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infrastructure for integrated waste management
a focus on informal trolley pushers in Newtown, Johannesburg
THANKS TO ...

Mom & Dad, thank you so much for all the sacrifices [in sleep and finances] you have made so that I have always had the opportunity to pursue my dreams! I owe everything to you!

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UP|DOWN|RE[C Y C L E]
infrastructure for integrated waste management
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This dissertation is submitted in partial fulfilment for the degree:
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THIS DISSERTATION IS PRINTED ON PAPER MADE FROM RECYCLED POST-CONSUMER WASTE
Every Tuesday morning my father makes a cup of coffee and a sandwich and takes them up to the gate at 8:00 am. A man named David is usually there sorting through the rubbish bins across the road, looking for recyclable materials that he can sell. This has been happening for as long as I remember, and is not something I questioned until I was employed at a home office in 2009. I arrived at work one morning to find my employer shouting at a man sorting through his rubbish bin. Once the man left, empty-handed, I asked my employer why he wouldn’t let the man look for recyclable materials. He replied that what was in the bin were personal and professional records such as his bank statements and medical bills and he was not going to have “some rubbish” sifting through his things. This was the first time I realised that not everybody is at ease with the men and women who move through the city reclaiming materials.
also known as informal recyclers, waste pickers, and trolleypreneurs. These are the men and women who pull one ton bags on simply constructed trolleys through the city collecting recyclable materials.
Upcycling is the practice of converting waste materials into new products that are of the same or higher quality than the original product. It gives waste materials a ‘second life’. Aluminium and glass are upcycled into the products that have the same quality as the waste used to create them. Other waste materials can be repurposed to form entirely new products, like the bottoms of bottles being made into a jewellery stand.

(The Dictionary of Sustainable Management 2013, Wikipedia 2013)

Downcycling is the practice of converting waste materials into new products that are of a lower quality than the original product. Most recycling is downcycling; white paper is downcycled into a lower grade cardboard. Higher grade plastics can only be downcycled and mixed with other plastics to form a hybrid of lower grade plastic.

(The Dictionary of Sustainable Management 2013, Wikipedia 2013)
The City of Johannesburg has no formal recycling strategy, and waste is simply dumped as collected in designated landfill sites. Yet these landfill sites, reportedly, will be good for no more than another eight years. Throughout the city there is an informal network of waste collectors commonly known as trolley pushers who, together with the private buy-back and recycle centres, form the only real system of recycling in Johannesburg.

There is no infrastructure for the trolley pushers, men and women who perform a vital function. There are no dedicated spaces and very little tolerance from the residents of Johannesburg. The trolley pushers sleep amongst their collection of waste, or travel far to start each day in the very early hours of the morning. They roll their improvised trolleys full of goods in the street among the traffic of commuters, hindering and being hindered. They store their messy waste, when they can in unsafe and public spaces, such as under bridges and on the side of some roads.

Storage is such a problem for trolley pushers that often they’re forced to sell their goods as soon as they collect them, when the fluctuating prices may be too low. They are always essentially at the mercy of the privately-owned buy-back centres. Their days are long and they have no ablution facilities, no designated space to catch their breath, eat, obtain drinking water, network or socialise.

This project is about changing that by facilitating the informal recycling sector, providing the convenient infrastructure without formalising the process. The term ‘convenient’ in this context encompasses spaces close to the buy-back centre, with low tech, low maintenance, mixed-use facilities. These facilities include secure sorting and storage spaces, sleeping, ablation and social spaces. The essence of this project is to encourage, empower and improve work and income potential in the informal waste recycling sector through simple, appropriate architectural interventions that are essentially self-maintaining.
CHAPTER OUTLINE

01 INTRODUCTION
01 provides a broad overview of the problem statement, project aims and objectives.

02 A PROCESS OF INTERPRETATION
02 discusses theory with the aim of understanding and interpreting the trolley pushers & the city they inhabit.

03 THE NEWTOWN CONTEXT
03 introduces the city, the precinct and the site.

04 KEY FINDINGS & RESULTING IMPLICATIONS
04 extracts the key findings of the mapping and site investigation.

05 ALL ROADS LEAD TO NEWTOWN
05 develops an urban framework based on the routes travelled by the Newtown trolley pushers.

06 DESIGN DEVELOPMENT
06 explores and investigates various design possibilities, from concept to material choices.

07 TECHNICAL RESOLUTION
07 develops the finer details of the proposed intervention.

08 CONCLUSION
08 evaluates the aims and outcomes of the proposed intervention.

09 ANNEXURE
09 list of figures and sources referenced.
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1.2 Long term aims/importance of the proposed project
1.3 Two typical waste management practices
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ILLUS 1 TROLLEY PUSHERS WAITING OUTSIDE A BUY-BACK DEPOT TO SELL THEIR RECLAIMED GOODS
Johannesburg does not have an advanced formal recycling system that attempts to reduce waste to landfill. This has created waste management opportunities in the informal sector.

This opportunity has been taken up by a vast army of ‘trolley pushers’. Although they work in the informal sector, these men and women provide a much needed service to the city of Johannesburg as urban recyclers. The latest plastics recycling survey (Plastics SA 2013) has shown that 40 950 informal jobs were created during 2010-2011, increasing to 44 100 informal jobs in 2012 in the refuse collection industry. An average of 60kg being collected per person per day. If the recyclers did not do this work, most of the urban waste that could be recycled would just end up on a landfill site on the edge of the city, un-recycled. Pikitup, the official collection agency, dumps urban waste without sorting or recycling it, filling up landfill sites [see illustration 2] which are quickly reaching capacity. It is projected that Johannesburg only has eight years left on its landfill sites.

This proposal seeks to understand the complex systems within which the trolley pushers operate, and to propose an architectural intervention that supports their daily activities. The main focus of this proposal is to facilitate the interaction between these informal trolley pushers and the formal recycling centres they sell to, in order to understand what is required to improve the living and working conditions of the trolley pushers. The ultimate aim of the proposed interventions is to:

- improve working conditions in the sector [short term]
- encourage greater recycling efforts [medium term]
- promote a circular metabolic system – or closed loop – to better manage the city’s waste streams [long term].
1.2 LONG TERM AIMS | IMPORTANCE OF THE PROPOSED PROJECT

- providing an increase in potential earning and production in the private recycling sector, by improving the flow, volume and variety of recyclable waste material.
- promoting a culture of recycling.
- reducing the amount of solid waste placed in landfills, thereby extending the expected lifespan of these sites around Johannesburg.
- enhancing the productivity of the informal sector and potentially increasing the number of informal sector jobs.
- generating greater recycling volume, thus reducing the demand for virgin materials and harmful processes required to produce glass, paper, plastic and metal based products, which, in turn, will promote the protection and preservation of the country’s natural resources and reduce the South African carbon footprint.
- reduce the need for harmful manufacturing processes, which often result in water and air pollution and greenhouse gas emissions.
- providing for a cleaner environment.

1.3 TWO TYPICAL WASTE MANAGEMENT PRACTICES

*Buy-back depots can be contracted to collect recyclable materials in certain areas
**The general public can also sell recyclable materials to buy-back depots
People buy products and consume the contents. The waste materials are thrown in the bin. Informal recyclers [trolley pushers] reclaim waste materials that can be recycled. * Materials are up, down and recycled. Informal recyclers [trolley pushers] sell the reclaimed materials to buy-back depots. ** Informal recyclers [trolley pushers] reclaim waste materials that can be recycled. * Buy-back depots sort, compress and package materials ready for transport. Materials are then sent to the various specialist recycling companies. Recycling is sustainable practice.
ILLUS. 3 INFORMAL TROLLEY PUSHERS EN ROUTE TO SELL THEIR RECLAIMED MATERIALS TO THE FORMAL BUY-BACK DEPOT
1.4 PROJECT OUTLINE

1.4.1 RESEARCH OBJECTIVES

• to gain a broad understanding of how the current waste management system works at the Newtown Remade depot

1.4.2 DESIGN OBJECTIVES

• to cater to the particular needs of ±90 informal recyclers who already sell their reclaimed goods to the Newtown Remade depot.
• to conceptualise a facility and infrastructure in Newtown that supports the ±90 informal recyclers through the provision of social, residential and training facilities.

1.4.3 PRINCIPLES

• enhance the continued existence of informal waste recyclers and their continued ability to earn income this manner
• enhance the skills of the informal recyclers so that they can move up in the sector
• increase production in the private recycling sector, by improving the flow, volume and variety of recyclable waste material.

1.4.4 PROBLEM DEFINITION

1.4.4.1 BACKGROUND TO THE PROBLEM
Informal waste recyclers are not formally recognised by the City. This means there is no infrastructure within which they can operate safely and with ease. They are very often not tolerated by road users and home owners.

1.4.4.2 PROBLEM STATEMENT

• many trolley pushers are informal urban dwellers that carry out this kind of work purely as a survival mechanism. This vulnerability and need for 'fast cash' means that their labour is readily extorted by large buy-back depots who buy the trolley pusher's reclaimed materials at a fraction of what they sell them for.
• the spaces that trolley pushers inhabit within the city are usually ill-equipped to house the activities that they engage in on a day-to-day basis.

1.4.4.3 PREMISE
Instead of destroying this informal city sector, my premise is that it should be actively supported by the private recycling companies and the City itself in order to promote a circular metabolic system to better manage the city's waste streams.

1.4.5 RESEARCH & DESIGN QUESTIONS

How can the lives of informal recyclers and the waste recycling process be improved through an appropriate architectural intervention?

1.4.5.1 SUB QUESTIONS

Can an architectural intervention

• facilitate the integration of the ±90 informal recyclers into the formal economy of the city, while keeping their activities in the informal sector?
• allow trolley pushers to hold onto reclaimed materials until the price suits them, thereby increasing their selling power
• strengthen the transaction between the formal and the informal recycling sectors?
• facilitate a greater flow and variety of waste material?
• encourage a circular metabolism that enables industrial ecology, thereby reducing waste?
1.4.6 Project Location

Illus. 4 Location of Johannesburg within the Greater Gauteng Region

Illus. 5 Location of Gauteng

Illus. 6 Location of the Inner City within Greater Johannesburg
1.4.7 SITE SELECTION & MOTIVATION

The reason so many informal waste recyclers make the porous district of Newtown their temporary residence is due to the close proximity of a buy-back depot; the Newtown Branch of the waste collection and recycling company Remade. This buy-back is the only one located on the western edge of the city. It is therefore the nucleus for all trolley pushers who collect materials in the north western suburbs and western areas of the inner city of Johannesburg.
ILLUS. 8 JOHANNESBURG IN 1887 [SOURCE SHORTEN 1970, 131]

ILLUS. 9 GENERAL VIEW OF EARLY JOHANNESBURG, 1887 [SOURCE SHORTEN 1970, 134]
1.5 A BRIEF HISTORY OF WASTE MANAGEMENT IN JOHANNESBURG

1.5.1 THE ESTABLISHMENT OF A VILLAGE

With the establishment of permanent residence of a group of people, comes many issues that need to be dealt with in order to provide people with basic human rights; such as potable water and food. However, something that is of a lesser concern at the very early onset of a ‘village’ is the issue of solid waste removal. But, in order to maintain hygiene levels and ensure the well-being of the residents of the area, it quickly becomes essential to manage and dispose of solid waste. Johannesburg was no exception.

![Image 10: Doornfontein and the town centre in about 1889](source: Shorten 1970, 134)

![Image 11: Looking across Doornfontein toward the centre of town, 1891](source: Shorten 1970, 135)

1.5.2 ESTABLISHING A MANAGEMENT COMMITTEE

Johannesburg was established in 1886 as a gold mining village. On the 8th of November 1886 a Diggers Committee was formed, with nine elected members, to give the people of Johannesburg a share in the management of the ‘village’. Relations between this village of strangers and the seat of Government in Pretoria were uncomfortable and a political struggle ensued. The Government refused to grant Johannesburg the status of municipality for fear of having a “government within a government” (Members of the Editorial Committee 1986: 20). This meant that the Diggers Committee had no independent funding and no significant power. The committee acted primarily as a court of appeal and allocated water rights, presumably they were also responsible for waste removal.

“THE PROBLEM OF SEWAGE AND REFUSE REMOVALS PLAGUED JOHANNESBURG IN THE EARLY YEARS” (Shorten 1970; 171)

Even though the committee had very little power under the Transvaal Government, they did their best to improve the health and sanitation conditions and maintained the roads. (Members of the Editorial Committee 1986; 20)

1.5.3 THE FIGHT FOR MUNICIPAL STATUS

A year after the establishment of the Diggers Committee, on the 30th of November 1887, a Health Committee was established. Together the two committees continued to petition for a “higher municipal status for Johannesburg” (Members of the Editorial Committee 1986: 20) and aided its development as a city. They called for the appointments of a district surgeon and a sanitary inspector, and the provision of a hospital. Charles Shaw was appointed as the sanitary inspector. (Shorten 1970; 96) He had a small task force of “scotchcarts drawn by mules and manned by prisoners under the guard of six Native constables” (Shorten 1970; 97) that kept the streets of Johannesburg clean.

Over time the Diggers Committee faded away and the limited responsibilities it had were taken over by the Health Committee. In 1887 a five-member ‘Gezondheids Comite’, or Sanitary Board was formed. In 1890 a new Health Committee was elected and sub committees were formed to deal with legal and financial matters; public works; public health; and cemeteries respectively.
Johannesburg still did not have municipal status, but the Transvaal Government did allow it to levy taxes. (Members of the Editorial Committee 1986: 279) which brought it one step closer to being a municipality.

1.5.4 EARLY WASTE REMOVAL

Sewerage and refuse removal was undertaken by tender before April 1893, but after that it was carried out by a department run by the official committee.

Before the days of the Milner Administration the pail system was in place, with receptacles being removed three times a week, and stable litter and refuse being removed every second day, both by mule-drawn carts. (Shorten 1970: 171)

According to Shorten (1970: 171) between June and December, 1893, 45 131 loads of refuse were carted away by the Sanitary Department. But sites on which to deposit the refuse were still an issue. The Waterval Farm (currently the location of the suburb of Newlands) was the main dumping site, but at the time other sites were being used as well. The first rubbish dump, located in Turffontein had to be closed after a local mine objected to the siting of the dump, and a court order against this practice was issued. In 1897 the Sanitary Department was met with protests from the residents of Fordsburg and Vrededorp who were unhappy about their areas being used as dumping sites. The Sanitary Department’s solution was to cover the refuse with a layer of earth. (Shorten 1970: 171)

1.5.5 THE OLD NEWTOWN

Johannesburg was developing at a rapid rate, and there was a high demand for building materials. This demand created an opportunity for poorer people who had moved to the city to find gold but had been unsuccessful; they began to excavate land and make bricks from the soil. Thus it was named Brickfields. This excavation area was on the western periphery of the establishing city, on the land that is, today, where Newtown stands.

As the city was expanding at such a rate, a large part of the old Brickfields was sold to the Netherlands South Africa Railway Company, NZASM, and the Kazerne marshalling yards were established there in 1893. The Sanitary Department decided to use kitchen and street refuse collected in the city to fill in the excavated holes in Brickfields. However, Captain Bleksley, the Sanitary Superintendent, eventually recommended that the brickfields site

ILLUSTRATION 12 THE FIRE THAT BROKE OUT IN WHAT WAS ONCE BRICKFIELDS BURNED FOR THREE DAYS [SOURCE: ITZKIN 2000: 50]
be closed down because there were no sanitary facilities and the close proximity of the site to the built up areas of town was problematic. (Shorten 1970: 171)

1.5.6 A TOWN COUNCIL ESTABLISHED
After the Jameson Raid the Transvaal Government reconsidered the status of Johannesburg, and in 1897 the Town Council’s Act for Johannesburg was published. On the 3rd of November 1897 the first elections took place for Town Council, and the Council was active as from December 5th 1897. (Members of the Editorial Committee 1986: 279)

1.5.7 JOHANNESBURG; A MUNICIPALITY
During the Anglo-Boer War the functions of the Town Council ground to a halt, and in mid-1900 the Republican Town Council held its last meeting. Mayor W A J O’Meara was given the responsibility of municipal affairs and made acting mayor by the occupying British Forces in 1900. After Lord Alfred Milner was appointed Governor in 1902, legislation was put in place to grant local government status to Johannesburg, thus making Johannesburg a municipality. This gave the Town Council the power to be the sole provider of electricity, to construct a tram system, and to implement a sewerage and drainage system.

1.5.8 THE RISE OF NEWTOWN
Sewerage had been a big issue for the previous Town Councils; one that they had been unable to resolve efficiently. In 1901 the Town Council had informed the Transvaal Government about unhygienic conditions on the site where the brickfields had once been located; which had since become an Indian location. The Town Council procrastinated cleaning up the area for a number of years, until in 1904 a plague broke out. The Council’s solution was to burn the location to the ground, and move the residents to an area near Klipspruit south of the city. (Members of the Editorial Committee 1986: 279) Once the smoke had cleared, the area was renamed Newtown. Taking advantage of the recently established marshalling yards, Newtown soon became an area with many light industrial facilities. A fresh produce market was set up in what today is the Market Theatre. The Premier Milling Company bought and developed land for flour milling in the west of Newtown. A bus factory was built in the south of Newtown to service the city’s electrically run busses. And in 1935 a power station was built to supply the city of Johannesburg.

Historically Brickfields/Newtown has been associated with waste management and servicing the greater metropolitan area.
1.5.9 THE DECLINE OF THE INNER CITY

In the 1970s inner city factories all over the world were being abandoned for buildings with more technologically advanced facilities. At this time in Johannesburg, the inner city light industrial factories were being encouraged to move to the borders of the city, where the city met the suburbs. New office developments were sprouting up in Braamfontein, and further north in the northern suburbs. And the government subsidised young white first-time home-owners. This subsidy encouraged young white families to buy property in the suburbs surrounding the city, instead of staying in apartments in the city. All of these factors had an effect on the inner city where many buildings were left derelict and deserted. The power station was decommissioned, the fresh produce market moved to the eastern edge of the city and the Premier Milling Company ...... This had a snowball effect because not only were the large corporations moving their businesses out of the city, the smaller formal retailers were following them. Supermarkets and retail stores opened in the suburbs, and their places in the inner city were filled by informal traders. (Garner 2011, 19)

During the apartheid years, Johannesburg had been controlled by separate, race-based institutions, which made management and administration of the city as a whole quite difficult. Basic services such as water, electricity and solid waste removal had not been standardised across the city, and different areas received varying degrees of service. With the rapid decline of the inner city after it was vacated by large businesses, management of this area fell into disrepair.

In 1995, a year after South Africa became a democratic state, the separate racially based institutions amalgamated to form the Greater Johannesburg Transitional Metropolitan Council. Although this was a good step toward effectively managing the maintenance of the inner city, there were still four metropolitan substructures which meant that management and administration were still rather difficult.

With the reputation of the inner city at an all-time low, the Johannesburg Municipality developed Inner City Spatial Framework with the aim of addressing “economic and spatial conditions in the inner city” (Garner 2011, 21) That framework was followed by the Inner City Economic Development Strategy which outlined areas where urban renewal programmes would be implemented (Garner 2011, 21) Newtown was one of the areas identified.

1.5.10 A SHIFT IN THE JOHANNESBURG MUNICIPALITY & URBAN RENEWAL

At the turn of the millennium the Johannesburg municipal government morphed into a single Greater Johannesburg Metropolitan Council with a single revenue base. In 1998 the Inner City Office (ICO) was established. And in 2001 the Johannesburg Development (JDA) was set up as a municipal-owned entity (MOE) with the aim of implementing projects that would achieve urban regeneration goals in the declining areas of the inner city, their mission was to support and stimulate “area-based economic development initiatives.”(Garner 2011, 24) This proposal seeks to align itself with this mission by supporting the economic activities of the trolley pushers based in Newtown.
Also established in 2001, with the City of Johannesburg as its sole shareholder, Pikitup is the largest waste management company in South Africa.

An Urban Development Zone (UDZ) tax incentive was introduced in 2004. This encouraged property development in the inner city. It is the main reason that the private sector has decided to once again invest in the inner city. (Garner 2011, 28) This UDZ “covers an area of 18km2 and stretches roughly from Fords burg [in the west, just west of Newtown] to Jeppestown [in the east], and from Bellevue [in the north] to the M2 highway [in the south].” (Garner 2011, 29)

In 2007 Executive Major Amos Masondo announced the launch of the Inner City Summit and Charter. The Charter foresaw a city “… that will be developed in a balanced way in order to accommodate all people and interests. A city area which remains a vibrant business heart of Johannesburg as a whole, but which balances future commercial, retail and light manufacturing development with a large increase in residential density. A city area which works as a key residential node where a diverse range of people from different income groups and backgrounds can have their residential needs met -not a dormitory for the poor or an exclusive enclave of loft apartments, galleries and coffee shops.” (Garner 2011, 24)

The charter states that “The inner city must be a place of primary entry into Johannesburg but also a place where people want to stay because it offers a high quality urban environment with available social and educational facilities, generous quality public open spaces and ample entertainment opportunities. It must be a city that serves as both the key transportation transit point for the entire Gauteng Global City Region, but also as a destination point where people want to walk in the streets. A city where prevailing urban management, safety and security concerns are a thing of the past.” (Garner 2011, 24)

Significantly the Charter states that “Fast changing city centres that accommodate a wide range of functions and interests in a dynamic mix do not have to be places where waste is not collected, by-laws are not enforced, buildings are in decay and public spaces deteriorating, and where many people cannot walk the streets free of the fear of crime. Regardless of the functions and people it accommodates in the future, Johannesburg's inner city will be well-managed, safe and clean.” (Inner City Regeneration Charter 2007, 5)

Even though this statement was made six years ago, and the waste management company Pikitup have dedicated themselves to removing solid waste from residential and commercial sites little has been done to improve the city’s recycling capacity.

In May this year [2013] a Waste Summit was held to address issues of waste management and recycling. It was for the first time at this summit that the Trolley Pushers, or “Trolleypreneur” as they were called, were formally mentioned (and possibly recognised) for the work they carry out to the city’s benefit.
2.1 THEORETICAL PREMISE

The premise of this dissertation is that informality, such as the trolley pushers, in the city unfolds in loose or smooth spaces, where informal activities are unregulated, opportunistic modes of spatial practice.

To enhance the productivity of informal and formal city systems, the proposed architectural intervention should accommodate both of these forms of space and the transition between them.

The hypothesis is that the transitions and transactions between loose/smooth [informal] and tight/striated [formal] within the waste management system can be arranged to create a circular metabolism that will contribute to a more sustainable urban ecology.

The theories discussed in this chapter explore

SOCIAL RELATIONSHIPS IN THE CITY; looking at the theories of urbanism, urban informality and the adaption of these theories to suit more contemporary urban conditions.

and

SPATIAL TYPOLOGIES IN THE CITY; looking at theories of loose spaces and how they are appropriated by, mainly, informal urban actors.

2.2 SOCIAL RELATIONSHIPS IN THE CITY

2.2.1 THEORISING URBANISM

Louis Wirth was part of the Chicago School of Urban Sociology which was the first institution to theorise the study of community and urbanism. His theories, along with the School’s theories have been held in high regard for many years. Students at the Chicago School of Urban Sociology noticed “patterns of rapid and dynamic growth” (AlSayyad and Roy 2004; 8) which lead to recurring ecological patterns of:

- Invasion
- Survival
- Assimilation
- Adaption, and
- Cooperation

These patterns lead to three main strands of research, namely:

- The relationship between the individual and the community
- The nature and meaning of progress
- The relationship between patterns and processes of urban life.

Although, as theorised by Wirth, the city is the “locus of urbanism”, urbanism no longer exists exclusively in cities anymore. It can be seen as a set of socially accepted factors. These factors, as defined by AlSayyad, are

- Density: which increases friction between people as well as increasing spatial segregation

ILLUS: 14. INFORMAL TRADE UNFOLDS ON THE LOOSE SPACE OF THE PAVEMENT

ILLUS: 15. DENSITY
Charles Abrams, also of the Chicago school, was one of the first to write on urbanism in Third World cities. Because of his Chicago School background he assumed that there was an existing rural-urban continuum; that people from rural areas had to go through a “transformative cycle” (AlSayyad and Roy 2004; 9) in order to become urbanites. Abrams argued that if people did not complete this cycle successfully, for whatever reasons, they became squatters. The theory is that in order to complete this cycle rural migrants must have the ability to:

• “replace quality of work with quantity of paid labour time;
• live in an impersonal environment of pure monetary exchange;
• become an anonymous customer and an actor in the spectacle of mass consumption;
• adopt a rational, calculating attitude fully adjusted to clock time; and
• free the self from the time-bound dictates of rural society.”

(Alsayyad and Roy 2004; 25)
2.2.3 THE 'INFORMAL SECTOR' AND URBAN INFORMALITY

In the early 1970's W. Arthur Lewis created a theoretical model to understand the patterns he saw in the movement of migration and employment during the 1950's and 1960's. He proposed a 2-sector model, introducing the concept of the “informal sector” to contrast the formal sector. Lloyd George Reynolds took this theory further and defined the two sectors as a “state sector” and a “trade-service sector”. He saw this [informal] trade-service sector as the “multitude of people whom one sees thronging the city streets, sidewalks and back alleys in the developing countries: the petty traders, street vendors …and porters, small artisans, messengers, barbers, shoe-shine boys and personal servants.” (Reynolds 1969: 9)

This fight is real, as seen in most cities in developing countries, where there is an increase in the number of poor people in the urban setting. This increase has led to an eruption of informal activities to “enable” the livelihoods of the urban poor. The anomaly here is that people move to the cities in the hopes of participating in the formal economy, but a decline in the formal economy then pushes people into informal practices. Thus the concept of “urban informality” has developed and today is a part of contemporary urban discourse.

The Chicago School and The Los Angeles School dominated theories on cities, urbanization and urbanism in the early 20th century. The writings of Georg Simmel and Robert Park focussed on immigrants as ‘strangers’, and labelled them as “marginals”. Georg Simmel stated that the “marginal personality was a manifestation of cultural hybridity”...

"OF LIVING ON THE MARGIN OF TWO CULTURES WITHOUT BEING A FULL MEMBER OF EITHER”.

The writings of Oscar Lewis, also based on the Chicago School of thought, theorised a “culture of poverty” by generalising research undertaken of the urban poor in Puerto Rico and Mexico. (AlSayyad and Roy 2004: 9)

But in the past 40 Years, there has been a paradigm shift, and the dominant view of these two schools has been challenged. Theorists working in Latin America, such as Janice Perlman, Manuel Castells and Asef Bayat, started to define marginality differently. They argued against Simmel’s view that “marginals” lived on the edge of two cultures without being fully part of either. Bayat saw “marginals” as fully integrated members of society, “but on terms that often caused them to be economically exploited, politically repressed, socially stigmatized, and culturally excluded” (AlSayyad and Roy 2004: 9). Castells shared this notion and added that however “excluded” the poor were, they aimed for “social transformation” by fighting for urban services through their everyday struggles. (AlSayyad and Roy 2004: 9)

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Since the 1970's the informal sector has been defined and characterised in a number of ways.

In the later part of the 1970’s it was described by Caroline Moser as “the urban poor”, or as “the people living in slums or squatter settlements.” (Moser 1978: 1051)

Keith Hart rationalised the distinction between the formal and informal sectors, based on types of employment. He stated that “the ‘informal’ (or traditional or underemployed) urban poor often engaged in petty capitalism as a substitute for the wage employment to which they were denied access.” (AlSayyad and Roy 2004; 10)

Dipak Mazumdar described the “informal” as the urban labour market that was unprotected, in contrast to the “protected” formal urban labour market.

The International Labour Organisation (ILO) also adopted the theory of a “two-sector dichotomy” by defining an “informal sector” in a 1972 report. The report characterised the way in which activities are carried out within this sector by the following:

a) ease of entry;
b) reliance on indigenous resources;
c) family ownership of enterprises;
d) small scale of operation;
e) labour intensive and adapted technology;
f) skills acquired outside the formal school system; and
g) unregulated and competitive markets.”

(International Labour Office 1972: 5)

Many of these theories, focused on the “unorganised, self-employed individuals” (AlSayyad and Roy 2004; 11) followed in the same vein as the Chicago School. However it was the ILO’s 1972 report that brought the dualistic concept of the two-sector dichotomy into the limelight.

In 1994 Cathy Rakowski looked into theories on urban informality that had been debated in the 1980’s. Ultimately she categorised the views of urban informality into two groups: the Structuralists and the Legalists.

2.2.3.1 THE STRUCTURALISTS

This ‘group’ consisted of the ILO and “advocates of the underground economy” (AlSayyad and Roy 2004; 12). There were, however, slightly differing views within this group. The ILO saw large social and economic differences between the formal and informal sectors, and their stance was that it was the state’s role to help equalise these differences.

The advocates of the underground economy did not accept this notion of “dualism”. Rather, they focused on the way “forms of production, productive units, technologies, and workers” were integrated into local, regional, and international economies.” (Rakowski 1994: 38.)

The advocates of the underground economy did not see the informal sector as a “small scale, easy entry way of doing things” (AlSayyad and Roy 2004; 12) but instead defined informality as:

- “a status of labour; undeclared and noncontractual, lacking benefits, earning under minimum wage
- a condition of work; hazardous and unprotected
- and a form of management; of some firms involving such strategies as fiscal fraud and unrecorded payments”
The common ground between these approaches was that both the ILO and the advocates of the underground economy saw the informal economy as a “growth economy” and they theorised that informality in “peripheral societies was the expression of the uneven nature of capitalist development.” (AlSayyad and Roy 2004: 12)

### 2.2.3.1 The Legalists

The legalists viewed urban informality as a microenterprise and focussed on “entrepreneurs and institutional constraints that make informality a rational economic strategy.” (Rakowski 1994: 38.)

Hernando de Soto, probably one of the most well known advocates of the “microenterprise” perspective, wrote about informality as a “survival strategy” (De Soto 1989: 243). He viewed informality as heroic entrepreneurship and states that the “informal economy is the people’s spontaneous and creative response to the state’s incapacity to satisfy the basic needs of the impoverished masses” (De Soto 1989: 14). Although these two groups have differing views on the root cause and definition of informality, they do both agree that rural-urban migration is a catalyst for informality and that it is a growth economy.

Asef Bayat describes the politics of marginalised informal urban groups as the “quiet encroachment of the ordinary”. This description is further elaborated as “ordinary people [who] challenge structures established by the propertied and powerful through silent, largely atomized actions that allow them to survive and improve their lives” (AlSayyad and Roy 2004: 17). The quiet actions that Bayat describes oppose a number of the prerequisites set by the state, “including the meaning of order, the control of public space, and access to public and private goods” (AlSayyad and Roy 2004: 17). Bayat argues that this unlawful action occurs out of necessity, and does not have any political connotations. Their struggle is for immediate effects through the direct actions of individuals.

“Yet at the same time that these groups are seeking autonomy from regulations, institutions, and discipline imposed by the modern state, they also need the security that comes from state surveillance. Thus, in their quest for security, they are engaged in a constant negotiation between autonomy and integration, carving out autonomy in any space available.” (AlSayyad and Roy 2004: 18)

This theory of the ‘urban informals’ carving out autonomy in any space available can be read as people appropriating | engaging loose space.

Tanya Zack’s documentation of trolley pushers supports the concept of trolley pushers as ‘urban informals’ who appropriate loose space in the city:

> ‘Recyclers operate independently of labour regulations and protection, without employee benefits, using improvised transport, and frequently inadvertently contravening bylaws. But they are intimately entwined with the formal, recognized systems of urban life: essential suppliers to registered recycling businesses, intense users of city roads, sidewalks and public spaces, specialised reclaimers competing daily with municipal waste removal corporations.’

(Zack 2012: 55)
2.3 SPATIAL TYPOLOGIES IN THE CITY

2.3.1 LOOSE SPACE
Loose spaces are spaces that lie outside of the “control of regulations and surveillance that come with the established uses of planned public space” (Franck and Stevens 2007: 8). They are “conditions where activities not originally intended for these locations take place” where there is reduced or little regulation (Bremner 2010: 74).

Loose space develops in a multiplicity of urban settings, some planned for unambiguous uses and others that have no clearly defined functions but that are accessible to the public. Sites theorised by Karen Franck and Quentin Stevens as loose space intersect with Lynch’s “open space,” which has “no necessary relation to ownership, size, type of use, or landscape character” and may comprise all the negative un-built and uncommitted space in and around the city. (Lynch 1965: 396-397).

Loose space also coincides with Crawford’s “everyday urban space” that “includes vacant lots, sidewalks, front yards, parks and parking lots that have been appropriated for new and often temporary uses” (Franck and Stevens 2007: 6).

Many spaces that are publicly-owned, such as streets, sidewalks, plazas and squares, are open to an assortment of uses beyond those originally intended. “It is … in these spaces that the city exhibits the key features of urbanity: access, freedom of choice. [and] density…” (Franck and Stevens 2007: 6)

Places where the orthodox uses have become detached from the space allow for new uses and new meanings by offering an invitation to imagine what the place could be. Places that once had functions, but may no longer have, include empty lots, abandoned buildings, piers, waterfronts and tunnels (Franck and Stevens 2007: 8).

Franck and Stevens state that leftover spaces that are usually appropriated are typically located next to spaces with fixed functions; such spaces include “under bridges and next to highways and railroad tracks.” (Franck and Stevens 2007: 7) (See Chapter 3, page 47)

These loose or leftover spaces offer opportunities for use in new and unexplored ways.

The trolley pushers in Newtown have appropriated all three of the above mentioned spaces, using the spaces underneath and next to the M1 Highway as well as the open spaces next to the railroad tracks near Braamfontein Station for sorting and storage of reclaimed goods. By appropriating loose space they address their economic need to make a living. Spaces such as these exist “beyond the boundaries of organised social space” (Franck and Stevens 2007: 7) and the types of activities, in this case sorting, storage and living, that unravel within these loose spaces juxtapose the clearly defined functions of the adjacent tight spaces.

2.3.2 TIGHT SPACES
Tight spaces are theorised as the contrast to loose spaces. They are defined as spaces in which fixed activate and schedules occur, where movement is structured from point to point in a sequence of planned departures and arrivals, with little possibility for deviation or transgression. (Bremner 2010: 74).

LOOSE AND TIGHT SPACES ARE FURTHER EXPLORED IN CHAPTER 3, PAGES 41-60.
La Varra characterises loose spaces and their uses as “Post-It City”, which then describes as a fragile and fragmentary network which filters into the tightly woven structures of urban public space.” (La Varra 2001: 428)

In their book, Franck and Stevens (2007: 18) write about a study that was conducted in nine developing countries which concluded that street vending is increasing at a phenomenal rate. They are quoted as saying that “most vendors are micro-entrepreneurs, not dependent workers. The informal and often robust economy observable in loose space sustains small-scale, independent and local entrepreneurship, all in sharp contrast to businesses owned by multinational corporations.” (Franck and Stevens 2007: 18). This view echoes that of De Soto’s, of informality as a micro-enterprise. It can therefore be said that informality, such as the trolley pushers, unravels in loose space.

“In loose space, the actions of others may be quite unpredictable, as can the speed and direction of their movement.” (Franck and Stevens 2007: 14)

The underlying aim of this project, then, is to facilitate the trolley pushers of Newtown to better utilise “their” loose spaces, to enable them to increase their productivity and income - to their advantage and for the benefit of the City of Johannesburg as a whole.
The loose spaces of the street and pavement are frequently appropriated by trolley pushers; this is where their daily activities unfold.
3.1 LAND USE MAP

Illustration 21: A map of Newtown, showing the land use, the redevelopment zones, the location of the remade buy-back depot, and the chosen site outlined in red.
3.2 NEWTOWN - THE HIGHWAY DIVIDE

The most well-known part of Newtown is considered Johannesburg’s ‘Cultural Precinct’. But Newtown is larger than its ‘Cultural Precinct’ and can currently be divided into four areas of development [see illustration 5]. A lot of money is and has been invested in the areas east of the M1 Highway, but most of Newtown west has retained its a gritty industrial character [see pages 24-25].
3.2.1 THE UPGRADED EAST

ILLUS: 26 MAP ILLUSTRATING POSITIONS FROM WHICH PHOTOGRAPHS HAVE BEEN TAKEN IN THE UPGRADED EAST SECTION OF NEWTOWN

ILLUS: 24 BRICKFIELDS SOCIAL HOUSING, ON THE CORNER OF CARR AND MIRIAM MAKEBA STREETS WAS COMPLETED IN 2005

ILLUS: 25 THE MARKET THEATRE (IN THE BACKGROUND) OCCUPIES WHAT WAS ONCE THE NEWTOWN MARKET BUILDING WHEN THE FRESH PRODUCE MARKET WAS ACTIVE IN NEWTOWN. THE STREET FURNITURE THAT WAS PART OF NEWTOWN’S RECENT URBAN UPGRADE IS IN THE FOREGROUND
The Sci-bono was established in 2006 in the old electric workshop built in 1906 to house the turbines for the electric trams.

Museum Africa (on the right) occupies the greater part of the old Newtown Market building, and fronts on to the hard-landscaped Mary Fitzgerald Square which has undergone numerous upgrades in recent years.

Anglo Gold Ashanti and numerous other companies have made Turbine Hall their home. The old Jeppe Street Power Station was upgraded between 2005 and 2009 and now houses various offices, conference centres and a wedding venue.
3.2.2 THE INDUSTRIAL WEST

Illus. 33 A VIEW OF THE CITY OVER THE ROOF TOPS OF THE MILLS BUILDING ON CARR STREET [SOURCE: TARKASTAD, J. [SA]]

Illus. 34 A TIGHT FABRIC WITH SMALL STREET FRONTAGES, ABOVE ALONG GWIGWI MRWEBI STREET, ARE WHAT CHARACTERISE THE WESTERN EDGE OF NEWTOWN.
The industrial nature of the mills precinct can be seen as one exits the M1 highway at the Carr Street off-ramp.

The original bridge that links the mills buildings over Quinn Street has remained as a reminder of the precinct's light industrial heritage.

Although residential units (on the left) were developed above the original Premier Mills office block, Quinn Street still has an industrial feel.

The Mills precinct has a very different type of 'cultural feel' with graffiti that covers most surfaces, especially along Henry Nxumalo Street underneath the M1 highway.

Light industry such as Glenpak, a cardboard company on Gwigwi Mrwebi Street, is still dominant in the Mills precinct.

Krishna's Spice Enterprise (on the right) is another example of active light industry in the Mills precinct.
3.3 URBAN ANALYSIS

3.3.1 THE GEOGRAPHY OF RECYCLING

On allocated days Pikitup trucks move through neighbourhoods amassing the trash that is put on the pavements for collection. Trolley pushers move through these same neighbourhoods ahead of the trucks in order to reclaim materials that can be sold as recyclable products.

The neighbourhoods that are serviced by the Pikitup Waterval Depot [see page 03] and that are in walking distance of the Remade buy-back depot are accessed via two main routes.
3.3.2 SUBURBAN COLLECTION AREAS

Illus. 43 THE AREAS FROM WHICH MATERIALS ARE COLLECTED ON TUESDAYS

Illus. 44 THE AREAS FROM WHICH MATERIALS ARE COLLECTED ON WEDNESDAYS

Illus. 45 THE AREAS FROM WHICH MATERIALS ARE COLLECTED ON FRIDAYS
3.4 NEWTOWN ANALYSIS
3.4.1 FIGUREGROUND

The figureground illustrates how the urban fabric of Newtown and neighbouring Fordsburg can be divided into three distinct zones.

A shows how porous the fabric of the Cultural Precinct is. This precinct is characterised mostly by large institutional and cultural buildings that front generous pockets of public open space. The majority of open space in the cultural precinct is loose space, and is used for events and gatherings on a fairly regular basis.

B In contrast, the area to the west of the M1 highway, the Mills precinct, has a dense built fabric comprised mainly of light industrial warehouses. These warehouses are situated on large blocks dissected by east-west service alleys. The type of loose space that exists in this precinct mainly manifests in these alleys and unoccupied buildings. The selected site is the only large, open, loose space in this precinct.

C West of Newtown, Fordsburg continues a dense urban fabric in small blocks of a more residential scale.
3.4.2 MAPPING OVERLAY

Carr Street is a main connector between the inner city and the western suburbs for vehicular traffic. It also connects both the suburbs with the inner city with the M1 Highway.

Carr Street also connects the areas of the suburbs and the inner city situated south of the railway tracks with the foot bridge that leads pedestrians across the track to the Braamfontein Station.

Carr, Bree and Burghersdorp Streets are the main areas of congestion with heavy vehicular, pedestrian and trolley pusher activities.

Where Burghersdorp Street and Central Road meet Carr and Subway Streets is the biggest point of congestion. Pedestrians are crossing the road during rush hour, vehicles are moving quickly around the bend into Carr Street and Trolley pushers are pulling heavy goods across the intersection.

*ILLUS: 48 CARR STREET; THE TROLLEY PUSHERS MAKE USE OF THE STREETS TO OPERATE, THUS COMING INTO CONTACT WITH FAST-MOVING AND POTENTIALLY DANGEROUS VEHICULAR TRAFFIC*
3.5 LOOSE SPACE ON CARR STREET

ILLUS: 49
LOOSE SPACE THAT HAS BEEN APPROPRIATED ON CARR STREET
3.5.1 APPROPRIATING LOOSE SPACE ON CARR

The trolley pushers occupy many loose spaces in the city which they use to sort, to store goods and to live.

Each of these spaces will be explored in the following pages.

Informal traders also appropriate loose space on the streets used by high traffic volumes.
A series of abandoned buildings that sit to the west of the Remade building on Carr Street have been appropriated by a number of trolley pushers who sell to Remade. These vacant buildings have become loose space and the opportunities that they offer have been realized by a number of trolley pushers. The buildings are located on the two sites to the west of the Remade buy-back depot which means that they are prime location for sorting and storing of the reclaimed materials that will later be sold to the Remade depot. These buildings also offer well located living space on the fringe between the inner city and the north-western suburbs, which opens up a number of job opportunities. The buildings consist of three residential sized units situated on a long narrow lot and a large three to four storey warehouse that has remained uncompleted for a few years. This site is ideal for using both interior and exterior spaces effectively for living, and for the sorting and storing of materials.
3.5.3 THE ABANDONED RAILWAY BUILDING

A building that has virtually fallen off the radar of South African history. Now owned by the South African Railways and looking for a tenant, it was, until mid-2013, being inhabited by trolley pushers who used the interior and exterior spaces for living as well as the sorting and storing of reclaimed materials. The building has since been forcibly vacated and bricked up.

There is no official record of this building at the Johannesburg City Council or in the Transnet Heritage Library. The building features the same gable and clock tower as the Braamfontein Train Station which was opened in 1912, so it assumed that this building was built around the same time.
Once a school known as Bekezela College, this large area of land is nestled between the Carr Street off-ramp and Carr Street itself, situated just east of the Remade buy-back depot. It comprises of long narrow internally-segmented buildings, open courtyards and large open air corridors between them.

Some time after this ‘compound’ was vacated by the school it was appropriated by trolley pushers. True to the theories of urbanisation and informal trading previously discussed, this is an ideal space to use for purposes other than those for which it was designed. The corridors between the buildings offer opportunities for the sorting and storing of large quantities of reclaimed materials. The classrooms offer reasonably sized living spaces and the courtyards are a perfect fit for social spaces within this ‘community of trolley pushers’
Streets are loose space because they are not considered as part of the organized social spaces of the city.

The loose space that occurs where Carr Street off-ramp meets Carr Street, (here it opens up from one lane into three), is well used by trolley pushers. It has been appropriated and put to use as a more permanent sorting and storage space in the city.
The space underneath the M1 highway around the Carr Street off-ramp is a large loose space “with no intended use, ...lacking conventionally appealing features.” (Franck and Stevens 2007: 7) And yet it has been appropriated as a living, social, sorting and storage space by people who have settled informally and who make a living as trolley pushers in the city.

“Bridges gather to them an underside; they have an underworld. They are outside the rush and flow taking place above, over the bridge”
Bishop 1988: 96
On the corner of Miriam Makeba and Carr Street two trolley pushers ‘rent’ a small secure storage yard from the Market Theatre. They make use of the loose space of the service road entrance and the pavement to sort their reclaimed materials. Because these men have a relatively large storage area that they can lock up at night, it means that they have the ability to hold on to various material until they feel that the price is right to sell. However, this storage space is under threat with the construction of Newtown Junction, and a new secure storage area will have to be found by mid-2014.
The area situated between Carr Street and the Carr Street on-ramp has been 'claimed' by a few trolley pushers who work together to collect and sort reclaimed materials. All their materials are stored here before they are sold to the Remade buy-back depot. Because there is such a large amount of land between the on-ramp and the street the trolley pushers are able to store more materials and have the ability to hold onto materials until they feel the price is right to sell. This is an important factor for the trolley pushers.
3.6 TIGHT SPACE SITE ANALYSIS

3.6.1 CARR STREET DEPOT

The Remade buy-back depot is situated on Carr Street. It is conveniently located between the Johannesburg Central Business District and the small-business and residential areas of Fordsburg and Mayfair. This means that the almost 150 informal waste recyclers who sell to the Newtown branch have access to a greater variety and quantity of materials from both residential and business waste.

Illustration 51: Trolley pushers waiting to sell their materials outside the Remade buy-back depot.

Illustration 52: The Remade buy-back depot on Carr Street. Both formally and informally collected materials are sold here.
A TROLLEY PUSHER ON HIS WAY TO SELL RECLAIMED MATERIALS ON CARR STREET IN THE BACKGROUND ARE THE SILOS ON THE LEFT AND THE REMADE BUY-BACK DEPOT.
3.6.1.1 THE MOVEMENT OF MATERIAL THROUGH BOTH PORTION A AND B OF THE REMADE BUY-BACK DEPOT

"TIGHT SPACES ARE HEAVILY PROGRAMMED PLACES WITH EXTENSIVE RULES AND PRESCRIBED WAYS OF BEING USED." (Rivlin 2007, 38)
The Remade Recycling company's buy back depot is a theoretically tight space. The four following plans show the structured and controlled movement of people and materials through the Remade buy-back depot.

The functions of Portion A of the warehouse are in constant flux, with people and vehicles moving through it regularly performing various actions.

The functions of Portion B of the warehouse are fixed, this section of the warehouse is used for sorting and storage all the time.

Materials that are brought into the warehouse are moved in a specific sequence from one dedicated space to another. The plan on the facing page shows this movement and the key below describes what happens at each point.
3.6.1.2 THE MOVEMENT OF TROLLEY PUSHERS THROUGH PORTION A OF THE REMADE BUY-BACK DEPOT

ILLUS: 57 PLAN OF THE REMADE BUY-BACK DEPOT SHOWING THE MOVEMENT ROUTE OF THE TROLLEY PUSHER THROUGH THE WAREHOUSE
Trolley pushers have to weigh their bags of materials on a small, floor standing scale that can hold a maximum of 20kg before they can exchange their goods for money.
3.6.1.3 THE MOVEMENT OF DELIVERY VEHICLES THROUGH PORTION A OF THE REMADE BUY-BACK DEPOT

ILLUS 59 PLAN OF THE REMADE BUY-BACK DEPOT SHOWING THE MOVEMENT ROUTE OF OFF-LOADING VEHICLES THROUGH THE WAREHOUSE
Private vehicles that sell materials to Remade, as well as the Remade collection vans are weighed on a floor scale in front of the cashier's booth before materials are off loaded.
3.6.1.4 THE MOVEMENT OF COLLECTION TRUCKS THROUGH PORTION A OF THE REMADE BUY-BACK DEPOT

PLAN OF THE REMADE BUY-BACK DEPOT SHOWING THE MOVEMENT ROUTE OF THE COLLECTION TRUCKS THROUGH THE WAREHOUSE
KEY

1. ENTER REMADE - PASS SECURITY CHECK

2. WEIGH VEHICLE [LESS GOODS] ON FLOOR SCALE (20+KG)

3. LOAD GOODS

4. WEIGH VEHICLE [WITH GOODS]

5. EXIT, PASSING SECURITY
ILLUS. 63 PLAN SHOWING LOCATION OF THE SITE AND EXISTING CONDITIONS; CONTOURS, SUN ANGLES AND WIND DIRECTION

ILLUS. 64 ELEVATION OF THE SITE FROM CARR STREET
3.7 THE SITE

The chosen site sits across the road from the Remade buy-back depot and belongs to the South African Railways. It is tucked away between the old Kazerne Marshalling (goods) Yards and Carr Street. The Marshalling Yards were a hive of activity and in full use when Newtown abounded with light industry. Since the market moved to the City Deep, the Mills closed down and the power station was decommissioned, the goods yard has been a lot less active.

This sliver of land is “no man’s land” according to Transnet Heritage Librarian Yolanda Meyer (June 2013) and there is little information regarding the construction and intended use of the This site and the buildings on it are loose space. It is largely unoccupied which has the potential to create new opportunities.
ILLUS 66  CARR STREET LOOKING WEST - WITH THE SILOS AND REMADE WAREHOUSE ON THE LEFT AND THE ABANDONED RAILWAY BUILDING ON THE RIGHT
Carr Street looking east - with the mills buildings, silos and remade warehouse on the right and the abandoned railway building on the left.
4.1 FINDINGS ABOUT CARR STREET

Months of research into this project, of following and talking to trolley pushers, of checking and rechecking data, have turned up several 'key findings'. These can be loosely divided into two categories: those pertaining to the Carr Street location, and those pertaining to the trolley pushers' economics.
There is generally a lack of secure storage facilities. Secure storage that does exist will be removed to make way for new developments.

**IMPLICATIONS:** The proposed building will house secure storage facilities where trolley pushers can store their reclaimed materials.
Loose space is used for sorting and storage of reclaimed materials.

**IMPLICATIONS:** The proposed building programme should provide for a safe working environment, away from open public spaces. A loose space sorting area away from the general public will be provided.
There are a few sites along Carr Street where trolley pushers sort and store their reclaimed goods in the same place they live [sleep].

IMPLICATIONS: Dignified sleeping spaces, separate from the messy sorting and storage areas.
There is no [formal] infrastructure for trolley pushers moving along the road network.

**IMPLICATIONS:** Trolley pusher lanes will be included in the urban strategy.
Carr Street is a main pedestrian link between the inner city and the footbridge that leads to the Braamfontein train station.

**IMPLICATIONS:** Trading will be included in the building programme in order to capitalise on the pedestrian network and generate additional income for the building’s inhabitants.
There is one [illegal] water point on Carr Street, underneath the M1 highway, that is frequented by trolley pushers seeking fresh water.

**IMPLICATIONS:** Ablution and fresh water facilities will be included in the urban strategy and the building programme.
A few of the trolley pushers who choose not to sleep rough in the city during the week, travel far distances each day to work in Newtown.

**IMPLICATIONS:** appropriate sleeping facilities, for trolley pushers who wish to save money and stay in the city during the week, will be included in the building programme.
4.2 FINDINGS ABOUT TROLLEY PUSHER ECONOMICS

The prices offered by the private buy-back depots differ from depot to depot, and they tend to fluctuate too.

The prices depicted above are an average of the prices offered by the Remade buy-back dept over a few months. The information was gathered from various trolley pushers in the area between March and August 2013, therefore the data may not be 100% accurate and should rather be seen as an estimate.

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
<th>Prices</th>
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<tbody>
<tr>
<td>Plastic (PET) Bottles</td>
<td>Polyethylene Terephthalate Water Bottles, Colddrink Bottles</td>
<td>R3.00 per kg</td>
</tr>
<tr>
<td>PE-HD Plastic</td>
<td>High Density Polyethylene Shampoo &amp; Milk Bottles, Bags, Household Containers</td>
<td>R1.00 per kg</td>
</tr>
<tr>
<td>Glass Bottles</td>
<td>Glass Beer, Wine, Colddrink and Condiment Bottles</td>
<td>R0.40 per kg</td>
</tr>
<tr>
<td>Cardboard Boxes</td>
<td>Cardboard Packaging Boxes, Cereal Boxes</td>
<td>R0.65 per kg</td>
</tr>
<tr>
<td>White Paper</td>
<td>HL-I White Paper, Printing Paper, Exam Paper</td>
<td>R1.80 per kg</td>
</tr>
<tr>
<td>Tins</td>
<td>Tinned Foods</td>
<td>R0.30 per kg</td>
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</table>
After further engagement with the site and the people operating in the area, a hierarchical system within the network of trolley pushers became apparent. It has become evident that a small select group, such as Jonas and Lucky who have been working in the industry longer have formed informal ‘contracts’ with specific collection points (such as restaurants and small businesses) These men and women are not only collecting more materials; they tend to collect more specialised goods.

For many of the trolley pushers, however, it is a means of making just enough money to cover food costs for the week (Zack 2012: 58). Their reclaimed goods are quickly sold for cash, so less storage space is needed.

**implications:** The storage area[s] will need to be large enough to accommodate the large volumes of materials collected every week, as well as the various types of materials.

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**JONAS & LUCKY**

<table>
<thead>
<tr>
<th>AVERAGE EARNING/ WEEK [R]</th>
<th>AVERAGE KGS COLLECTED/ WEEK [KG]</th>
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<tbody>
<tr>
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**BOB**

<table>
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<tr>
<th>AVERAGE EARNING/ WEEK [R]</th>
<th>AVERAGE KGS COLLECTED/ WEEK [KG]</th>
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<tr>
<td>600</td>
<td>200</td>
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<td>300</td>
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<td>162</td>
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**total**

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<th>2900</th>
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<tr>
<td><strong>total</strong></td>
<td>1472</td>
<td>1056</td>
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---

**operate from a large secure storage area that is let out (for free) by the Market Theatre**

* not his real name
<table>
<thead>
<tr>
<th>Category</th>
<th>SIPHO*</th>
<th>DAVID*</th>
<th>JOSEPH*</th>
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<td><strong>AVERAGE EARNING/WEEK [R]</strong></td>
<td>750 250 250 0 0 0 260 400</td>
<td>300 100 200 0 0 130 200</td>
<td>60 20 50 50 20 0 0 0</td>
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<td><strong>AVERAGE KGS COLLECTED/WEEK [KG]</strong></td>
<td>1260 900</td>
<td>678 610</td>
<td>131.5 115</td>
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**Notes:**
- Polyethylene: water bottles, colddrink bottles
- Terephthalate: shampoo & milk bottles, bags, household containers
- Cardboard: packaging boxes, cereal boxes
- Glass: beer, wine, coldrink and condiment bottles
- Tin: tinned foods
- Plastic (PET): bottles
- White paper: printing paper, exam paper
- Total earnings: 65 160 250 200 20 60 200 250 300 50 2000 0 0 50 20 4000 0 0 100 40 4987 610 900 1056 115

**Average Earnings per Week:**
- SIPHO: R3.00
- DAVID: R1.00
- JOSEPH: R0.65
- AVERAGE: R0.40
**Total Collected Per Week [Kgs] by 5 Trolley Pushers**

- Bottles: 635
- Cans: 860
- Glass Jars: 4140
- Cartons: 1312
- Newspaper: 360
- Cans: 355

**Average Collected Per Week [Kgs] by a Trolley Pusher**

- Bottles: 127
- Cans: 172
- Cans: 828
- Cartons: 262
- Newspaper: 72
- Cans: 71

**Average Collected Per Month [Kgs] by a Trolley Pusher**

- Bottles: 508
- Cans: 688
- Cans: 3312
- Cartons: 1050
- Newspaper: 288
- Cans: 284

*Not their real names*
**Key Findings and Resulting Implications**

<table>
<thead>
<tr>
<th>DENSITY(^1) OF MATERIALS (\text{[g/cm}^3])</th>
<th>STORAGE(^2) REQUIRED PER MONTH (\text{[m}^3])</th>
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<tr>
<td><em>COMPACTED</em> # UNCOMPACTED</td>
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**Total** \(54.5\text{m}^3\)

---


2 - calculation: \(\text{m}^3 = \text{mass} / \text{specific density}\)
<table>
<thead>
<tr>
<th>STORAGE REQUIRED PER MONTH [m³]</th>
<th>FOR 90 TROLLEY PUSHERS</th>
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<td></td>
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<td>630</td>
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<td>180</td>
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</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4905 m³</strong></td>
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**COLLECTIVE STORAGE**

**TOTAL = 4905 m³**
ALL ROADS LEAD TO NEWTOWN | 82
Harber, Masson & Associates designed a complex comprised of

- a bathhouse; with self-flushing, unblockable toilets.
- accommodation for 44 'drum ladies'; with a small commercial outlet and plumbing, separated from two bedrooms by a courtyard with a pergola.
- a carboot market; for operators on beachfront parking lots at night
- open sheds; were created for pinafore ladies to sell their wares.

and transitional housing was proposed on the site for the convenience of drivers and itinerant traders.
Lessons learnt

Ablution Facilities

The management system of the sorting|storing facility and that of the satellite stations will be integral to the facilities’ sustainability. The most notable lesson to be taken from The Mansel Road Bus Facility is the ingenious design of the ablution block that encourages the trader at the entrance of the ablutions to take management of them and ensure their continued functioning and cleanliness.

Living Trading Unit

The integration of private dwelling and trading in one unit is an approach that can be taken when conceptualising the living areas for the trolley pushers and the trading spaces along Carr Street. Doubling as living and storing space, the establishment of trading on Mansel Road lead to a need for storage, sleeping and trading facilities. Ablution facilities were also needed to accommodate the travellers who stay overnight.

A small commercial outlet and plumbing, separated from two bedrooms by a courtyard with a pergola. This courtyard doubles as storage space and private dwelling space for the ‘drum ladies’.

The bathhouse|ablution facility is fronted by a small shop where items can be purchased and luggage can be left. It is the responsibility of the ‘shopkeeper’ to keep the facility clean because this stimulates trade. The bathhouse has self-flushing, unblockable toilets. Solar panels fitted to the roof of the ablation block provide the power necessary to heat the water for hotwater showers [cost -R1 for two minutes]

Illustr: 72 Section and Plan of the Bathhouse [Source: Schlemmer 2004, 44]
5.1 TROLLEY PUSHING ON AN URBAN SCALE

The urban design framework is based on the mapping of the suburbs in which the majority of trolley pushers collect recyclable materials.

As shown in Chapter 3 there are two main routes that link the suburbs, in which trolley pushers collect, to the depot where they sell. These routes use main roads from which the trolley pushers branch off to get into each suburb. These roads are main arterials which creates hazardous conflict zones between the trolley pushers and formal road traffic.

5.1.1 THE PROPOSAL:

The proposal is that these main roads be widened so that the trolley pushers can be formally be given a dedicated lane. This will minimise their interaction with fast moving vehicular traffic and reduce the number of “conflict zones”.

ILLUS: 74

MAP SHOWING MAIN ROUTES WITH PROPOSED TROLLEY PUSHER LAKES AND THE LOCATION OF STATIONS

ALL ROADS LEAD TO NEWTOWN
These dedicated lanes would not only minimise the conflict zones they would be a formal acknowledgement by the City of Johannesburg of the valuable work carried out by the trolley pushers.

‘Stations’ are proposed at specific intervals along these main connection routes. [with the architectural intervention on Carr Street being the nucleus of these routes]

Each station will have a small ablution block, a trade stall and storage space; based on the precedent of Mansel Road Bus Facility in Durban (following page).

Each ablution block will comprise of toilets, wash hand basins and a potable water point. The two larger sites should include showers in the ablution block.

The ablution block will be fronted by a trade stall which means that anyone wishing to make use of the ablution facilities will have to pay a small fee to the shopkeeper. The management of this facility is the responsibility of the shopkeeper. The motivation for this is keeping the facility clean and tidy will encourage a greater flow of people through the shop, thus increasing the shopkeeper’s trade volumes. Each trade stall that fronts an ablution block will have storage space for six to seven trolleys where Trolley pushers can safely leave their accumulated goods while they use the ablution facilities.
6.1 CLIENTS AND USERS

CLIENTS: The client is potentially an agent of the City of Johannesburg such as The JDA, which has an interest in urban upgrade in Newtown.

The client could also be a privately owned recycling company such as Remade. Remade, an organisation with a vested interest in the recycling business, understands the value of the informal recyclers, since the latter bring in up to three quarters of Remade’s daily intake of reclaimed materials.

USERS: The users of this facility will be trolley pushers.

6.2 A NEW ECONOMIC MODEL

From the onset of this project, a major aim has been to create upliftment through skills development and secure storage facilities for the trolley pushers in Newtown, along the same lines as their existing trend of infiltrating loose spaces in the city. One of the main intentions behind the creation of secure storage space is largely to increase the economics, by increasing the potential holding power of the trolley pusher.

On the east side of the city there are a number of buy-back depots which means that the prices that they offer for reclaimed goods are always competitive. If someone selling reclaimed goods felt that a depot was not offering a fair price for materials they could move a block or two up and find another depot and sell for a better price.

However, it’s a different case on the western edge of the City environs where there is only one depot. Here prices can fluctuate as the depot owner sees fit because there is no competition to challenge his prices.

Currently the majority of trolley pushers use the system as a means of producing capital flow - the idea of significant income and investment possibilities is simply out of their reach.

Over and above the obvious advantage of being able to collect more goods, allowing a large number of trolley pushers to store vast quantities of goods at any one time will give the trolley pushers some control, some power. This will provide them with potential to significantly increase their income in the long run, as it will allow them to hold onto specific materials until they feel the price offered by the buy-back depot is favourable for selling. So, with large holding/storage areas, a system of ‘investment flow’ is created. Then trolley pushers could band together as a collective and would have the potential to negotiate with the buy-back depot or withhold their goods to force more favourable prices, to some extent - essentially allowing them to turn their waste into an investment. This potential would most likely attract more people to take up work in the informal recycling sector.

Ideally the proposed intervention should be a facility that caters for both the capital and investment flows, and should facilitate the transaction between formal and informal sectors.

The intervention should include all the programmes depicted on the following page:
6.3 BUILDING PROGRAMME

- Administration and Skills: 1400m² (existing building)
- Trading: 90m²
- Ablutions on Living Floor: 60m²
- Ablutions on Sorting Floor: 40m²
- Storage: 5000m³
- Sorting: 2000m²
- Sleeping: 90m²
- Living Floor: 60m²
6.4 A PROCESS OF DESIGN INVESTIGATIONS

The design development can be separated into five parts:

6.4.1. The first railway site investigation
6.4.2. The silos – external chute system
6.4.3. The silos – restructured
6.4.4. The second railway site investigation
6.4.5. The third railway site investigation

*the skills development center was always intended to be an alteration of the existing building on the railway site
6.4.1 THE RAILWAY SITE

Initial investigations were carried out on the site directly across the road from the Newtown Remade Buy-back depot. Early interviews with a small number of trolley pushers had revealed the fact that materials had to be cleaned and sorted before being sold to Remade. (This information has since been discredited.) Thus the first sketch design revolved around a sorting floor and storage area that fed into a central cleaning area. The water runoff from the cleaning area then drained into a reed bed to filter the water so that it could be used for irrigation purposes.

The idea was that the trolley pushers would move onto the sorting and storage platform (3-4 meters above Carr Street) using the existing road that runs around the back of the site. From there goods could be sorted into piles of each different material, cleaned and then either stored in ‘lockers’ or taken across the road to be sold via a ramp that was to lead directly to the entrance of the Remade buy-back centre.

A problem encountered was this – the sorting process takes up a lot of horizontal space, and the existing practice of storing materials horizontally was using up a lot of valuable sorting space.

ADDITIONAL FACILITIES

The design included, in the existing railway building, a skills development workshop, where trolley pushers could be taught to upcycle reclaimed materials that could be sold for additional income. As this building faces Carr Street along the main pedestrian route that links the inner city with Braamfontein station, it provides the perfect opportunity for the selling of upcycled goods, with the minimum transportation effort. Sleeping facilities were assigned to the loose spaces already infiltrated by the trolley pushers, i.e. the three small residential units and the large warehouse to the west of the Remade depot.
6.4.2 THE SILOS

After exploring the site further, a potential solution was found for the problem of wasting space by storing goods horizontally - the ten grain silos originally built for the Premier Milling Company further up on Carr Street.

PRECEDENT STUDY: STORING STRATEGY
THE SILOS

The design logic of a grain silo is that the grain is off-loaded in the receiving pits, from where a bucket lift moves the grain up to the top and deposits it into a scale bin. The weight of the grain is registered and it is then fed into a tipper that moves along a conveyor belt to deposit the grain into storage bins. When the grain is required, (either the price for selling is right, or it is needed to make new products) it is released into belt loading spouts at the base of the storage bins and moved along a conveyor belt to the point from where it can be collected.

LESSONS LEARNT

The concept of storing large quantities of grain vertically is a logical use of space in the city, where plots of land are generally small and have a high value. This concept could easily be adapted to store reclaimed materials.

At the onset of this project the 10 grain silos were empty, and considered to be loose space.
INITIAL RESPONSE - VERTICAL STORAGE

At 36 meters tall, 10 floors could easily be accommodated inside the silos. The initial idea was to split the silos (in section) into two halves; each with a collection floor at the bottom and four to five sorting floors above.

• The internal pockets created by the silos would be used as sorting space by one trolley pusher or a collective of trolley pushers.

• Storage of the reclaimed goods would happen in chutes attached to the outside of the silos.

• Each chute would hold a different type of material and would run from the sorting floor down to one of the collection floors.

• A load cell would be attached to the underside of each chute in order to show the weight of the materials in each chute at any given time.

• When the trolley pusher felt that s/he had enough material, based on the weight, and that the price of that specific material was right s/he could unload the material from the chute and sell it to Remade next door.

The vertical circulation of this initial sketch design was proposed to happen in the existing building on the southern edge of the silos which previously housed the bucket elevator. The proposal was for two generic elevators to move people and trolleys up and down the silos.

There was a snag, however. Using electric lifts was not practical - too expensive and not within the trolley pushers' capacity to maintain. A simpler mechanism was needed to provide for vertical circulation.
The trolleys used by many of the men and women collecting recyclable materials comprise of upcycled materials. All the components of the trolleys are readily available in urban areas. The simplicity of the connections makes for easy construction and maintenance.

LESSONS LEARNT
The simplicity and efficiency of the trolley design is an important design generator for this dissertation.
SECOND RESPONSE - KINETIC INVOLVEMENT

Tom Kundig specialises in the concept of mechanical systems that can be operated and maintained by the people who inhabit the building.

“CELEBRATE MOMENTS WHEN PEOPLE BECOME KINETICALLY INVOLVED WITH THE BUILDING AND THE SPACES THEY INHABIT.” [MARSHALL 2013]

The trolley pusher is already kinetically involved with the city and the suburbs, using pure manpower to move materials from collection point to selling point. The trolley pusher’s trolley is made of simple materials (see facing page) put together in clever ways that make for easy maintenance. So it was a simple step to make the mental transition to a mechanical circulation system, and this approach is one that has driven the development of the design since the second review.

THE LIFT

A series of pulley systems were explored for moving people up through the building. The problem with creating mechanical advantage with a series of pulleys (a complex pulley system) is that the more pulleys added to the system, the more vertical space is needed to move the platform; the existing shaft is 40m high and extending that further for a pulley system did not seem appropriate.

To resolve this problem, the possibility of using a counterweight with two different sized gears was explored.

• The counterweight would have the same mass as the lift cage.

• The smaller gear, which can be turned easily and quickly, would be used to move a lighter load up the lift shaft, while

• The larger gear would be needed for heavier loads as it provides more torque. It would obviously also move more slowly
If space in the vertical chutes was to be optimised then materials needed to be compacted before being stored. Therefore, while the kinetic movement through the building was being explored, so were ways in which materials could be compacted before storage. This is where a complex pulley system could be useful. If a weight was attached to a rope, and fed through a complex pulley system to wind around a barrel, then the kinetic energy of the falling weight would compact materials in a pit below it.
The size of the pit determines the size of each compacted block of materials. As it’s important to ensure that the compacted block of material is manageable for one person to move on his own, the pit size was based on the size of the one tonne bag, used by trolley pushers to collect and move goods around in. The most commonly used bag has a base of 760mm x 760mm and a height of 1900mm when full. Therefore the compacted blocks of materials were rationalised like this:
THE CHUTES

Each pocket within the silos would have five chutes; each allocated to various materials (see Chapter 4) and based on the size of the compacted block. Because cutting into the structure of the silos should be kept to a minimum, an attempt was made to optimise the efficiency of the incisions made for the chutes, by using them to bring light and ventilation into the silos too.

The main reason for attaching the chutes to the outside of the silos was to allow the internal space to be dedicated to sorting. However, attaching the chutes to the exterior of the building could also provide the city with a visual ‘trash barometer’. If the chutes were made of a transparent material, people driving along the M1 highway (to the east of the site) would be able to witness the rapid rate at which reclaimed materials were collected and sold in the city.

ADDITIONAL FACILITIES

The skills development workshop and sleeping facilities.
6.4.3 THE SILOS - RESTRUCTURED

The chute system in the silos needed to reflect this hierarchy. And the following was explored:

The chutes were placed inside the silo's concrete structure, minimizing the incisions needed to the structure. Instead, in order to keep the barometer effect for the rest of the city to see, long thin slits would be cut into the silos. These thin slits would have less potential to cause structural damage to the silos.

The 5 silos on the eastern edge would house the largest chutes. These would be allocated to the people who have been in the industry the longest and have a higher collection volume and a slower turnover rate. If the chutes were 33m tall, and 400mm x 500mm (to accommodate the compacted blocks of material) then each chute would be able to hold 6m\(^3\) of material.

The 5 silos on the western edge would, on the first three floors, be allocated to the smaller collectors. People who have a small collection volume and a quick turnover rate. The upper floors would house medium sized chutes and be allocated to the people who collect larger volumes of material but have a quick turnover rate.

**Option 1**
- The large operation trolley pushers physically move the compacted waste up to the top level of the silos and drop it into the chute, ready for collection.

**Option 2**
- The large operation trolley pushers hoist the compacted waste to the top of the silos and drop it into the chute, ready for collection.

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ILLUS. 66  SKETCHES SHOWING THE EXPLORATION OF THE CHUTE SYSTEMS
THE TURNING POINT

After long discussions and debates it was rationalised that housing could no longer just be part of an urban scheme, and had to feature as a built form in the project. Another rationalisation was that the structural integrity of the silos could not be tampered with and that sorting and storage would have to happen elsewhere.

Therefore the proposal moved back to the original site across the road from Remade on the sliver of land between Carr Street and the South African Railways.
The footprint of the building is marked out based on the grid of the surrounding buildings. The industrial grid of the Remade Buy-back depot is carried through the site on the north-south axis, and the northern edge of the abandoned railway building becomes the northern edge of the proposed building too.
With the 3-4 meter fall on the southern edge of the site, trading stalls will be accommodated in this space; feeding off the pedestrian network that moves along Carr Street, as in the first scheme.

Returning to the initial idea of the main access route for trolley pushers being the existing road that moves around the back of the site eliminates having a long ramp cutting through the site and taking up valuable space. The road moves up on to a proposed sorting platform. The different areas on the sorting floor would be defined by the compacting mechanisms and the chutes. The same principles of compacting and vertical storage that were conceptualised during the investigation in the silos would be applied on this sorting platform.

The 'chutes' would be made of wire mesh and would be used much in the same manner as before. Compacted material blocks would be hoisted up using a pulley system and then lowered into the chute. Collection would happen at the bottom of the chute. Chutes would be placed along the Carr Street edge of the sorting platform in order to retain the idea of the chutes acting as barometers.

Above the sorting and storage, deliberately separated to provide a level of dignity, would be the living spaces.
6.4.4.2 Design Principles

- **Sorting Floor on the Existing Upper Level, Accessible by the Existing Road Off Carr Street**

- **Mesh Storage Bins Along the Southern Edge, Visible to the Street to Act as a 'Trash Barometer'**

- **Compacting Mechanisms on the Southern Edge, Visible to the Street Showcasing the 'Machine-Like Quality' of the Sorting Floor**

- **Trade Stalls Tucked into the Site, Along Carr Street to Feed of Pedestrian Network (To Sell Upcycled Goods and Fresh Produce)**

- **Living Unit Opens Out Onto a Courtyard on the Northern Edge**

- **Living Spaces Above and Separate from the Sorting Floor**

- **Balcony That Overlooks the Street on the Southern Edge, Providing Passive Surveillance**

- **Access to the Sorting Floor Off Carr Street to Create Public Seating Where Trolley Pushers Currently Congregate**

- **Retain Some of the Existing Trees on Site**

- **Collonade Over Pedestrian Pavement**
In 2012 50 of us University of Johannesburg students participated in a project in Marlboro South. Marlboro South is an ‘informal settlement’ in a previously industrial area used as an apartheid buffer zone. Many of the warehouses have been vacated over time, becoming loose space. Today, those loose spaces have been illegally inhabited by informal urban dwellers.

For this dissertation the biggest lesson to be taken from the infiltration of these warehouses is the spatial arrangements of the dwellings set up by the inhabitants themselves. The living units are small and if the space allows for it they are arranged around courtyards that feed off main circulation routes. These courtyards have been carved out as gathering spaces that enhance the social networks of the warehouse microcosms.

The proposed architecture will allow for gathering spaces that build and enhance the trolley pushers’ networks by encouraging social interaction. These social interactions are important because they provide opportunities for trolley pushers to share ideas and build business relations.
The exploration of the residential floor revolved around a series of courtyards. The biggest of these courtyards was at the top of the staircase that provided social gathering space outside the Remade entrance on Carr Street. This courtyard was proposed as the main gathering space on the residential floor.

The problem with the layout plan shown here is that the courtyards are split in half by semi-public circulation routes, which means that the courtyards lose the intended privacy.

The units in this plan were also too big considering the men and women who would occupy them earn a relatively low income and would potentially not be willing to pay for such units.
The previous design investigation had been too static. It did not allow for much growth; and since the economy of the trolley pusher fluctuates so much the storage spaces need to be flexible enough to allow for expansion and contraction.

- The movement through the site has been restructured. Trolley pushers will move around the back of the site to the sorting platform via the existing road as before.
- Once materials have been sorted, they move south to the compacting mechanisms.
- From there the compacted blocks are stored on the southern edge of the site that faces Carr Street.
- There are six access points | cores from Carr Street that allow trolley pushers to either move up onto the sorting platform, or use the vertical circulation to access the residential floors above the sorting platform.

The sizes of each storage unit depicted below is the maximum [based on key findings: see chapter 4] cubic meters collected per item by 90 trolley pushers in one month.
6.5 DESIGN PRINCIPLES

6.5.1 MOVEMENT

KEY

- MAIN PEDESTRIAN ROUTES
- TROLLEY PUSHER LANE
- ACCESS OFF CARR STREET
- TROLLEY PUSHER ROAD
- ONTO SORTING PLATFORM
- TRADING STALLS

CARR STREET PLAN
6.5.2 INDUSTRY

The sizes of the storage bins were calculated based on the volumes of materials collected per month [see chapter 4, pages 77-80].
6.5.3 LIVING

KEY

- VERTICAL CIRCULATION CORES
- LOADING AREAS FROM CARR STREET AND SORTING LEVEL
- CIRCULATION ON THE SOUTHERN EDGE
- WASHING AREA & LOOSE SOCIAL SPACE
- LOOSE SOCIAL SPACE
- ABLUTION FACILITIES

LIVING FLOOR PLAN
living units

washing area & loose social space

vertical circulation cores

circulation on the southern edge

ablution facilities

washing area & loose social space

living units

potential use of space:

living|sleeping

cooking|dining
**KEY**

- **TROLLEY PUSHER LANE**
- **ACCESS OFF CARR STREET**
- **TRADING STALLS**
- **VERTICAL CIRCULATION CORES**
- **CIRCULATION ON THE SOUTHERN EDGE**
- **SPACE SORTING MECHANISMS**
- **PRIVATE VERTICAL STORAGE**

**TYPICAL SECTION**
6.6 AXONOMETRIC VIEWS

6.6.1 VIEW ALONG CARR STREET
6.6.2 Exploded View
6.7 USING THE BUILDING

6.7.1 JONAS

LIVES AND WORKS AT THE TROLLEY PUSHER STORAGE FACILITY. COLLECTS MOSTLY CARDBOARD AND PLASTICS

After a day out in the suburbs reclaiming recyclable materials; predominantly cardboard and plastics, Jonas walks east along Carr street towards the trolley pushers' storage facility.

1. HE WALKS UP ALONG THE EXISTING ROAD TOWARD THE SORTING FLOOR. HERE HE SEPARATES THE MATERIALS HE HAS COLLECTED INTO THE VARIOUS CATEGORIES.

2. ONCE MATERIALS HAVE BEEN SORTED, JONAS USES THE COMPACTING MECHANISMS TO COMPACT THE PLASTIC HE HAS COLLECTED. HE ALSO TIES THEM INTO BUNDLES FOR EASY TRANSPORTATION.

3. AFTER COMPACTING HIS MATERIALS JONAS STORES A FEW ITEMS IN HIS PRIVATE STORAGE UNIT. HE WILL USE THESE TO SELL IF/WHEN HE NEEDS CASH QUICKLY.

4. HE THEN COLLECTS THE BULK OF HIS RECLAIMED MATERIALS AND TAKES THEM TO THE SCALE TO BE WEIGHED, WHERE HE RECEIVES A SLIP FROM A CO-OP MEMBER, STATING THE TYPE AND WEIGHT OF MATERIAL HE HAS CONTRIBUTED TO THE CO-OP.

5. ONCE JONAS HAS OFF-LOADED HIS MATERIALS HE GOES INTO THE ADMIN BLOCK TO LEAVE HIS TROLLEY IN THE STORAGE AREA.

A. FROM THERE, THE CO-OP MEMBER TAKES THE MATERIALS TO THE LOADING AREA WHERE HE USES A HOIST CHAIN ATTACHED TO A MANUAL GEARED TROLLEY TO HOIST THE MATERIALS UP AND INTO THE STORAGE BIN.

6. HE THEN GOES UPSTAIRS TO HIS LIVING ROOM TO GET CLOTHES.

7. AND HE GOES TO SHOWER AND FRESHEN UP IN THE SHARED ABLUTION BLOCK.

8. AFTER THAT HE RETURNS TO HIS ROOM TO START PREPARING DINNER.

9. HE MAY GO TO THE COMMUNAL WASH-UP AREA TO CLEAN VEGETABLES AND/OR WASH DISHES.

10. AFTER DINNER JONAS GOES TO THE ADMIN BLOCK TO ATTEND A NIGHT CLASS OFFERED IN THE LECTURE ROOMS.

11. ONCE HIS CLASS IS FINISHED, JONAS WALKS BACK UPSTAIRS TO HIS ROOM TO SLEEP.

12. EARLY NEXT MORNING JONAS GETS UP AND COLLECTS HIS TROLLEY FROM STORAGE AND STARTS OFF ON THE JOURNEY TO COLLECT RECYCLABLE MATERIALS IN THE SUBURBS.
Jonas collects mostly cardboard and plastics at the trolley pusher storage facility. He has contributed to the co-op.

Upon his return, he goes to the communal wash-up area to clean vegetables and/or wash dishes. He then gathers materials to be submitted or sold to the co-op and takes them to the scale to be weighed, where he receives a slip from a co-op member, stating the type and weight of material he has contributed to the co-op. He ties them into bundles for easy transportation back to his living quarters on Bree Street.

He makes use of the small canteen in the admin block to make tea and/or have a snack before attending his class offered in the lecture block. After his class, he goes to the basement of the building to check on his trolley and any materials he may have collected, as well as anything else he needs to attend to. He then goes to shower and freshen up in the shared ablution block. Once his class is finished, he walks back upstairs to his room to sleep.

Bob lives in a shared room on Bree Street. He walks from Bree Street to Carr Street during the morning rush hour and then again during the afternoon rush hour to collect recyclable materials; predominantly cardboard and plastics. Once materials have been sorted, Bob stores the materials he will upcycle at a later stage in his private storage unit. He then uses the compacting mechanisms to compact the tin he has collected. He also ties them into bundles for easy transportation.

He makes use of the small canteen in the admin block to make tea and/or have a snack before attending his class offered in the lecture block. After his class, he goes to the basement of the building to check on his trolley and any materials he may have collected, as well as anything else he needs to attend to. He then goes to shower and freshen up in the shared ablution block. Once his class is finished, he walks back upstairs to his room to sleep.

David operates the manual hoist that moves materials from the ground into the respective storage bins. David mans the scales and keeps a log of the weight and types of materials that trolley pushers bring to the facility. Once the dinner prep is done, Angie goes to her residence to cook. She sells produce to people moving into the city along Carr Street for easy delivery to the Remade Buy-back Depot across the street.

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6.7.2 BOB

WORKS AT THE TROLLEY PUSHER STORAGE FACILITY & IN THE UPCYCLING WORKSHOP, AND LIVES IN THE INNER CITY.

COLLECTS MOSTLY GLASS, TIN AND PLASTICS

Bob lives in a shared room on bree street. he walks from Bree Street to Carr Street in the early morning.

1. HERE HE COLLECTS HIS TROLLEY FROM THE TROLLEY STORAGE.

2. ONCE HE HAS HIS TROLLEY HE SETS OUT ON THE JOURNEY TO COLLECT RECYCLABLE WASTE MATERIALS

3. AFTER A MORNING OF COLLECTING MATERIALS HE WALKS UP ALONG THE EXISTING ROAD TOWARD THE SORTING FLOOR. HERE HE SEPARATES THE MATERIALS HE HAS COLLECTED INTO THE VARIOUS CATEGORIES.

4. ONCE MATERIALS HAVE BEEN SORTED, BOB STORES THE MATERIALS HE WILL UPCYCLE AT A LATER STAGE IN HIS PRIVATE STORAGE UNIT.

5. HE THEN USES THE COMPACTING MECHANISMS TO COMPACT THE TIN HE HAS COLLECTED. HE TIES THE COMPACTED SQUARES INTO BUNDLES FOR EASY TRANSPORTATION.

6. HE THEN GATHERS THE MATERIALS HE’LL BE SUBMITTING/SELLING TO THE CO-OP AND TAKES THEM TO THE SCALE TO BE WEIGHED, WHERE HE RECEIVES A SLIP FROM AN CO-OP MEMBER, STATING THE TYPE AND WEIGHT OF MATERIAL HE HAS CONTRIBUTED TO THE CO-OP.

A. FROM THERE, THE CO-OP MEMBER TAKES THE MATERIALS TO THE LOADING AREA WHERE HE USES A HOIST CHAIN ATTACHED TO A MANUAL GEARED TROLLEY TO HOIST THE MATERIALS UP AND INTO THE STORAGE BIN.

7. ONCE BOB HAS OFF LOADED SOME OF THE MATERIALS HE TAKES THE REST, MAINLY GLASS AND PLASTIC, TO THE UPCYCLING WORKSHOP WHERE HE TURNS THEM INTO NEW PRODUCTS TO BE SOLD TO THE PUBLIC.

8. HE MAKES USE OF THE SMALL CANTEEN IN THE ADMIN BLOCK TO MAKE TEA AND/OR COFFEE FOR HIMSELF WHILE HE WORKS

9. HE ALSO GOES DOWN TO THE TRADING STALLS TO BUY FRESH GOODS TO EAT

10. WHEN HE FEELS THAT HE HAS COMPLETED ENOUGH WORK, BOB TAKES THE SHORT WALK BACK TO HIS LIVING QUARTERS ON BREE STREET.
After a day out in the suburbs reclaiming recyclable materials; predominantly cardboard and plastics, Jonas returns to his living quarters on Bree street during the morning rush hour. He walks from Bree street to Carrfontein train station.

In the trolley pusher storage facility, he collects mostly cardboard and plastics. Jonas lives and works at the trolley pusher storage facility & in the upcycling workshop, and lives in the inner city.

1. Here he collects his trolley from the trolley storage.
2. Once he has his trolley he sets out on the journey to collect recyclable waste materials.
3. Once the materials have been weighed and receipts have been handed out to the trolley pushers for the goods they have contributed, they walk to the loading area to place the goods in the co-op's warehouse.
4. The materials are then carried to the loading area by a member of the co-op.
5. Once the materials have been weighed and receipts have been handed out to the trolley pushers for the goods they have contributed, they walk to the loading area to place the goods in the co-op's warehouse.
6. Once the dinner prep is done, Angie goes to her residence to cook dinner for herself and her husband, and to socialize with the other ladies in the building. Prepare dinner for herself and her husband.

7. He makes use of the small canteen in the admin block to make tea and/or coffee for himself while he works back to his living quarters on Bree street.
8. He may go to the communal wash-up area to clean vegetables and/or wash dishes.
9. He also goes down to the trading stalls to buy fresh goods to eat at dinner and eat it with her husband before going to sleep.
10. When he feels that he has completed enough work, Bob takes the short walk to his residence on Bree street.

Angie, a middle-aged lady living in a shared room on Bree street, also serves the co-op.

1. Angie meets the bakkie on Carr Street, off-loads the goods and sets up her trading stall.
2. She sells produce to people moving into the city along Carr Street during the morning rush hour and then again during the afternoon rush hour.
3. Angie also supplies the canteen and the residents of the trolley pusher storage facility with fresh produce.
4. From there, the co-op member takes the materials to the loading area to place the goods in the co-op's warehouse.
5. Once the materials have been weighed and receipts have been handed out to the trolley pushers for the goods they have contributed, they walk to the loading area to place the goods in the co-op's warehouse.
6. The materials are then carried to the loading area by a member of the co-op.
7. Deciding that the price for selling is right, David will use the hoist to lift materials out of the bins and down onto Carr Street.
8. Once the materials have been weighed and receipts have been handed out to the trolley pushers for the goods they have contributed, they walk to the loading area to place the goods in the co-op's warehouse.
9. The materials are then carried to the loading area by a member of the co-op.
ANGIE AND DAVID

ANGIE
LIVES AND TRADES FROM THE TROLLEY PUSHER STORAGE FACILITY

DAVID
WORKS FOR THE CO-OP THAT RUNS THE TROLLEY PUSHER STORAGE FACILITY

Angie lives with her husband who is a trolley pusher. Early in the morning a bakkie delivers fresh produce from the city deep market to Angie's trading stall on Carr street.

1. **ANGIE MEETS THE BAKKIE ON CARR STREET, OFF-LOADS THE GOODS AND SETS UP HER TRADING STALL.**

2. **SHE SELLS PRODUCE TO PEOPLE MOVING INTO THE CITY ALONG CARR STREET DURING THE MORNING RUSH HOUR AND THEN AGAIN DURING THE AFTERNOON RUSH HOUR TO PEOPLE MOVING ALONG CARR STREET TOWARDS THE BRAAMFONTEIN TRAIN STATION.**

3. **ANGIE ALSO SUPPLIES THE CANTEEN AND THE RESIDENTS OF THE TROLLEY PUSHER STORAGE FACILITY WITH FRESH PRODUCE.**

4. **AROUND 8PM ANGIE CLOSES HER STALL AND GOES UPSTAIRS TO THE WASH UP AREA TO PREPARE DINNER FOR HERSELF AND HER HUSBAND, AND TO SOCIALISE WITH THE OTHER LADIES IN THE BUILDING.**

5. **ONCE THE DINNER PREP IS DONE, ANGIE GOES TO HER RESIDENCE TO COOK DINNER AND EAT IT WITH HER HUSBAND BEFORE GOING TO SLEEP.**

David operates the manual hoist that moves materials from the ground into the respective storage bins.

1. **DAVID MANS THE SCALES AND KEEPS A LOG OF THE WEIGHT AND TYPES OF MATERIALS THAT TROLLEY PUSHERS BRING TO THE FACILITY.**

2. **ONCE THE MATERIALS HAVE BEEN WEIGHED AND RECEIPTS HAVE BEEN ISSUED TO TROLLEY PUSHERS, DAVID TAKES THE MATERIALS TO THE LOADING AREA WHERE HE USES A HOIST CHAIN ATTACHED TO A MANUAL GEARED TROLLEY TO HOIST THE MATERIALS UP AND INTO THE STORAGE BIN.**

3. **WHEN THE TROLLEY PUSHERS, AS A COLLECTIVE BODY [THE CO-OP] DECIDE THAT THE PRICE FOR SELLING IS RIGHT, DAVID WILL USE THE HOIST CHAIN TO LIFT MATERIALS* OUT OF THE BINS AND DOWN ON TO CARR STREET FOR EASY DELIVERY TO THE REMADE BUY-BACK DEPOT ACROSS THE STREET.**

*ATTACHED TO THE CHAIN BY ANOTHER MEMBER OF THE CO-OP POSITIONED ON THE ROLLING PLATFORMS ABOVE THE STORAGE BINS.
Jonas collects mostly cardboard and plastics, lives and works for the co-op that runs the trolley pusher storage facility. He has contributed to the co-op.

He walks up along the existing road toward the sorting floor. Here he separates the materials he has collected into the various categories.

Once materials have been sorted, Jonas uses the compacting mechanisms to compact the plastics, takes them to the scale to be weighed, where he receives a slip from a co-op member, stating the type and weight of material he has contributed to the co-op.

Once materials have been sorted, he stores a few items in his private storage unit. He will use these to sell if/when he needs cash quickly.

When he feels that he has completed enough work, he takes the short walk from there, the co-op member takes the materials to the loading area where he uses the hoist to lift materials* out of the bins and down on to carr street in the early morning, for easy delivery to the remade buy-back depot across the street. The co-op members then weigh the materials up and into the storage bin.

When enough materials have been collected and weighed, they are compacted, weighed again, and the co-op members are paid.

Each of the co-op members is responsible for their portion of the collection.

A.  From there, the co-op member takes the materials to the loading area where he uses a hand held chain operated hoist to lift the materials to the loading area. This hoist is positioned on the rolling platforms above the storage bins attached to the chain by another member of the co-op.

David mans the scales and keeps a log of the weight and positions of the materials. When the trolley pushers, as a collective body [the co-op], decide that the price for selling is right, David will use the hoist to lift materials* out of the bins and down on to carr street.
7.1 PLANS

7.1.1 SITE PLAN
7.1.2 CARR STREET PLAN
7.1.3 sorting floor plan

[Diagram of a sorting floor plan with various labeled areas such as sorting entrance road, existing entrance road, double volume upcycling, lecture room, male/female canter trolley, male/female storage, and more.]
7.1.4 LIVING FLOOR PLAN
7.2 ELEVATIONS

7.2.1 [SOUTH] CARR STREET ELEVATION
7.3 SECTIONS

7.3.1 SECTION A
7.3.3 SECTION C

MANUAL GEARED TROLLEY FIXED TO 600MM X 300MM I BEAM

CHAIN HOIST

RESIDENT WALKWAY

RESIDENT WALKWAY

STORAGE BIN

ROLLING PLATFORM

TRANSLUCENT POLY CARBONATE SCREEN; SEPARATES LIVING FROM STORING

COMPACTING MECHANISM

LOOSE SORTING SPACE

TRADING STALLS PEDESTRIAN WALKWAY TROLLEY PUSHER LANE

EXISTING REPAIR & MAINTENANCE DEPOT

LAW STREET

SMALL PRIVATE STORAGE BINS; FOR QUICK TURNOVER

SCALE
7.4 DETAILS
7.4.1 WALL AND ROOF DETAIL
SCALE 1:10

140mm x 290mm x 190mm. Masonry concrete blockwork

Plaster to interior finish

Flashing

Silver painted bitumen layer on 60mm structural screed

Soft joint; closed cell neoprene foam filler

Minimum 60mm reinforced structural screed on 75mm high density polyurethane board

75mm high density polyurethane board on 150mm x 900mm x 5000mm precast hollow core concrete slabs

On 600mm x 250mm hot rolled I beams

600mm x 250mm x 12mm M/steel I beam fixed to 250mm x 250mm x 12mm M/steel frame

Flashing

10mm plaster board fixed to 63.5 x 50mm steel light lip channels

50mm polystyrene insulation board in 63.5 x 50mm steel light lip channels

DPC

140mm x 290mm x 190mm. Masonry concrete blockwork
7.4.2 Weather Step Detail

Scale 1:10

- 10mm Plaster Board fixed to 63.5 x 50 mm Steel Light Lip Channels
- 50mm Polystyrene Insulation Board in 63.5 x 50 mm Steel Light Lip Channels
- 140mm x 290mm x 190mm Masonry Concrete Blockwork with Plaster Finish

Minimum 60mm reinforced structural screed on 75mm high density polyurethane board

75mm high density polyurethane board on 150mm x 900mm x 5000mm precast hollow core concrete slabs on 600mm x 250mm hot rolled I beams

Minimum 60mm reinforced structural screed to fall on 150mm x 900mm x 5000mm precast hollow core concrete slabs on 600mm x 250mm hot rolled I beams

200mm x 200mm x 8mm M/Steel shelf fixed with M10 bolts to 600mm x 250mm x 12mm M/Steel I Beam

600mm x 250mm x 12mm M/Steel I Beam fixed to 250mm x 250mm x 12mm M/Steel Frame

10mm Plaster Board fixed to 63.5 x 50 mm Steel Light Lip Channels
- 50mm Polystyrene Insulation Board in 63.5 x 50 mm Steel Light Lip Channels
- 140mm x 290mm x 190mm Masonry Concrete Blockwork with Plaster Finish
7.4.3 MANUAL GEARED TROLLEY

SCALE 1:10

- 325mm Trolley wheels set on to 600mm x 250mm x 12mm M/Steel I beam
- Series of gears with varying diameters
- Drive chain
- Hoist chain
- 600mm x 250mm x 12mm M/Steel I beam fixed to 250mm x 250mm x 12mm M/Steel frame
7.4.4 PRIVATE VERTICAL STORAGE UNIT

SCALE 1:20

300MM x 150MM x 8MM M/STEEL I BEAM

COMPLEX PULLEY SYSTEM: 160MM DIA. PULLEY ON A 40MM TRACK WITH A 5:1 PULLEY RATIO. COMPLEX PULLEY SYSTEM: 160MM DIA. PULLEY ON A 40MM TRACK WITH A 5:1 PULLEY RATIO

500MM X 500MM X 4000MM STEEL MESH CHUTE
7.4.5 COMPACTING MECHANISM

SCALE 1:20

COMPLEX PULLEY SYSTEM: 160MM DIA. PULLEY WITH A 7:1 PULLEY RATIO ATTACHED TO A 500MM DIA. GEARED RATCHET

COMPACT WEIGHT OF 30KGS
500MM X 400MM X 400MM

COMPACT BOX: 1000MM X 1000MM X 800MM STEEL BOX WITH RELEASE DOOR ON 550MM X 450MM X 450MM COMPACT PIT
Much has been written and discussed globally regarding the essential and urgent need to respect our natural resources and to re-use materials. The City of Johannesburg is now recognising this need. The Up\Down\Recycle project is a perfect answer for such questions. It is a project of our times. It aims to make use of simple, appropriate architectural interventions to sustain, improve and increase the existing informal recycling sector, with relatively little effort or cost.

The intention of the project was to provide appropriate infrastructure for the trolley pushers in Newtown.

- It encompasses the provision of mixed-use spaces for
  - sorting and securely storing various waste materials
  - home-away-from home needs (sleeping, cleaning, eating and socialising)
  - skills development.

- It advocates the need for designated lanes for the trolley pushers.

The proposal not only aims to improve the work, investment, negotiating and income potential of the informal waste recycling sector, it also has the potential to grow the numbers of income-earning trolley pushers - i.e. to allow for more jobs, with relatively little effort or cost to the City.
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ANGLO GOLD ASHANTI AND NUMEROUS OTHER COMPANIES HAVE MADE TURBINE HALL THEIR HOME. THE OLD JEPPE STREET POWER STATION WAS UPGRADED BETWEEN 2005 AND 2009 AND NOW HOUSES VARIOUS OFFICES, CONFERENCE CENTRES AND A WEDDING VENUE. 32
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