

EXPLORING CURRENT VIEWS AND METHODS OF RECYCLING IN DURBAN'S CBD:

A Design Proposal for a Self-Sustaining Waste Recycling System in Durban.

By

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Signed



DEDICATION

This dissertation is dedicated to my mom. Without your support throughout my entire life I would never have been to achieve what I have.

Thanks for everything Robynne.

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I would like to express my deepest thanks to the all the people who have helped and contributed towards the completion of this dissertation. I would specifically like to thank the following people:

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ABSTRACT

The management of urban waste streams is increasingly becoming an issue as modernisation and a new consumerist culture takes hold of cities globally, resulting in greater production of waste and an even greater need for sustainable alternatives to the current systems put in place. Locally, urban waste leads to neighbourhoods that feel unclean and thus feel unsafe. This dissertation identifies viable new recycling solutions to ever growing waste streams in Durban's CBD through education and awareness as well as being informed by local informal networks that thrive in the city, networks that are derived from grassroots movements that have an in depth understanding of how to adapt and overcome relevant challenges. The methodology makes use of case studies and precedents that demonstrate examples of awareness, sustainability and informality. In addition to this, various interviews were conducted in Durban's CBD to investigate how locals experienced waste on a daily basis. The result of these studies demonstrated that waste was not seen as a priority in urban environments, lacking the educational drive to see waste management as a viable job creator and urban regenerator. In conclusion, waste should not be considered a problem that is dealt with in Durban's CBD, but rather as an opportunity that is made use of proactively, the result being a building typology that creates an abundance of new job opportunities, trains and educates people on sustainable living and most importantly helps to clean up Durban's streets, making them safer and healthier to live in.

KEY WORDS: Informal Emergent Potential; Self-Sustaining Recycling Systems; Sustainable Practices; Education and Awareness; Iconic Block Leader; Integrated Communities

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND RESEARCH: DYSTOPIAN REALITIES

Today one of the most daunting issues facing the world is the mounting waste problem, which impairs public health, pollutes the environment and threatens to drown some poor countries in toxicity. Currently, according to Simmons (2016), more than half the world's population lacks adequate access to regular waste collection. Ever growing populations around the world and the evolution of consumer culture have added to the new crisis affecting nations globally. Simmons (2016) states that each year the global production of waste totals approximately 1.3 billion tons and this figure is expected to exceed 4 billion tons by the year 2100 and as countries become more urbanized and industrialised, the problem of waste production becomes exceedingly difficult to solve. This trend will be even more noticeable in developing African and Asian countries as urbanisation picks up pace. The United Nations make specific reference to this global crisis

"There is no end in sight to this trend. Public waste systems in cities cannot keep pace with urban expansion; rapid industrialization is happening in countries that have not yet developed the appropriate systems to deal with hazardous and special wastes."

(Simmons, The world's trash crisis, and why many Americans are oblivious, 2016)

Metric tons of solid waste generated each day*

(In thousands)

Less than 40 40 - 60 60 - 80 80 - 100 More than 100

No data available

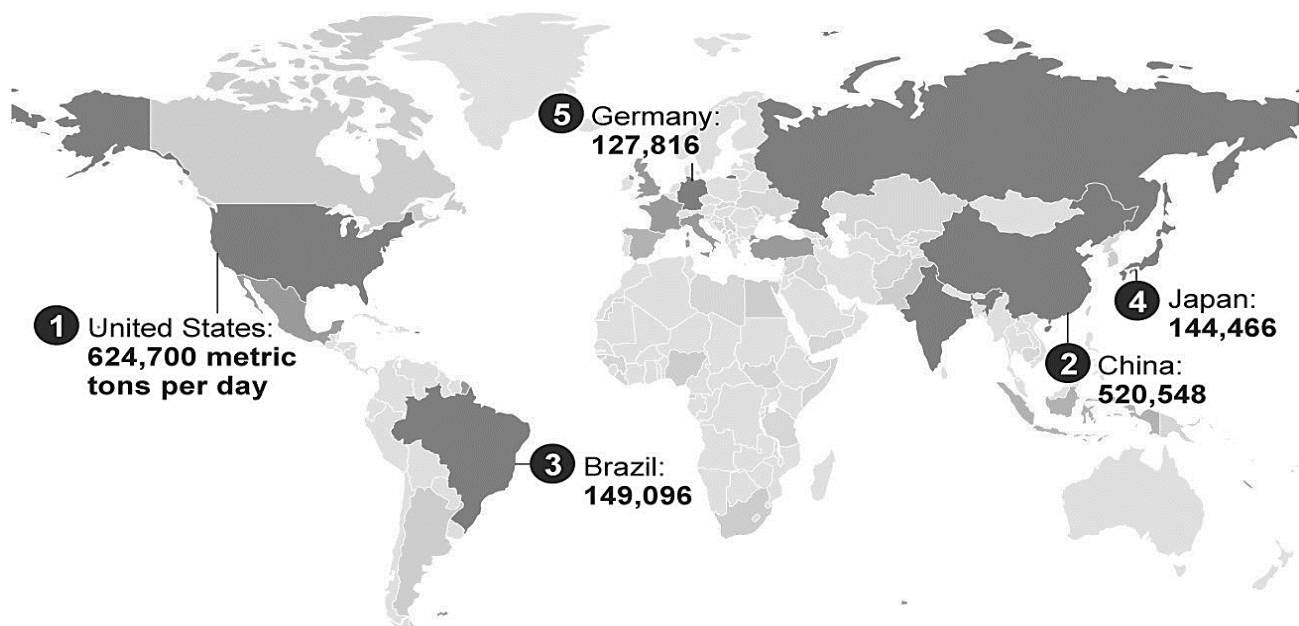


Figure 1 showing worldwide solid waste. Source: World Bank

Before moving onto the challenges facing recycling, waste management and informality, it is important to understand its foundations. In the wake of modernity's quest for a regulated and structured world, is found a new dystopian reality upon which disordered informality grew and evolved. But what is a dystopia? In the past century there have been numerous literary iterations of dystopias. In 1894 H.G Wells described a future dystopia of an "upper world of ruins and an underworld in the bowels of the earth where people live permanently underground" (Doxiadis, 1966, pg. 32). Sixty years later in 1954, Ray Bradbury's book "Fahrenheit 451" describes a time where highways are full of crowds going "somewhere, somewhere, somewhere, nowhere" (Doxiadis, 1966, pg. 32). These literary dystopias of the past have become realities of the present. Doxiadis (1966) describes our problems in cities as being ameliorated through modern super highways and new technologically advanced buildings but in fact, all we have achieved is to turn our cities into "bad places" (Doxiadis, 1966, pg. 32).

Before the dawn of the industrial age, settlements were characterized as being static. Their population sizes were restricted, city limits were contained within walls and the availability of resources were fairly limited. However, come the turn of the 18th century and the industrial revolution, we witnessed the evolution of communication, transport and production. No distance was too far. Doxiadis (1966) sites London as a prime example of this evolution. It had become a "dynamic" city that was constantly in transition, moving and growing at a rapid rate. These dynamic cities then suffered the many growing pains of the new tensions created within them.

According to Doxiadis (1966) there are 5 elements of the city: the natural container, man, society, shells and networks, the last of which is of particular importance in the modern city. The transport industry has become the focal point of many city developments and has forced man to adapt to the new environment he now finds himself in. He has been forced to accept cohabitation with "the machine" (Doxiadis, 1966, pg. 32). These networks of cars, highways and trains have separated man from the city total, forcing our buildings to face away from the street, destroying intimate connections that define society and damaging the natural container that we all live in.

These networks are choking man to death as the "human scale is lost" and "communities are split by high-speed lines" (Doxiadis, 1966, pg. 32) It is within the confines of this concrete jungle that serious issues of waste management and litter have found a permanent foothold in the everyday life of urban residents. However, as a result of this dystopian reality in which waste has flourished, a new type of creative informality has found its feet in the 21st century. Informality adapts to the restrictions placed upon it in this new dystopian reality, constantly changing and moving (Hernandez, 2011) and it is within this silver lining that a new alternative to waste management can be found, one that views recycling as a meaningful and effective contribution to urban life.

1.2 MOTIVATION OF RESEARCH

When analysing the chosen subject matter of waste management and recycling and attempting to identify a problem, the primary theory of 'Broken Windows' (Gary Petersen, 2004) goes a long way towards explaining how litter can adversely affect an urban environment. Criminologists, James Q. Wilson and George Killing believed that if a broken window remains broken, vandals will soon break the remaining windows (Gary Petersen, 2004). In the context of a city, if a street is left with litter and waste, crime, poverty and poor health is likely to follow. As a possible theoretical solution to this problem 'Small Change' (Hamdi, 2004) seeks to deal with small issues to tackle bigger problems. In the book, Nabeel Hamdi looks at the studies of Keller, Lee and Nagasaki in slime mould behaviour. For mould to survive, it makes use of each independent cell together to emerge as a "larger more sophisticated organization" (Hamdi, 2004, pg. xvi) which ultimately, would be the goal of letting a self-sustaining recycling system unite an entire community

In an African context, studies into how Africans view waste is not a research topic that has been dealt with, due to the numerous social ills already plaguing the continent, resulting in an urban landscape where litter has steadily become a common and ultimately permanent fixture. It is clear that the continent is held back by poor municipal management that limits the self-organisation required to effectively deal with waste. One example of this ineffectiveness can be found in the urban and peri-urban regions of Zimbabwe where Enock Makwara (2013) identifies various problems that have led to the ever growing waste crisis in Zimbabwe. Firstly, there is an inefficient method of collecting and transporting waste and secondly, poor methods of storing it. This has a direct link with other studies in Cameroon and other North African Countries. As an alternative to municipal management of waste we see ideal examples in Nairobi. Bill Freund (2007) identifies Andrew Hake's study of Nairobi which refers to the African city as a "self-help" city. This is with reference to the way in which the poor members of the city could endure many hardships and create their own self-employment and thus make important contributions to the city. This is also seen in the way that Cairo, in the 20th century, cleaned up its own streets in an effort to improve its basic image and the lives of those that operated within. Freund (2007) explains that the city made use of NGO's and church funding to support a community of waste pickers within the city.

Likewise, locally in South Africa there have been numerous difficulties to overcome in its management of waste. Durban's 'Integrated Waste Management Plan' implemented in 2004 suggests varied ways of dealing with waste with an extra emphasis on the environmental effect of Durban's waste. (eThekweni Municipality, 2004). In the context of Warwick Junction, which can be considered the informal CBD of Durban, is seen a prime example of the growing pains experienced by dynamic cities. The concrete conglomerations of vehicular bridges that pass over Warwick hide it away from the city. This physical separation from the city, coupled with its violent and oppressed apartheid history,

generated a tarnished image. According to Skinner (2009) Warwick had swiftly become an example of crime, mismanagement, poor service delivery and poverty. Once again reference can be made to the literary dystopias of the past century. Durban's CBD had become "an underworld in the bowels of the earth" (H.G Wells, 1894) separated from the city by people on highways going "somewhere, somewhere, somewhere, nowhere" (Ray Bradbury, 1954). As stated by Doxiadis (1966) our cities had become the focal point of huge transport networks designed to get people from one place to another across great distances and at great speeds. Warwick is a major transport interchange of taxi services, train stations, and highways that filter put into Durban's CBD. The enormous amount of activity moving through region placed great strain on the ability of the area to maintain order as these networks threatened to choke man to death. The burgeoning trade industry in Warwick also brought about new challenges that the area needed to grapple with. Informality brought about "increasing competition between taxi operators, and a rise in crime" (Kitchin, Ovens, p 21, 2008) and the dynamic and temporal nature of the area resulted in litter, waste and a general feeling of degradation despite the vibrancy that characterized the space.



Figure 2 showing dystopian realities of urban settings. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

Since 1994 area based pilot projects in Warwick have worked tirelessly to make the lives of those that live and work in Warwick better. According to Skinner (2009) local city councillors and traders formed an integrated collaborative programme that would reshape Warwick over the next ten years, dealing with crime and waste management, which in turn improved the lives of commuters and other diverse trading groups that operated in the area. Interventions in the area were a directed at specific user groups that included amongst others; cardboard or waste collectors, lime sellers, bead workers and traditional medicine traders. The manner in which Warwick has turned around its image is testament to the how sensitive city planning and a dedicated, resilient people can generate job opportunities and a better life for all and this will be examined in more detail as this paper progresses.

1.3 DEFINITION OF RESEARCH AIMS AND OBJECTIVES

1.3.1 RESEARCH AIM

One of the principal aims of this research was to identify how people independently approach the act of recycling and how South African citizens could actively contribute to the recycling of waste and the preservation of the environments they live and work in, attempting to determine whether clean streets can be achieved through recycling methods in the context of Durban's CBD. Currently, in Africa, there is very little empirical or observational data that relates to how people feel when their neighbourhood has poor waste management. Due to South Africa's poor management of its waste, it's clear that a gap in the research lies in how people approach the act of recycling in South Africa and more specifically Durban's CBD. Can one achieve better waste management without the help of current systems put in place by an already strained under staffed, under resourced municipality with the ultimate goal of deriving an innovative building typology that strives to involve the everyday citizen in actively engaging in recycling and more self-conscious waste management that benefits them as well as their neighbour.

1.3.2 RESEARCH OBJECTIVES

EXPLORING THE URBAN WASTE PARADIGM: The first objective of this research was an attempt at discovering the extent to which waste impacts our society. The research observed how urban waste streams influence urban centers, specifically in the context of South Africa and Durban, whilst also delving into the various strategies currently used to eradicate waste.

CHANGING PERCEPTIONS: As an extension of the first objective of exploring urban waste, changing perceptions seeded to identify where changes can be made in societies current behaviour and at a more micro level where changes can be made to the way individual recycle and manage their waste. It analysed the mind-set of the average person when approaching waste management to determine whether they are of the belief that efficient waste management and recycling is in fact a civic responsibility.

INNOVATION: The final objective made use of the information gathered by objective one and two to derive a new innovative building typology and design framework, that strives to involve the everyday citizen in actively engaging in recycling, as well as redefining the image that currently accompanies recycling and waste management in South Africa's urban centers.

1.4 SETTING THE SCOPE

1.4.1 HYPOTHESIS

Underlying this research project was a simple outlook on how waste management can benefit the Durban's urban centre. The project aimed to identify a key issue that might in many ways seem trivial, but if dealt with, can have a huge impact on the lives of all that live and work within Durban. Thus, the

hypothesis was ultimately that the use of waste management and recycling will be a key driver in urban regeneration, employing a very simple, unique incremental grassroots methodology that includes the entire urban population in the act of cleaning up their city.



Figure 3 showing urban markets of Warwick. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

1.4.2 KEY QUESTIONS

PRIMARY QUESTION:

-What is the extent to which urban waste stream affect communities?

This question strived to set the scope of the project and contextualise more detailed research into the subject matter. It aimed to fulfil the objective of EXPLORING THE URBAN WASTE PARADIGM in Durban's CBD.

SECONDARY QUESTION:

-What are the views of residents in Durban's CBD on recycling of waste?

-How do traders and residents believe the act of recycling can be improved?

-How can the act of recycling become a civic responsibility naturally taken on by residents of Durban's CBD?

These questions aimed to fulfil the objective of CHANGING PERCEPTIONS by seeking out information that deals with human behaviour with regards to waste and how human beings perceive recycling in cities. This is particularly important because it established if in fact society views recycling as an important part of urban life.

1.4.3 RESEARCH METHODS

1.4.3.1 OVERVIEW

The chosen research methodology consisted of three parts. Firstly, the dissertation outlined the problem of waste management as a possible solution and catalyst for urban regeneration by using different literature that was reviewed and documented. This grounded the dissertation with a theoretical foundation that first identified waste as a major issue in urban environments, as well as highlighting how it can be used to better the lives of many urban residents. Secondly, the research looked at current forms of recycling locally in Durban and the way recycling is managed with the use of a purely observational analysis of the current systems in place. This aided in determining how Durban's waste paradigm currently operates, highlighting relevant issues that this dissertation could tap into and improve upon. As an extension of part two, the third part of the research took the form of a qualitative study aimed at the traders and residents living in Durban's CBD, attempting to analyse how they viewed waste management and recycling, as well as investigating the extent to which they currently recycle. These three methodologies were combined to ascertain the validity of the research statement: whether the current waste management systems in Durban are effective and how the informal sector can positively contribute to current systems.

1.4.3.2 PRACTICAL RESEARCH METHADODOLOGY

The method of the practical research study was qualitative to understand the livelihoods of the informal sector as well as the way people view waste management. The qualitative nature aided the research validity in Durban as none of the information accumulated could be generalised and applied in other areas. It ultimately becomes a study that is uniquely contextual and follows closely the lives of people that live and work in Durban. The chosen subjects were groups of residents and traders in Durban's CBD, documenting their opinions on waste management. The study will be in three primary routes of Durban, namely Dr Pixley Kaseme Street (West Street), Anton Lembede Street (Smith Street).

To make the process as fluid and effective as possible the sampling method chosen, led to an informal recruitment strategy along each street. The participants selected were divided up into two parts, male and female as well as being restricted to traders and store operators who stay in one place for an extended period. This meant that the study investigated the views of a wide variety of individuals from either gender group with no age restrictions but all on the basis that these individuals who were all very closely connected to urban waste streams daily. The study involved a total of 10 participants. Each interview was conducted using a questionnaire where I, as the interviewer asked the questions, the participant answered and a scribe recorded the answers. This strategy meant information was gathered fast without taking up too much of the participant's time.

1.5 INTRODUCING THE PROPOSED TYPOLOGY

The chosen building typology will primarily be that of an urban waste recycling center striving to deal with litter and waste in the CBD of Durban. However, the typology will also need to be a hybrid that is inclusive of many other building elements and functions. These functions will include market places, educational facilities and offices. The market place will cater for any informal trade that might occur in and around the center whilst the educational facilities will attempt to inform people on the importance of recycling in our cities. The building typology might also take the form of a museum or visitors center in an attempt to make the building iconic, building awareness of the growing waste problem in our urban environments, and reimagining recycling as an important part of urban life.

CHAPTER TWO: LITERATURE REVIEW

2.1 THEROETICAL FRAMEWORK:

2.1.1 BROKEN WINDOWS: EXAMINING THE PROBLEM

The problem of litter and waste management is not only restricted locally to South African cities. It is an issue that has plagued man since the earliest settlements formed thousands of years ago. By solving this age old problem, it is assumed that there will be much broader knock on effects that go far beyond merely cleaning up the streets of Durban. In the mid-1970s the state of New Jersey began a programme that attempted to create clean and safe neighbourhoods. The programme was designed “to improve the quality of community life” (Wilson, Kelling, 1982, pg. 1). In order to accomplish this, the program took police officers out of their vehicles and instructed them to conduct foot patrols. According to Wilson and Kelling (1982) the programme brought about no real reduction in the actual amount of crime in each city. However, there was a noticeable change in the attitude of the residents that lived in these cities. In the community of Newark in New Jersey, it was concluded that “foot patrol has no effect on crime; it merely fools the citizens into thinking that they are safer.” (Wilson, Kelling, 1982, pg. 29) Despite the sceptic’s views on this apparent failure, important positives could be taken from this programme. In the context of the people of Newark, foot patrols provided the residents with a sense of high public order and they felt “relieved and reassured” (Wilson, Kelling, 1982, pg. 29) when they were aware of the police attempting to help them maintain that order. Wilson and Kelling (1982) go on to conclude that many citizens may not be affected by crime, but are assaulted by an often overlooked threat, and that is the paralyzing effects of fear. Thus, despite the fact that there was no true reduction in crime, a very public and involved police force gave the community a better sense of security, and aided in reducing the sense of fear that surrounds violent crime and disorderly behaviour.

As a result of these studies on the programme’s effectiveness, a second important conclusion could be made. Within an urban community “disorder and crime are usually inextricably linked, in a kind of developmental sequence.” (Wilson, Kelling, 1982, pg. 30). Skogan (2008) states that disorderly behaviour included public gambling, public drinking and urination, street prostitution, congregations of idle men and bands of youths dressed in gang-related apparel, as well as activities such as panhandling, disturbing the peace, loitering, and vagrancy. Since the theories early inception, the list has grown to include truant high-schoolers, squeegee men looking for tips, dumpster divers in search of dinner, street preachers armed with bullhorns, “urban campers” in parks under cardboard tents, people with a “street lifestyle,” the presence of sexually oriented establishments, street harassment of women, open gambling, threatening phone calls and recreational violence in pubs and clubs. This disorder needs to be taken seriously as it can potentially have serious consequences for urban communities. Disorder undermines the stability of neighbourhoods and can affect a neighbourhoods

capacity to defend itself. Skogan (2008) goes on to say that those who are in a position to leave the community move away, and those that cannot move away withdraw from all public life as the public space is no longer a place of freedom and safety, but a place of conflict and fear. It can be concluded that a place where disorder is left unchecked it is likely that the negative impacts of this disorder are likely to spread into all facets of urban life.

In the built environment, similar results can be seen in untended structures. Wilson and Kelling (1982) state that social psychologists and police officers all agree that when a building has three or four windows left broken, very soon after, all remaining windows will be broken as demonstrated in Figure 4. This occurs in both good and bad neighbourhoods, and one broken window that is left unrepaired is a signal that “no one cares, and so breaking more windows costs nothing.” As an extension of this, if a community is constantly disrupted by disorder, it is likely that more menacing and life threatening crime is to follow. The concept of now one caring, and issues of disorder can often be seen as the result of littering and poor waste management. In cities where waste is left uncollected, it is immediately assumed that this city is in a state of disorder, and that the inhabitants of this city do not care.

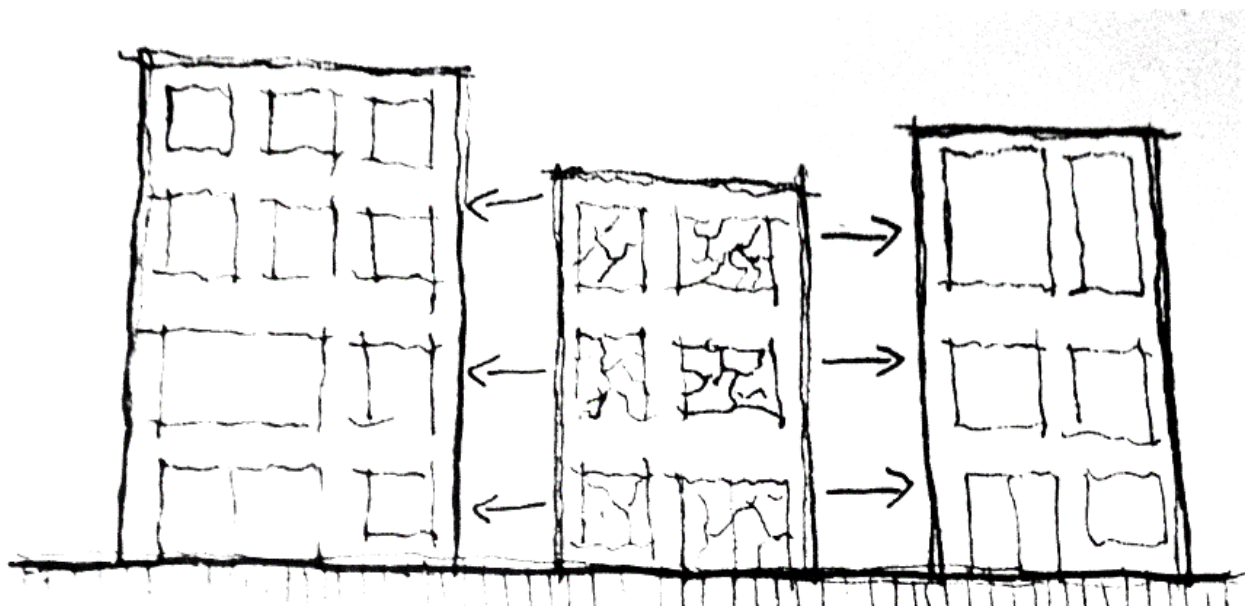


Figure 4 showing “Broken Windows” theory. Source: Author

According to Wilson and Kelling (1982) in 1969, a Stanford University psychologist Philip Zimbardo conducted experiments testing the broken-window theory. Zimbardo took two identical cars and left them abandoned in two separate neighbourhoods, one in the working class Bronx of New York and the other in middle class Palo Alto, all in an attempt to study what happened. Within ten minutes the abandoned car in the Bronx had already become the victim of theft and vandalism and within three days it had been completely stripped. In complete contrast, the car in Palo Alto remained untouched for up to two weeks. Intrigued by this, Zimbardo took a sledgehammer to one of the car’s windows and not hours later, other passers-by began to vandalize the car just as Zimbardo had. (Wilson and

Kelling, 1982) The experiment demonstrated that untended property that has been abandoned or left in a poor state of disrepair will soon become the target of vandalism by not only common criminals but also by certain citizens that might “consider themselves law-abiding”. (Wilson, Kelling, 1982, pg. 31). This behaviour is all linked to anonymity and the common experience of “no one caring.” (Wilson, Kelling, 1982, pg. 31) Within a community it can be said that a continuation of “untended behaviour” (Wilson, Kelling, 1982, pg. 31) and the breakdown of communal barriers that govern mutual regard and civil obligation, can drastically destabilise an otherwise stable community. Wilson and Kelling (1982) hypothesise that if a piece of property is abandoned, weeds grow and windows are smashed, then very soon stable neighbourhoods of families who are traditionally very conscientious lose all interest in their communal civility, transforming the neighbourhoods into a frightening cesspool of disorderly behaviour.

“Families move out, unattached adults move in. Teenagers gather in front of the corner store. The merchant asks them to move; they refuse. Fights occur. Litter accumulates. People start drinking in front of the grocery; in time, an inebriate slumps to the sidewalk and is allowed to sleep it off. Pedestrians are approached by panhandlers.”

(Wilson, Kelling, 1982, pg. 3)

In this environment “street crime flourishes” (Wilson, Kelling, 1982, pg. 32) When trying to relate this back to waste management and the act of recycling, in an environment where litter has become a common element, that community starts to develop an attitude of “no one caring.” (Wilson, Kelling, 1982, pg. 31) and as an extension of this, residents begin to lose interest in communal care and mischievous behaviour is no longer costly or punishable. If waste is considered a key component in the creation of disorder, it can be concluded that its eradication might go a long way towards the creation of safer more secure neighbourhoods. Litter and waste is a key contributor to the problem of urban decay, but what is the solution to its eradication?

2.1.2 SMALL CHANGE: FINDING A SOLUTION

In order to discover a possible solution to waste and litter in urban areas, a unique approach needs to be utilized, with particular emphasis on the existing informal practices of Durban. Hamdi (2004) refers to the way that organic systems in nature, exhibit similar patterns to those found in informal cities around the world, in order to solve various problems. Batty (2012) describes cities as living, self-organising systems that evolve and grow organically. These cities are constantly needing to change as they are composed of individual entities that “have limited lifespans and have to be renewed continuously” (Batty, 2012, pg. 54). In each case, informal cities are able to regenerate and renew by “drawing on a variety of information from the multitude of the small, relatively simple and local elements, rather from some power elite or single brain”. (Hamdi, 2004, pg. xvii) This approach

reinforces the notion of litter eradication and recycling as a catalyst for social change as well as providing a theoretical foundation that informs the design of a recycling system in Durban.

Hamdi (2004) makes reference to slime mould behaviour and the way in which mould oscillates between being both a single entity and a multitude of elements, as well as being independent as one entity and dependant on each individual element that makes up that entity. The mould has a unique ability to act spontaneously and instinctively to a specific need, to “self-organize in response to need, from the bottom up” (Hamdi, 2004, pg. xvii) where no single element is more important than the other and each one is required to ensure the moulds survival. This ability to organise and become more sophisticated as seen in Figure 5, the ability to evolve from one state to a more sophisticated higher order, is referred to as “emergence” (Hamdi, 2004, pg. xvii).

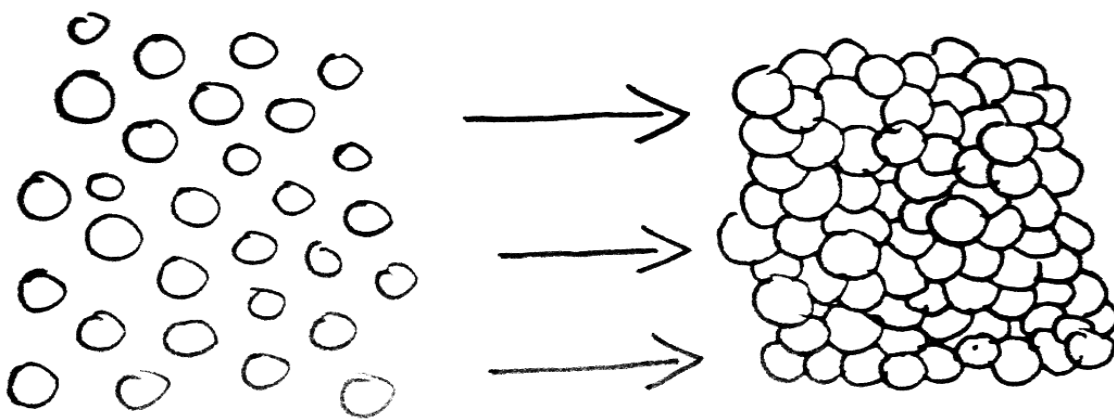


Figure 5 showing “Small Change” theory: Simple elements forming a more sophisticated entity. Source: Author

When considering the practice of development in cities, the concept of emergence can be a unique strategy to accomplish the often complex goals of development. Hamdi (2004) states that emergence and development can be considered similar, however, with development, a certain amount of design structure is required together with certain rules that govern a communal development, providing stability and order. The structure of development forces the designer to surrender some of the natural liberties that occur in the processes of emergence and in practice it is common to see “structure itself start to inhibit personal freedom” (Hamdi, 2004, pg. xviii). According to Batty (2012) current urban regeneration in cities is structured mostly through planned interventions defined as development. This is in complete contrast to the spontaneous systems of regeneration found in the organic systems of nature. The creative effects of spontaneous regeneration and development are crucial elements that aid in the survival of such a system and often regeneration can be “stopped in its tracks by attempts at planned regeneration, which tends to be manufactured from the top down (Batty, 2012, pg. 55). Presently, in a built environment that contains an abundance of complex problems that need to be solved, it is crucial the one finds the right balance that compliments both “the creativity of emergence and the stability of design” (Hamdi, 2004, pg. xviii). One of the current pitfalls facing development in cities is the fact that development is closely linked to individual capitalism and the need for individuals

to improve their own lives, even at the expense of others. In contrast the concept of emergence attempts to encourage an approach that is much more communal and inclusive. There are numerous reasons why this incremental strategy is ideal in solving the social and environmental ills that currently affect urban eco-systems. Firstly, this practice builds on “the collective wisdom of people and organizations on the ground” (Hamdi, 2004, pg. xviii) drawing from local thinking that understands the challenges it faces and can decide accordingly on how to deal with these challenges. The practice of emergence creates a unique environment within which those who think locally and act locally can then contribute to a greater cause, which is then “rationalised in ways that make a difference globally” (Hamdi, 2004, pg. xviii). The practice of development facilitates the practice of emergence, building on what is available and taking that to scale, building a densely connected system consisting of very simple elements that generate a platform on which more sophisticated behaviour can then establish itself. Hamdi (2004) states that to achieve something big, one needs to start with something small.

Pragmatically speaking however, the theory of emergence needs to be driven by progress beyond the simple. In order for emergence to be successful in practice of development, a certain amount of complexity must be enforced. According to Hamdi (2004) development practice must attempt to make the everyday activity special in its own right, giving a certain amount of importance to the mundane, and then making these now special activities widely accessible to all, expanding boundaries and if possible removing all obstacles. The practice of bottom-up emergence in tandem with the goals of development “starts a process by which small organisations, events and activities can be scaled up” (Hamdi, 2004, pg. xix). Batty (2008) adds to this argument in saying that with urban planning, decisions must be made that ensure that seeds are planted do not end in failure, but lead to regeneration that is sustainable and built up from a grassroots level, from the bottom up. Urban planners need to address key points whereby “small change can lead to spontaneously to massive change for the better.” Figure 6 below demonstrates the manner in which top down approaches are reinterpreted for a more diverse approach that is far more inclusive and built from the bottom up in a new type of regenerative process.

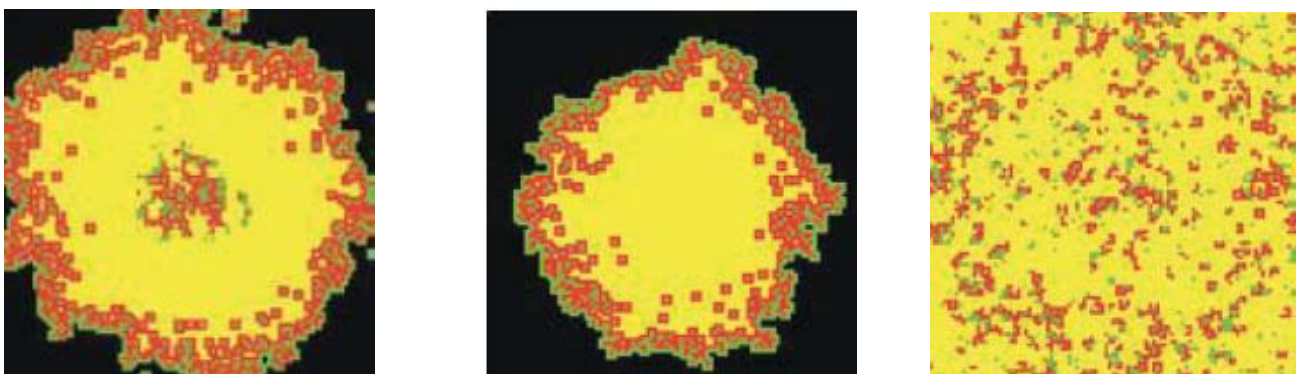


Figure 6 showing regenerative growth that creates an inclusive sophisticated entity. Source: Batty (2008)

The scaling up from local to global can happen in a multitude of ways. Firstly, it can happen slowly through gradual integration of different programmes with each other over time, both informally and formally. Secondly, it can happen through political means whereby certain programmes begin to wield enough power, becoming part of the governance of cities and lastly it can occur organisationally whereby a small programme develops into a large scale programme with a higher order of organisation (Hamdi, 2004). The ultimate objective of small change and the theory of emergence is to try and cultivate an environment of change that starts at a grassroots level with small beginnings that have “emergent potential” (Hamdi, 2004, pg. xx). Hamdi (2004) identifies small subtle examples that include something as simple as a bus top or a composting bin. These are small items that if scaled up can have huge impacts on the societies that they serve.

“From these small and often simple beginnings with all their practical methods of improving housing, health and education, emerges an agenda of reforms to policy, legal frameworks and standards which help to build social capital, promote social integration and gender equality, reduce dependency unlock resources and build livelihoods”

(Hamdi, 2004, pg. xx)



Figure 7 showing simple beginnings being scaled up for more far reaching impacts. Source: Author

So how does the theory of small change and emergent development apply to the context of Durban. As previously mentioned emergence seeks to use small interventions at grass root levels in order to bring about large amounts of change and in order to achieve this the method is usually grounded in informality and the growth of informal trades in third world cities. In the context of Durban this is particularly applicable as the CBD has become increasingly dependent on the activity generated by the informal sector. The informal economy of Durban can be seen as its beating heart with Warwick Junction the catalyst for this new trend.

2.2 THE INFORMAL CITY: WASTE MANAGMENT AS A TOOL FOR SOCIAL UPLIFTMENT

In developing cities, the informal sector has swiftly become one of the key pillars in the continued stability of urban areas and is one of the key drivers behind the practice of emergence and small change. Freund (2007) describes the growth of post-colonial African cities as being firmly entrenched by the introduction of the informal economy that arose. Early development experts who had previously seen informal African cities as obstacles to modernist development began to see the informal economy in a completely different light. Freund (2007) states that the parasites, shack dwellers, and the unemployed who sought to create their own informal methods of employment gradually became the authentic builders of the modern and dynamic African city. This emphasized a completely original method as “part of a process of development from below” (Freund, 2007, pg. 155). Development from below echoes the sentiments put forward by Hamdi on how informality is now central to the creation of many socially integrated cities as it makes use of “the collective wisdom of people and organizations on the ground” (Hamdi, 2004, pg. xviii). Freund (2007) explains that poor dwellers occupying the informal economy should be seen as far more than ‘parasites’ as they do it for a particular reason, to provide a better life for themselves and for their families. They perform important services for others, create their own employment and contribute massively to their communities as a whole, actively engaged in building the community from the ground up.

Waste management; the act of recycling and waste picking; has steadily become one the focal elements of modern day informality. According to Moore (2012, cited in Nzeadibe and Mbah), the current understanding of waste management, in both urban and rural areas, is shifting from waste being viewed merely as a material requiring collection, handling and disposal to an essential resource. Waste management has begun to embrace a new paradigm of resource management that pays particular attention to the act of waste picking and recycling. In this new framework, waste has become a resource whose exploitation “provides significant socioeconomic benefits” (Nzeadibe and Mbah, 2015, pg. 280). Furthermore, in many developing cities globally, municipal solid waste is often seen as a natural resource which can be utilized by poor urban communities to generate a sustainable livelihood.

Marello and Helwege (2014) describe how informal waste pickers who generate livelihoods off the use of waste, have collectively organized to press municipalities into respecting their rights as citizens, giving value to the service they provide. In many countries where waste picking was seen as an illegal, unsightly act, it has steadily become a green alternative to creating more sustainable cities, economically and environmentally. The growing optimism surrounding waste management as a viable resource for disenfranchised communities has led to greater co-operation between informal waste pickers and municipalities, offering “the hope of achieving better waste management as well as the ‘social inclusion’ of these marginalized citizens.” (Marello and Helwege, 2014, pg. 1). At the core of

this new optimism is the ability to adapt and innovate according to need, and new integrated waste management systems have taken hold in many developing cities worldwide. Marello and Helwege (2014) describe the way in which Municipal Solid Waste Systems (MSWs) and Waste Picker Cooperatives (WPCs) have formed collective organizations. Institutions such as the World Bank have funded and supported projects that encourage the integration of waste picking into the formal recycling sector and other advocacy organizations such as WIEGO (Women in Informal Employment: Globalizing and Organizing) have been very vocal in the need for an intensification of efforts to support waste picking, calling for more access to improved technology as well as more partnerships to encourage recycling in underdeveloped communities.



Figure 8 and 9 showing the informal waste pickers and porters of urban areas. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

Durban's waste reality is important in determining how the informal economy and waste management practices can actively contribute to the development and upliftment of the city. According to the eThekweni Municipality (2016) waste prevention and avoidance is the most favoured option with regards to waste management as it has many benefits such as the reduction of haulage costs and the conservation of many landfill sites around the province of kwaZulu Natal. The municipality believes that the reuse approach is an essential part of the implementation of sound waste prevention measures. Currently the most used prevention approach is house hold collection whereby "households reuse empty plastic packaging containers and glass bottles" (eThekweni Municipality, 2016, pg. 60). Other approaches most used in the region include the national implementation of a special levy on plastic shopping bags, resulting in a huge reduction of plastic entering landfill sites and encouraged consumers to make use of reusable shopping bags. eThekweni Municipality (2016) also state that education and public awareness on waste prevention has also been made a priority in an attempt to revitalise the recycling industry. Currently DSW implements numerous initiatives that use education and waste management to promote the minimisation of waste. This is done in

conjunction with the Education and Waste Minimisation Department who train educational officers to conduct waste awareness programmes across the eThekweni municipality, with each trained employee tasked with “organising community clean ups, clearing illegal dumps, door to door education and conducting educational workshops.” (eThekweni Municipality, 2016, pg. 60)

Aside from the above mentioned methods the eThekweni Municipality (2016) also sees recycling in Durban as one of the key components proposed for future minimisation of waste and is currently practised by DSW (Durban Solid Waste), private companies and many local entrepreneurs. The size of recycling ranges from small scale efforts centered around kerb side collection to much larger scale business enterprises that maintain collection, storage and processing facilities. The flagship recycling method spearheading the municipalities efforts is DSW’s “orange bag kerbside collection system” (eThekweni Municipality, 2016, pg. 83) whereby orange bags are supplied to households and stores to be utilised for recycling of cardboard, paper and plastic. The use of kerbside collection is not only restricted to paper and plastic with another programme built around the collection of glass bottles and cans with the use of clear bags. This programme however is still in its infancy and plans to distribute the bags were only put in place in the early part of 2016.



Figure 10 showing the poor state of Buyback centers in the eThekweni area. Source: eThekweni Municipality (2016)

According to the eThekweni Municipality (2016) another key method in minimising waste is the inclusion of various drop off centres in strategic positions, each equipped to accept and process paper, cardboard, glass, plastics, metals and in some cases used oil. These drop off centers are usually closely associated with the informal economy and are sustained by individuals who use their own resources to move recyclable materials to each collection point to try and generate their own income. At each station, material that has been collected by individuals is weighed and according to the type and pf recyclable material and its weight, an amount of money is paid to the individual. DSW have set up seven buyback centres across the eThekweni Municipality, providing potential for self-employment and an income to many of the poorer communities in the surrounding areas. The eThekweni Municipality (2016) state that because of these by back centres, the surrounding areas in these regions are largely free from recyclable waste as individuals regularly pick up such materials which in turn reduces the amount of litter on the streets.

The main challenge currently facing most buy back centres in eThekweni is the fact that they are heavily understaffed, badly maintained and short of the necessary tools and amenities required to run them effectively. According to table 1 below most of the buyback centres in operation require attention apart from Westmead and Kwamashu recycling centres. In these two cases it can be seen that centres that have bundling equipment on site have a more structured process with a potential for higher financial returns. In centres such as Escom road, Lorne Street and Brook Street there is a dire need for sanitation and electricity and water supply. Buyback centres often require proper built structures on site as interactions between consumers and site staff occurs openly which causes a threat as cash is involved. It is clear that site supervisors have good plans and enthusiasm to build these small enterprises but lack the support required. (eThekweni Municipality, 2016)

DSW BUYBACK CENTRES			
NAME OF FACILITY	MATERIAL COLLECTED	NUMBER OF WASTE RECEPICALS	GENERAL COMMENTS
BROOK STREET	Paper, plastic, cardboard, cans	1 ton bulk bags for plastics and glass. 27m ³ skip used by Mpact to remove recyclable material	Site has no toilets, electricity and water. Informal structure used as site office.
ESCOM ROAD	Paper, plastic, glass bottles, cardboard, metal	2 x Cages for cardboard, 1-ton bulk bags for plastics and glass	Site is very poorly maintained, possible fire hazard. No electricity on site, toilets very bad condition.
KWAMASHU	Paper, plastic, glass, cardboard, oil, cans	1 ton bulk bags for plastics and glass, Closed container for oil collection	This site is excellently operated, it has bailing facilities and all recyclable materials are stored neatly. The site has excellent infrastructure.
LORNE STREET	Paper, plastic, cardboard, cans	1 ton bulk bags for plastics and glass. 27m ³ skip used by Mpact to remove recyclable material	Site has no toilets, electricity and water. Informal structure used as site office.
NORTH COAST ROAD	Paper, plastic, glass, cardboard	5 x cages, 15 skips and 1 ton bulk bags for plastic and glass	Site is poorly maintained, recyclable material is scattered across the site. Fire hazard.
QUEENSBURGH	Metal	20 skips	Site is a scrapyard that only accepts all forms of metal.
WESTMEAD	Paper, plastic, glass bottles, cardboard, metal	5 x cages, 10 skips and 1 ton bulk bags for plastic and glass	Site is well maintained, has bailing equipment.

Table 1 showing eThekweni DSW Buyback Centres. Source: eThekweni Municipality (2016)

Thus, it can be seen that Durban uses multiple buy back centers in an attempt to increase dependence on recycled waste systems but these facilities lack the support required and as an extension of this, the informal waste pickers that form the backbone of these systems are negatively affected. According to Thieme (2013) the current waste picking phenomenon stems from the coming together of high unemployment and the lack of basic services in low-income neighbourhoods. This combination has shaped alternative modes of social and economic organization amongst people living in urban poverty, in particular the youth. Thieme (2013) describes the 'hustle' of the urban youth to create their own employment opportunities, a struggle that overcomes the traditional wait for job opportunities. In Latin America the wide diversity and scope of waste picking is clearly evident in the number of names assigned to the process with Brazil, Nicaragua, Mexico, Argentina, Costa Rica all having numerous iterations of waste picking (Marello and Helwege, 2014, cited in Fergutz, 2011). The field of waste picking is usually associated with a lone struggle but in fact the field is dominated by family and micro-enterprises comprised of mostly women, children and elderly relatives. According to Marello and Helwege (2014) the appeal of waste picking comes largely from ease of entry into the practice as well as relatively good profit margins on waste picked and sold. The trade is highly desirable as it provides low-risk income as well as being a well-established, secure trade.

Upon closer inspection of waste picking there are numerous pitfalls that hinder the development of the trade. Marello and Helwege (2014) state that as cities develop socially inclusive systems meant to integrate waste pickers fluidly into a more formal mechanized recycling system, the result is often less available work for pickers. The fluid nature of waste picking also makes it increasingly difficult to cater for the most disadvantaged waste picker as they are not necessarily "those who benefit from partnerships with municipal waste programs" (Marello and Helwege, 2014, pg. 2). In addition to the administrative and logistical challenges, there are also numerous health hazards that affect the trade. Waste picking is usually bound to the streets of urban centers and because of this, waste pickers are often exposed to highly contaminated materials with risk of chemical contamination and biological infection. Kennedy et al (2004, cited in Gutberlet and Baeder, 2008) describes the unsafe and unhealthy working conditions of refuse workers on the streets and in refuse centers. Workers are exposed to extreme weather conditions throughout the year which contributes to colds, virus infections, sinusitis and pneumonia, all of which is exasperated by the inability to access adequate medical care. In addition to extreme weather, high levels of air pollutants cause additional health impacts which increase respiratory diseases, allergies and skin problems. Cuts and fractures are also common amongst waste pickers as most waste collection involves the sorting of recyclable material which has been disposed of unsafely. Close proximity to the street edge makes pickers particularly vulnerable to traffic related injury and death, further highlighting the dangers of waste picking. Marello and Helwege (2014) describe the conditions facing waste pickers:

“They face injuries from dogs, rats, and other vectors, combined with chemical and biological health risks due to contact with toxic substances, health care wastes, fecal matter, body parts, used syringes and other materials in the waste stream. In the best of situations, pickers report ergonomic problems due to the physically taxing nature of the work, and psychological and social disadvantages stemming from their low social status”

(Sheinberg, 2011, pg. 49; cited in Marelllo and Helwege, 2014, pg. 3).



Figure 11 showing harsh urban conditions confronted by informal waste pickers. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

The low social status of waste pickers adds another element of concern associated with the psychological health of waste pickers. According to Gutberlet and Baeder (2008), attention needs to be given to the social health implications of waste picking as powerlessness, vulnerability and low self-esteem cause immeasurable psychological damage amongst many pickers. Due to their low social status, extreme poverty, and poor health, pickers are often stigmatized, bullied and excluded by the rest of society. One picker interviewed, shone a light on this issue saying “more respect would be the most needed change to improve work” (Gutberlet and Baeder, 2008, pg. 12; cited in Sarkar,

2003). Due to the fact that waste pickers are part of the informal economy, they are denied access to many social benefits such as health insurance, pensions and unemployment insurance. Coupled with this is a lack of education and income imperatives, all of which prevent the informal waste picker from protecting themselves (Marello and Helwege, 2014). The consequence of all these factors is a group of people with emotional instability, insecurity and social intolerance.

Gutberlet and Baeder (2008) state that due to the lower social standing of waste pickers, health concerns for the trade receive very little media coverage or public attention. As an extension of this, the various health concerns affecting informal recyclers are very rarely taken into consideration by existing and future municipal waste management policies. The sector lacks a significant lobby to put pressure and demand resolutions to their respective health issues as their voices remain largely unvoiced. Waste pickers tend to remain powerless in the workforce, unable to seek improved conditions and the numerous problems that hinder their daily survival mean that “the recyclers attention is usually concentrated on collecting as many materials as possible to make it through the day.” (Gutberlet and Baeder, 2008, pg. 12)

2.3 THE RISE OF WASTE MANGEMENT COOPERATIVES

The numerous challenges facing informal waste pickers have driven them towards a possible solution that involves the formation of cooperatives. Waste picking as an idea has been around for centuries but the idea of forming cooperatives is fairly new and casts a fresh perspective on the possibilities of informal recycling as a sustainable process. According to Marello and Helwege (2014), waste picking cooperatives took hold at the dawn of the human rights movement of the twentieth century. Encouraged by the new human rights democracy sweeping the planet, waste pickers took action, forming associations that united waste pickers behind one common goal, brought awareness to the contributions of waste pickers and advocated for better policies on informal waste management rights. WIEGO (2009; cited in Marello and Helwege, 2014) states that the organization of waste pickers into social movements, have enabled them to negotiate changes to laws that recognise waste pickers as workers with firmly established labour rights and these social movements and cooperatives have achieved this through blockades, strikes and protests. The result is political enfranchisement, decriminalization and even the establishment of social security benefits that include pensions and medical aids. In many cities, recent laws passed have given greater access to waste as “permission to gather street waste or, more generously, as rights to specific components in the municipal waste stream” (WIEGO, 2009; cited in Marello and Helwege, 2014, pg. 4). The rise of cooperation in the last fifty years has reversed the fortunes of many poor urban dwellers. According Marello and Helwege (2014), in the Columbia, the first cooperative association came to the fore in the 1980’s as the municipality threatened to close an open dump site in Manizales that would destroy the livelihoods of

numerous waste pickers. Columbia today plays host to over “100 waste picker collectives” (Marello and Helwege, 2014, pg. 4) and the city of Bogota leads the innovative movement, allocating collection routes and directing recycling routes to waste picker-run sorting facilities. According to WIEGO (2012, cited in Marello and Helwege, 2014) the Argentinean city of Buenos Aires signed an agreement with waste picker cooperatives to give them sole responsibility of the city’s waste recycling efforts, as well as providing various support such as day cares, uniforms, workplace insurance and medical care. Brazil followed this trend in providing low-income housing and education for many waste picking families.

The advantages of cooperatives between municipalities and waste picker associations are numerous. WIEGO (2012, cited in Marello and Helwege, 2014) state that the biggest advantage of cooperatives are the huge gains in terms of productivity. By sharing and working together, pickers gain access to more storage space, a wider range of equipment as well as strengthening bargaining power with middlemen and the municipality. Due to the increased scale of cooperatives, materials can be sold in bulk for higher prices and the risk attached the trade is significantly lowered because of the huge variety of recyclables collected by a broader range of interconnected pickers. Essentially the rise of cooperatives has led to better job security enabled by a stable social network (FAO, 2012; cited in Marello and Helwege, 2014).

On the flip side of this optimistic coin however, are various issues confronting cooperatives. The process of forming cooperatives is a particularly slow, arduous and challenging process with many obstacles concerning democracy and management within organisations. (WIEGO, 2012; cited in Marello and Helwege, 2014). The internal democracy of waste picker cooperatives give rise to leadership debates, transparency disputes and a general shortage in management skills. WIEGO (2012; cited in Marello and Helwege, 2014) states that once these cooperatives are established one of the most significant obstacles of the organisations growth is a lack of financial resources needed to expand the business. In order to add value to recycled goods, the collection, sorting and reselling of materials needs to be improved through large processing volumes from mechanisation and warehouses, a requirement that needs significant financial investment.

It can be assumed that the inclusion of informal waste picking and recycling can have enormous social and economic benefits but in order to implement it effectively the understanding of waste and recycling must first be dissected. Waste and litter in urban areas is viewed as a nuisance, a negative impact on the environment and the act of recycling is often not undertaken with any true vigour. How does one improve a community’s outlook on recycling and the informal act of waste management?

2.4 PERCEPTIONS OF RECYCLING

In the context of Africa, the act of recycling is a fairly new process. Given that there is a distinct shortage of skills and policy driven waste management systems, recycling has played second fiddle to issues considered more pressing, such as crime, transport and unemployment. In contrast, outside the borders of Africa, recycling has become a hugely important part of municipal agendas, with many studies being conducted to try and identify how to improve on recycling and waste management. Bowman et al (2009) states that the low levels of recycling in the United Kingdom can be attested to the local municipalities' inability to bridge the gap between people's attitudes and behaviour when it pertains to recycling. Swami et al (2010) identifies several factors that have been shown to impact the manner in which people recycle.

The first factor encompasses situational settings in relation to context and structural and socio-demographics. Studies have shown that there is an inverse relationship between the distance travelled to a recycling site and good recycling behaviour with curb-side recycling found to have the biggest impact (Barr, 2002 and Derksen & Gartell, 1993; cited in Swami et al, 2010). Other situational factors pertain to the individual themselves such as personal income, previous experiences and habits. In this instance it is clear that past behaviour directly affects present and future recycling behaviours (Carrus, 2008; cited in Swami et al, 2010). Situational factors often implicate convenience as a determining element. Curb side recycling is the most prevalent form of successful recycling habits. Oskamp (1977; cited in Bowman et al, 2009) explains that because it is considered the most convenient method, it can be deduced that ultimately, convenience may override pro-environmental attitudes and thus negatively affect recycling behaviour.

A second factor said to influence recycling behaviour are the environmental concerns attached to individuals involved. Fransson and Garling (1999; cited in Swami et al, 2010) describe environmental factors as a person's orientation and concern for the preservation, restoration and improvement of the natural environment. Research suggests that an individual with a more egoistic nature, an individual more concerned with self-preservation over that of the environment, is far less environmentally friendly and as an extension of this less likely to recycle. Particularly in an African context, the daily struggle of the urban poor means that the importance of self-preservation and the preservation of one's family far exceeds that of the environment. Low income urbanites are met with hardships on a daily basis and issues of environmental health are superseded by the life and death struggle of urban life as a general feeling. In certain social climates "indifference is thought to be a main reason for non-participation" (Howenstine, 1993; cited in Bowman et al, 2009, pg. 265) and many "non-recyclers often quote lack of time as an obstacle to recycling." (Vining and Ebreo, 1990; cited in Bowman et al, 2009, pg. 265)

Leading on from the struggles of everyday life, another factor with a direct influence on recycling is the psychology behind the behaviour. Studies by Hopper and Nielsen (1991, cited in Swami et al, 2010) highlight the extent to which an individual believes they can undertake waste management and how individuals believed their actions could ultimately have a very real effect on the waste problems of today, prompting them to act in the best interest of the environment. In addition to this, threats to personal wellbeing caused by poor waste management is another possible incentive for an individual to actively contribute to recycling and environmental activism (Baldassare & Katz, 1992, cited in Swami et al, 2010). According to Boldero (1995; cited in Bowman et al, 2009) other collectivist variables such as peer pressure and shared public commitment to recycling are seen have an impact on positive waste management movements.

Using social inclusion as an alternative, Selman and Parker (1997 cited in Swami et al, 2010) have argued that environmental citizenship, which can be loosely defined as involved citizenship in relation to environmental issues, may have a positive influence on waste management actions. Psychologists have long studied the idea of producing a lasting change in behaviour by changing the social context that the individual is placed in (Lewin, 1947; cited in Burn, 1991). According to Schwartz (1970; cited in Burn, 1991) in order for social norms to influence recycling behaviour, the individual must truly believe that noncompliance will produce negative consequences for others, assuming personal responsibility for any of the negative consequences thereafter. In most urban settings it can be seen that the negative consequences of environmentally destructive behaviour is not evident as individuals feel no individual responsibility. In this setting, there is no collective approach to positive environmental behaviour and a person feels that if no one else cares about their environment then “they have no choice but to perform the environmentally irresponsible act.” (Burn, 1991, pg. 615)

Burn (1991) discusses the use of the ‘block leader’ approach in order to increase levels of recycling. This approach uses individuals who have already had consistent participation in recycling programs to deliver persuasive communications about recycling to their communities. The objective is to encourage their non-recycling neighbours to commit to positive environmental contributions as well as implementing a new social norm of good recycling behaviour. The use of this block leader approach demonstrates “other people are doing it and reminds individuals that they do have some choice regarding their waste disposal.” (Burn, 1991, pg. 615) According to Cook and Berrenberg (1981; cited in Burn, 1991) awareness of ones neighbour can lead to action and may lead to better performance due to an increased desire for social approval from those around you. This social approval can be described as a social incentive, motivating an individual to undertake recycling in order to improve the environment around them as well as the environment around their neighbours.

2.5 REIMAGINING WASTE: THE DROS CITY

The word 'dros' is used when referring to matter that is foreign, worn out and impure. It is a material that has become so meaningless that for many it does not even exist in their perception (Kallipoliti, 2010). Dross is "worthless; it is incidental, displaced material, and a side effect of chemical reactions that serve no purpose" (Kallipoliti, 2010, pg. 105) Dross has over time, come to mean waste, impurity and any collection of disparate pieces and material fragments. The origin of the word speaks of a material displacement in the process of making and production.

"However, the etymological origin of the word refers to a residual substance that emerges in transitional material stages, such as the process of melting a metal or the sedimentation of a liquid."

(Kallipoliti, 2010, pg. 105)

Dross can come to mean the material displacement that occurs in our urban context, a material displacement that occurs in the process of making our cities, a material displacement that produces litter and waste. In the past decade the way waste streams are viewed has shifted steadily from not only the quantity of waste being produced, but also the composition. Kallipoliti (2010) makes particular reference to a new type of 'e-waste' that is the result of highly advanced technologies and is the resultant material displacement of electronics such as computers and laptops. The home computer contains "over a thousand different substances, many of which are toxic, and creates serious pollution upon disposal." (Kallipoliti, 2010, pg. 105) The recycling process required is an incredibly complicated and involved task that requires numerous stages of preparation, shredding and segregation into different components and materials (Kallipoliti, 2010). This process represents a significant opportunity in terms of employment and a reimagining of waste as a possible solution. Parallels can be drawn with the opportunities seen in city waste management. Waste in cities is incredibly varied in composition, and the process of collecting this waste is a long and arduous process, a process that also has significant opportunities in terms of employment and social upliftment.

There are numerous key elements that can inform a building typology that effectively deals with waste. Firstly, broken window theory attempts to outline the basic problem confronting urban settings today by highlighting the manner in which the apparently small malfunctioning parts of society can have far greater impacts on communities if left unchecked. The theory also goes a long way towards proposing a possible solution to many of the issues that plague urban ecologies by encouraging intervention on smaller micro levels that can then solve broader issues on larger scales. In the same way that "disorder and crime are usually inextricably linked, in a kind of developmental sequence." (Wilson, Kelling, 1982, pg. 2) the idea of an ordered and unified community occurs in the same developmental sequence. If one individual takes it upon themselves to care for the environment around them, the

behaviour is likely to spread to those around them. The theory of small change further emphasises this developmental sequence through the introduction of small changes that start at the grassroots level and are scaled up to solve greater issues in a more sophisticated arrangement. This theory points towards a distinct incremental design strategy whereby no single entity is more important than the other and every single part is required for the ultimate survival of the collective. (Hamdi, 2004)

Incremental design is closely linked with the use of informal strategies to accomplish various goals, as informality speaks to individuals on the ground, struggling with the day to day hardships that constantly confront them. The urban poor that form part the informal economy have derived their own forms of employment through adaptation and resilience, elements that need to be echoed in the design of a new building typology that is not only adaptive and resilient, but also provides for free thinking and creativity. Of all the informal methods of employment, none represent the sector better than that of informal waste pickers. Waste pickers are often seen as a nuisance, at the mercy of various health hazards and injury, and yet have evolved into possibly the most resilient and adaptive entrepreneurs of this generation. Marengo and Helwegge (2014) discuss the manner in which this marginalised community are able to provide not only job opportunities for thousands of urban poor but also provide a unique and increasingly attractive alternative that creates a sustainable environment for all to live in. It can be deduced that the act of recycling by waste pickers needs to become a core element upon which cities are built, as they understand the grass root struggles of urban life. In order to build cities around informal waste pickers and a truly sustainable outlook, importance must be placed on the formation of cooperatives. Cooperative organisations formed amongst waste pickers with support from the municipalities are key to creating a stable community that can achieve the goals of sustainable income, employment and ecological health (Marengo and Helwegge, 2014).

Thus the informal city, one that is adaptive and built from the ground up, can be compared to the idea of the 'Dross city'. According to Kallipoliti (2010) the dross city is a city that is almost invisible to most. It is a phantom city that most individuals cannot see or do not wish to see and exists as a "secondary layer enmeshed in the urban fabric." (Kallipoliti, 2010, pg. 105) The city is unintentional in nature, rising from the cheap land that surrounds developing urban centers, informally constructed from the masses of obsolete materials discarded by the bourgeois. In present day urban ecologies, the face of buildings is becoming increasingly different in nature as a new era of techno junk and displaced materials overwhelm the contemporary city. Kallipoliti (2010) describes how defunct oil tankers, air conditioning tubes, advertising billboards and other containers are swiftly articulating a new urban language that is violating the building envelope. On street level the same can be said for large amounts of waste polluting the spaces people occupy in and around the buildings they live and work. Significantly, the lifetime of waste in cities is becoming more and more difficult to combat as mass

consumption, production and urbanisation takes hold, and waste swiftly becomes a permanent fixture of the urban landscape. Buildings are unable to adapt to the change taking place, incapable of reshaping the ever-increasing urban dystopias of the present as man is steadily forced to accept cohabitation with “the machine” (Doxiadis, 1966, pg. 32).

“In the future we may see waste migrating from an advertising strategy for the consumer market to a problematic social reality in developing countries and our polluted oceans, and finally to the not-so-distant future of a planet uninhabited by life and smothered with inorganic obsolete matter”

(Kallipoliti, 2010, pg. 107)



Figure 12 showing dystopian future of a world filled with junk and waste from Disney film Wall-E. Source: Kallipoliti (2010)

Kallipoliti (2010) states that a new discourse must not only be driven by the necessity for ecological awareness but also by the need to manipulate and reuse the kind of discarded raw materials floating around city streets. The issue with the current discourse on ecology and sustainable design is the current obsession with a return to nature. Žižek (cited in Kallipoliti, 2010) views this disposition as regressive, saying that when dealing with the immense waste reality confronting the world, the requirement should be more artificiality and less nature. In no way does this mean that the ‘creation of more’ is needed, but rather that the reuse of existing is encouraged. Dross city gives rise to a design post praxis that emerges through a new creativity drive with a desire to transform existing information, concepts and materials. The ultimate aim is to recycle the energy created during the process of creativity and production, and exploit the accumulative effects of knowledge and materiality (Kallipoliti, 2010). In conclusion by reimagining the existing systems in place through systems such as informal waste picking and recycling, we can create a new social aesthetic that sees litter not as a problem, but rather as a significant opportunity.

CHAPTER THREE: PRECEDENT STUDIES

3.1 INTRODUCTION

The precedents outlined below speak to the two case studies that will be mentioned further on in this dissertation. The first precedent of Sunset Park Material Recovery Facility serves as an example of a waste management facility that deals with the complex workings of waste delivery, processing and storage as well as incorporating education and awareness into its makeup. The second precedent, the California Academy of Sciences, functions as an exhibition center and therefore provides many excellent architectural examples of ways in which one can raise awareness of recycling and its importance in society. Both precedents are exceptional examples of sustainable design as they make use of recycled materials and employ sustainable design elements meant to reduce energy consumption and minimise the buildings impact on its surrounding context.

3.2 PRECEDENT ONE: SUNSET PARK MATERIAL RECOVERY FACILITY

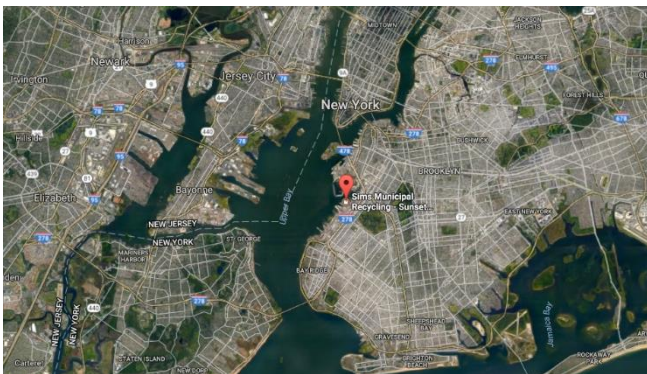


Figure 13 showing Sunset Park Material Recovery Facility. Source: Google Earth (2017)



Figure 14 showing Sunset Park Material Recovery Facility. Source: Selldorf Architects (n.d.)

Location: New York

Architect: Selldorf Architects



Figure 15 showing Sunset Park Material Recovery Facility. Source: Selldorf Architects (n.d.)

3.2.1 INTRODUCTION

Being one of the largest cities on the planet, New York produces huge amounts of waste on an annual basis, producing eleven thousand tons of waste every twenty-four hours (Krichels, 2014). In 2013 New York began its largest recycling push in a quarter of a century to try and deal with the ever increasing waste stream affecting the city. The cities plan included a long term contract with international waste management company, SIMS Municipal Recycling who were tasked with the processing and selling of recycled materials throughout the city. According to Krichels (2014) SIMS and several city agencies appointed Selldorf Architects to design a new recycling plant located on an eleven-acre city owned pier in Sunset Park, Brooklyn. Due to outcries from the local neighbourhood at the prospect of living next to a waste sanitation facility, Selldorf architects needed to design a facility that not only served the city infrastructure but that also worked for the neighbourhood's needs. Thus, the Sunset Park Material Recovery Facility was designed as a facility that “feels like an experience designed for people rather than for a truck full of yogurt containers” (Krichels, 2014, pg. 124).

3.2.2 BUILDING ANALYSIS

3.2.2.1 EDUCATION

Selldorf Architects (n.d.) state that the facility is organised according to functionality, creating distinct circulation systems that separates visitors to the center from its operations, however the facility was also designed with the intent of allowing visitors to view the recycling process first hand from a viewing platform within the facility. Krichels (2014) explains that the facility makes use of several courtyards and hierarchical volumes to give the space an urban walkable scale, ensuring that the building no longer resembles a large warehouse for storage and waste processing. As previously mentioned, the facility was designed to serve the neighbourhood and this was achieved with the inclusion of an Administrative and Education Center, connected to the processing facility viewing platform via the use of a pedestrian bridge as seen below in Figure 16.



Figure 16 showing pedestrian bridge connecting Educational Center to Recycling Facility. Source: Selldorf Architects (n.d.)

Located to the North, the facility is meant to be open to the public and the Educational center offers numerous programs for students and the public, with the inclusion of classrooms, exhibitions and interactive displays. The center is flanked by neatly landscaped grounds and bios-wales designed to remove silt and pollution from surface run off water, all giving occupants access to the waterfront. Large windows in the center and a large second floor terrace give sweeping panoramic views of the Manhattan Skyline and fleeting glimpses of the Statue of Liberty as well as views of the rest of the facility (Krichels, 2014). People visiting and using the site can arrive by car, bike or foot through access that is separate from the facilities truck and rail deliveries of recycled waste. According to Selldorf (cited in Krichels, 2014) when places that are meant to serve city infrastructure are given more humane consideration, it changes the spirit of that city.

3.2.2.2 OPERATIONAL FACILITIES

Selldorf Architects (n.d.) explain that the use of pre-engineered construction meant that one of the challenges that needed to be overcome was articulating the building in a way that would distinguish the facility from ordinary big box warehouse construction. In order to do this, structural elements were inverted and exposed on the building exterior, giving steel structural members a real visual impact. In terms of the facilities operational arrangement, aside from the educational facility it was designed around a Tipping building where recycled materials arrived by barge which is connected to a Processing and Bale Storage facility where the recycled materials are sorted and processed. The arrangement as seen in figure 17 below, was designed to make the process as fluid as possible. According to Krichels (2014) the majority of recyclable materials arrive by barge at the Tipping building from where it is moved to a sorting and processing plant. After being sorted the recycled materials are stored in a bale warehouse from where they are shipped out by truck or freight rail.

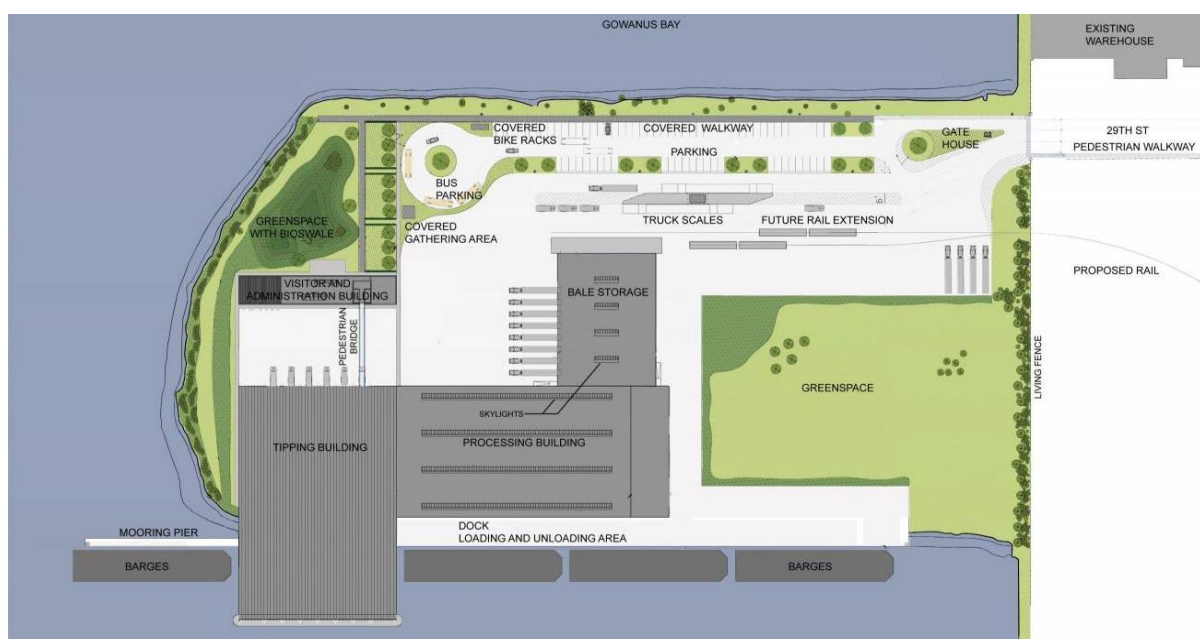


Figure 17 showing master plan arrangement of Sunset Park Material Recovery Facility. Source: Selldorf Architects (n.d.)

3.2.2.3 SUSTAINABLE FEATURES

Selldorf Architects (n.d.) explain that the facility not only makes a major environmental contribution by processing recyclables but also by recycled materials throughout the building. Site fill use on site is composed of recycled glass, asphalt and reclaimed rock from the Second Avenue subway station construction. The building is constructed from large quantities of recycled steel and various plazas located around the site make use of recycled glass. Other sustainable features included in the design according to Krichels (2014) includes previously mentioned bio swales for better storm water management, as well as New York City's largest photovoltaic array to date and a new wind turbine that produces twenty-five percent of the plants power. As seen in Figure 27 the facility was also designed by Parks Department landscape designer Mark Vaccaro with numerous greenspaces located around the site, the largest of which was earmarked for future expansion on the site. The use of a sloped roof on the Tipping building meant that there was efficient use of daylighting in the space with various clerestories and skylights allowing a consistent stream of sunlight into the work space and adjacent storage sheds as seen in figures 18 and 19 below.

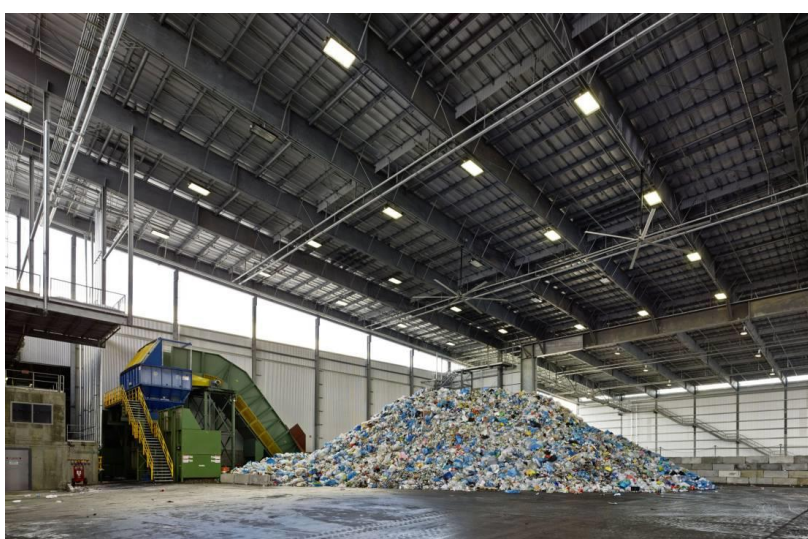


Figure 18 and Figure 19 showing clerestory lighting in work spaces. Source: Selldorf Architects (n.d.)

3.2.3 CONCLUSION

Sunset Park Material Recovery Facility presents many unique ways of dealing with urban waste recycling centers by efficiently incorporating the complex operations of the recycling process as well as providing for the community through education and awareness whilst also implementing sustainable practices throughout the building. The building is inexpensive and simple whilst its details add complexity to the whole, breaking down each large mass in subtle ways that in turn add to the human scale. Each space is uses carefully considered simplicity to enhance the human experience, subtly turning noisy spaces into places of learning and reflection in “a building where nothing is wasted” (Krichels, 2014, pg. 126).

3.3 PRECEDENT TWO: CALIFORNIA ACADEMY OF SCIENCES

Location: San Francisco (California)

Architects: Renzo Piano Building Workshop



Figure 20 showing California Academy of Sciences. Source: Renzo Piano Building Workshop (n.d.)

3.3.1 INTRODUCTION

The California Academy of Sciences is a long-standing institution founded in 1853 and is one of the few academic institutions that combines both public participation and scientific research in the same location. According to Renzo Piano Building Workshop (n.d) the design of this building needed to compliment the great cultural and scientific significance of the institution whilst acknowledging a city which already had a strong collective standpoint on the environment. Built to replace the eleven existing buildings that occupied Golden Gate Park, the academy strives to educate all that visit whilst employing many sustainable practices that represent the environmental vision of the institution.

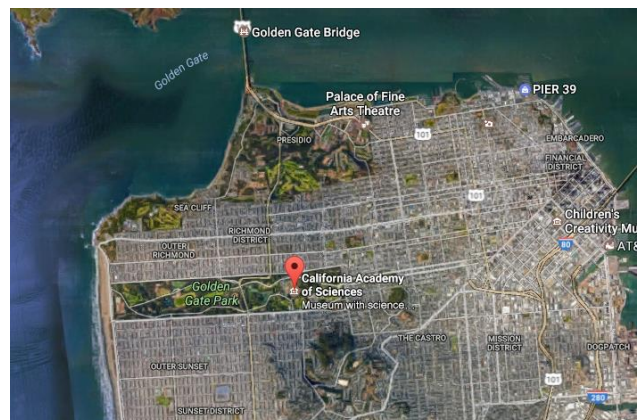


Figure 21 showing California Academy of Sciences.
Source Google Earth (2017)

“Through the evocative spaces of the Museum of Natural History, the large green roof that breathes and the successful coexistence of outreach activities and research, the new headquarters of the California Academy of Sciences wanted, using architecture, to convey their passion for knowledge of nature and the fact that the earth is fragile.”

(Renzo Piano Building Workshop, n.d, pg. 1)

3.3.2 BUILDING ANALYSIS

3.3.2.1 EDUCATION

The eleven original buildings that existed on the site were grouped around a central courtyard and this arrangement has been retained in the new academy building. Renzo Piano Building Workshop (n.d) arranged all functions around the central courtyard to create a very open entrance lobby and important centre around which all the academies collections revolve, this central point covered by a concave glass canopy that allows light into the space, keeping it open to the sky above as seen in figure 22 below.

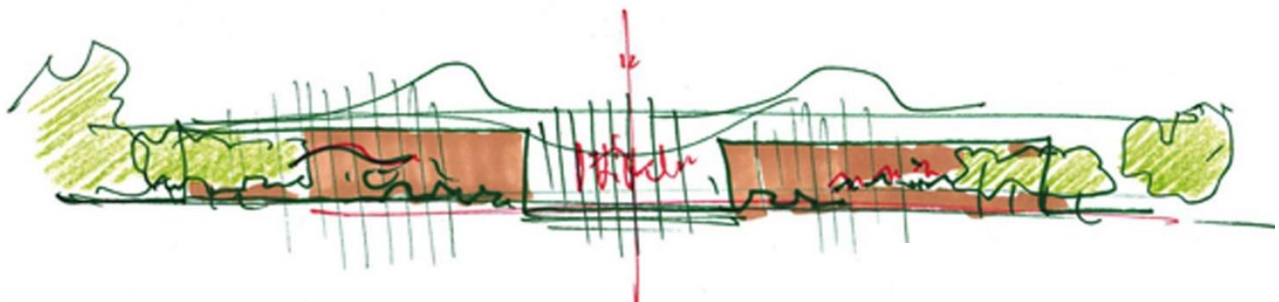


Figure 22 showing California Academy of Sciences. Source: Renzo Piano Building Workshop (n.d.)

The academy combines exhibition spaces, educational facilities, conservation and research labs as well as a natural history museum, aquarium and planetarium all under one single roof space, creating a fluid learning process that all can easily enjoy. This devotion to environmental awareness in terms of functionality is further emphasized in the building design itself as its choice of materials, recycling, the design of spaces with respect to natural lighting and ventilation, water usage and rainwater recovery and storage as well as energy reduction, are all integral parts of the project, becoming physical manifestations of the environmental concerns the building strives to educate users on. (Renzo Piano Building Workshop, n.d) As seen in figures 23, 24 and 25 below, the spaces throughout the building were designed to engage users in the best way possible, with multiple viewing platforms and pathways and natural lighting illuminating the exhibitions throughout.



Figure 23 showing exhibition. Source: Renzo Piano Building Workshop (n.d.)



Figure 24 showing platform. Source: Renzo Piano Building Workshop (n.d.)

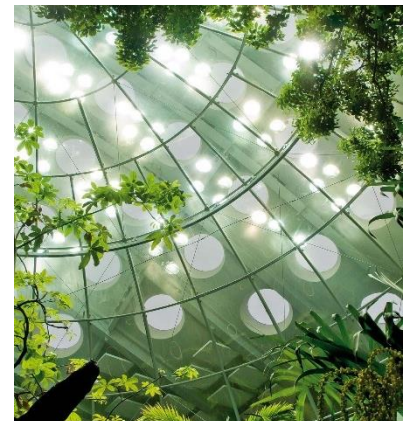


Figure 25 showing skylights. Source: Renzo Piano Building Workshop (n.d.)

3.3.2.2 SUSTAINABLE FEATURES

According to XIA International (2009) there were numerous environmental strategies employed to preserve the natural ecology of the Golden Gate Park in California such as water conservation, reduction in pollution and the use of natural light and ventilation. The result is a museum that manages to embody the core elements found in nature, becoming an exhibition in itself and an educational tool.

The building is drawn together under one key element known as the undulating 'living roof' which according to Renzo Piano Building Workshop (n.d) is covered by approximately 1.7 million plants native to California. The plants are planted in unique biodegradable coconut-fibre containers and due to the undulating nature of the roof, occupy a diversity of exposures to the elements and varied biological interactions. As seen in figure 26 below, the living roof is predominantly flat at its perimeter and undulates naturally much like a landscape as it moves away from the edge towards the center, forming a series of hills that cover several domes contained within the building.

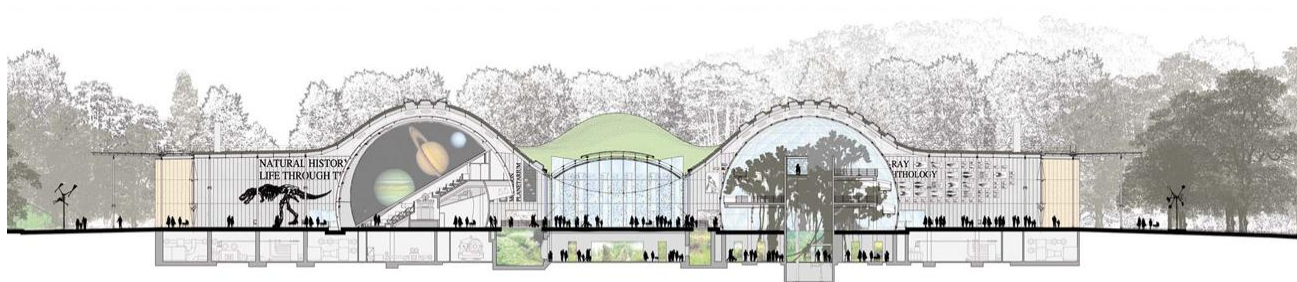


Figure 26 showing the 'living roof'. Source: Renzo Piano Building Workshop (n.d.)

XIA International (2009) states that the living roof attempts to mimic the seven hills of San Francisco in an aesthetic sense, whilst functionally its undulating roof shape helps deal with rising hot air, keeping public spaces well ventilated and cool, and thus saving huge amounts of energy. In addition to this, the roof also aids in water conservation through the use of a micro irrigation system that captures rainwater that otherwise might have flowed into the storm drains of San Francisco. In addition to water conservation, the roof is also equipped with over 60 thousand photovoltaic cells which provide both cover and modulated light for visitors, and over 220 kilowatts of energy every year. The manner in which the cells are used and their educational value with regards to renewable energy are highlighted throughout the museum.

“The energy produced by the photovoltaic cells will be highlighted and demonstrated on the publicly-accessible roof deck. In addition, tours of the building will be offered to highlight and demonstrate how the building works, the materials used and performance of conservation approaches.”

(XIA International, 2009, pg. 12)

3.3.3 CONCLUSION

The California Academy of Science has several key elements that make it the ideal precedent towards the design of an effective recycling system. Firstly, the building strives to educate its visitors and does so in a manner that best describes a museum. In this instance parallels can be drawn with Maropeng Visitor's center in the way that it uses a multitude of displays and galleries to educate those that are passing through. The building is also unique in the way that it combines learning and research with public use, performing scholarly activities in conjunction with public access, making it an open learning experience that all can enjoy with absolute ease and freedom.

Secondly, the building becomes an icon for sustainable design and the preservation of the environment around it. It uses multiple strategies including the use of the incredibly unique 'living roof' which becomes a home for an abundance of local plant life whilst also helping with the effective cooling of the spaces below it. It reduces water and energy consumption by collecting water on the roof and reusing it throughout the building whilst putting in place photovoltaic cells to generate energy. Additionally, the building makes use of much of the materials gathered during the demolition of the existing buildings that once housed the Academy of Sciences. In conclusion the iconic nature of the building in relation to its surrounding context and the message it attempts to deliver to the world, is very effective in educating the general public as well as those that study at the Academy.

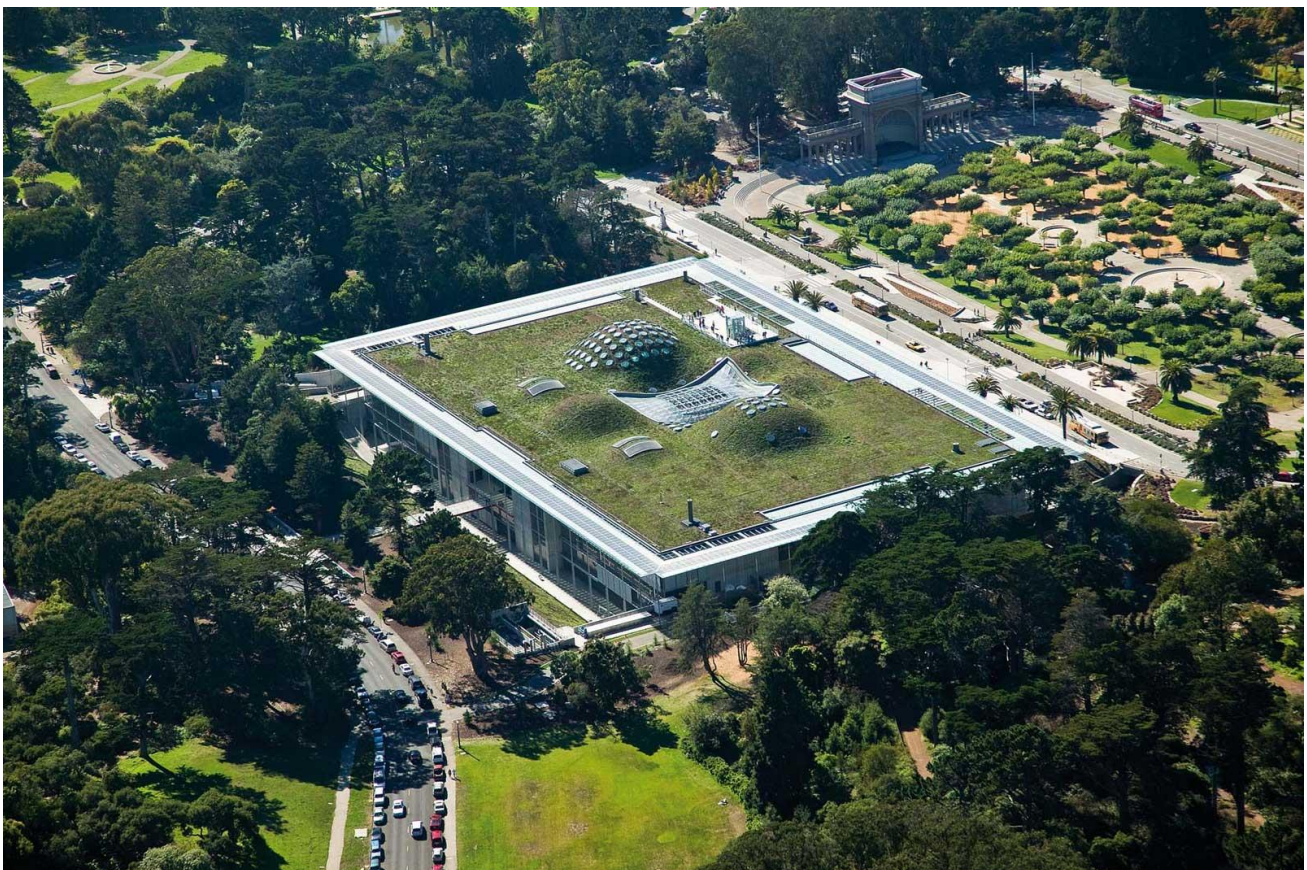


Figure 27 showing the 'living roof'. Source: Renzo Piano Building Workshop (n.d.)

CHAPTER FOUR: CASE STUDIES

4.1 INTRODUCTION

The chosen case studies aim to address the various issues identified in the theoretical framework previously outlined. The first case study focuses on Warwick Junction and the informal practices that dominate the area. This case study relates to the small incremental values of informality identified by the theory of small change and the practice of emergence. As a foil to informality, the second case study of Maropeng Visitors Center, aims to reimagine waste as an issue that deserves the same attention reserved for art found in prestigious galleries. When identifying the issues facing waste management the block leader approach was seen as an approach that can positively affect the manner in which recycling is undertaken. If one was to think about this idea in architectural terms, the use of an iconic building that serves as an architectural 'block leader' can go a long way towards reimagining waste as an opportunity and not a problem, educating and informing the public on relative issues facing our cities today.

4.2 CASE STUDY ONE: WARWICK JUNCTION

4.2.1 MOTIVATION

In recent times Warwick, has become the beating heart of Durban and at the core of this are its people. Doxiadis (1966) argues that one of the most important elements that makes up the city is the society as an extension of man himself. In the case of Warwick, one witnesses a society of people reinterpreting and adapting to the spatial limitations placed upon them daily



Figure 28 showing Warwick Junction. Source Google Earth (2017)



Figure 29 showing Warwick Junction. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

4.2.2 ANALYSIS OF WARWICK JUNCTION

The first group of traders that have taken ownership of their space are those that work in the traditional medicine market. According to Dobson (2009) the market presently contains over seven hundred traders whose goods comprise of huge varieties and combinations of roots, dried plants, bulbs and bark. The bridge market is 'the equivalent of a modern pharmacy' (Dobson, Skinner, et al; 2009, p 29). What makes this market so remarkable however, is the site it has been located on. Traditional healers have only truly found a stable foothold within the city in the last 10 years. Dobson (2009) observes the earlier experiences of a traditional healers in Warwick as being oppressed and fraught with danger. Before 1994, police would often harass the local healers and a lack of storage and adequate trading kiosks meant that their goods were often damaged or stolen. In 1997 the muthi market was built allowing for the healers to take ownership of the space they worked in. The site of the market is located on an unused flyover, a remnant of the modernised city of Durban. Dobson (2009) explains that because the infrastructure was already in place and unutilized, the construction and design process was seamless. The traders easily adapted to the new space provided to them and the market connected the early morning market to brook street market it allowing for a great number of pedestrian traffic to pass through. This is an example of how a previous system designed solely for the movement of vehicles from point to another could be deconstructed and reinterpreted for the traditional healers of Warwick. Apart from the spatial re arranging of the space we can also observe a metaphorical deconstruction of the previous apartheid regime who 'long denounced and repressed' the traditional practices of healers in the heart of the city. These healers have now formed a spiritual center in the city of Durban. Perhaps the most striking element of the muthi market is the manner in which one moves through the space to get from one point to the next. The market is a thoroughfare that guides you along a unique journey, exposing you to sights and smells both delight and assault the senses.

In the clay wholesalers market, we also see the unique way traders have adapted the spaces they occupy. Dobson (2009) describes the site as being away from the main concourse of Brook street market and hidden below the bridges and fly overs that have come to define Warwick's character. The traders here are all women and each woman "mines, prepares and sells the balls of red or white clay" that are used in "traditional practices to spread onto the face or parts of the body, or to be eaten" (Dobson, Skinner, et al; 2009, pg. 37). According to Dobson (2009) most of the clay traders live two hours away from Durban in rural Ndwedwe where they mine the clay. This has forced them to take up residence in the city for a week at a time as they sell their goods. Gates have recently been put in place on either side of the market so that the women who reside there are safe from any unwanted intruders at night. This market place could be seen an example of the literary dystopia described by HG Wells, an 'underworld in the bowels of the earth where people live permanently underground'

(Doxiadis, 1966, p 32). However, the traders of the market have reinterpreted the physical limitations of the flyovers above, transforming the space below into both a market place for their goods but also as a safe sheltered space within which they can live. In a very similar fashion to that of the muthi market, this market functions as a unique thoroughfare from Brooke street market to the bead sellers' market and waste recycling center.



Figure 30 showing mixed trading strip Warwick Junction. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

Moving on from the more static traders of clay and muthi is found the very kinetic and dynamic trading movements of the mixed trade strip seen in figure 30 above, cardboard collectors and the porters that serve every market in Warwick. The mixed traders according to Dobson (2009), sell a huge variety of goods that range from cigarettes to small snacks as well as 'hand lotions, music, crockery, small hardware items and even rat poison'. (Dobson, Skinner, et al; 2009, p 17) These traders fill every space available to them on the street edge depending on what kind of permits they have been given by local government. The street edge becomes a vibrant and chaotic space and is the perfect example of Hernandez's (2012) kinetic and dynamic informal city. The items sold on the pavements shift as the day wears on and pedestrian needs shift. In the morning items are geared towards the 'people going to work who may want to pick up something on the way – a cigarette or a packet of chips' (Dobson, Skinner, et al; 2009, p 17) By the middle of the day the stalls aim to attract people looking for specific items such as music and hardware. Towards the end of the day the emphasis has shifted once more 'to attract customers needing something to buy for the evening meal or other immediate household needs' (Dobson, Skinner, et al; 2009, p 17). This constant shift shows the way in which the street traders of Warwick utilize the street edge as a market space. The pavements primary

function is that of a walkway, but in this instance its function was reinterpreted so that it serves multiple uses, adapting to different times of the day.

In amongst this new street paradigm created is found another informal group that adds to the dynamic quality of Warwick. Weaving in between cars, trading stores and pedestrians are the largely unnoticed waste pickers and porters of the area. Waste pickers go about their day collecting odds and ends to be sold at the local waste collection facility and are forced to confront and overcome challenges daily. According to Mkhize (2014) the average waste picker reported a monthly turnover of approximately R 1,500, selling a wide variety of materials with men collecting the majority of metals and women dominating the collection of cardboard, paper, plastics and glass. In many instances it is also common to find waste pickers adding value to the materials they collect by making things such as cupboards, toys and furniture, epitomising the inherent adaptive spirit of informal grassroots movements. Mkhize (2014) goes on to list the many problems dealt with by waste pickers of Warwick. One of the current major issues is that waste pickers access to waste has been severely reduced by restrictions imposed by the municipality and large corporations. Other issues cited was the ease of access to previously mentioned buy back centers whereby waste pickers were having to travel far distances to buy back centers, making it incredibly difficult to be effective in reselling collected materials. In addition to this, the current lack of infrastructural support provided for waste pickers means that they have little to no access to water and sanitation, a severe lack in storage space for trolleys and collected materials, a shortage of adequate tools required such as trolleys, bundling equipment, protective gloves and more. A lack of accommodation and medical aid was also cited as a serious cause for concern. Due to the informal nature of waste picking, coupled with many lacking work permits, harassment by police and authorities has also become a problem, however many intermediary waste pickers organizations and associations have come to ease these grievances, smoothing the process considerably.

In addition to waste pickers, according to Dobson (2009), porters form another very mobile informal network within Warwick. Used by customers, street traders as well as wholesalers to transport goods to and from different locations around Warwick, porters fill the streets and markets of Warwick forming a dense network of mobile porters carrying items all throughout the day, further diversifying the spatial experiences of the area. There are two different groups of porters in Warwick. The first group makes use of the lightweight shopping trolley, to transport lighter loads in quick time. The second group is 'barrow operators who work with much heavier loads' (Dobson, Skinner, et al; 2009, pg. 23,). These porters also provide an additional service that is quite remarkable. Storage is a big issue in Warwick as many traders are unable to take their goods home. Porters have reinterpreted the idea of storage as a static built form and constructed their own version. According to Dobson (2009) at night one will often find porters sleeping huddled together in a circle around their 'heavily laden trolleys', forming a mobile human storage facility.

4.2.3 OBSERVING WASTE IN WARWICK



Figure 31 showing Informal Waste Pickers. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)



Figure 32 showing Brook Street Buy Back Center. Source: Dobson, R, Skinner, C, and Nicholson, J (2009)

When walking through Warwick litter and waste is evident throughout and it is in this environment that one quickly comes to grips with the abundance of opportunities available to the informal waste picker. Figure 31 to the left shows the cardboard bales that waste pickers carry around when collecting cardboard and paper in Warwick. These informal self-employed members of society play a huge part in keeping the busy markets of Warwick clean, going about their business largely unnoticed during the day

Figure 32 shows Brook Street buy back center located in Warwick Junction. The center is located away from the constant activity of Warwick, tucked away from the site of most who live and work in the area. However, it provides employment for vast numbers of informal pickers as well as aiding in the constant day to day clean-up project of Durban's CBD and Warwick. The center has no toilets, electricity and water and an informal structure used as a site office.

4.4 CONCLUSION

This case study of Warwick highlights the importance of the informal economy and informal methods of self-upliftment that play a crucial part in redefining the wellbeing of a previously marginalised community. It is this adaptation and reuse of resources in all walks of life that can be used to inform a building design that uses grassroots movements and thought processes that stem from people's experiences on the ground. It must be noted however that recycling efforts do not receive enough attention and the current waste buy back center is inefficient with not enough emphasis placed on waste picking and the importance of recycling in the informal economy.

4.3 MAROPENG VISITORS CENTER

4.3.1 MOTIVATION

The process of reimagining recycling requires a unique approach to the design process. Recycling has often been associated with a mundane action, with litter and waste viewed as a nuisance and a blight on our urban environments. The ultimate goal will be to change the public's perceptions of recycling, the informal economy and the waste pickers of Durban. In order to do this the building must 'display' and 'portray' recycling as an opportunity as opposed to a problem. Environmental and social preservation is at the core of this ideal and thus, a museum-like setting employed in Maropeng Visitors Center informs this notion.

4.3.2 ANALYSIS OF MAROPENG VISITORS CENTER

Set in the rolling plains of the north-west Highveld, Maropeng visitors center is located just 50 kilometres from Johannesburg in the cradle of human kind. According to Lighting and Design (2006) the cradle of human kind encompasses an area of around 47 000 hectares and is home to three million years of human history and evolution. The area is the sole custodian of many key fossil sites that have yielded the remains of numerous species of plant species, animal species and in particular hominids: the earliest forms of man. In 1999 the area was declared a world heritage site as acknowledgement of the site's unique historical significance (Lighting and Design, 2006).



Figure 33 showing Maropeng Visitors Center. Source: Author

Upon approach of Maropeng, one is greeted with a large artificial mound looming in the distance. The building is referred to as the Tumulus and houses various conference centers, offices and a restaurant. The building is designed to represent a burial mound “covered on one side in earth and grass and rises like a ziggurat from the undulating hills.” (Bremmer, 2006, pg. 14) On the other side of the ‘mound’, the building evolves into a modern form composed of glass and concrete, offering balconies and striking views. Bremmer (2006) states that the building was designed to convey a spiritual sense of ancient sacredness that is reminiscent of the earliest civilisations, all in an attempt to emphasise the areas deep historical roots. The approach to the building echoes the spiritual journey present in ancient temple architecture as the approach comes from below the Tumulus on an axial path. The path undulates up and down past curio shops and various food establishments, culminating in the awe inspiring mound of earth (Bremmer, 2006).

The real magic of Maropeng occurs as one explores the building further. Common themes within the building are elements of discovery and illusion whereby as one moves through, different spaces bring about surprise. The center starts off above ground with the Tumulus but in fact most of the gallery spaces are built below ground, unable to be seen from any point around the center (Digest of South African Architecture, 2006). Bremmer (2006) describes the entrance Tumulus as a surprising exposure to an enormous bright cavern with falling water brought about by a large fountain and light well in the center of the enormous vertical space. The contrast between the harsh rugged highveld outside and the soft cool interior makes the viewer feel a true sense of arrival.

“a total divorce from interior from exterior, the hot dusty highveld air is displaced by a wall of wet humidity, the silence of the exterior by the deafening roar of the interior, and the vast horizontality of the exterior landscape by a vertical shift”

(Bremmer, 2006, pg. 15)

The stark contrast seen in the building entrance is continued as one journeys along the museum route. The brightly lit interior is then plunged into darkness as narrow curving corridors guide visitors to underground gallery spaces that are uniquely lit in a clear attempt to reinforce the spiritual significance of the site. Throughout the building one is constantly exposed to a sensory experience like no other, immersing visitors in touching, hearing, seeing and feeling the history of humankind. (Bremmer, 2006) In conclusion Maropeng is able to combine the spiritual center of Africa with the new modernity of contemporary African. The center is successful in transforming “the humble story of human origins into a spectacular tableau that conveys a new sense of pride and assertiveness by Africans in themselves.” (Bremmer, pg. 15, 2006)

4.3.3 OBSERVING THE JOURNEY THROUGH MAROPENG



Figure 34 showing Tumulus Mound Entrance. Source: Author

Figure 34 shows the Tumulus mound set against the horizontal backdrop of the grassy plains of the highveld. As one approaches the building the sheer scale of the mound is immediately noticeable that symbolises its importance as well as the contrast in style between the ancient burial mound covered in grass and the contemporary building defined by concrete, glass and steel. Significantly, this is just one small part of the structure.



Figure 35 showing curved route underground. Source: Author

Upon entering Maropeng one is greeted by an immense open vertical volume that truly speaks of arrival. It is then that your journey through time and space truly begins as the route then winds slow down underground, using soft ambient lighting to illuminate the route as figure 35 shows. The gentle curve of the route plays an important role in revealing what is in front and concealing what is behind and the constricted space adds to the experience



Figure 36 showing lighting effects. Source: Author

Figure 36 highlights the very effective use of intricate lighting effects in conjunction with materiality. Concrete walls are raw and textured, meant to enhance the notion of being underground and the use of ambient lighting throughout highlights the texture of materials. Contrast between light and dark emphasise important elements in the center, adding a degree of spatial hierarchy to the arrangement.



Figure 37 showing gallery spaces. Source: Author



Figure 38 showing open gallery. Source: Author



Figure 39 showing exit of visitor's center. Source: Author

In figure 37 and figure 38 is seen examples of gallery spaces. The scale of space is important as they are not too large as to overwhelm the viewer and small enough to constantly urge the viewer to engage with the various exhibits on display. Crucially the gallery spaces are well lit and very interactive, adding to the high levels of engagement and interest generated. Upon exiting the center at the end of the route, one finally discovers the extent of their journey culminating in figure 39 which shows a sculpted figure extending out of the earth.

4.4 CONCLUSION

There are several elements observed in the Maropeng Visitors Center that can be used to inform the design of a unique building typology involving waste management and recycling. Of particular interest is the use of routes throughout the building to reveal important gallery spaces and displays. The journey through the building combined with the unique use of lighting ensures that each experience is memorable and curved forms generate a constant flow from one space to the next. Most importantly, the iconic nature of the building generates a feeling of arrival in the context of a place that is hugely important in the history of humankind and will be a key element in the design of a waste recycling building that is iconic and able to redefine the importance of waste and recycling.

CHAPTER FIVE: CBD SURVEY AND DATA ANALYSIS

5.1 INTRODUCTION

All data collected in this study was taken from two streets, namely Dr Pixley Kaseme Street (West Street) and Anton Lembede Street (Smith Street) to explore how workers and residents of Durban's CBD viewed waste management and by extension recycling. There were 10 participants in this study, each selected randomly, with 5 participants from each street. Participants selected represented a variety of individuals from different walks of life, whether they worked, lived or were merely passing through the CBD and participants selected were of varied ethnicity, age and gender to get a fair distribution of results that best represented the area. Across the study as seen in Table 2 and 3 below, 7 women and 3 men were interviewed. Across the study, it must also be noted that many potential participants declined to be interviewed, making the task of collecting data slightly more challenging.

Dr Pixley Kaseme Street (West Street)	
Total Participants	5
Demographic Arrangements	
Female (1 White Woman, 1 Indian Woman, 2 African Women)	4
Male (1 Indian Man)	1

Table 2 showing demographic arrangements of participants in Dr Pixley Kaseme Street

Anton Lembede Street (Smith Street)	
Total Participants	5
Demographic Arrangements	
Female (1 White Woman, 2 African Women)	3
Male (1 Indian Man, 1 African Man)	2

Table 3 showing demographic arrangements of participants in Anton Lembede Street

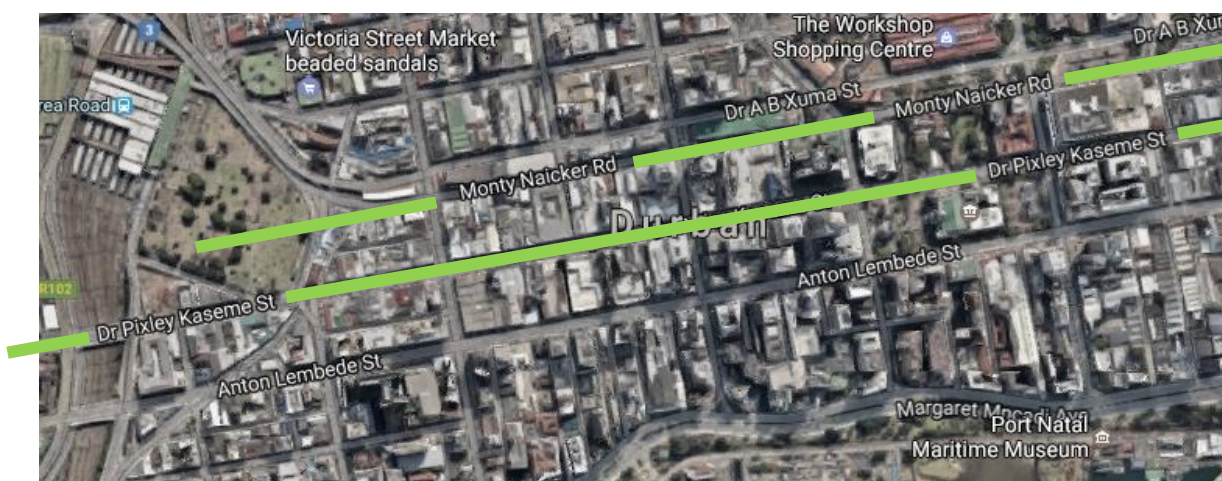


Figure 40 showing locations of Anton Lembede Street and Dr Pixley Kaseme Street Source: Google Earth (2017)

5.2 SURVEY OUTCOMES

5.2.1 WASTE AND SAFETY

A common theme found throughout the study was the general consensus about the importance of clean streets with 7 out of ten participants of the opinion that clean streets and safety were closely linked and that if streets were kept clean it was likely that individuals would feel safer in that space. This outcome clearly supports the notion that litter free streets can give the perception of safety and thus will aid in reducing crime and other disorderly behaviour. As an extension to this, in an area where the ethnic groups using the space are dominated by one ethnicity in particular, it can be assumed that if the perceived safety of a street was better, it might encourage other ethnic groups to visit these areas in an environment they feel far more comfortable in.

5.2.2 MUNICIPAL WASTE MANAGEMENT

On the theme of whether participants felt that the municipality did enough to provide bins and clean the streets under their care there was a clear difference of opinions with half the participants of the opinion that the municipality did not provide enough bins, and the other half of the opinion that there were enough bins and that the municipality did do a reasonably good job of cleaning their streets. This difference of opinions may point towards a certain amount of apathy towards the job the municipality does and in some cases a general belief that the municipality does not do enough. One participant made mention of the current practices whereby municipal workers were sometimes at work till three in the morning cleaning the streets, highlighting an apparent inefficiency in the collection of waste in the CBD. 7 out of 10 participants highlighted paper and cardboard as the most prominent waste material in the CBD whilst 3 participants also identified plastic as the most common material.



Figure 41 and 42 showing urban setting of practical research location. Source: Author

5.2.3 THE INFORMAL WASTE PICKING COMMUNITY

In many cases the subject of informal waste pickers was met with much confusion. 4 participants were simply unaware of the existence of this trade with 3 participants believing that these members of society did not truly contribute to its wellbeing. This also supports the notion that the informal sector does not receive the support it needs to be taken seriously as an income generator and an opportunity for job growth and in many cases is seen as a nuisance to society. It also highlights the critical part education needs to play to remove the stigma attached to waste picking and the informal sector, educating people on the essential role these marginalised communities play in society.

5.2.4 RECYCLING

When presented with questions regarding recycling it was clear that many participants knew little to nothing about the concept and those that did, did not participate in recycling. These examples point towards an apparent lack of education and awareness of the importance of recycling. When queried about whether or not they believed they had the right tools to recycle or whether or not they believed it was easy to recycle, many answered no and this shows clear evidence of a lack of support that is so vital in encouraging this much needed act.

5.2.4 THE BENEFITS OF RECYCLING

Most participants stated that if their community benefited economically from recycling or they themselves benefitted they would actively begin to participate in the act. They also believed that if done successfully it could be a possible catalyst in helping to bring about unity within communities.



Figure 43 and 44 showing urban setting of practical research location. Source: Author

5.3 CONCLUDING REMARKS

There are several key points that can be taken from the studies conducted in Durban's CBD:

- Cleaner streets can help make a community feel safer by contributing to a more positive perception of an area, as well as providing an abundance of opportunities to unify a community both through economic capital and social capital.
- Current municipal waste management strategies do not put enough emphasis on the act of recycling, with clean-up methods leaning towards a more reactive approach that merely attempts to clean up the streets after dark as opposed to a proactive approach that seeks to use recycling as a preventative measure that reduces the need for constant municipal intervention.
- Education and awareness on the importance of recycling and caring for one's environment has been neglected and many urban residents have little to no knowledge on the subject.
- Recycling is often driven by convenience and incentive. If recycling was made easier and more readily available to the public, as well as providing visible benefits and incentives, it would become a civil act that many would actively participate in.
- From an architectural standpoint, the relatively apathetic and ignorant stance on recycling that was observed during the study might be put down to construction in the modern consumerist era. The creation of new is preferred to the preservation and reuse of the old, and the architecture of the present often reflects this attitude. Thus any building typology associated with recycling needs to incorporate many sustainable features that speak of reuse, leading by example for those that pass through the building on a daily basis.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 RESEARCH CONCLUSIONS

6.1.1 EXPLORING THE URBAN WASTE PARADIGM

The overall premise of this dissertation is founded on the idea that there are numerous small problems found in modern cities that have big impacts on the environmental and social quality of urban life. It can be seen that these small problems must in fact be seen as big problems, problems that require drastic and immediate attention. The theories of 'broken windows' and 'small change' as outlined in the theoretical framework, give credence to how one small broken street pole left unrepaired, can in fact lead to more broken street poles, a dark street and finally more crime. If one was to replace the broken street pole with uncollected waste, it can be seen that a street consistently filled with litter will ultimately be perceived as a bad space, and one within which crime can flourish.

This underpins the theory on how waste eradication can have a big impact on urban communities and the perceived safety of these spaces. Aside from crime prevention there is an abundance of advantages that accompany waste eradication, most notable amongst them being job opportunities and a greater emphasis on sustainable urban life. In terms of job opportunities, the research points towards the informal economy of many countries worldwide, an economy where waste becomes the lifeblood of many poor families. The rise of waste picking cooperatives has meant that the waste picking trade has steadily become a credible form of entrepreneurship that serves not only the families of each picker, but also the communities around them and in many instances the municipalities usually tasked with eradicating waste. In terms of sustainable living it is clear across the board that recycling is currently the spearhead of many efforts to reduce waste, create jobs and improve urban settings.

6.1.2 CHANGING PERCEPTIONS

In order to change perceptions of recycling it is essential that one identifies the reasons behind why recycling is an activity that has very little to no influence on societies, particularly in poorer countries. Some of the main reasons point towards habitual behaviours whereby if recycling was not done in the past, it is unlikely that person will do it going forwards into the future. The other important reason is a lack of incentive and issues around convenience. In areas where recycling either does not reward people or provide adequate ways of easily recycling goods, it is highly unlikely that these people will recycle. Other reasons behind underachievement with regards to recycling also points towards a clear lack of understanding, knowledge and awareness around the subject. Data collected in Durban's CBD shows the lack of education surrounding recycling, and in this case if one has no knowledge on recycling it is highly unlikely that will engage in the act. Currently it is important to note that there is distinct lack of incentive that hinders recycling.

The current condition of Durban's waste management plan can be seen as an incredibly reactive system. The city provides bins in urban settings such as figure 38 and 39 below as well as an abundance of landfills in outlying areas but in many ways still reject the more sustainable path laid out by recycling. The current recycling buy back system is heavily underfunded, understaffed and underutilised, with many facilities being too small and unable to keep up with increasing demand as well as lacking the necessary tools to efficiently complete the job at hand. In addition, the lack of commitment to education on the subject of sustainable conscientious living, points towards a reactive approach that is dependent on the outdated landfill system that simply cannot deal with ever increasing waste stream increases over the next century.



Figure 45 and 46 showing environment that requires innovative intervention. Source: Author

6.1.3 INNOVATION

In forming a new unique building typology there are several key aspects that can aid in fulfilling the objective of innovation by involving the everyday citizen in actively engaging in recycling, as well as redefining the image that currently accompanies recycling and waste management in South Africa's urban centers. Based on the research it can be seen that waste is currently viewed as a negative part of our urban environments, a blight on our communities that must be cleaned up and shifted out of sight and out of mind in large landfills on the outskirts of our cities. In order to innovate, waste must be reimagined as an opportunity, an object that must be recycled and reused to clean up cities, provide job opportunities and preserve the environment for future generations. Innovation can be derived from the idea of the 'Dros City', a phantom city that is unintentional, almost invisible to most and existing as a "secondary layer enmeshed in the urban fabric." (Kallipoliti, 2010, pg. 105) In present day urban ecologies, waste has become a permanent occupant, polluting streets, parks and pavements. In order to adapt and innovate, a new discourse must be driven by the need to manipulate discarded raw materials in a way that benefits communities, innovating a new building typology that helps to encourage the reuse of these materials.

6.1.4 CONFRIMING THE HYPOTHESIS

In terms of the initial hypothesis that better waste management and clean streets can lead to safer urban environments that provide job opportunities and uplift the social environment that people live in, it can be concluded that this is in fact true. However, it was initially thought that this could be achieved through a simple grassroots methodology when in fact there is a vast complex system of issues that need to be dealt with. This building cannot be a simple structure that deals with one single issue, it needs to be a building that deals with several issues with a multitude of complex functions, mostly centred around the urban poor, education and the ability to produce more job opportunities.

6.2 DESIGN RECOMMENDATIONS

From the research obtained in this dissertation there are four key elements that can contribute towards the design of an effective waste recycling facility in Durban's CBD, these being an iconic block leader, an educational facility, a building that encourages the growth of emergent informal potential with the and lastly the core processes of recycling. These elements will need to be integrated into a facility in a way that encourages a community to recycle more, teaches them about good recycling practices, and provides adequate tools that make the process of recycling easier and more effective. Listed below are the respective design elements.

6.2.1 ICONIC BLOCK LEADER

One of the success stories behind good recycling systems is the use of a block leader approach whereby in a community, one individual is assigned the role of leading the community in recycling efforts, encouraging others to recycle more and showing a good example that others can follow (Burn, 1991). In architectural terms this could be applied to an iconic building typology that attracts communities to it and in turn leads by example. As previously outlined, many buy back centers in eThekweni are understaffed, underequipped and in most cases are sites that are placed in secluded

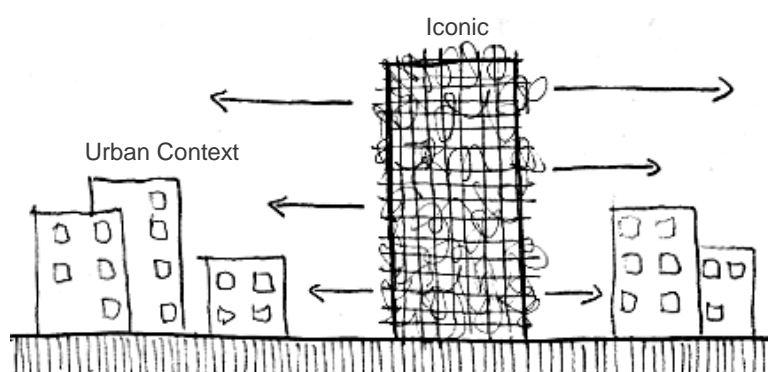


Figure 47 showing iconic block leader approach. Source: Author

areas that are not easily accessed and barely visible to the communities around them. The goal of this iconic building goes against the traditional image of an urban recycling center in developing countries, as it strives to be a clean efficient example of recycling and waste management, standing out in its urban context as seen in image 47 to the left.

6.2.1.1 SUSTAINABLE ICONICISM

The precedent of California Academy of Sciences by Renzo Piano serves as a successful example of a structure that is iconic in giving awareness to the function contained within. The building stands out in its park context, whilst also using many sustainable elements that further emphasizes its iconic nature, portraying the importance of sustainable living through the use of the built form. The building becomes a symbol for environmental awareness and conscientious living. This is an example that must be followed in the creation of a waste recycling center through the use of sustainable elements such as living roof gardens, planted facades and efficient use of daylighting throughout.

6.2.1.2 CONTEXTUAL ICONICISM

In the Maropeng Visitors Center, we see an iconic building that uses its context very effectively in creating a built form that stands out in its context whilst not overpowering its context. The use of an 'earth mound' to inform the built form is powerful in that it stands out as a large iconic structure but also blends in with the rolling grassy plains surrounding it. The building is also iconic in its use of built form under the earth. The vast majority of the center is not visible and when experienced the vastness of the structure is felt, but when viewed from the outside, the structure is not seen as overbearing or excessively large. When this is applied to an urban recycling center it is important to take note of its urban context, using its surrounding area to motivate it's form. The structure needs to be iconic whilst also containing elements of its urban context, becoming representative of the surrounding buildings and the people that make use them.

6.2.2 EDUCATION AND AWARENESS

A crucial element in changing perceptions of recycling is the use of education and awareness. The previously mentioned research and according to data collected in Durban's CBD points towards a lack of knowledge being one of the many reasons behind poor recycling behaviours. In terms of functionality this recycling center will be structured around education and awareness, constantly exposing passers-by and users of the building to the processes of recycling whilst also providing various workshops and educational facilities.

6.2.2.1 VIEWING PLATFORMS AND EDUCATIONAL CENTERS

The Sunset Park Material Recovery Facility makes use of education and awareness within its functionality as a waste recycling center. It contains a large educational center that accepts visitors wanting to learn more about recycling. As seen in figure 48 below, the facility also makes use of a connecting bridge leading from the educational center to a viewing platform that overlooks the sorting and tipping building of the facility. It is here that visitors are exposed to the process involved in

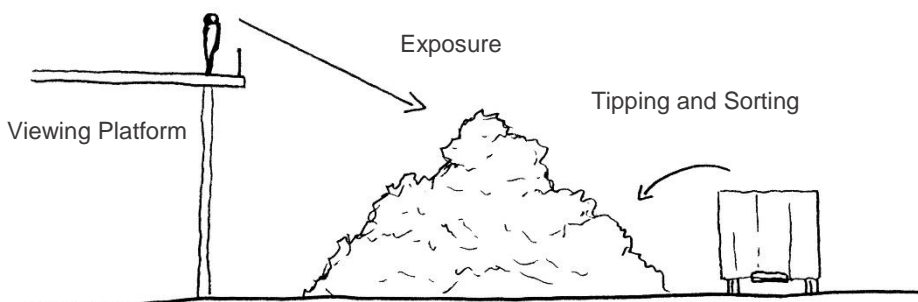


Figure 48 showing viewing platforms for education purposes. Source: Author

recycling. It is important to note here that the facility is designed in a way that it does not only resemble a standard factory setting, but in a way that is attractive to the eye, combining both functionality and aesthetics to attract more visitors to the center.

6.2.2.2 A JOURNEY THROUGH THE BUILDING

Maropeng Visitors Center makes use of the length of the building to show a journey through time starting from man's early beginnings to the present day, a journey that is very effective in educating visitors to the center as they move through each space along the route. As visitors progress through the length of the building they are exposed to different exhibitions and galleries. Seen below in figure 49 this waste recycling center will strive to be innovative in the way it is pieced together, making use of a route along the length of the building that exposes the user to the various processes of recycling, different educational workshops and various facilities that visitors can utilise.

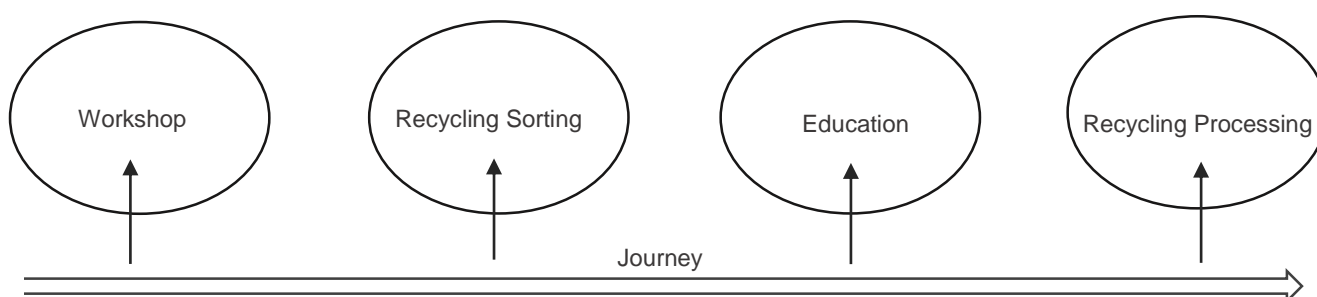


Figure 49 showing journey through the building. Source: Author

6.2.3 INFORMAL EMERGENT POTENTIAL

Durban is home to densely connected and extensive informal network that over the years has seamlessly integrated itself into the city's urban fabric and is one of the crucial elements that will need to be fully explored in the complexity contained with the waste recycling center. Informal practices are formed from the ground up as grassroots movements and thus contain an abundance of informative information that can aid communities in developing strong and intimate relationships. The strong connection to adaptation and reuse can be of huge importance within the economic and social sustainability and viability of the recycling center.

6.2.3.1 WASTE PICKERS

As seen in the Warwick Junction Case study there are numerous parts of the area that exemplify informal development and adaptation. The most important in this case being the waste pickers of Durban, informal entrepreneurs who travel the length and breadth of Durban picking up recyclable materials and reselling them to generate income for themselves and their families. Pickers form a huge part of Durban Solid Wastes efforts to clean up the streets in Durban but there are many pitfalls currently hindering their development and efficiency. Currently there is a distinct shortage of support for informal waste pickers, shortages in adequate tools pick, medical support to battle against infections acquired when picking waste, workshops to repair and adjust picking trolleys, space to store

trolleys and items they were unable to sell and lastly in many cases adequate accommodation to stay during the week. It is for these reasons that this recycling center needs to become a central safe haven for the informal pickers of Durban, providing medical facilities, workshops, storage and accommodation. These facilities need to be integrated into the building in a way that emphasises them as central to the building's functionality and its economic viability as seen below in figure 50.

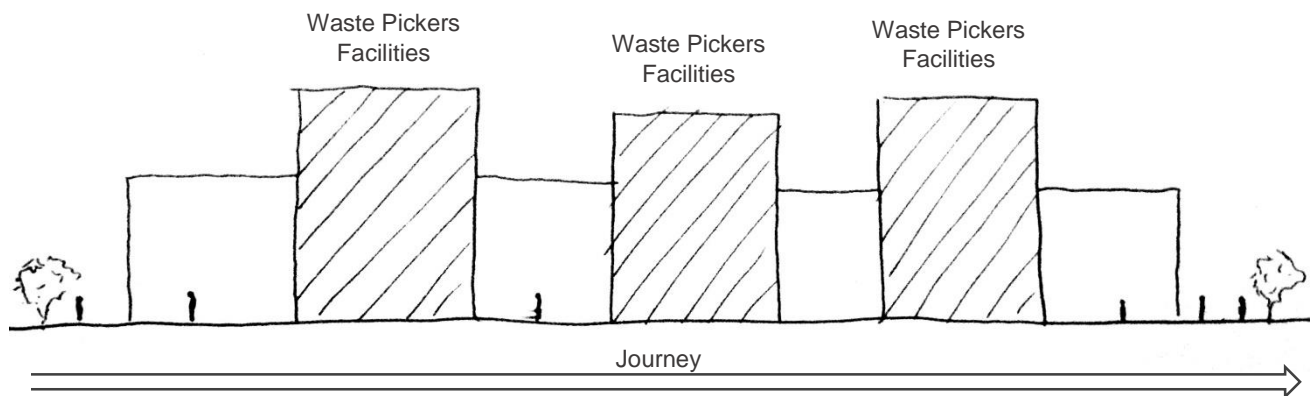


Figure 50 showing hierarchical emphasis on informal practices. Source: Author

6.2.3.2 INFORMAL PRACTICES

In addition to the informal waste picking practices of Durban they are accompanied by the other informal practices occupying the street edges of Durban's CBD and Warwick Junction. These informal practices are temporal in nature and are often in close proximity to public transport, providing social and economic capital and uplifting the area around it. These informal traders become eyes on the street, making them safer and more comfortable spaces to be in. The waste recycling center will need to be placed close to public transport systems as well as tapping into the informal trade around Durban, integrating it into the formal practices of recycling and thus creating more exposure for passers-by to the processes of recycling as seen on figure 51 below.

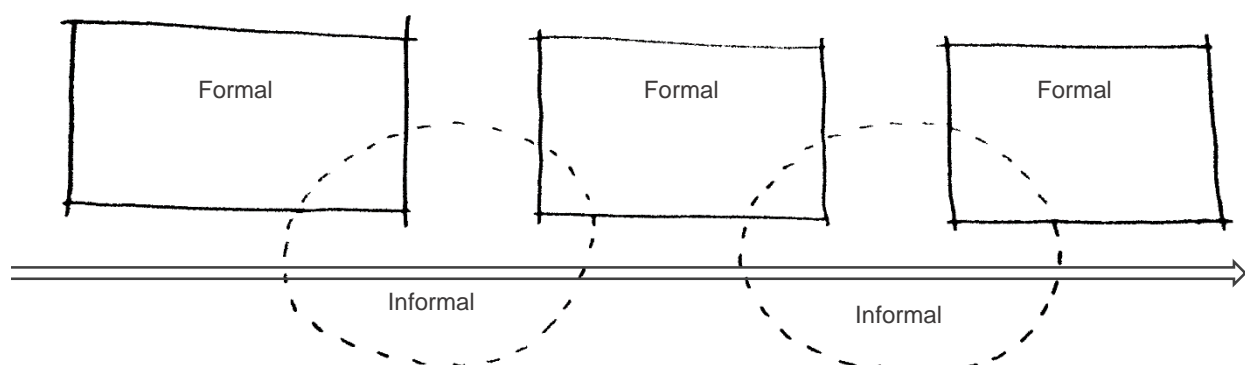


Figure 51 showing integration of formal and informal practices. Source: Author

6.2.4 THE RECYCLING PROCESS

The last aspect included is the core elements surrounding the recycling process. Durban's current waste reality places very little importance on recycling with a shortage of waste buy back centers with the existing buy back centers lacking adequate storage space and equipment. On a macro scale this dissertation aims to create a system that aids in recycling, making it an easier and more efficient process that is available to all. On a micro scale there needs to be a waste recycling center that performs the standard functions associated with waste storage and sorting.

6.2.4.1 MACRO SCALE: CREATING A SYSTEM

This design objective looks at the urban context that the building is going to be set in and the creation of a viable system. To make recycling more accessible the proposal is for the creation and implementation of more buy back centers in Durban, with Block leader recycling centers managing these centers as seen below in figure 52.

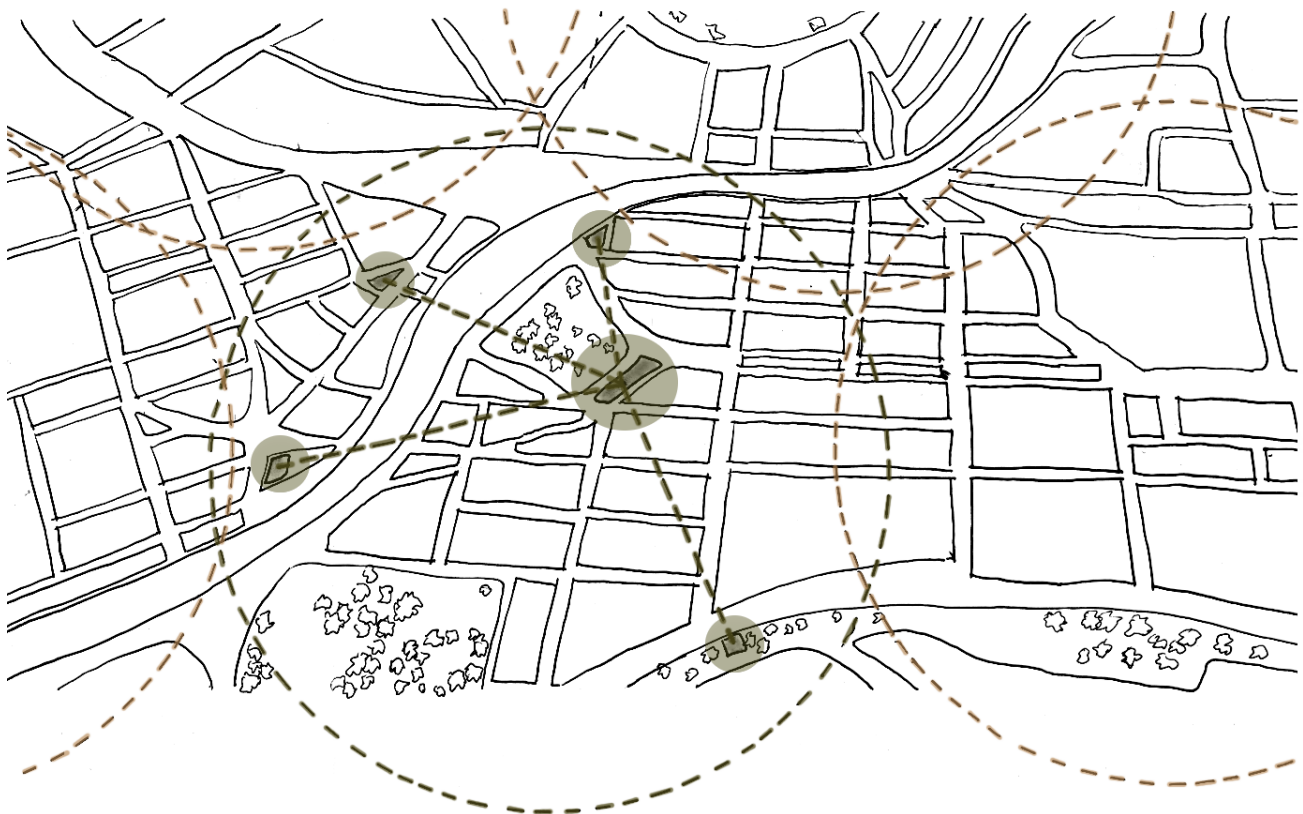


Figure 52 showing system of integrated buy back centers. Source: Author

The above figure shows the proposed districts located around Durban each with several new buy back centers to supplement the existing ones and a central waste recycling facility designed to sort, store and ship materials recovered at the respective buy back centers.

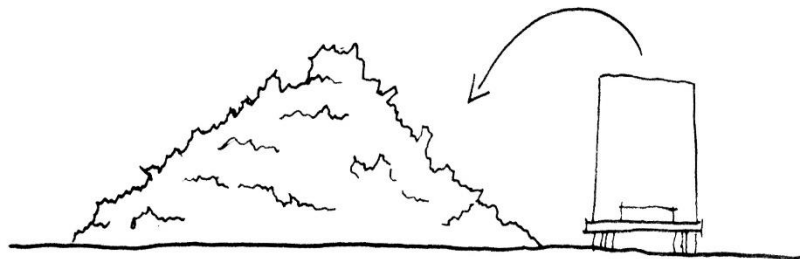
6.2.4.2 MICRO SCALE: THE RECYCLING PROCESS

The last key design element is that of the core recycling process that operates within the building. As previously mentioned the central recycling center will be managing the materials that are collected on a weekly basis by the surrounding buy back centers. With this in mind the center will be receiving trucks loaded with waste from which waste will need to be tipped, sorted, processed and then stored. As seen in the Sunset Park Material Recovery Facility waste material is delivered by barge to a tipping building where all the waste is sorted and arranged. From there it is moved to the processing and bailing building where bailing equipment bundles the various waste together so that it is easily transported. From this point on it is stored and then removed by truck or rail, delivered to industrial processing plants that can reshape the recyclable material into viable materials that can be used. Below can be seen the process to be used in the recycling center. The three main categories of materials collected will range between steel and aluminium (cans etc.), glass and cardboard paper and plastics.

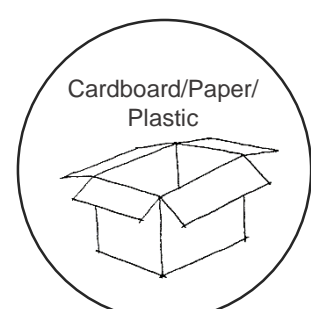
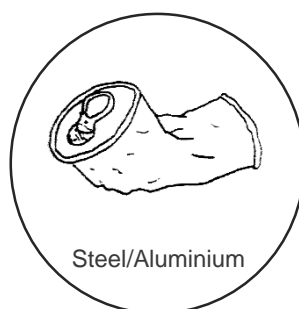
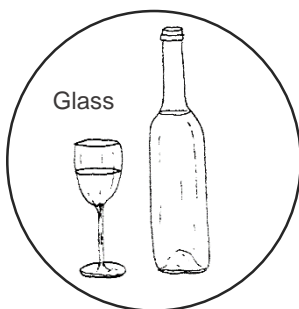
1 Buy Back Center Collection



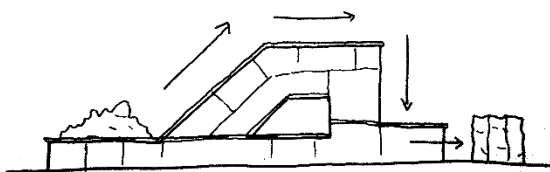
2 Delivery of recyclable waste material and tipping of materials



3 Sorting and processing of recyclable material into different categories and removing any unrecyclable materials



4 Bailing and storage of processed recyclable materials



5 Removal and transportation of materials off site

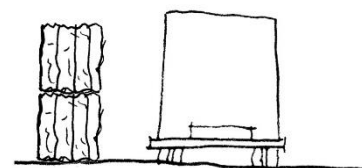


Figure 53 showing the formal recycling process. Source: Author

PART TWO

CHAPTER SEVEN: DESIGN REPORT

7.1 DESIGN PRIMER

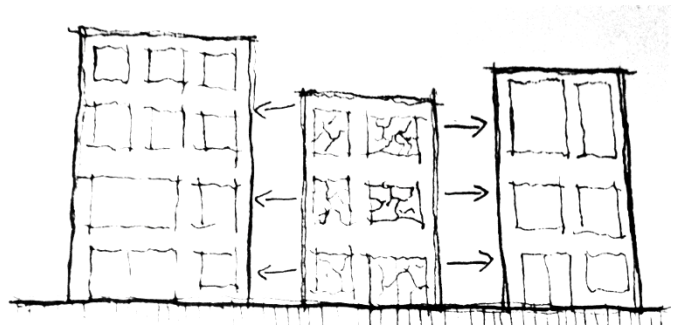
7.1.1 THEORETICAL FRAMEWORK

7.1.1.1 THE PROBLEM: BROKEN WINDOWS

WHY _One broken window that is left unrepaired is a signal that “no one cares, and so breaking more windows costs nothing.”

WHAT _ Effects of solid waste build up in cities

WHO _Urban communities connected to urban waste stream

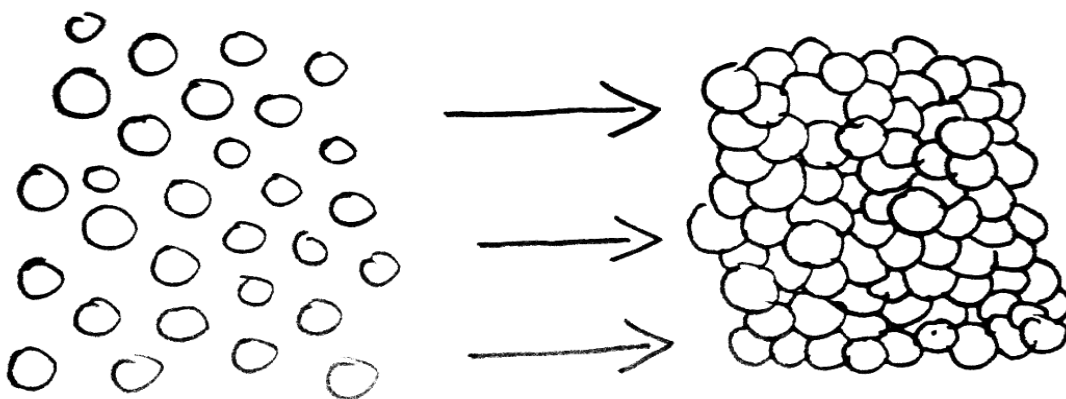


PROBLEM STATEMENT _ Within an urban community “disorder and crime are usually inextricably linked, in a kind of developmental sequence.” As an extension of this, if a community is constantly disrupted by disorder (waste), it is likely that more menacing and life threatening issues are to follow.

7.1.1.2 THE SOLUTION: SMALL CHANGE

HOW _ In order for mould to survive, it makes use of each independent cell together to emerge as a “larger more sophisticated organization”

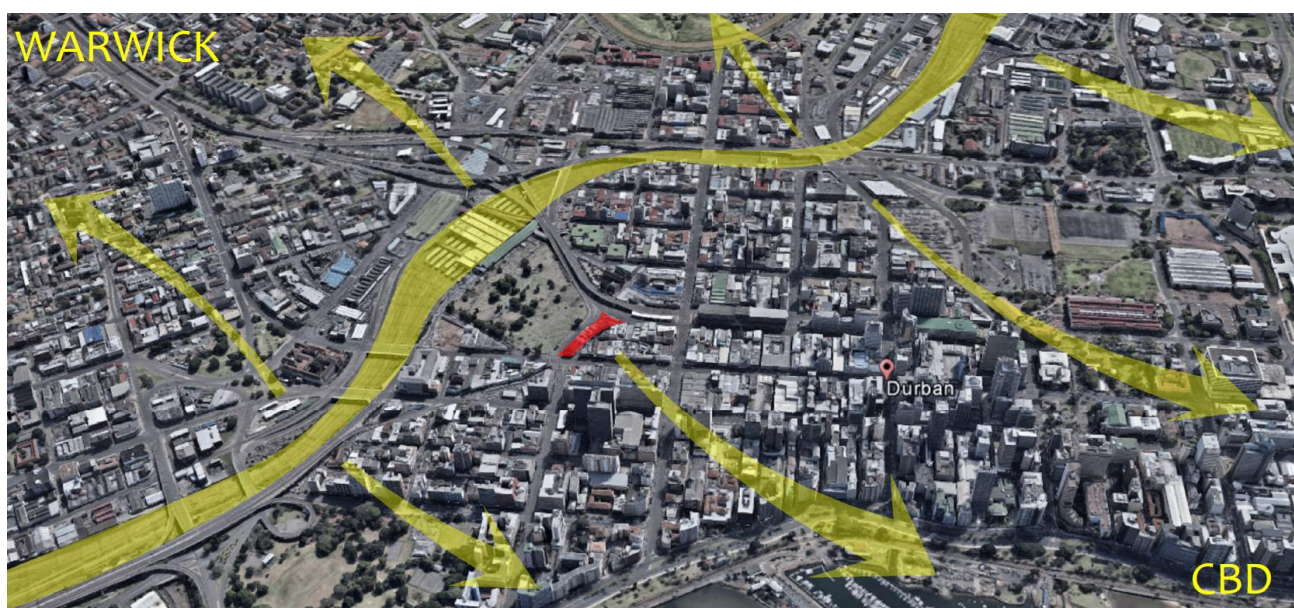
The goal of letting a self-sustaining recycling system unite an entire community for the common good. “Those who think locally and act locally- which is then rationalised in ways that make a difference globally”



7.1.2 DESIGN BRIEF

The existing waste reality of the eThekweni region means that there is an ever increasing need for landfills. However, the municipality has implemented a sustainable vision for the future that places recycling at the forefront of waste reduction and thus the need for waste buy back centers that process and store waste is essential. This project aims to 1) Address the need for a waste recycling headquarters that can organise an integrated system of buy back centers and collection points 2) Bring awareness to sustainable living and recycling by educating users and 3) Integrate the informal nature of Durban's CBD into its makeup.

7.1.2.1 SITE SELECTION AND PRELIMINARY EVALUATION



SITE LOCATION

The chosen site, located on Joseph Nduli Street seeks to draw on the many elements found in Durban's CBD to the east and Warwick junction to the west, the objective being to create a new sustainable heart of the area that serves the neighbourhoods surrounding it. The site can also serve as an iconic island in amongst Durban's built up CBD, an urban landmark of sorts.

NOTABLE LANDMARKS

Some of the notable landmarks that are in close proximity to the site include West Street Cemetery with strong spiritual and historical connections to Warwick and Durban, Dennis Hurley Centre and an adjacent Catholic Cathedral as well as Brook Street Market and various public transport nodes that support the markets in the area.

SITE AREA: +/- 6 000 m²

7.1.2.2 PROJECT REQUIREMENTS

BUILDING SIZE: 20 000 m² -25 000 m² +/- 5 floors

BUILDING TYPOLOGY: Waste Recycling Center that offers additional facilities such as support for informal trades, educational facilities for users of the facility and central office headquarters for NGO's and Durban Solid Waste

PROJECT CLIENT: The project client will need to provide for several clients as a project of this complexity requires collaboration across different types of organizations to create the desired inclusive typology. The clients will be the eThekweni Municipality and Durban Solid Waste (DSW) as well as NGO's such as Asiye eTafuleni and the South African Waste Pickers Association (SAWPA) with the ultimate goal of strengthening waste pickers collectives that can help create a more inclusive environment for the informal sector.



7.1.2.3 PRELIMINARY SCHEDULE OF ACCOMODATION

Primary Functions

- Waste Recycling Centre
- Market Place-Informal Trade
- Educational Workshops
- Viewing Platforms
- Primary Offices
- Public Space
- Trader Storage

Secondary Functions

- Ablutions
- Additional Storage
- Public Parking
- Secondary Offices
- Receptions
- Kitchens
- Circulation Spaces



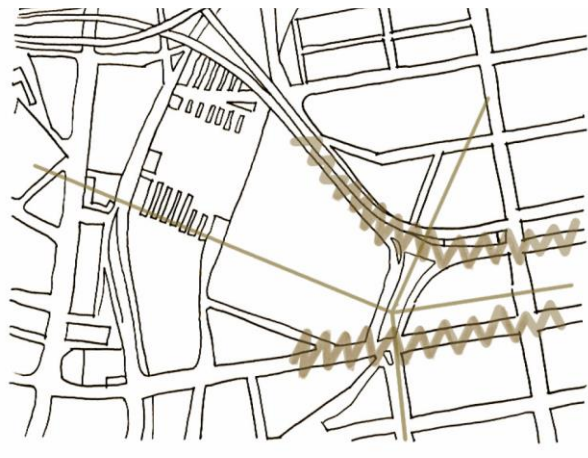
7.2 MOCK JURY DESIGN

7.2.1 SITE ANALYSIS



Site Visibility

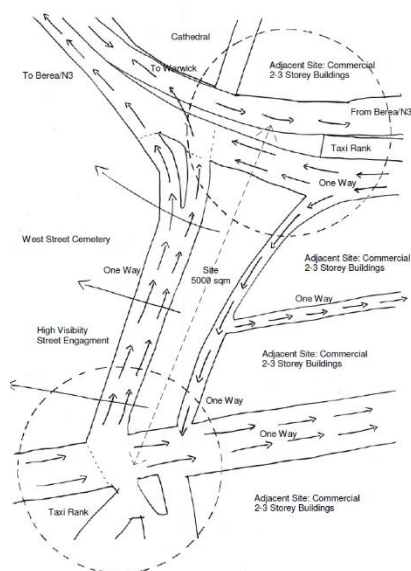
Scale 1 : 4000



Site Activity

Scale 1 : 4000

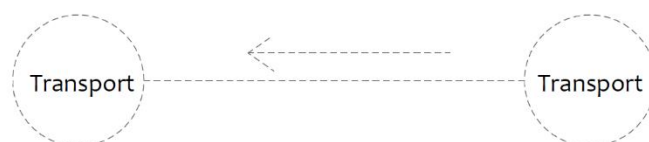
The high visibility of the site is based on its location in relation to West Street Cemetery on the west and the highly built up Durban CBD to the east, all resulting in the need for an engaging street frontage that engages with West Street Cemetery. In terms of site activity, there are two public transport nodes located to the north and south of the site, creating the possibility for primary access points to the building that can create a journey from south to north and vice versa, with the goal of pulling high volumes of pedestrian traffic through the building.



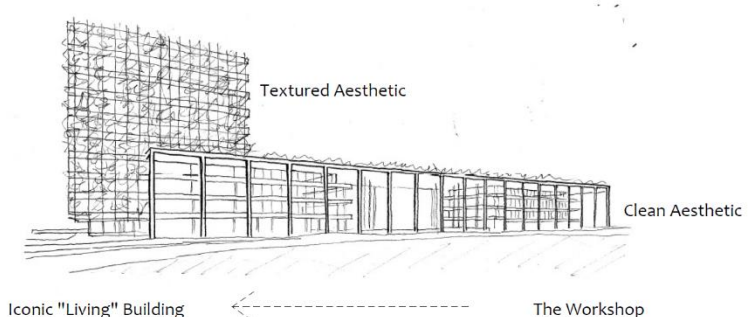
Site Analysis

Scale 1 : 1000

① Journey across site

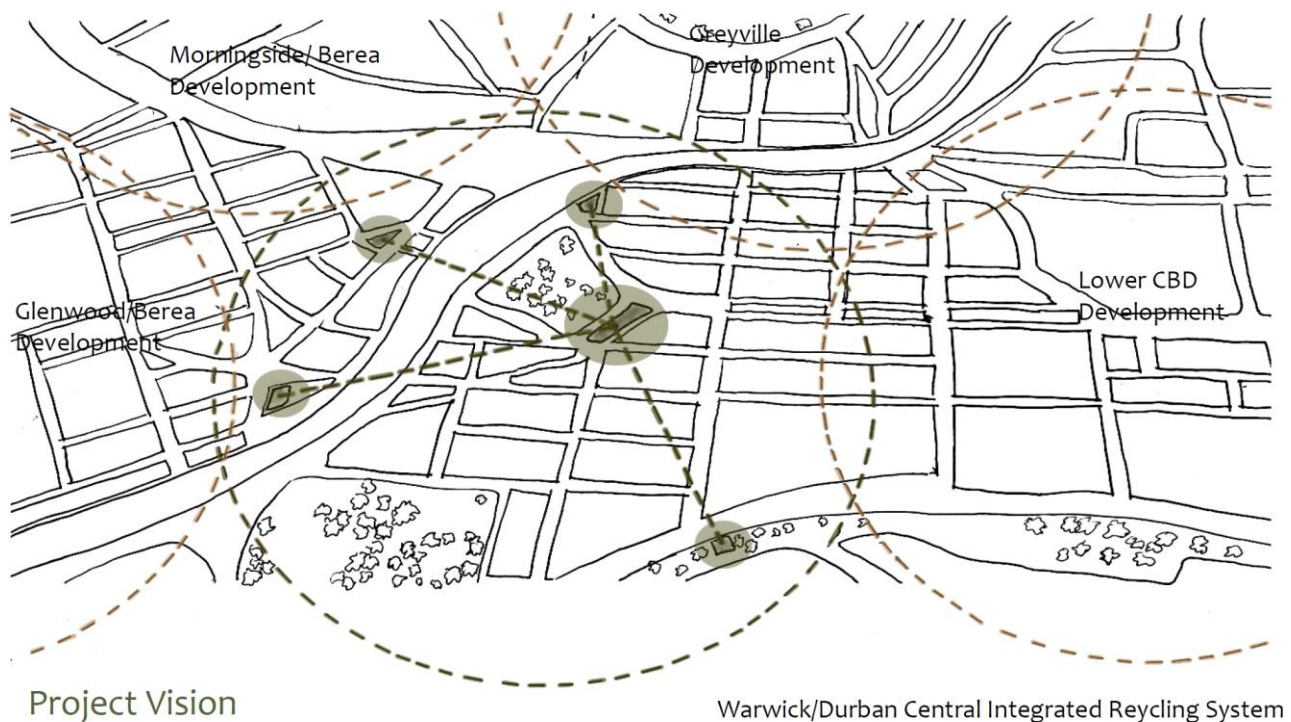


② The Workshop vs The "Living" Building



As previously mentioned the above site analysis provides insight into the two taxi ranks to the north and south of the site. In terms of a conceptual idea the journey across the site that engages pedestrians is vital to the success of this building.

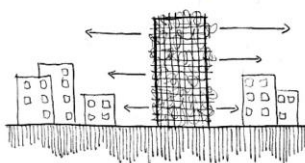
7.2.2 CREATING AN INTEGRATED RECYCLING SYSTEM



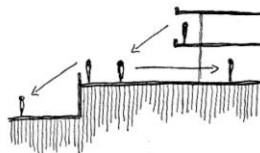
One distinct problem with recycling in Durban is a lack of access to facilities such as buy back centers making it difficult to become active participants in the recycling process as the distance to travel is often too great. The project vision would be to propose the completion of more buy back centers that serve specific districts, each of which is assigned a central recycling hub, the proposed typology for this project. The central recycling center would be tasked with managing and maintaining the buyback centers surrounding them, creating a system that is efficient and adequately deals with the waste demands in Durban.

7.2.3 DESIGN PRINCIPLES

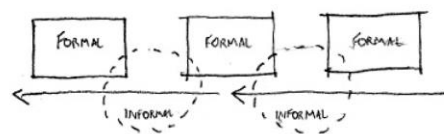
Design Principles



① Iconic Block Leader



② Engaged Education



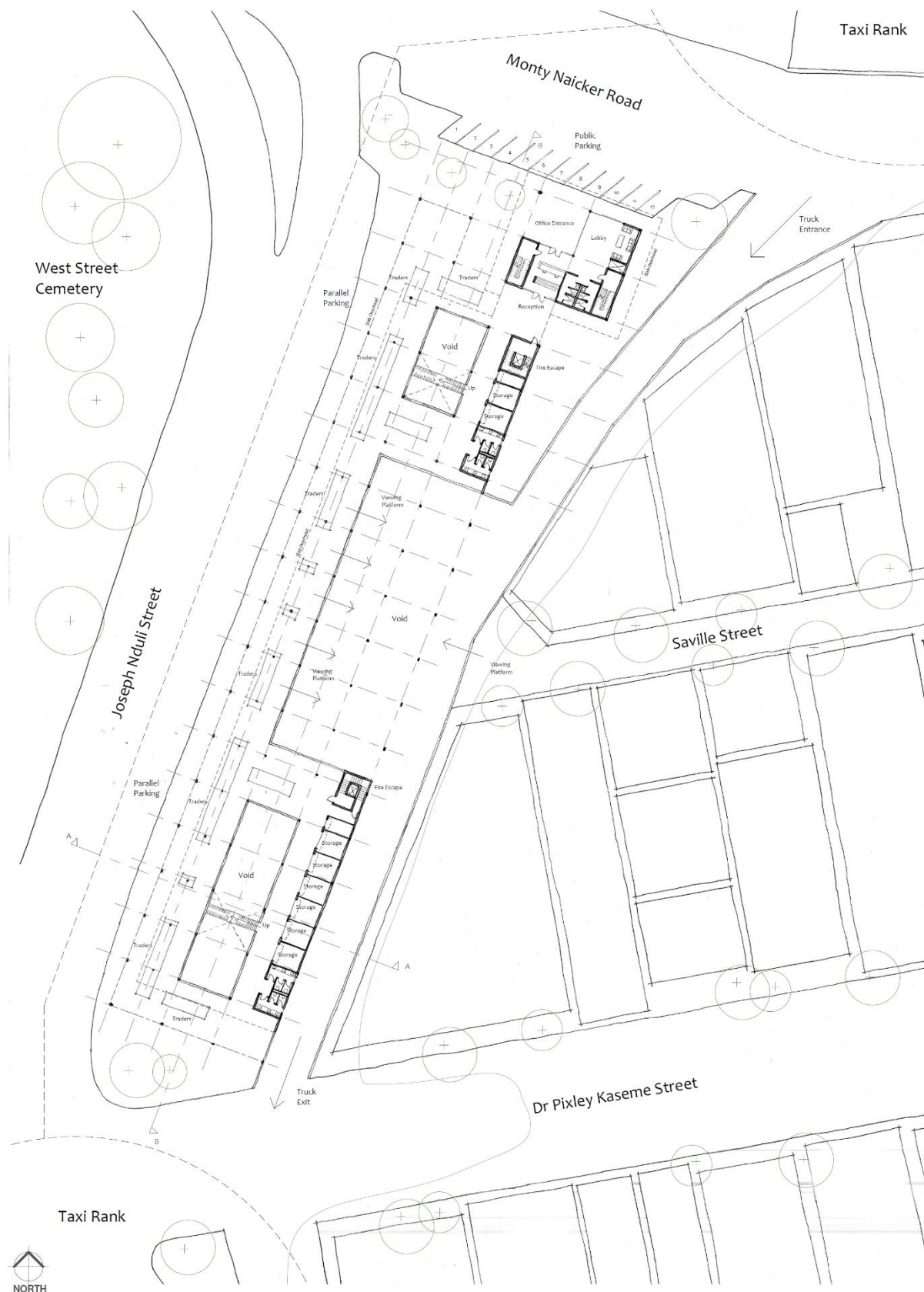
③ Informal Emergent Potential

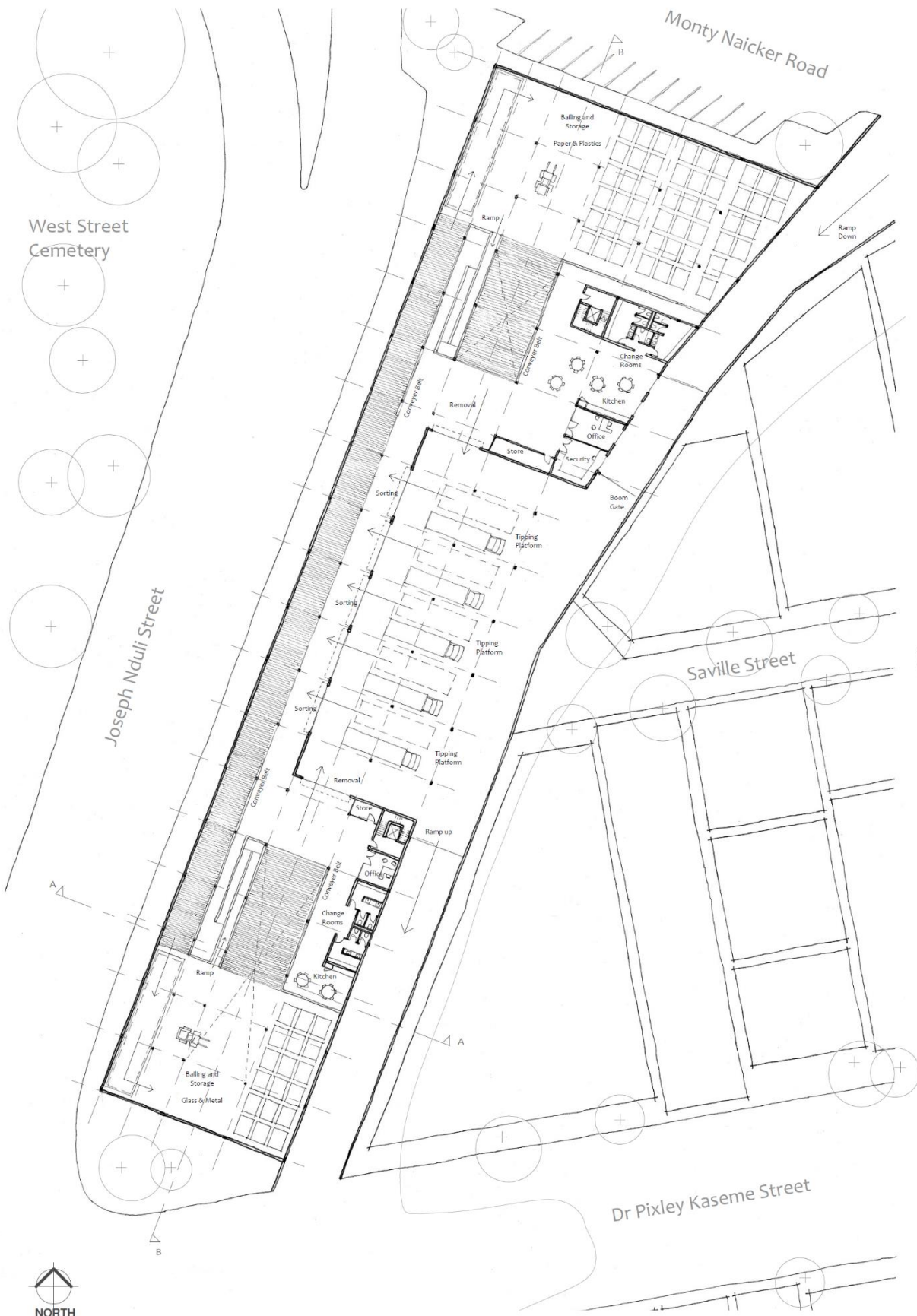
As stated in the design brief, the three design principles would need to create an iconic building that demonstrates recycling as an attractive opportunity, creates engaging education facilities and street frontages that are open and receptive as well as integrating informal practices into the formal makeup of the building.

7.2.4 DESIGN DRAWINGS

Ground Floor Plan

Scale 1 : 250





First Floor Plan

Scale 1 : 250

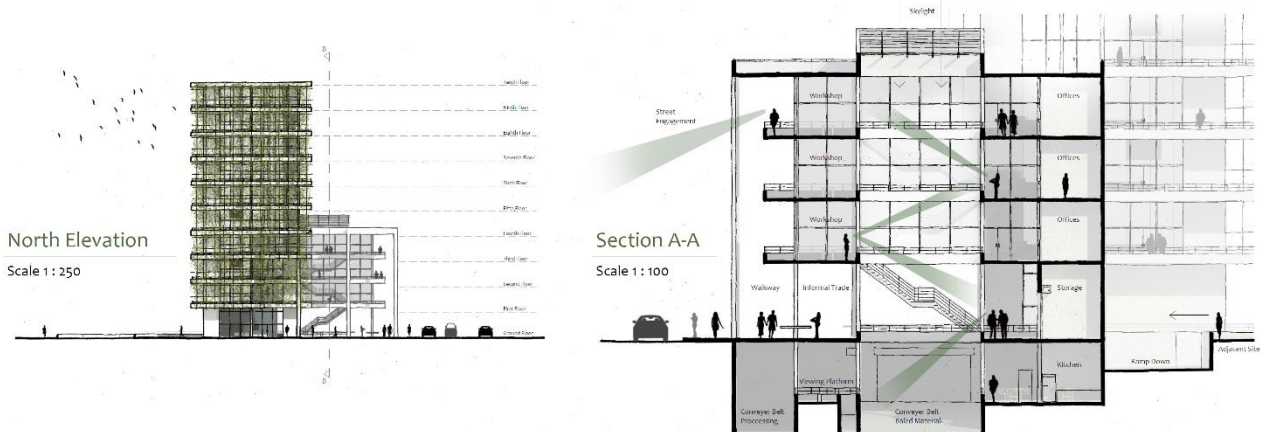


EXPLORING CURRENT VIEWS AND METHODS OF RECYCLING IN DURBAN'S CBD:

A Design Proposal for a Self-Sustaining
Waste Recycling System in Durban.



Elevations and Sections



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APPENDIX

Dissertation Questionnaire English

1 Socio-economic and general details

1,1 Do you live or work in Durban's CBD?

Live ☐
Work ☐

1,2 What is your age?

0-18 ☐
19-25 ☐
26-35 ☐
35-55 ☐
55+ ☐

1,3 Race (by observation, do not ask)

African ☐
White ☐
Coloured ☐
Indian/Asian ☐
Other ☐

1,4 Gender (by observation, do not ask)

Female ☐
Male ☐

1,4 Occupation

Student ☐
Employed ☐
Looking for work ☐
Self-Employed ☐

1,5 What is your approximate monthly income?

0-1000 ☐
1001-2000 ☐
2001-4000 ☐
4001-5000 ☐
5001-10000 ☐
10001+ ☐

2 Selected area for interviews:

2,1 Do you recycle your waste and litter?

Yes ☐
No ☐

2,2 How often do you recycle your waste and litter

Daily ☐
Weekly ☐
Monthly ☐
Never ☐

- 2,3 Do you believe the municipality does a good job cleaning up your streets?
 Yes ☐
 No ☐
- 2,4 Do you believe informal street cleaners such as waste pickers contribute to your community?
 No they don't ☐
 Yes they do ☐
- 2,5 Do you think cleaner streets will make you feel safer in the space you live/work?
 Yes ☐
 No ☐
- 2,6 Do you believe there are enough bins in your area to dispose of your waste?
 Yes ☐
 No ☐
- 2,7 What waste is most prominent in your area?
 Plastic ☐
 Tins ☐
 Cardboard/Paper ☐
- 2,8 How much do you know about waste recycling and management?
 A lot ☐
 A little ☐
 Nothing ☐
- 2,9 Do you think recycling is good for our environment?
 Yes ☐
 No ☐
- 2,10 Do you think it is easy for you to participate in recycling of waste on a daily basis?
 Yes ☐
 No ☐
- 2,11 Do you have the right tools to recycle ?
 Yes ☐
 No ☐
- 2,12 Do you believe recycling will help unify your community under a common cause?
 Yes ☐
 No ☐
- 2,13 If you or your community benefitted from recycling would you recycle on a daily basis?
 Yes ☐
 No ☐
 Maybe ☐