author, 2017)

implemented in the industries, the informal nature of the markets culture in Marabastad was aggressively contested by the apartheid government (Christie, 2017). Today the informal sector contributes an estimated 9.5% of South Africa's GDP and is embraced by the legislation as individual entrepreneurship is encouraged and allowed to thrive (Ligthelm, 2006: 33). This shift in governance has brought about a thriving informal environment in Marabastad which is contrasted by the large scale, formalized, production line methods of food production in Pretoria West.

The role of Pretoria West (specifically that of the area surrounding the Showgrounds) however, can be seen as a supplier of food to the markets of Marabastad. These industrial buildings and structures were constructed for the sole purpose of housing the specific function that took place inside it, with no connection between the inside and outside environments.

*“History exists if a form maintains its original function. If the form or building has been adapted to a different use, then we are in the realm of memory.” - (de Arce, 2014: 7)*

de Arce (2014) states that once a building loses its function it becomes an artefact with the city. Then, whenever possible, the original function of structures with a historic significance should be maintained. This correlates to the notion that we should not allow functioning industries to die and become post-industrial landscapes (TICCIH, 2012: 208) before we address spatial concerns.

However, it is usually only after a property is transferred to a new owner, who attempts to redevelop the property, that the heritage significance is questioned and used as a protective blanket to deter owners from demolishing these structures.

“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.” SAHRA 1999: 58

This Act thereby protects the heritage but not the function. By this time it is too late to maintain the original function, especially in industrial buildings, as operations would have ceased by the time of transfer. I thus propose that instead of waiting to repurpose the Silos and milling buildings in Pretoria West, we should protect functioning industries from becoming irrelevant. It is therefore important to discuss possibilities on a theoretical level for the future adaption of an existing/functioning industry.

Only in acting before production halts can we retain history instead of memory.

### MODEL FOR ADDITIONS

The current site seems to be disorganised and without a distinct architectural intention. By investigating the morphology of not only the specific site but industry in Pretoria as a whole, various historic boundaries were discovered on site. As Industry imposed itself onto the initial residential urban fabric, various erven were consolidated to form the initial milling operation. The incremental creep of the industry into the entire city block (and ultimately beyond the city block) then seems to have been as a result of systematic

## STEREO TOMIC REPITION OF STRUCTURE AS FORMAL ORDER AND TOOL FOR NEW BUILDINGS EXTENTIONS



Fig. 5.7 Admin block (Google Street View, 2017)



Fig. 5.8 Grain Silos with Overhead Pipes Leading to the Oil Refinement Plant (Urban Vision Group, 2017)



consolidation of these erven. When posed with the challenge of ordering a seemingly disorganized site, the palimpsestic layers can be rolled back as we utilize the understanding of the morphological development and use the original/repeating erven as an ordering system. In short: the historic erf boundaries imposed an ordered grid onto the existing site.

Due to the repetitive and uniform nature of this erf division the site becomes much easier to understand and navigate. Some of the original dwellings still remain on site, albeit in a less than favourable condition and under utilized as makeshift offices. This condition clearly summarizes the imposition of industry and the strangling effect that industrial development had on the residents of the day.

### MORPHOLOGY OF SITE: EVOLVING A MODEL FOR ADDITIONS

Various additions have been made to the original structures as the production line has grown and changed over the years and these additions have been made in a repeating distinct fashion. The original milling and sorting buildings consisted of: a heavy exposed concrete frame, masonry infill, a simple corrugated pitched roof with gable ends and typical to industries of the time; steel pivoting windows. The most defining feature of the original buildings is the depth of the concrete beams (and width of columns) as they typically had to accommodate massive internal volumes. These framed structures were repeated multiple times throughout the building in a regular rhythm in accordance to the spans able to be achieved in concrete construction at the time.

When these structures were later lengthened (in both directions) the same method of construction

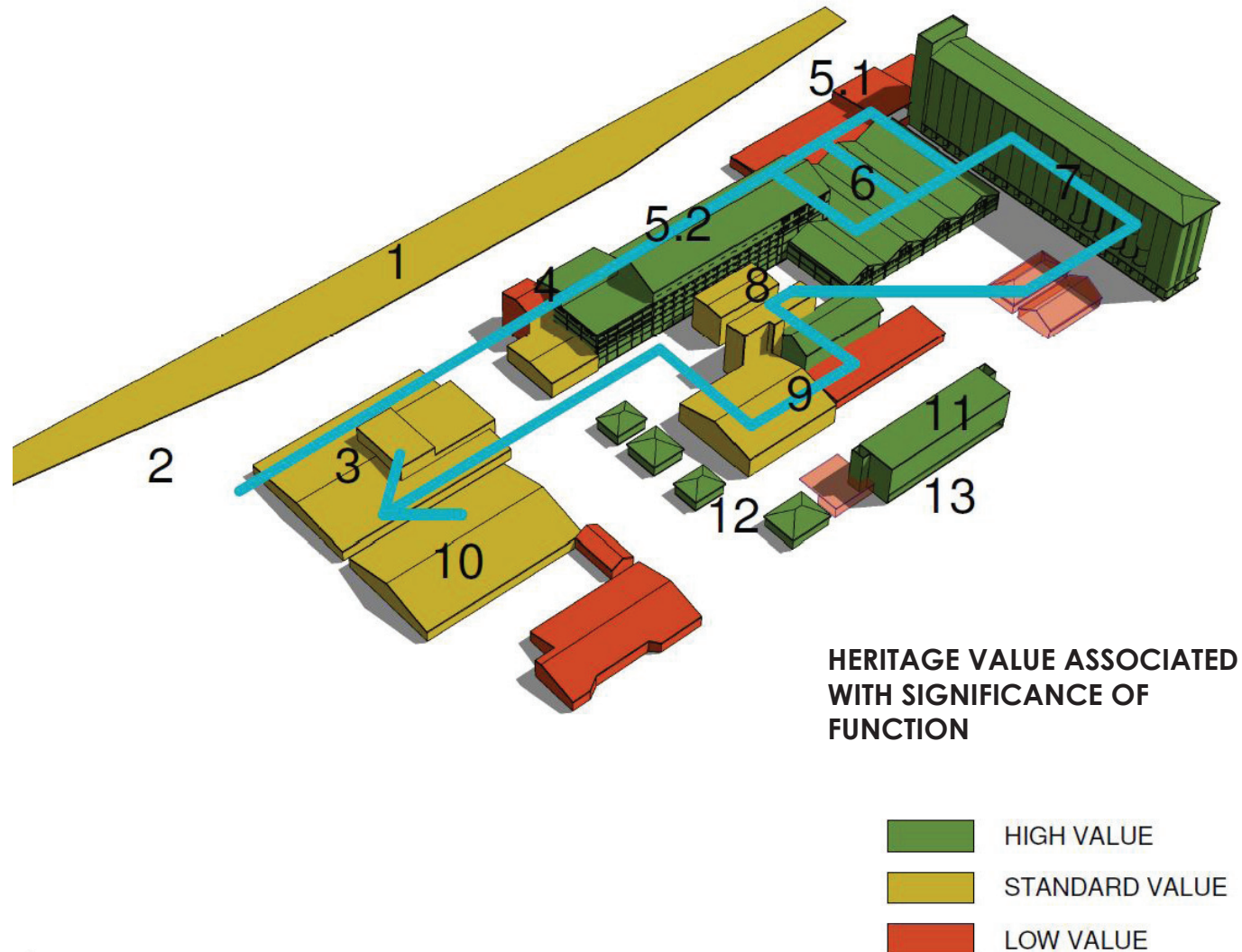


Fig. 5.9 Heritage value of structures (Author, 2017)

was utilized and as the structure was once again repeated to extend the function. It is only through close observation that this difference can be noticed amongst the mash of additions that followed.

Construction of the administrative building, to the north of the site, is architecturally derived from the original sorting and milling buildings and expresses a rhythmic pattern of concrete structure with a dark masonry infill and high-level steel paned windows.

Today the silos dominate the skyline as a defining monument to the agriculture and food industries. Visible throughout Pretoria West, only a feint vertical shadow reveals that it was ex-tended from the original 12 silos to the current 24. This time an exact reproduction of the circular structures extended the function of the original silos.

The site also seems to be littered with lightweight steel additions (the inconsistent profiles hinting that these additions were not done simultaneously). In contrast to the original buildings they seem temporary and subject to change, leading to the next model for additions – the ease and speed of construction as well as the ease and speed of dismantling the structure.

These additions mostly seem to serve a supplementary function to those functions housed in the buildings described above. Through closer inspection the overall dimensions of these additions follow the ordering rhythm set by the original building and its additions.

Although the steel structures do not express its own structural rhythm as is the case with the original concrete frame each lightweight addition

corresponds directly to a specific part of the stereotomic additions. The external facades thus are a direct result of the functions housed inside of them and can be attributed to the fact that the buildings and structures themselves are purely functional in nature.

The repetition of structure is one of the only constants to the additions on site and once again, due to its regularity and uniformity, serves as an ordering grid for future additions in a building that has become increasingly disorganized.

The notion of additions through repetition in structure is evident throughout the site. In modern construction, these repeating rhythms resulting from material spans replace the ordering principles used by the Greeks (such as the golden section) (Ching, 2014; )

### PROGRAMMATIC PRECEDENT: HIGH STREET ABATTOIR

Continuing the interface between city and industry in a productive environment the High street Abattoir serves as a unique model for a programmatic approach to design. (Nieuwoudt, J.H., 2012) With industrial process being the driving design factor for industrial buildings/sector proper integration between the process and the community creates a thoroughly integrated function.

### THE ARCHITECTURE OF ADDITIONS

The acknowledgement of time in architecture leads to a palimpsestic approach to architecture, wherein the built environment is seen as a series of layers. With even what is commonly referred to as an empty site bearing various layers of cultural, social and other

## TECTONIC REPETITION OF STRUCTURE FOR SUPPLEMENTARY PROCESSES



Fig. 5.10 Steel Structure as Tectonic Addition (Urban Vision Group, 2017)



Fig. 5.11 Steel Construction as Tectonic Addition (Urban Vision Group, 2017)

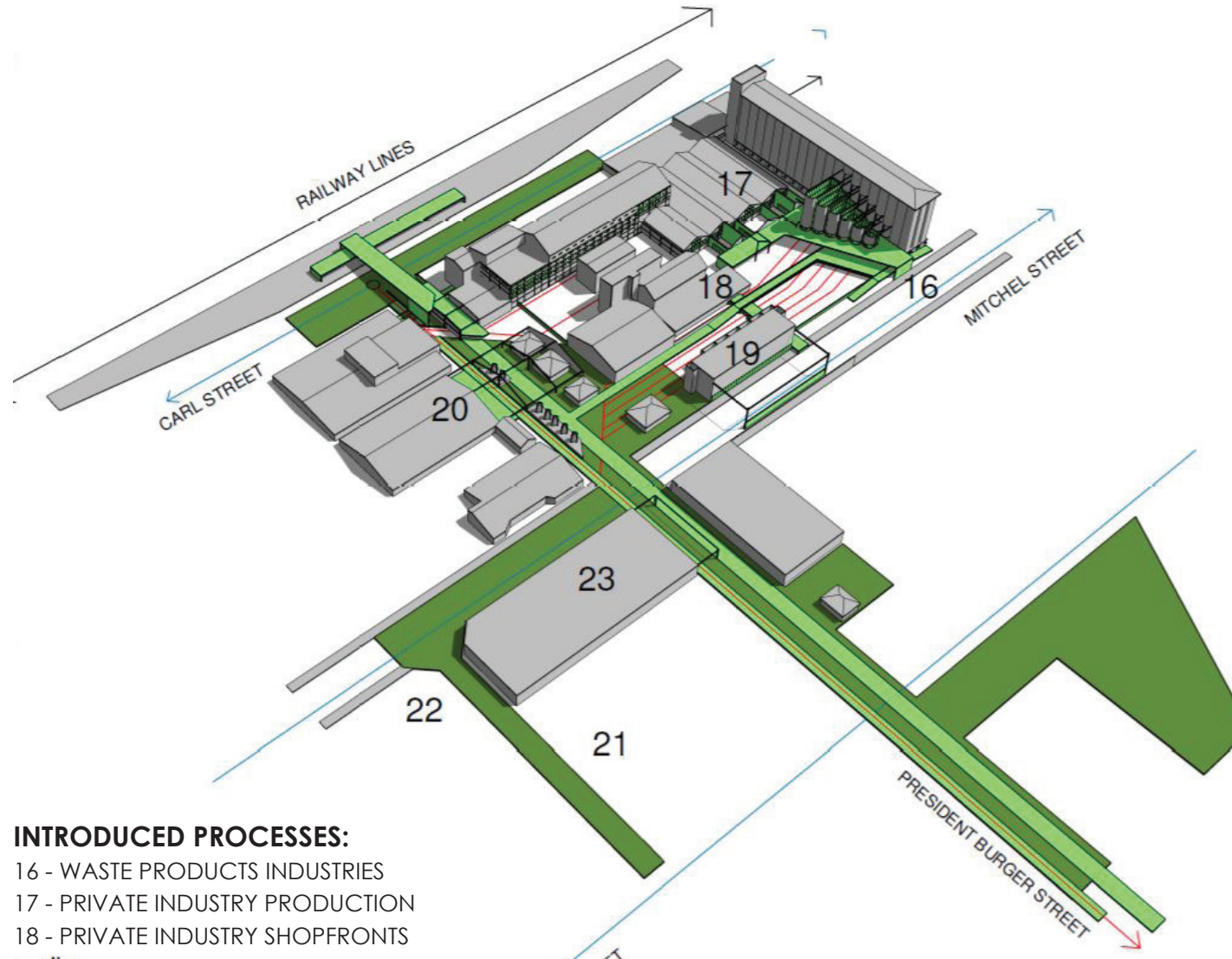


layers applied to it either directly or as a result of it's context (de Arce, 2014).

I propose that as this structural grid and the methods of additions could not only order what seems to be disorganized but also can outline the new proposed intervention as the functions are extended from the original buildings towards the public realm.

My intentions are thus to dismantle the façade and extrude the function and extend the production line towards the public. My intentions are solidified in 2 aspects of the design. Firstly the progression of the productive corridor through community centred production spaces in the north South direction. Secondly the scale of industry in the east west direction perpendicular to the productive corridor. Further design approaches stem from the historic eradication of landscape, the public and open space as these industries established. Usually a design stems from the direct environment and its influences. But due to the neglect and over engineered landscape on site the public realm and landscape is shaped from the surrounding buildings as the existing structures now defines an industrial landscape.

I have gone through great effort in this initial ordering and extrusions in order to create a legible urban condition. Through various models I experimented with community and socially active production, acknowledging that food production in itself is an activity and thus should serve as the central pivot in the design. These design guides can be adopted for future developments that are to directly attach to the productive artery and serves as a continuous language for the productive corridor. The test sample of the design includes and progresses



#### INTRODUCED PROCESSES:

- 16 - WASTE PRODUCTS INDUSTRIES
- 17 - PRIVATE INDUSTRY PRODUCTION
- 18 - PRIVATE INDUSTRY SHOPFRONTS
- 19 - LABOURER'S DWELLINGS
- 20 - PACKHOUSE DEPOT
- 21 - PRETORIA COLD STORAGE (EXISTING)
- 22 - THERON'S MEAT MARKET (EXISTING)
- 23 - EXTENDED MEAT MARKET (CURRENTLY UNOCCUPIED)

\*INCLUDING INFORMAL STREET VENDORS

Fig. 5.12 Diagram of Introduced Spaces (Author, 2017)

through firstly a starkly separated Industrial Transport Interchange, a public release space, and crossover from grain market to meat market space.

Pedestrians are given precedence over HMV's as the entrance to the site is elevated and extends through the extruded façade including the user into the process of food production before leaving the terminal.

Pedestrians are given precedence over HMV's as the entrance to the site is elevated and extends through the extruded façade including the user into the process of food production before leaving the terminal. Thereafter the user descends and is released into a public landing wherein the existing dwellings is occupied by home industries that are serviced from the rear. The existing Packhouse's façade is extruded all the way to behind these dwellings to form an industrial silhouette as backdrop for the dwelling to tell their story and further define a legible urban space. The Pack house with addition of a lightweight frontage is converted into an grain depot that feeds smaller industries and the informal sector.

Circulation is primarily pedestrian with a single restricted access road and delivery bays for service vehicles originating from Carl street, which frees up the city from HMV's as it becomes designated to industrial Vehicles. Thereafter the user enters a productive public court surrounded various scale of industries the are in themselves arranged around internalised common spaces. This test area currently serves as a testing ground for my design approach and ordering principles as these would ultimately extend along the production corridor. The essence of the design I feel should thus be captured in the typical

detailing of junctions and arrangements in order to fulfil the intentions of the urban vision.

## CONCLUSION

The relationship between industry and the city is a damaged one. However, with its existing mix of residents, industry and commerce (albeit segregated from one-another) Pretoria West holds the potential for a unique relationship between industry and the citizens of Pretoria.

Only by understanding the role that these industries play within the greater context of the city can the rich character and culture of a place be amplified and solidified in a development plan. Catalysed by its heritage, development will become a manifestation of the character of place that will attract further growth and simultaneously embrace the existing stakeholders.

I conclude that theoretically it is possible to bridge the vast void that exists between the industrial environment and the public realm by introducing a community setting for production and reimagining the way that industries function. Through an intricate morphological understanding of industrial development, we can design a future for industries that is contextually appropriate.

The existing industrial built environment is often misshapen and illegible and whilst it is difficult to organize (and navigate) the seemingly disorganized site, it is possible to resolve; through understanding historic boundaries and development patterns that can be utilized as organisational grids. In this case historic erf divisions and consolidations can be utilized as an organisational tool at a large scale and

should serve as a guide to where future structures should be erected in order to maintain a legible built environment.

When designing future additions, understanding the historic expansion of these industrial buildings holds the key to a harmonious relationship between old and new. With minimal architectural intent, these buildings supply little for the architect to grapple onto, but with material spans and structural repetition forming the underlying ordering principle; it is possible to create a logical and ordered ex-tension of the past.

With all considered it should become apparent that we should, in fact, not allow the industrial heritage and infrastructure that supports it to die, but rather that it should be adapted to suit the needs of to-morrow.



Fig. 5.13 Site Photo Collage (Author, 2017)







# CONCEPT -----[VI]-----

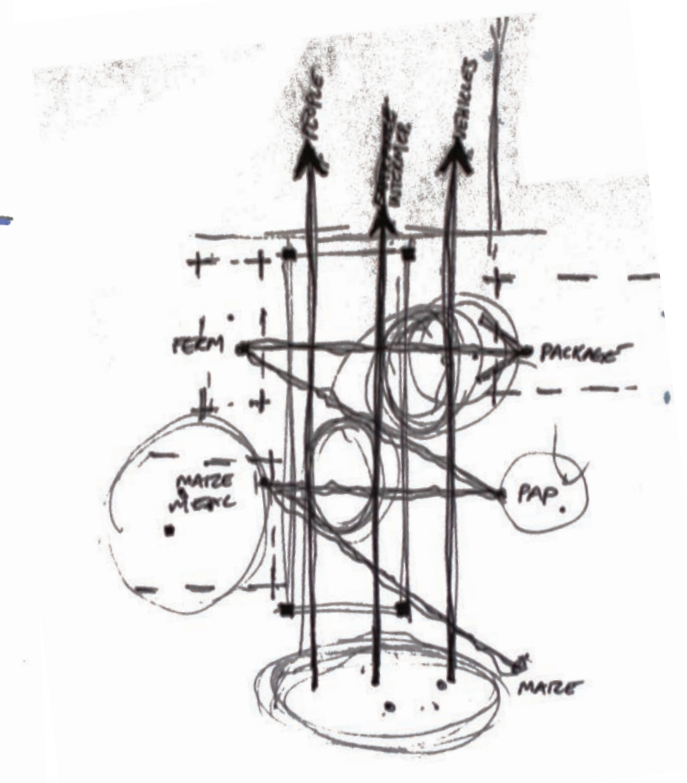
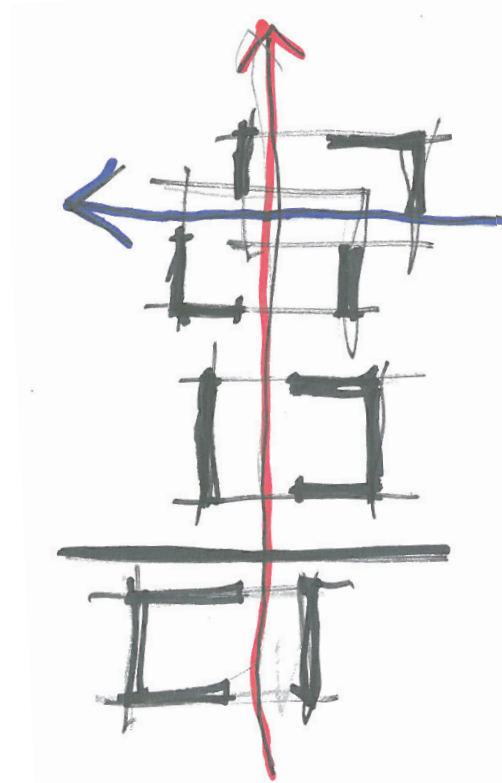
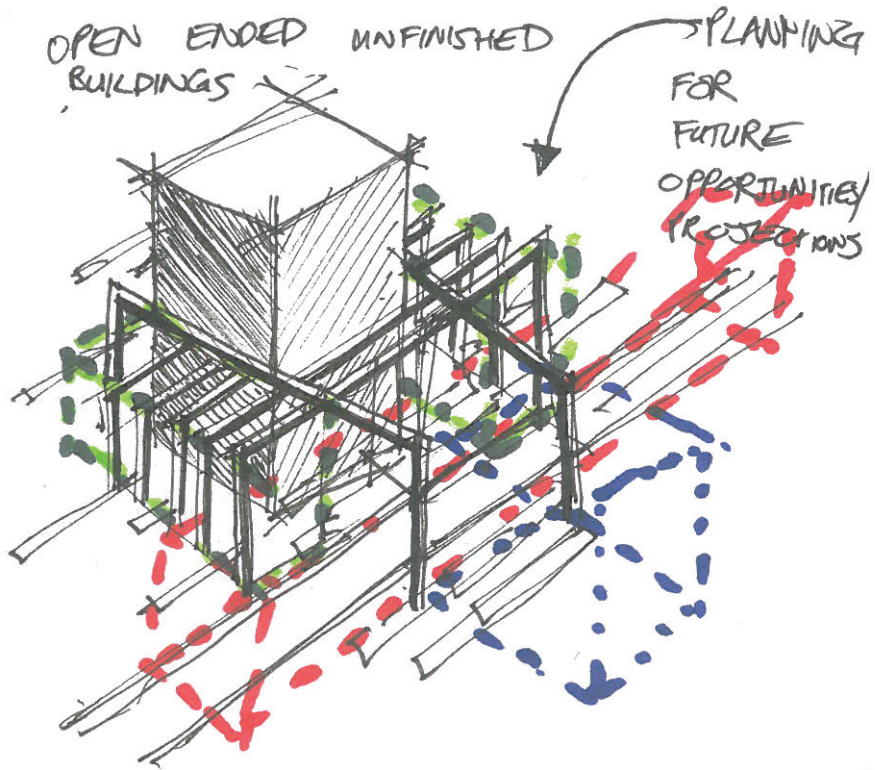


## CONCEPT

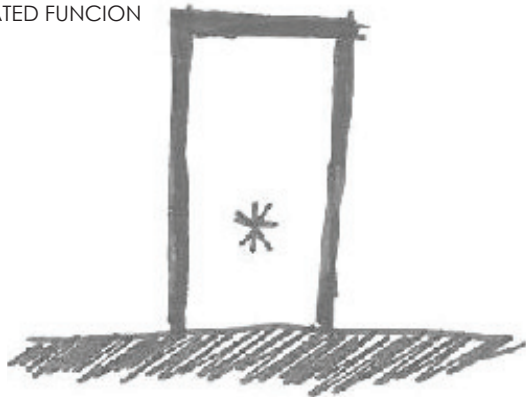
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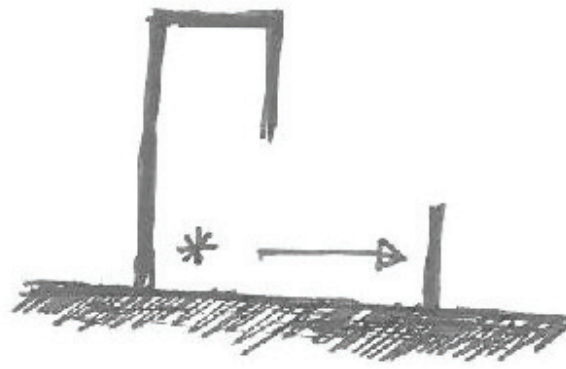




ISOLATED FUNCTION



EXTENDED FUNCTION



DYNAMIC FUNCTION

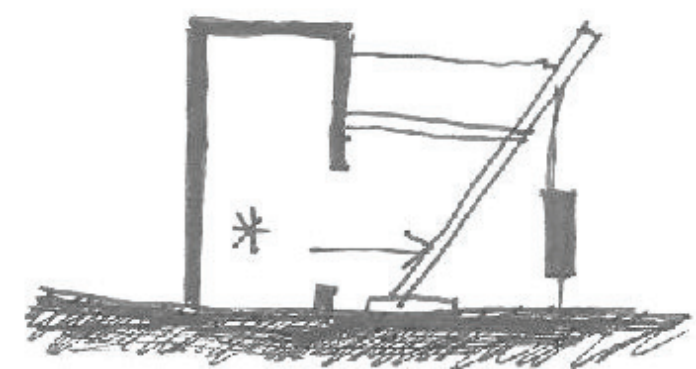


Fig. 6.1 Concept Development Sketches (Author, 2017)

## CONCEPTUAL APPROACH

Once the morphological study has been completed and understood one can project and interpret future trends and short-falls of the existing. From this understanding, the project intentions have been outlined in order to fulfil not only the requirements of today but of the future as well.

The project's individual intentions as a reaction forms the driving factor for decision making, whilst the site, theory and program is utilised as tools in order to fulfil the project intentions. <insert Parthenon heritage example>. With this approach for example it is of more importance to utilize heritage to fulfil a specific programmatic intention rather than to protect heritage by applying a new program to an unrelated building of heritage value. In short: Emphasis falls on utilization of context, theory and programme with the intentions unifying and synthesizing the response to each of the aforementioned factors.

To achieve this, the intentions themselves need to be synthesized into a singular concise narrative. This will avoid the obvious "checklist" approach to design and instead sets out a holistic essence that could narrate the design process and design decisions. The synthesis of the design intentions into a singularity is crucial to the "DNA" of the building as it encapsulates a unifying ideal throughout the entirety of the architectural solution.

After the specific design intentions are distilled into a singular design concept that encapsulates the essence of the required intervention. The narrative becomes the underlying yard-stick to which the responses to context, heritage, theory and programme is measured.

## PROJECT INTENTIONS

### Theoretical Intentions

Following the morphological study and reflection of the industry-city relationship, as a whole, one can conclude that industry will be returning to a community setting and the relationship between city and industry would become symbiotic in nature. This projection is supported in theory as proposed by Jankovic, Farel and Yannou in their Conceptual framework for Eco-Industrial parks.

### Contextual Intentions

A morphological understanding of the development of the intricate situation that exists on site today leads the contextual discussion. Various models for expansion, additions and new developments can be distilled from this understanding. As discussed in the model for additions chapter, there are few architectural principles or unities for the architect to latch on to for future interventions and the site itself alienates the individual and is in a state of disarray.

The intentions are thus to create a legible and harmonious condition that includes the individual. Also, the limited historic architectural intentions that are available on site are to be utilized and amplified through the establishment of a model for additions (a result of the morphological study).

The extension of the old into the new becomes the initiation of the technical investigation as well as the instigating programmatic intention.

### Programmatic Intentions

Currently the functions on site are isolated from outside influences. Natural systems and the community setting that the city offers has been completely neglected

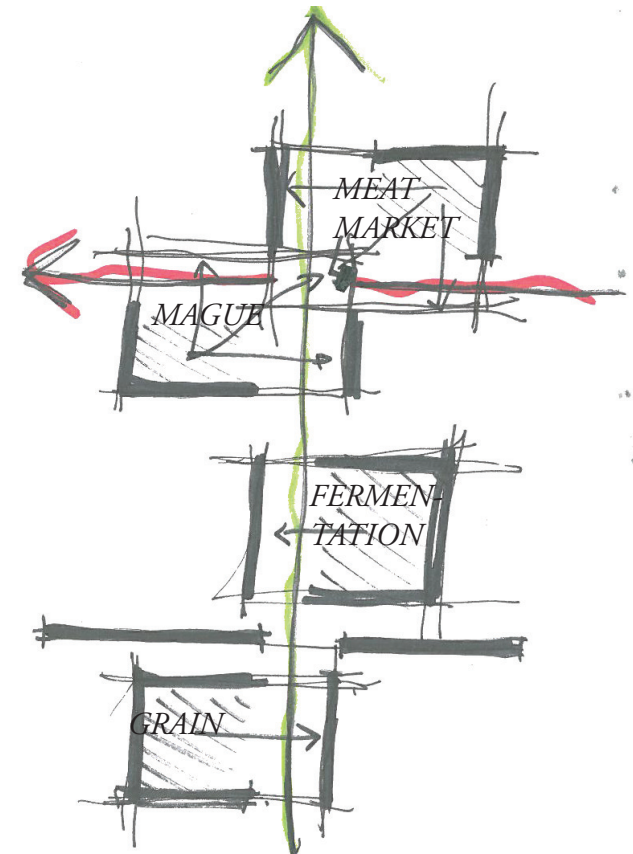


Fig. 6.2 Extending the facade to allow program to spill out (Author,2017)

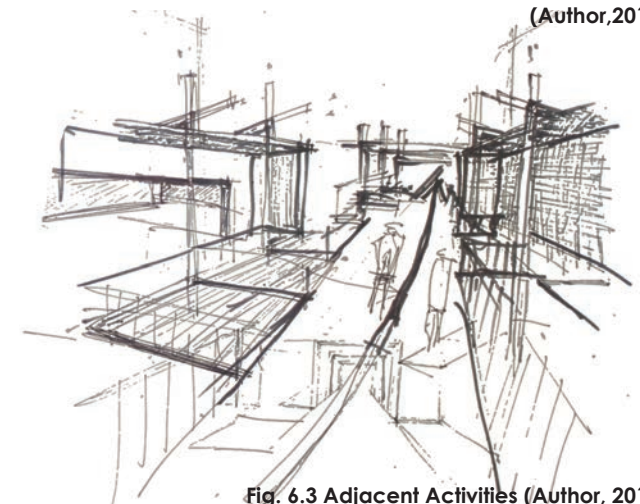


Fig. 6.3 Adjacent Activities (Author, 2017)



in the planning of the specific program. Extending these isolated functions towards the street (public interface) allowance can be made for secondary and supplementary functions to attach to it.

As defined by the Eco-Industrial Parks the establishment of anchor tenant (Mageu) with secondary industries that link with this tenant, should result in a collaborative and more sustainable environment.

The central programmatic theme consists of the cross programming of industry and the public. This results in a community setting that addresses the research question: Can architecture serve as a tool to reconnect Industry to the city? The central programmatic theme is recurring throughout the intervention and apparent at various scales of intervention. From the initial urban framework and organisation of industries to finally the integration of shared resource systems and shared public spaces. (Komarzynska-Swiesciak, E., 2013)

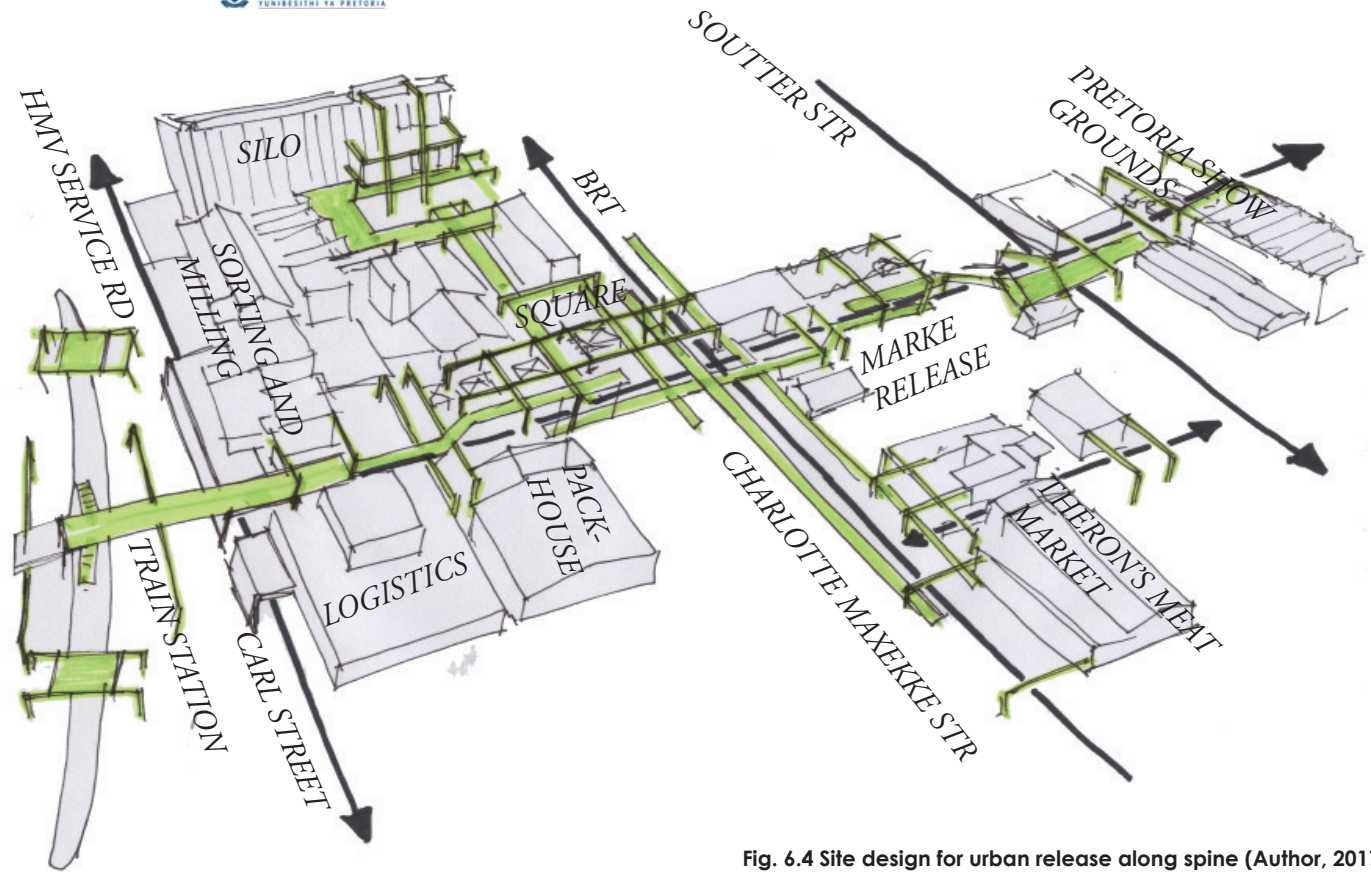


Fig. 6.4 Site design for urban release along spine (Author, 2017)

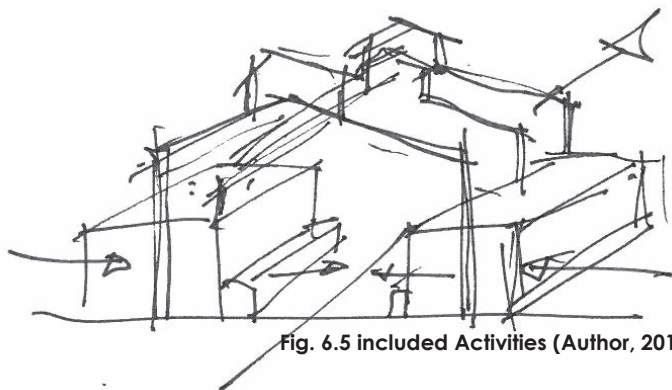


Fig. 6.5 included Activities (Author, 2017)

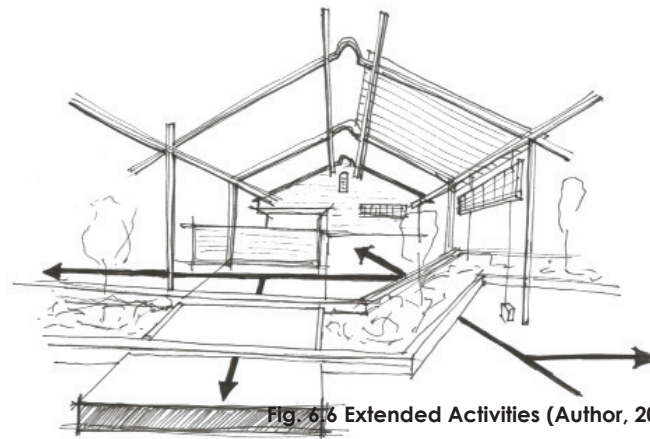


Fig. 6.6 Extended Activities (Author, 2017)

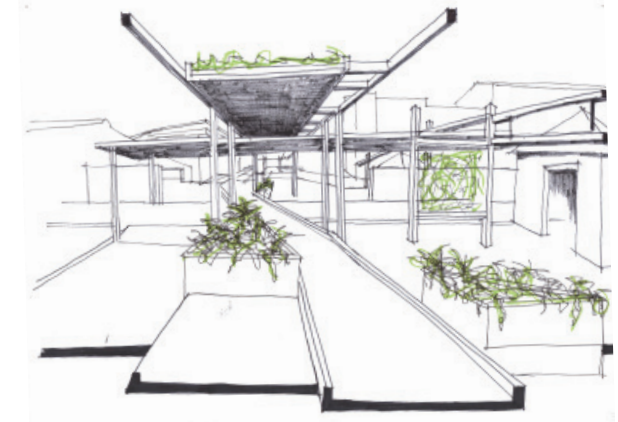


Fig. 6.7 Progressing Through Activities (Author, 2017)

## FINAL CONCEPT

A roof draped over a cross-Programmed, productive network.

The synthesis of intentions into a singular concept that encapsulates the essence of the of the required intervention was developed early on in the investigation. Although the concept is utilized as the yard stick to which design decisions are measured in terms of context, program and Theoretical application, it is important to note that the concept is derived from the issues and intentions stemming from the context, program and theory. This leads to a cyclical design process where eventually, the design issues become the design informants and these ultimately become the design measuring device that measures responses to the design issues.

The extension of the production line towards the public interface:

This concept is utilized throughout the design. For an example as an approach to heritage:

Whilst the statement of significance outlines which parts of the buildings are of value and which are not, the project intentions are summarised in the concept that describes how these various parts of the building should be adapted and how the new addition should be approached in order to utilize the heritage value to fulfil the intentions. The concept also plays a unifying role, as it unites the heritage approach with the approach to systems de-sign/programmatic function and theoretical outcomes.

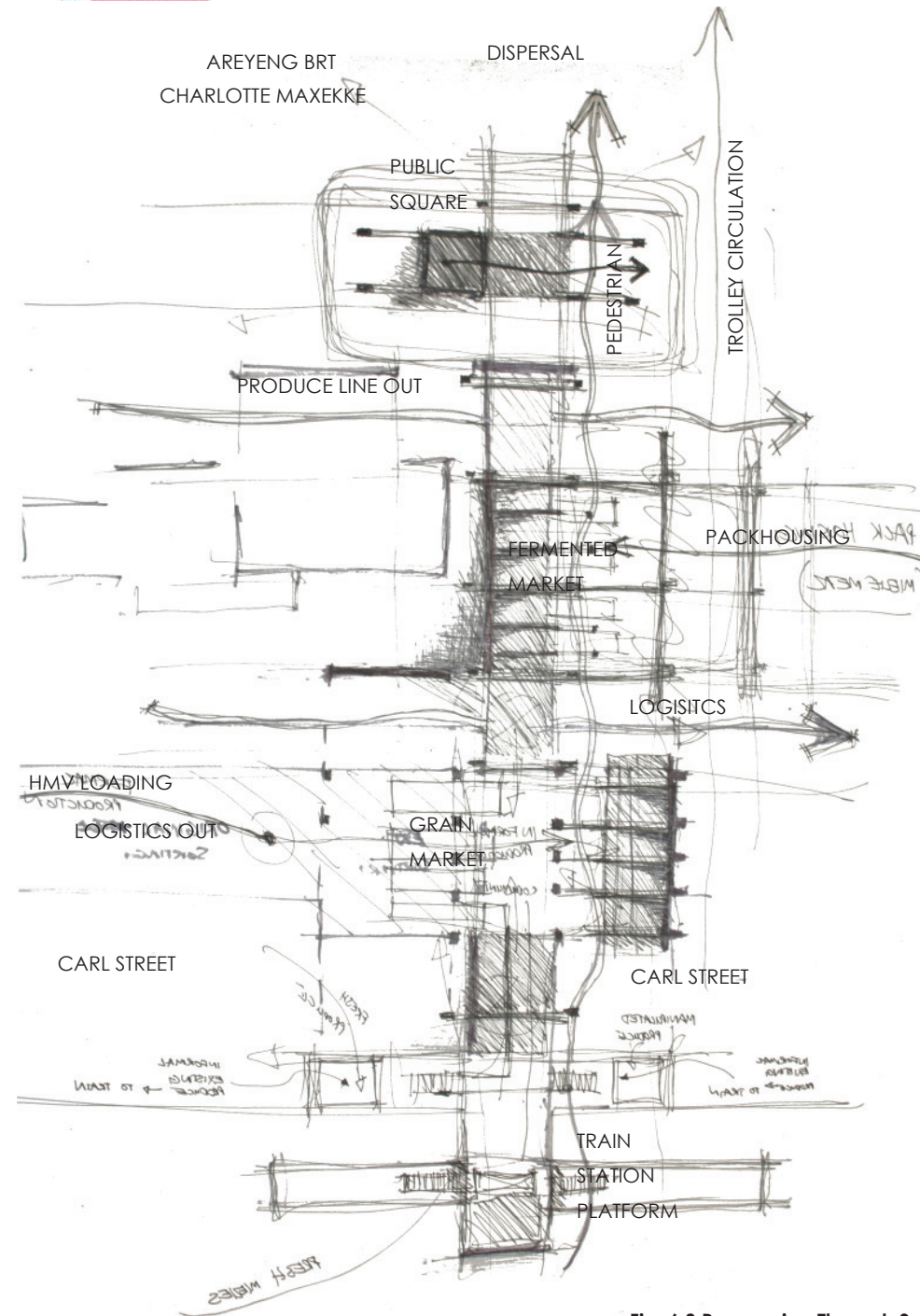


Fig. 6.8 Progressing Through Spaces (Author, 2017)



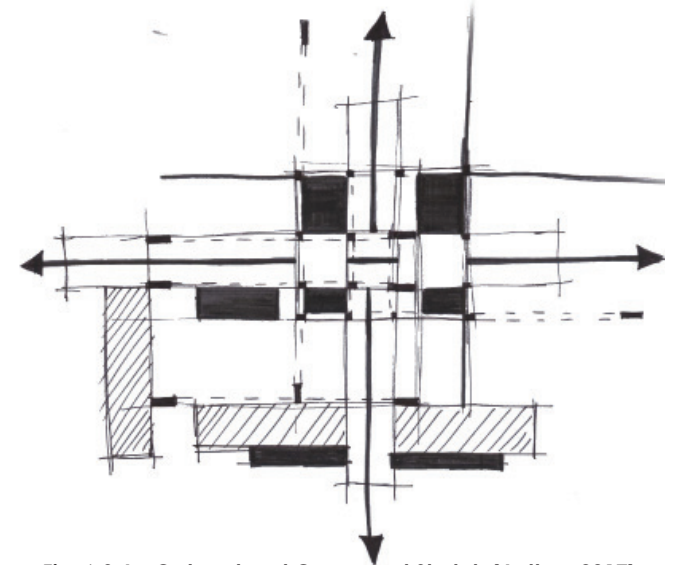
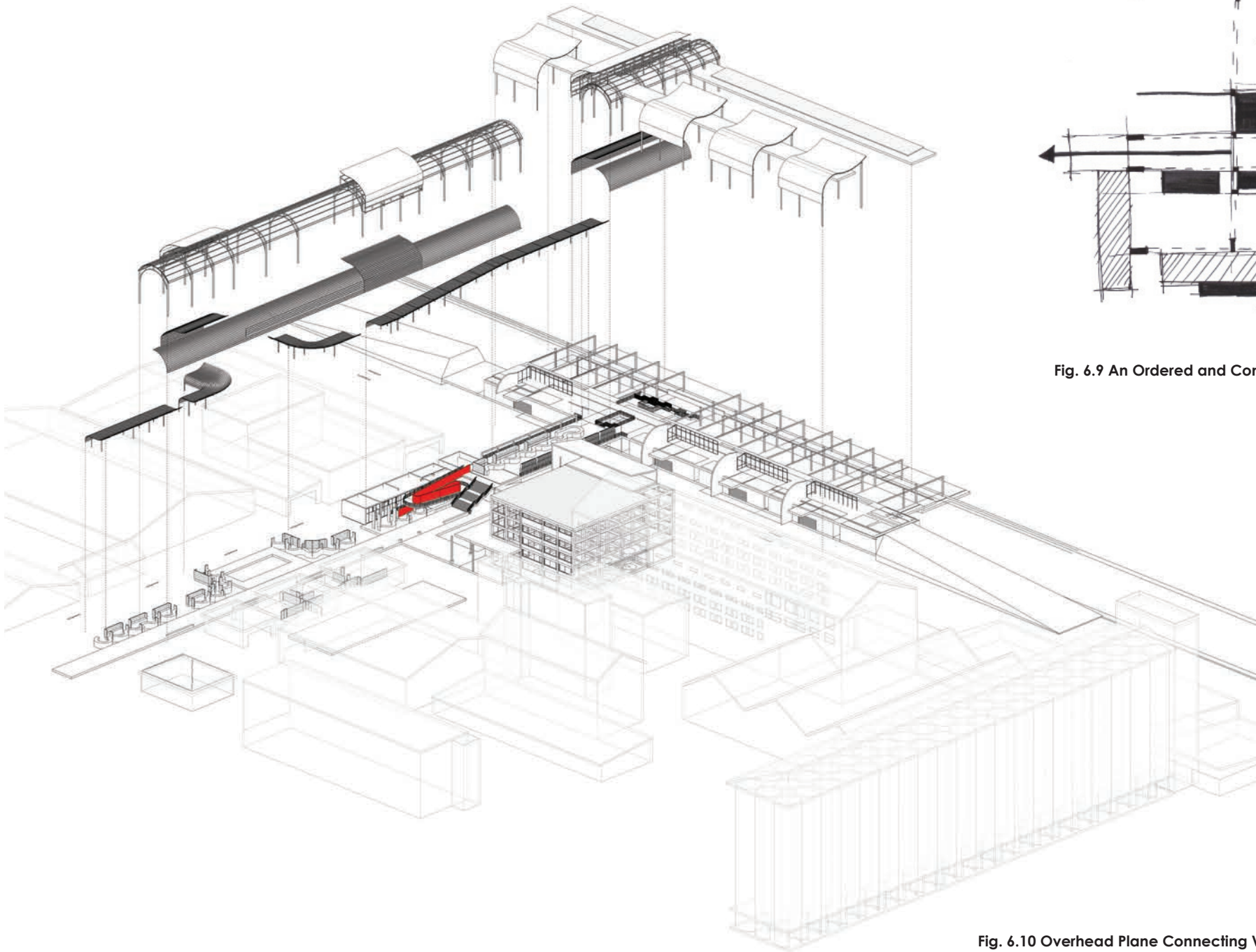


Fig. 6.9 An Ordered and Composed Sketch (Author, 2017)

Fig. 6.10 Overhead Plane Connecting Various Individual Elements Below

# -----[VII]----- DESIGN DEVELOPMENT



## **DESIGN DEVELOPMENT**

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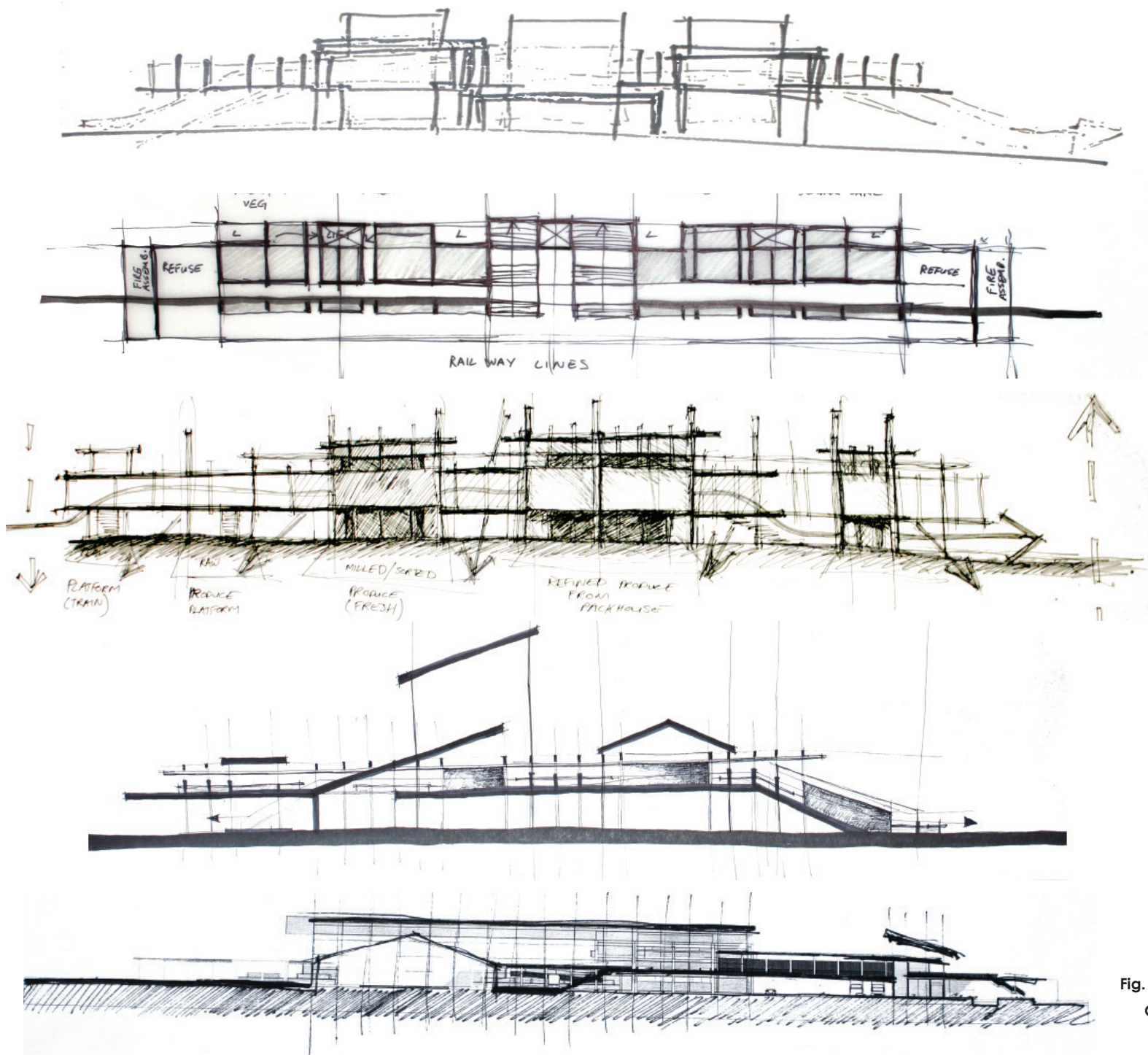


Fig. 7.1 Evolution of Elevational Composition (Author, 2017)

## DESIGN DEVELOPMENT METHODOLOGY

The theoretical argument formed the outline and intentions encapsulated by the concept. The design development extended these theoretical approaches with legibility, complexity and cross-programming became the focus of the design intentions. The design methodology was aimed at iterating various design solutions that addressed these issues.

The existing context was measured according to the method prescribed by Evans and Schiller (2006) and forms the baseline figure that would be compared to the final design solution. The comparison of these figures would show the impact of the intervention on the Urban Fabric and indicate the appropriateness of the design as a large urban intervention.

The design intentions were distilled into a series of diagrammatic sketches. These sketches were utilized as 2-dimensional compositions that could be retraced and re-configured and quickly test the viability of a solution. Frequently, these diagrammatic sketches would purposefully be left without annotations in order to retain the integrity of a pure composition that did not have the restraints of, for instance, a floor plan. This allows the designer to iterate specific elements of the design in isolation without the need to consider the entire complexity of the scheme in each attempt to explore a solution.

At various stages these sketches were tested against the context, to ensure that they were suited to the practical conditions of the site. Sketches were often retraced with multiple drawings layered underneath to extract the essence of the drawings that lied underneath. This synthesised multiple intentions into a single sketch without sacrificing the overall composition.

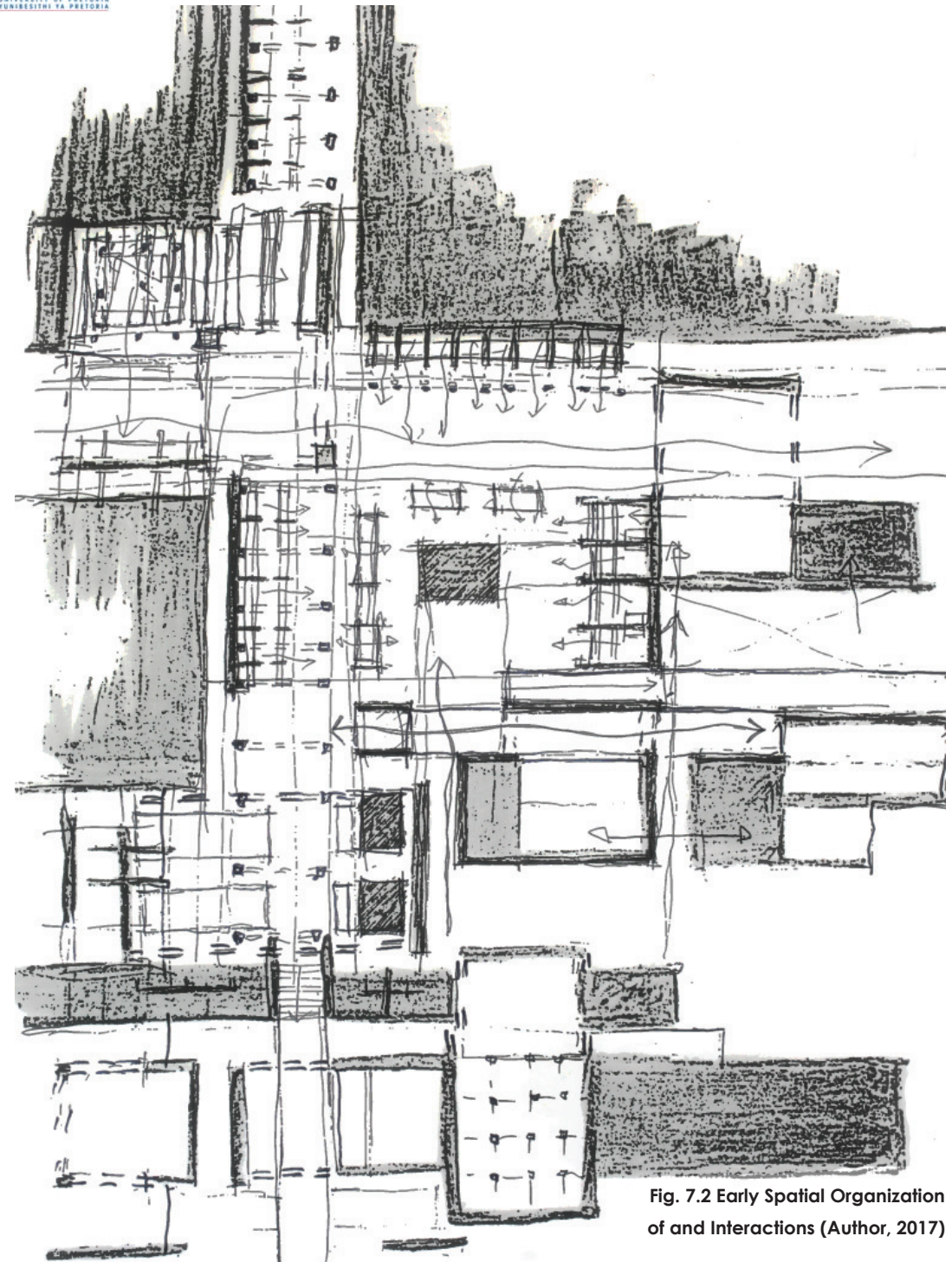


Fig. 7.2 Early Spatial Organization of and Interactions (Author, 2017)



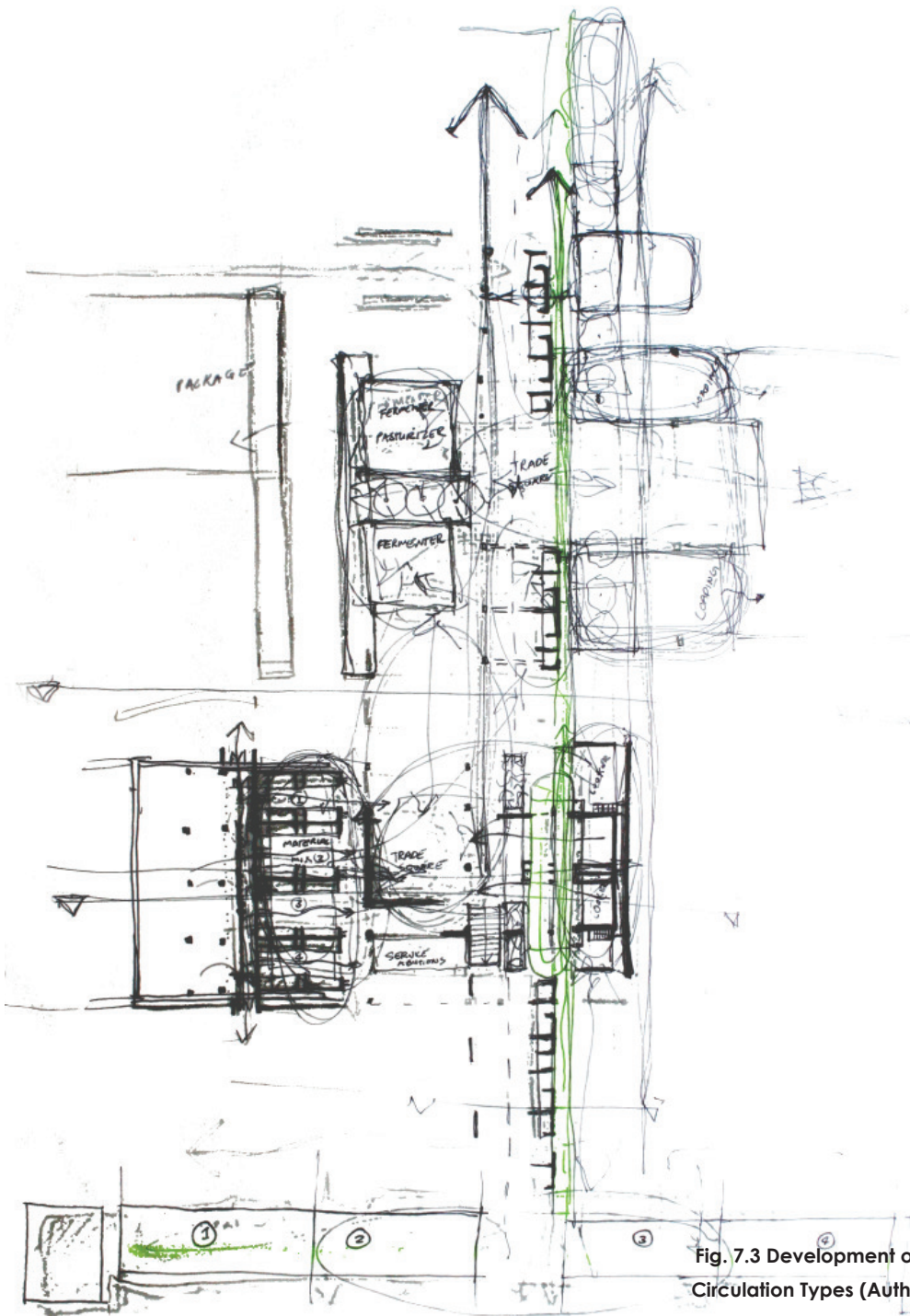


Fig. 7.3 Development of Distinct Circulation Types (Author, 2017)

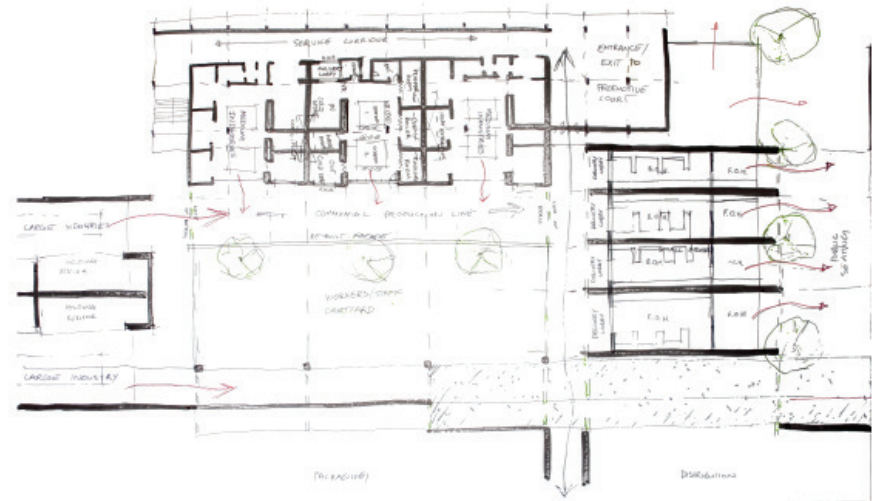


Fig. 7.4 Productive court yard allows for programmatic collisions between routes and functions (Author, 2017)

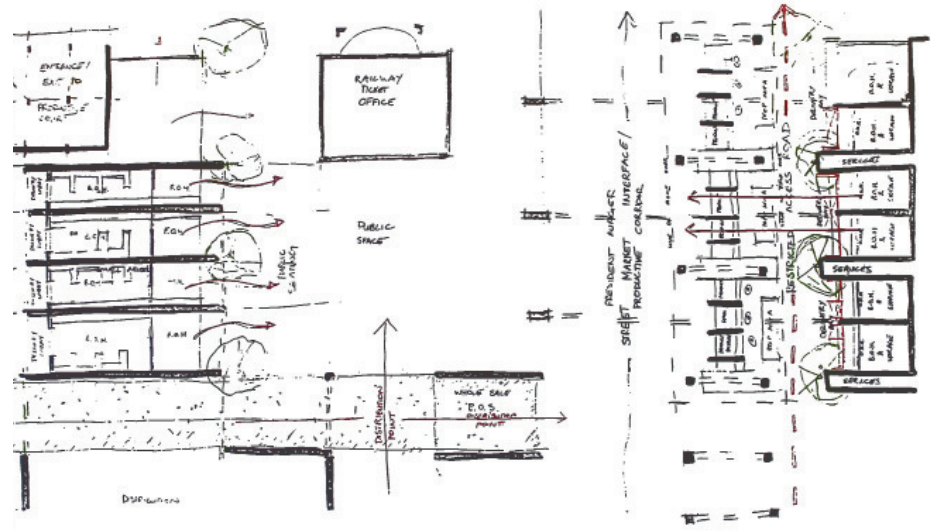
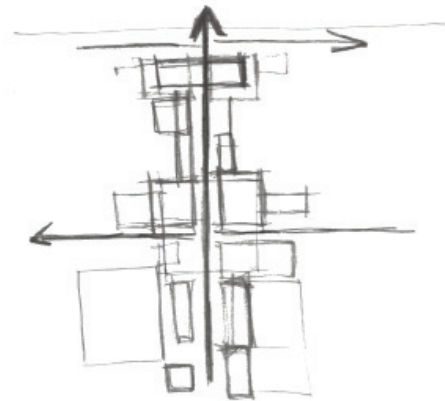


Fig. 7.5 Grouping of Functions and Separation of Circulation Paths (Author, 2017)

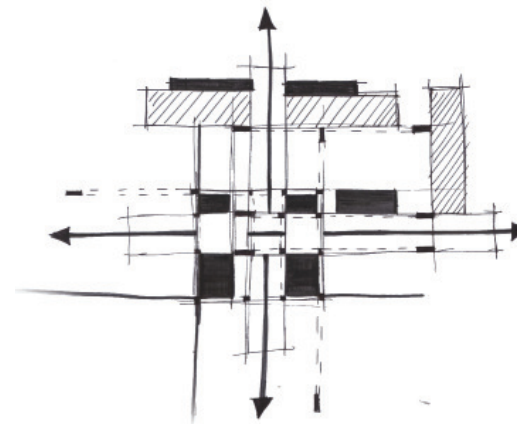
# DESIGN MORPHOLOGY FORMAL DEVELOPMENT



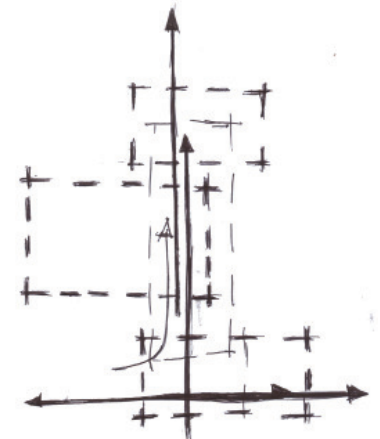
INTENTIONS AND PROGRAMS



EXISTING FIGURES



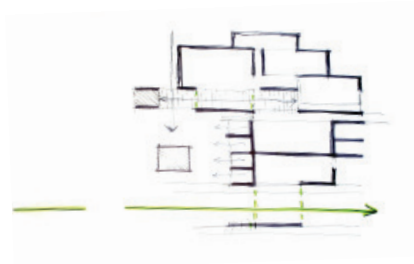
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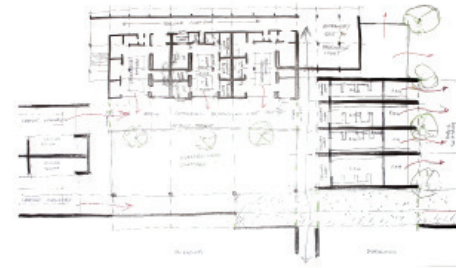
EXISTING GROUPING



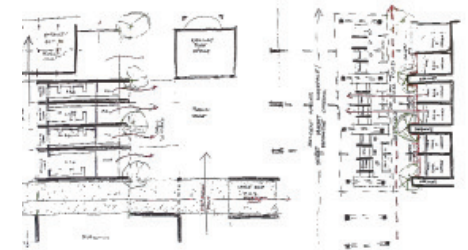
ZOOMING IN: INSERTIVE INTERACTIONS



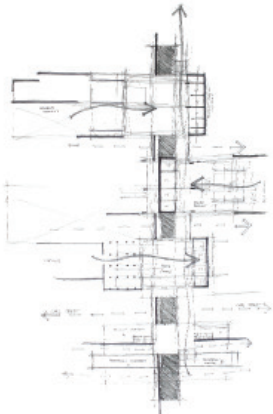
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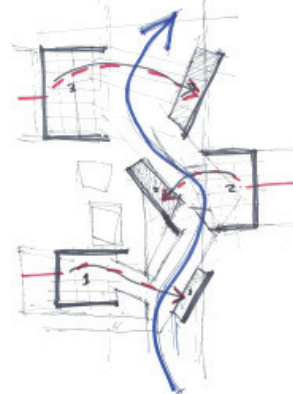
PRODUCTIVE COURTYARDS



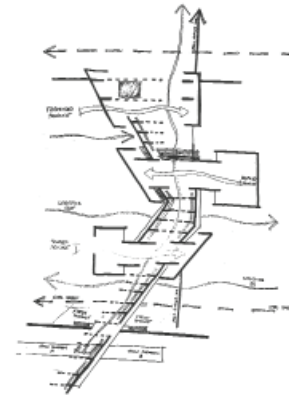
DEFINING RELATIONSHIPS



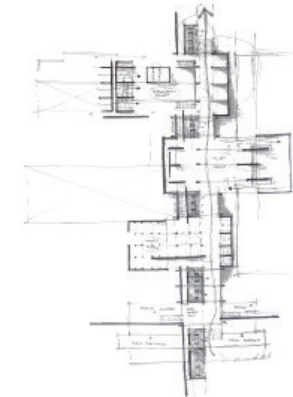
INFORMAL BINDING



RE-DEFINE PRODUCTIVE ROUTE

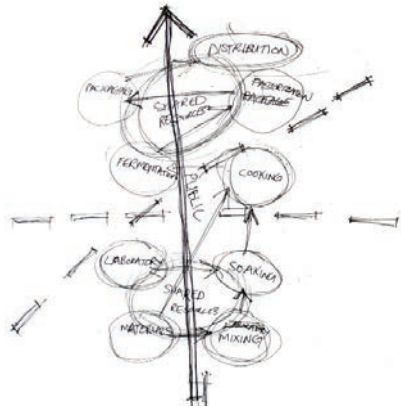


RE-DEFINE PEDESTRIAN ROUTE

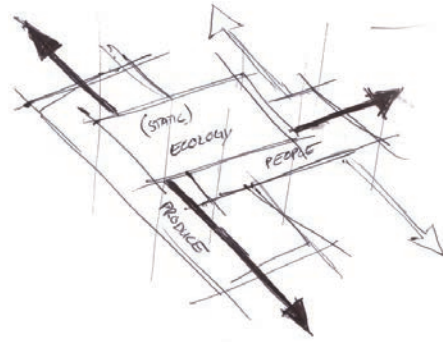


RESET JUNCTIONS

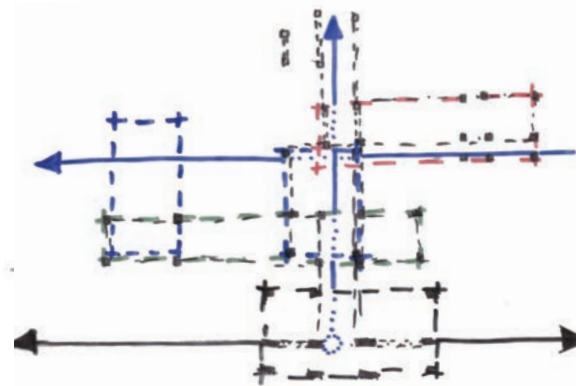




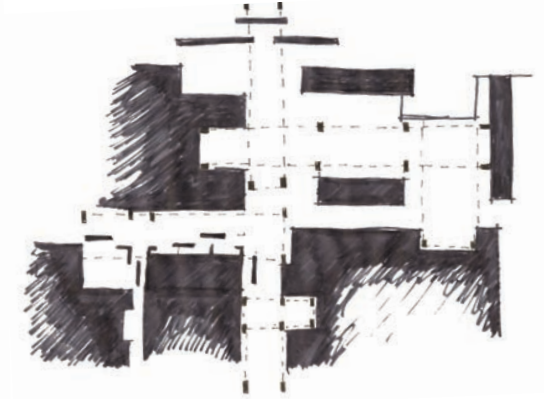
INSERTED PROGRAM



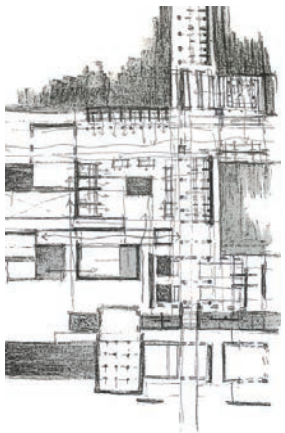
INTERVENTION



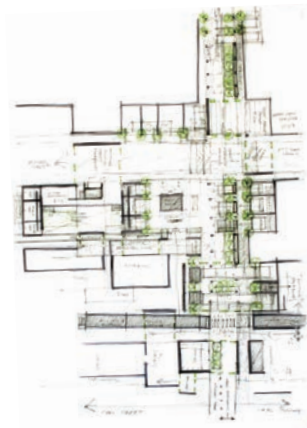
DEFINING THE MARKET(S)



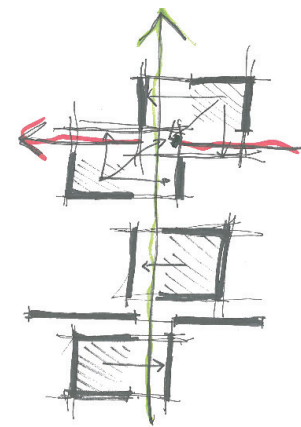
EXTENDING FUNCTIONS/FIGURES



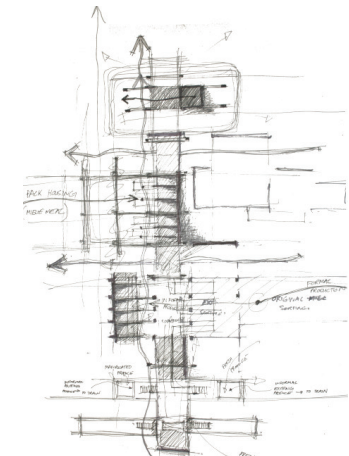
ZOOMING OUT: SITE CONTRAST



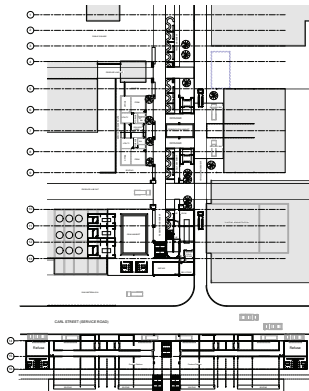
SITE ORGANIZATION



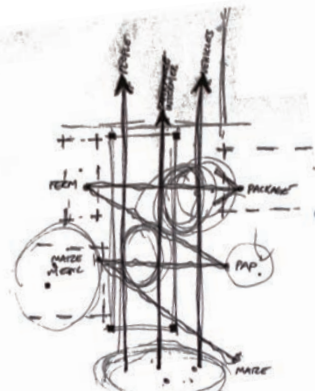
SIMPLIFYING: PRODUCTIVE ROUTE



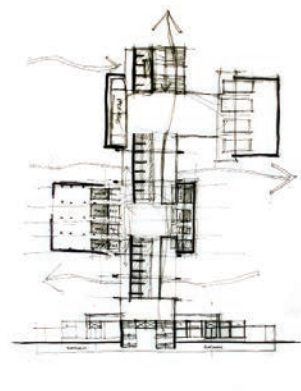
EXTENDING FUNCTIONS



SYNTHESISING INTENTIONS



SIMPLIFYING PARTI



DISENTANGLE THE COMPOSITION

Fig 7.6 Development Sketch Plans of Spatial and Organization and Composition (Author, 2017)

# DESIGN MORPHOLOGY FORMAL DEVELOPMENT

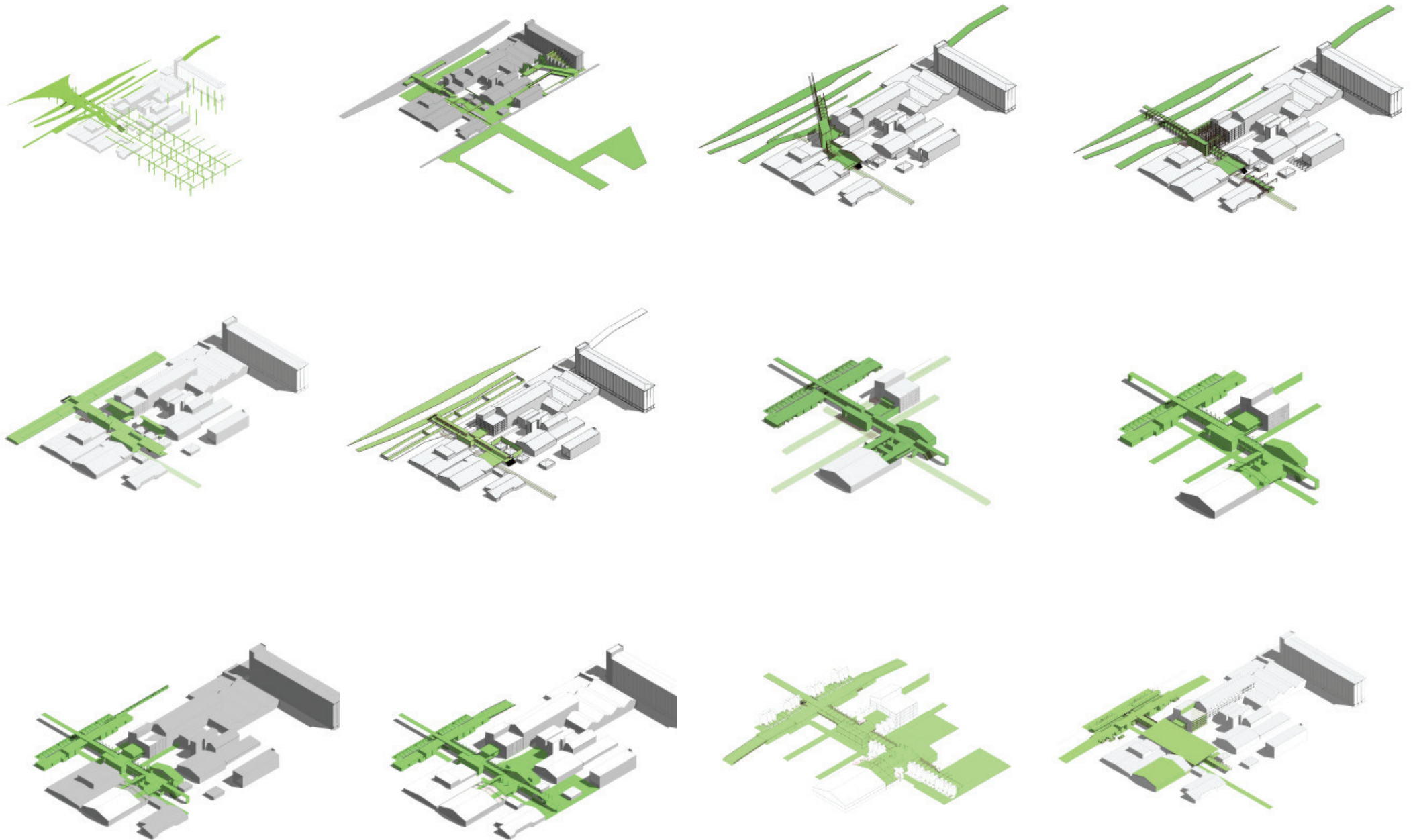






Fig 7.7 Spatial Development Models  
(Author, 2017)

## SKETCH PLANS

Bernard Tschumi proposes cross-programming as a means to activate in-between spaces and uses it to reclaim lost space. I utilize this method in heavily programming existing nodes of activity starting at the train station, that is both an industrial and public transport node, the sorting facility, and the Packhouse and introduce a new semi formalized productive programme in between. The production of mague a traditional African drink is exemplified. Whilst the public movement is unhindered, production flows out from the existing structures and engages the public. The train station facilitates the existing informal traders and incorporates small de-husking industries. Fresh maize is then crated and transported by train to Shoshonguve, Atteridgeville and throughout Tshwane. The unsold produce then moves to the grain market, where it is milled and mixed into a grain mixture as is required by the client.

From the grain market the maize meal is then distributed throughout the street market and also used to cook mielie pap, an addition to any dish prepared as well as the base for Mague. In the repurposed historic residential buildings water is added to stale mielie pap that is then allowed to ferment to make mague. From there on the Mague can be packaged at the pack housing facility and transported up the productive corridor where it ultimately reaches the Tshwane Market.

This productive programmatic example allows for both formal and informal industries to attach to an infrastructure that mutually benefits both sides of the spectrum. Architecturally the multitude of programmatic opportunities is arranged around circulation routes and courtyards as a roof is draped over the processes. The Structure supporting the roof

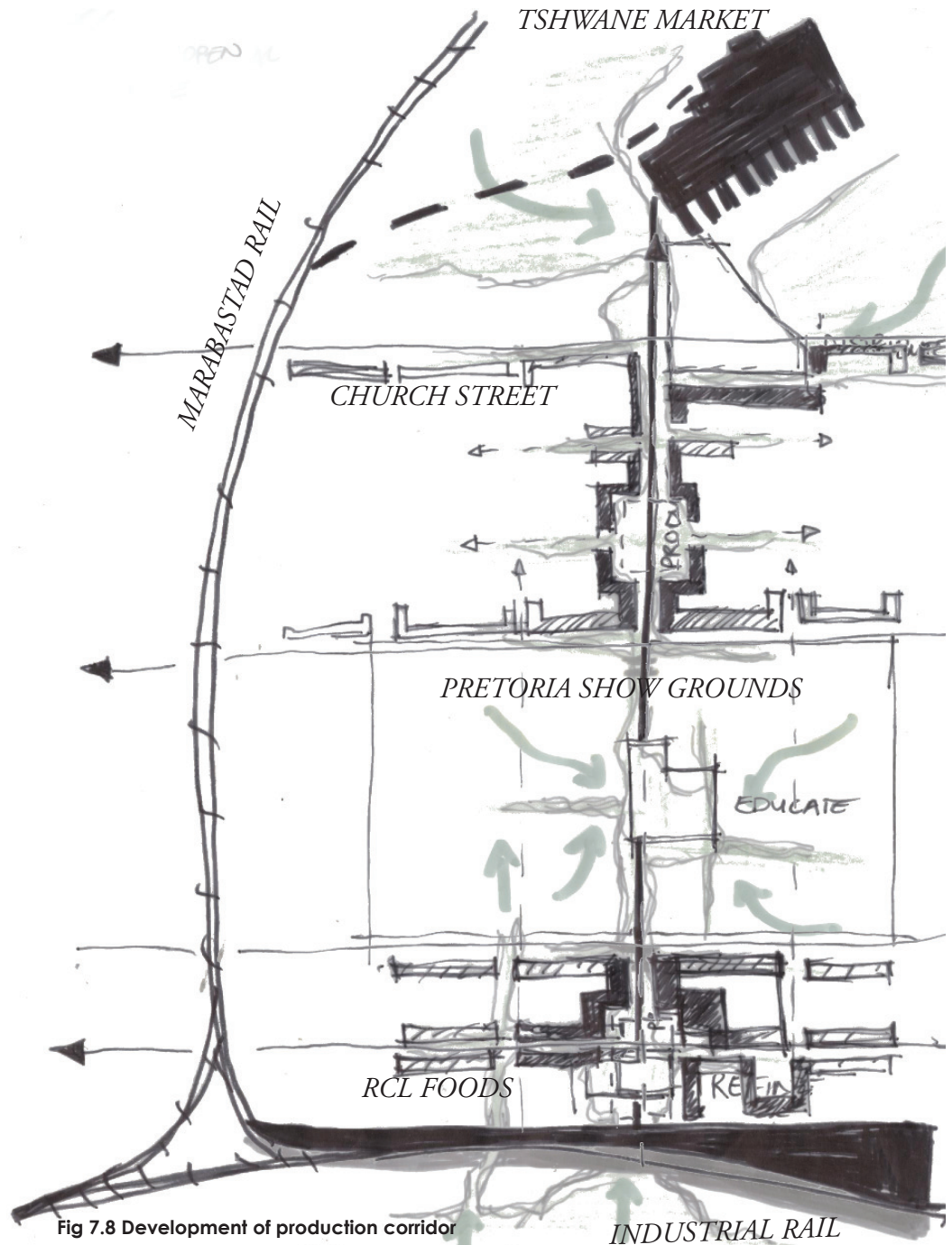


Fig 7.8 Development of production corridor  
(Author, 2017)



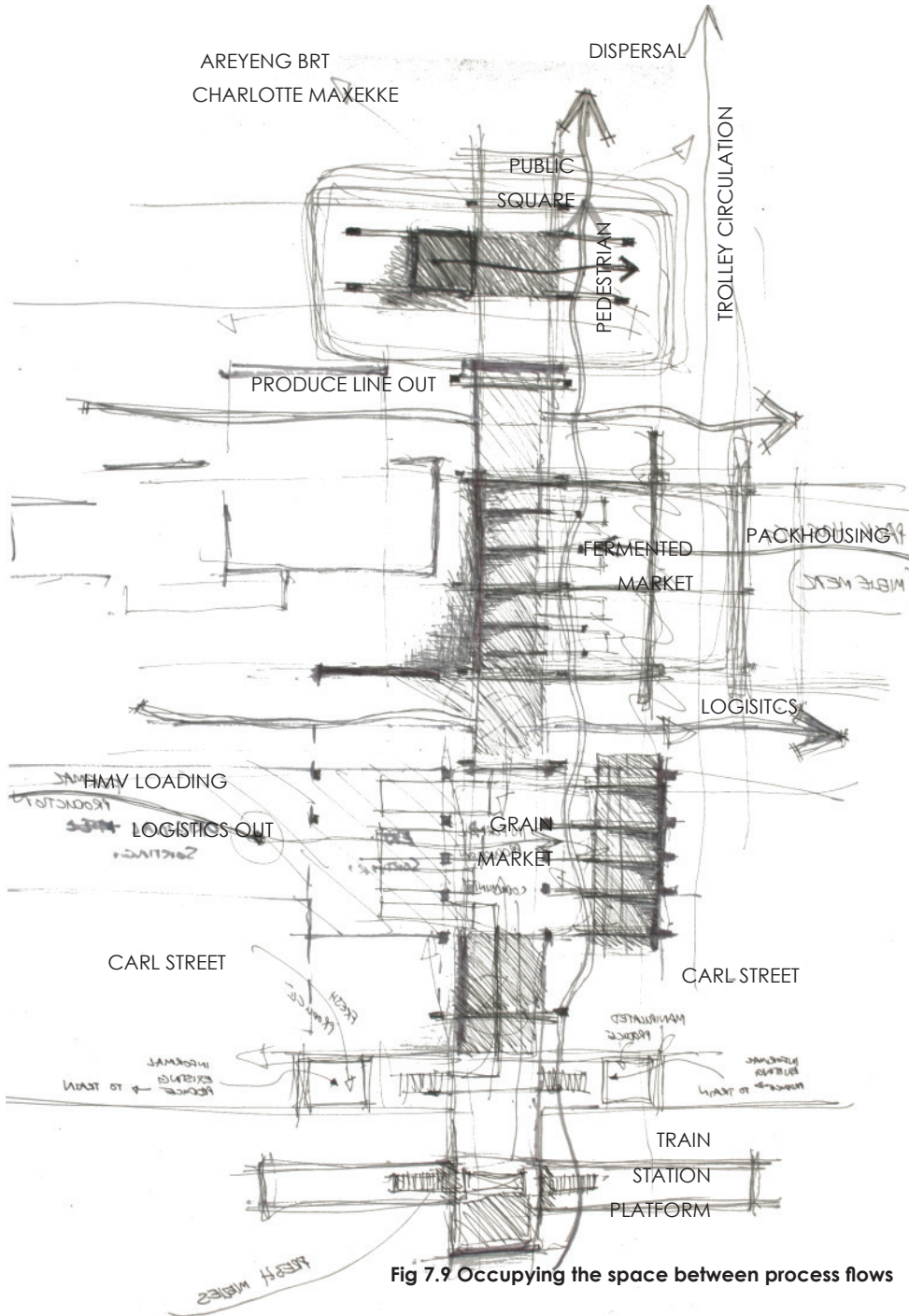


Fig 7.9 Occupying the space between process flows

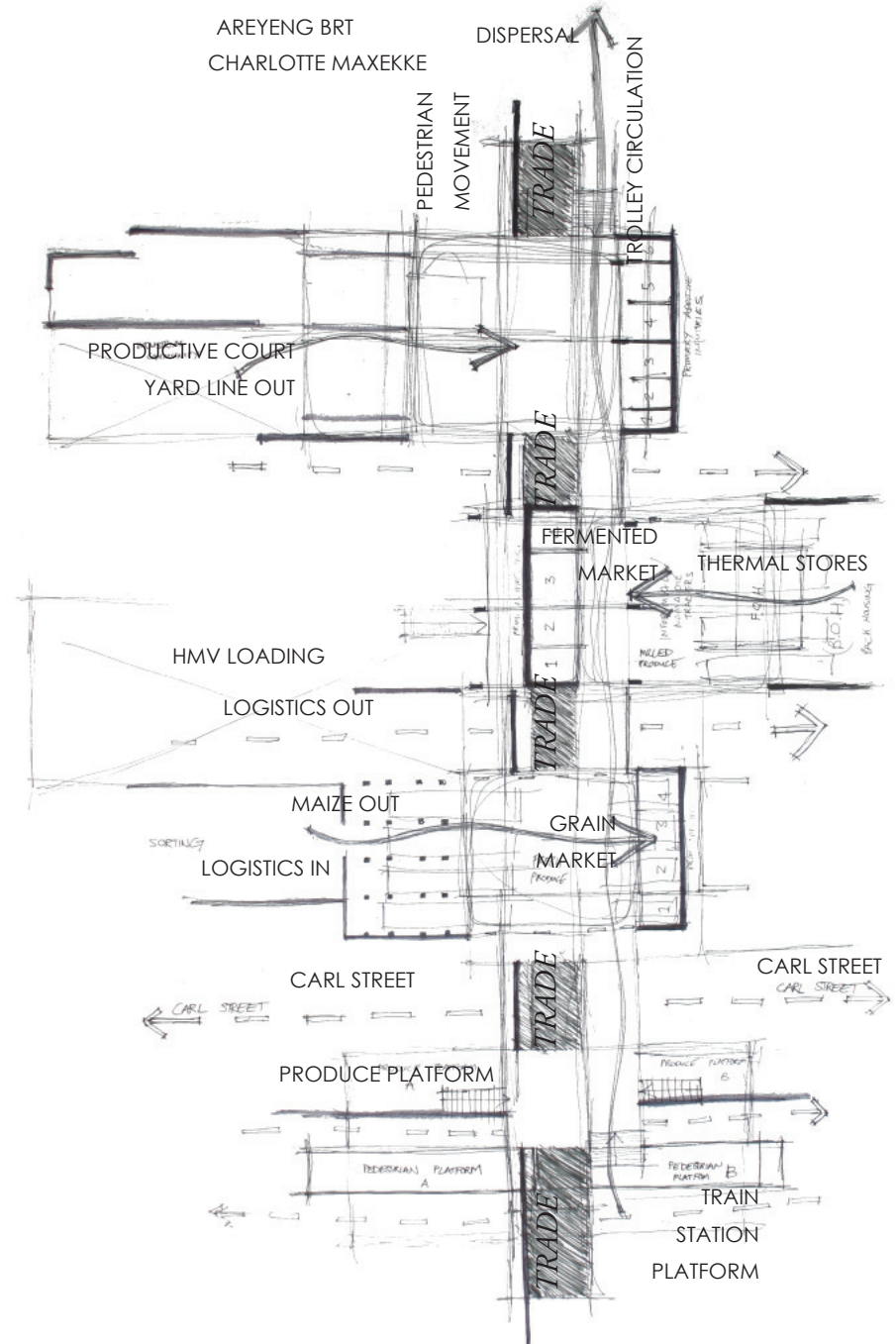


Fig 7.10 Allowing production lines into shared spaces (Author, 2017)

organizes the informal as an ordered and legible addition to the existing industrial site.

The draping of the roof structure results as an efficiency of structure as the main circular structure inverts the bending moment diagram posed by the self-weight of a spanning structure. Additions to this efficient structure then is used to naturally ventilate the structure. This was achieved by iterating various airflow patterns that could best eject foul air. A Daylighting study further contributed to the design scattered sunlight defines a varying width of walkway that corresponds to the varying activity level due to the train station's fluctuating activity.

A water recycling system is utilised that captures rainwater from the roof structure, flows freely to underground storage pipes where photo voltaic assisted pumps pressurise the water supply. This water is used for cleaning purposes and other non-potable purposes. Once used the water is recaptured by means of grated drains in the floor. The Greywater is then stored in a separate storage pipe and is then recycled in the existing oil plant that extracts bio-oil from food waste. This oil is used to power generators that power lights and pressure washers that continue the water recycling system.

The nature of the design as discussed during this presentation continues a view of the built environment not as a stagnant object but rather as continually evolving where the architecture is an addition in itself but also allows street traders and larger, more temporary additions to continually attach and evolve, as activities are catalysed between anchoring nodes of activity.

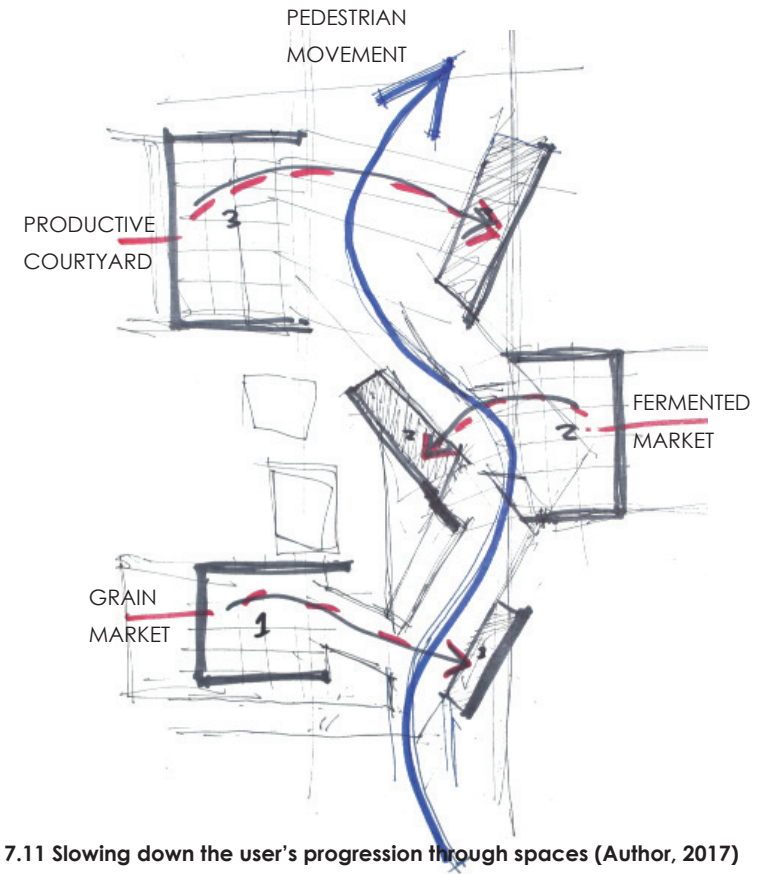


Fig 7.11 Slowing down the user's progression through spaces (Author, 2017)

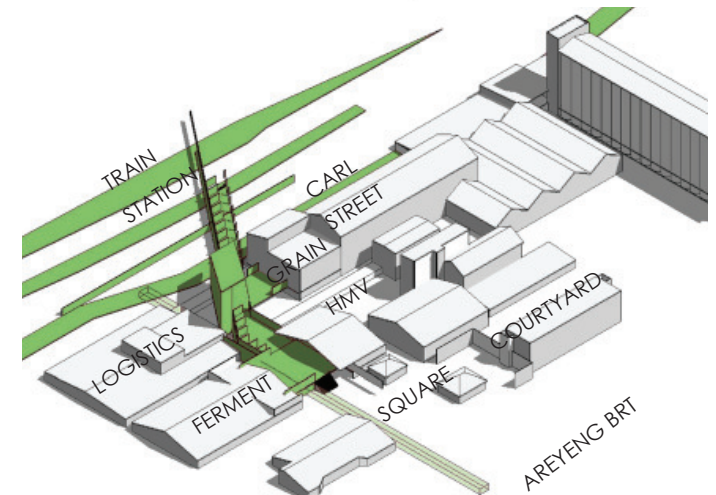


Fig 7.12 Draping the Market Between Nodes (Author, 2017)







PHYSICAL MODELS

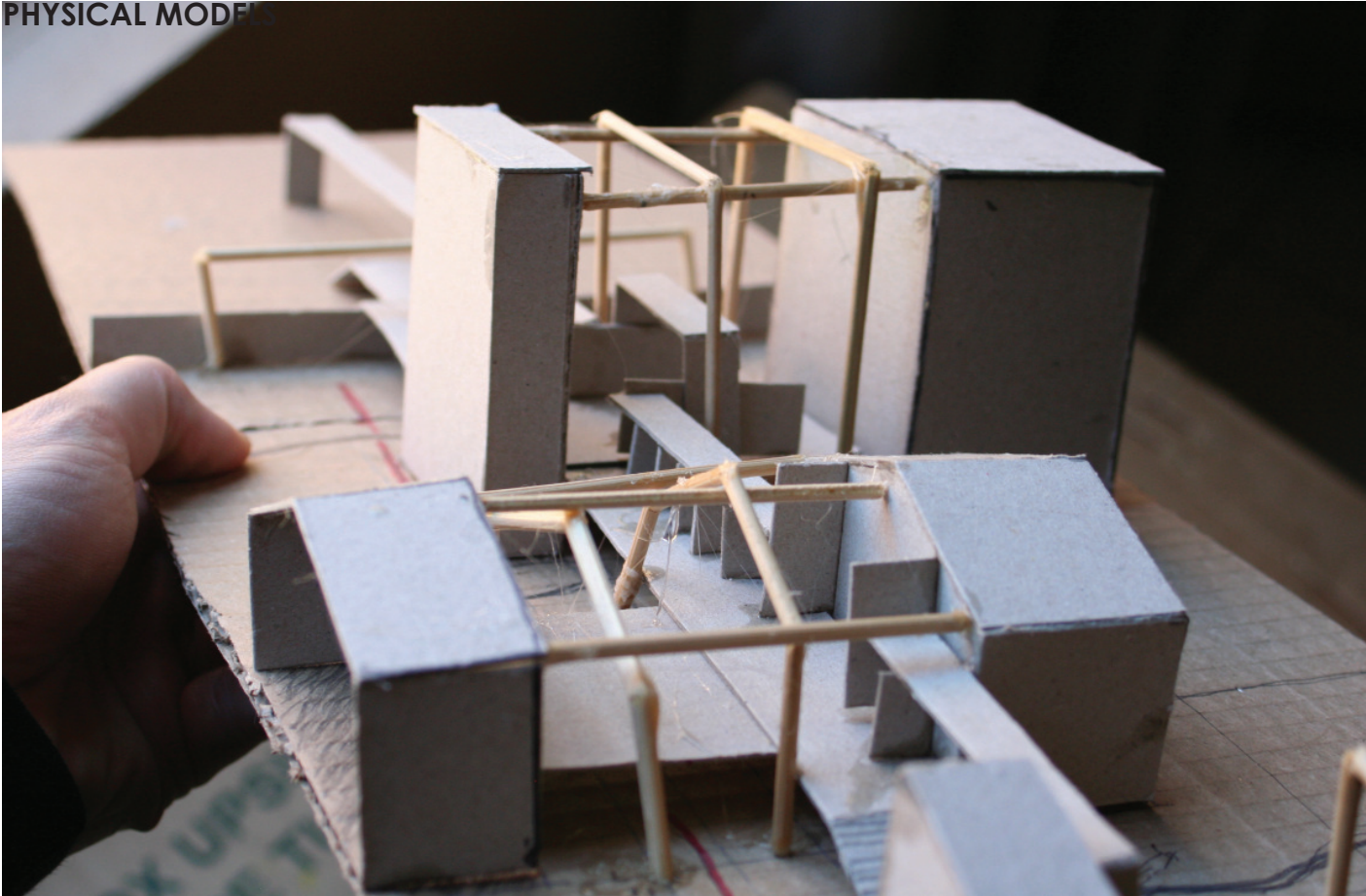


Fig 7.15 Direct Transposing of Facade (Author, 2017)

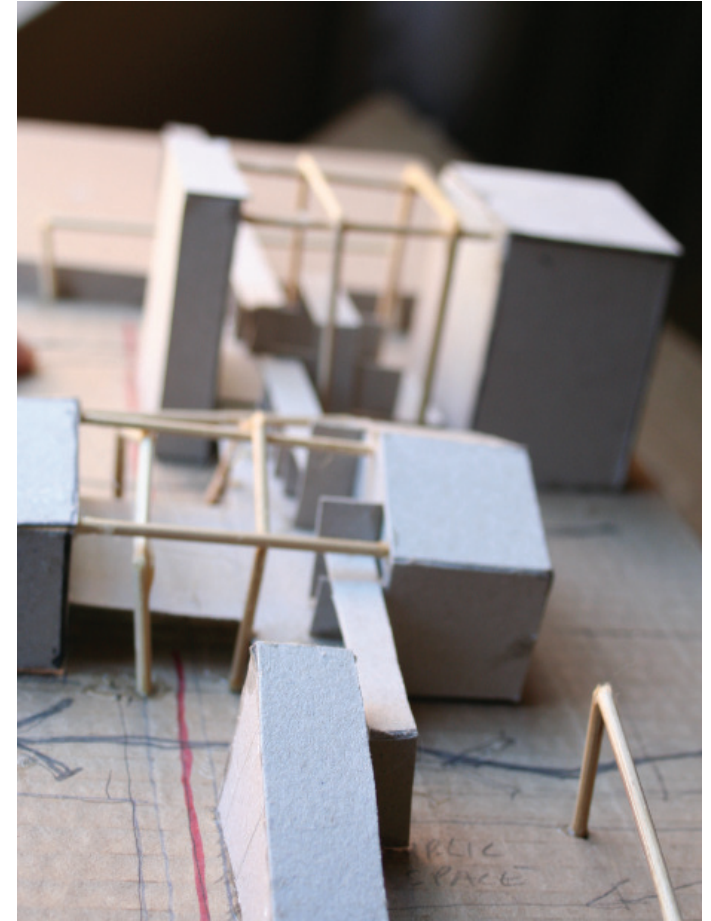


Fig 7.16 Stepped Extrusions (Author, 2017)



Fig 7.17 Tectonic Insertions between Old and New (Author, 2017)

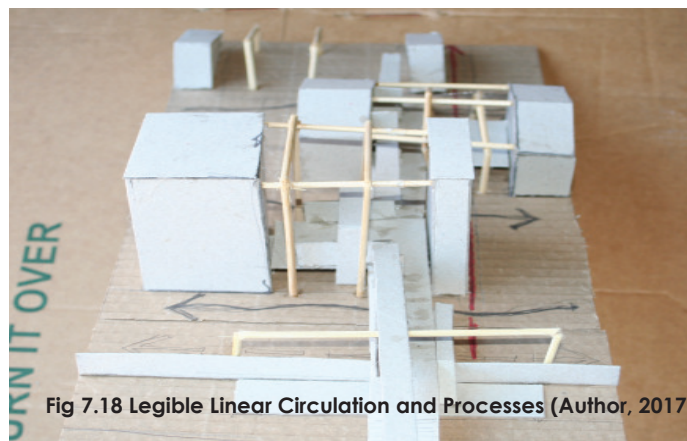


Fig 7.18 Legible Linear Circulation and Processes (Author, 2017)



Fig 7.19 Informal Production on Bridge Over Service Road (Author, 2017)



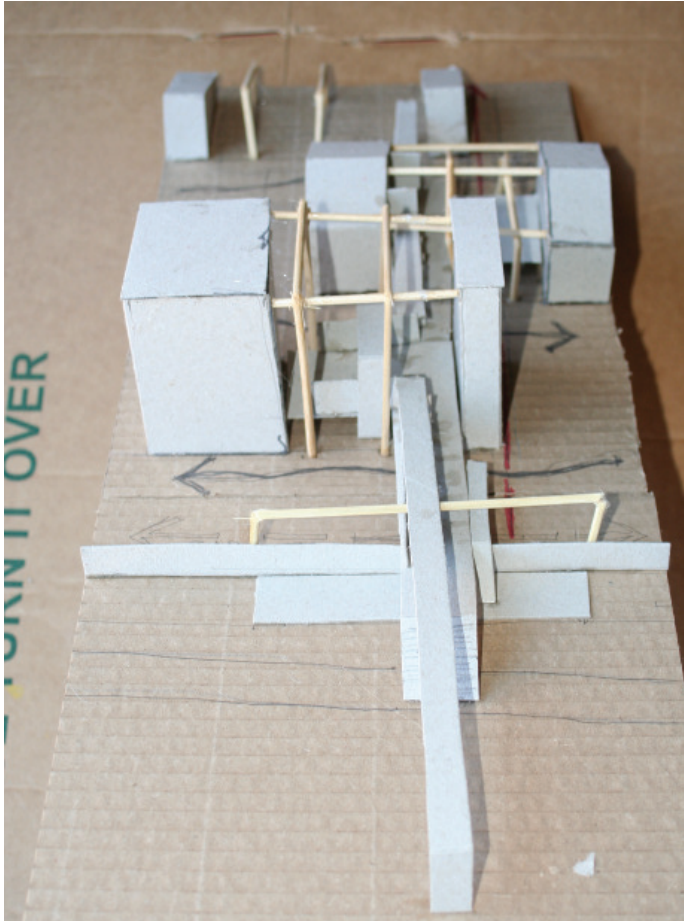


Fig 7.20 Crossing Over the Railway Lines (Author, 2017)

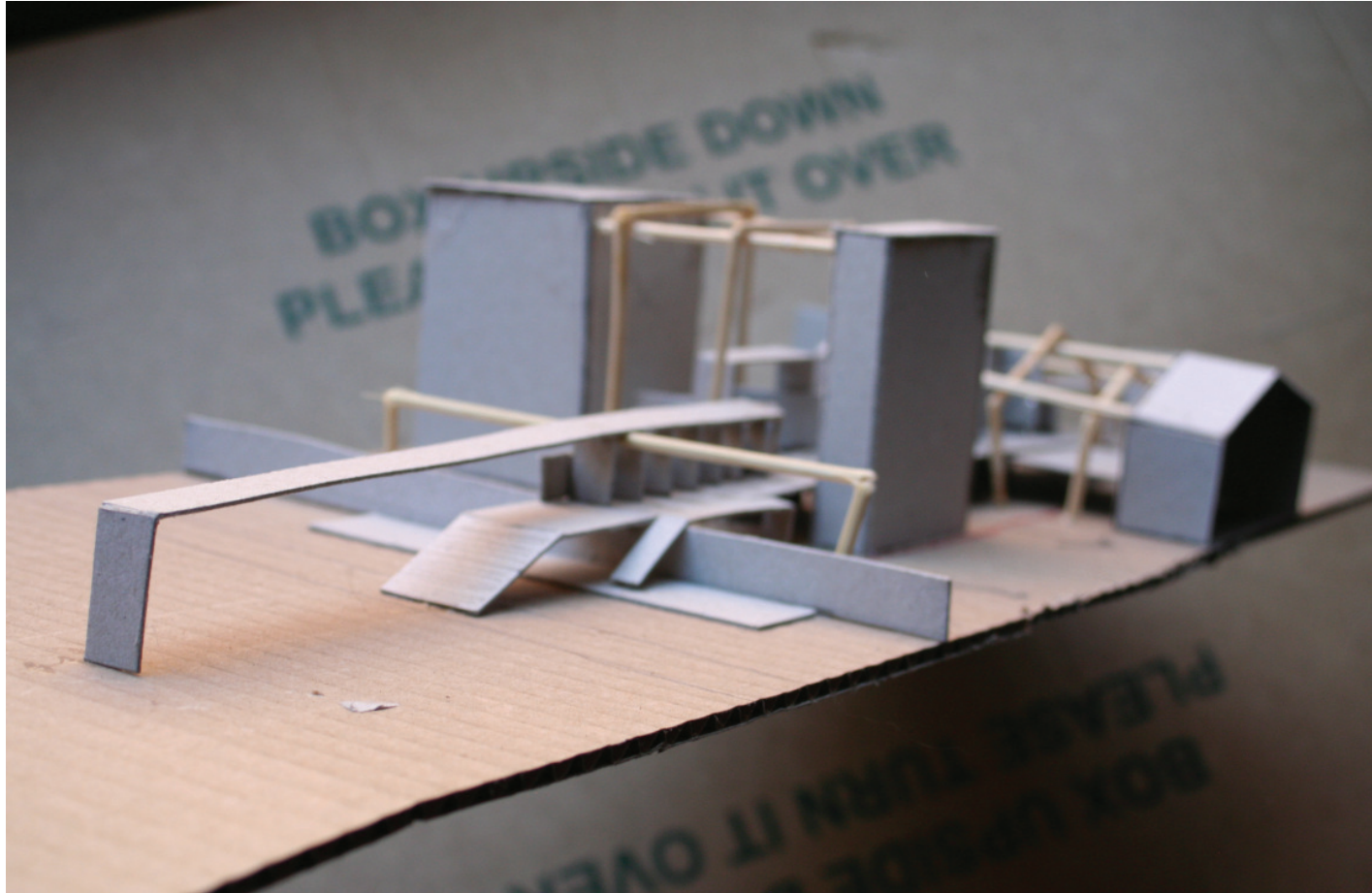


Fig 7.21 Access to Train Platform from Service Road and Market (Author, 2017)

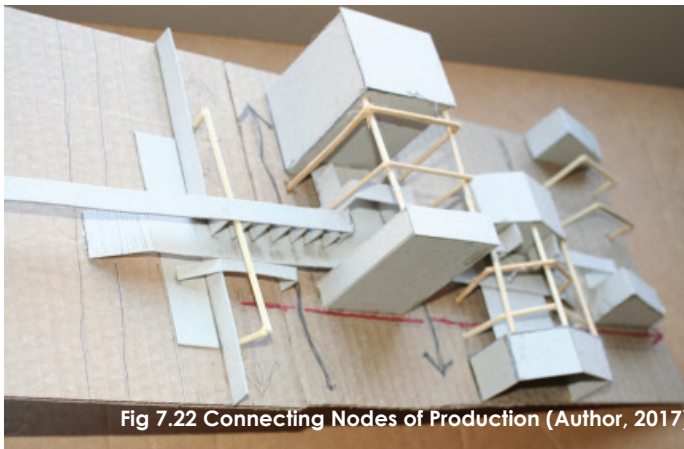


Fig 7.22 Connecting Nodes of Production (Author, 2017)

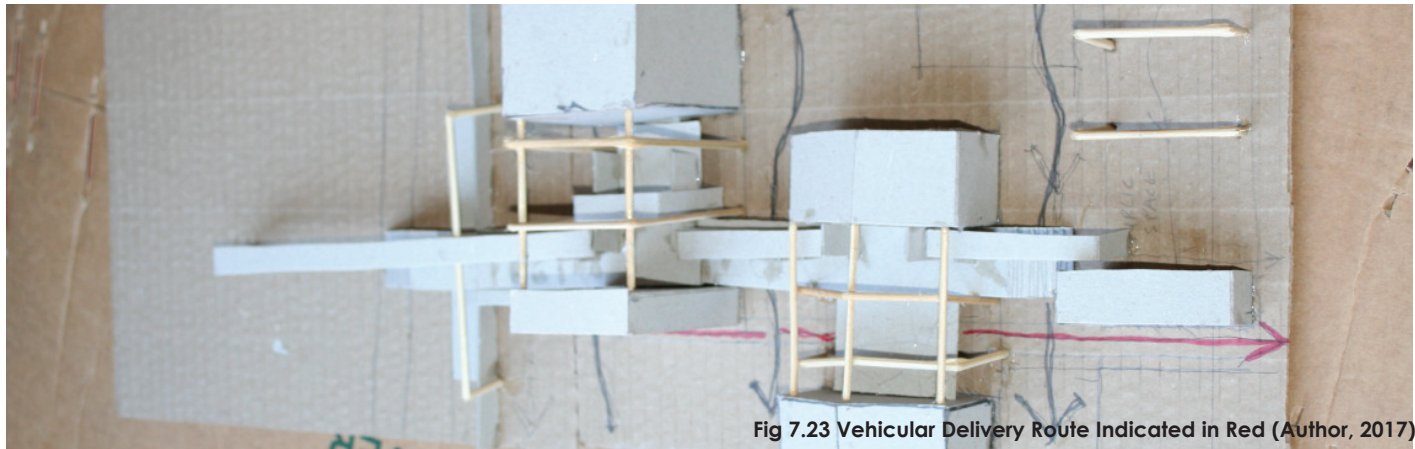


Fig 7.23 Vehicular Delivery Route Indicated in Red (Author, 2017)



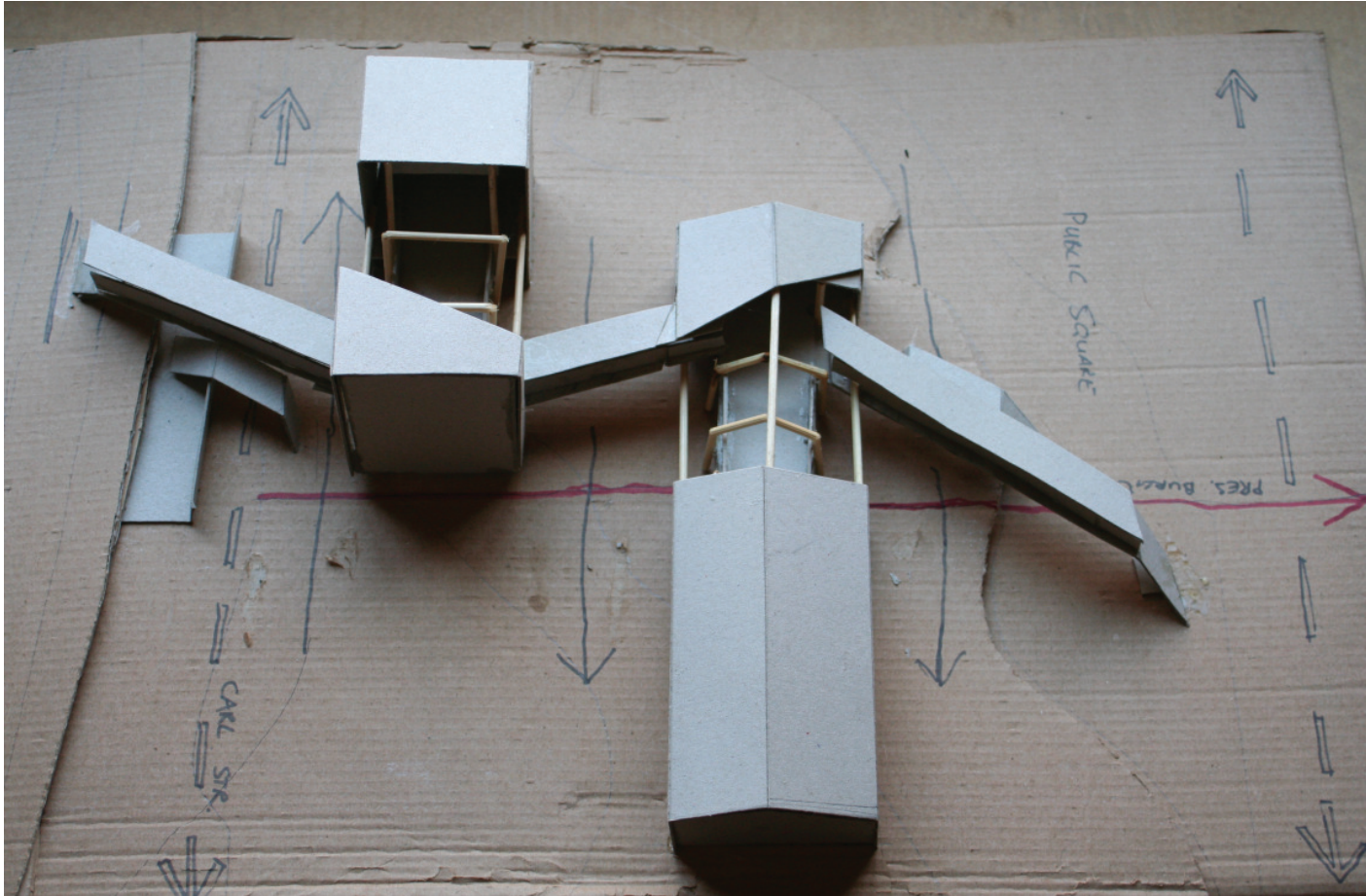


Fig 7.24 Revised Connective Route (Author, 2017)

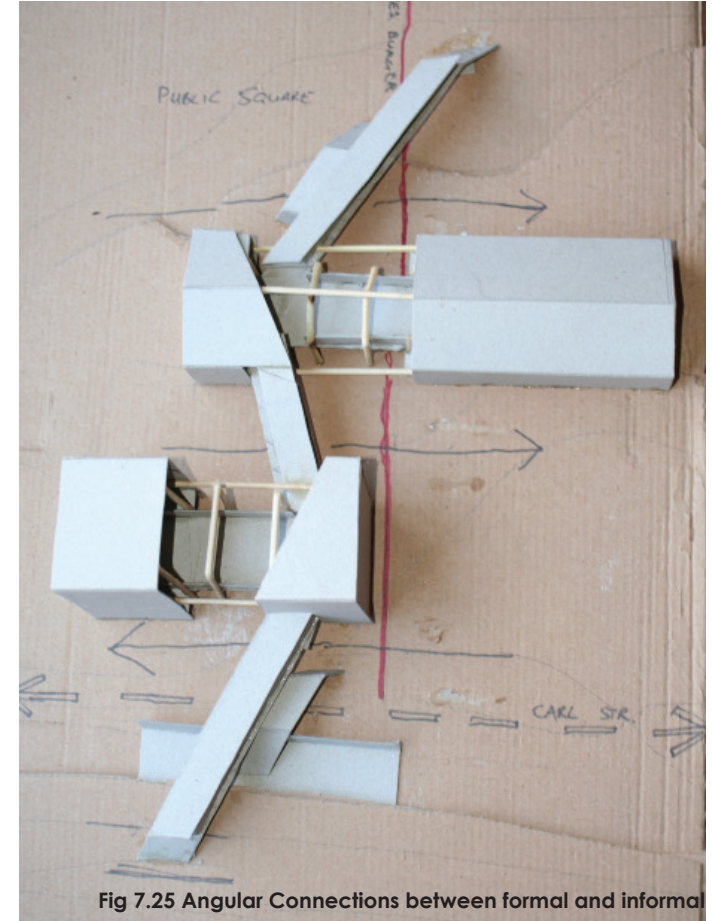


Fig 7.25 Angular Connections between formal and informal (Author, 2017)



Fig 7.26 Horizontal Order and Alignment Between Market and Existing Building (Author, 2017)

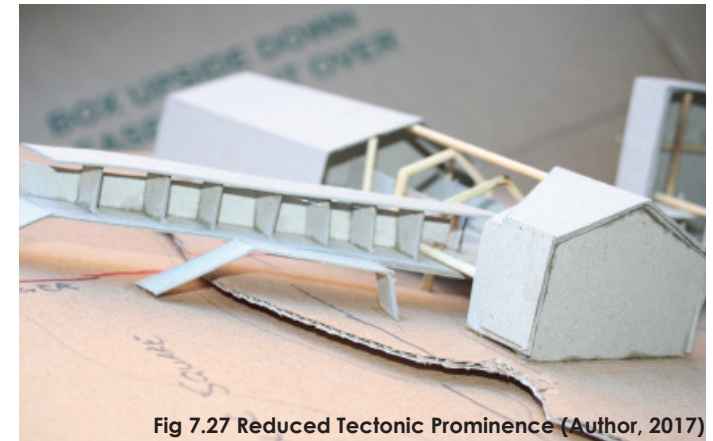


Fig 7.27 Reduced Tectonic Prominence (Author, 2017)





Fig 7.28 Informal connection to new facade (Author, 2017)



Fig 7.29 Continuous Raised Market (Author, 2017)



Fig 7.30 Horizontal Penetration of Market (Author, 2017)



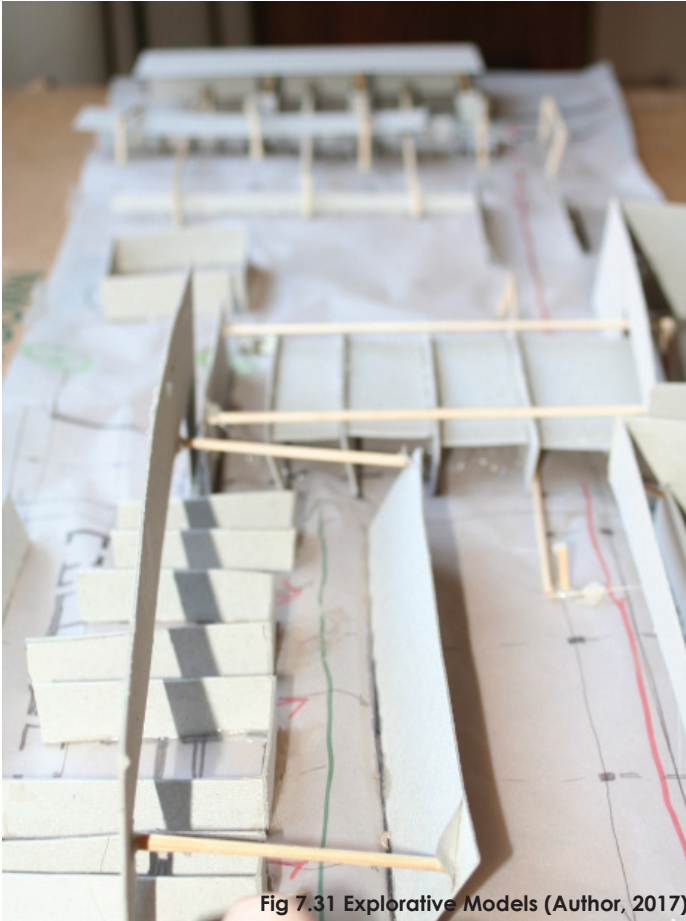


Fig 7.31 Explorative Models (Author, 2017)

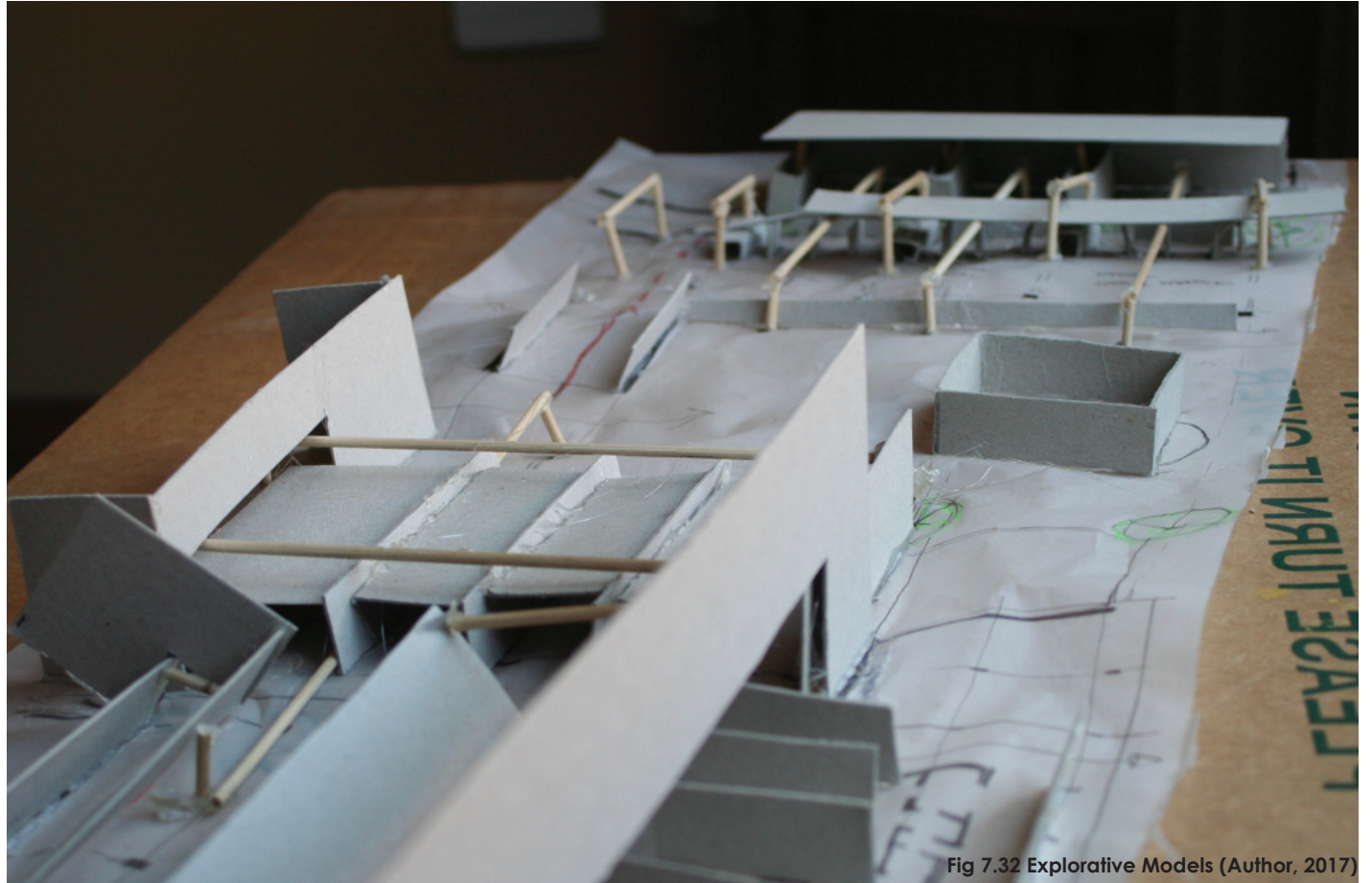


Fig 7.32 Explorative Models (Author, 2017)

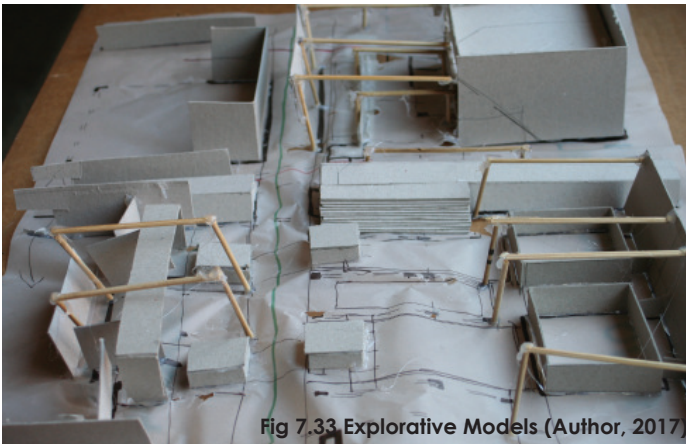


Fig 7.33 Explorative Models (Author, 2017)

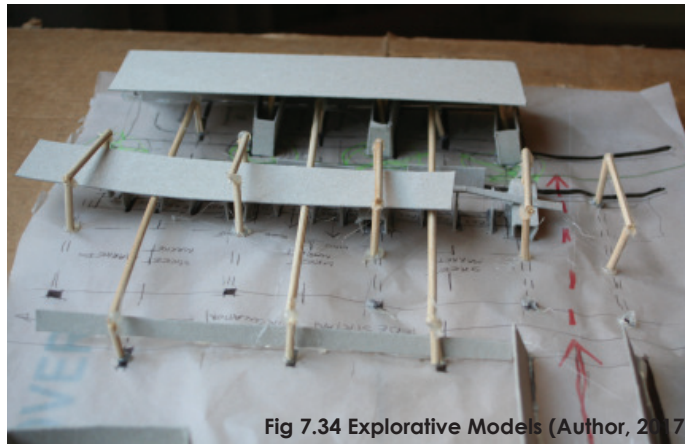


Fig 7.34 Explorative Models (Author, 2017)

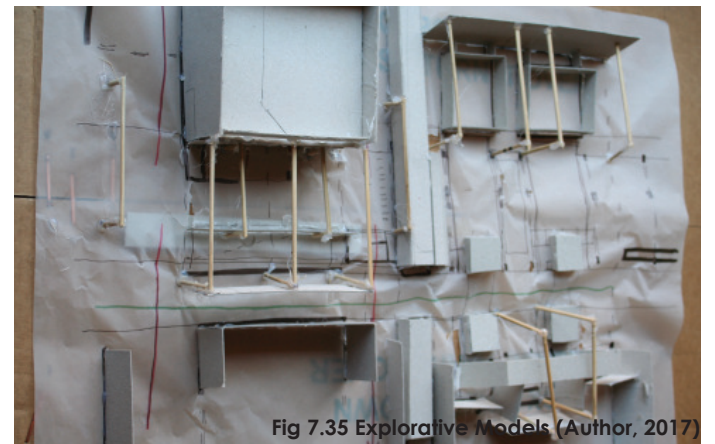


Fig 7.35 Explorative Models (Author, 2017)



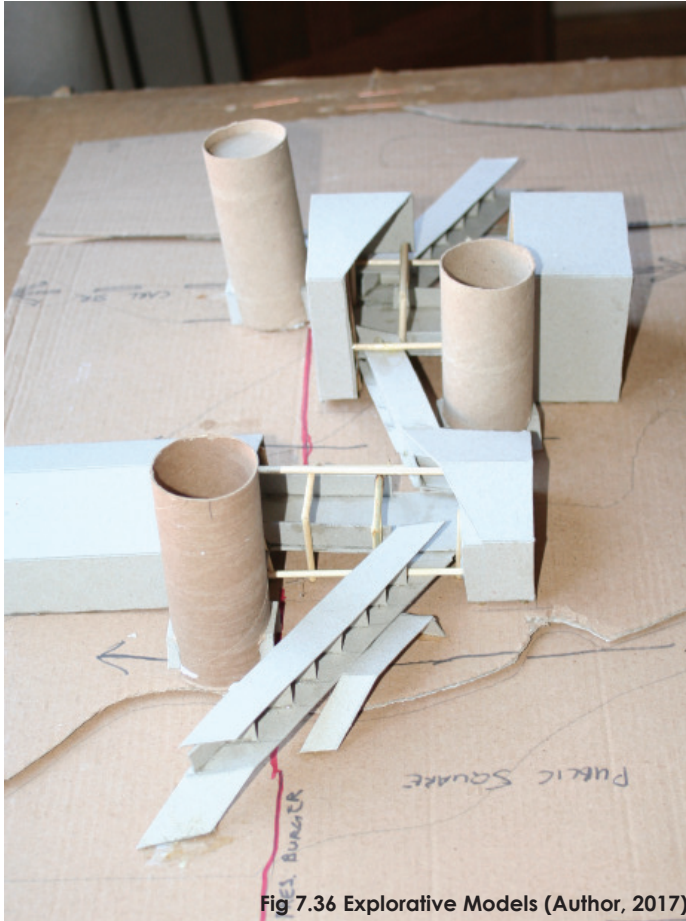


Fig 7.36 Explorative Models (Author, 2017)

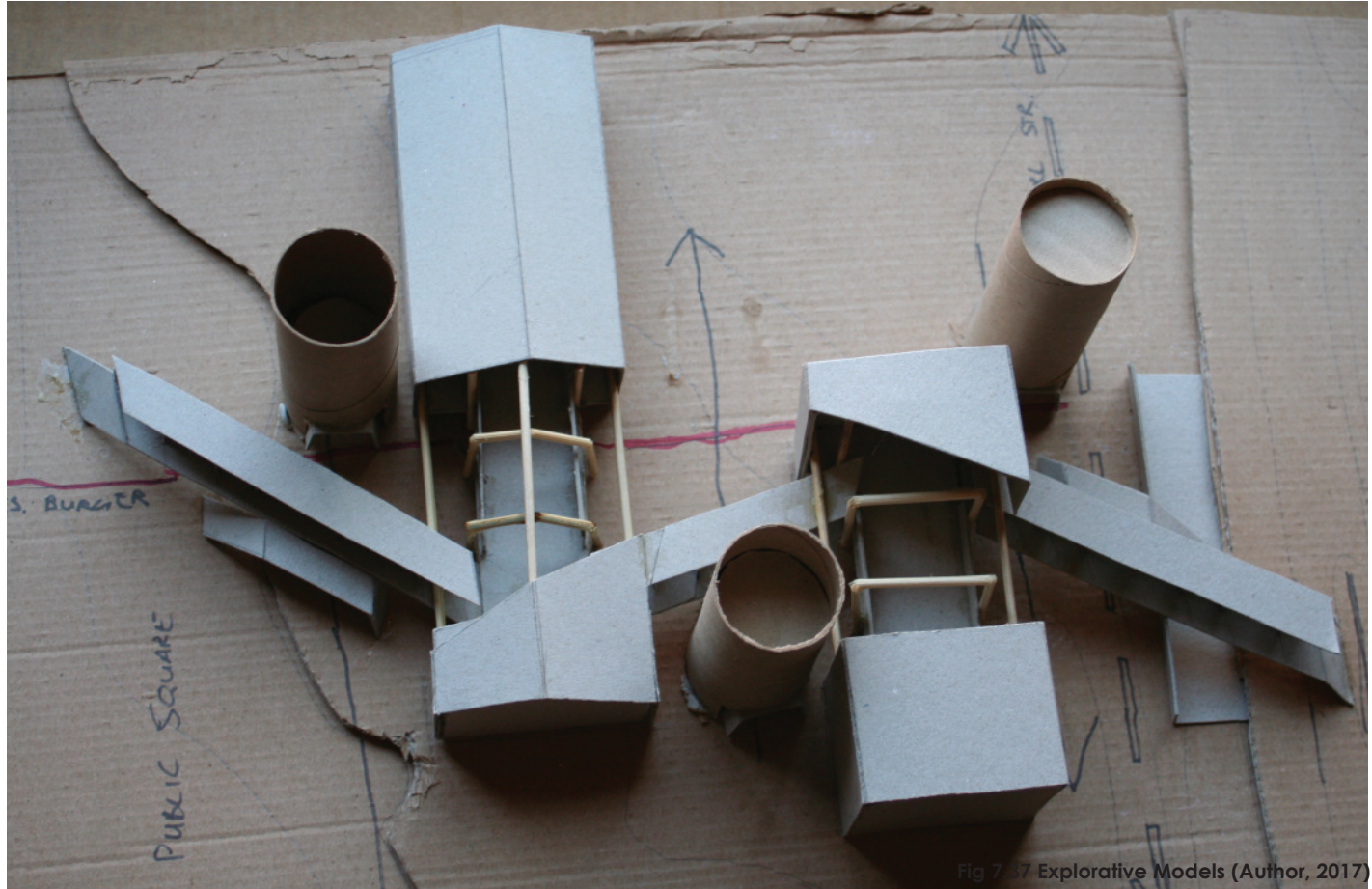


Fig 7.37 Explorative Models (Author, 2017)

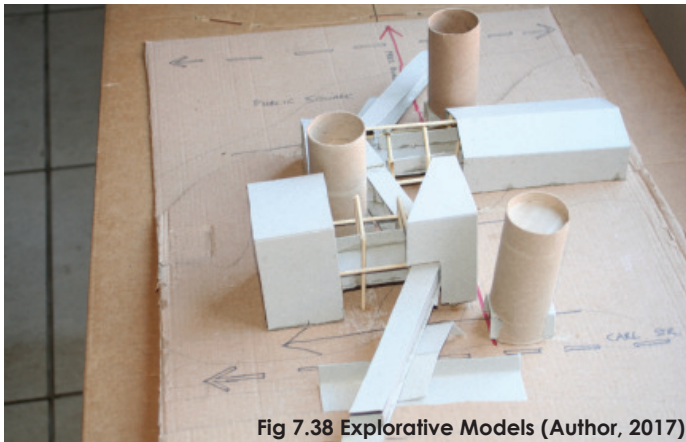


Fig 7.38 Explorative Models (Author, 2017)

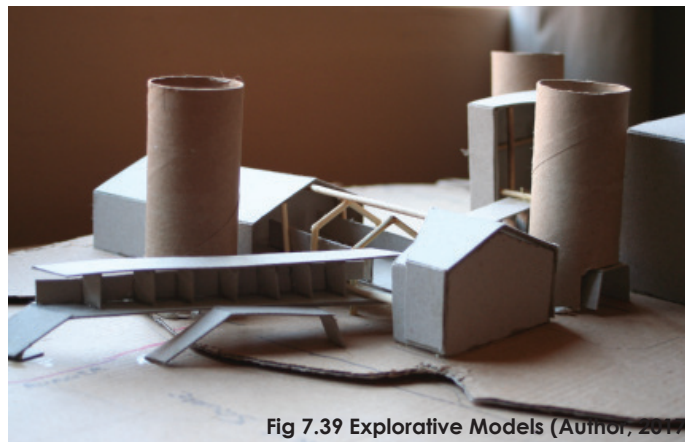


Fig 7.39 Explorative Models (Author, 2017)



Fig 7.40 Explorative Models (Author, 2017)





Fig 7.41 Site Photo (Urban Vision, 2017)



Fig 7.42 Site Photo (Author, 2017)



Fig 7.43 Site Photo (Author, 2017)





Fig 7.44 Site Photo (Author, 2017)



Fig 7.45 Site Photo (Author, 2017)



Fig 7.46 Tshwane Market (Google Earth, 2017)



# -----[ VIII ]----- T E C H N I F I C A T I O N



## **TECHNIFICATION**

8.1 Ventilation Design	page 89
8.2 Daylighting Design	page 90
8.4 Plans	page 92
8.5 Systems Design	page 95
8.6 Elevations and Sections	page 96
8.7 Final Models	page 100



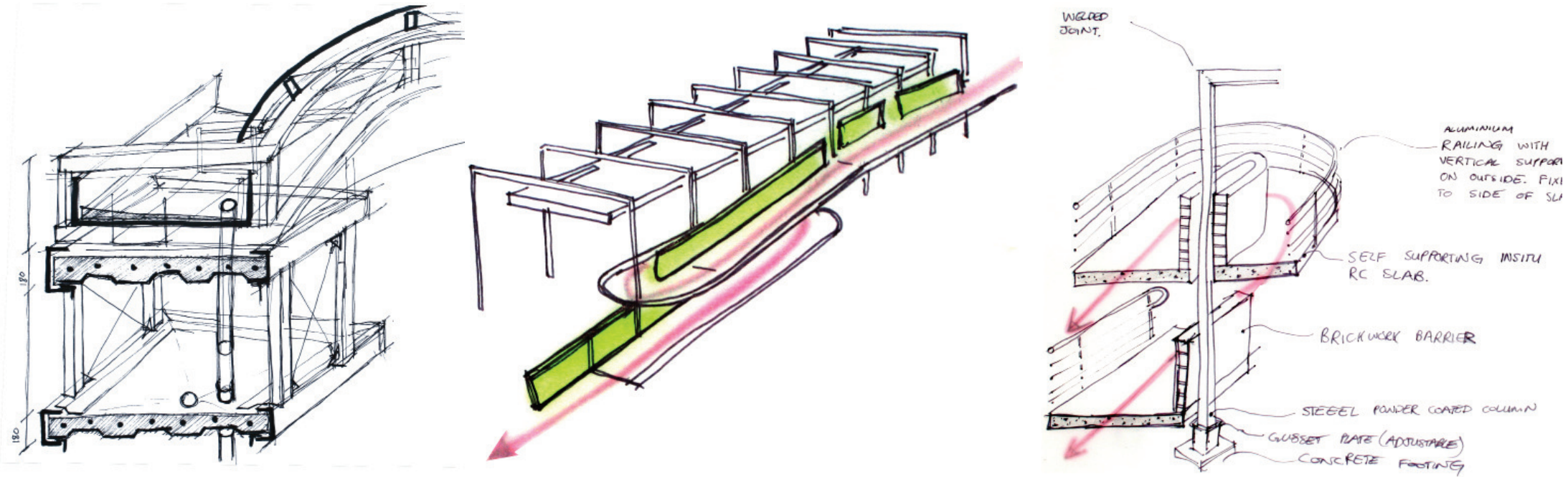


Fig. 8.1 Technical sketches (Author, 2017)

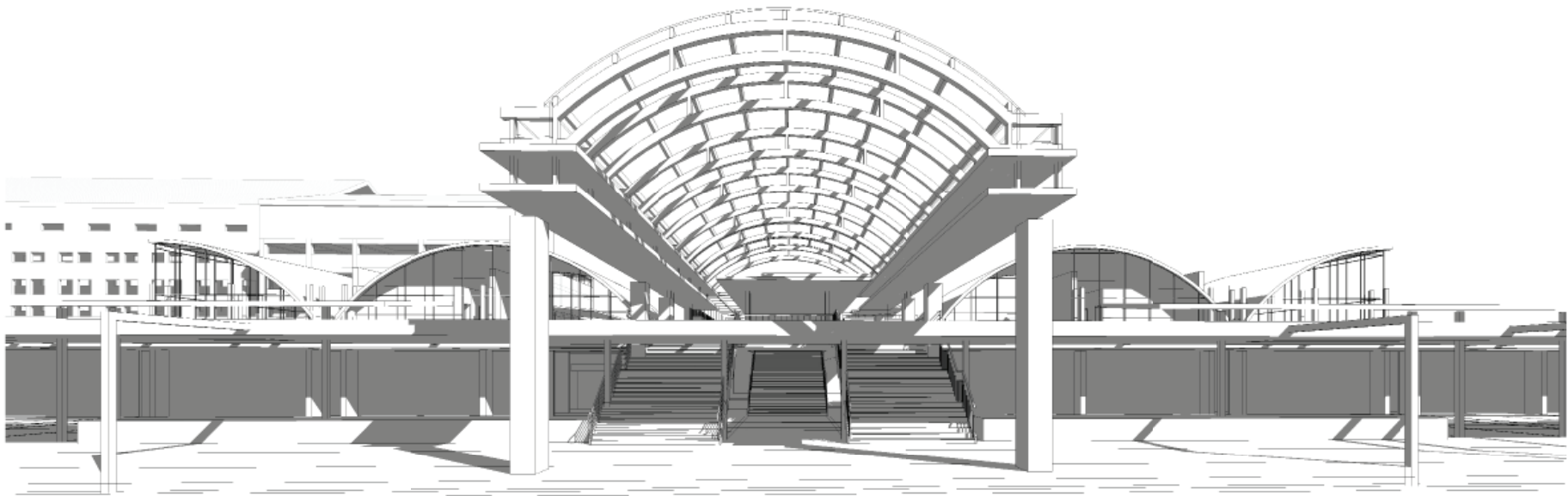


Fig. 8.2 Solar Study (Author, 2017)



# PRODUCTIVE CORRIDOR<sup>®</sup> AS BINDING ELEMENT TO TSHWANE MARKET, SILOS AND PRETORIA SHOW GROUNDS

CONTINUING AN AESTHETIC OF ELEMENTS IN THE LANDSCAPE DRAPED OVER THE FUNCTION AS A BINDING ELEMENT

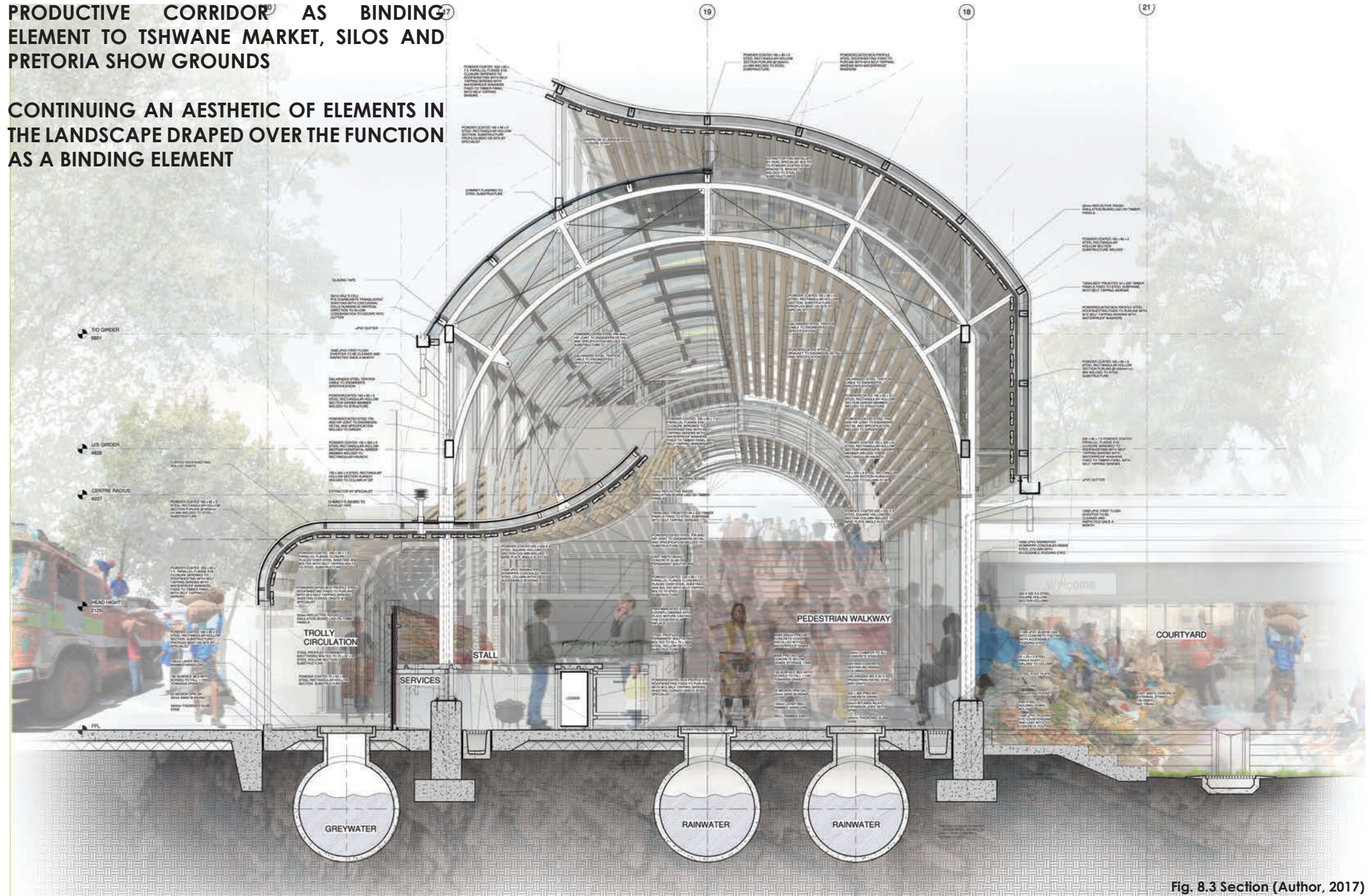


Fig. 8.3 Section (Author, 2017)



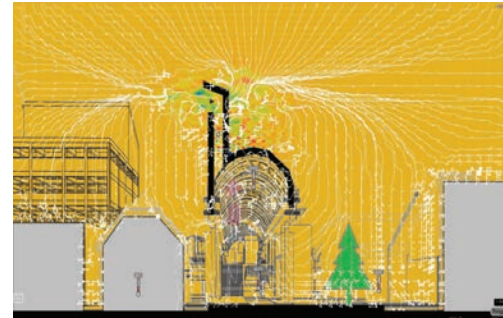
Iteration 1



Iteration 2



Iteration 3



Iteration 4



Fig. 8.4 Ventilation Iterations (Energy 2D by Author, 2017)

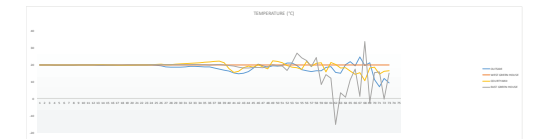
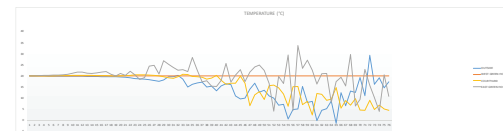
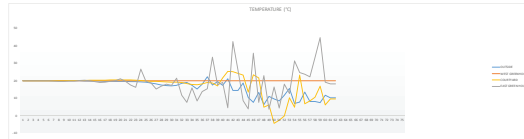
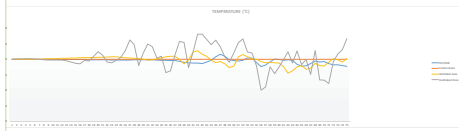
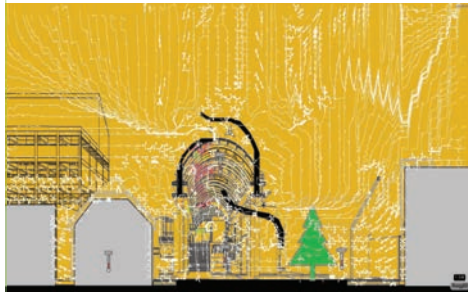


Fig. 8.5 Ventilation Graphs (Author, 2017)

Iteration 5



Iteration 6



Iteration 7



Iteration 8



Fig. 8.6 Ventilation Iterations (Energy 2D by Author, 2017)

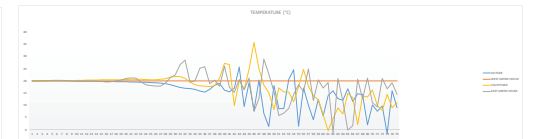
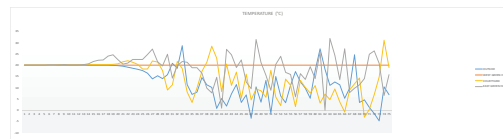
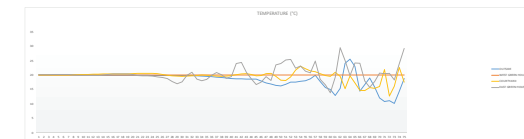
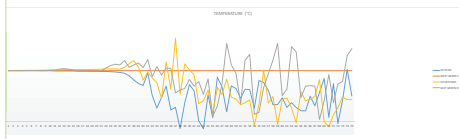


Fig. 8.7 Ventilation Graphs (Author, 2017)

## TECTONIC CONCEPT:

A roof superimposes a grid that organizes and unifies various interdependent elements. These interdependent elements can be described as a series of layers that make up the building. From the onset of the design the intentions were to imply an open outline for architecture rather than creating a sealed and controlled environment. Thus, instead of isolating the user from the environmental factors, elements such as direct sunlight is used as a dynamic device that influences the habits of users during the specific times of the day. Thermal Comfort of users is addressed in specifically zoned and controlled areas, whilst the majority of the intervention is kept open. Relating to the intentional openness of the space, is the lightness of the architecture that accompanies it. The openness of space contrasts the closed, and isolated nature of the existing industrial buildings.

## ENVIRONMENTAL STRATEGY

This open air nature of the street market that superimposes itself onto the food production activities taking place below dictates the environmental strategy. Due to the open air nature of the design, a Greenstar design rating was utilized instead of energy modelling techniques that rely on enclosed climate control. Construction depends on the sourcing of materials from surrounding industries whilst the running demand on resources depends on a cyclical system that reuses greywater, extracts bio-diesel from food scraps and generates electricity. Programmatically the informal industries reduce waste generated by the formal industries by incorporating human activities into the process of producing food. The symbiotic relationship encourages reduction in waste and simultaneously shortens the supply chain. The transportation of goods between industry and market

## SOLAR STUDY

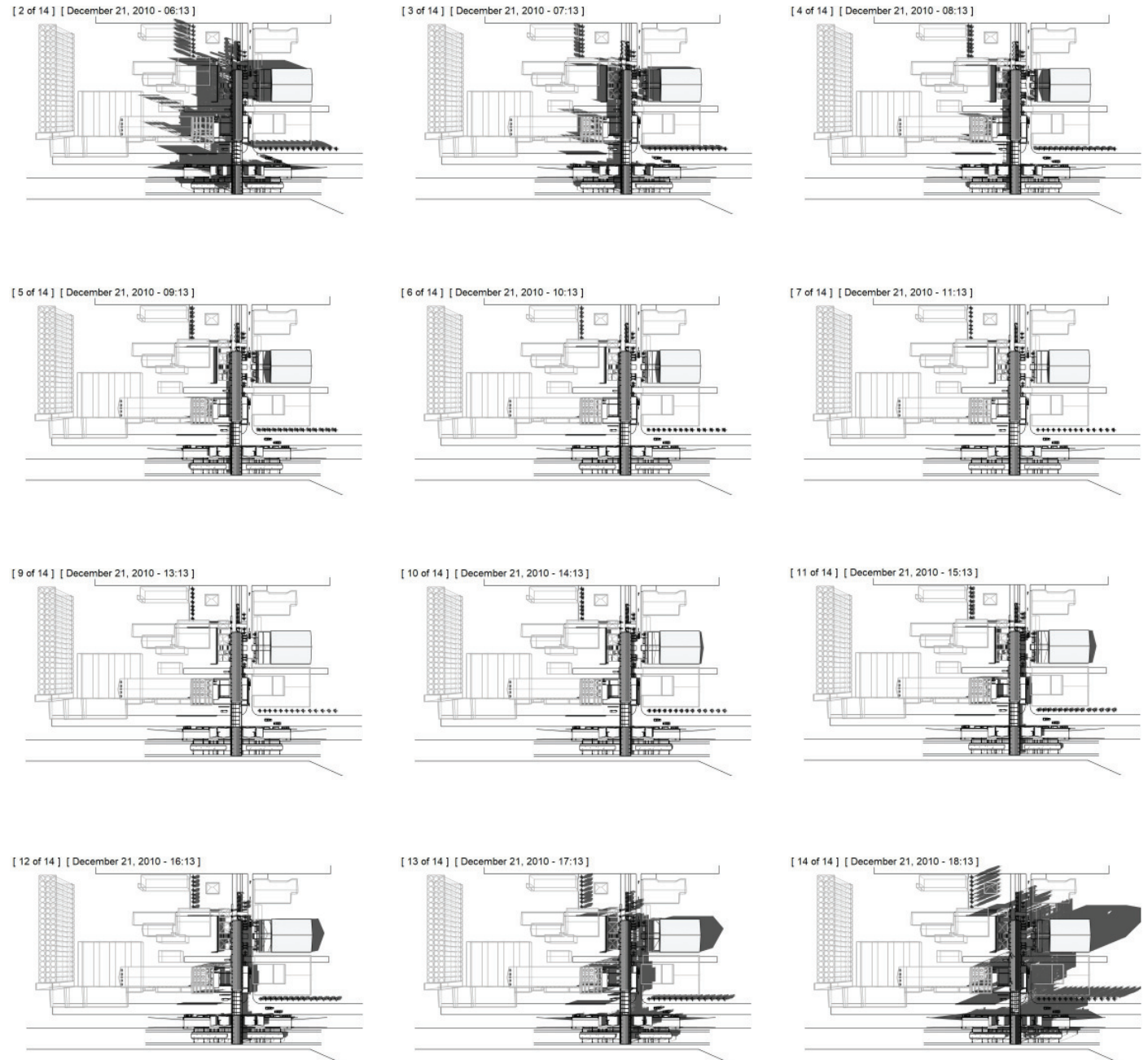


Fig. 8.8 Solar Study (Revit 2016 by Author)



# SHADING DESIGN

## GBCSA - GREENSTAR RATING 5 STARS RATING WITH 70 CREDITS (6 STAR RATING WITH 5 POTENTIAL AD- DITIONAL CREDITS)

Refer to Appendix B for a detailed description of the credits that were achieved in each category

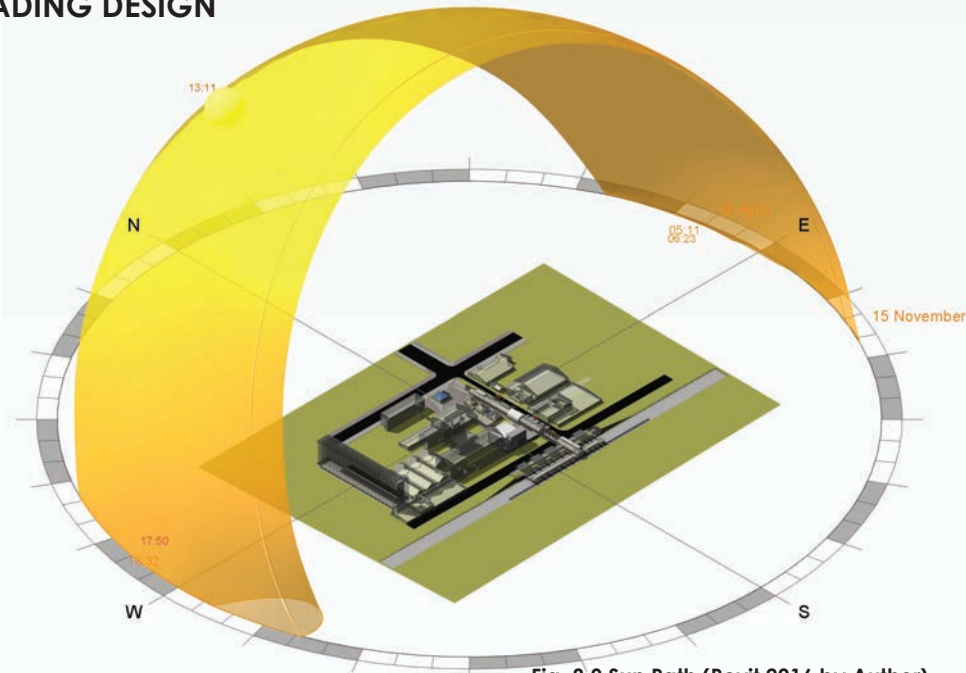


Fig. 8.9 Sun Path (Revit 2016 by Author)

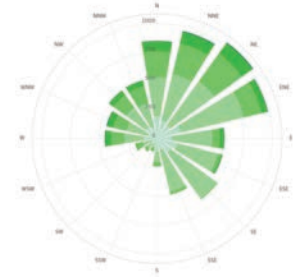


Fig. 8.11 Climate (Revit 2016 by Author)

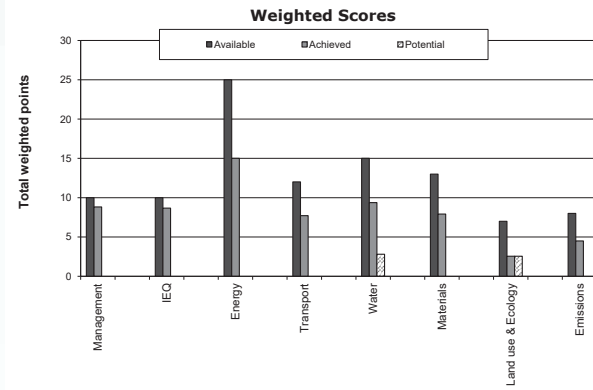


Fig. 8.10 Greenstar Rating Credit Categories (GBCSA, 2017)

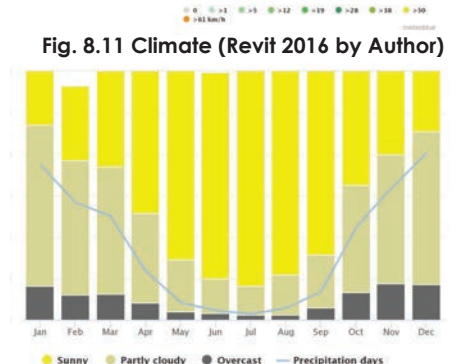


Fig. 8.12 Climate (Revit 2016 by Author)

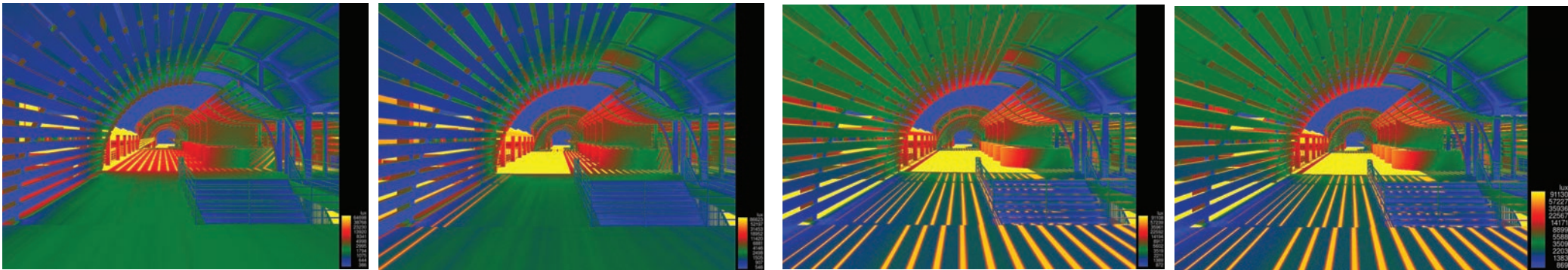
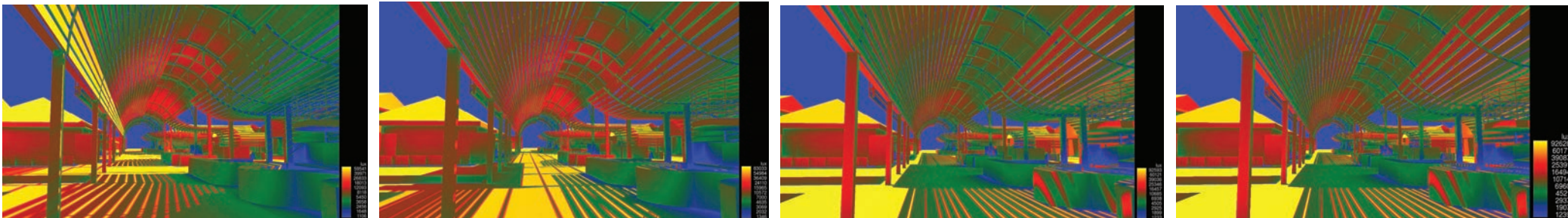


Fig. 8.13 Solar Study (Revit 2016 by Author)





is greatly reduced and economic opportunities are generated along the new market infrastructure.

## TECHNIFICATION OF AN [IN]FORMAL PROGRAM

By intensely programming a series of nodes with interactions between, informal programs could be catalysed to settle along the interactions between these nodes. The informal process is then free to change as the requirements of production change, whilst the formal (existing) nodes remain stagnant. By incorporating spill out spaces for informal programs that cannot be predicted, the existing programmes can serve as a host and be activated by the informal programs in a symbiotic relationship.

## EXTENDING THE OLD INTO THE NEW

The structural rhythm and order of the existing buildings is extended and expressed through the new additions, creating a unity in proportions between old and new. The extension of the old into the new aligns with the original architectural concept of the extending of existing functions towards the public. The illegible aesthetic of the existing structures is thus addressed (through the new additions) by highlighting the most prominent architectural system; the structural frame.

## OUTLINES

Various layers of the proposal depend on subtly implied boundaries and suggestions of space. Historic erf boundaries for instance forms distinct development patterns in the existing structures and form the broad proportional grid to which the new structure is ordered. These faint historic outlines are highlighted whilst the expected silhouette of the new building is blurred. The organisational grid thus becomes more important, and thus more prominent, than the roof that it carries.

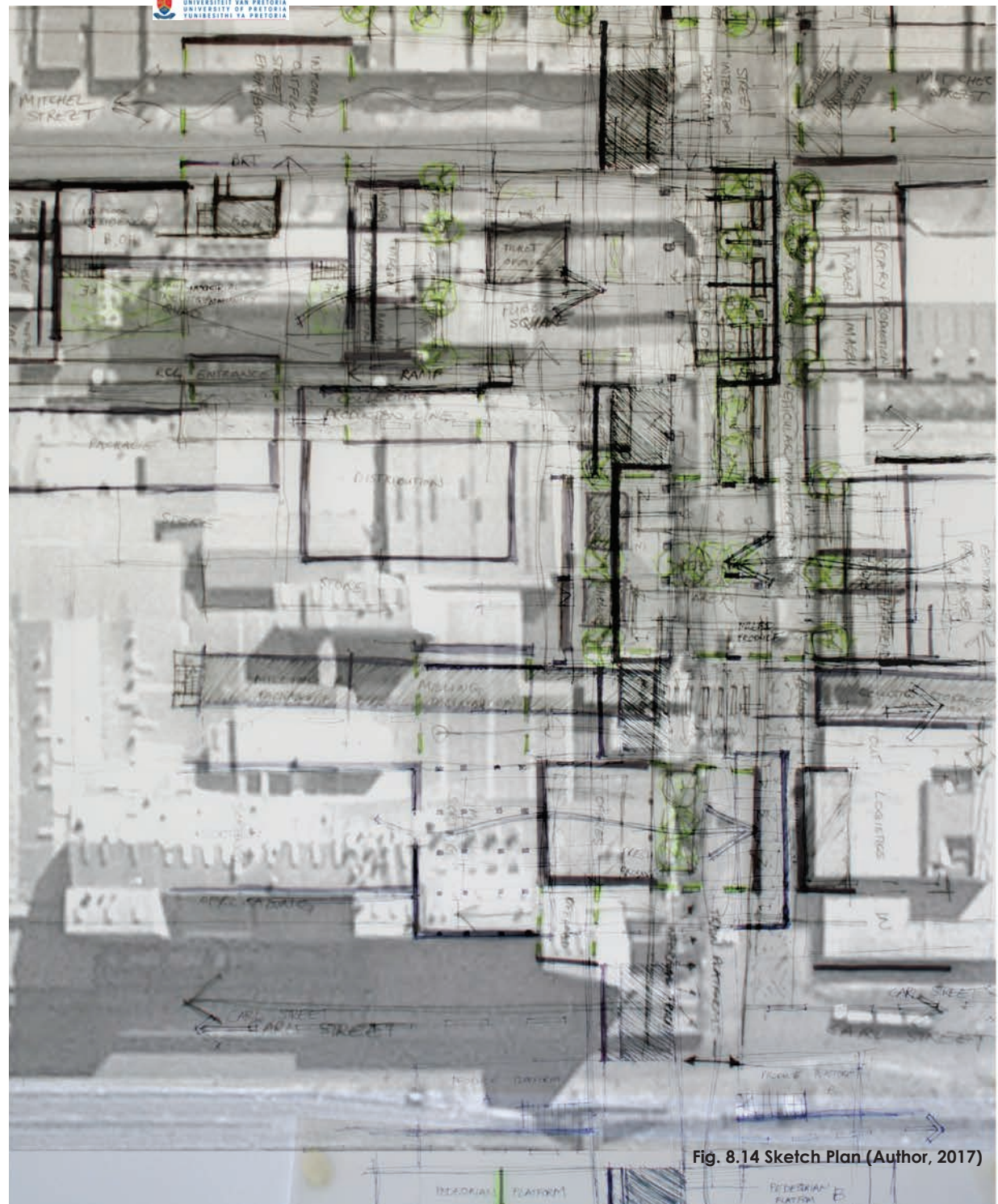


Fig. 8.14 Sketch Plan (Author, 2017)





TRAIN STATION PLANS

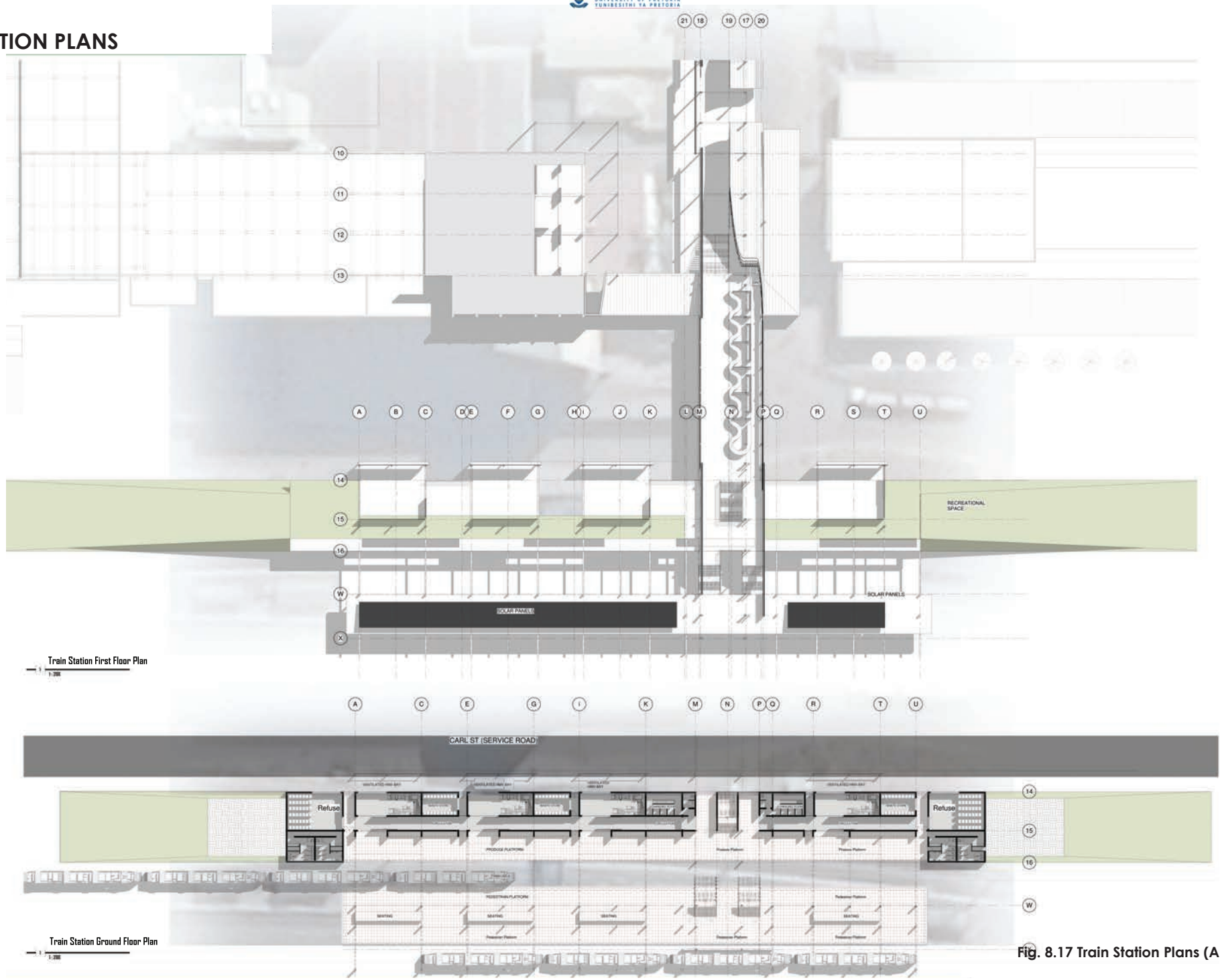
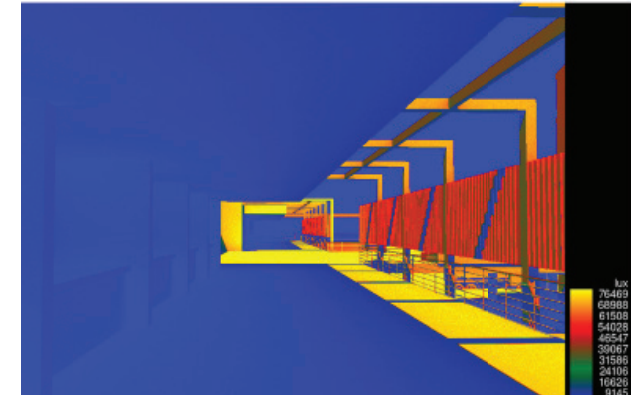
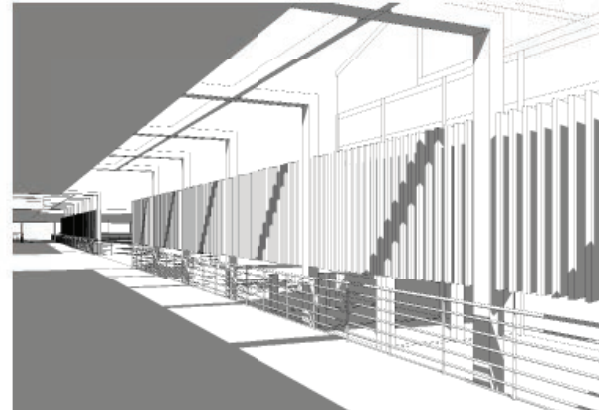


Fig. 8.17 Train Station Plans (Author, 2017)





**SYSTEMS DESIGN**

Fig. 8.18 Shading Design (Revit 2016 by Author, 2017)



**RAINWATER HARVESTING**  
1970m<sup>2</sup> CATCHMENT AREA ROOF  
STRUCTURE



**WASTE CATCHMENT**  
FILTRATION AND SEPERATION OF WET  
WASTE AND GREYWATER RECYCLING



**OIL PLANT**  
INDUSTRIAL PROCESS REFINING



**WATER STORAGE TANKS**  
RAINWATER STORAGE AND  
SEPARATE GREYWATER STORAGE



**PRESURE WASHING**  
DAILY CLEANING OF STALLS AND  
WALKWAYS



**ENERGY GENERATION**  
GENERATORS CONVERT BIO-FEUL  
INTO ELECTRICITY ON SITE USED FOR  
LIGHTING AND PRESURE WASHING



**PHOTOVOLTAIC PANELS**  
450m<sup>2</sup> PHOTOVOLTAIC CELLS  
POWERING WATERPUMPS AND  
LIGHTING



**GREYWATER RECYCLING**  
GREYWATER RECYCLING USED FOR  
IRRIGATION AS WELL AS TOILET



**AIR CURTAIN**  
PEST CONTROL, AIR QUALITY  
CONTROL COMPARTMENTAL AIR  
CONTROL

Fig. 8.19 Systems Design (Author, 2017)

SECTIONS

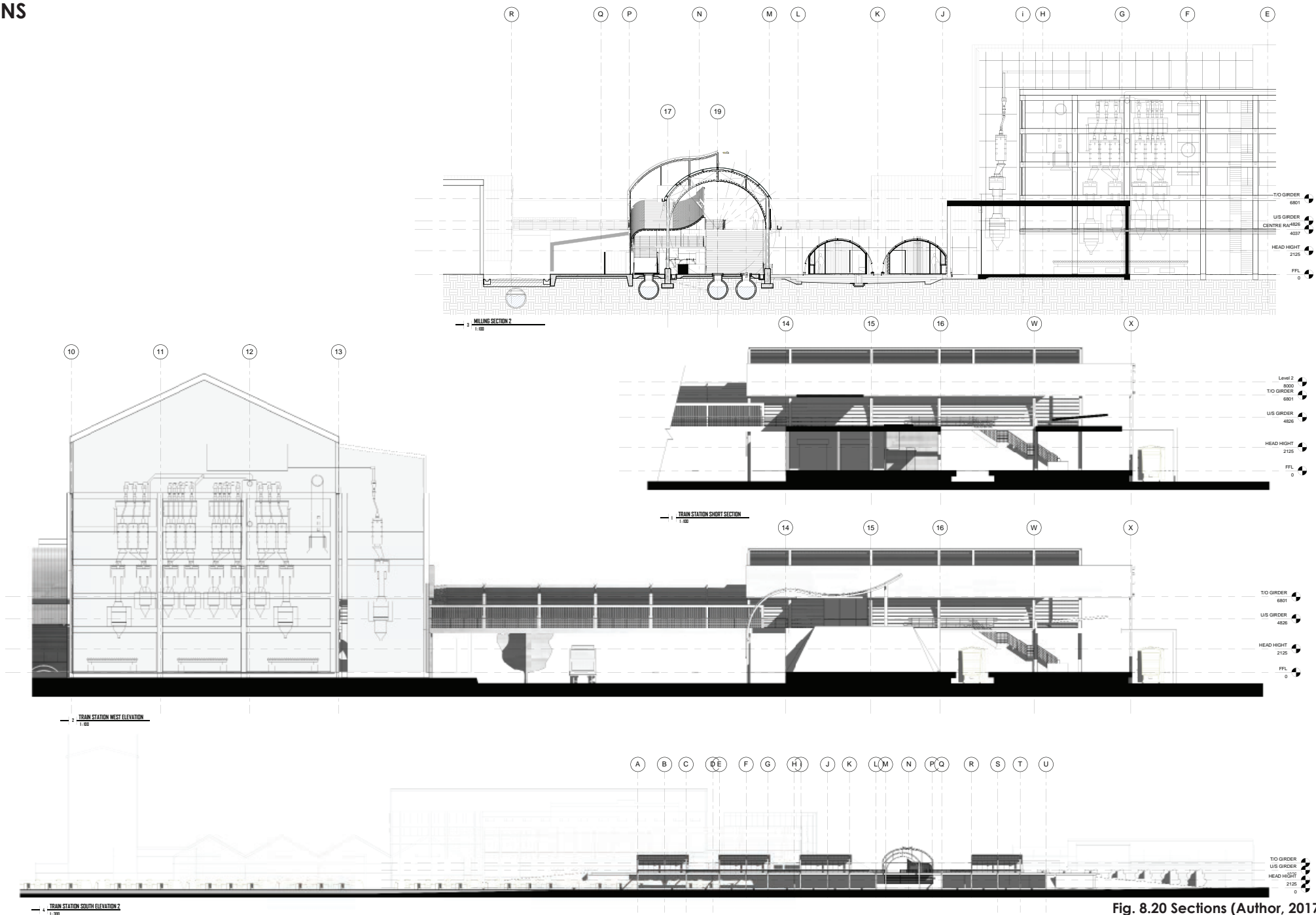


Fig. 8.20 Sections (Author, 2017)



# ELEVATIONS

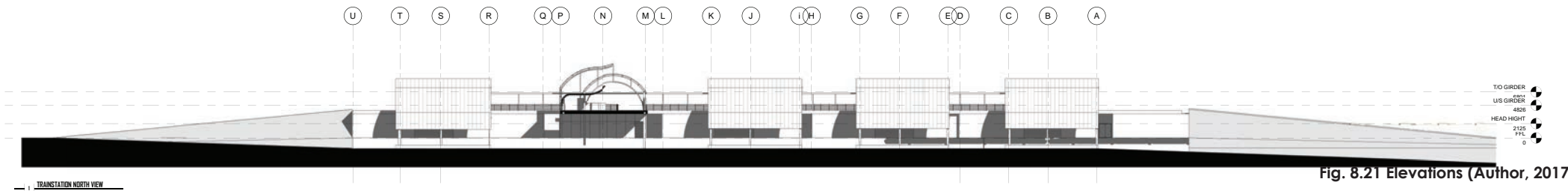
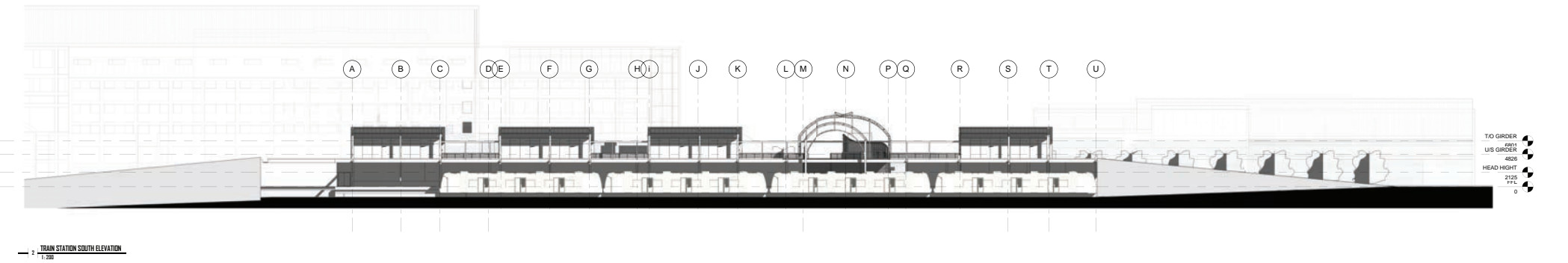
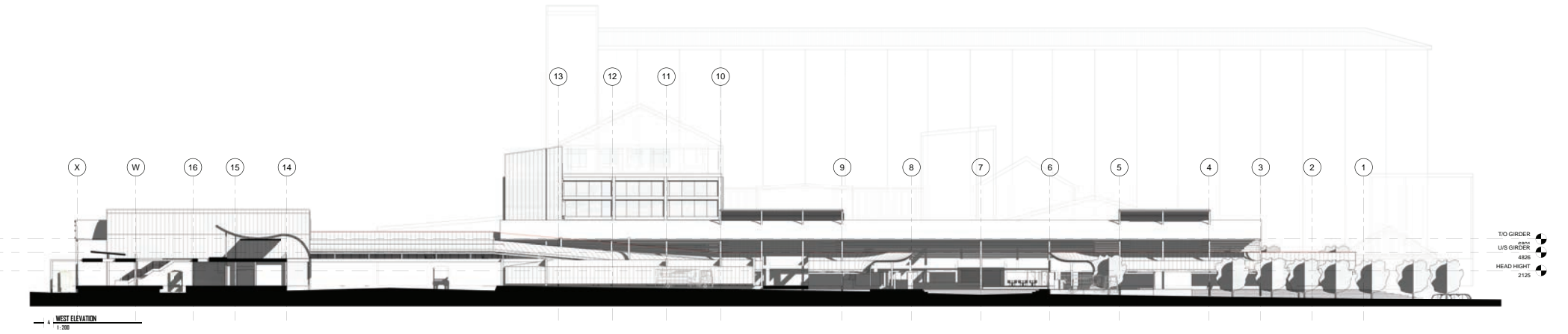
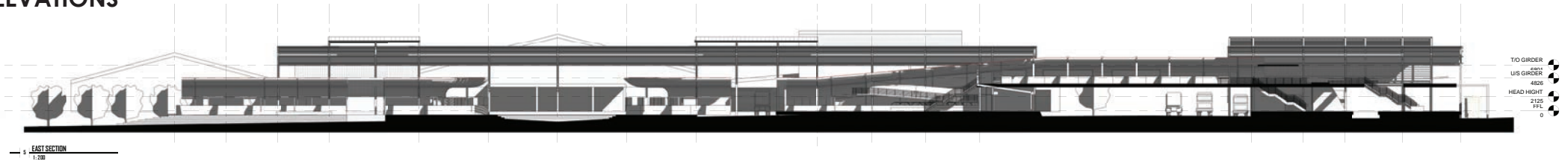
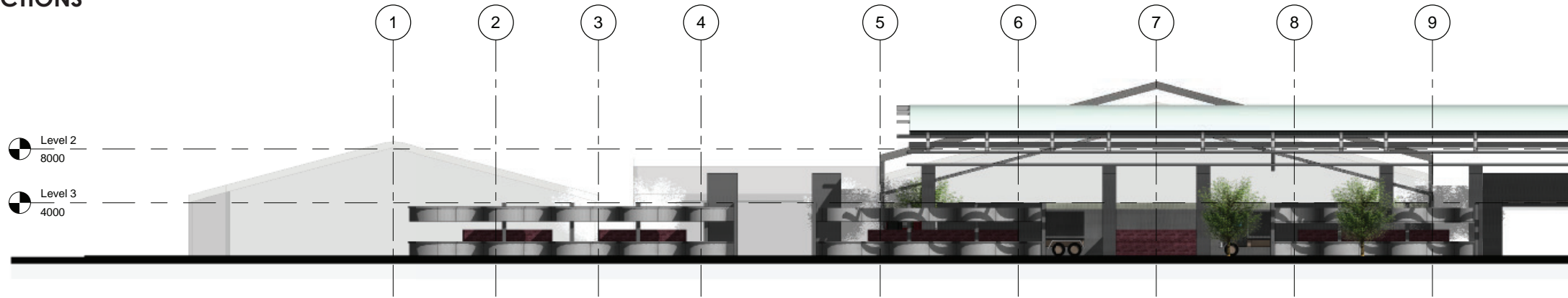


Fig. 8.21 Elevations (Author, 2017)

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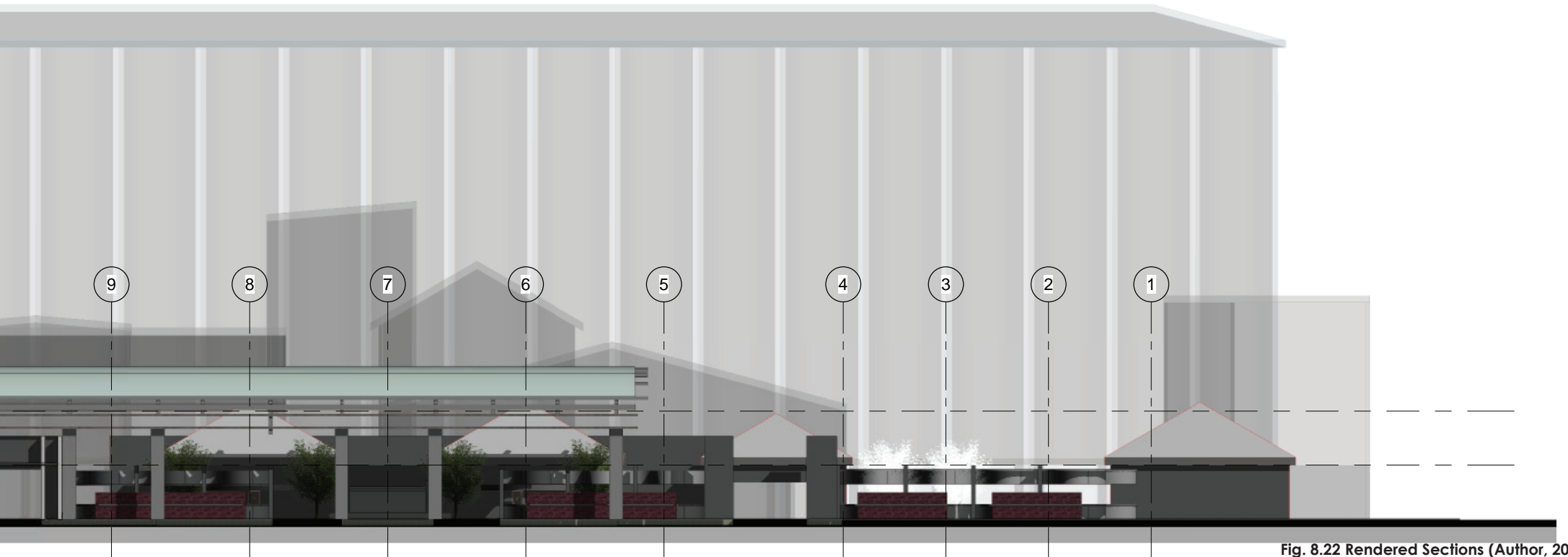
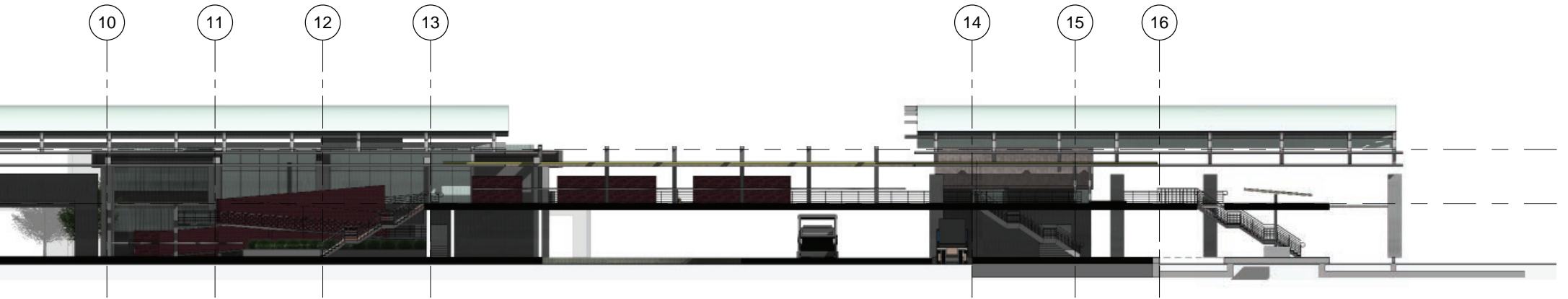


Fig. 8.22 Rendered Sections (Author, 2017)



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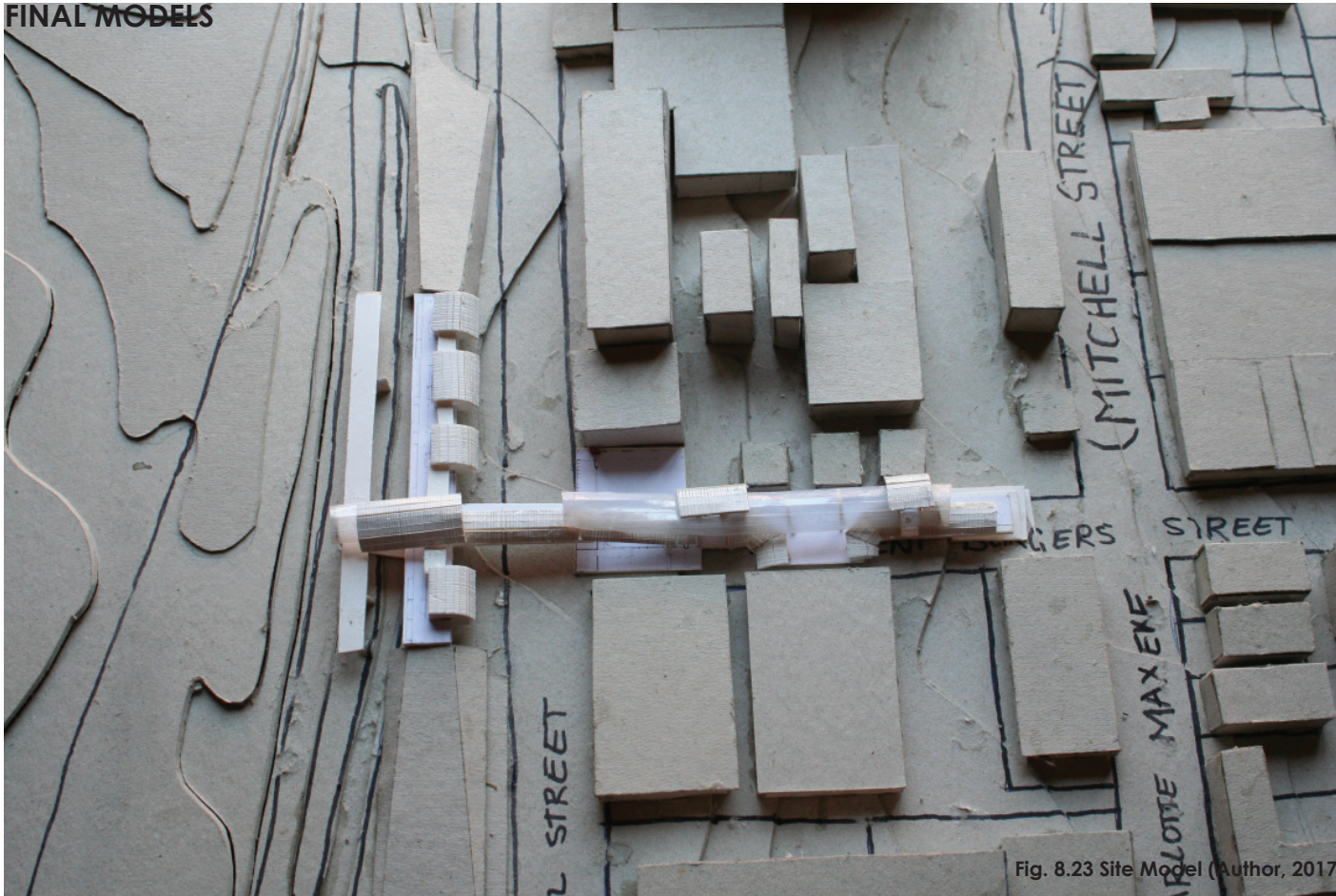


Fig. 8.23 Site Model (Author, 2017)

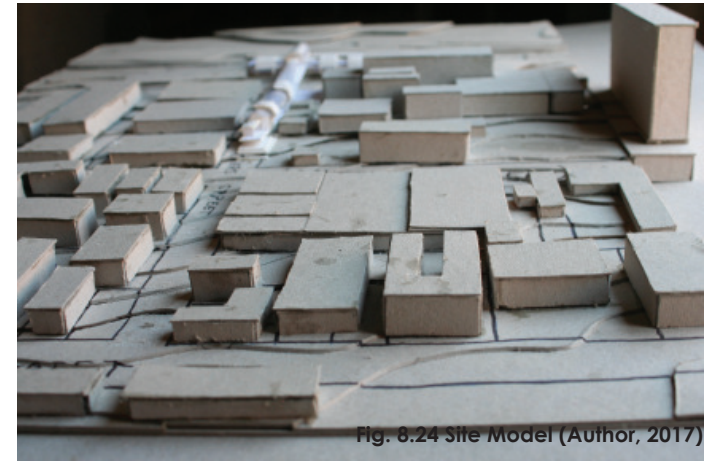


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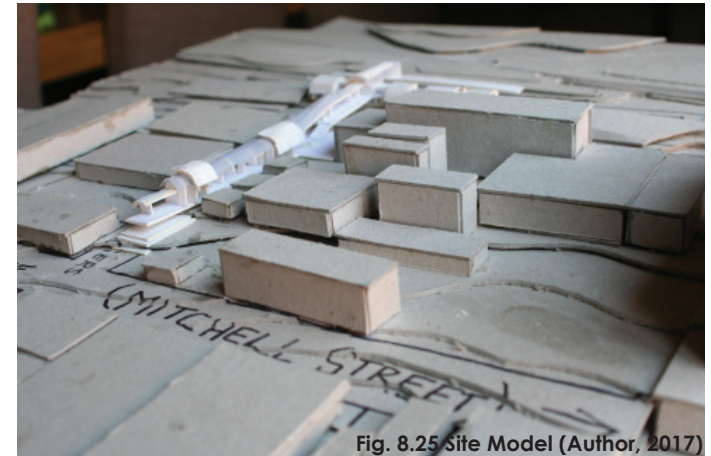


Fig. 8.25 Site Model (Author, 2017)



Fig. 8.26 Pretoria Figure Model (Author, 2017)

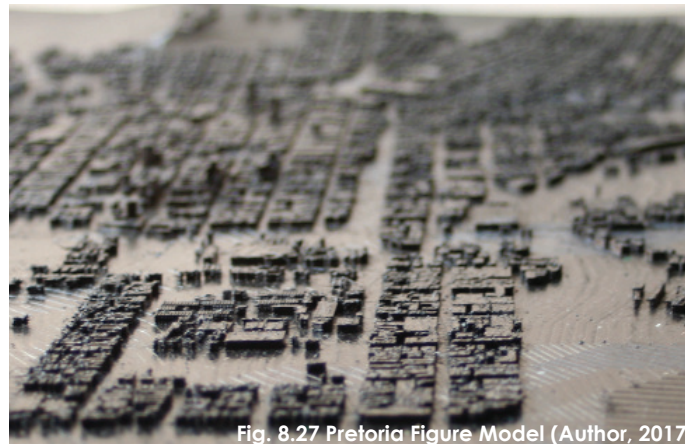


Fig. 8.27 Pretoria Figure Model (Author, 2017)



Fig. 8.28 Site Model (Author, 2017)



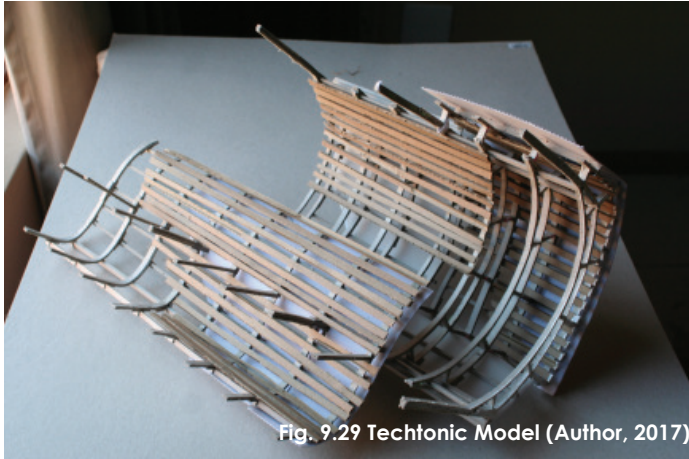


Fig. 9.29 Tectonic Model (Author, 2017)



Fig. 8.30 Tectonic Model (Author, 2017)



Fig. 8.31 Tectonic Model (Author, 2017)

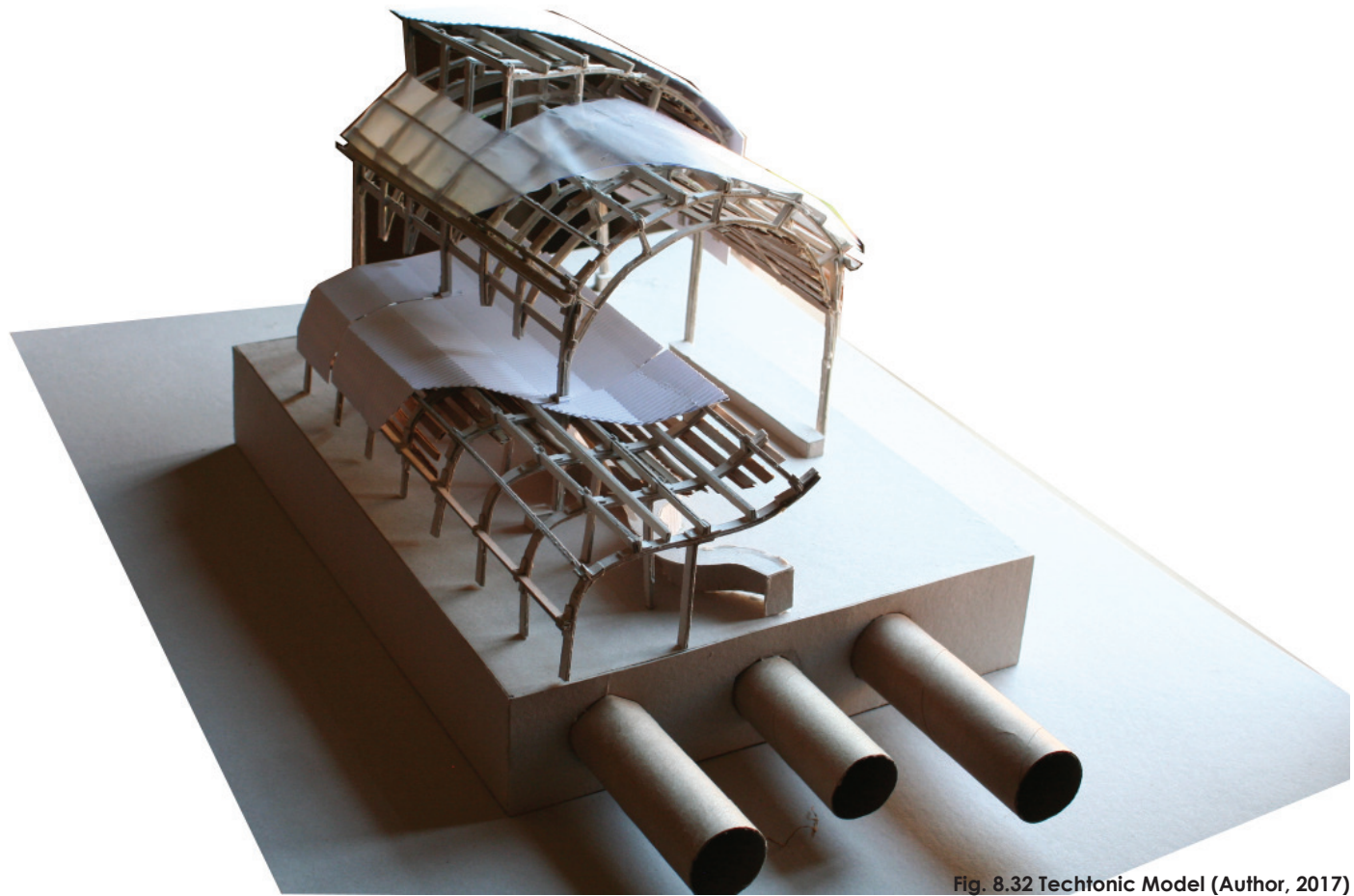


Fig. 8.32 Tectonic Model (Author, 2017)

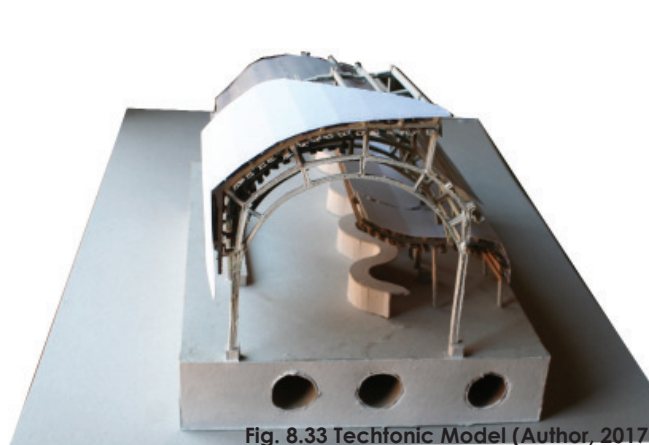


Fig. 8.33 Tectonic Model (Author, 2017)

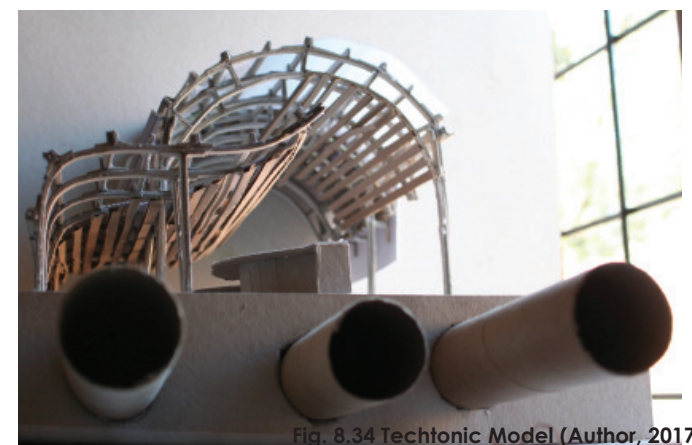


Fig. 8.34 Tectonic Model (Author, 2017)



DETAIL 1

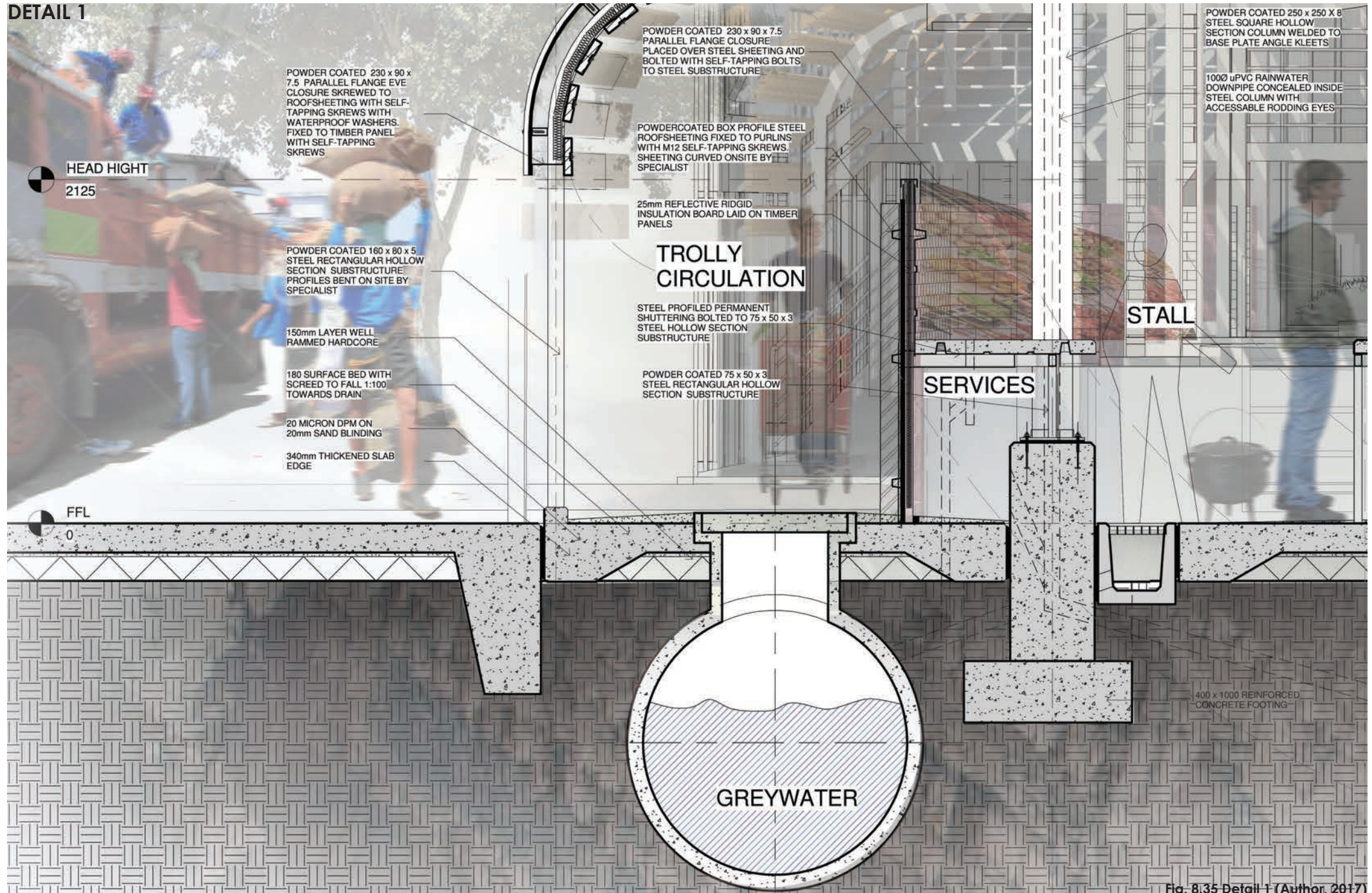


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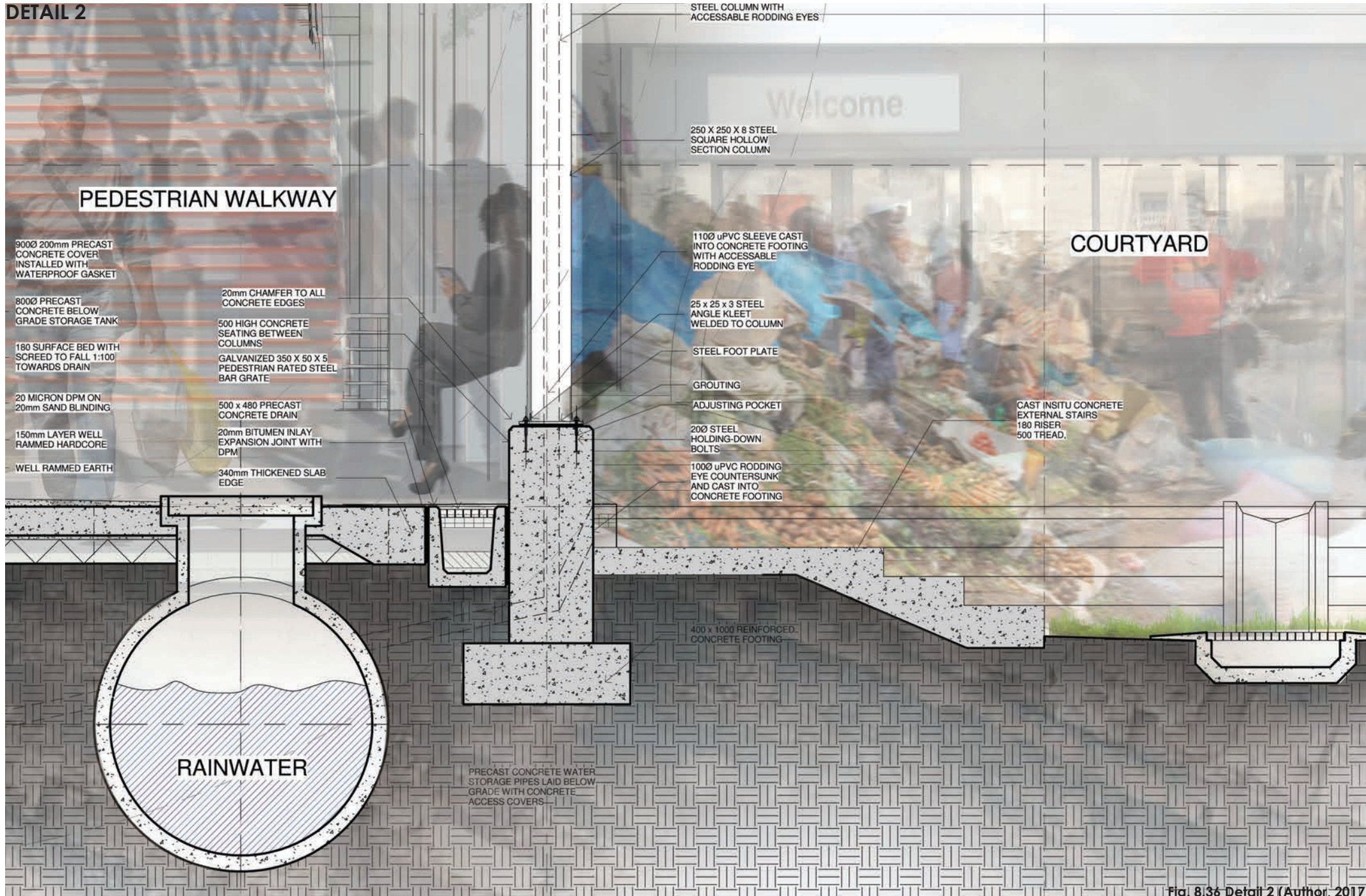


Fig. 8.36 Detail 2 (Author, 2017)



### DETAIL 3

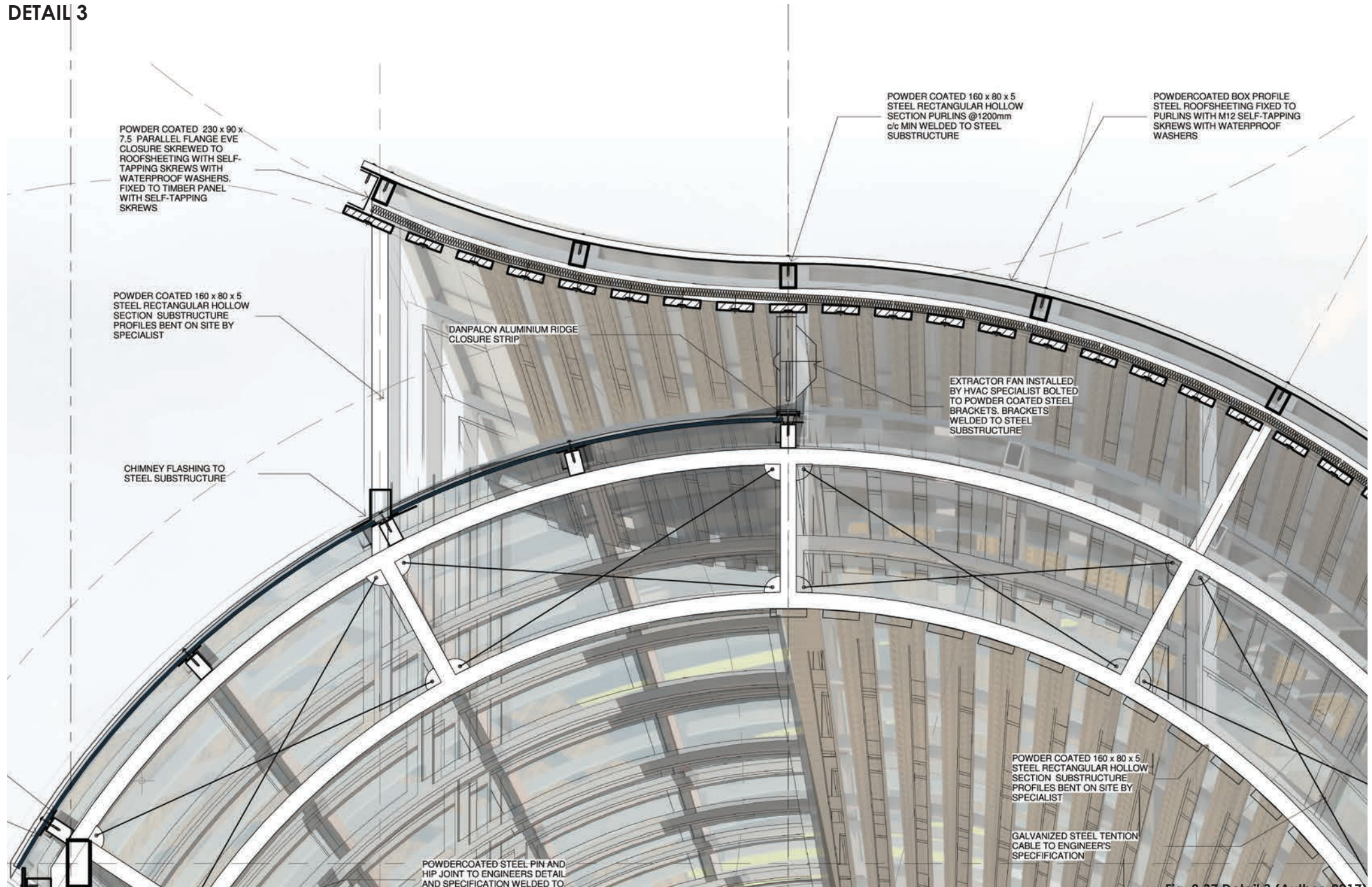


Fig. 8.37 Detail 3 (Author, 2017)



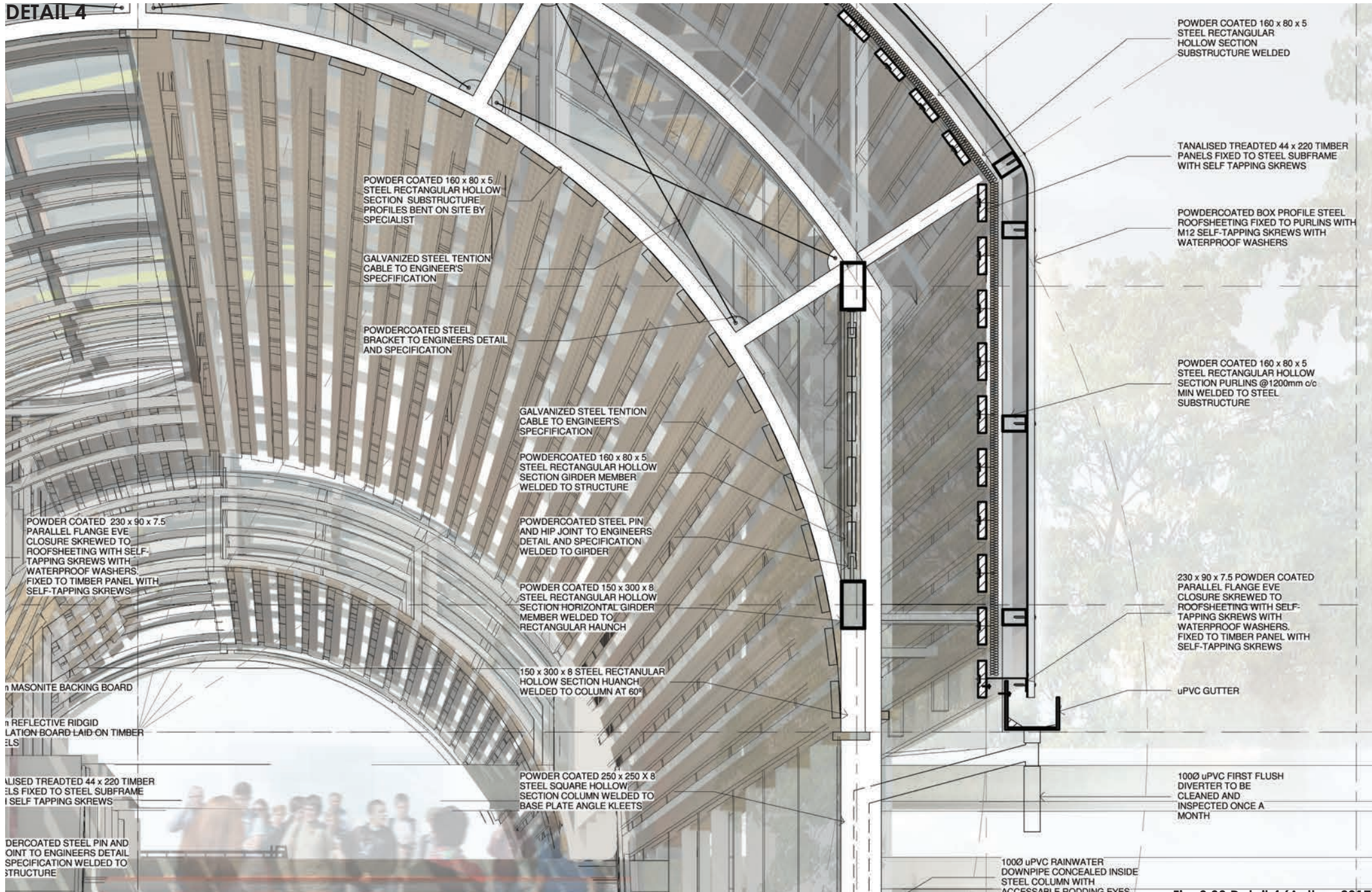


Fig. 8.38 Detail 4 (Author, 2017)



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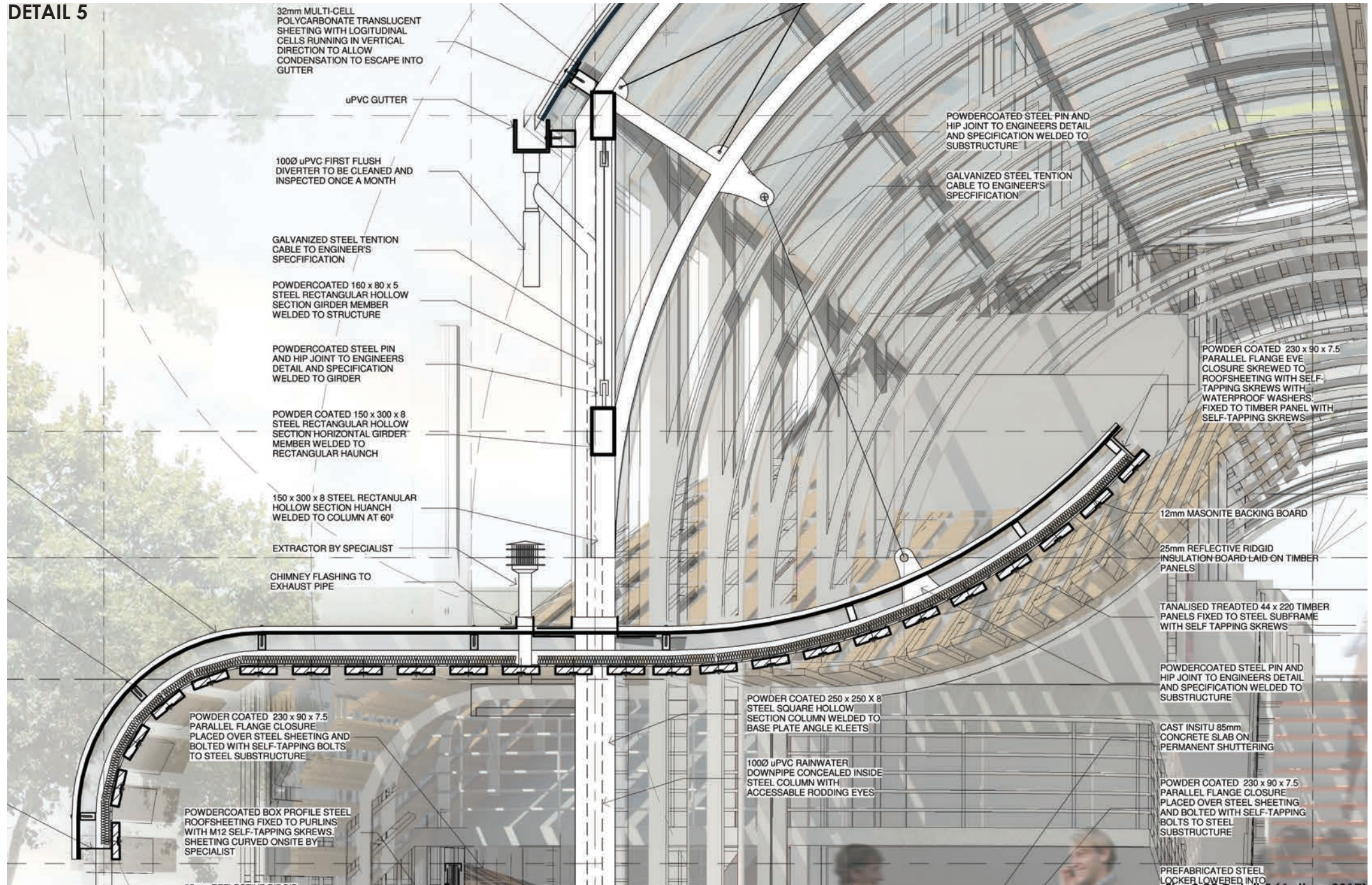


Fig. 8.39 Detail 5 (Author, 2017)



DETAIL 6

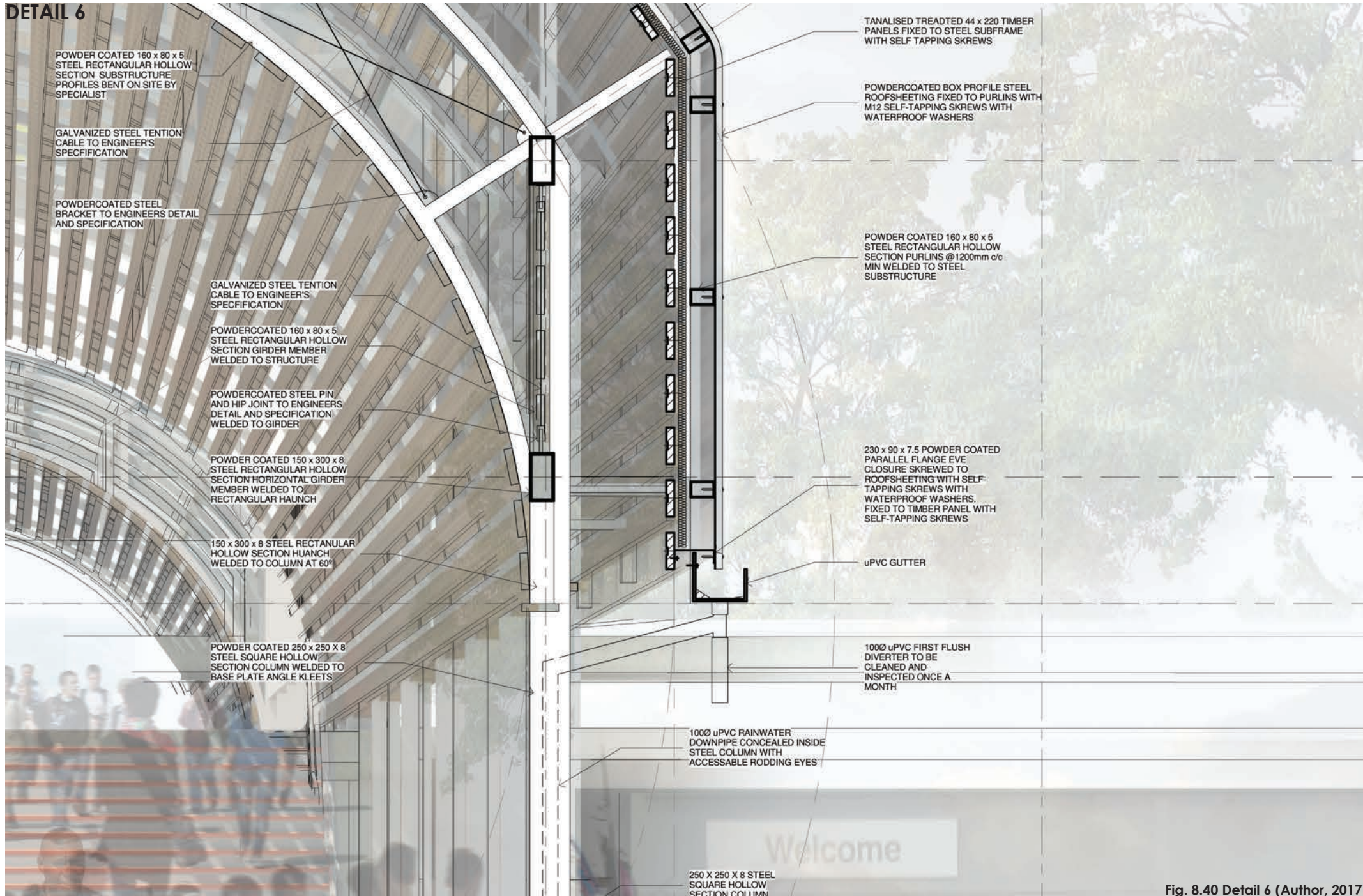


Fig. 8.40 Detail 6 (Author, 2017)



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Fig. 9.1 Design in Context (Author, 2017)

## CONCLUSION

With its existing mix of residents, industry and commerce (albeit segregated from one-another) Pretoria West holds the potential for a unique relationship between industry and the citizens of Pretoria. Only by understanding the role that these industries play within the greater context of the city can the rich character and culture of a place be amplified and solidified in a development plan. Catalysed by its heritage, development will become a manifestation of the character of place that will attract further growth and simultaneously embrace the existing stakeholders.

I conclude that theoretically it is possible to bridge the vast void that exists between the industrial environment and the public realm by introducing a community setting for production and reimagining the way that industries function. Through an intricate morphological understanding of industrial development, we can design a future for industries that is contextually appropriate.

The existing industrial built environment is often misshapen and illegible and whilst it is difficult to organize (and navigate) the seemingly disorganized site, it is possible to resolve; through understanding historic boundaries and development patterns that can be utilized as organizational grids. In this case historic erf divisions and consolidations can be utilized as an organizational tool at a large scale and should serve as a guide to where future structures should be erected in order to maintain a legible built environment.





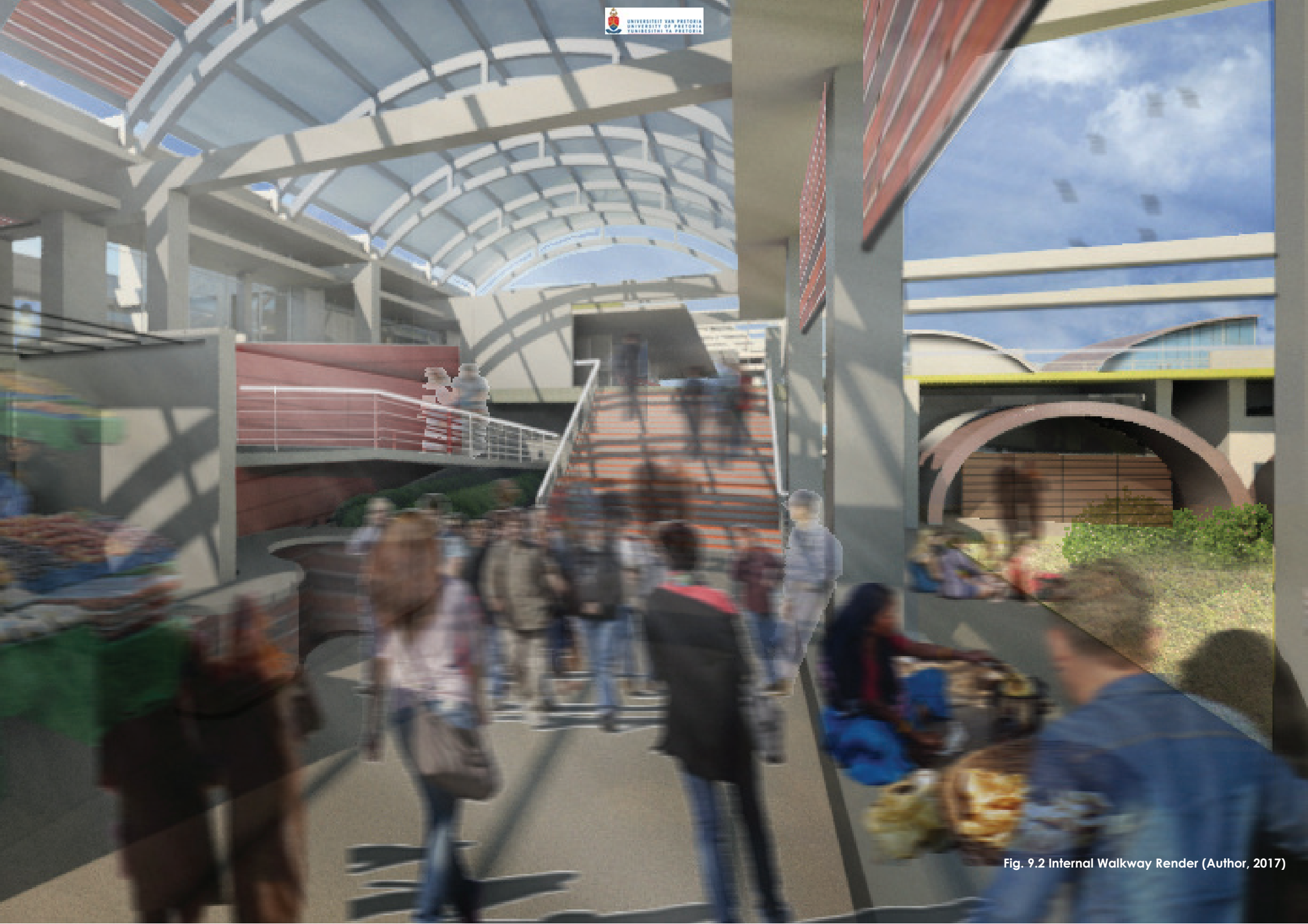


Fig. 9.2 Internal Walkway Render (Author, 2017)

When designing future additions, understanding the historic expansion of these industrial buildings holds the key to a harmonious relationship between old and new. With minimal architectural intent, these buildings supply little for the architect to grapple onto, but with material spans and structural repetition forming the underlying ordering principle; it is possible to create a logical and ordered extension of the past.



Fig. 9.3 Northern Birds Eye View (Author, 2017)



Fig. 9.4 Southern Birds Eye View (Author, 2017)



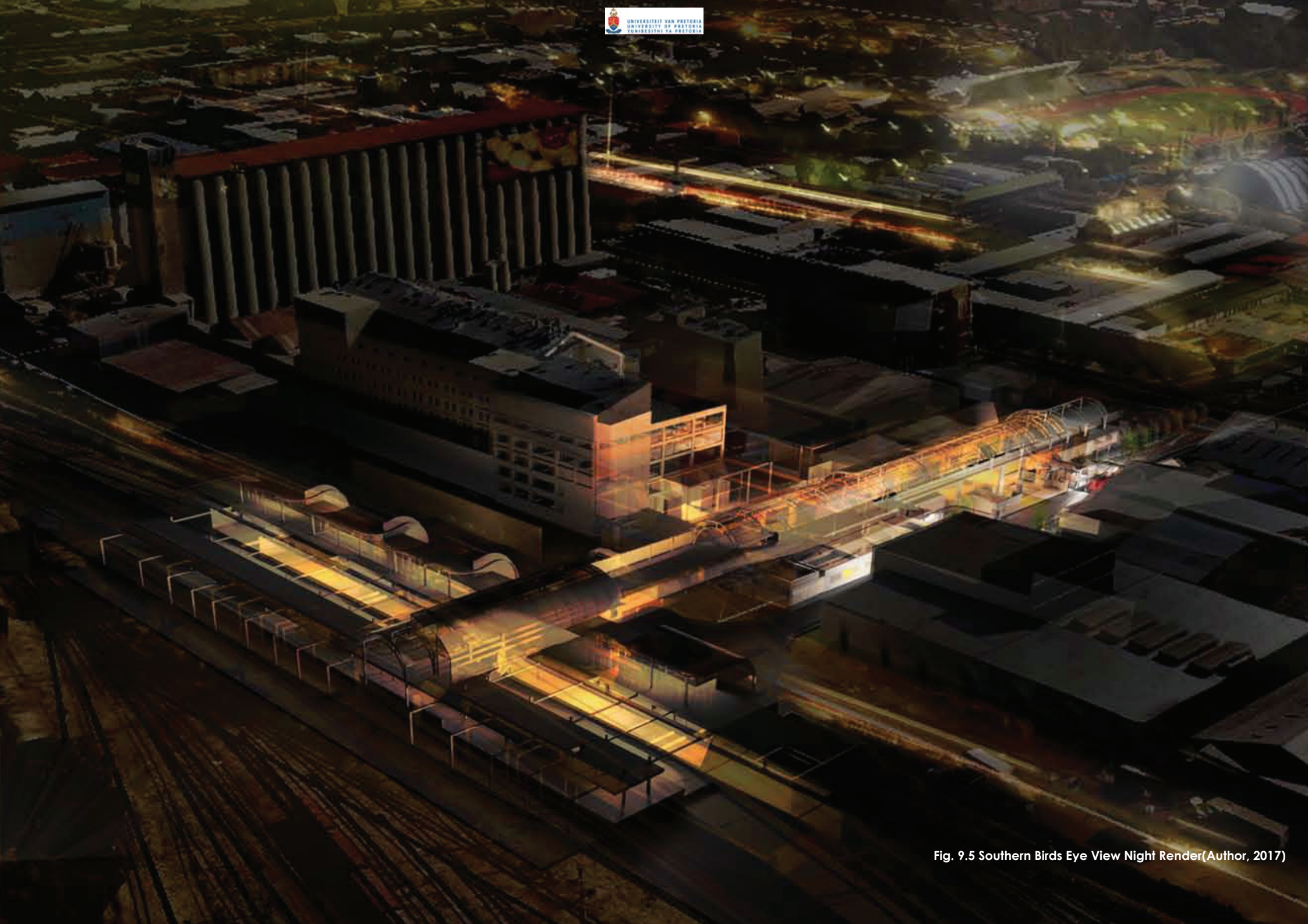


Fig. 9.5 Southern Birds Eye View Night Render(Author, 2017)



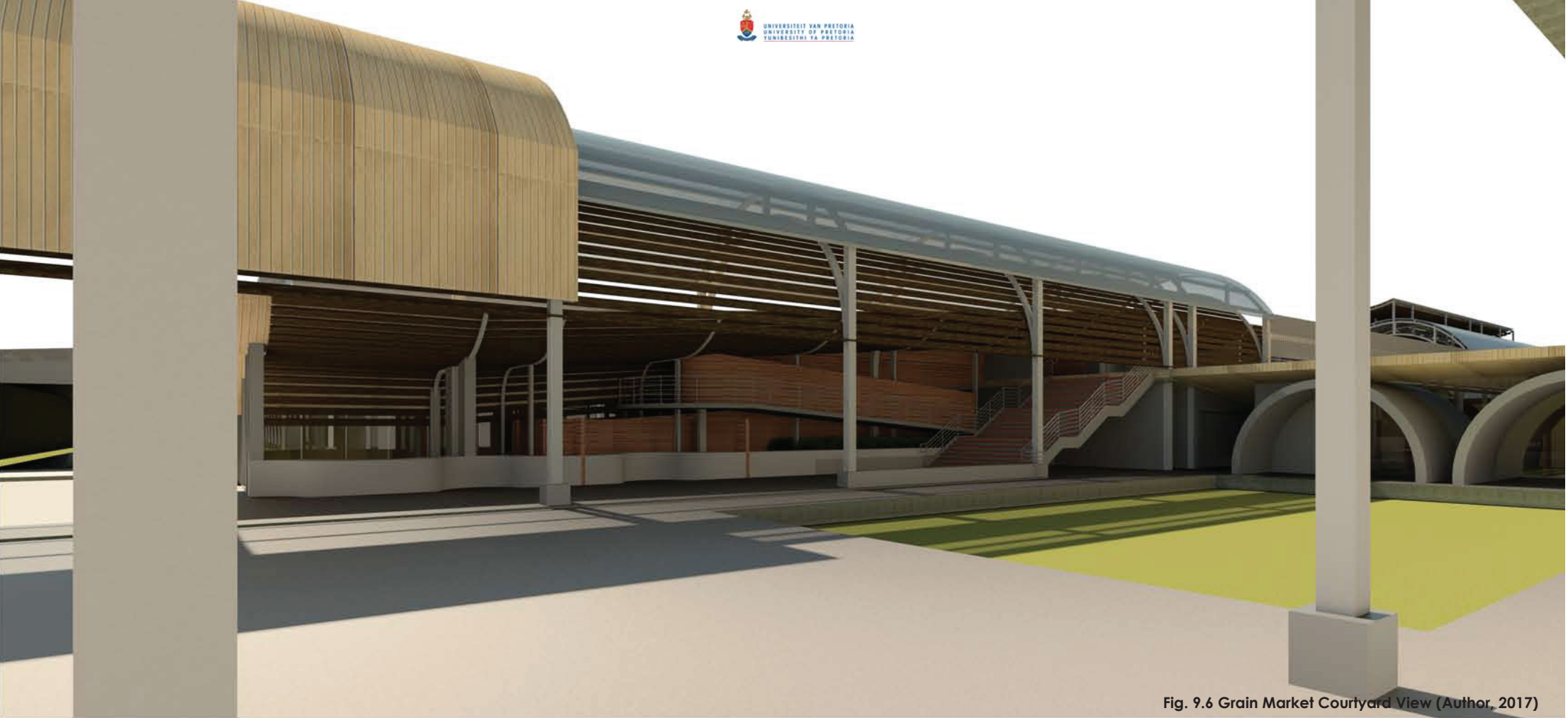


Fig. 9.6 Grain Market Courtyard View (Author, 2017)

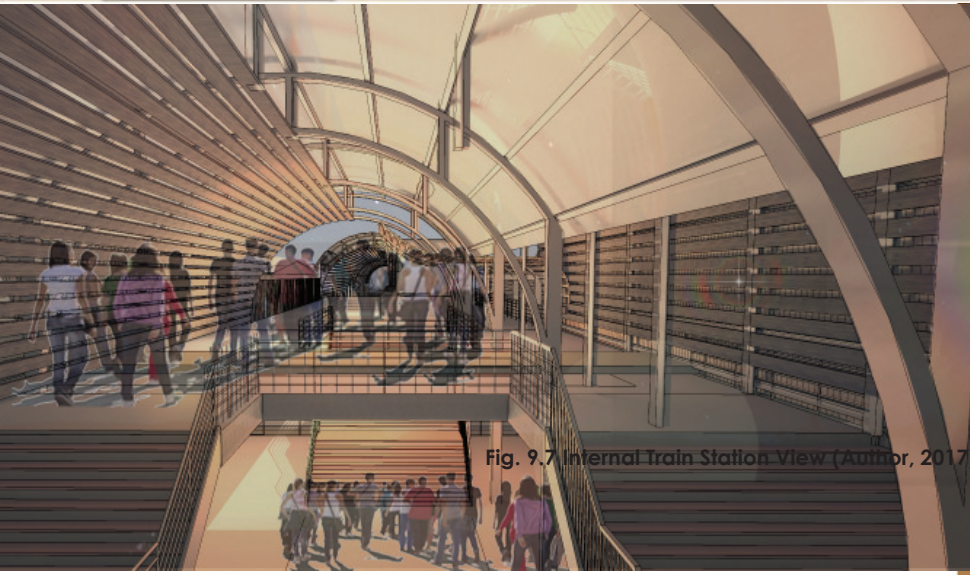


Fig. 9.7 Internal Train Station View (Author, 2017)

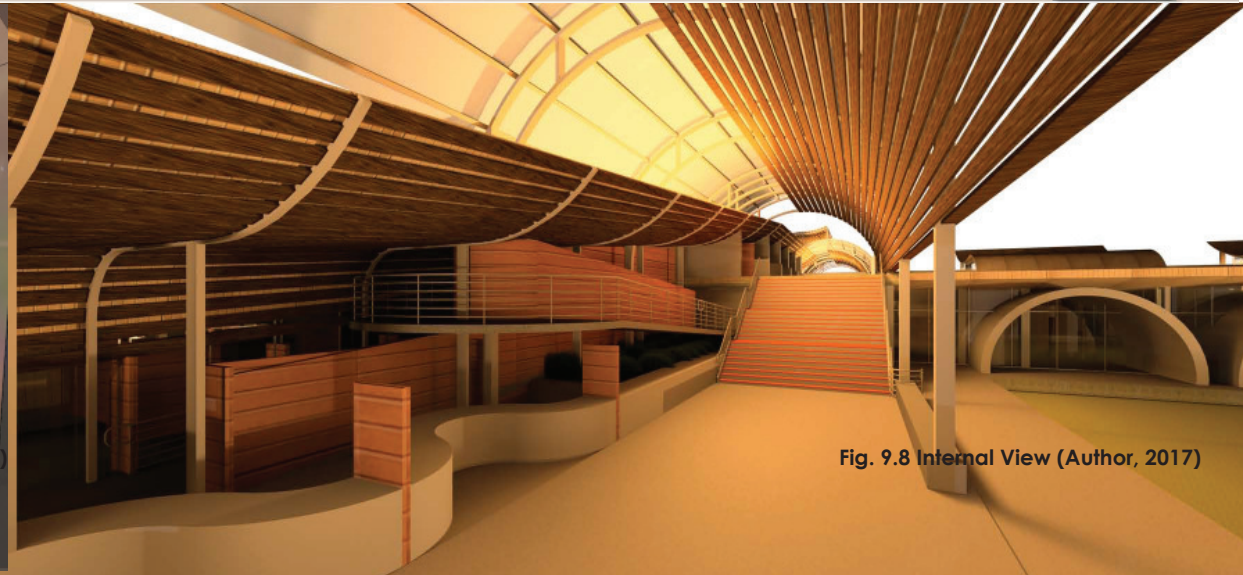


Fig. 9.8 Internal View (Author, 2017)





Fig. 9.9 Southern View Development Render (Author, 2017)



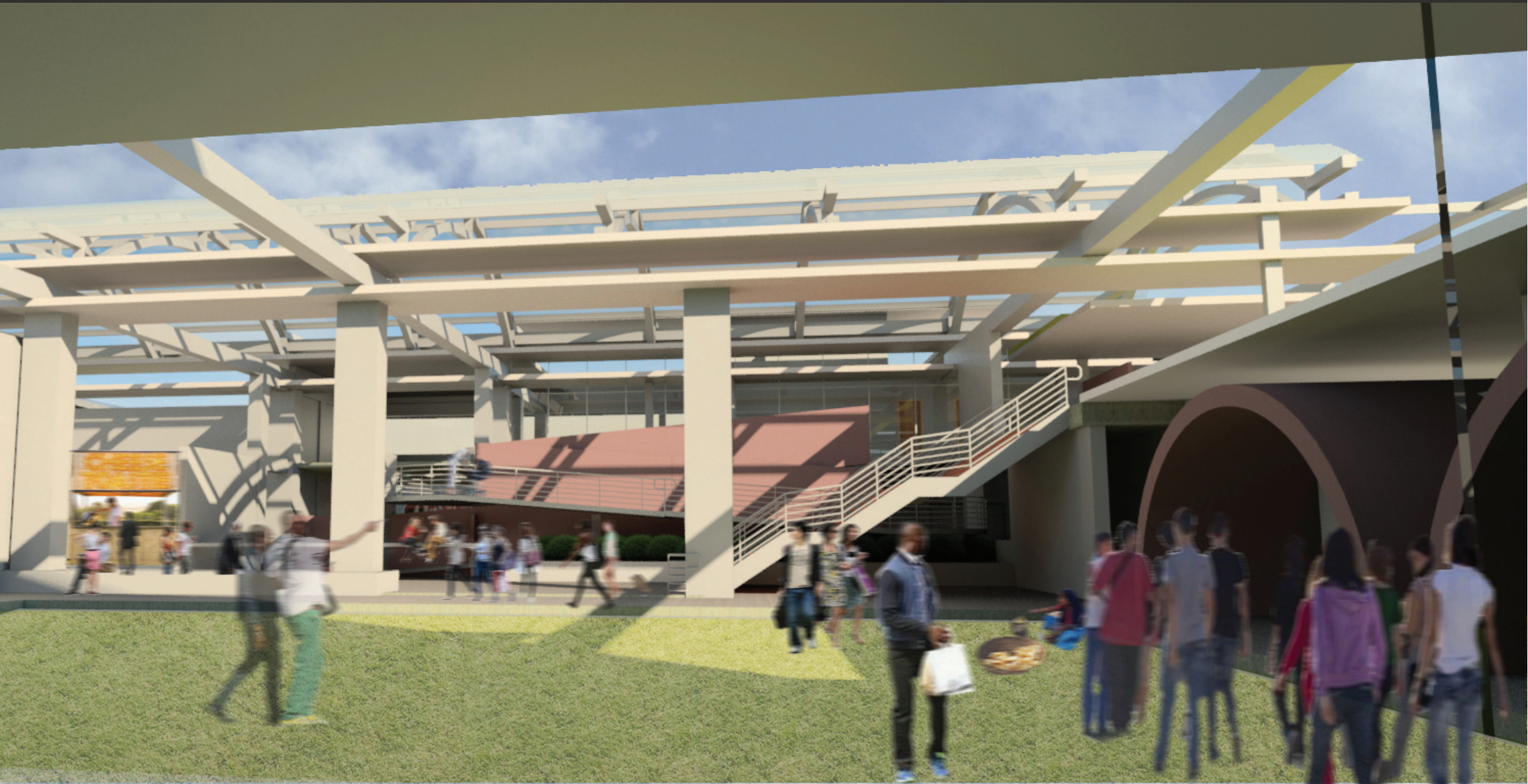


Fig. 9.10 Grain Market View (Author, 2017)





Fig. 9.11 Grain Market View Night Render (Author, 2017)







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## APPENDICES

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A Urban Sustainability Rating Tool	page 134
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## APENDIX A

### DIRECT REFERENCE TO TABLES FOR CALCULATING URBAN SUSTAINABILITY

- De Schiller, S. and Evans, J.M., 2006, September. Assessing urban sustainability: microclimate and design qualities of a new development. In 23rd

**Table 1.** Scale of 'permeability'.

Level	Category	Definition
-2	Lack of permeability	Urban sectors with routes limited by railways or other urban barriers, very large city blocks.
-1	Limited permeability	Large city blocks, subdivisions and plots with building complexes without through routes.
0	Normal	Typical city blocks ( of about 100 m x 100 m for most cities of Argentina) without galleries, passages or other through routes.
+1	Permeable	Smaller city blocks or standard city blocks with pedestrian routes through the centre of the block.
+2	Very permeable	City block with various alternative through routes or open squares with open

Figure 10.01: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)

**Table 2.** Scale of 'vitality'.

Level	Category	Definition
-2	Lack of vitality	Notable lack of activity in urban spaces, very limited number of entrances, land uses that discourage pedestrian movement.
-1	Limited vitality	Limited street activity, limited number of entrances, activities and land use that does not attract users.
0	Normal	Normal urban street activity, for example medium density residential areas with normal number of entrances.
+1	Moderate vitality	Greater level of activity than the urban average, with activities that attract pedestrians.
+2	High Vitality	Lively areas with large number of pedestrians and constant activity throughout the day.

Figure 10.02: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)



**Table 3.** Scale of 'variety'.

Level	Category	Definition
-2	Lack of variety	Limited land uses and/or planning restrictions. Large buildings with single uses or groups of buildings with the same use.
-1	Limited variety	Scarce variation of uses and number of building types, restricting potential activities.
0	Normal	Normal variation of building types and range of urban activities within them.
+1	Moderate variety	Greater than average range of uses with a variety of building types and uses.
+2	Ample variety	Great variety of uses, different building types and complementary activities.

Figure 10.03: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)

**Table 4.** Scale of 'legibility'.

Level	Category	Definition
-2	Lack of legibility	Urban structure difficult to understand, with lack of elements to provide visual orientation. Lack of identity.
-1	Low legibility	Lack of clarity in the urban structure, few landmarks or elements to aid orientation.
0	Normal	Normal urban structure and street pattern, without notable spatial identity.
+1	Moderate legibility	Easy understanding of the street pattern, with clear spatial identity.
+2	High legibility	Easy understanding of the street pattern and urban structure, with elements to aid the recognition of uses and orientate movement.

Figure 10.04: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)

**Table 5.** Scale of 'robustness'.

Level	Category	Definition
-2	Lack of robustness	Very limited potential to adapt to changes or new uses, rigid subdivisions and lack of flexibility in building design.
-1	Limited robustness	Limited adaptability of the urban tissue, buildings with limited flexibility and variety.
0	Normal robustness	Average capacity of adaptation to changes with low potential to allow modifications of urban structure and building types.
+1	Moderate robustness	Better than average possibilities of change and development over time.
+2	High robustness	High potential to adapt to change flexible buildings and urban structure that be maintained over time.

Figure 10.05: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)

**Table 6.** Quality of urban design and quality of urban sustainability.

Quality [1]	Urban design quality	Sustainable urban quality
Permeability	Functional and visual connections in the urban tissue. Choice of alternative routes	Access to renewable resources of sun breeze and daylight. Access to promote social participation.
Vitality	Location and extent of active borders Frequency of entrances and indoor – outdoor relationship.	Social: Improve the quality of life conservation of cultural and social heritage Economic: promote commercial activity and exchange.
Variety	Variation of complementary uses day and night, indoors and outdoors.	Environmental: conservation of diversity. Social: inclusion of different social sectors.
Legibility	Comprehension of the urban structure and layout, relation with the city, visual identity, ease of identifying routes, activities and movement.	Social organization: promote self determination and appropriation of urban space, favour social responsibility participation and integration.
Robustness	Flexibility, ability to accept different uses and activities over time.	Flexible development, to favour change, renovation, reuse, revitalization and recycling.

Figure 10.06: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)



**Table 7.** Quality of urban design and microclimate.

<b>Quality [1]</b>	<b>Urban design quality.</b>	<b>Microclimatic quality.</b>
Permeability	Functional and visual connections in the urban tissue Choice of alternative routes	Access to renewable resources of sun, breeze and daylight. Lack of protection from wind and shade.
Vitality	Location and extent of active borders Frequency of entrances and indoor – outdoor relationship.	Environmental conditions that favour outdoor activities with a stimulating microclimate.
Variety	Variation of complementary uses day and night, indoors and outdoors.	Variety of microclimate conditions and opportunities to choose alternative outdoor environments for urban use.
Legibility	Comprehension of the urban structure and layout, relation with the city, visual identity, ease of identifying routes, activities and movement.	Ease of understanding microclimate potential and possibilities to achieve outdoor comfort and acceptance to perform open air activities.
Robustness	Flexibility, ability to accept different users and activities over time.	Possibilities to adapt, correct or modify environmental conditions in urban spaces.

Figure 10.07: Scale of Permeability Table (De Schiller, S. and Evans, J.M., 2006)

# Green Star SA - Retail Centre v1

## Credit Summary

Pretoria West Industrial Food Market

**Comments:**

Enter description of project aspects etc.

Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Percent of Available Points Achieved	Weighting	Weighted Score
<b>Management</b>								
	Green Star SA Accredited Professional	Man - 1	2	2	0			
	Commissioning Clauses	Man - 2	2	2	0			
	Building Tuning	Man - 3	2	2	0			
	Independent Commissioning Agent	Man - 4	1	0	0			
	Building Guides	Man - 5	2	2	0			
	Environmental Management	Man - 6	2	1	0			
	Waste Management	Man - 7	3	3	0			
	Waste and Recycling Management Plan	Man - 9	1	1	0			
	Building Management Systems	Man - 10	1	1	0			
	Green Lease	Man - 11	1	1	0			
	<b>TOTAL</b>		<b>17</b>	<b>15</b>	<b>0</b>	<b>88%</b>	<b>10%</b>	<b>8.8</b>



Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Percent of Available Points Achieved	Weighting	Weighted Score
<b>Indoor Environment Quality</b>								
	Ventilation Rates	IEQ - 1	3	3	0			
	Air Change Effectiveness	IEQ - 2	2	2	0			
	Carbon Dioxide Monitoring and Control	IEQ - 3	1	1	0			
	Daylight	IEQ - 4	2	2	0			
	Thermal Comfort	IEQ - 9	1	0	0			
	Hazardous Materials	IEQ - 11	1	1	0			
	Internal Noise Levels	IEQ - 12	na	na	-			
	Volatile Organic Compounds	IEQ - 13	2	2	0			
	Formaldehyde Minimisation	IEQ - 14	1	1	0			
	Mould Prevention	IEQ - 15	1	1	0			
	Places of Respite and Connection to Nature	IEQ - 18	1	0	0			
	<b>TOTAL</b>		<b>15</b>	<b>13</b>	<b>0</b>	<b>87%</b>	<b>10%</b>	<b>8.7</b>
<b>Energy</b>								
	Conditional Requirement	Ene - 0	0	Achieved	-			
	Greenhouse Gas Emissions	Ene - 1	20	12	0			
	Electrical Energy Sub-metering	Ene - 2	2	2	0			
	Maximum Electrical Demand Reduction	Ene - 5	3	1	0			
	Thermal Energy Sub-metering	Ene - 6	na	na	-			
	<b>TOTAL</b>		<b>25</b>	<b>15</b>	<b>0</b>	<b>60%</b>	<b>25%</b>	<b>15.0</b>
<b>Transport</b>								
	Provision of Car Parking	Tra - 1	2	2	0			
	Fuel-Efficient Transport	Tra - 2	na	na	-			
	Cyclist Facilities	Tra - 3	3	0	0			
	Commuting Mass Transport	Tra - 4	6	6	0			
	Trip Reduction - Mixed-Use	Tra - 6	1	1	0			
	Vehicle Operating Emissions	Tra - 7	2	0	0			
	<b>TOTAL</b>		<b>14</b>	<b>9</b>	<b>0</b>	<b>64%</b>	<b>12%</b>	<b>7.7</b>

Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Percent of Available Points Achieved	Weighting	Weighted Score
<b>Water</b>								
	Occupant Amenity Water	Wat - 1	5	0	3			
	Water Meters	Wat - 2	3	3	0			
	Landscape Irrigation	Wat - 3	3	2	0			
	Heat Rejection Water	Wat - 4	4	4	0			
	Fire System Water Consumption	Wat - 5	1	1	0			
	<b>TOTAL</b>		<b>16</b>	<b>10</b>	<b>3</b>	63%	15%	<b>9.4</b>
<b>Materials</b>								
	Recycling Waste Storage	Mat - 1	2	2	0			
	Building Reuse	Mat - 2	5	0	0			
	Recycled Content & Re-Used Materials	Mat - 3	3	0	0			
	Concrete	Mat - 5	3	3	0			
	Steel	Mat - 6	3	3	0			
	PVC Minimisation	Mat - 7	1	0	0			
	Sustainable Timber	Mat - 8	2	2	0			
	Design for Disassembly	Mat - 9	1	1	0			
	Dematerialisation	Mat - 10	1	1	0			
	Local Sourcing	Mat - 11	2	2	0			
	<b>TOTAL</b>		<b>23</b>	<b>14</b>	<b>0</b>	61%	13%	<b>7.9</b>



Category Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Percent of Available Points Achieved	Weighting	Weighted Score
<b>Land Use &amp; Ecology</b>							
Conditional Requirement	Eco - 0	0	Not Achieved	-			
Topsoil	Eco - 1	1	1	0			
Reuse of Land	Eco - 2	2	2	0			
Reclaimed Contaminated Land	Eco - 3	2	0	0			
Change of Ecological Value	Eco - 4	4	0	4			
Urban Heat Island	Eco - 5	2	1	0			
	<b>TOTAL</b>	<b>11</b>	<b>4</b>	<b>4</b>	<b>36%</b>	<b>7%</b>	<b>2.5</b>
<b>Emissions</b>							
Refrigerant / Gaseous ODP	Emi - 1	1	1	0			
Refrigerant GWP	Emi - 2	2	2	0			
Refrigerant Leaks	Emi - 3	na	na	-			
Insulant ODP	Emi - 4	1	1	0			
Watercourse Pollution	Emi - 5	3	2	0			
Discharge to Sewer	Emi - 6	5	0	0			
Light Pollution	Emi - 7	1	0	0			
Legionella	Emi - 8	1	1	0			
Boiler and Generator Emissions	Emi - 9	1	1	0			
Kitchen Exhaust Emissions	Emi - 10	1	1	0			
	<b>TOTAL</b>	<b>16</b>	<b>9</b>	<b>0</b>	<b>56%</b>	<b>8%</b>	<b>4.5</b>
<b>Sub-total weighted points achieved:</b>							<b>65</b>
<b>Innovation</b>							
Innovative Strategies & Technologies	Inn - 1	5	3	0			
Exceeding Green Star SA Benchmarks	Inn - 2	5	1	0			
Environmental Design Initiatives	Inn - 3	5	1	0			
	<b>TOTAL</b>	<b>5</b>	<b>5</b>	<b>0</b>	(Innovation is not weighted)		<b>5</b>
<b>Total weighted points achieved:</b>							<b>70</b>

Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Percent of Available Points Achieved	Weighting	Weighted Score
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The GBCSA does not endorse any self-assessed rating achieved by the use of Green Star SA - Retail Centre v1. The GBCSA offers a formal certification process for ratings of Four Stars and above; this service provides for independent third party review of points claimed to ensure all points can be demonstrated to be achieved by the provision of the necessary documentary evidence. The use of Green Star SA - Retail Centre v1 without formal certification by the GBCSA does not entitle the user or any other party to promote the Green Star SA rating achieved.

Weighted Score	Rating
45-59	Four Star
60-74	Five Star
75+	Six Star





-----[ VIII ]-----  
P R E S E N T A T I O N

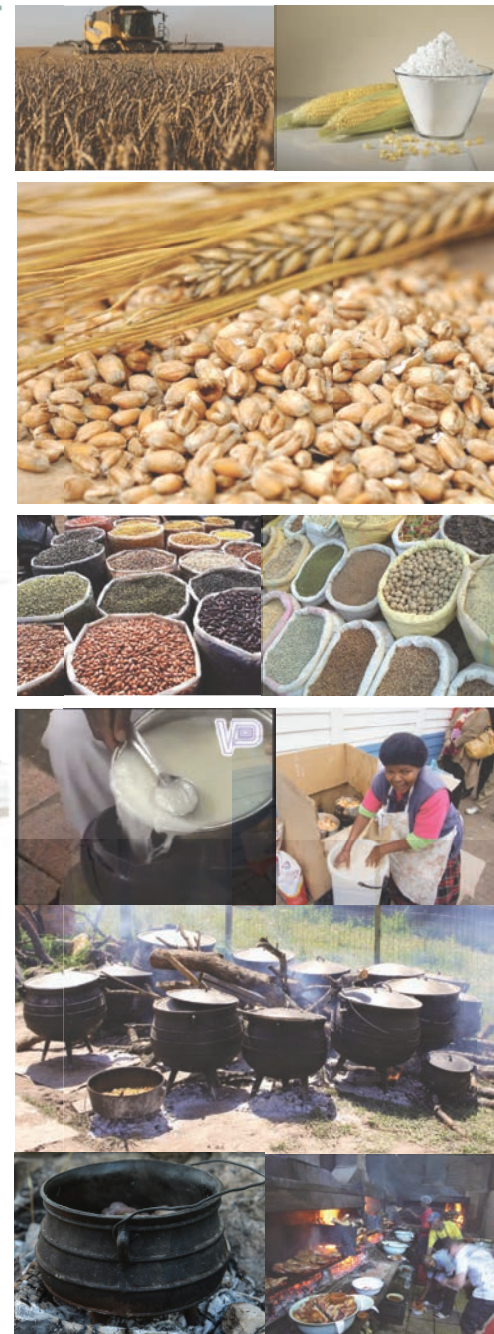


Fig. 2.21 Informal Food Collage (Collated by Author)





Fig. 2.7 Ford's moving  
Production line. Weber,  
A. (2013)



Fig.2.22 Urban infill in lower market (Snow 2012)



Fig.2.23 Road infrastructure as informal market (Battista 2017)



Fig.2.24 Urban infill in lower market (Battista 2017)

TECHNOLOGICAL ADVANCEMENT

PRE-INDUSTRIAL COMMUNITIES

Fig. 2.4 Ancient  
African Community  
(DEXTER COLOR  
INC.1946-1960)



FIRST INDUSTRIAL REVOLUTION

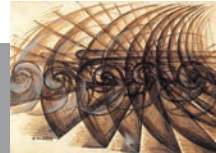


Fig. 2.5 Speed  
of a motorcycle  
(Giacomo Balla,  
1913)

SECOND INDUSTRIAL REVOLUTION



Fig. 2.6 Ford motor  
company factory. Weber,  
A. (2013)

THIRD INDUSTRIAL REVOLUTION

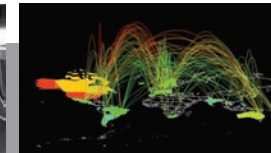


Fig 2.10 Global Internet  
traffic (Arabiya, 2016)



Fig. 2.2 Patterns  
on Mapungubwe  
Artefacts (Tiley-Nel,  
2014)

PRECEDENT STUDIES

TSUKIJI MARKET-JAPAN



Fig. 2.15 Tsukiji Fish Market (Chris, 2017)



Fig. 2.16 Tsukiji Redevelopment Plan (Johnny, 2015)



MAPPING

PRETORIA FIGURE GROUND



PUBLIC TRANSPORT



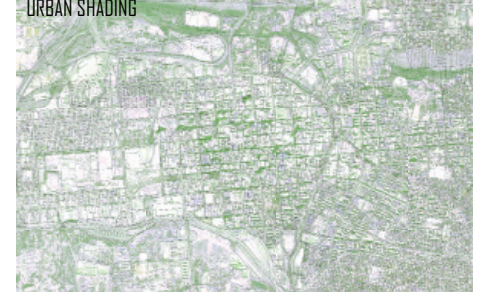
INCOME %



URBAN USE



URBAN SHADING



URBAN CORRIDORS



WEST CAPITAL DEVELOPMENT

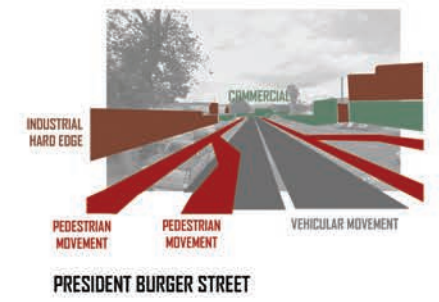
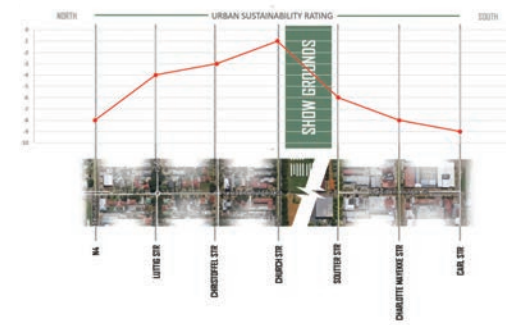
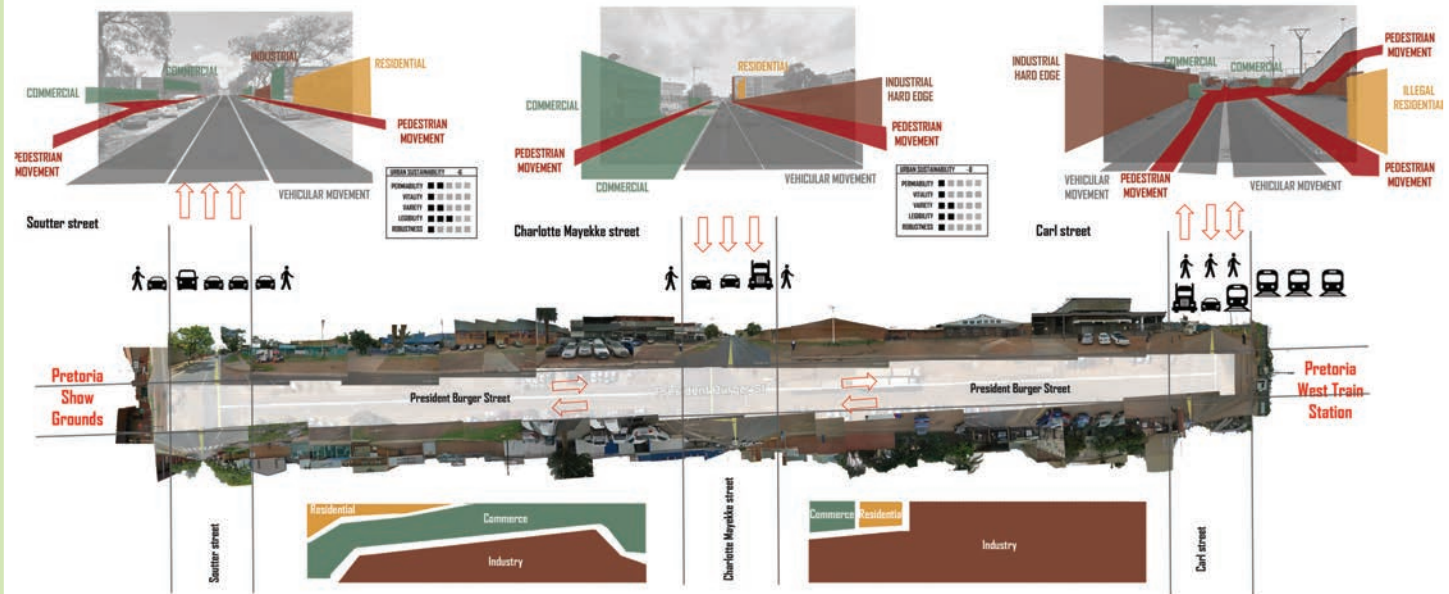
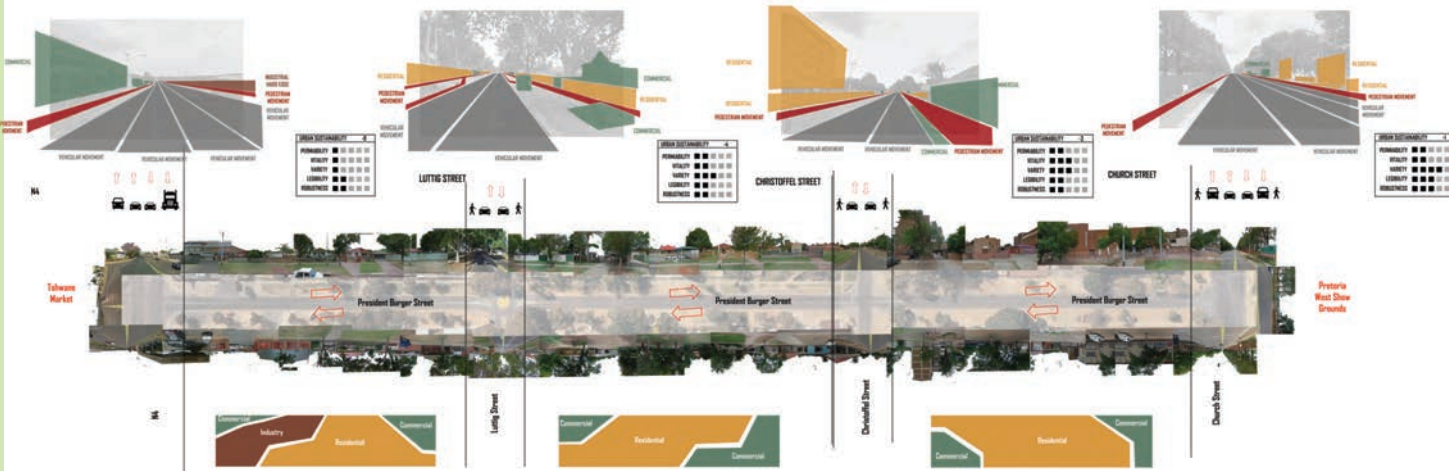


PUBLIC SPACE



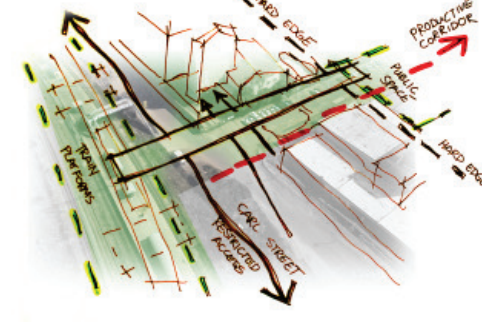
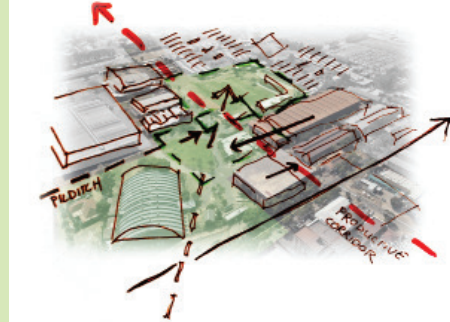
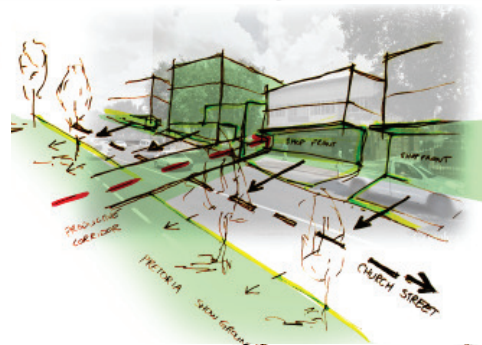
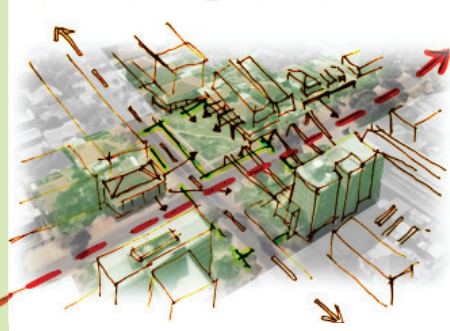


# STREET ELEVATIONS AND URBAN ANALYSIS

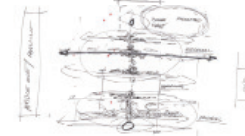




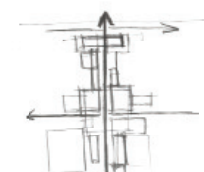
URBAN VISION



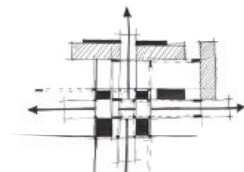
DESIGN MORPHOLOGY  
FORMAL DEVELOPMENT



INTENTIONS AND PROGRAMS



EXISTING FIGURES



ACTIVE CONTRAST



EXISTING GROUPING



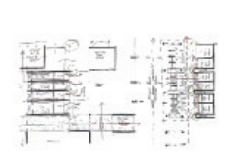
ZOOMING IN: INSERTIVE INTERACTIONS



SITE SPECIFIC TEST



PRODUCTIVE COURTYARDS



DEFINING RELATIONSHIPS



INFORMAL BINDING



RE-DEFINE PRODUCTIVE ROUTE



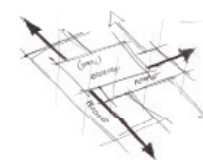
RE-DEFINE PEDESTRIAN ROUTE



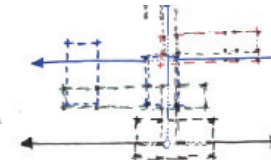
RESET JUNCTIONS



INSERTED PROGRAM



INTERVENTION



DEFINING THE MARKET(S)



EXTENDING FUNCTIONS/FIGURES



ZOOMING OUT: SITE CONTRAST



SITE ORGANIZATION



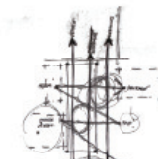
SIMPLIFYING: PRODUCTIVE ROUTE



EXTENDING FUNCTIONS



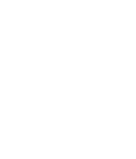
SYNTHESISING INTENTIONS



SIMPLIFYING PARTI



DISENTANGLE THE COMPOSITION



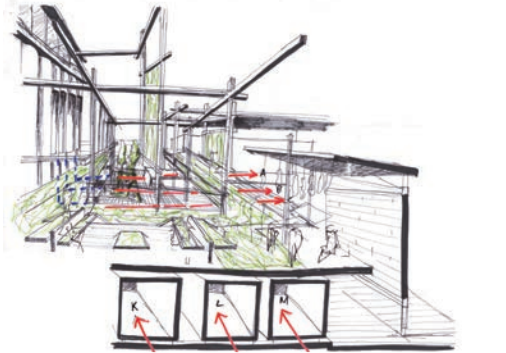
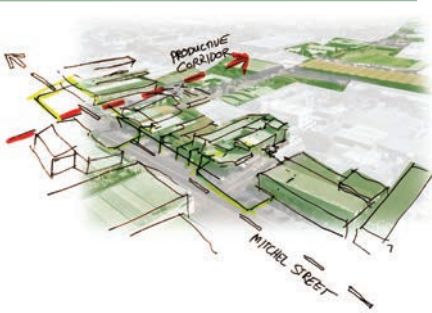
RE-INSERT FIGURES

76

77



URBAN VISION DESIGN



DESIGN MORPHOLOGY  
FORMAL DEVELOPMENT

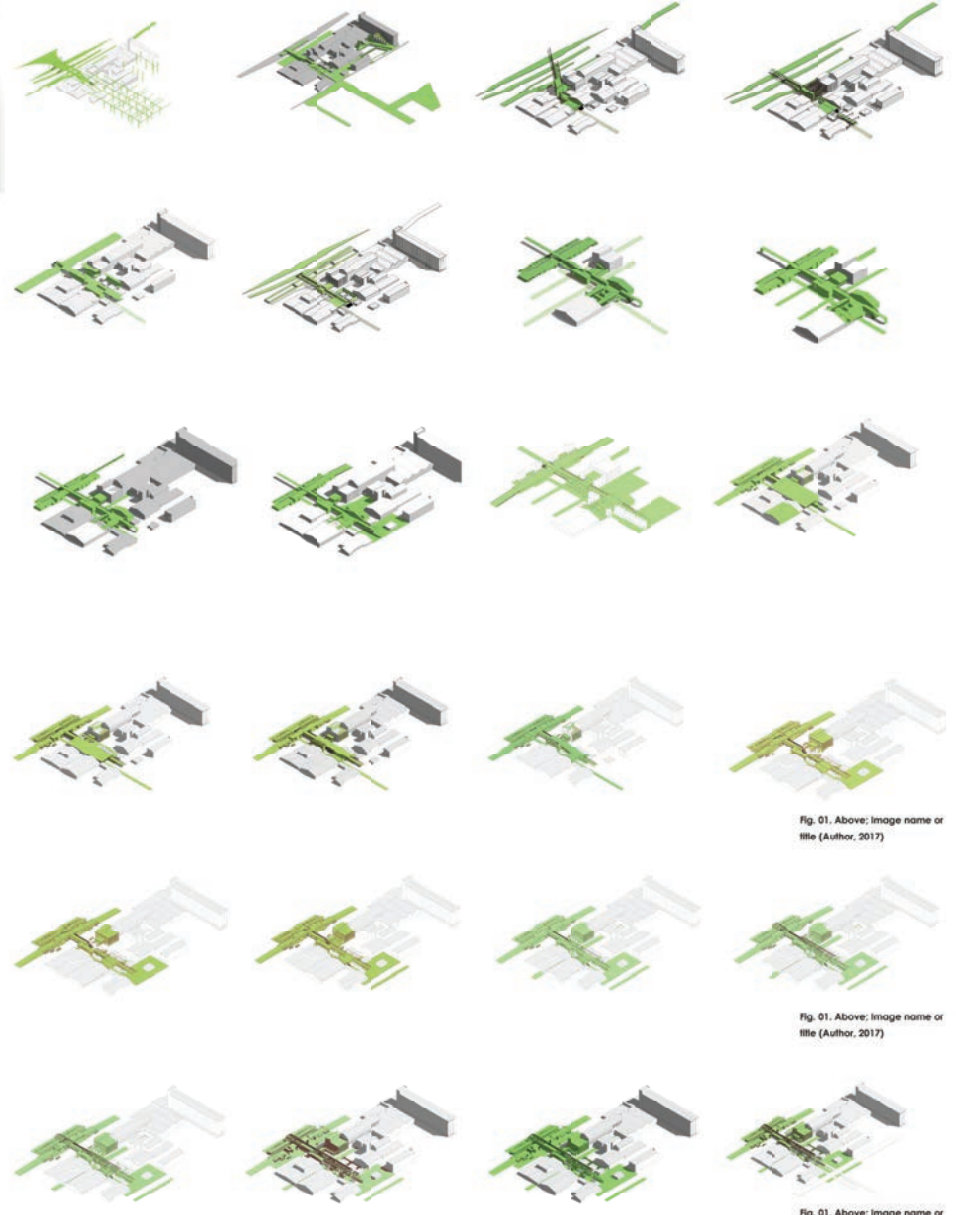


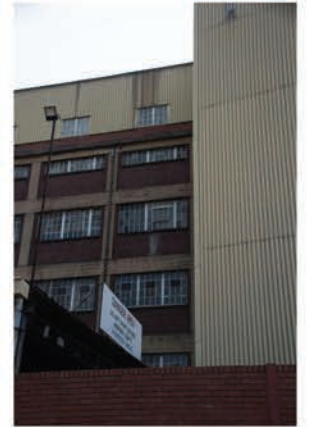
Fig. 01. Above: Image name or title (Author, 2017)

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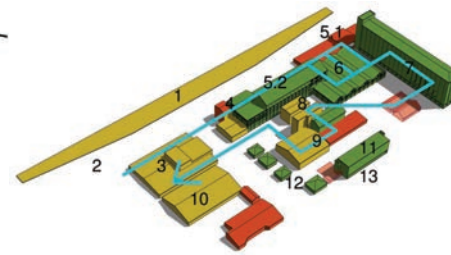
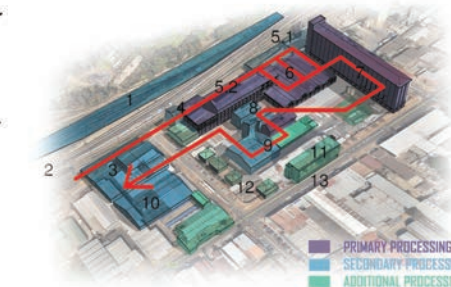
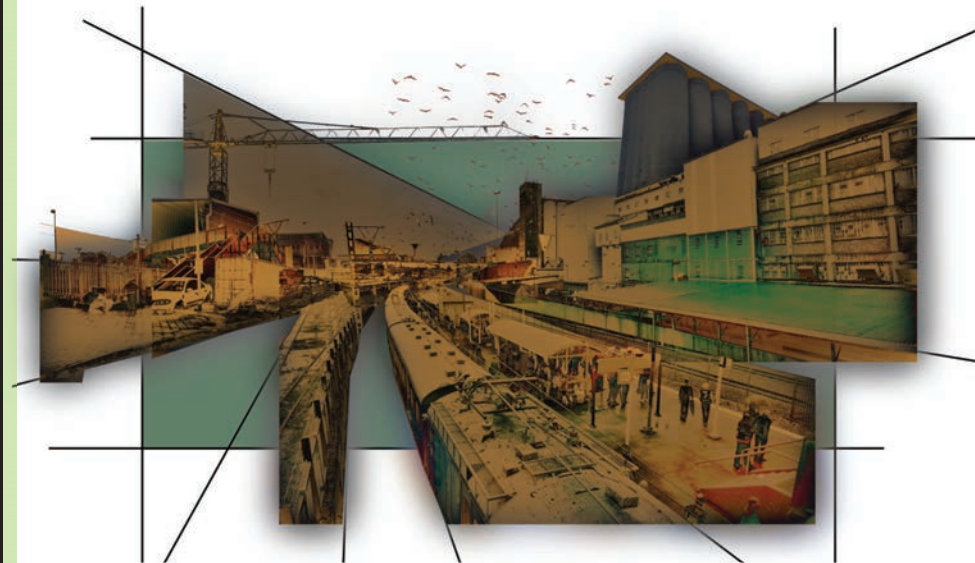


CONTEXT



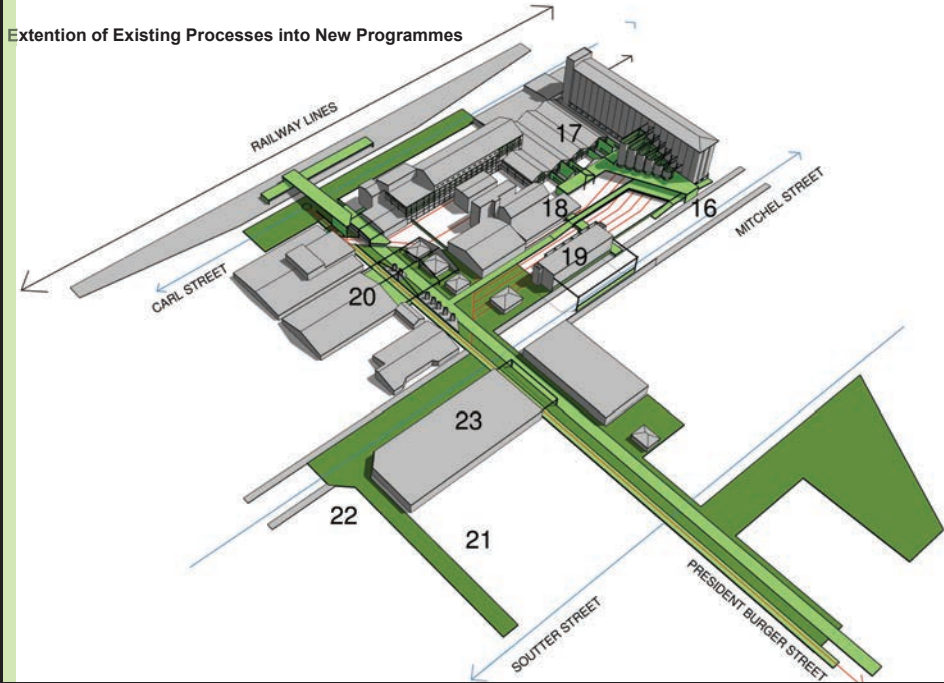


MODEL FOR ADDITIONS



- HIGH VALUE
- STANDARD VALUE
- LOW VALUE

Extension of Existing Processes into New Programmes



- EXISTING PROCESS DRIVEN STRUCTURES:**
- 1 - TRAIN STATION: PUBLIC TRANSPORT/WORKFORCE COMMUTE
  - 2 - CARL STREET: TRUCK STACKING & ACCESS
  - 3 - LOGISTICS: GRAIN SUPPLY & DISTRIBUTION CENTRE
  - 4 - INDUSTRIAL RAIL: RAIN-CAP STACKING & GRAIN SUPPLY
  - 5.1 - SORTING PLANT: GRAIN DROP-OFF
  - 5.2 - SORTING PLANT: GRAIN SORTING/HUSKING
  - 6 - MILLING PLANT: GRAIN PROCESSING/SEPARATION
  - 7 - SILO: PROCESSED GRAIN STORAGE
  - 8 - FEEDER STACKS: PRE-PACKAGE OPERATION
  - 9 - PACKAGING STATION
  - 10 - PACK HOUSING: PACKAGED PRODUCE STORAGE
- NON PROCESS DRIVEN STRUCTURES:**
- 11 - ADMINISTRATION
  - 12 - OFFICE SPACE
  - 13 - TAKEAWAY OUTLET
  - 14 - BOUNDARY WALL
  - 15 - PARKING SPACES
- INTRODUCED PROCESSES:**
- 16 - WASTE PRODUCTS INDUSTRIES
  - 17 - PRIVATE INDUSTRY PRODUCTION
  - 18 - PRIVATE INDUSTRY SHOPFRONTS
  - 19 - LABOURER'S DWELLINGS
  - 20 - PACKHOUSE DEPOT
  - 21 - PRETORIA COLD STORAGE (EXISTING)
  - 22 - THERON'S MEAT MARKET (EXISTING)
  - 23 - EXTENDED MEAT MARKET (CURRENTLY UNOCCUPIED)
- \*INCLUDING INFORMAL STREET VENDORS

Fig. 5.3 1968 Aerial Photo of the Milling Site  
<https://supremeflour.co.za/why-supreme/heritage/2017/>

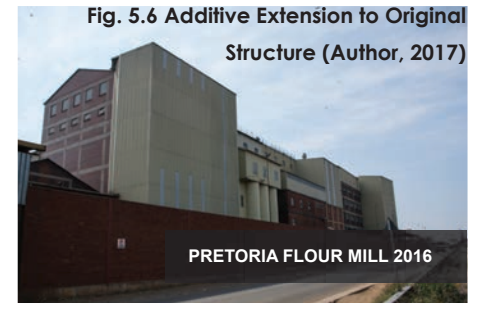
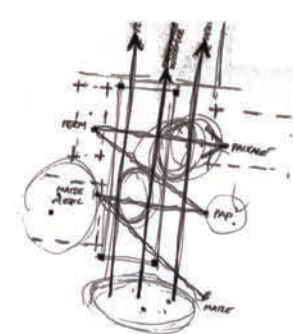
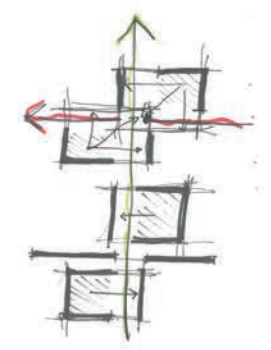
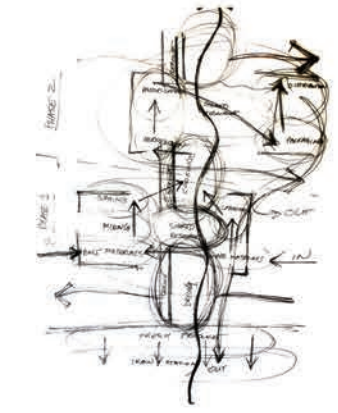
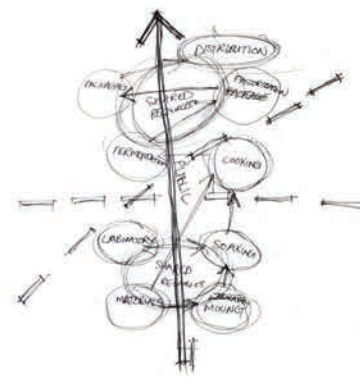
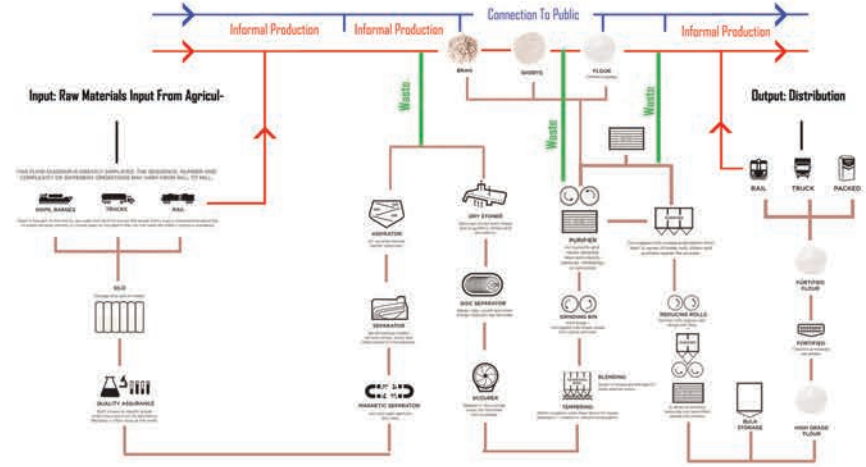
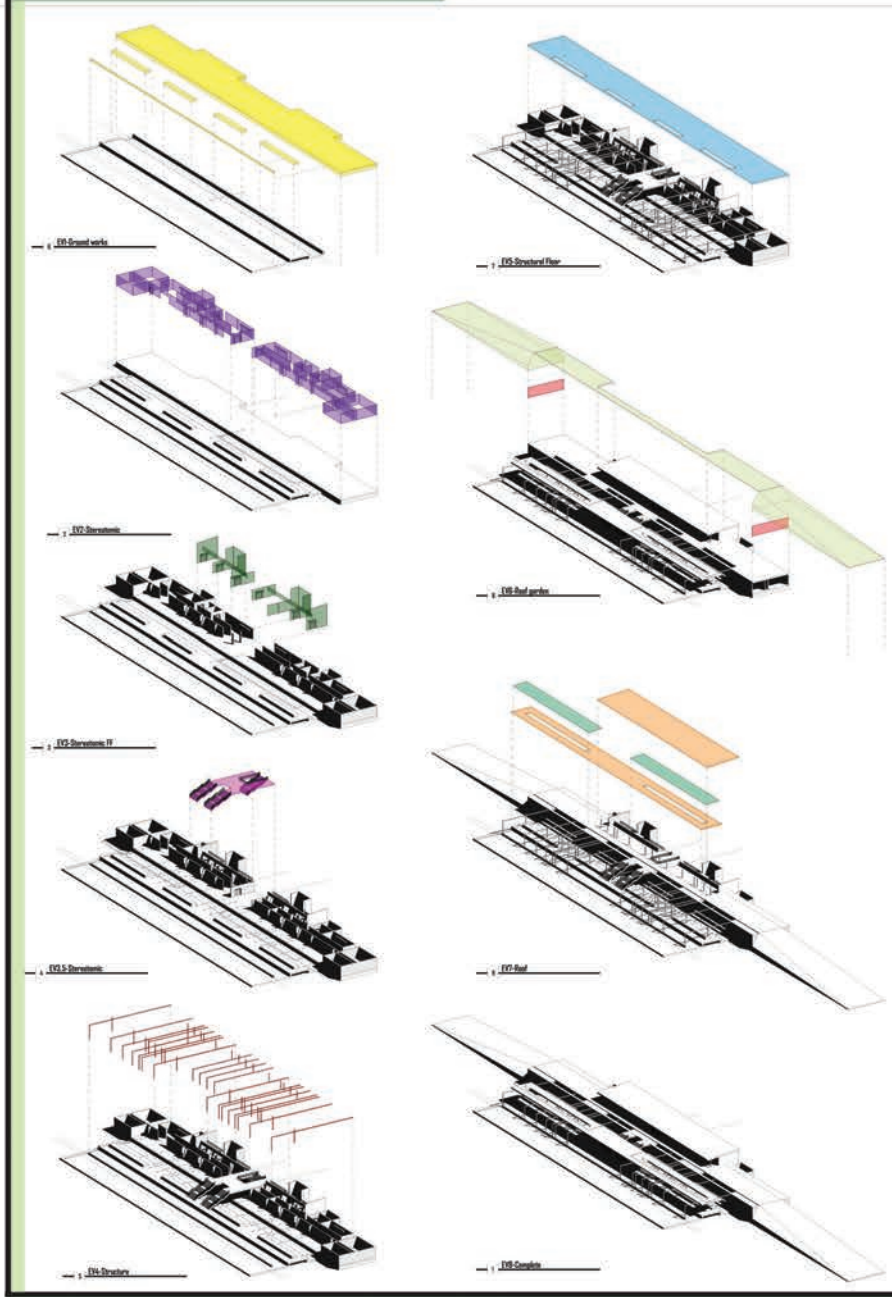


Fig. 5.4 Current Milling Site (Google Earth, 2017)

Fig. 5.5 Photo of Original Milling Structure  
<https://supremeflour.co.za/why-supreme/heritage/2017/>

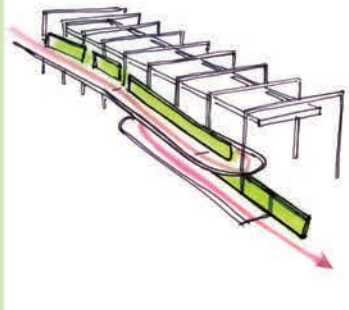
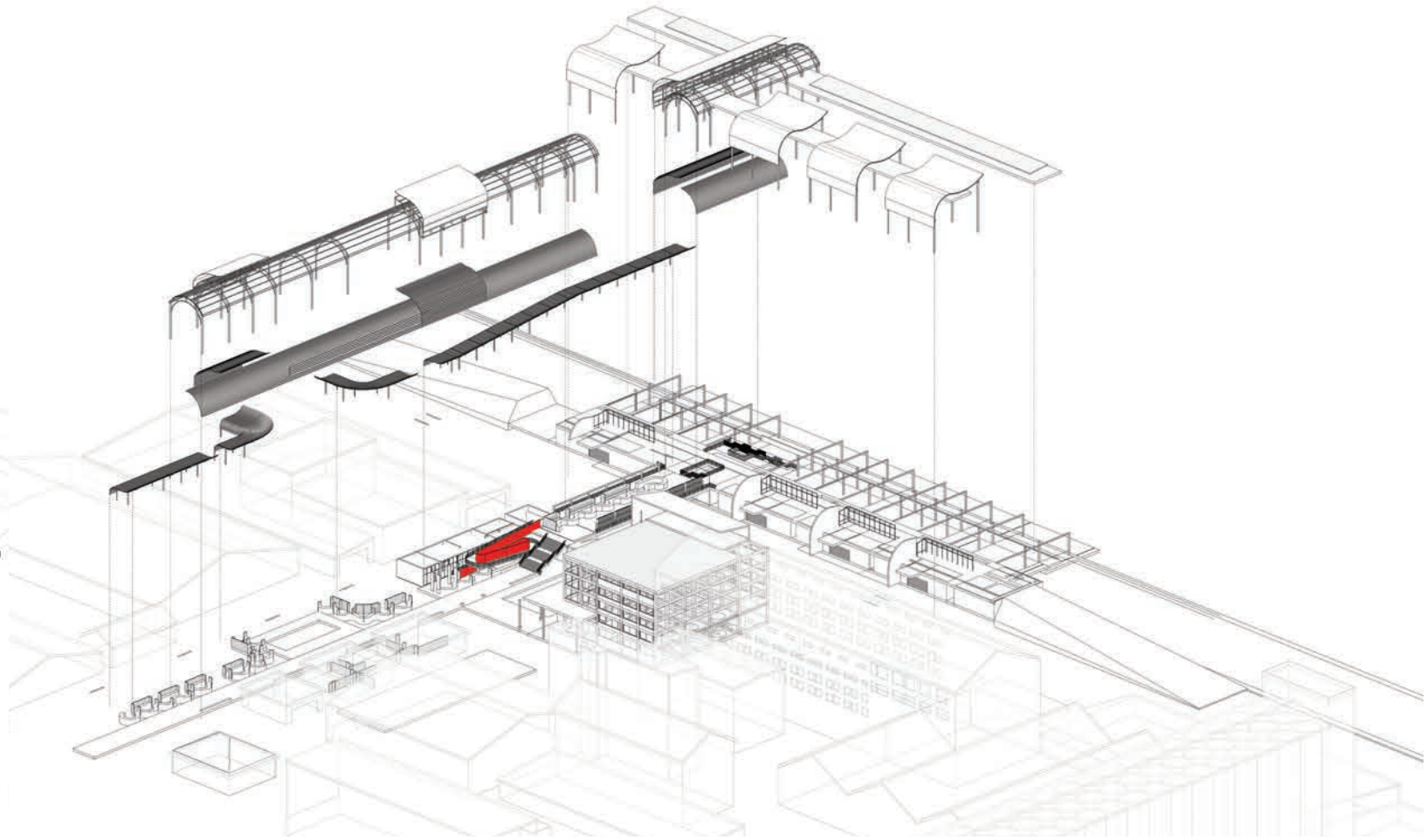
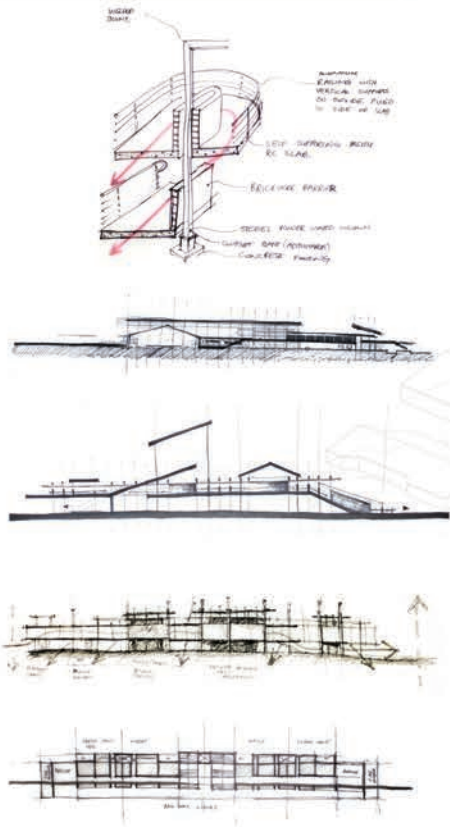
Fig. 5.6 Additive Extension to Original Structure (Author, 2017)

PROGRAMMATIC DESIGN- CROSS-PROGRAMMING





PROGRAMMATIC DESIGN- CROSS-PROGRAMMING

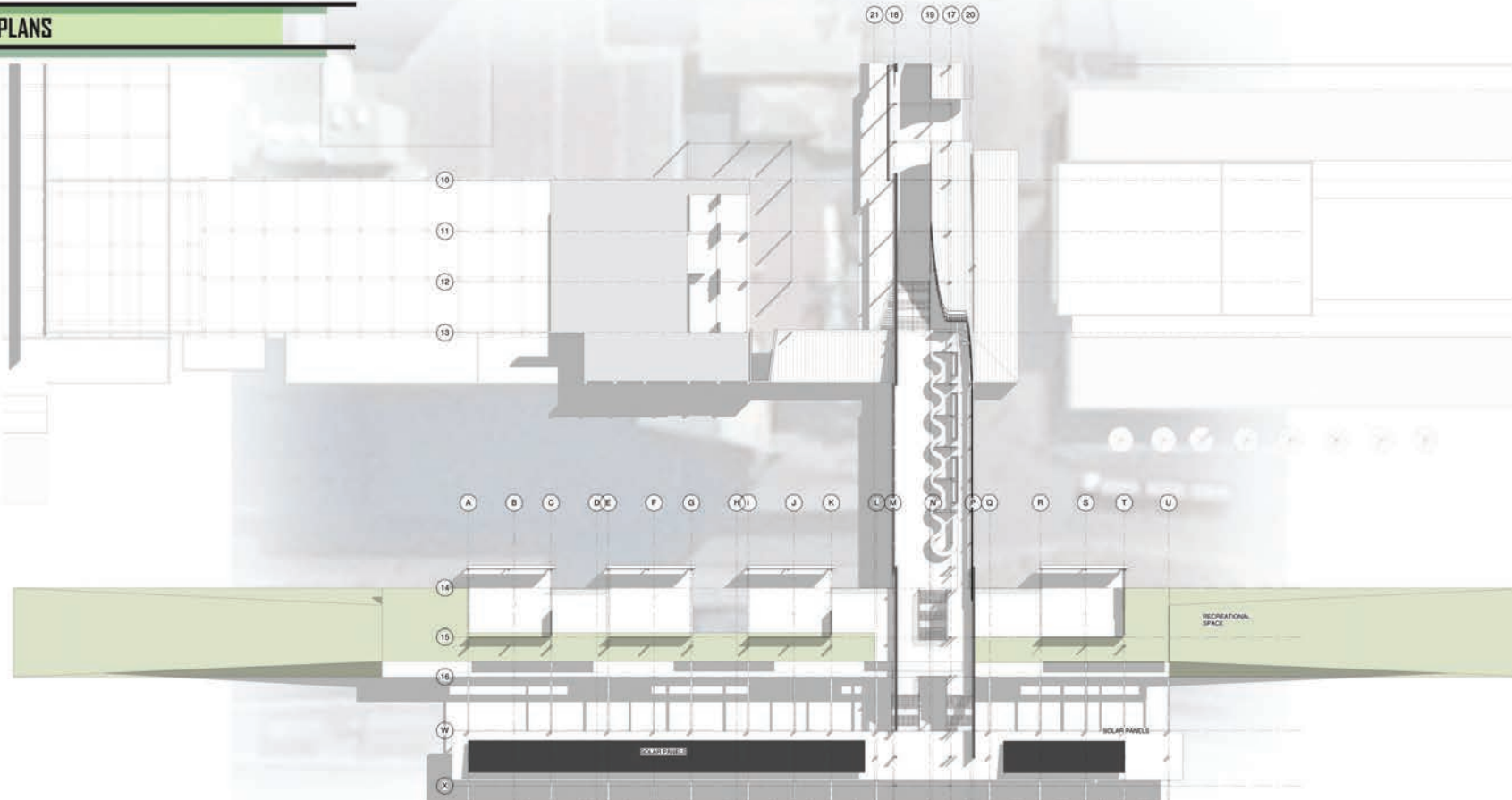






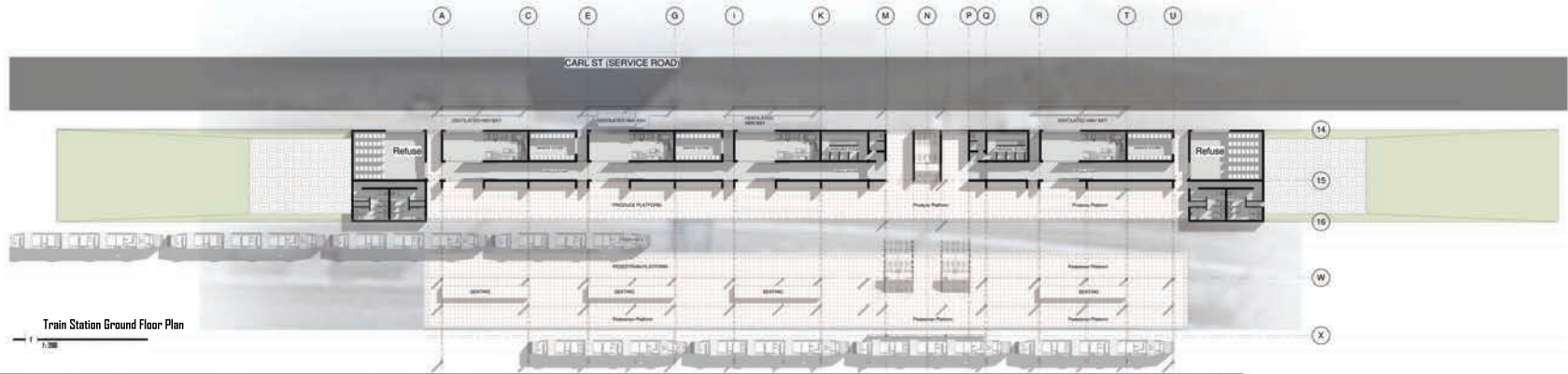


FLOOR PLANS



Train Station First Floor Plan

1:200



Train Station Ground Floor Plan

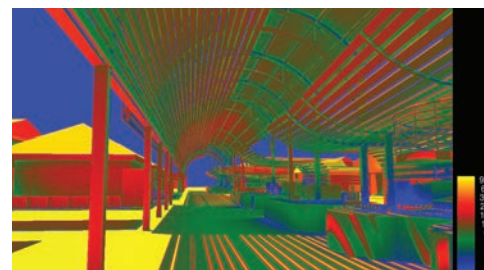
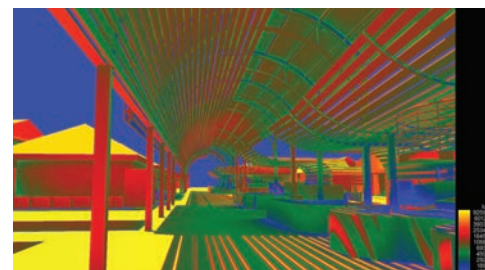
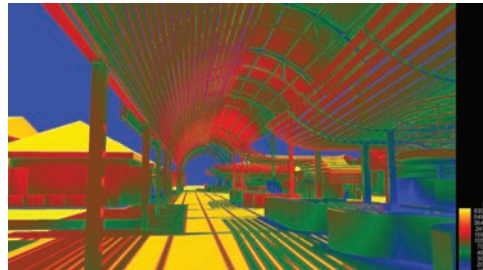
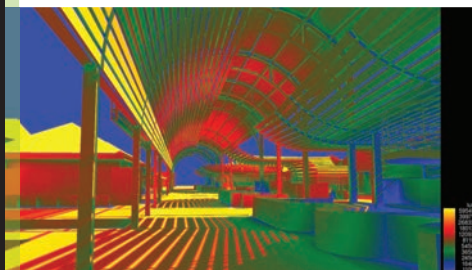
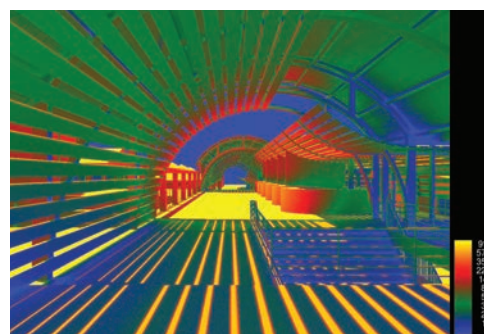
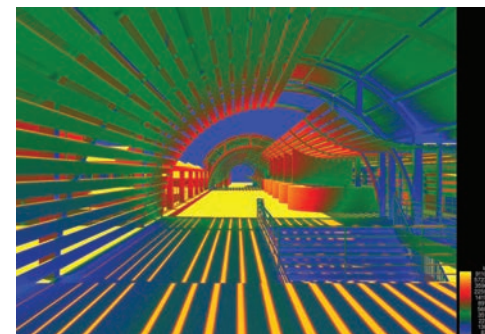
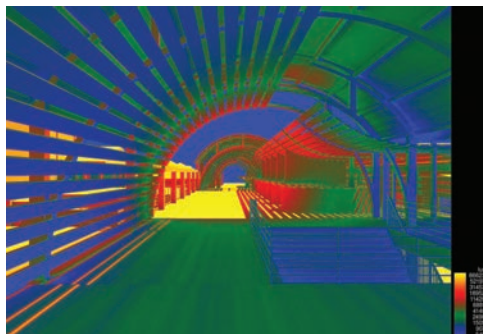
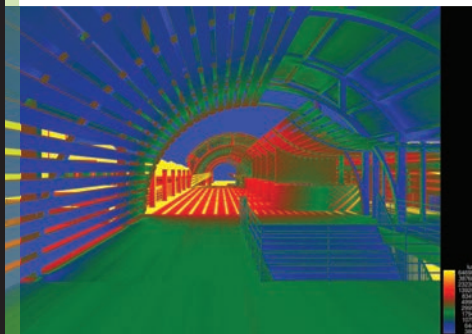
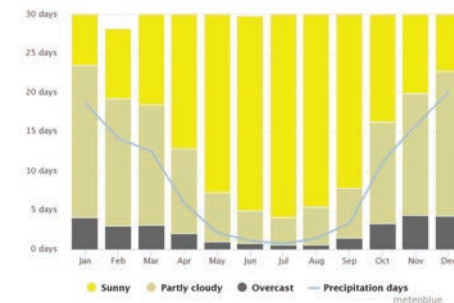
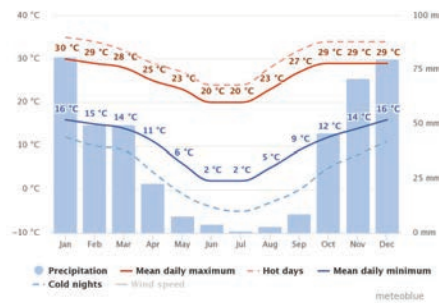
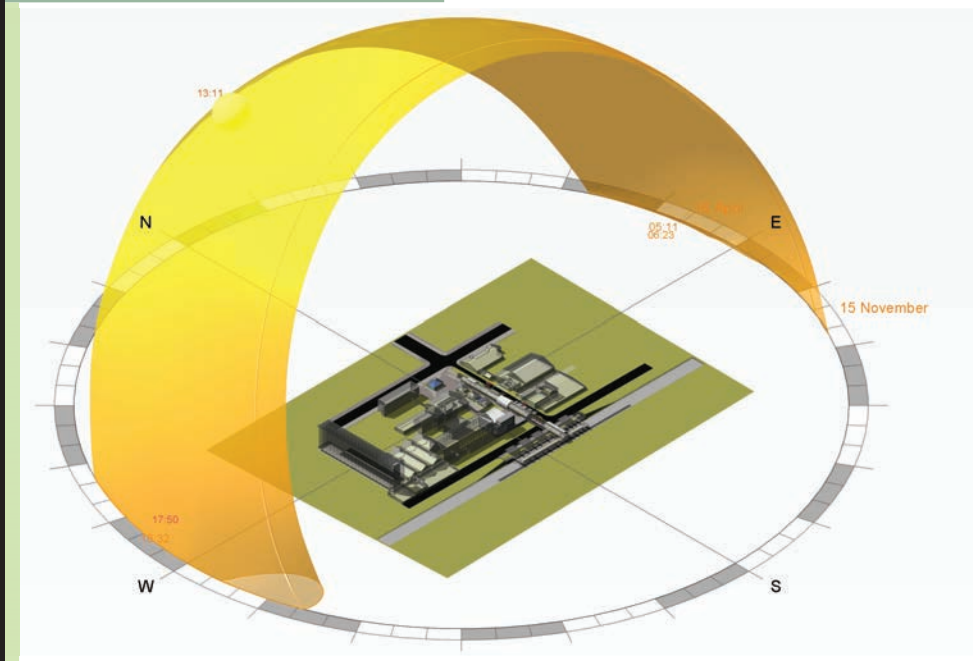
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# DAYLIGHTING





# VENTILATION DESIGN

Iteration 1



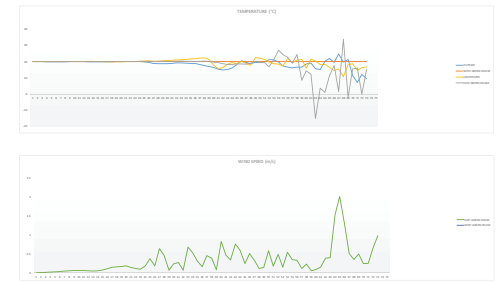
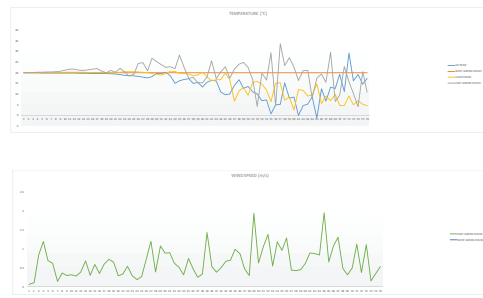
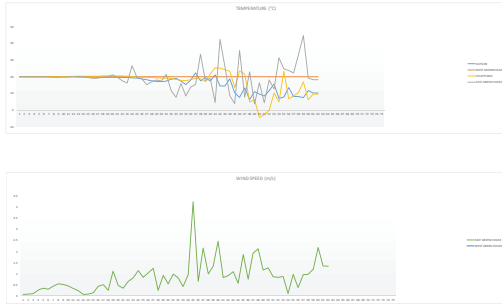
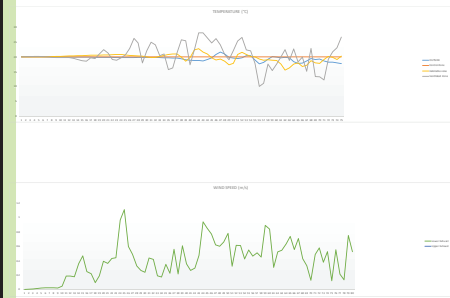
Iteration 2



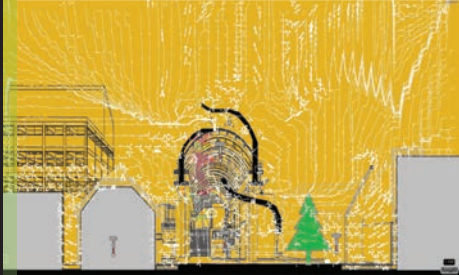
Iteration 3



Iteration 4



Iteration 5



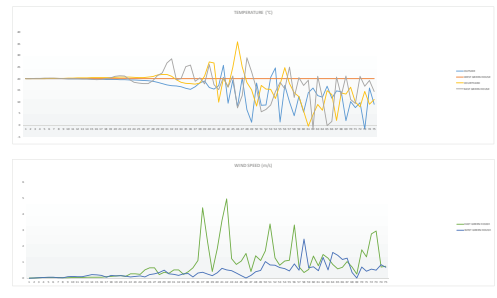
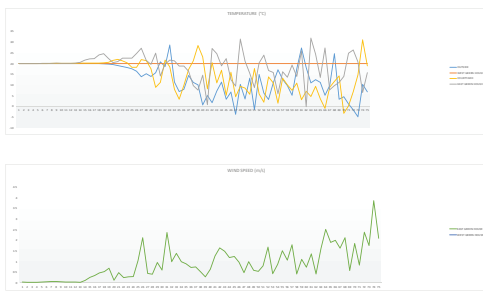
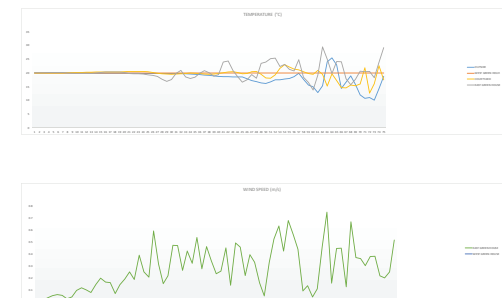
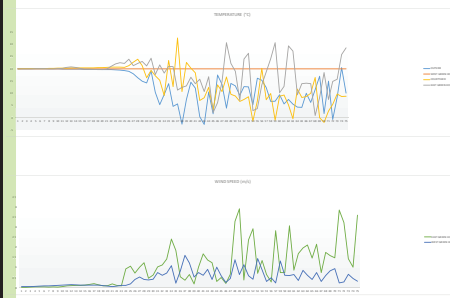
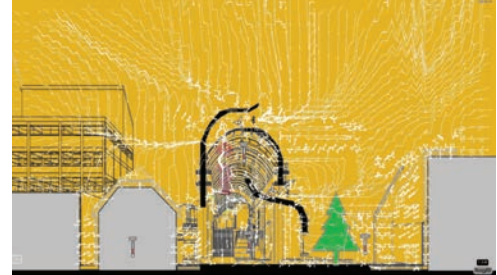
Iteration 6



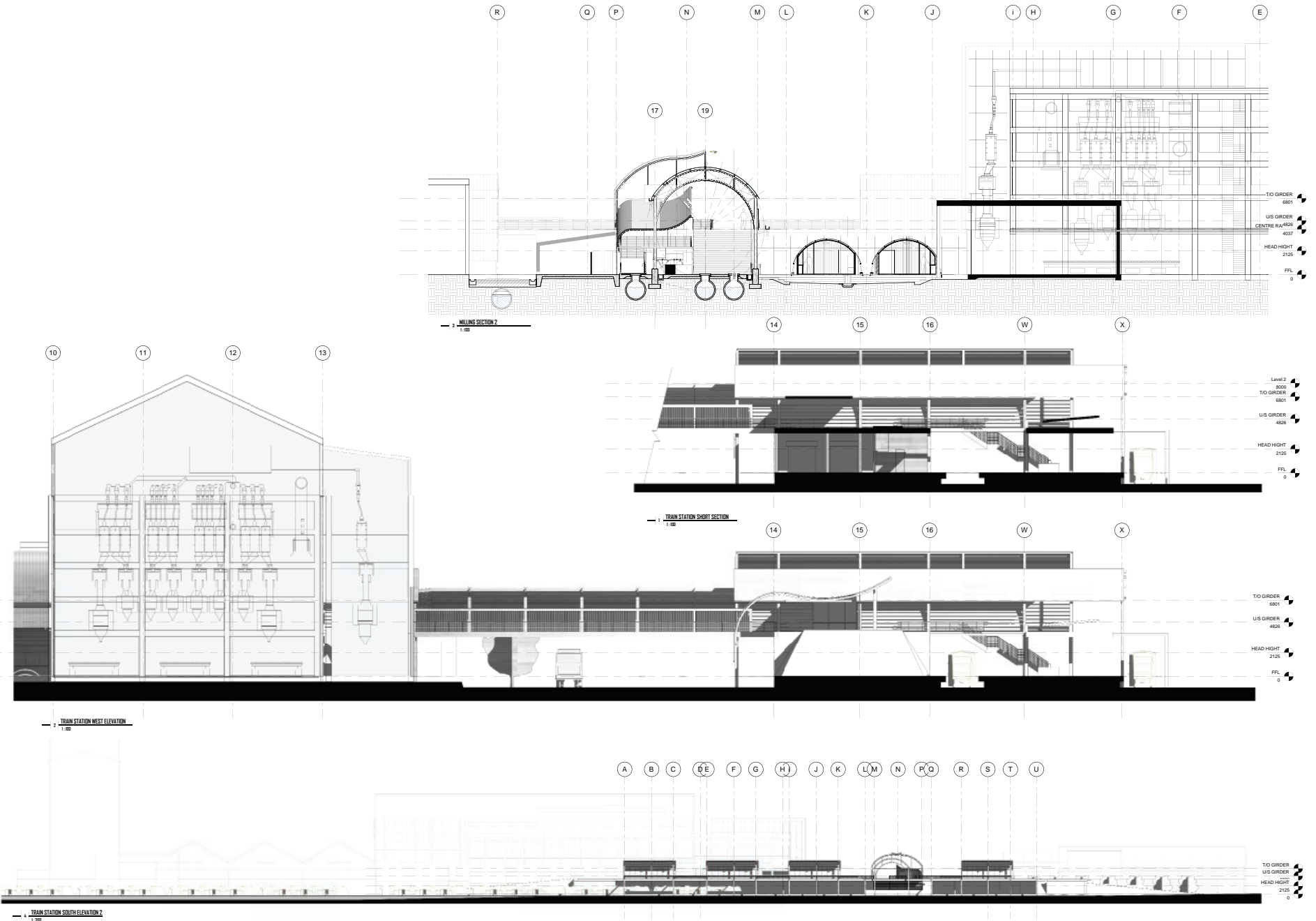
Iteration 7



Iteration 8

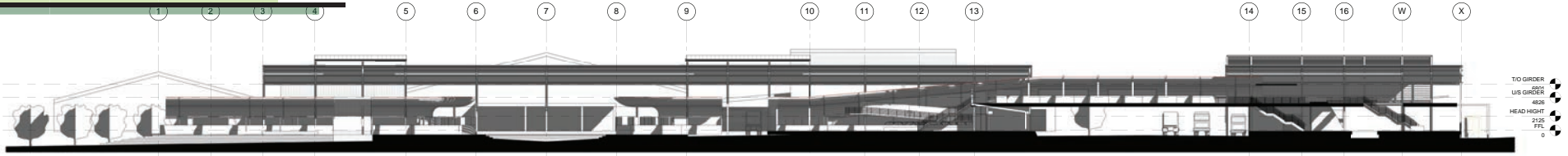


SECTIONAL ELEVATION





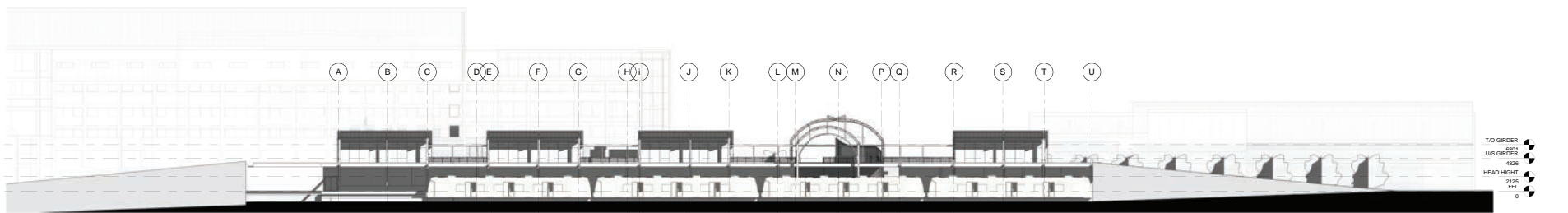
ELEVATIONS



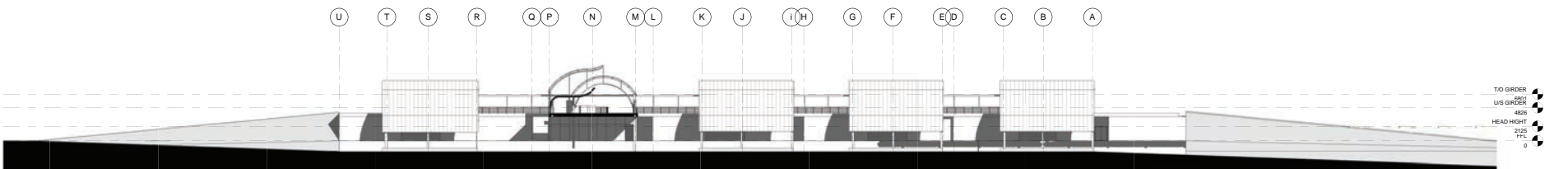
EAST SECTION  
1:200



WEST ELEVATION  
1:200

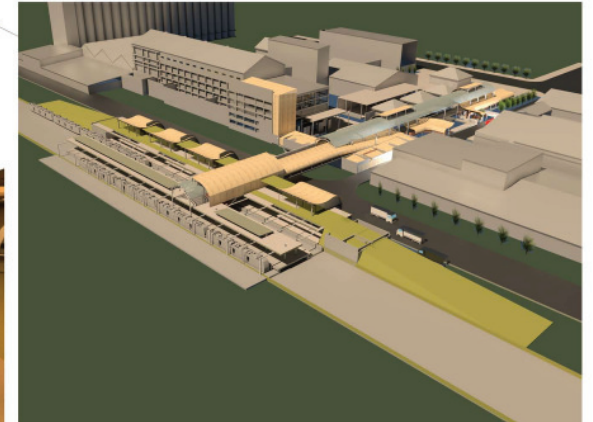
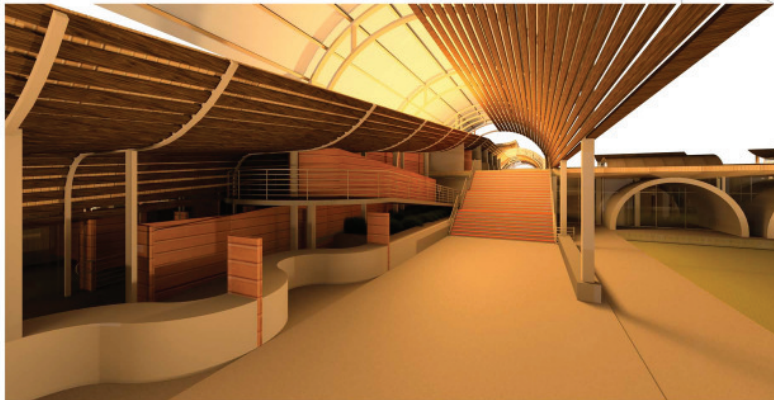
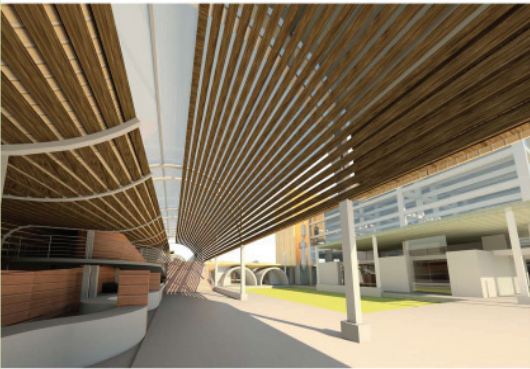
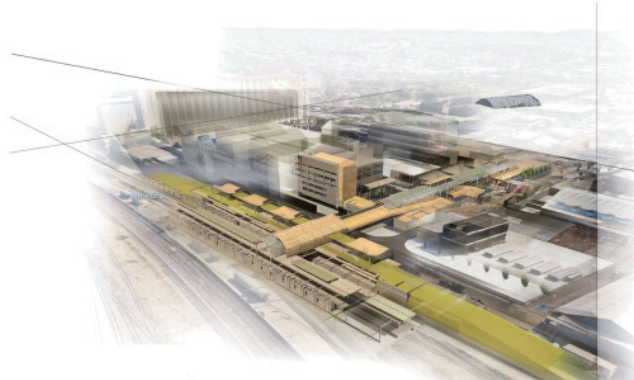
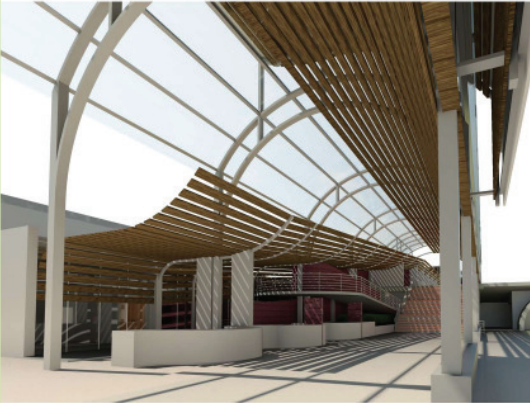
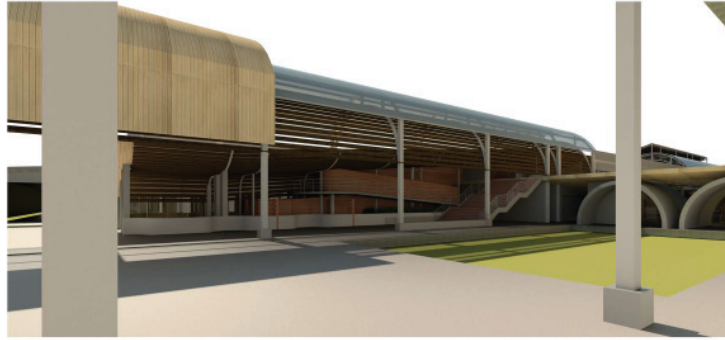


TRAIN STATION SOUTH ELEVATION  
1:200



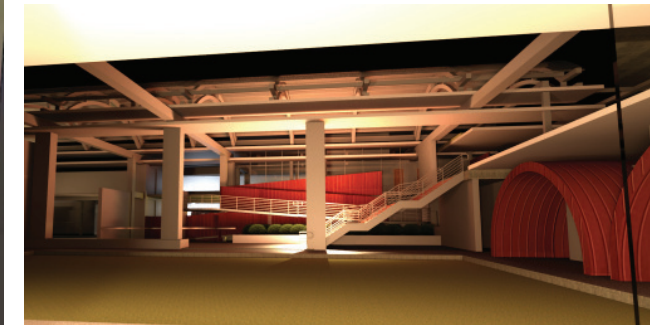
TRAIN STATION NORTH VIEW  
1:200

RENDERS





HERITAGE IN CONTEXT





In formal food programs, not works  
a Pretoria's work.

