CONSTRUCTING A CULTURE CYCLE

An Upcycling Waste Centre in Pretoria CBD

By Mark Dickinson

Submitted in partial fulfilment of the requirements for the degree Master of Interior Architecture (Professional) to the faculty of Engineering, Built Environment and Information Technology.

University of Pretoria

November 2017

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Department of Architecture
University of Pretoria
2017

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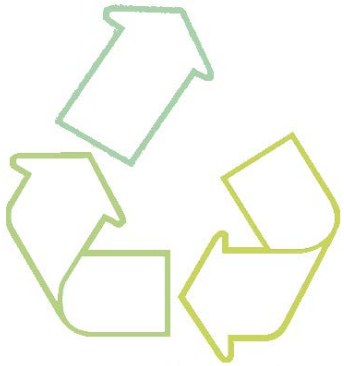

CONSTRUCTING A CULTURE CYCLE

An Upcycling Waste Centre in Pretoria CBD

Programme/Type of building: Upcycling / skills development centre
Site Description: 1960's service station building
Site Location: South Western quadrant of Pretoria CBD
Address: 395 Bosman Street, Pretoria CBD
GPS Coordinates: 25°45'04.5"S 28°11'09.4"E
Research Field: Environmental potential
Keywords: Upcycling, upskilling, sustainability, regenerative architecture, furniture production
Chosen Client: Department of economic development / environmental affairs / Street Sleeper
Users: Waste pickers, crafts people, product designers
Interior Architectural Theoretical Question: What is the social role of an upcycling centre as a gateway to cultural development?
Interior Architectural Approach: The re-appropriation of a service station into an upcycling centre, using certain waste materials collected by waste pickers as basis for upcycled furniture manufactured by crafts people and a lead designer. The selected waste materials are upcycled into new products and as interior furnishings throughout the building. Upcycling is applied to the users, environment and architecture in this design proposal.

SAMEVATTING

"Upcycling" is die hergebruik van weggooivoorwerpe of -materiaal op so 'n manier om 'm produk te skep van hoër gehalte of waarde as die oorspronklike. Dit is in vandag se samelewing is nog relatief skaars, met die meeste "upcycling" slegs te vinde in werke van kunstenaars en produkontwerpers. Hierdie 'kreatiewe hergebruik' is 'n vorm van die vermindering van afvalprodukte in 'n meer effektiewe proses as herwinning. Hierdie studie handel oor die ontwerp van 'n "upcycling" sentrum en hoe binne-argitektuur 'n raamwerk vir die opheffing van die gasheergebou in die middestad van Pretoria, die modelbewoners (afvalverwerkers en handwerkmense), afvalmateriaal en die omliggende omgewing is.

Baie mense beskou die self-ondernemende beroep van straatafvalversameling as vuil en minderwaardig. Maar diegene wat afvalversamling beoefen, doen dit gewoonlik as 'n manier om te oorleef, en kan waardevolle hulp bied in omgewingsvolhoubaarheid. Afvalplukkers word dikwels as 'n sosiale groep geïsoleer - nie in staat om hoër inkomstevlakke of lewensomstandighede te bereik nie. Onkunde oor hierdie informele ekonomiese sektor het gelei tot 'n verdeelde en gefragmenteerde samelewing, veral binne die Pretoria-middestad (geïdentifiseer as die plek vir die ingryping). Dit is belangrik om volhoubare oplossings te vind vir hergebruik van afval en werkskepping, soos hierdie voorgestelde "upcycling" sentrum. Die sentrum is aktief betrokke by verskeie lede van die samelewing (in hierdie geval afvalversamelaars, kunshandwerkers en die breër gemeenskap) is belangrik. Sulke programme kan voordelig wees vir gemeenskappe wat in digte woonbuurte woon, aangesien hulle die sleutelblokke van samehang en simbiose kan bied om 'n voorspoedige toekoms te bou.
Die interieurargitektuurdissipline is hier relevant as 'n tasbare raamwerk om kulturele produksie van nuwe voorwerpe, omgewingsvolhoubaarheid, verbouing van menslike kapitaal en 'n ondersteuningsisteem vir modelbewoners moontlik te maak. Afvalmateriaal en weggooiprodukte kan die karakter van 'n binnenshuise ruimte inlig en gebruikersingryping weerspieël met ingeboude vorms wat die aktiwiteit en daaglikse roetine binne die gemeenskap eggo. As fasiliteerder is interieurargitektuur voorgestel om te stimuleer, te inspireer, te herleef en beskou te word as 'n siklus van vernuwing. Dit is die konsep wat die ervaring, aktiwiteit en proses bepaal vir gebruikers wat die voorgestelde "upcycling" sentrum betree.

Hierdie voorgestelde ingryping van die geïdentifiseerde Minty's Bande-gebou gebruik drie teorieë om die reaksie in te lig. Eerstens lei die omgewingsielkunde teorie die verandering van die gebou om te reageer op gemeenskaps- en sosiale insluitingstrategieë. Tweedens, lig die aanpassings hergebruiksteorie die verandering van die gebou in reaksie op die nuwe program as 'n vorm van "upcycling" en die verbetering van die gebou se gebruikerservaring en hulpbrondoeltreffendheid. Ten slotte word die herskeppende ontwerpteorie gefokus op herstellende aksies en die tegnologieë geraadpleeg om 'n stelsel te skep wat effektief en volhoubaar is. Die argitektuur self (d.w.s. die fisiese gebou, materiale en struktuur) word ontwikkel saammet die werklike terrein en ekologiese omgewing.

ABSTRACT

Upcycling in today's society is still relatively rare, with most upcycling occurring in works by artists and product designers. This 'creative reuse' is a form of minimising waste products in a more effective process than recycling. This study deals with the design of an upcycling centre and how interior architecture is a framework for the upliftment of the host building in the Pretoria CBD, the model inhabitants (namely waste pickers and crafts people), waste materials and the surrounding environment.

Many people perceive the self-starter occupation of street-waste picking as being dirty and inferior. However, those who practice waste picking usually do so as a means of survival, and can offer valuable assistance in environmental sustainability. Waste pickers are often isolated as a social group – unable to reach higher income levels or living conditions. Ignorance around this informal economic sector has led to a divided and fragmented society, particularly within the Pretoria CBD (identified as the location for the intervention).

Finding sustainable solutions to waste reuse and job creation, such as this proposed upcycling centre, which actively engage various members of society (in this case, waste pickers, crafts people and the broader community) is important. This is because such programmes can be beneficial to communities living in dense neighbourhoods, as they can provide the key blocks of cohesiveness and symbiosis for building a prosperous future.

The interior architecture discipline is relevant here as being a tangible framework to enable cultural production of new objects, environmental sustainability, cultivation of human capital and a support system for model inhabitants. Waste material and discarded products can inform the character of an interior space, and reflect user intervention with built forms that echo the activity and daily routines within the community. As a facilitator, the interior architecture has been imagined to stimulate, inspire, revive and be perceived as a cyclic journey of renewal. This is the concept which governs the experience, activity and process for users entering the proposed upcycling centre.

This proposed intervention of the identified Minty's Tyres building utilises three theories to guide and inform its responses. Firstly, environmental psychology theory guides the alteration of the building to respond to community and social inclusion strategies. Secondly, adaptive reuse theory informs the alteration of the building in response to the new programme as a form of upcycling and improving the building's user experience and resource efficiency. Finally, regenerative design theory based on restorative actions and technology is consulted to produce a system that is both efficient and sustainable. The architecture itself (i.e. the physical building, materials and structure) is developed alongside the actual site and ecological surroundings.

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1

INTRODUCTION

"*One man's rubbish is another man's treasure*" (Hector Urquhart 1860: xi)

1.1 INTRODUCTION

This chapter establishes background conditions to the real-world problem, with contextual reference. A problem statement is generated based on this information which informs a programme and further research questions.
Aims and research methods are proposed with contributions to the study identified in the realm of Interior Design. Limitations to the study are presented that form boundaries and the scope of reference analysed. Finally, an overview of the study is given, along with conclusions to and a summary of the introduction to the project.

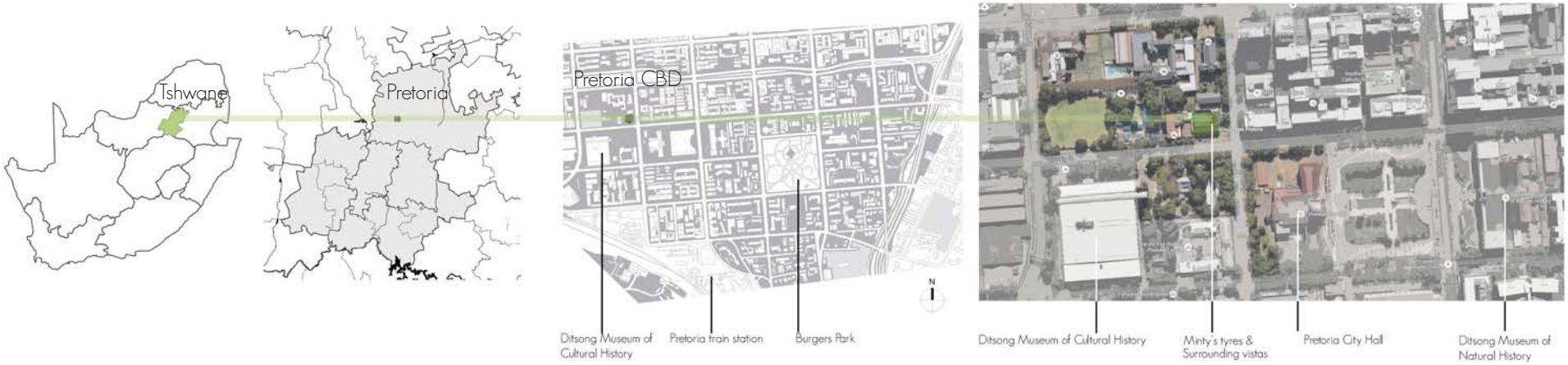


Figure 1.3.1 Locality of the proposed site, Minty's Tyre's and surrounding cultural landmarks (Maplibrary, 2017) (Speleno, 2017) (Google earth; 2017)

1.2 BACKGROUND

Many South Africans face the challenge of unemployment; particularly those who are either unskilled or have a low level of education. With few options available, many seek work in the urban informal market as a means of survival (Viljoen, Schenck and Blaauw, 2016).

The focus of this study is placed on informal street-waste pickers, who play a significant role in environmental sustainability by limiting waste that would otherwise end up in landfills by re-routing it to buy-back recycle centres. Street-waste pickers collect selected waste materials (accepted by recycle centres) from dustbins and refuse containers and transport them on repurposed trolleys to recycle centres. Waste pickers are also hired by private companies to clean up after big events or functions, which illustrates their importance in forming a symbiotic relationship to waste removal within their urban context as well as to waste management strategies (Raborife, 2016).

Crafts people are also significant, as the framework of the proposed intervention aims to employ, develop skills and generate income through the manufacturing process under the guidance of a designer. Crafts people add value to this upcycling process by bringing their previous hand-crafting skills and techniques into a collaborative process.

The close interaction of the waste pickers, crafts people (and by extension the larger Pretoria CBC community) through the creation of a member-based organisation (MBO) such as the upcycling centre relates to the interior design discipline as being the organisation of space. Such organisation of space enables cultural practices, environmental sustainability, income generation, skills development and a support system for these model occupants.

Figure 1.3.2 Image of the proposed site, Minty's Tyres, and surrounding cultural landmarks (Google Earth, 2017)

1.3 CONTEXT

The chosen site of the Minty's Tyres building, 395 Bosman Street, Pretoria CBD, is surrounded by cultural public spaces and historical landmarks, as seen in Figure 1.3.2. Activities of waste pickers have a role to play in this area, as shown in the mapping exercise in Figure 1.3.3 Identified waste generators here are schools, public spaces and residential apartment blocks. Waste is further generated due to the limited availability and location of recycle/buy-back centres. There are two recycle buy-back centres near to, but not in, the Pretoria CBD. This means that waste pickers have to travel a great distance from the Pretoria CBD to reach these centres and sell their waste material. The high number of waste generators and current lack of recycle/buy-back centres in this area make the chosen site ideal for the purposes of this study.

Figure 1.3.3 shows the location and proximity of the host building to surrounding waste generators and institutions upon which waste pickers depend for collecting waste. From the mapping analysis, it is evident that the proposed upcycling centre has the potential to reduce the distances that waste pickers must travel to sell their collected items. The mapping analysis also reveals the site's close proximity to cultural landmarks, public spaces, schools and apartment blocks (i.e. waste generators).

The upcycling centre also aims to accept other types of waste for manufacturing (such as timber, metal and plastic items), which do not conflict with the existing materials sold at buy-back centres (such as plastic bottles, paper, aluminium cans and cardboard). The reason for this is that these 'other' items can provide waste pickers with an additional source of income, over and above that which they currently receive from buy-

Figure 1.3.3 Mapping exercise to investigate waste generators in the chosen site of the Minty's Tyres building, 395 Bosman Street, Pretoria CBD

back centres. Furthermore, being situated in the established museum precinct or 'cultural node' of Pretoria, a centre which produces current artefacts from waste, has the potential for breathing new life and interest into the relic-housed and out-of-date exhibition halls.
The analysis also reveals a large amount of service stations within the immediate area, making the current function of the proposed site, namely a service station, contextually common and therefore irrelevant.
From the mapping analysis, it can be concluded that the removal of the building's current service station function in favour of an upcycling centre is viable due to the prominence of other service stations in the area. It can also be concluded that an upcycling centre or 'creative reuse centre' is an appropriate option due to the prevalence of waste pickers within this context (Stats SA, 2011). This type of centre can also work to fill a gap within this area's current market by providing further economic opportunity to uplift waste pickers and the broader community from their current impoverished state (Stats SA, 2011).

1.4 Problem Statement

With unemployment levels as high as 24.2% in Tshwane, and education levels ranging from 3.1%, with no schooling, to only 29.8% completing secondary school and higher (Stats SA, 2011), people with limited options of employment turn to the informal market for survival. Due to the lack of education and little resources required, informal waste collection is a viable avenue of income for this group of people. Waste picking is a noble community service, and has a large role to play in environmental sustainability, as waste pickers work to significantly limit waste which would otherwise be sent to landfills. This activity promotes product reuse while leaving little to no carbon footprint. Unfortunately, the life of a waste picker is one of impoverishment and hardship, with many pickers being ostracised within their communities and often having their contribution to society overlooked (Schenck and Blaauw, 2011). Therefore, more needs to be done to improve their current economic and social standing. This is of even more importance when considering that 37,000 people earned an income from recycling in South Africa in 2004/2005 (Langenhoven and Dyssel, 2007).

1.5 Site Significance

The selected site is relevant to the proposed intervention because of its cultural connotations, historical background and position amidst public spaces (i.e. places of interest). The significance of this upcycling centre is that it will become a facilitator for income generation for its users and affiliates and a support centre for waste pickers. It will also become a cultural and public space that can work to construct an environmentally sustainable identity.

Using the proposed site as an anchor point for the research questions, a brief statement of significance has been prepared:

- The structure designed and erected in the 1960's still serves its purpose of functioning as a service station today. These architectural characteristics offer opportunities for the proposed new intervention, such as a lift, car ramp and non-existent threshold/open spatial transition from street to interior on the ground floor.
- The surrounding environment allows for unobstructed views to the large Museum Gardens facing the main south façade. This also contributes to a peaceful and quiet neighbourhood, promoting the integration of nature and environmental awareness.
- The large open spaces on the ground and first floor allow for an intervention of creative workspaces appropriate for the upcycling centre proposal.
- The accessibility and visibility of the building make for easy movement and navigation.
- The interior spaces have high ceilings that permit soft southern light to penetrate to within the building, meaning that little artificial lighting is needed. This further meets the sustainable design intention of the proposed intervention.

The host building is estimated to have been erected in 1963, making it fall outside of the 60-year National Heritage Act. However, the building displays significant architectural characteristics which deserve to remain unaltered. According to the National Heritage Act (Republic of South Africa, 1999: 8) and the Australian Burra Charter (ICOMOS, 2013: 1), an appropriate response for architectural historical significance is

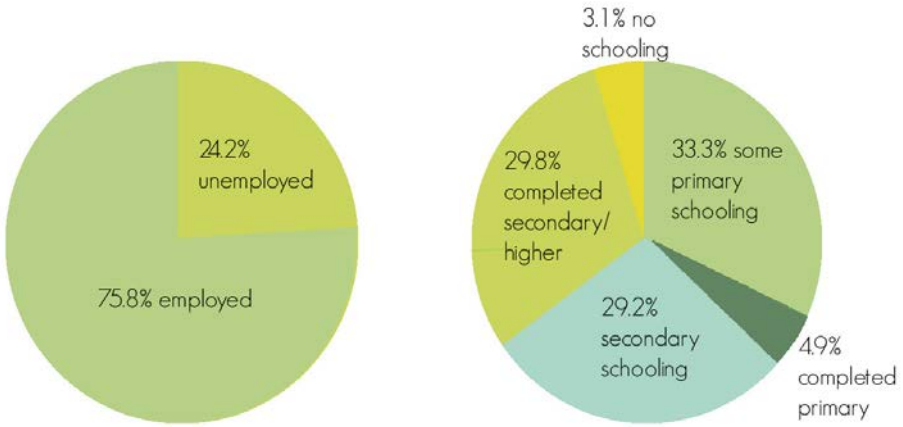


Figure 1.4.1 Statistics on unemployment and education levels in Pretoria (Stats SA, 2011).

conservation. Conservation is a means of showing respect to the existing building fabric, its use, associations and meanings (ICOMOS, 2013: 3). Conservation is applicable to this intervention, as the programme includes retention of the visual and sensory setting, which further extends to the spiritual and cultural relationship (ICOMOS 2013: 5) that the building shares with the Cathederal of the Sacred Heart and the Loreto Convent next door.

The Minty's Tyres building highlights the horizontal planes which are characteristic of the buildings' architectural style. They are also acknowledged as appealing features with historical and cultural significance. Therefore, these must remain intact as the building is altered to an upcycling centre.

1.6 Programme

Informal waste collection in Pretoria is currently an autonomous system governed by the homeless (Schenck and Blaauw, 2011). An upcycling process facilitated by designers can provide additional skills development and a showcasing of products by promoting environmental sustainability. Furthermore, waste material generated from public and residential spaces can be innovatively re-used into high quality functional objects, as depicted in Figure 1.6.1.
Through previously conducted research, the following hypothesis is considered: if there is available waste material generated from public spaces, then it can be upcycled into functional objects of higher quality for reuse, skill and income generation. As a design objective, the alteration of the existing architecture is to enable the users to fulfil the upcycling process.

Constructing a culture cycle, as per this study's title and Figure 1.6.1, is to provide a facility that engages waste pickers in collecting waste material to be upcycled. This reduces their travel distances in transportation of waste material and provides a support system, in the form of amenities in a building (such as ablutions, additional income, skills development and training and a canteen rest area). The cyclic process is then concerned with what is produced by this collected and re-

Figure 1.6.1 The proposed culture cycle.

used material waste, and how the products produced, or 'upcycled', can provide additional income to, or assist in skills development of, the community of waste pickers and crafts people themselves. This is considered as part of the design scope, and manifests in the spatial transmission of interior design strategies. The focus of this real-world problem is placed on providing access and support to the furthering of human cultural development. This is achieved through waste material reuse resulting from waste recycling with contextual reference to the Pretoria CBD.

1.7 Research Questions

An investigation into the contextual frameworks that serve to inform the need for an upcycling centre in the Pretoria CBD needs to be conducted. This investigation need prompts the following research question: What is the social role of an upcycling centre as a gateway to cultural development? This brings about further sub-questions:

- What urban context and theoretical frameworks serve to inform the need for an upcycling centre in the Pretoria CBD?
- How can an upcycling centre in the Pretoria CBD create a tangible framework that includes a support network to uplift the waste pickers and surrounding community?
- How do architectural examples correlate between upcycled/recycled waste products and regenerative design approaches?

1.8 AIM

The aim of the study is the construction and consideration of a framework which can address and support the lives of waste pickers and the local community in and around the chosen site. The aim is also to contribute to the cultural aspect of the established precinct. The outcome of this process is to test the design of an upcycling centre in the Pretoria CBD using cultural, social and heritage informants from the immediate context relating to the hypothesis mentioned earlier. The adaptive reuse of the Minty's Tyres building also furthers cultural production through material reuse and waste upcycling. The process of upcycling aims to develop skills and create additional income as a result of skills training and social cohesion within the local community. The design/technical development of the study aims to promote regenerative architecture as a sustainable approach to the project, which starts with the waste pickers and their skills training and feeds into all aspects of the interior design of the building and its services.
This desired outcome aligns with a normative position of upliftment through interior design ecology and social systems by the interior designer.

1.9 RESEARCH METHOD

Research methods employed in this study are qualitative. Specifically, the study utilises case studies, precedent studies, a literature review and observations with ethical limitations. Through the collaboration of designers and community members, more sustainable methods of production and opportunities for income are generated. Figure 1.9.1 shows a mind map of approaches and theoretical underpinnings for the proposed study. The mind map consists of, firstly, the programme which is centred on upcycling or creative material reuse whereby waste materials are synthesised into functional furniture pieces of a higher value than the original. Design informants considered for this type of furniture production are mainly provided through precedent and case studies.
Secondly, context is presented, which serves to inform the geographical, social and cultural relations to the intervention. This is done by examining the site significance, urban mapping and an analysis of the selected building. Methods of research used here are observation and spatial analysis in the precinct and building structure. These methods are used to extract the importance, idiosyncrasies and cultural phenomenon exclusive to the area. A literature review and case studies of the historical origins, the role in the development of Pretoria and the current status of the selected building and site are also presented.
Thirdly, the potential site users and waste pickers are researched in terms of their social status in society, with the identification of barriers to improving their economic position. This is completed through case studies, observations with limitations (so as not to trespass on ethical etiquette) and a literature review.
Fourthly, theory which covers regenerative and ecological architecture, recycling and upcycling processes and materials; cultural production in interior design as a system of meaning; and environmental psychology in exhibition and public spaces is consulted. These theories are analysed through case studies, observations and a literature review.

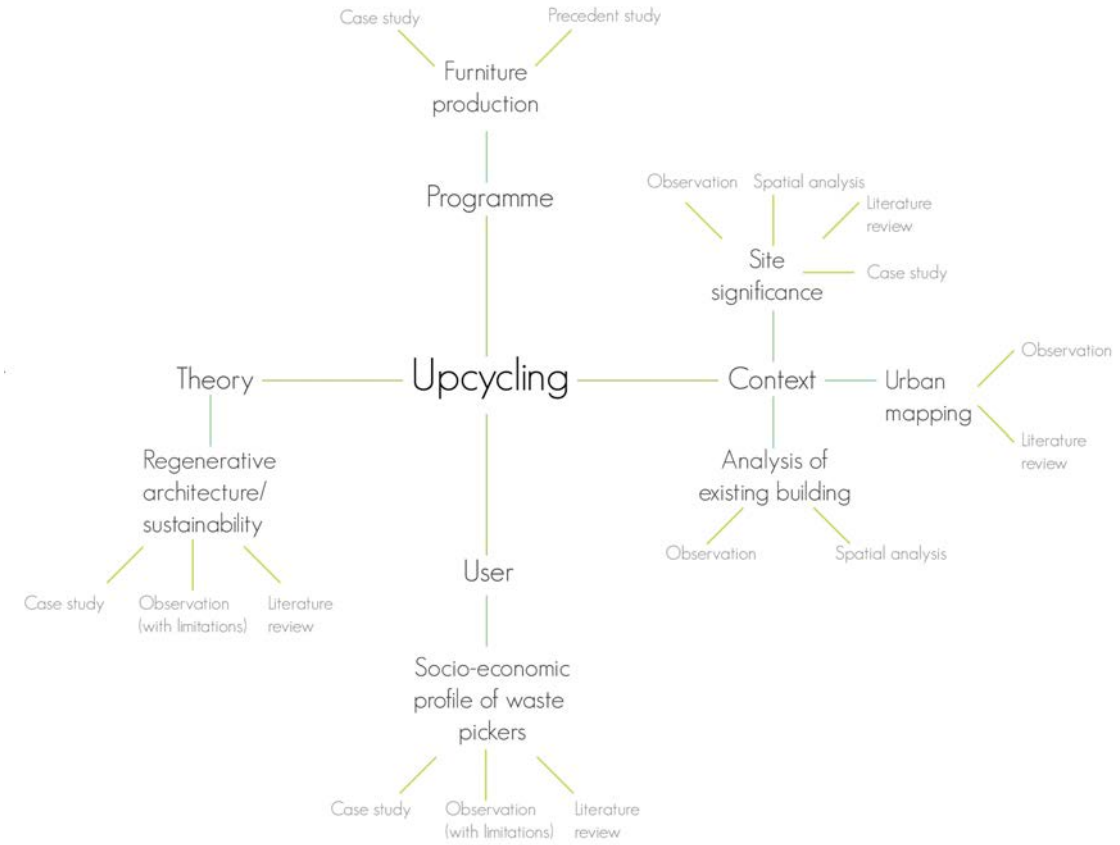


Figure 1.9.1 Research methods and theory basis.

1.10 CONTRIBUTIONS OF THE STUDY

The study aims to identify and explore the real-world problems that waste pickers experience. Specifically, it addresses skills development and income generation in the informal sector. Possible solutions are suggested through testing. That is, the design project is the avenue through which the hypothesis and problem are tested. The design project also presents how interior design can contribute to, facilitate, and extend cultural production of objects, specifically with regard to the transmission of a spatial message by the designer to the model inhabitant.

1.11 DELINEATION AND LIMITATIONS

The study considers a limited profile of waste types for upcycling and production processes. This is due to the existing agreements of waste types between waste pickers and buy-back recycling centres. Waste types which are desired for the upcycling centre are based on what is found within the immediate vicinity and surrounding areas where the waste pickers travel (i.e. the Pretoria CBD). These desired waste types are identified as having the potential to be upcycled with minimal embodied energy and resources.

An objective of the proposed upcycling centre is to utilise waste material that does not conflict with these agreements. In this way, the centre can, in essence, extend the waste pickers' income by including additional items for collection.

Other limitations include quantities of produced goods, their availability for public retail and the thresholds between employed persons/waste pickers and the public showroom micro-ecology. In other words, the space will function primarily as a workshop and collection centre, while providing amenities for affiliates and exhibition/public space for completed works/products.

1.12 OVERVIEW OF STUDY

The study encompasses the collaborative workshopping of designers with the community so as to produce sustainable methods of creating opportunities and income. The process of this collaboration connects environmental sustainability, skills development and income generation. It also provides a support system and a space for the production of functional artefacts that identify the region's potential talent. The nature of the existing building has value to the study in terms of its architectural language, visual access on a prominent street corner, panoramic views and large workshop spaces (with an access ramp) which can be appropriated to the new intervention.

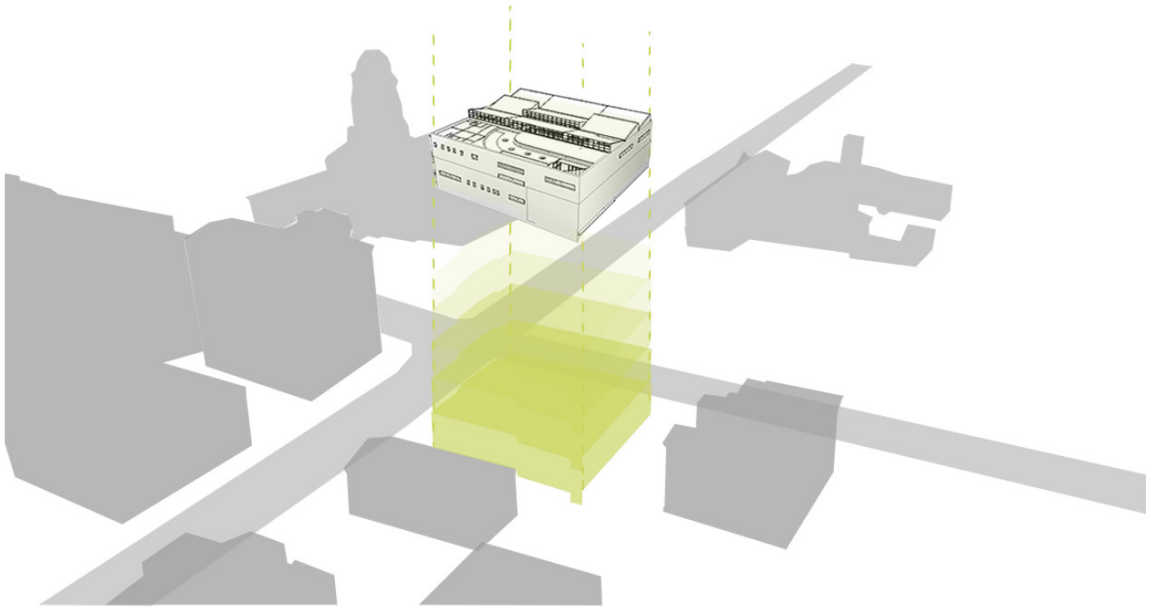


Figure 1.12.1 Contextual block intervention

1.13 CONCLUSION

The chapter presents a real-world problem associated with waste pickers and discarded waste material. It identifies conditions which have caused this situation. The chapter also identifies that waste picking occurs as an informal means of survival, and highlights the practice's positive effect on the environmental system. Research questions are proposed to address factors which inform the design interventions' relevance and significance in the urban context.

Significant drivers and a theoretical basis of contextual, programme and user responses are communicated, as well as how the study aims to respond to the problem. Limitations within the study are identified by providing a scope of design intentions and restrictions. The chapter also notes that the study is qualitative in nature, as it is concerned with the interpretation of information, and the need for and potential impact of a recycling centre in the Pretoria CBD, given its urban context and heritage background.

1

CONTEXT

Upcycling: reuse (discarded objects or material) in such a way as to create a product of higher quality or value than the original (Oxford Living Dictionaries 2017).

Figure 2.1.1 Graphic representation of upcycling, also known as "creative re-use".

2.1 INTRODUCTION

This chapter covers the contextual aspects of the study, with reference to the building's significance, adjacent block development, climate, parameters and regulations. A building analysis considers the existing structure, with user profiles or model inhabitants which are covered towards the end of the chapter. The chapter concludes with a summary of the design opportunities and informants into the proposed programme of upcycling.
One the main advantages of the proposed upcycling centre is that it will accept plastics that other recycling centres do not. These plastic items have been identified as Class 2 plastic – high density polyethylene such as milk bottles, some detergent bottles and shopping bags – and Class 6 plastic – polystyrene, typically used in fast food packaging (Good Housekeeping, 2008). Timber pallets and tyres are also not among the waste materials accepted by recycling centres but which will be accepted at this proposed centre. Table 2.1.1 provides a breakdown of these accepted materials.

By displaying and exhibiting the upcycled products, the centre also creates awareness of and opportunity for the creative reuse possibilities of waste materials which may not be apparent to most people.

Waste type	Image	Original use
Tyres		Car / motorcycle tyres (Metrowasteauthority, 2015)
Timber		Timber pallets / wood off cuts / timber boards (shopfitting) (GPSwoodpallets, 2017)
Plastic class 2 (HDPE)		Milk bottles / trash bags / detergent bottles (Goodhousekeeping, 2003)
Plastic class 6 (PS)		Polystyrene food packaging / disposable plates / cups (Goodhousekeeping, 2003)

Table 2.1.1 Waste types attributed to the proposed upcycling centre

2.2 SITE CONTEXT

The following sub-sections explore the context of the chosen Minty's Tyres building in terms of religious, social, cultural and historical development.

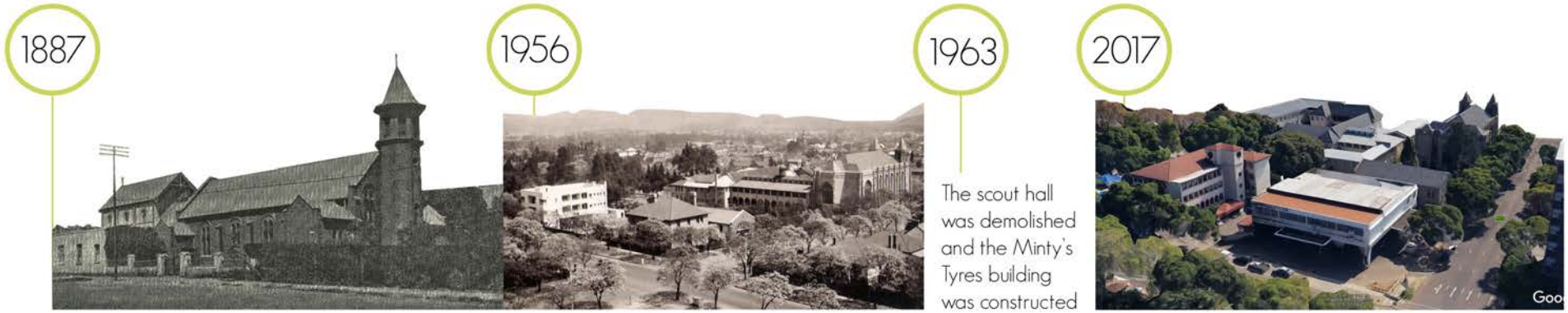


Figure 2.2.1.1 Religious timeline showing the development of structures on the selected site (i.e. the Minty's Tyres building) (Hansen, 2016) (Flikr, 2007) (googleearth, 2017)

2.2.1 Religious Timeline of the Site

The character of the site retained its Catholic religious heritage from 1887 to 1963 (with two building renovations) (see Figure 2.2.1.1). From there, it took on a new identity – one of a commercial service station (which still remains today).

Initially, the structure was used as a priests' house, serving the Loreto Convent and Cathedral of the Sacred Heart as from 1887. Then, the second building to occupy the site was a scout hall, serving the Loreto Convent and Cathedral of the Sacred Heart (circa 1956). The block currently (2017) retains its religious integrity and presence, 147 years later, as the home of the Archdiocese and Loreto Convent to the west and north-west area, and the Cathedral of the Sacred Heart to the north. The block is also in current use as part of a social upliftment endeavour in that the church's youth group provides services to the homeless in the form of a soup kitchen located at the Cathedral of the Sacred Heart admin building (The Sacred Heart [CSH] Pretoria, 2017). In the same way, the proposed function of the Minty's Tyre building located in this block will extend this kind of community service.

John Albert Hoogterp / Jolliffe Architects
Were the appointed architectural firm for the construction of the Minty's Tyre building.
Hoogterp was born in 1892 in Johannesburg and known for his partnership and association to Herbert Baker. He was involved in the construction of The Union Buildings and acted as Bakers representative on projects in Nairobi (where he established a prominant office advising the Governor on certain buildings).
Hoogterp worked in London, The Netherlands, New York, Italy, Kenya. and Zambia.
His practice was operational in Johannesburg in the 1960s and 1970's (artefacts, 2017).

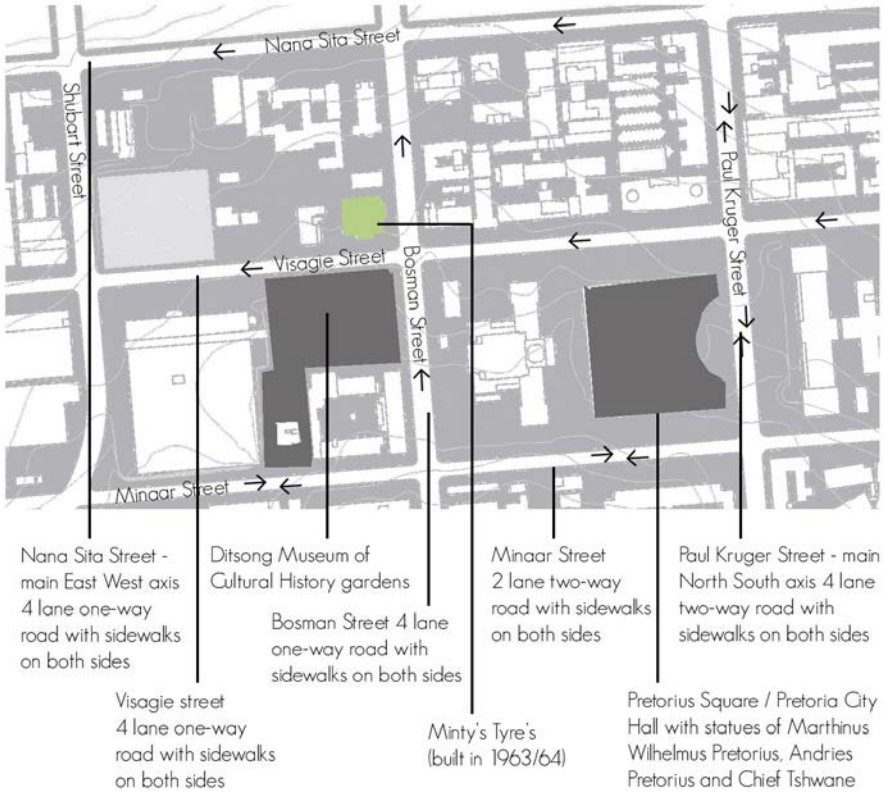


Figure 2.2.2.1 A social analysis of the surrounding blocks to the Minty's Tyres building

Figure 2.2.2.2 A cultural analysis of the surrounding blocks to the Minty's Tyres building

2.2.2 ADJACENT BLOCK ANALYSIS (URBAN CONTEXT)

The urban context conditions relating to the selected site are: historical development of the site, climate, SWOT analysis (i.e. strengths, weaknesses, opportunities and threats associated with the site) and site and design parameters.

Figure 2.2.2.1 analyses the public spaces and streets which become social streams in the area. These are the public spaces which host events and are used as gathering spots, which generate waste for waste pickers. The streets are analysed here, due to the fact that the waste pickers transport their waste material gathered in this, and other areas around the city. This transportation often takes place on unsuitable roads, where the waste pickers become traffic hazards. The roads surrounding the Minty's Tyres building can become better vessels for transportation of the waste material. From top-down, Nana Sita, Bosman and Visagie Streets are identified as having four lanes (one-way) with sidewalks on both sides. These offer less of a risk for and from waste pickers in relation to traffic. The streets also currently form primary movement routes. Minaar and Paul Kruger Streets offer two-way traffic, both with sidewalks on both sides of the road. Each street consists of two to four lanes, offering secondary routes through the area.

Figures 2.2.2.2 and 2.2.2.3 show the historical development and cultural institutions of the surrounding blocks to the site. What is important here is to see the patterns which emerged from the religious block (where the site is located) and the

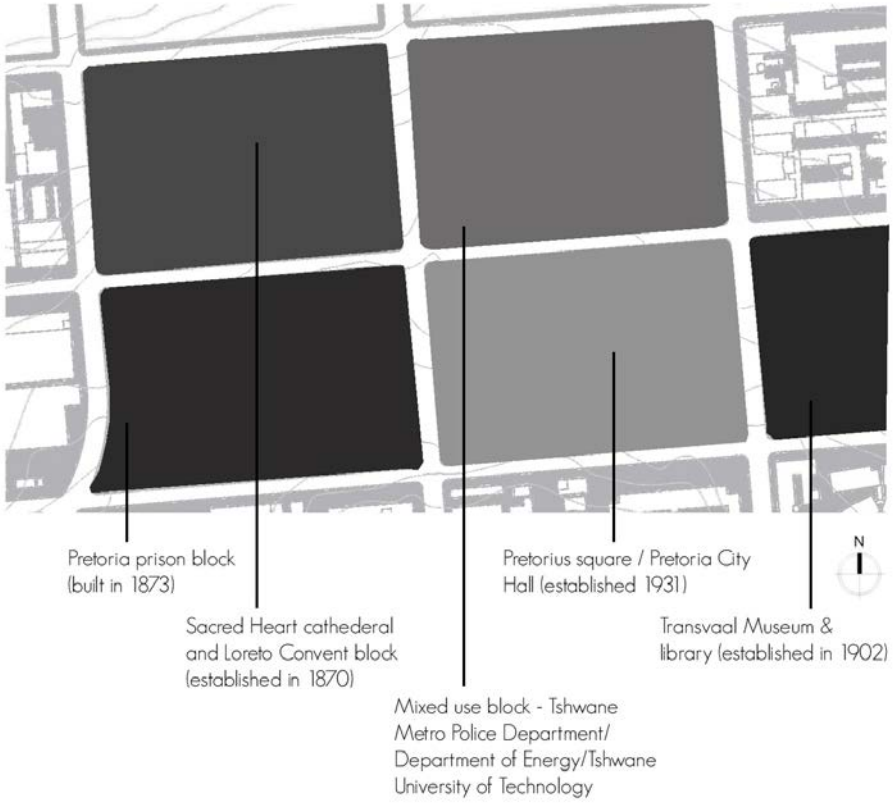


Figure 2.2.2.3 A historical analysis of the surrounding blocks to the Minty's Tyres building

related Pretorius Square/Pretoria City Hall blocks, as they have not changed their use over time. The block south of the religious block has changed its use from the Pretoria Prison to the National Mint building to its current use as the Ditsong Museum of Cultural History.

The fact that the museum precinct is located here is also significant. It binds the cultural places of interest and places of importance to that of City Hall and Pretorius Square. Pretorius Square is important as it houses the statues of Marthinus Wilhelmus Pretorius and Andries Pretorius, after whom the city is named. Chief Tshwane's (after whom the broader metropole is named) statue is also situated in the square, creating a juxtaposition with the old and new roots of the city's identity. The possible impact on the design here is the historical importance of the location. Namely, that it falls within the heart of Pretoria (i.e. City Hall) which can be seen as symbolic of a gathering point and juxtaposition of transformation. Similarly, the proposed upcycling centre will also become a gathering point of discarded material and cultural expression, symbolic of change and transformation.

Figure 2.2.2.4 South elevation of adjacent buildings

Figure 2.2.2.5 East elevation of adjacent buildings

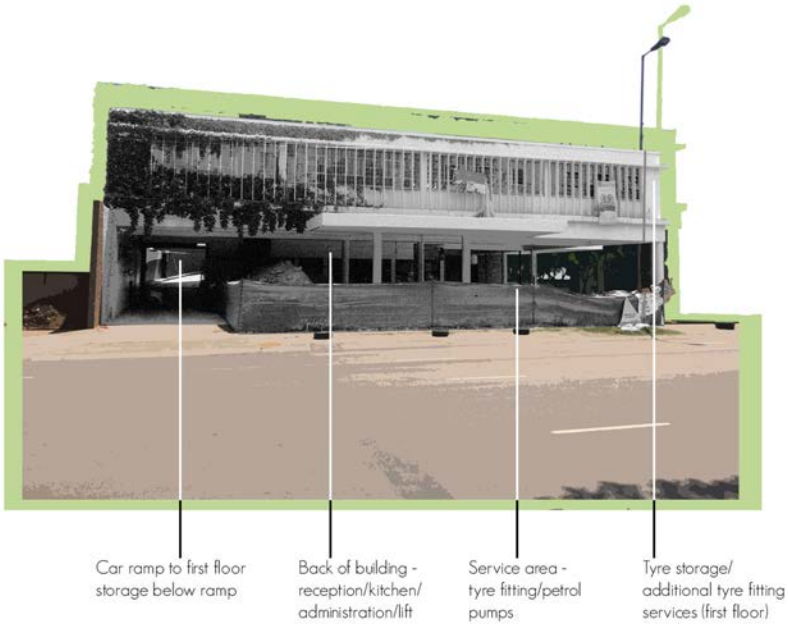


Figure 2.3.1 Southern façade of the existing Minty's Tyres building

2.3 BUILDING ANALYSIS

Figure 2.3.1 identifies the main façade of the building and recognises its operational zones. Access and movement is easy, as one navigates throught the ground floor space. Figures 2.3.2 to 2.3.4 show the current spatial zoning of the building and identify existing flows of matter and energy (i.e. natural light and ventilation in blue, and movement circulation in green) and how they interact with the existing spatial heirachy.

Figures 2.3.2 to 2.3.4 also identify opportunities for integrating natural forms of lighting and ventilation on the ground and first floors, in line with the environmental potential aspect of the intervention. This is in addition to the building's contribution to sustainable waste management strategies through upcycling. Through these sketch explorations, design opportunities are identified in regard to the regenerative nature of services within the building.

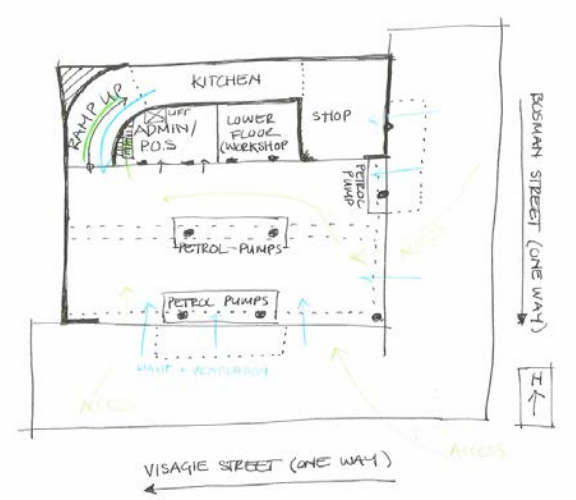


Figure 2.3.2 Existing ground floor sketch showing flows of matter, energy (natural light and ventilation in blue, movement in green) and spatial zones

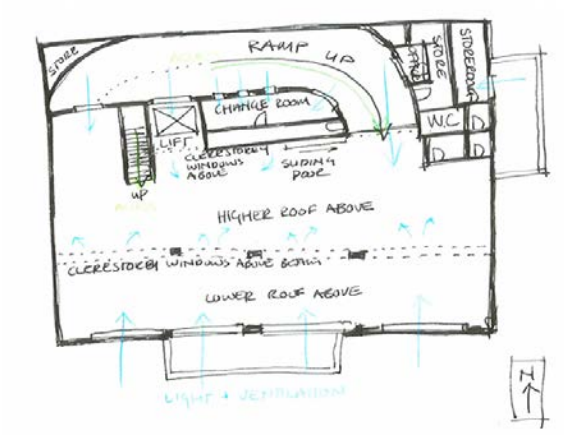


Figure 2.3.3 Existing first floor sketch showing flows of matter, energy (natural light and ventilation in blue, movement in green) and spatial zones.

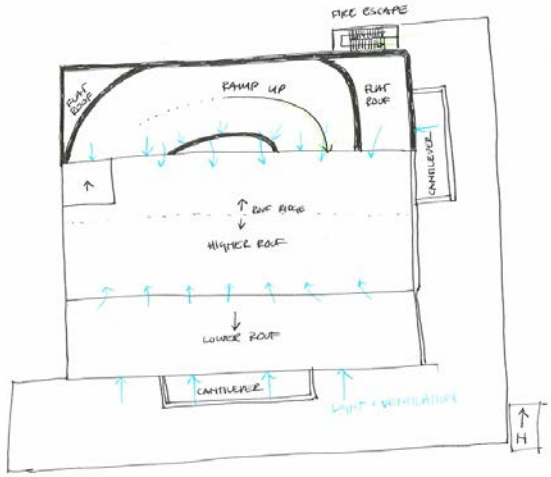


Figure 2.3.4 Existing roof sketch showing flows of matter, energy (natural light and ventilation in blue, movement in green) and spatial zones.

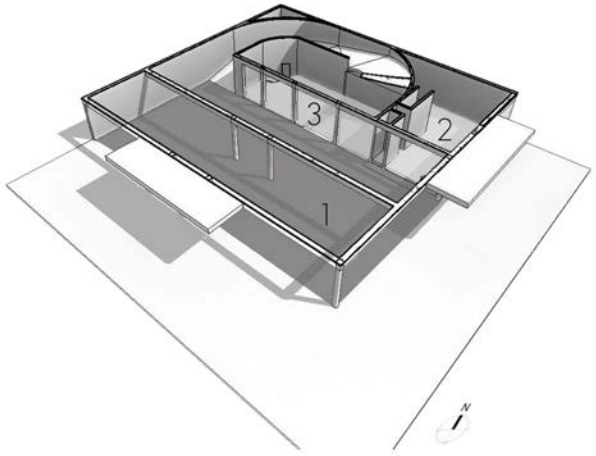


Figure 2.3.5 Building structure and existing spatial zones (ground floor)

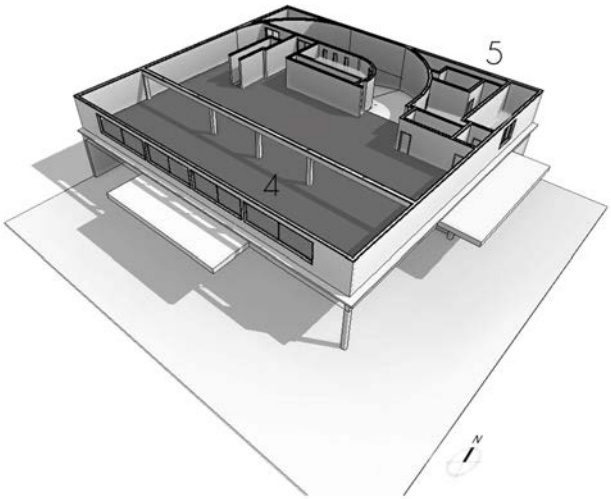


Figure 2.3.6 Building structure and existing spatial zones (first floor)

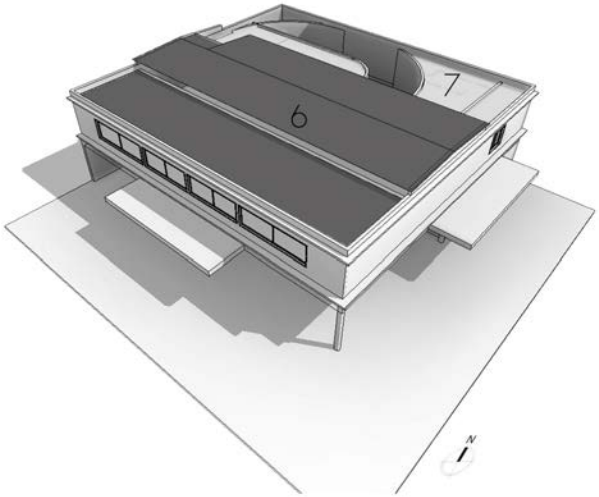


Figure 2.3.7 Building structure and existing spatial zones (roof)

Figures 2.3.5 to 2.3.7 aim at decoding the building structure and recognise design potential in the existing spatial zones. On the ground floor zones, the structure is made up of concrete columns and beams. The entire northern and western walls consist of concrete frameworks and bricks with only a fire escape door opening to the north. The entire front (southern) section is open, while the access (eastern) side is only partially open. There is a concrete car ramp, as well as a steel internal staircase and functional lift. Floors are paved and tiled on the ground floor, making the interior seamless with the adjacent sidewalk.
Figure 2.3.5 presents the following spatial zones:
Zone 1 – general floor (commercial) Zone 2 – kitchen/shop (semi private and commercial) Zone 3 – admin/sales area

On the first floor zones, the first floor has steel frame window openings (south) and a large sliding door on the northern side leading from the ramp on ground floor. The workshop floor has a screed finish with all storerooms and change rooms/ bathrooms as tiled floors. Walls are brick, with concrete columns and beams.
Figure 2.3.6 presents the following spatial zones:
Zone 4 – workshop Zone 5 – storerooms/bathrooms/change rooms

On the roof zones, the roof is composed of corrugated steel sheeting with steel trusses (exposed). There are clerestory windows (north and south) which separate a higher roof section (middle), providing additional ventilation and natural light into the workshop space. Flat fiberglass roof sheets and concrete slabs are used on the adjoining roofs of zones 6 and 7. Figure 2.3.7 presents the following spatial zones:
Zone 6 – main workshop roof Zone 7 – storeroom/change room roof

The presented Figures show how the structure has been categorised into seven zones which make up the building function and form. Materials used within the building are honest and exposed, allowing for heavy machinery and industrial methods of production to be facilitated, without the dependence of artificial lighting or ventilation. The building offers opportunity for further sustainable design strategies in these areas, as well as the introduction of an adaptive reuse strategy in the proposal of an upcycling centre. Opportunities such as increased natural lighting/ventilation and cohesive working spaces with visual access are considered. Here waste can be sorted and creatively re-used with the assistance of light machinery and methods (i.e. the synthesising of waste materials) and finished products displayed.

A further advantage of the host building being situated on an active street corner is the opportunity for exhibition or a showcasing of products. The building's open ground floor has a strong visual access from the adjacent buildings and gardens due to its orientation and architectural characteristics. This also makes the building accessible and easily identifiable. Table 2.3.10 provides a breakdown of these advantages.

Figures 2.3.8 and 2.3.9 show images of the existing south and east façades of the building, with a 5000mm height from the ground floor to the underside of the first floor slab. Light admittance and ventilation is significant, enabling easy movement and navigation on the permeable street corner of Visagie and Bosman Streets. This also opens up the possibility of strong visual connections from adjacent street corners to the ground floor of the building, as an exhibition gallery or public space. It can also allow for this building to form part of an extension of the Pretorius Square to the south-east, and the Ditsong Museum of Cultural History gardens to the south.

Figure 2.3.8 Southern façade of Minty's Tyres building

Figure 2.3.9 Eastern façade of Minty's Tyres building

Minty's building characteristics					
Location	Basement floor	Ground floor	Ground floor	First floor	First floor
Availability of services	Storage underneath the car ramp	Floor drainage Large sinks Extraction hood Appliances	Paved floor finish Ramp and drainage grating	Car ramp from first floor	Car ramp / entrance to the first floor workshop
Key elements	Large subterranean storage level	Kitchen services seating and serving area	Paved floor finish offers little transition and threshold from the street and sidewalk boundary to interior space	Wide curved ramp with easy access from ground floor to first floor	Large opening for vehicles and northern light into the workshop space
Design potential / re-approproiation	Good storage space of material accessible from the kitchen area and admin rooms	Reused as a kitchen / seating serving area / as existing infrastructure is present	Continuation from street to interior visual elements and aesthetic connections	Opportunity for the transportation of vehicles or waste material in large amounts	Potential for good cross ventilation and access to the first floor

Minty's building characteristics				
Location	First floor	First floor	First floor	First floor
Availability of services	First floor workshop space	First floor lift and clerestory windows	Workshop South view	Natural lighting strategies in the change room spaces
Key elements	Large open space with good natural ventilation and light admittance	Working lift from ground to first floor	Pleasant view of the Ditsong Museum gardens	Fiberglass roof acting as a roof light
Design potential / re-approproiation	Appropriate for product manufacture where people are integrated and low amount of mechanical services are required	Potential for transportation of finished products or large amount of waste material	Good orientation of Southern indirect and diffused light and open vistas	Natural lighting strategies provide reduction in mechanical energy needed

Table 2.3.10 Characteristics of the Minty's Tyres building, key elements and re-appropriation potential

Location	Feature	Function	Material	Space	Reappropriation
Exterior	South facing windows (FF)	Admitting soft indirect light	Steel framed windows	South facade full width	Good natural light addmittance/ventilation/pleasing views to Cultural Museums gardens
Exterior	Cantilevered slabs	Architectural/visual/shelter	Concrete slab	South and East facades	Architectural feature/shelter
Exterior	Car ramp	Access from GF to FF (cars/loads)	Concrete	North facing	Transporting heavy loads/cars from ground to first floor/potential interior design feature
Interior	Open ground floor space	Multifunctional/good circulation space		South/East facade	Good open workshop/sorting/display/circulation space
Interior	Concrete columns	Load bearing	Concrete	Ground/first floor	Opportunities for features as interior design 'boundary objects'
Interior	Lift	Heavy load transfer from GF to FF	Steel cage with motor on FF	Centre of building	Transportation of materials/objects and potential interior design feature
Interior	Kitchen	Amenities for cafe	Appliances	Back/northern side of building	Amenities for waste pickers/homeless/community members/workers
Interior	Open first floor space/clerestory windows	Multifunctional/good circulation space		South and East facades	Good open workshop/sorting/display/circulation space
Interior	High ceilings (GF & FF)	Good light addmittance on both floors		Ground and first floors	Good natural light and ventilation strategies

Table 2.4.1 Assessment of the Minty's Tyres building and how its features can be re-appropriated

2.4 ASSESSMENT OF BUILDING

The building has been assessed according to its current features, their function, material composition, space and re-appropriation for the proposed intervention, as seen in Figure 2.4.1

2.5 CLIMATE

Temperature.
Temperatures in Pretoria range from highs of 34 C° to lows of 10 C°, where high rainfall follows high temperature and vice versa. Rainfall ranges from 250mm, in the 'wet season', to 5mm, in the 'dry season', per annum. The summer and early autumn months of January to April are associated with high temperatures and high rainfall, whereas the late autumn to early spring months of May to September are associated with lower temperatures and almost no rainfall. October to December have higher temperatures and rainfall than the rest of the year (World Weather Online, 2017). This is relevant to this proposed programme as it informs ecological and regenerative design strategies, or a 'place-based' approach to interevention.

Light.
Highest natural lighting LUX levels were recorded on the ground floor on the southern and eastern open sides of the Minty's Tyres building. Similarly, the first floor's southern side had the highest LUX levels near the windows. Note that a minimum of 500 LUX is required for an office space and 200 LUX for sorting and unpacking of goods (Kellwood LED Lighting, 2017). This analysis shows that minimal mechanical lighting is necessary for the proposed intervention to operate during the daytime. The building being orientated to the south is also advantageous, as it admits a softer indirect light which does not increase the solar heat gain on window surfaces, leading to greater temperature ranges inside the building.

On average, Pretoria receives a minimum of 07:42 (hours/mins) and a maximum of 09:54 (hours/mins) of sunlight per day. The higher number of sunshine hours are associated with the late autumn to early spring months (i.e. May to September) and the lower number of sunshine hours are typical of the summer and early autumn months (i.e. January to April), October to December has on average of 9:00 (hours/mins) sunshine hours (Climatemps, 2014).
Wind.
Wind speeds in Pretoria vary from 4.5mhp to 14.8mph, where the highest speeds occur in October and the lowest in June. Most of the wind currents are from Visagie Street on the south-facing side of the Minty's Tyre building (World Weather Online, 2017).
Noise.
Noise levels taken on a Decibel meter, ranged from 63.2dB to 85.8dB, from the measurements taken on Monday, 13 March 2017. Higher noise levels only resulted from traffic on adjacent roads (Visagie more than Bosman) when the lights turned green.
The climate study is important here as being an informant for the proposed intervention to be ecologically responsive and a site-based systems approach design.

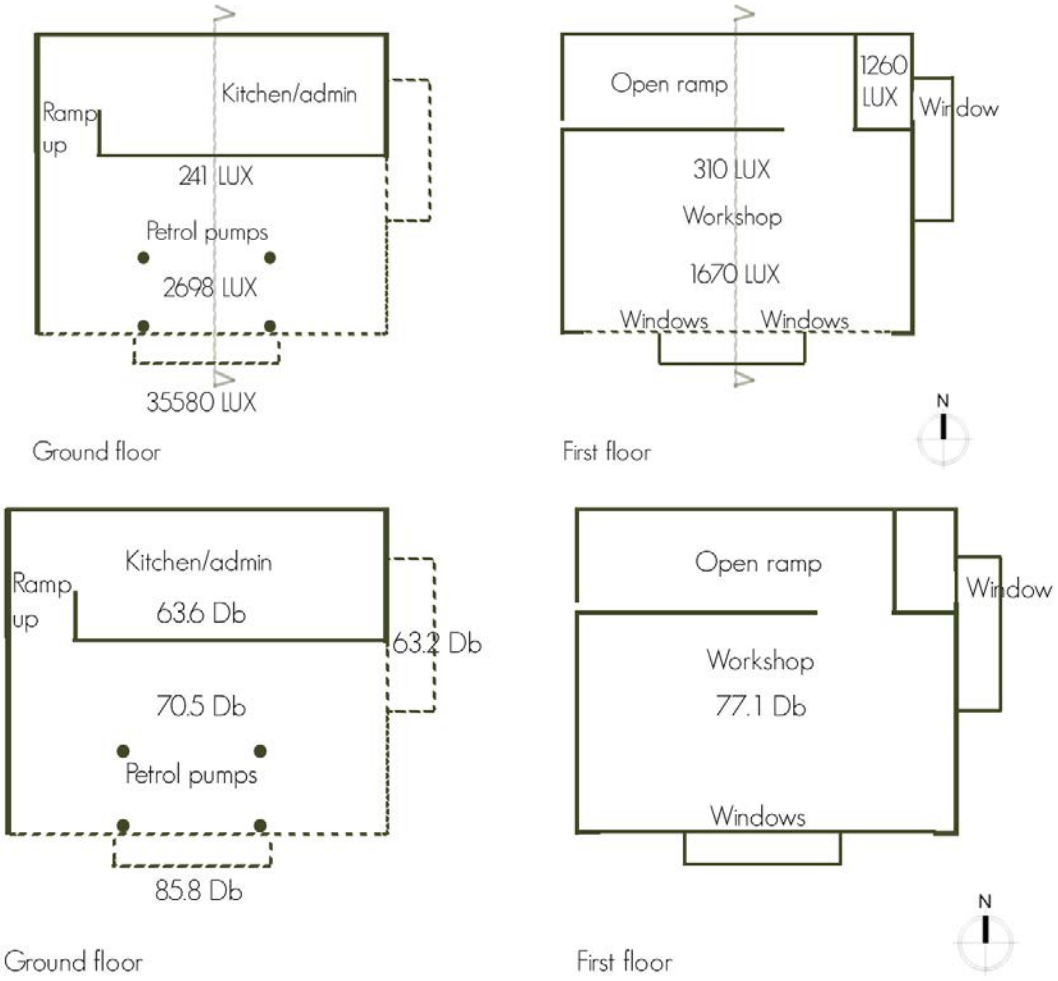


Figure 2.5.1 Sketch plan showing LUX levels and Decibel readings taken at the Minty's Tyres building

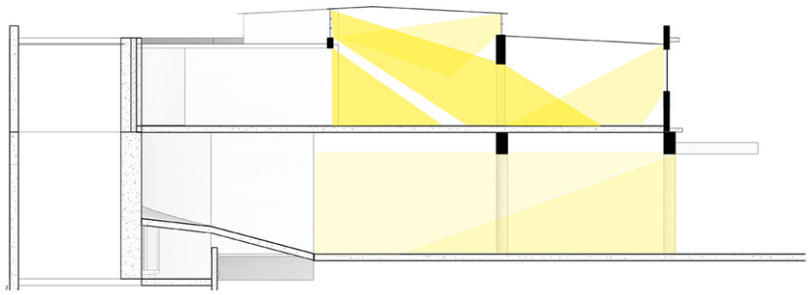


Figure 2.5.2 Section A (west facing) showing the orientation of the building (south) and sun penetration through the north-facing door on the first floor (Revit model solar study, taken at 11:00)

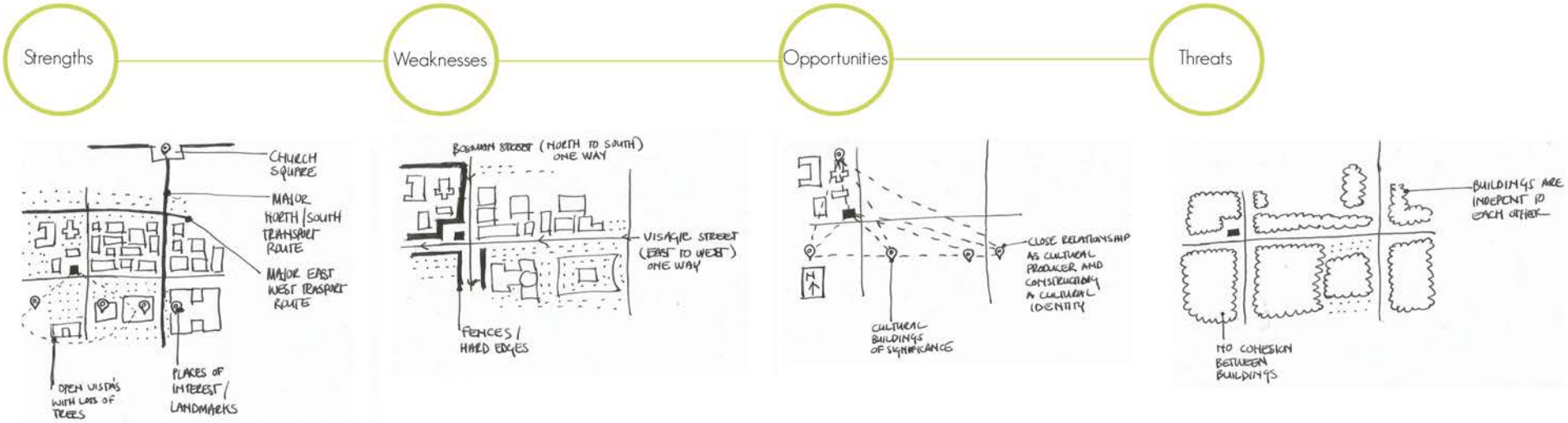


Figure 2.6.1 SWOT analysis on the surrounding area of the Minty's Tyre building

2.6 SWOT ANALYSIS

Various strengths, weaknesses, opportunities and threats (SWOT) related to the site have been identified. One of the main strengths of the side includes the its close proximity to cultural, public and historical places. Other strengths are the site's strong access routes on the North – South and East – West orientations of the site; the opportunity to strengthen the interaction with neighbouring buildings and spaces; and the contribution of the building as a producer of cultural objects (through activity and upcycled objects).

Weaknesses include closed-off street edges with parking restricted to street-only. Opportunities for improving this site can be recognised in the proposed intervention, which integrates thresholds from street to interior with good building orientation for regenerative design principles. Threats include current low levels of community cohesion, as buildings act independently from one another, and historical buildings are neither celebrated nor 'kept alive'.

2.7 SITE AND DESIGN PARAMETERS

The host building provides unique opportunities and idiosyncrasies. The structure supports a limited range of activities and operations, namely those of commercial/ business activities for which the building has been zoned (i.e. light production/manufacturing).

Although the building is not protected by the 60-year National Heritage Act, its architectural character is worthy of celebration and should be preserved as much as possible. This sentiment is justified by the statement of significance presented in Chapter 1, and is in line with theory pertaining to the Australian Burra Charter (ICOMOS, 2013). The new intervention aims to utilise the existing features and nature of the building by conserving its found character.

Site parameters also aim to positively contribute to the existing nature of the area. This is disclosed with consideration to the nearby church (and its humanitarian aid function as a soup kitchen), convent and cultural museum. These parameters aim to encourage community and local identity through the operations of the proposed intervention.

2.8 MUNICIPAL REGULATIONS

Current use of the building is zoned for business use in relation to light industry (i.e. a service station), which will remain unaffected by the new project. This is due to the new proposed use of the building still being for business purposes (i.e. an upcycling centre). The Minty's Tyres building also falls under the use zone of education and place of worship, as per the other religious buildings on the block.

The building line restriction is 4.5m on all sides, with storeys above the first storey. The Minty's Tyres building has two storeys above ground level and a utility area below the ground floor. A servitude of 2m is unobstructed on both street boundaries of Visagie and Bosman Streets. The new intervention does not increase floor area ratio (FAR), coverage or height of the current building, therefore it does not infringe on municipal bylaws and zoning regulations (Tshwane Government, 2008).

2.9 SOLAR STUDY

Conducted on the 22nd of May 2017, illustrating shadows of nearby buildings in relation to the Minty's building.

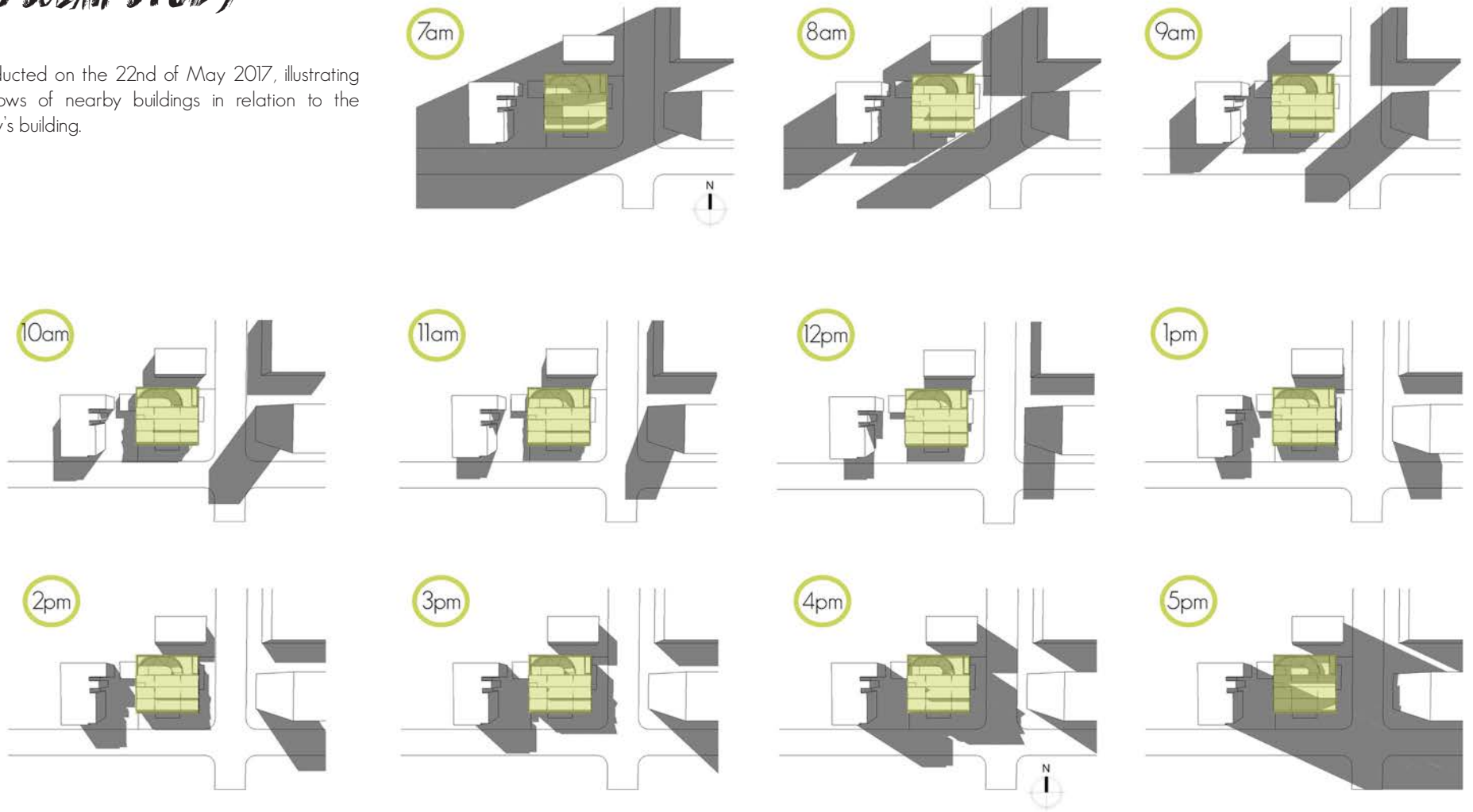


Figure 2.9.1 Solar study of the Minty's building

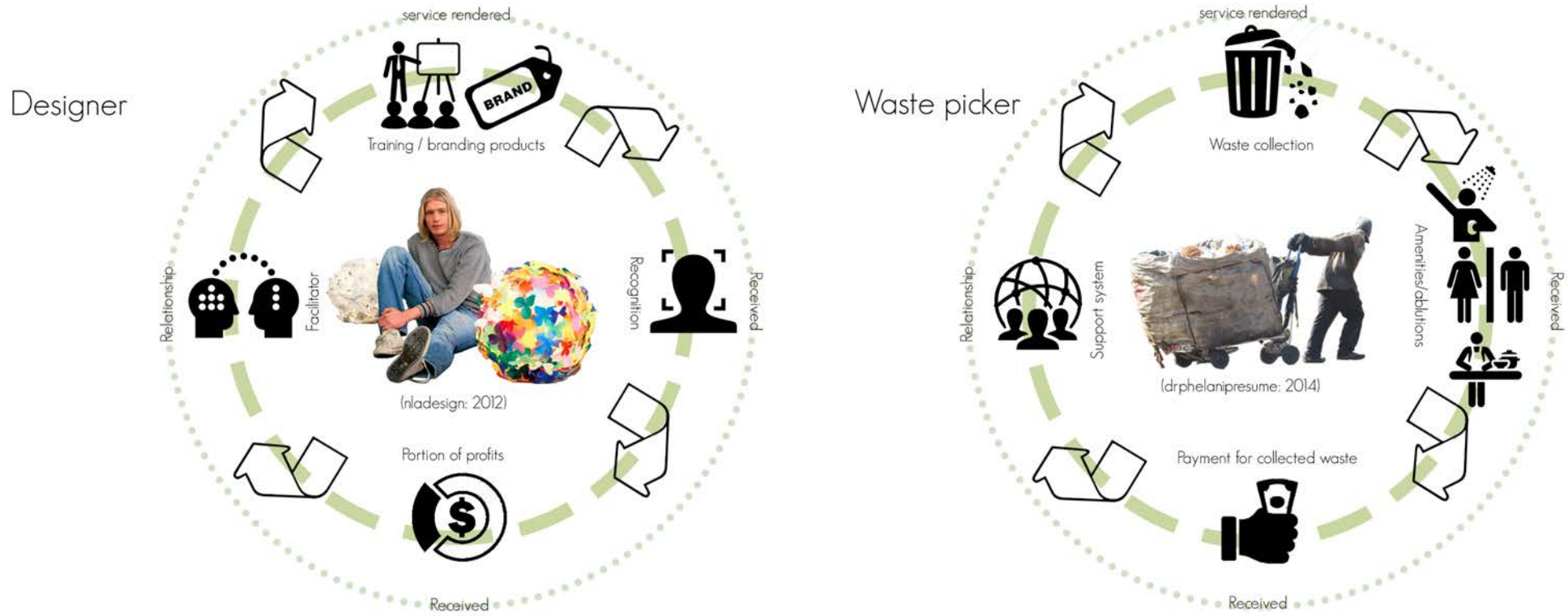


Figure 2.10.1 Designer and waste picker profile groups and their interactions with the proposed intervention

2.10 USER PROFILES

The following user profiles are considered for those who will likely inhabit the proposed space, and interact with and support the proposed intervention. These profiles are illustrated in Figure 2.10.1, while Figure 2.10.2 shows how these user types have differing processes and exchanges. The user profile groups and their interactions with the proposed intervention building fall either into forming part of the support system or as part of the production strategy.

Firstly, the designer performs the 'driver' role in the cycle. They train and facilitate crafts people by adding their 'brand' to the objects manufactured at the centre. They receive a share of the profits as a means of recognition for their community service and contribution to society. They also have access to the workshop. Their relationship with the building is one of 'facilitator'.

Secondly, the waste picker performs the 'collector/gatherer' role in the cycle. They provide waste material which is selected or predetermined by the designer for use by the crafts people. They receive amenities (such as showers, toilets, and cooking facilities) from the building. They also receive compensation (either through receiving money or meal vouchers, or through the opportunity to participate in a skills development and training programme) for their collected waste materials. This practice builds on from the current money-only compensation strategies present at current buy-back centres. The waste pickers' relationship with the building is one of support, namely that the building provides them with additional income, amenities and facilities. This forms part of the larger community support system by extending the soup kitchen services performed by the Cathedral of the Sacred Heart (CSH Pretoria, 2017).

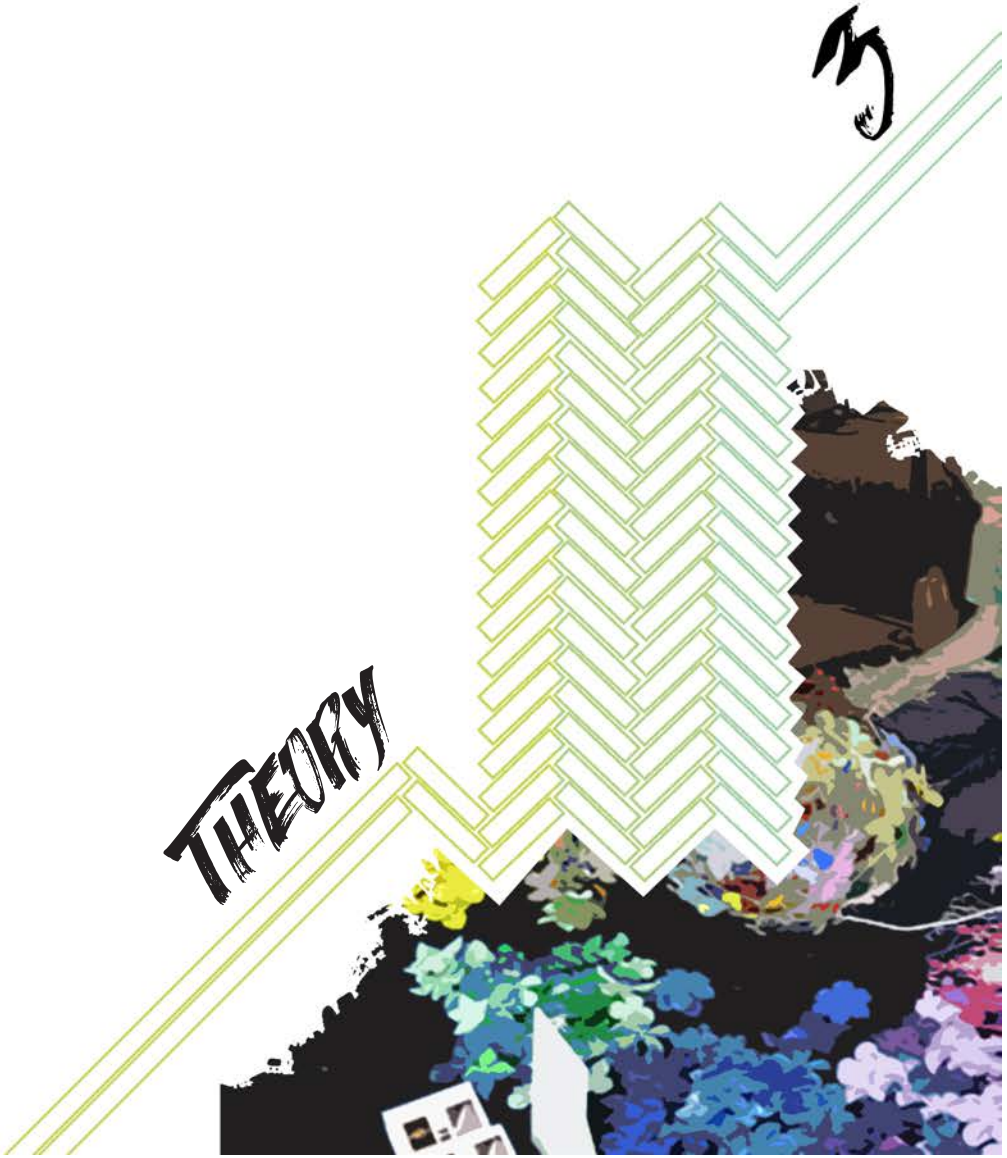
Thirdly, the crafts people perform the 'producer/worker' role in the cycle. They sort, curate and assemble objects under

Figure 2.10.2 Crafts people, stakeholder profile groups and their interactions with the proposed intervention

the designer's supervision. They receive amenities (such as showers, toilets, and cooking facilities) from the building. They also receive a share of the profits from the objects sold. Their relationship with the building is also one of a support system.
Fourthly, the other stakeholders/non-profit organisations (NPO's), and potential end-users also play a role in the cycle. They review, support or purchase items in accordance with the designer or government organisation. They receive objects produced by the local community, thereby promoting income creation, cultural identity from the area and local empowerment. Their relationship with the building is one of a consumer or support partnership agreement for the showroom and manufacturer.

2.11 CONCLUSION

The study proves the need for an upcycling centre in the Pretoria CBD due to the prominence of both waste generators and waste pickers in the area. The Minty's Tyres building is an ideal location for such a centre due to its historical development, cultural significance and social conditions. The host building is also suitable for the proposed intervention of upcycling according to the climatic and contextual setting. The building's spatial hierarchy is equipped to transition from a service station (i.e. tyre fitment, fuel refilling and café operations) to an upcycling centre (i.e. limited waste collection, sorting, cleaning, manufacturing, exhibition and café operations).
Completed climatic, building, urban and site analyses show that the Minty's Tyres building is able to be re-appropriated for an upcycling centre as proposed, as the new function responds to the current operations of the building. This means that no new municipal zoning is required. The building is also contextually relevant.



The designer today should not help to produce more – he has to help produce fewer and better things. There is a beauty, an aesthetic and philosophy of the less (Philippe Starck, n.d.).

3.1 INTRODUCTION

This chapter examines theory supporting the social role of an upcycling centre as a gateway to cultural development. This is structured in a way which covers the spatial experience of the users as they inhabit and use the space, along with the response and alteration of the building to the new programme of upcycling.
Firstly, environmental psychology, where elements of the physical environment should be aligned to facilitate social interactions between users and the building is addressed. Secondly, adaptive reuse, which alters the structure in response to the existing fabric and the accommodation of a new programme is dealt with. Thirdly, regenerative architecture, the theory that improves the energy performance and utilisation of ecological factors surrounding the site is discussed.

Supporting theory was selected using Google Scholar and the University of Pretoria's library. The chapter is concluded by emphasising design informants to the built fabric, spatial synthesis for the model inhabitants and the significance of cohesive systems integrated into the operations of the building.

3.2 Environmental Psychology

Environmental psychology is defined as the study of transactions between individuals and their physical settings (Gifford, 2002).
The integration of the users with the public, workshop, break space and amenities are discussed here, as such factors are important when considering how environmental psychology informs such integration. This is because community areas and schools are the reflection of the larger community (Kopec 2012: 195). In Upcycling: Re-use and Recreate Functional Interior Spaces Using Waste Materials, by Shukriah, Khairuddin and Zainal Abidin (2013), the layer of waste materials is described as giving more personality to a space in which

> ...a distinctive yet functional interior space can be created through the process of converting waste materials or useful products into new goods which also contribute to a higher environmental value (p. 798).

Principles of environmental psychology relevant to this intervention are the integral theory, behaviour setting theory and affordances and preference model theory (Kopec, 2012: 30). The integral theory states that elements of the environment should work in harmony to facilitate a particular behaviour. This theory is applied to this proposed intervention in the form of how interior elements guide the user to navigate and interact with the space. In this case, navigation can be seen in the intended revitalisation of waste pickers, by depositing their waste products to the collection area, then moving to the remuneration (replenish area), ablutions (refresh area), canteen (refuelling area) and seating (rest) areas via a narrative of spatial hierarchy and orientation with the building layout.

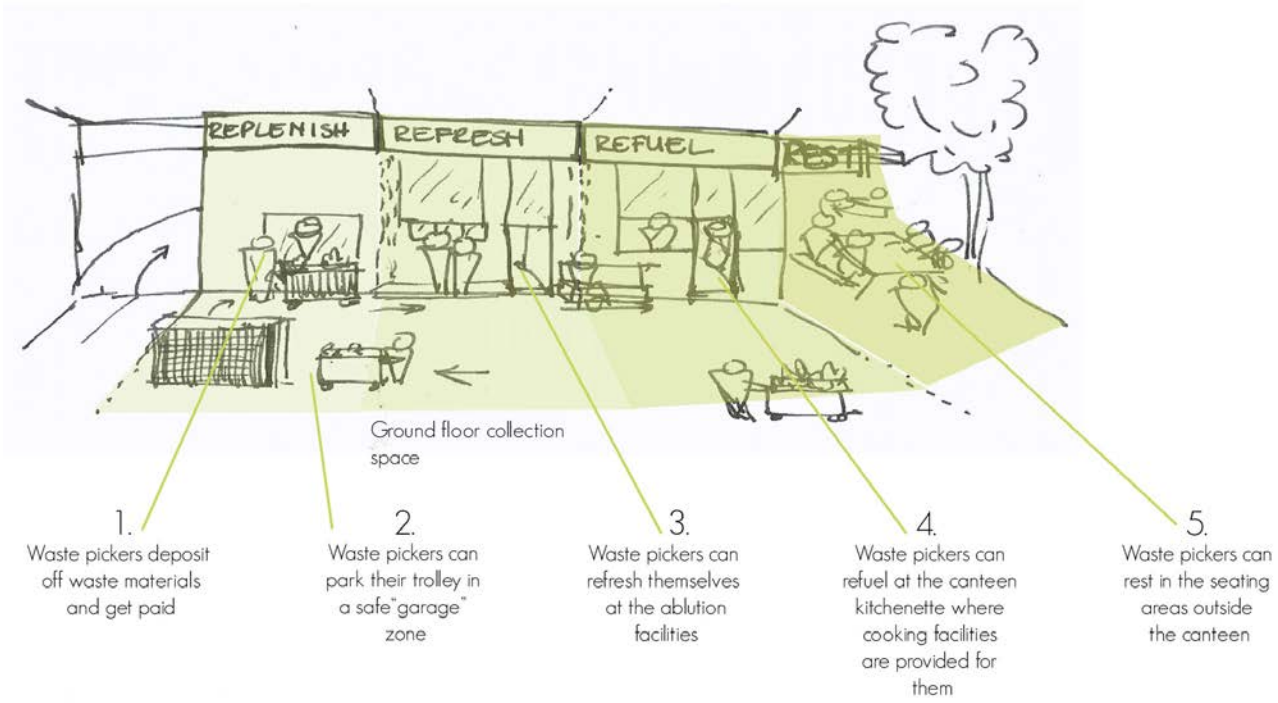


Figure 3.2.1 The spatial transition of waste pickers using the integral theory

Similarly, the crafts people on the proposed mezzanine and current first floor workspaces are encouraged to manufacture products in different areas according to machinery and stages of production. Break spaces are situated on the ground floor away from the workspaces, thereby creating a suitable environment for social engagement and integration of all users. Inspiration is imagined through ensembles of seating design using reclaimed and recycled materials.

The behaviour setting theory emphasises that design is an important component of a setting that contributes to certain behaviours (Kopec, 2012:30). This is manifested in the proposed programme through the spatial arrangements according to the orientation of the building with collaborative interactions, manufacturing processes and hierarchy of occupant experiences. Interior design ensembles and furnishings in this space are also informed by this principle. Choice of material, proximity and function guide the user to navigate and inhabit the various zones. In this case, work zones are arranged in the building which make them visible to users across all the floors. On the southern side, green open vistas and semi-isolated stations are located for end-of-process manufacturing, making for a pleasant location within the building. The waste collection area is located at the south-eastern entrance on the main transportation route (i.e. Visagie Street), where it is easy for waste pickers to access the building, as they move against the traffic from West to East (as observed in site visits). The street edge to interior is unobstructed by a threshold, making wayfinding and orientation universal to understand. Circulation routes and transfer zones between floors are guided by this theory to form visual connections and interactions between users and activities, thereby creating cohesiveness and recognition.

The affordances theory is described as the arrangement of spaces in a recognisable function of environmental features according to substances, surfaces and textures (Kopec, 2012: 30). This is realised through the material transformation and reuse of products via upcycling and recycling that the users experience in different areas of the building. Experiencing a material in a different way to its original purpose also generates a sense of renewal in the user as to the possibilities and adaptiveness of the material in surface, composition or new function. Green walls, vertical gardens and grass pavers add to the building's connection with nature. This is further promoted by the building's current close proximity to the Ditsong Museum of Cultural History Gardens.

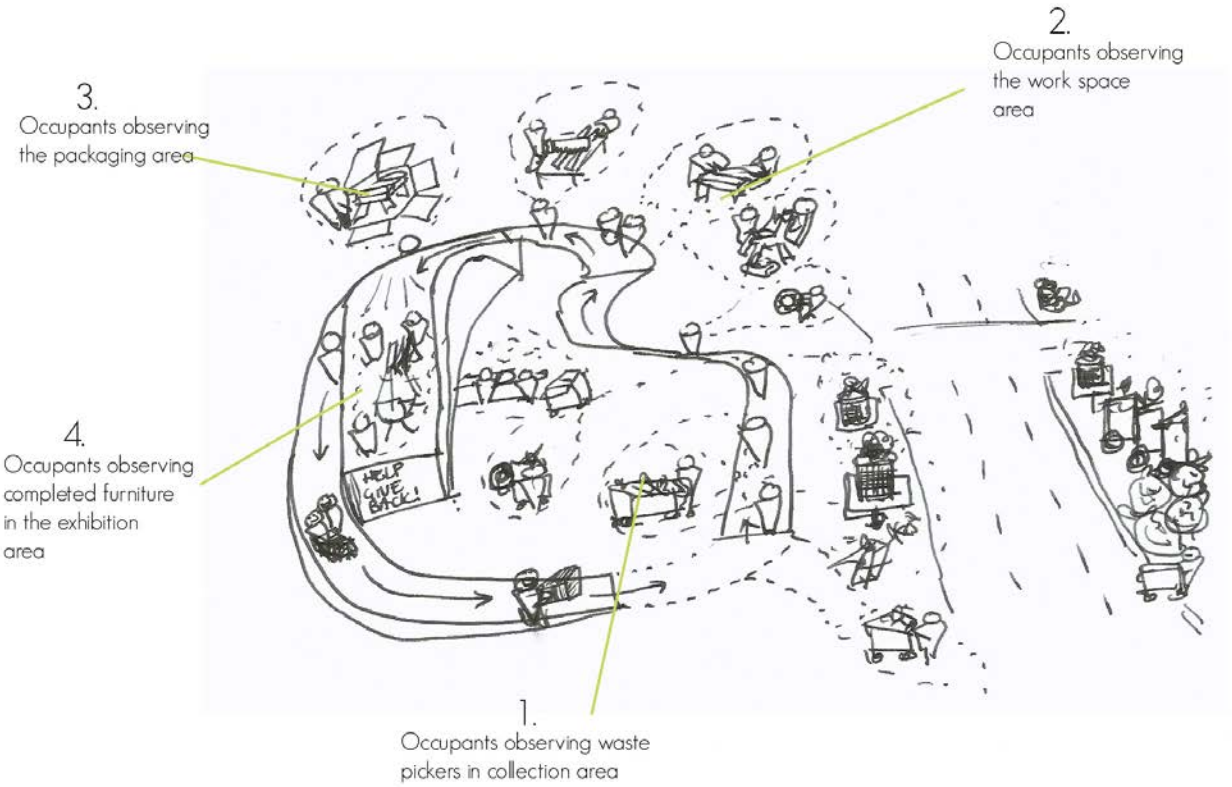


Figure 3.2.2 The narrative circulation routes which the occupants experience in the space using the behaviour setting theory

The preference model theory is a method for designing engaging environments (Kopec, 2012: 30). It is applied in the mezzanine and first floor workspaces, as well as the canteen space, as being inspiring to crafts people and waste pickers through renewing discarded materials and stimulating creativity with product possibilities. Interaction through material re-appropriation is the catalyst to awareness, motivation and construction of new possibilities in interior objects and furniture.

Upcycled products, workspaces, amenities, exhibition and public spaces should have a strong *synomorphy* – the principle that physical and social aspects of an environment should fit together (Gifford, 2002). Environmental psychology is the theory which guides the alteration of the building to respond to community and social inclusion strategies, thus meeting the need for synomorphy (Gifford, 2002). Here, elements should reflect the social interactions and shared spaces.

The integration of community and awareness of the possibilities of re-using waste materials as a sustainable initiative is one of the key objectives in this intervention. Integration, in this sense, is the acceptance and elimination of the inferiority to which waste pickers are subjected, regarding their role in society. This is achieved by providing amenities and a knowledge economy, cultivating skills, and providing waste pickers with tools to improve their socio-economic status and livelihood.
Attributes and associations of the upcycling centre aim to further and mirror the cultural and developmental aspects relative to a support structure, and should accommodate different experiences and networks. The interconnectivity of the intangible activities and frameworks with the tangible psychological reactance of the space as a facilitator should be seen as socially and culturally supportive (Kopec, 2012: 195). The ground floor space of the proposed building is intended to be a framework of crosspollination through the integration of all users. The collection and exhibition space also reflects this larger community and the cultural aspects established in the precinct (as mentioned in the Chapter 2 sub-section entitled 'Context'). It would therefore be prudent to include elements of developmental and break away spaces to achieve a synthesis of community integration. This would include variation in levels, surface materials, seating options, foliage, artworks, colours and textures to support socialising, as well as quiet and play areas (Kopec, 2012: 198).

Product display in a space, such as the proposed, should be centred on being relevant to its context and cultural background, in order to construct an identity. Additionally, in order to construct an identity, an understanding of how consumers use furniture and objects to create individualities and projected perception is needed. This is based on an assessment of intricate influences such as class, age, gender, sexuality, household composition and geographic location upon furniture consumption, and feeds into the proposed design of the site (Leslie and Reimer, 2003: 428).

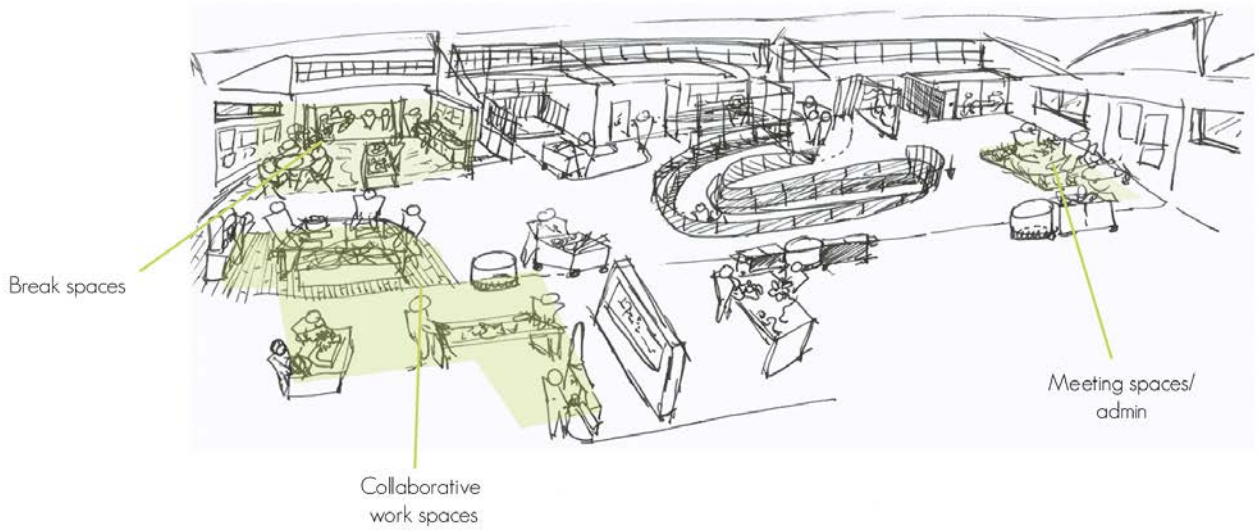
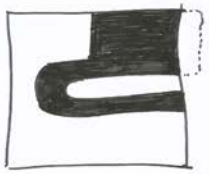


Figure 3.2.3 The first floor workspaces as informed by the preference model theory

Routes and movements throughout the interior space

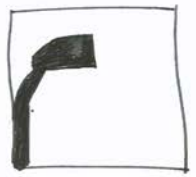
Public routes (ground floor / first floor)

Intended journey of public visitors through the space where they are educated and exposed to manufacturing and collection of waste processes. The journey offers to improve or "upcycle" them in creativity and social responsibility of the products.



Waste picker's routes (ground floor)

The journey and areas intended to improve the waste picker's livelihood.. From building entry, waste material deposits, ablution facilities, canteen and seating / rest areas.

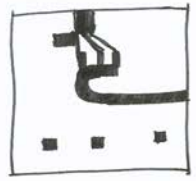


Crafts people's routes (ground floor)

The movement path which crafts people access the building space to reach the first floor work spaces.

Crafts people's routes (first floor)

From the ground floor, the crafts people inhabit the majority of the first floor space.. This includes open working spaces, separate indoor and outdoor break spaces, restrooms, exhibition and storage areas



Waste routes (ground floor)

The routes which the waste materials travel from collection, cleaning, sorting and disposal after use. The waste cycles through the centre returning to waste picker's for further recycling at other facilities.

Waste routes (first floor)

The waste arrives in trolleys on the first floor via the lift, which is then stored until use or moves to applicable waste upcycling stations for processing. Discarded pieces are thrown down the waste chute returning to the waste p.icker's

Figure 3.2.4 The routes and movement of users and waste material throughout the interior space.

Requirements of interior spaces

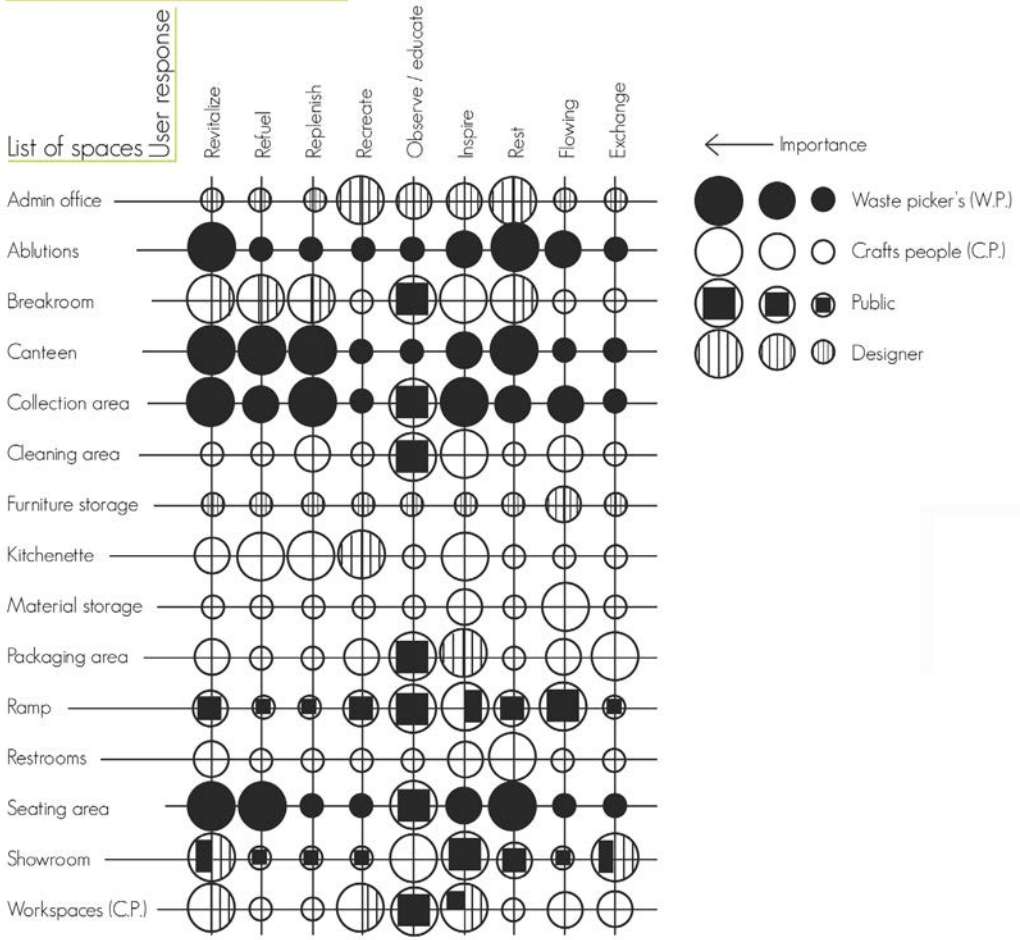


Figure 3.2.5 The requirements of interior space as aligning to the environmental psychology of the program and concept of "a cyclic journey of renewal".

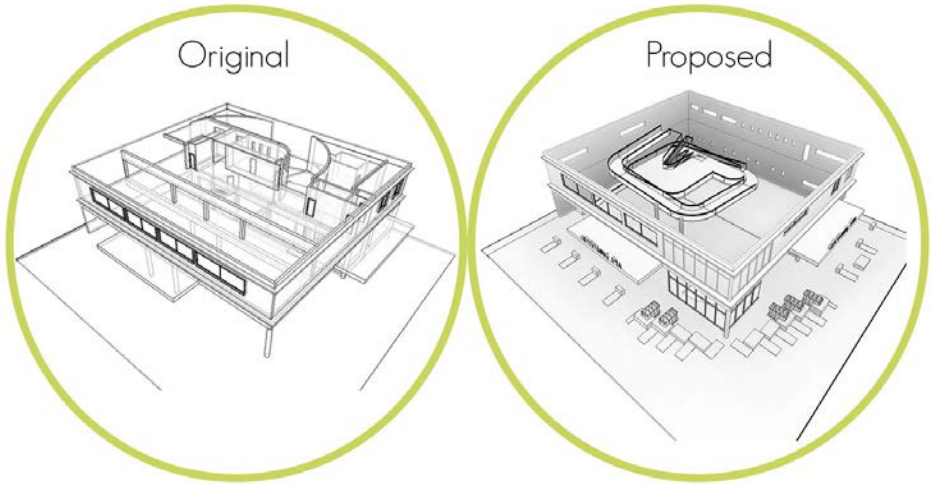


Figure 3.3.1 Ramp intervention to the Minty's Tyres building.

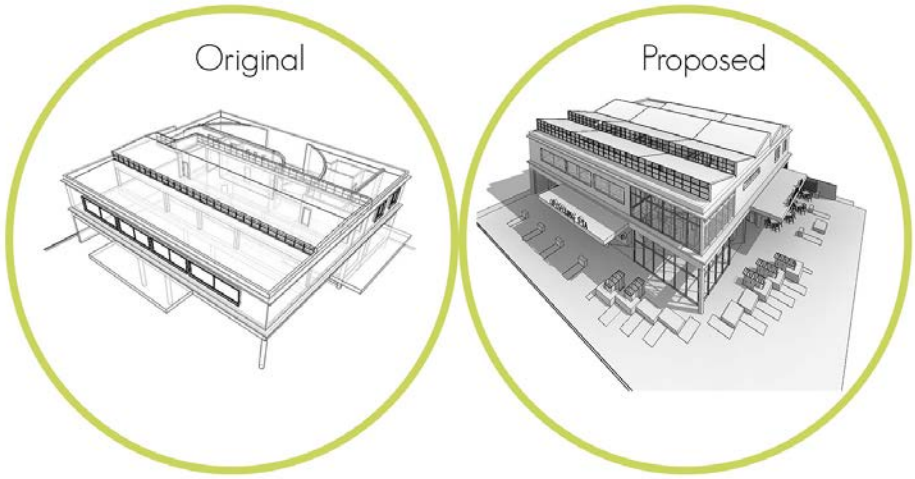


Figure 3.3.2 Roof intervention to the Minty's Tyres building.

3.3 ADAPTIVE REUSE

Adaptive reuse is defined as the process that changes a disused or ineffective item into a new item that can be used for a different purpose. Sometimes nothing but the item's use changes (Department of the Environment and Health [DEH], 2004). In On Altering Architecture, Scott (2008) describes an intervention as aiming to "be always equal to the host building in some respect, and better in others, or else it is a failure" (p. 168).

The main principle which guides the adaptive reuse strategy in this study, is that of intervention. Installation, however, is also present as a temporary approach on a smaller scale. The alteration of the building is in response to the new programme as a form of upcycling and improving the building's user experience and resource efficiency. Connecting to the concept of a cyclic journey of renewal, the additions and alterations aim to use natural systems, such as light and ventilation, as well as existing features of the building, to enhance productivity and user participation.

Intervention is a procedure that activates the potential or repressed meaning of a specific place. It only truly works when the architectural response of the modifications draws all its cues from the existing building (Brooker and Stone, 2004: 81).

This more permanent form of adaptive reuse is applied to the building by the addition of a ramp and mezzanine level. Using the existing high volumes, the ramp and mezzanine level open up the building from the inside, creating visual connections and permeability of spaces between all users. Such permeability is intended to activate the large volume as access to the first floor workspace areas, thereby creating a narrative journey meandering around the ground floor space.

The material used to clad the ramp balustrade is imagined as reclaimed waste materials collected in the centre. This reclaimed waste is symbolic of the adaptiveness of materiality; here adapting to a new function from its original purpose.

Intervention is also applied in the Minty's Tyres building in the form of a new roof, complete with north- and south-facing light shafts. North-facing light shafts typically channel intense and direct natural light into central or deeper areas of the first floor or mezzanine level, whereas south-facing light shafts channel softer indirect light onto perimeter spaces already receiving light from windows on the southern and eastern façades. The permeability of light is symbolic of the building's adaptiveness to concede the visual connections and unrestricted access for users throughout the space. Intervention, here, is appropriated by activating various zones through their visual connection to the sky from the centre of the building, and juxtaposing lighting intensities ranging across the horizontal and vertical levels.

The new roof intervention is intended to enhance the energy efficiency and working experience of the first and mezzanine floors. The hierarchy of North and South permits light to guide movement and functional zones according to the flexibility of workspaces and occupant permeability. The new roof manifests a discourse envisioned to be stimulating to the users and visitors on street level.

Installation is the placement of a series or group of related elements within the context of an existing building (Brooker and Stone, 2004: 127). Installation is a temporary form of adaptive reuse, and in the Minty's Tyres building can be seen in the flexible and adaptive workspaces and exhibition space. The designer and product range are temporary, with either a monthly or quarterly rotation, providing a platform for different partnerships and interconnected design environments. The space therefore needs to accommodate different spatial arrangements and manufacturing patterns. This is important, as the zones and spatial requirements are able to a change, thus aligning to the building's ability to adapt to an adjustment in production focus. Machinery in the space also informs the placement and location of associated activities and required

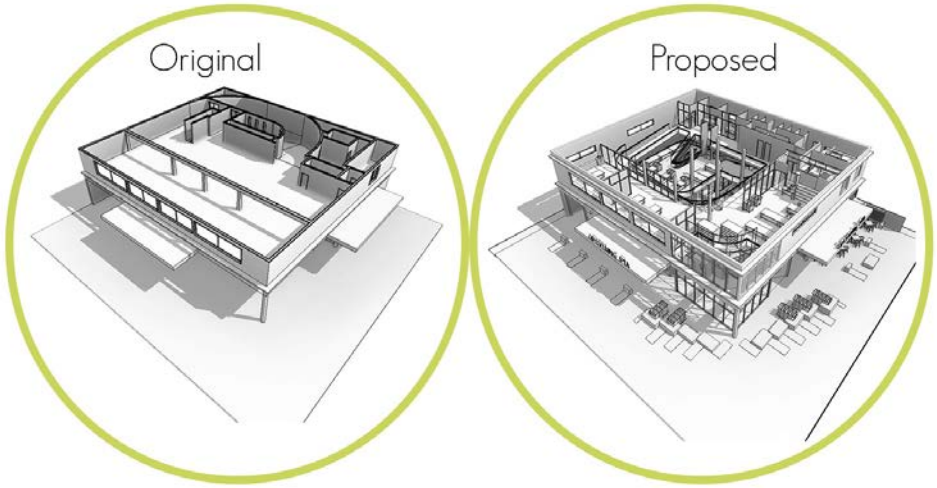


Figure 3.3.3 Workspace installation to the Minty's Tyres building

equipment, depending on what product is being manufactured.

Workspace arrangement and spatial organisation is intended to promote cohesive creative collaborations. The adaptive exhibition display space is directly influenced by the designer and furniture or other objects which are produced in the workshop. This should reflect the waste components used in the manufacturing and typologies of produced items, and should be displayed in a prominent corner of the building where items are highly visible to pedestrians and cars on street level.

Understanding material properties during the process of upcycling is one of the most important considerations of this programme. However, how this will play out in real-world application and practice is still to be seen. This is said with reference to the preservation of the original material, its new functionality and aesthetic value, as previous material connotations are adopted to the new object. Preservation accounts for the surface treatment of the material to ensure its longevity and ensures that the material's appearance is celebrated. Functionality is grouped with the adaption of material to which its properties can take on a new role in the interior of a space. Aesthetic value refers to the material's characteristics and meaning as the original object's associations are transferred to the new object's association (Shukriah et al., 2013: 802).

It is important to mention here that material connotations connect to the overall concept of upcycling. The users involved in the manufacturing process and their experience of the space and interior architecture is intended to be an inspiring and stimulating environment of creativity. Upcycling and improving conditions of the waste pickers, local community and architecture are intended here as sub-categories of upcycling in a broader sense.

3.4 REGENERATIVE ARCHITECTURE

Regenerative design is a concept based on exchanges within a system that ultimately improves itself (The Energy Initiative, 2015). It relies heavily on restorative actions, sustainability, and technology to produce a system that is both efficient and sustainable. In order to do so, the architecture itself (i.e. the physical building, materials and structure) is developed alongside the actual site and ecological surroundings (The Energy Initiative, 2015). Principles of regenerative architecture relevant to the intervention are: internal influencing factors, external influencing factors, the building envelope, generating electricity, visual, acoustic and olfactory factors. Figure 3.4.1 shows how such regenerative strategies are employed in terms of light and ventilation in the intervention.

As mentioned in Chapter 1, the significance of the existing structure portrays architectural characteristics of the 1960's. These characteristics are evident in the building's identified horizontal planes and simplistic geometric volumes. Its appearance remains as it was when initially constructed and serves the same function – that of a service station. It therefore retains its connection to the existing site, as well as past and lived experiences, forming an inter-generational equity (ICOMOS, 2013). Preservation of the southern and eastern façades is valuable as it retains this connection to the building's past and historical development of the precinct.

Ecological and place-based approaches are concerned with the energy, material and product performance of buildings in reaction to their site conditions (Peters, 2011: 17). Form, materiality, orientation and envelope openings are some of the factors which help to manipulate site conditions to suit the interior space. This, in turn, results in occupant comfort and sustainable services of the building. Identifying opportunities within the climatic conditions of a building's surroundings help to minimise the impact which is imposed on it by its occupation. It also works to improve its operations in terms of lighting, air movement, acoustic and resource use.

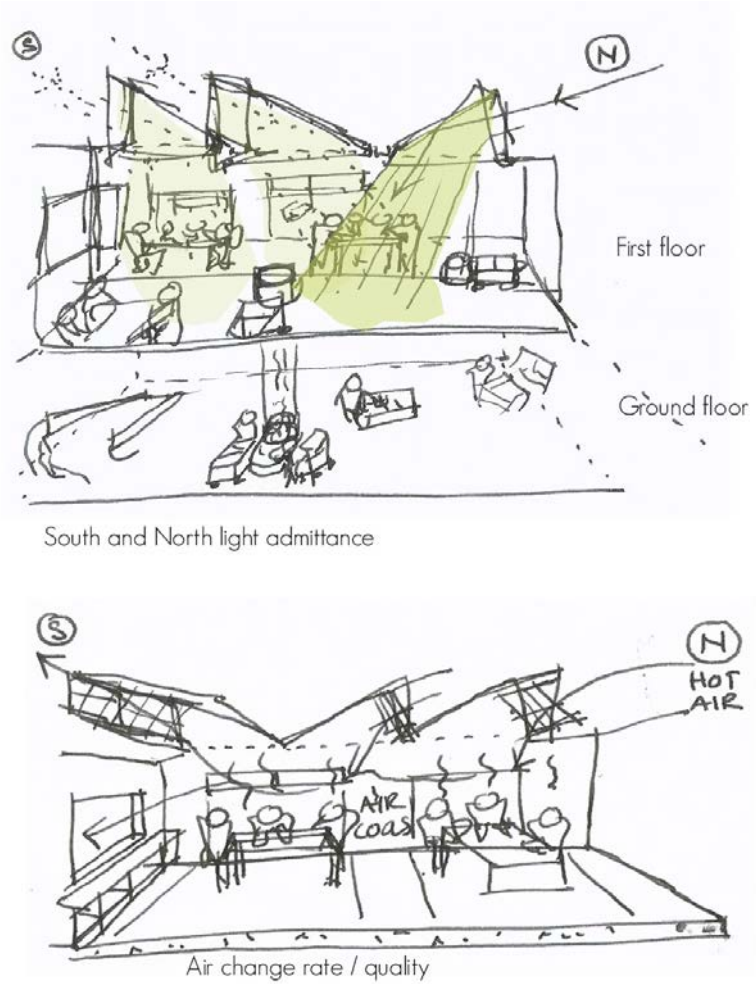


Figure 3.4.1 Natural light and ventilation application in the Minty's Tyres building based on regenerative strategies

Adaptive strategies are considered with reference to such opportunities and operations in the programme. Of particular importance is how such factors respond spatially to the proposed new programme in the existing Minty's Tyre building. Using multi-functional design, or addressing multiple uses with one solution, is considered to be characteristic of green design and sustainable approaches (Peters, 2011). Such is the case with this proposed project. Incorporating diversity and modular components for simple solutions, and making use of readily available materials and energy, are the driving force behind regenerative design strategies applicable to the improvement of the Minty's Tyres building. This is especially true in terms of resource use.

The building aims to respond to regenerative strategies in terms of materiality by using recycled materials for floor coverings and cladding. The choice for these materials is based on their material properties and how they can be adapted. Using reclaimed rubber and timber throughout the spaces align to a reduction in material waste (as generated through general building waste) and embodied energy expenditure, as is evident in Figure 3.4.2.

In the article, Nature as Measure – The Biomimicry Guild, Terri Peters (2011) accounts for taking advantage of repeating phenomena as sources of energy in a cyclic process, in which a biomimetic approach favours ecological performance. The intention here is to use the context of the site and existing building as design informants in shaping a frame to improve the energy performance of the new programme. Such an approach is presented in Figure 3.4.3.

The identified programme of upcycling is not heavily reliant on artificial energy for machinery and manufacturing equipment. This is advantageous, as the process aims to promote material reuse, as well as little embodied energy required to manufacture upcycled products. Drozdowski (2011) states:
...for a building to transcend functionality and truly perform efficiently, it cannot simply be an assemblage of architectural products, but requires that the design and technology layers employed are intertwined into one dynamic system (p. 120).
A dynamic system such as this could include the management

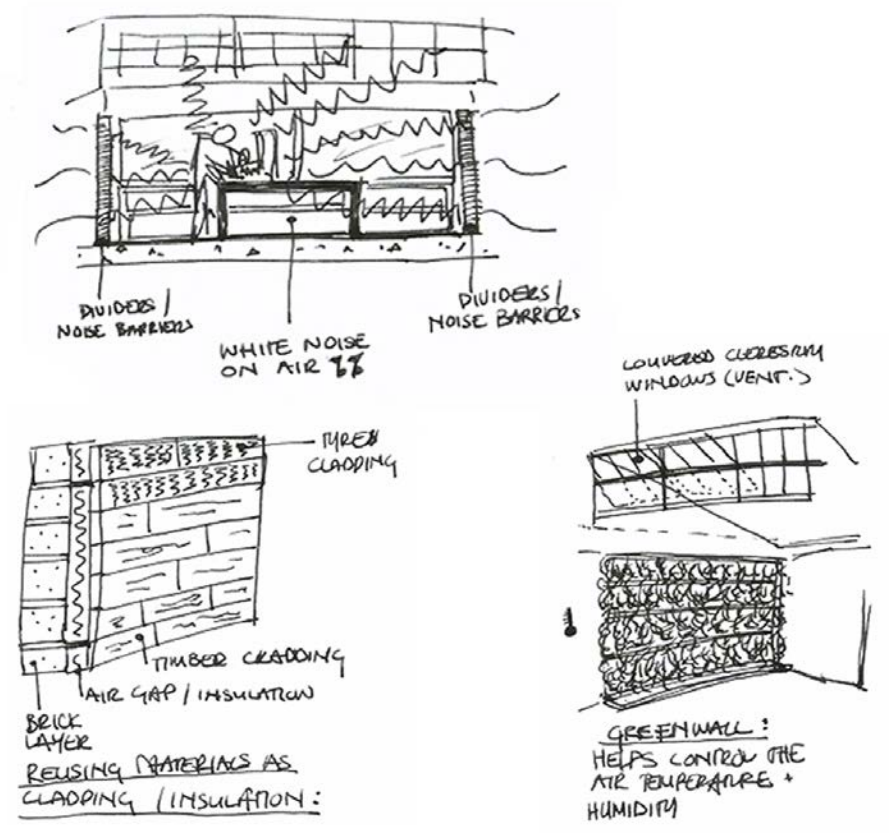


Figure 3.4.2 Material reuse and green wall application into the Minty's Tyres building using regenerative strategies

of exchanges or flows of energy, such as air movement, heating, cooling and light control which latch onto the concept of user renewal. This dynamic system is envisioned to construct inviting spaces that encourage stimulation and comfort, as well as productivity. This leads to an experience of renewal and revitalisation and creates a space which truly uplifts its occupants during their interactions with the structure and interior architecture.

This takes place in the interaction and thresholds of the natural elements and the building envelope. Working within the existing form of the building, strategies must be developed to accommodate this new regenerative and place-based approach. "In order to be regenerative, one must develop the ability to take direction from a higher-level system" (Mang, Haggard and Regenesis, 2016: 62). A higher-level system in the proposed intervention is that of the current conditions of the building's surroundings. These are to be employed to achieve the interior spaces proposed for the purpose of improving occupant well-being in the new space. This can be achieved through a discourse of material selection, tangibility of light, spatial proximity and human-activity relations.
A further aspect to consider is that the production of culture is at the centre of a nation, and speaks to the nation's ability to identify with its heritage and to adapt to new materials (Sellschop, Glodblatt and Hemp, 2002). This proposed centre adds to the quintessential South African identity through its cultural production. Sellschop et al. (2002) highlight craft as a process of object-making where the material and technique is chosen first, as compared to art, which begins with a concept and a material is chosen to suit it. Hence 'craft' and not 'art' is at the heart of the upcycling centre's activity. In this case, material selection (i.e. waste materials) becomes the premise and framework for new object making, and is expressed through the craft-based collaboration between traditional tacit knowledge (i.e. crafts people) and contemporary trained (i.e. designer) production of furniture.

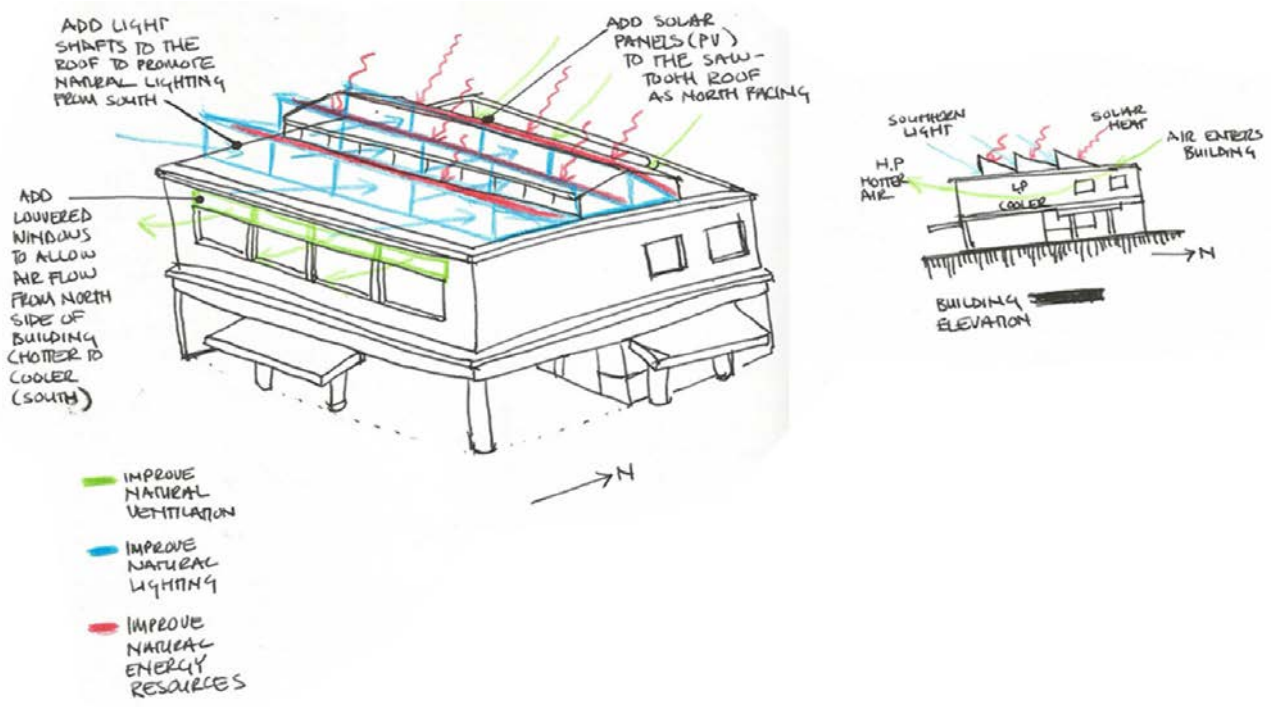


Figure 3.4.3 Service improvements and photovoltaic panel placement to the Minty's Tyres building using regenerative principles

3.5 CONCLUSION

This chapter discusses the alteration of the current building and physical aspects to the envisioned social transactions with reference to environmental psychology for design. These aspects are aligned with the concept of a cyclic journey of renewal where the user experiences an educational, inspiring or revitalising circulation and occupation throughout the building. Synomorphy as an extension of public and exhibition space is mentioned in relation to the building's integration of community and cultural identity. The chapter also highlights how upcycling or creative reuse in this study is the vehicle for the development of human capital and social integration.

Environmental psychology supports the user experience and navigation of the space, aligning the new programme to the existing building.

Adaptive reuse informs the basis for adapting the structure either as a permanent or temporal alteration. This is illustrated through intervention, with the inclusion of a new ramp on the ground floor, and the new mezzanine level and new roof. On a smaller, temporary scale, installation is also illustrated through the building's response to adaptive and flexible workspaces on the three levels, accommodating an experience of renewal with user groups and waste material interaction. Adaptive reuse is integrated here as being the informant for the building alterations. This aligns to the new user interaction and programme of upcycling.

Regenerative architecture is the underpinning for an ecological and energy efficient approach to the current Minty's Tyres building. This is discussed through the addition of natural lighting and ventilation strategies, electricity generation, and water and material reuse throughout the structure. Regenerative architecture informs a specific dialogue between the building and existing site conditions to accommodate the user groups and programme.

The environmental psychology, adaptive reuse and regenerative design theories are integrated as a means of upcycling and improving the experience of users for the new programme, which responds to the current context and community networks.

4

PRECEDENT STUDIES

Every great architect is, necessarily, a great poet. He must be a great original interpreter of his time, his day, his age (Frank Lloyd Wright, n.d.).

4.1 INTRODUCTION

This chapter examines precedent examples in an attempt to identify existing recycling and upcycling centres which function as regenerative and socially responsible designed facilities. The objective here is to extract systems and associations which align to the proposed upcycling centre in terms of: regenerative and ecological architecture, spatial arrangements, community upliftment and alteration to an existing built fabric accommodating a new function.

Two recycling centres and three upcycling workshops are observed as precedent examples relating to the new programme of upcycling. One adaptive reuse example is also observed in relation to adapting an existing building to a new programme and user group.

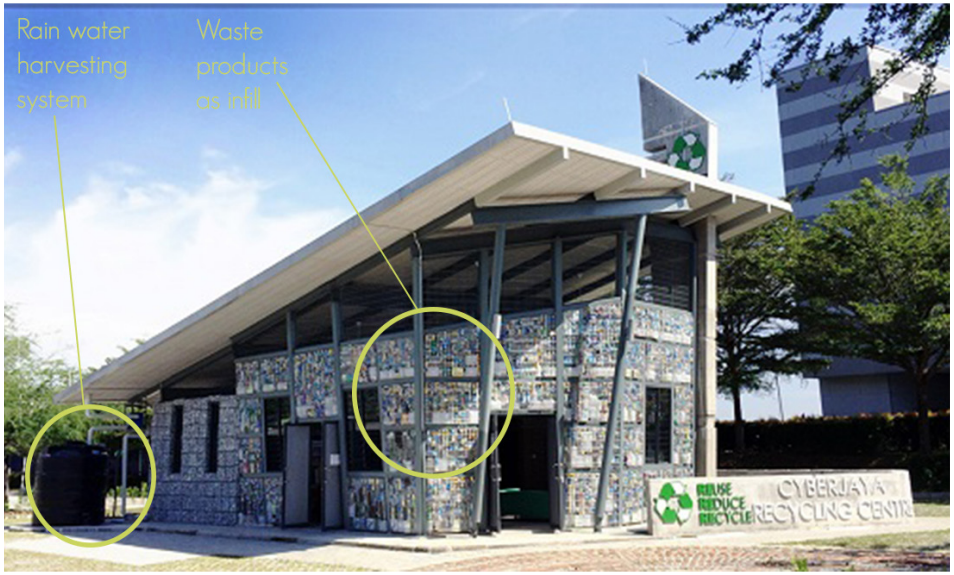


Figure 4.2.1 Cyberjaya Recycling Centre entrance (ATSA Architects, 2015)

4.2 CYBERJAYA RECYCLING CENTRE, CYBERJAYA, MALAYSIA

This recycling centre shows principles of green and sustainable design relevant for the proposed programme. The facility deals with the collection and sorting of waste material. It is able to accommodate and promote recycling and environmental awareness initiatives. The building functions well in its environmental impact and programmatic function. What is appealing here is the direct influence which waste products have on the building envelope, as well as the contemporary manner in which it is synthesised (ATSA Architects, 2015).

The exterior walls are made from steel mesh, with waste products and stone as infill, as well as brick (see Figure 4.2.1). The roof is made from solar panels (see Figure 4.2.2) (The Lost Octave, 2016). The PV panels on the roof supply the energy needed to power the LED lighting system.

Figure 4.2.2 also shows how there are porous paved areas around the building which manage on-site storm water infiltration and reduce soil erosion. By using drought-tolerant species and native plants with a marginal grassed area, the centre's water requirements are low, as is the need for fertilisers and pesticides. Restrictive after fittings and low flow fixtures further reduce the amount of water required by the building.

The waste products as infill also add to the reduction in building material for the structure, in addition to displaying the operation purpose of the centre, as evidenced in Figure 4.2.3. Figure 4.2.4 shows how areas in the mesh walls are left open to encourage passive ventilation and natural lighting strategies (ATSA Architects, 2015).

Figure 4.2.2 Cyberjaya Recycling Centre back façade (ATSA Architects, 2015)

Figure 4.2.3 Cyberjaya Recycling Centre reception (ATSA Architects, 2015)

Figure 4.2.4 Cyberjaya Recycling Centre collection area (ATSA Architects, 2015)


Figure 4.3.1 East Side Recycling Center main façade at night (Shive Hattery, 2011)


Figure 4.3.2 East Side Recycling Center main façade during the day (Shive Hattery, 2011)

4.3 EAST SIDE RECYCLING CENTER, IOWA, UNITED STATES

Associated with Habitat for Humanity, this platinum LEED-certified building features a waste collection drop-off and an environmental educational centre for the local community. The centre has one large multi-functional space in which the educational activities, meetings or community events take place. The space's associations to sustainable principles, its contemporary appearance and its comfortable inviting spatial qualities are what make it attractive (Shive Hattery, 2011).

Photovoltaic panels positioned on the south facing façade (as can be seen in Figures 4.3.1 to 4.3.3) power the LED lighting (with occupancy sensors) throughout the building. There are also flow restrictive taps and flushing mechanisms helping to reduce the centre's water usage. Wind turbines on the site generate electricity, contributing to 5% of the building's power requirements (Shive Hattery, 2011). The building is site-responsive, as it has two green roofs, a green wall, a bulk water station, two rain gardens and artificial birds' nests (YouTube, 2014).
The building functions more as an environmental educational facility, with collection containers for recycled items, than simply a recycling centre on its own. The building also uses cork flooring, as can be seen in Figure 4.3.4. This flooring is a sustainable material, and worth considering for this study's proposed upcycling endeavour. The ecological and regenerative design of the East Side Recycling Center is what is most appealing in this precedent.

Figure 4.3.3 East Side Recycling Center details (Shive Hattery, 2011)

Figure 4.3.4 East Side Recycling Center interior (Shive Hattery, 2011)

Figure 4.4.1 Heath Nash studio exterior (Designboom, 2010)

Figure 4.4.2 Heath Nash studio workshop (Designboom, 2010)

4.4 HEATH NASH STUDIO, WOODSTOCK, SOUTH AFRICA

Heath Nash, a Cape Town-based upcycling designer, uses a medium-sized building, which could pass as a retail space, as his product workshop (I Love Woodstock, 2011). In this example, there are no regenerative or ecological approaches to the interaction between the building and the site (see Figure 4.4.1).

There is also no design method to the re-appropriation of the building into an upcycling product workshop. However, what is valuable in this example for the proposed programme is the spatial zoning allocated to product display and storage of raw materials (see Figures 4.4.2 to 4.4.6).

Here, the focus is placed on the interior use of space and operational purpose. This has value to the proposal as it shows a real-world example of the same type of activity and material use as the proposed intervention. Emphasis here is placed on storage of unused waste materials, working spaces, administration and displayed products, as can be seen in Figures 4.4.3 to 4.4.6.

According to his website, Heath Nash Makes Cool Things, the Heath Nash brand also presents workshops and skills development classes which take place in schools and craft institutions. This further establishes the contribution and social responsibility of the Heath Nash brand (Nash, 2017). This is important as it extends the production of cultural items (i.e. upcycled waste products) to generate skills and uplifts people in other communities. It also shows the possibilities of re-using waste in a contemporary manner, encouraging social engagement and community cohesiveness outside of a workshop environment.

One drawback of the workshop design is that despite the myriad of lighting products which they manufacture there, the workspaces are makeshift and messy. This example provides evidence for how the proposed programme might focus on improving the interior experience and contribution of its own upcycled interior.

Figure 4.4.3 Heath Nash studio workshop (Designboom, 2010)

Figure 4.4.5 Heath Nash studio storage (Designboom, 2010)

Figure 4.4.4 Heath Nash studio displayed products (Designboom, 2010)

Figure 4.4.6 Heath Nash studio office (Designboom 2010)

Figure 4.5.1 Jockey Club Upcycling centre signage (SLHO and Associates LTD, 2015)

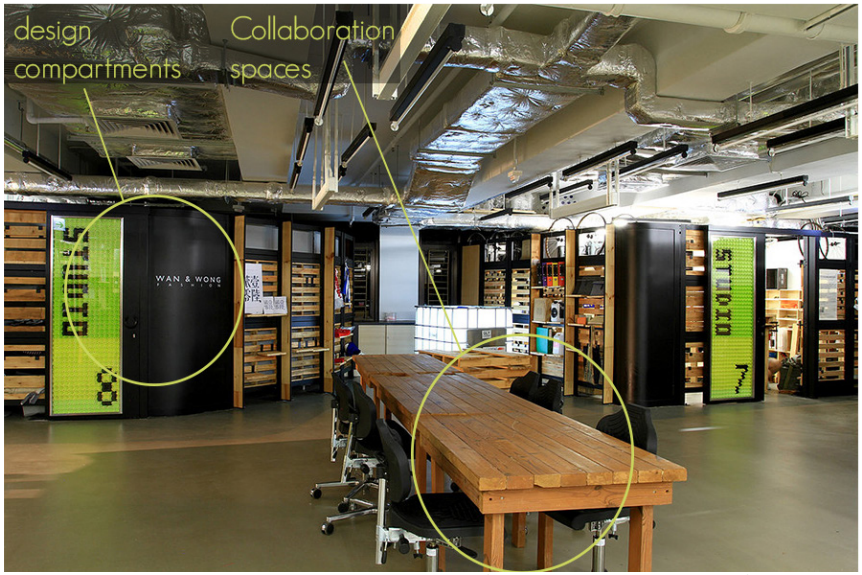


Figure 4.5.2 Jockey Club Upcycling Centre open workspace (SLHO and Associates LTD, 2015)

4.5 JOCKEY CLUB UPCYCLING CENTRE, WANCHAI, HONG KONG

The Jockey Club Upcycling Centre is a large workspace with separate workshop compartments rented out to upcycling designers. Kevin Cheung is a resident upcycling product designer, who believes designs should be sustainable, through enriching the environment, users and society (Cheung, 2017). All upcycling products are made from waste collected in Hong Kong, and produced by local NGO's sheltered workshops, which provide income and skills creation for people with disabilities (Cheung, 2017).

What is most appealing in this precedent study is the re-used and upcycled materials seen throughout the centre that appear as fixtures presented in a contemporary way (see Figure 4.5.1). The design approach to the centre is: "If product design can make use of the upcycling concept, so can interior design" (SLHO and Associates LTD, 2015). The signage and door handles use discarded steel horse shoes to make the letters 'U' and 'C', standing for Upcycling Centre, in a repetitive way, so as to become a feature wall pattern (see Figure 4.5.1).

Examples of materials that have been upcycled here are: salvaged timber pallets, wooden red wine boxes and recycled egg cartons which, together with steel frames, make up the dividing walls between the individual workshop studios (see Figures 4.5.2 to 4.5.4).

Lighting fixtures are made from discarded plastic magazine racks, which once disassembled, become diffusers as light shades, as can be seen in Figure 4.5.5.

Wooden wine boxes and pallets become functional shelves and storage units for displayed products (see Figure 4.5.5). Egg cartons, as seen in Figure 4.5.3, function as signage on the sliding doors and, due to the material properties, also act as sound absorption buffers (SLHO and Associates LTD, 2015). The space works well to accommodate different users and model inhabitants, whether they are in groups or single designers (i.e. in the compartments or the open workspaces). The clean, organised and well-planned interior results in a pleasant working environment, with the possibilities of creative collaborations and exhibition associations (SLHO and Associates LTD, 2015).

Figure 4.5.3 Jockey Club Upcycling centre dividers (SLHO and Associates, LTD 2015)


Figure 4.5.4 Jockey Club Upcycling centre open workspace (SLHO and Associates LTD, 2015)

Figure 4.5.5 Jockey Club Upcycling Centre shelving and lighting (SLHO and Associates LTD, 2015)

Figure 4.6.1 Max McMurdo Upcycling Workshop office (Herringshoes, 2017)

Figure 4.6.2 Max McMurdo Upcycling Workshop (Cochrane, 2017)

4.6 MAX MCMURDO UPCYCLING WORKSHOP, BEDFORD, UNITED KINGDOM

Max McMurdo is a British upcycling designer, best known for his appearance on BBC 2's Dragons' Den, where he displayed a series of upcycled designs, such as the shopping trolley chair he is sitting on in Figure 4.6.1 (Herringshoes, 2017). The focus of this precedent study in relation to the proposed programme is the upcycled items which Max has incorporated into his workshop space, the equipment he uses for product manufacture and his upcycling's promotion of social responsibility.

The Max McMurdo Upcycling Workshop, as seen in Figures 4.6.2 to 4.6.5, is a warehouse structure. However, the interior objects are of his own creations, which hold functional value. Take, for example, the aeroplane wing which he uses as his office desk (see Figure 4.6.1), in the converted office container.

It should be noted that the workshop does not respond to the ecology or nature of the site. Instead, it is a workshop with discarded waste items which are used for upcycling and adapatation. The value of this example to the proposed intervention is in the amount of space that it offers for the required storage and the low embodied energy or machinery used for operational purposes. This is relevant to the proposed intervention as an informant for the equipment and machinery required to upcycle certain products.

Additionally, the caravan which can be seen in the background of Figure 4.6.3, has been upcycled into a 'soupervan' which travels around Britian aiding 'rough sleepers' and homeless people with a warm bowl of gourmet soup (Soupervan, 2017). This is appealing, as using upcycling as a vehicle (literally), Max has created a framework to reach and uplift the surrounding community; another objective of the proposed upcycling centre.

It should be noted, however, that waste products are scattered and unorganised in the workshop. As the operation is run only by Max, there seems to be no system and management of production. The workshop appears to be exclusively for product manufacture and storage, with little interaction with public or collaborative initiatives. This is important as this precedent informs the amount of material storage (although different to the proposed upcycling centre waste materials) and equipment needed to achieve transformed products. It shows that upcycled materials are not made from mass-produced factory workshops but almost bespoke and once-off creations individual to the designer/crafts person's characteristics.

Figure 4.6.3 Max McMurdo Upcycling Workshop (Herringshoes, 2017)

Figure 4.6.4 Max McMurdo Upcycling Workshop (Cochrane, 2017)

Figure 4.6.5 Max McMurdo Upcycling Workshop (Cochrane, 2017)

Figure 4.7.1 San Mateo High School exterior façade (AIA Redwood Empire, 2016)


Figure 4.7.2 San Mateo High School art studio with natural light admittance (AIA Redwood Empire, 2016)

4.7 SAN MATEO HIGH SCHOOL, CALIFORNIA, UNITED STATES

The San Mateo High School is an example of adaptive reuse of a 1920's shop building. This building was converted into school art studios, meeting spaces and educational classrooms (see Figures 4.7.1 to 4.7.4).

The building has been restored on the exterior with red brick, new shopfront glazing and mullions (AIA Redwood Empire, 2016). It has been further improved with seismic resilience and modern amenities (AIA Redwood Empire 2016). Apart from being a celebration of the school's history, the building alterations have also been directed by light and interior volumes of the east-facing clerestory windows and 'sawtooth' roof shape, typical of a factory typology (see Figure 4.7.2.)
The sawtooth roof shape defines the spaces of the different studios below, thereby providing an assortment of multi-functioning learning spaces (AIA Redwood Empire, 2016).

What is noticeable in this example is the way the windows and doors have been replaced to open up the space to natural light and ventilation (see Figures 4.7.3 and 4.7.4). New services have been added, as well as white and black layers depicting the original structure as a 'blank canvas', with new flooring and furniture as the accented colours and finishes (see Figures 4.7.3 and 4.7.4).

Such material addition and/or reuse, and the limited use of artificial lighting, due to the natural lighting strategies, seen in this studio design align with the proposed upcycling centre's intention of improving the building while minimising resources and environmental impacts.
These studios are also a successful example of an intervention where old and new live together harmoniously in a new programme and function.

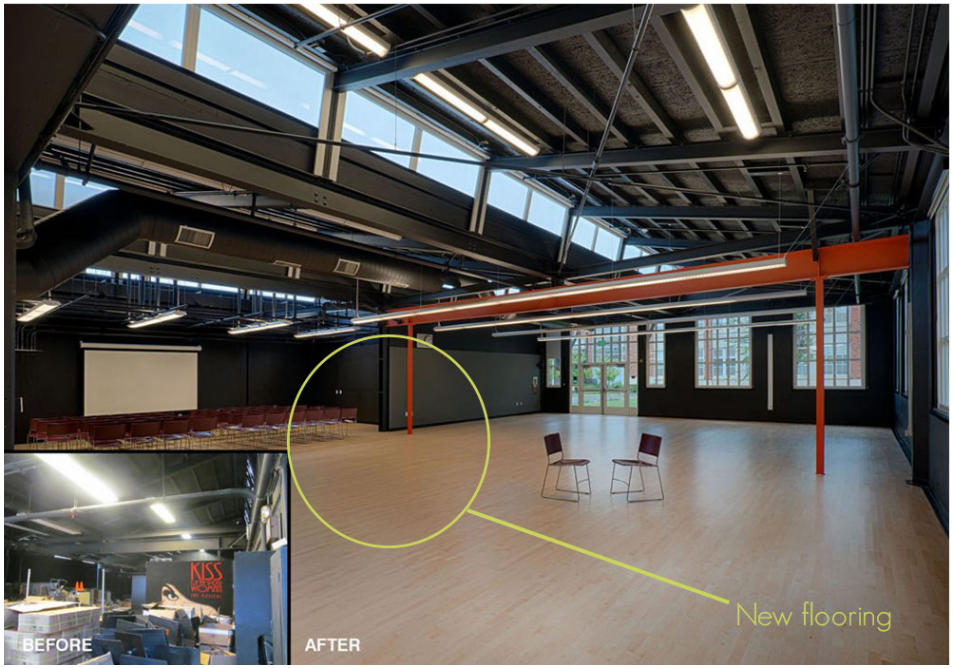


Figure 4.7.3 San Mateo High School art studio with new timber flooring (AIA Redwood Empire, 2016)

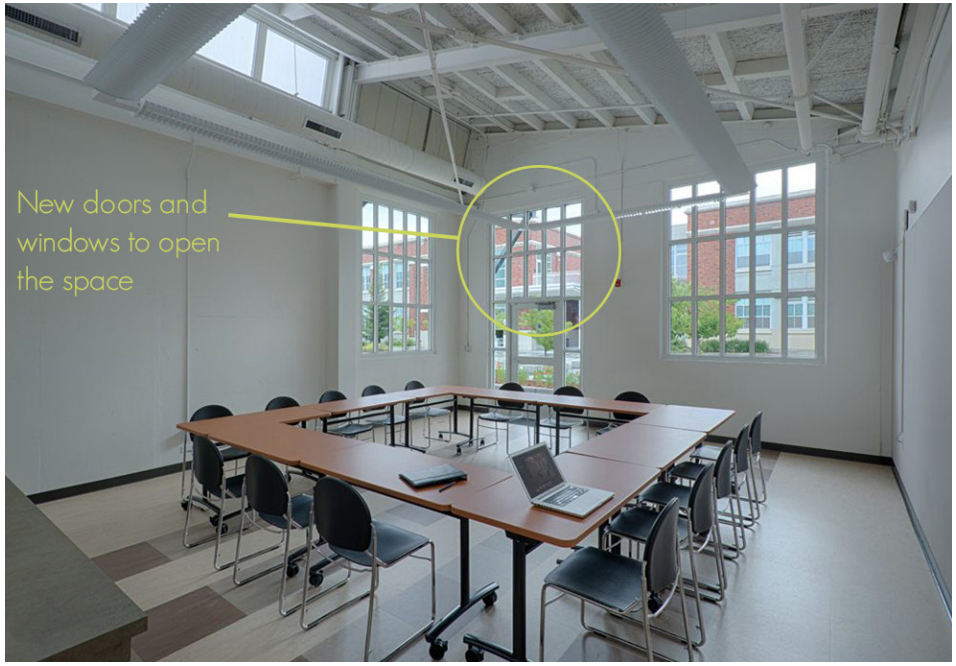


Figure 4.7.4 San Mateo High School art studio with new doors and windows (AIA Redwood Empire, 2016)

4.8 CONCLUSION

This chapter examines two recycling centres and three upcycling product workshops to extract examples of regenerative, ecological and socially responsible spaces.

The selected recycling centres have been identified as regenerative, site responsive and environmentally sustainable design principles which echo their service of recycling waste material for reuse and increase in life span. Such services also aid in diverting waste away from landfills. These principles are significant as they inform design strategies for the proposed upcycling centre, in which the building maintains a sustainable dialogue with the natural opportunities of the environment. This is achieved using solar panels, natural and sensor-based lighting strategies, flow restricting fittings, rainwater harvesting, passive ventilation, wind turbines and, of course, reclaimed and adaptive materials, as per the presented examples.

The three examples of upcycling product workshops are located in medium-sized workshop or warehouse spaces, with no concern for a 'place-based approach' or envelope which interacts with the site in a sustainable manner. The focus in these examples are on the interior, namely spatial layout, proximity, display of products and storage areas as design informants to the proposed upcycling centre. It has been discovered through an analysis of these examples that there is little in terms of a formalised structural manufacturing process, which is based on small-scale production. As such, the process is labour intensive and time consuming. This is a positive indicator, however, as it associates the products with craftsmanship, exclusivity and a degree of specialisation. This is relevant to the proposed upcycling centre, as it will perform the function of a craft- and design-based creative reuse centre more than a mass production furniture facility. These workshop examples serve more as storage and workspaces, rather than public interactive display spaces for viewing products, which the proposed upcycling centre aims to incorporate.

The upcycling product workshops examined in this chapter also display a degree of social responsibility. For example, Max McMurdo's soupervan, Heath Nash's workshops in skills development and Kevin Cheung's employment of people with disabilities. These initiatives reach out beyond the confines of the workspace to generate skills which uplift people within the surrounding communities, give them a warm meal as a support service and exercise social inclusion. The proposed upcycling centre aims to match these kinds of initiatives.

5

DESIGN DEVELOPMENT PART 1

Design creates culture. Culture shapes values. Values determine the future (Robert L. Peters, n.d).

5.1 INTRODUCTION

The conceptual and design development of the proposed intervention is addressed in this chapter. The contribution to interior design which this intervention attempts to make is firstly, on a social scale, to rejuvenate and upcycle the user profiles as identified through observation and academic literature. These user profiles consist of waste pickers in Pretoria. The project also works to create a knowledge economy and skills development programme for these waste pickers, so as to enable them to improve their socio-economic status.

Secondly, on an architectural scale, the intervention aims to renew and improve the current building (i.e. the Minty's Tyres building) as being more energy and resource efficient. This is accomplished through ecological strategies, as well as responding to the new programme and established character that the building has commanded since its construction in the early 1960's.

Thirdly, on an urban scale, the intervention aims to revive the cultural precinct by breathing new life into it as a cultural producer of product re-use and environmental sustainability. This will be achieved through collaborating with traditional crafts people and incorporating their knowledge into contemporary design training.

Finally, on an environmental scale, the intervention attempts to revitalise waste products through the practice of upcycling, thereby prolonging a product's life and diverting it away from landfills. Figure 5.1.1 provides a visual representation of these aims and contributions.

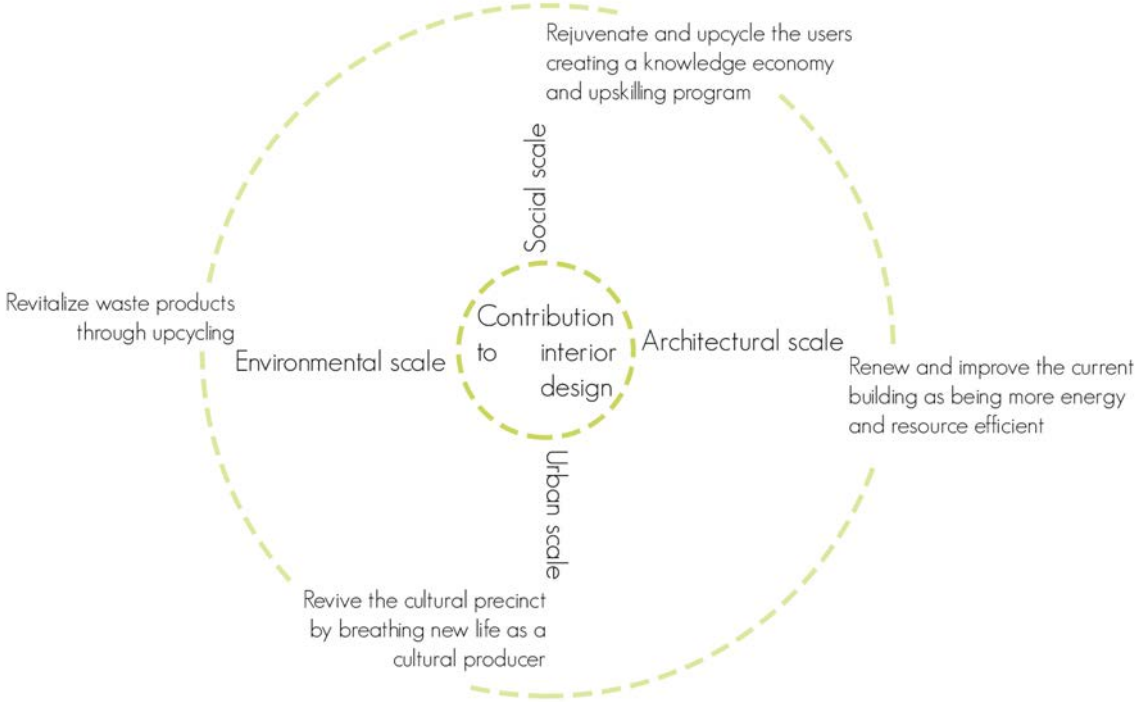


Figure 5.1.1 Project contributions to interior design

5.2 CONCEPT

As noted in Chapter 1, a cyclic journey of renewal refers to an experience which develops, elevates and enriches users who are submerged into a design's realm. It is a process of symbiosis where all members interact for mutual advantage. This proposed programme's aim is to transform the impoverished livelihood of the identified waste pickers into a future where they have the potential to actively partake in a formal economy.

Certain processes and behaviours are followed within the intervention to allow for this transformation. Just as a product undergoing upcycling is transformed into something of higher value than the original, so too does the skills development of users transform them into employable and self-confident individuals. This experience is manifested through the creation of an interior space that is edged to nurture learning and development, thereby converting both product and user into better versions of themselves. Thus, a cyclic journey of renewal aims to cultivate skills and create a cycle which inspires the urban framework around it. In so doing, a relationship between model inhabitants who share and motivate each other in a sequence of ripple effects is formed. This is the objective of the upcycling centre, which is guided by interior architecture as the discipline to construct a framework and synomorphy, merging built form with user interaction. The concept of a cyclic journey of renewal is to inform the experience and intended mood of users as they move through or occupy the upcycling centre.

The mood boards shown in Figures 5.2.1 to 5.2.3 communicate the interior architecture acting as a facilitator and enabler to achieve the sense of upliftment to which the identified user groups would be exposed.

Figure 5.2.1 shows the point of entry and exit of users through the building. It shows the interaction between the street and the building façades for waste pickers, crafts people and passers-by. The open ground floor is intended to be inviting, intriguing and informative. It aims to engage pedestrians through the narrative of the products on display. The street furniture is also arranged in such a way that pedestrians can view City Hall and the upcycling activities.

Figure 5.2.1 Exterior mood image

Figure 5.2.2 First floor workshop mood image

Figure 5.2.3 First floor workshop mood image

Figures 5.2.2 and 5.2.3 also show the first floor workshop mood and different areas associated with the production phases. They show how important natural light is in the workspace, as well as how integrated work zones are compartmentalised but still connected visually. These creative workspaces are important, as they are stimulating and inspiring for the crafts people who move across the three levels as they create products from waste materials. The concept of a cyclic journey of renewal is intended to:

- Uplift waste pickers through remuneration in the form of: income from deposited waste material, meal coupons and skills development (e.g. manufacturing skills, basic cooking skills and understanding production methods). They also receive access to ablutions, a canteen facility and resting area where their trolleys can be stored safely.
- Inspire crafts people by providing them with the opportunity to acquire skills and income through the creative reuse process and collaboration with a designer and colleagues.
- Fulfil the designer's vision through partnering with crafts people who create upcycled products.
- Revive discarded waste products by turning them into products of higher quality than the original. This is the main function of the upcycling centre.
- Regenerate the building by using natural lighting and ventilation strategies, rain water harvesting and grey water systems, solar panels and reclaimed and recycled materials as interior design finishings and elements throughout the space. This also serves to introduce the surrounding neighbourhood to a 'green building', thereby allowing it to become distinguished by the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool). The Green Star Rating Tool is discussed in more detail in Section 5.8. However, it should be noted that this tool is the assessment tool used for the proposed intervention in terms of measuring and determining environmental and socio-economic impacts.

Of further import is that materiality forms a significant portion of the concept development. Firstly, materiality is evident in the inclusion of nature as a means to control humidity, air temperature, and as a sensory aesthetic. Secondly, materiality is incorporated through the use of recycled materials such as elastomers and steel for floor coverings and cladding, based on their material properties. Thirdly, using reclaimed rubber and timber as spatial dividers and design features informing narratives and inspiring occupants further shows how materiality is important to the project. The reuse of materials throughout the interior space also transfers their original connotations and associations to its new function and acts as an iconic connection that becomes "a resemblance between the signifier and the signified, with no physical connection" (Eco, 1976: 193).

Figure 5.3.1 Users and common requirements in amenities

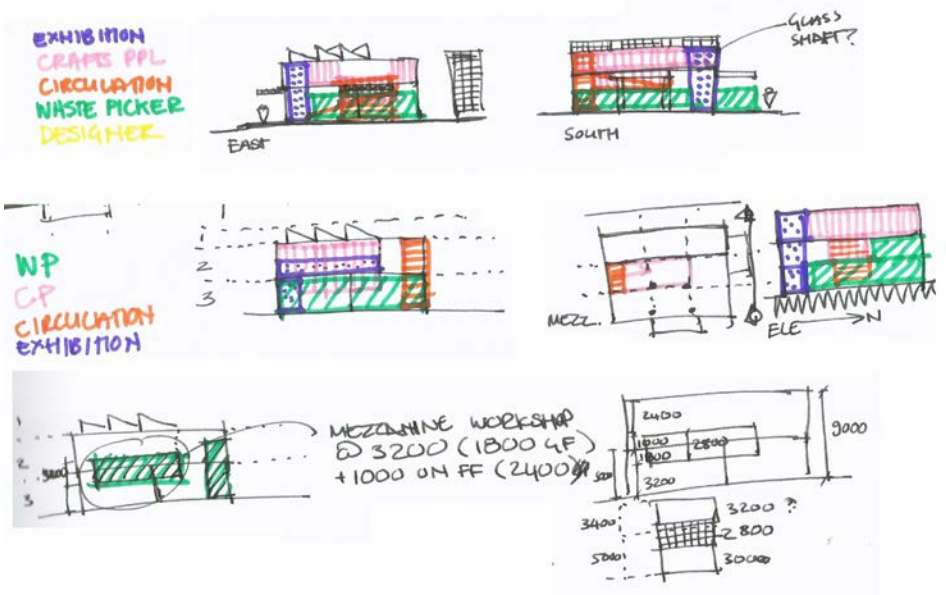


Figure 5.3.2 Verticality and volume allocation of function and user movements

5.3 CONCEPT DEVELOPMENT

Using the model inhabitants as a primary design informant, amenities and spaces to renew and uplift them have been explored for this programme. Figure 5.3.1 shows how the upcycling intervention pays attention to the user groups and commonalities in their requirements as a means to construct a comfortable experiences within the centre. These intersections shape the location of activity zones and user movements.

The zoning diagrams (see Figures 5.3.2 to 5.3.5) took shape after the second iteration and are informed by the users, orientation of the building and relations to the main access routes. They are also informed according to a hierarchy of occupancy activities intended for the different spaces.
The potential of the existing high volumes on the ground floor inform the addition of a mezzanine floor. This mezzanine floor will link the ground and first floors, thereby increasing the potential workspace area and building permeability (see Figure 5.3.2). Product display space is located on the most visible corner for cars and pedestrians (i.e. the south-east corner), with circulation space relegated to the western side of the building, as it has restricted physical and visual access, as can be seen in Figure 5.3.3.

The northern side is also restricted in access and opens out to a service alley behind the Sacred Heart Cathedral's admin building on the south façade (refer back to Figure 2.2.2.2 in Chapter 2). Due to the first floor being located at the back of the building, it has been allocated as space for crafts people and the designer (i.e. meeting rooms/administration), while ablutions for the waste pickers and canteen space for all users are allocated on the ground floor (see Figure 5.3.3).

The primary access route for waste pickers on Visagie Street has been identified through observation. This access route is chosen based on it being the primary point of entry, with Bosman Street as the exit point, as waste pickers move in a direction opposite to vehicle traffic (refer back to Figure 2.2.2.1 in Chapter 2). Visagie Street is a one-way street that runs in an East – West direction. Bosman Street, which is also a one-way, runs in a South – North direction. Therefore, the best direction of travel for waste pickers is West – East on Visagie Street and North – South on Bosman Street.
By locating workspaces in the centre of the ground and mezzanine floors, visual access and spatial hierarchy have resulted. The workspaces are situated along the southern and eastern areas on the first floor due to their orientation, views and identified climatic conditions (refer back to the Chapter 2 sub-section entitled 'Context').
A new roof is considered, as natural lighting can then better reach the ground floor (see Figure 5.3.5). This will occur through the proposed way in which the roof opens up the interior space using the mezzanine floor. The new roof design provides four practical approaches and solutions for suitability. Firstly, the roof allows natural light into the centre of the building down to the ground floor. Secondly, it has openable clerestory windows to exhaust out hot air from the interior, thereby creating air movement and ventilation. Thirdly, the roof design allows rainwater to be channelled to and stored in tanks for reuse. Finally, the roof allows the north-facing position of solar panels to generate electricity for lighting throughout the centre.

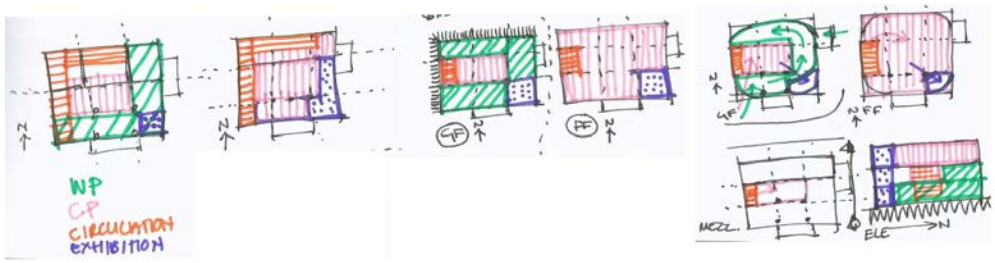


Figure 5.3.3 Zoning plans for the proposed programme of upcycling in the Minty's Tyres building

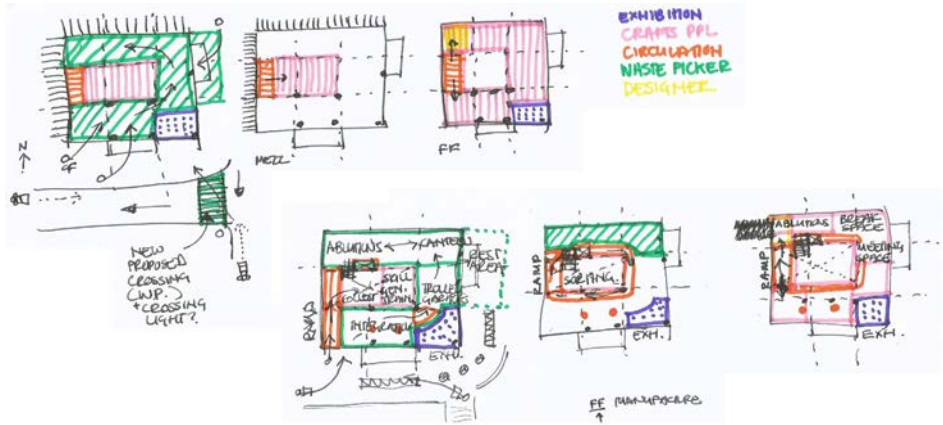


Figure 5.3.4 Zoning plans for the proposed programme of upcycling in the Minty's Tyres building

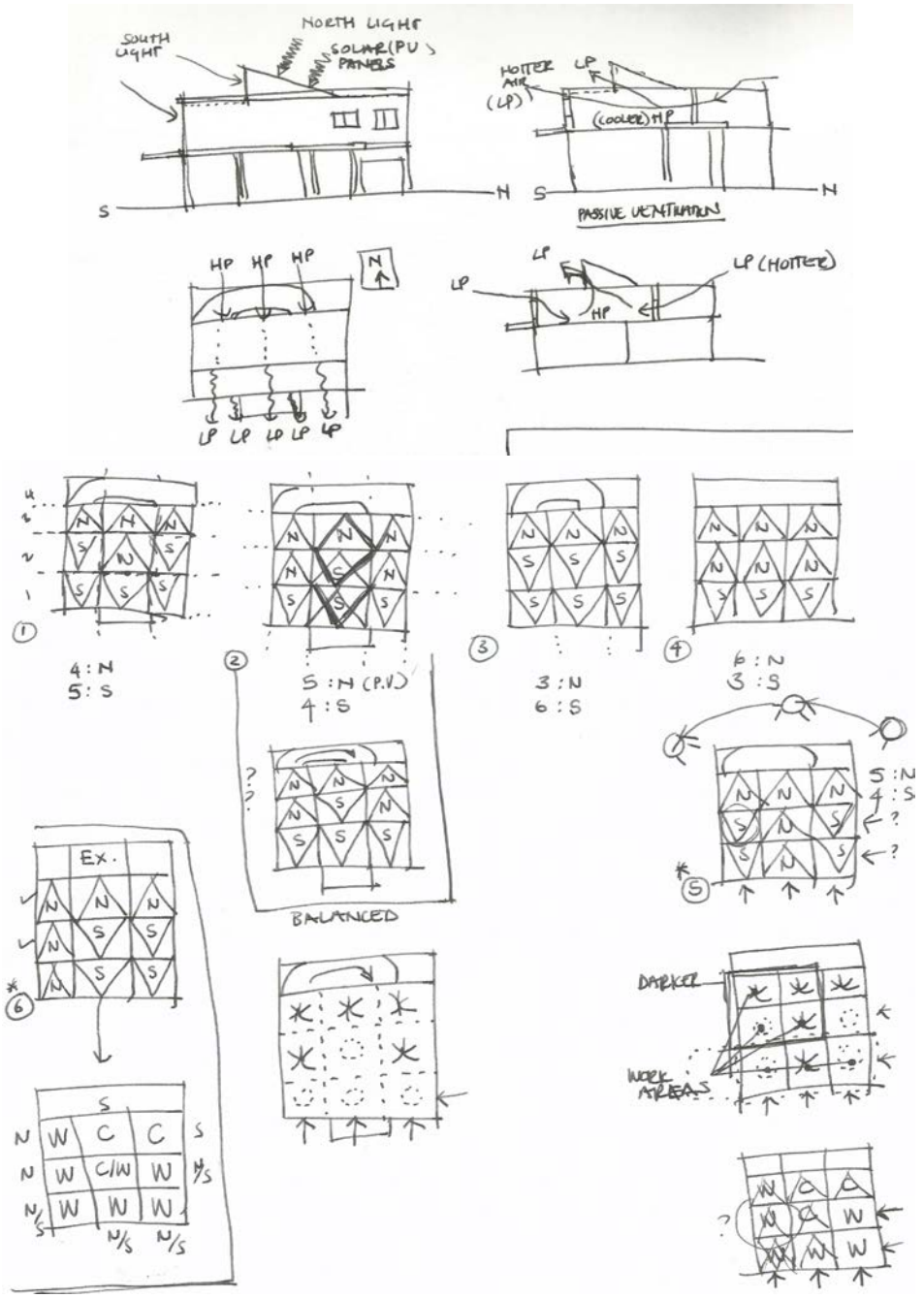


Figure 5.3.5 Zoning plans for the new roof (orientation) in the Minty's Tyres building

Figure 5.4.1 The existing building model compared to villa Savoye (Archdaily, 2010).

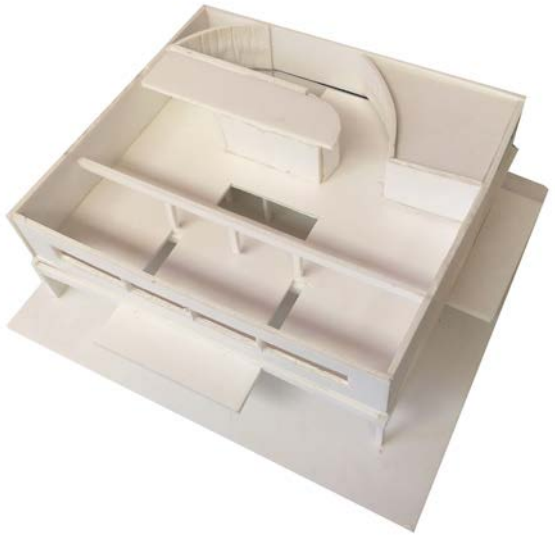


Figure 5.4.2 The new floor, with visual connections (first iteration)

5.4 DESIGN DRAFTS

As can be seen in Figure 5.4.1, the existing structure has a striking resemblance to Le Corbusier's Villa Savoye, known for its iconic horizontal façade and strip windows reminiscent of the international style and architecture's reaction to the machine age (Archdaily, 2010). Similar to Le Corbusier's statement that "the house is a machine for living in", the host building is a machine for creative product design. The cantilevered slabs and floating first floor of the host building are elements selected to retain the building's character in response to the new programme.

The drafts following this first itiration (see Figures 5.4.3 to 5.4.9) reflect the development made in spatial zoning and operational hierachy of occupants. The iterations shown in the following figures aim to activate the ground floor space and create a sense of place and support system for the waste pickers. The addition of a mezzanine level aims to unite a visual connection of the ground and first floors. The new ramp encourages circulation in a central capacity, further assisting in the visual connection. The new roof is intended to reflect the lighting hierachy of spaces which demand intense northern light and softer southern light, according to penertation through the volumes.

The first iteration (refer to Appendix B: First Design Draft, as well as Figure 5.4.2 in this section) is centred on the two levels working independently, allowing waste pickers to deposit their waste material on the ground floor, before storing their trolleys in the garages provided.

The first floor is restricted to crafts people, the designer and public visitors. Using the original car ramp to access the first floor, visitors can view the collection process on the ground floor and the manufacturing processes and displayed products on the first floor, before returning to the collection space on the ground floor via a new staircase in the centre of the building.

This draft was abandoned as it fails to capture the integration of users throughout the process of upcycling and being cognisant of spaces which renew and inspire model inhabitants through this separation.

Figure 5.4.3 The new ramp intervention (second iteration)

The second iteration (refer to Appendix C: Second Design Draft, as well as Figure 5.4.3 in this section) sees waste pickers and collection areas on the ground floor, with ablutions and the canteen as amenities dedicated for them. A ramp has been added to serve as visual access and as a means to narrate a journey for public visitors up to the first floor. This adds an educational element into the design and invites visitors to experience the space. The original car ramp is divided into a ramp exit point (original ramp) and exhibition space for completed products (on first floor level). The first floor space remains as the workshop, crafts people's restrooms, break space and admin space.
This draft was also discarded as it unsuccessfully integrates all of the users and activities. It also includes a fourth user group (i.e. the public) which was deemed unnecessary.

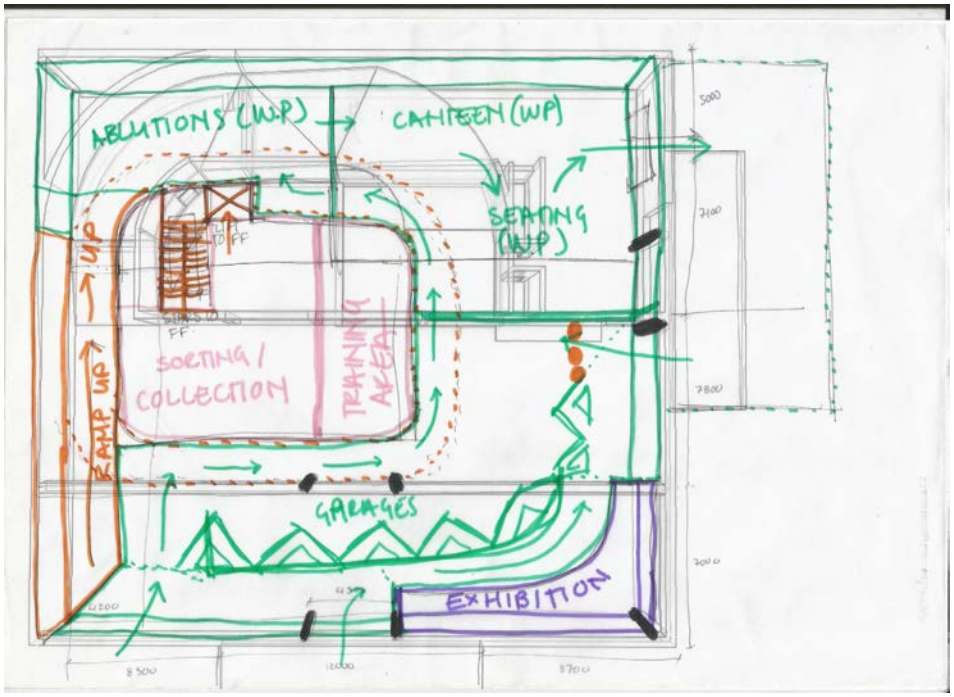


Figure 5.4.4 Ground floor third sketch design draft

Figure 5.4.5 Ground floor third design draft

The third iteration (see Figures 5.4.4 to 5.4.11) focusses on creating a more prominent visual access between levels. To this end, a mezzanine level has been added so as to open up the interior space from the inside (see Figure 5.5.3 in the sub-section titled 'Design Development' later in this chapter). This creates integration and orientation between users and their activities as being part of a greater whole. Futhermore, waste picker ablutions have become unisex, which has been deemed a more comfortable experience for accommodating both male and female waste pickers, with the canteen area as a space for all users to interact and integrate.

From the user requirements diagram (refer back to Figure 5.3.1) spaces are arranged according to user groups and existing building idiosyncrasies. This diagram has become the informant for the design strategy, creating spaces and a flow of spaces that will reflect a cyclic journey of renewal for users and materials.

A skills development area has been added as a further means of promoting a knowledge economy (i.e. through the development of human capital) within the space. This is important, as it provides skills and training to assist waste pickers in finding work in the formal economic sector. Its location is significant as it is the focal area to all users and activities in the building. It is also a tangible manifestation of the upcycling centre's objective, namely the improvement of model inhabitants as a gateway to cultural and economic stability.

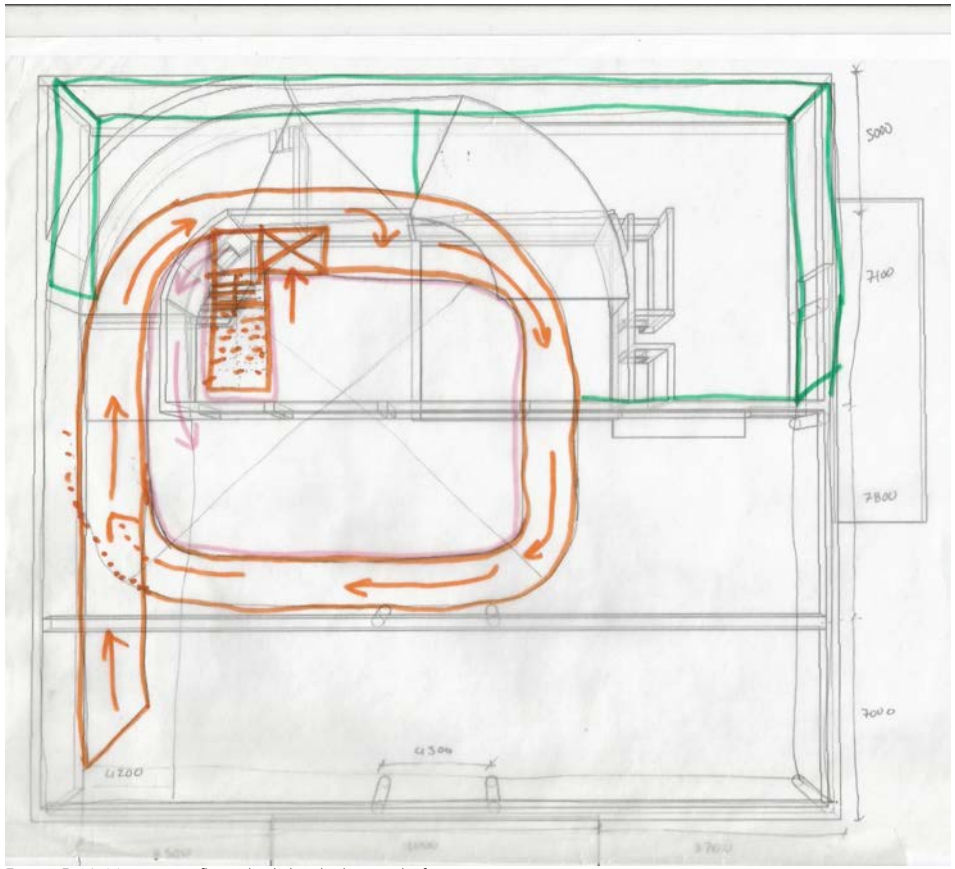


Figure 5.4.6 Mezzanine floor third sketch design draft

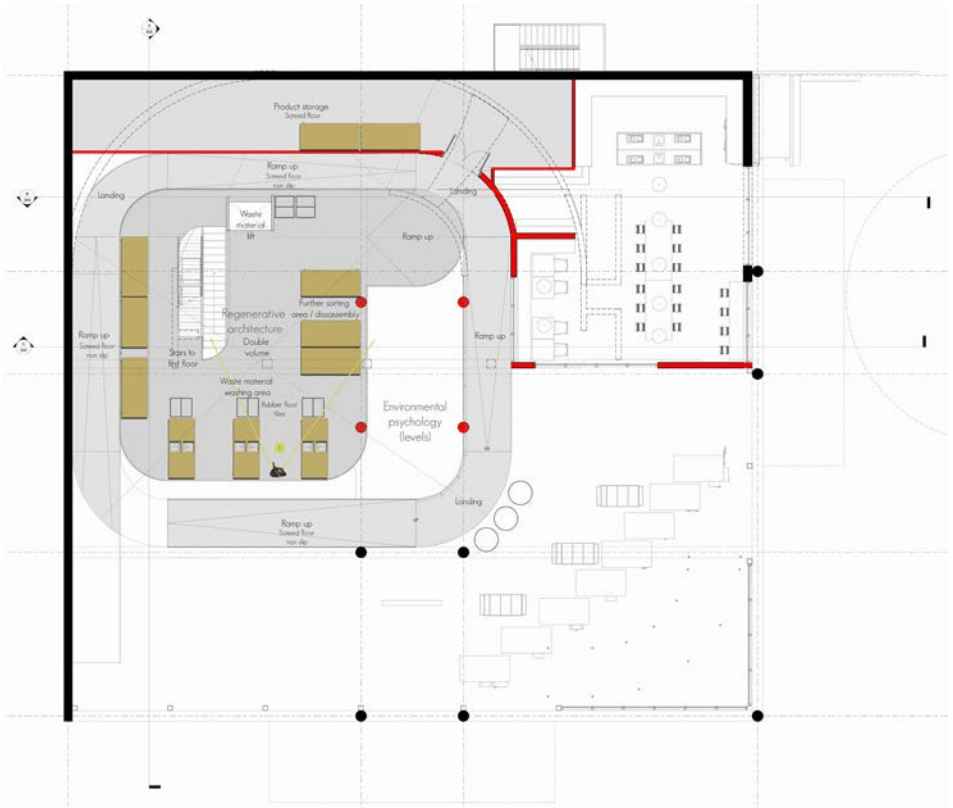


Figure 5.4.7 Mezzanine floor third design draft

At the first point of interaction between the waste picker and crafts person (i.e. where material is exchanged) is the zone where the waste picker is able to see the two above levels and the activities that take place there. This creates the connection to a higher purpose and establishes these users' role in the greater scheme of manufacturing new products which, in turn, can lead to acknowledgement and their feeling of recognition within society.
The ramp becomes a central 'current' which wraps around the collection, sorting and skills development spaces; reaching the mezzanine and first floors as a narrative of cohesion through journey. The ramp and staircase are accessed from level to level and are included as a route for crafts people and the designer. They also form the secondary circulation of material routes, with the primary route for material transportation being the service lift.
The intersection-facing corner of the building (i.e. the south-east corner) is dedicated to being an extension of the pavement in which passers-by can pass through and engage with the pedestrian signage and suspended product display above them (see Figure 5.4.4). Street furniture and trolley parking have also been added along the pavement corner to encourage community cohesion outside the building (Figure 5.4.5).

The mezzanine floor unlocks visual restrictions between the ground and first floors, allowing natural light from the clerestory windows to permeate and create a vertical dialogue between the levels and users (see Figures 5.4.6 and 5.4.7). The lift and original service staircase remain from the original building as conduits for waste materials and crafts people.
The first floor becomes dedicated to workspaces, meeting rooms and the crafts people's ablutions. Workspaces are refined according to machinery and activities related to material upcycling. These are located along the eastern and southern zones of the building. The south-eastern corner of the building is the ideal location to display produced objects and has been made a double volume zone, again creating permeability from street to workspace with object displayed in a vertical hierachy.

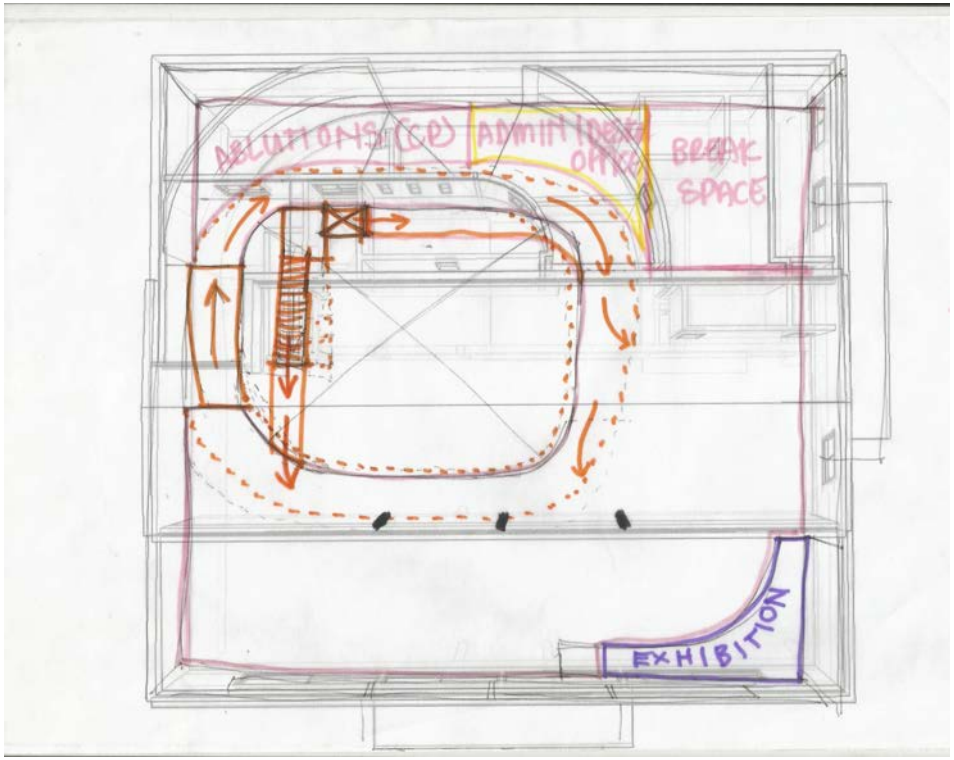


Figure 5.4.8 First floor third sketch design draft

Figure 5.4.9 First floor third design draft

The workspaces need to accommodate different spatial arrangements and manufacturing patterns (see Figures 5.4.8 and 5.4.9). This is realised by having mobile workbenches and tables on caster wheels with locking functions. Flexible workspaces relate to the workspace efficiency and ergonomics section in the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool). Additionally, dividers and screens act as boundary objects and intersect the different work zones, as can be seen in Figures 5.4.10 and 5.4.11.

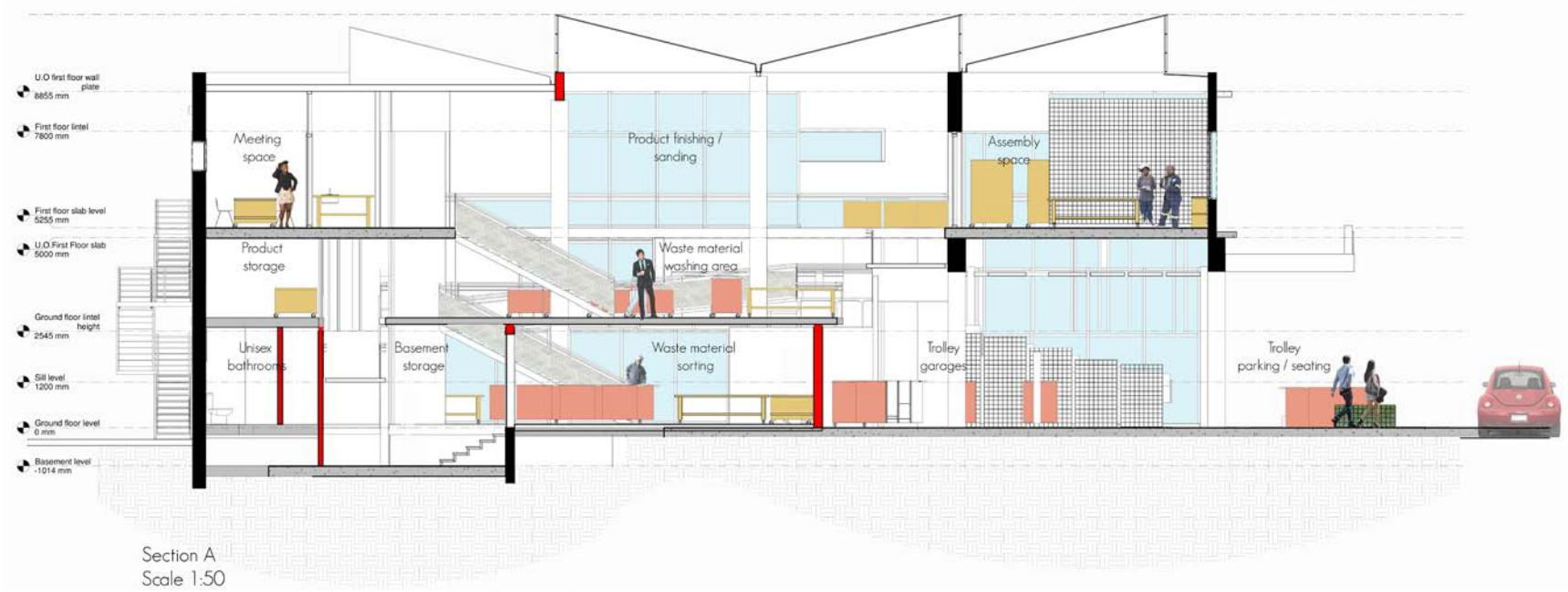


Figure 5.4.10 Section A showing level changes and floor interation (third draft)

Figure 5.4.11 Section C showing level changes and floor interation (third draft)

Figure 5.4.12 The new ramp and mezzanine level intervention (third iteration)

Figure 5.4.13 The new roof iteration

The following models (namely Figures 5.4.12 and 5.4.13) explore the existing volumes with the addition of the new ramp, roof and mezzanine floor. Building these elements and plugging them into the existing structure assists in understanding the structural and spatial capacities of the building.

The third and final iteration draft is successful in its visual connection and integration of levels and user occupation; where upskilling and a knowledge economy is placed central to the spatial arrangement. The new ramp has become an opportunistic route where users can engage, connect and identify their role in the greater cycle of the building. The roof allows ample intensities of natural light and ventilation to enter the space, with users having visual access to the outside environment and weather conditions. Manufacturing areas and material routes for the upcycling of waste have become more refined on a practical and efficient level, as well as in relation to the interior experience of waste pickers, crafts people and the designer.

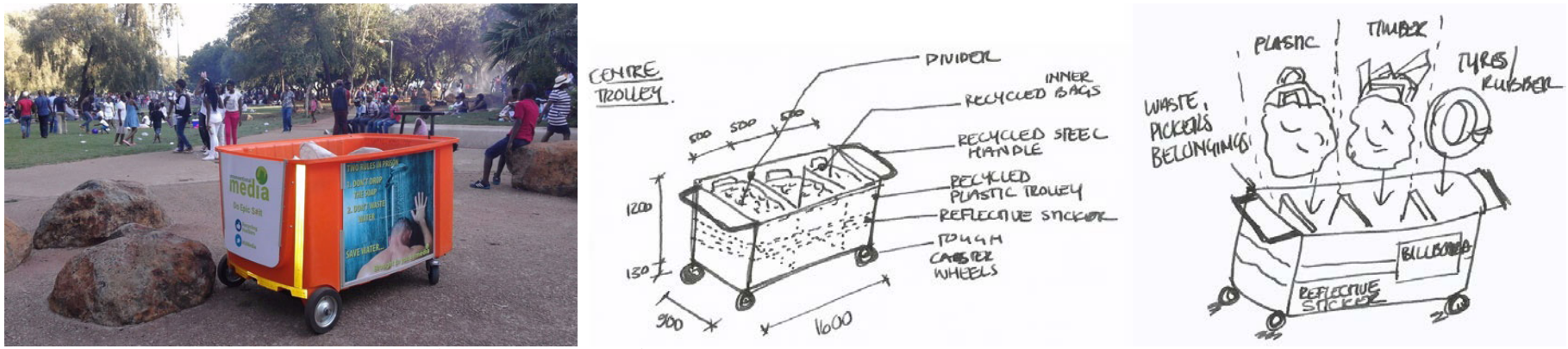


Figure 5.5.1 Existing trolley by Unconventional Media Solutions (Unconventional Media, 2017) and the proposed new waste pickers trolley

5.5 DESIGN DEVELOPMENT

For this proposed intervention, sketches, visual modelling and scale models have been used for testing and development. Figure 5.5.1 shows the conceptual sketches exploring the type of trolleys which will be supplied to the waste pickers. They consist of a lockable compartment (as a trolley is the most valuable item which waste pickers possess) and divisions for different types of waste so as to make sorting easier. This design is based on the existing trolley initiative by the Abomakgereza project from Unconventional Media Solutions (Unconventional Media, 2017).

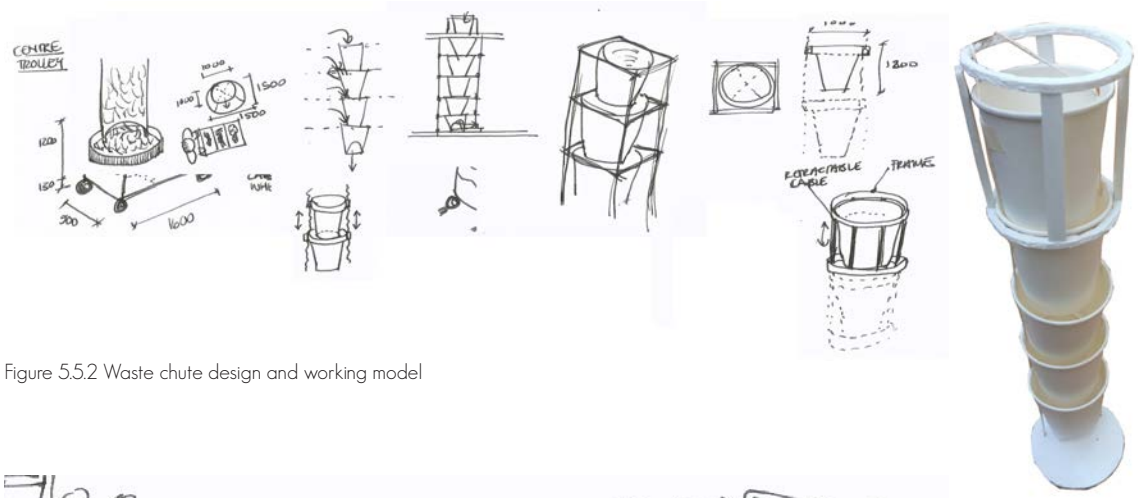


Figure 5.5.2 Waste chute design and working model

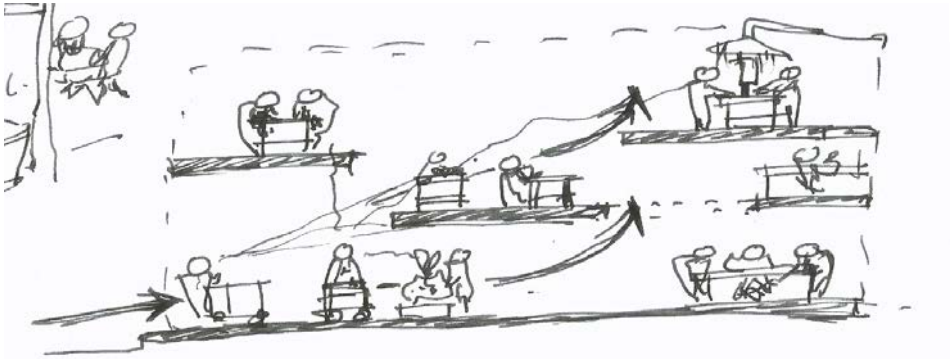


Figure 5.5.3 Visual accessibility of all levels throughout the space

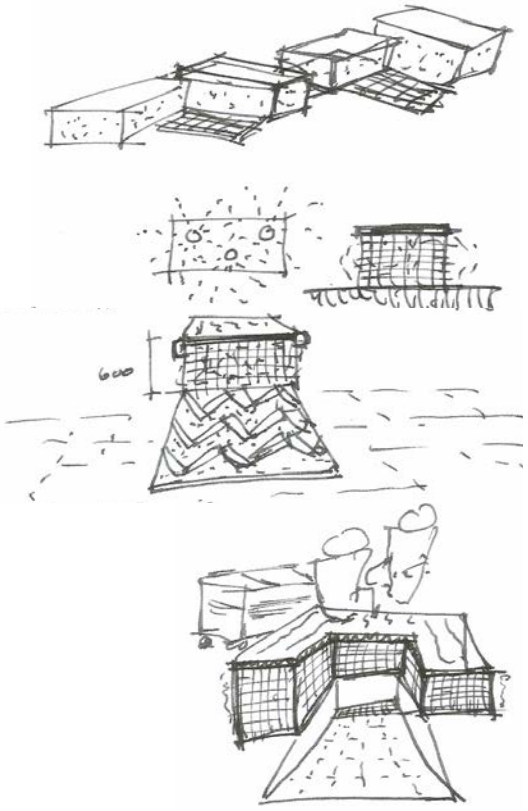


Figure 5.5.4 Street furniture

The building narrative for waste pickers is organised in different zones: waste deposit, remuneration, ablutions, canteen, trolley parking and rest area. Off-cuts and discarded materials from the upcycling workshop on the first floor will be returned to waste pickers on the ground floor via waste chutes. The waste chutes ensure that additional waste is not thrown away but returned to the waste pickers so that they can sell these items to other recycling centres.
The chute design aims to create colourful vertical conduits, contrasting the structural columns (see Figure 5.5.2). This design is based on construction waste material chutes that hang off the side of new buildings or buildings having alterations made to them, and which allow construction waste to travel to a skip waste bin from higher floors above. This waste chute is made from recycled plastic (similar to the recycled plastic used for the trolleys). This relates to the operational waste management section in the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).

Permeability of the interior spaces has been imagined through the opening up of the centre of the building and the addition of the mezzanine floor and circulation ramp. Figure 5.5.3 presents a consideration of how activities on the first floor are visually accessible to users on the ground floor, and vice versa.

On the southern and eastern pavements, street furniture and additional trolley bays are intended to create environments condusive to social interaction and engagement among passers-by. Figure 5.5.4 shows the initial ideas of gabion structures (with hedge or building waste infil) which act as stepped seating levels, as well as trolley parking bays on the southern and eastern pavements. This relates to the construction of waste management section in the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).

A vertical garden (see Figure 5.5.5) with individual plots serves as subsistence to waste pickers, as it allows them the opportunity of growing their own food. The garden further links back to the skills development initiative of basic cooking, to be taught in the canteen space, which also instills a sense of ownership in the facility.
A green wall placed on the western interior wall assists in

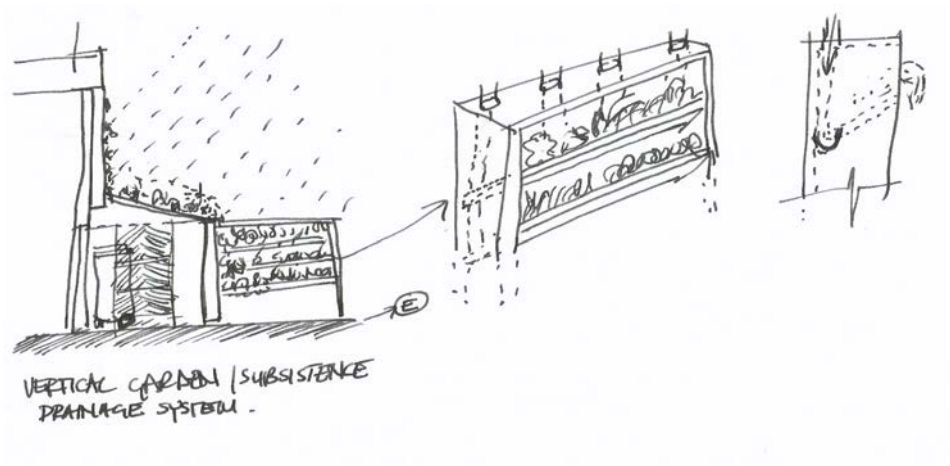


Figure 5.5.5 Vertical gardens

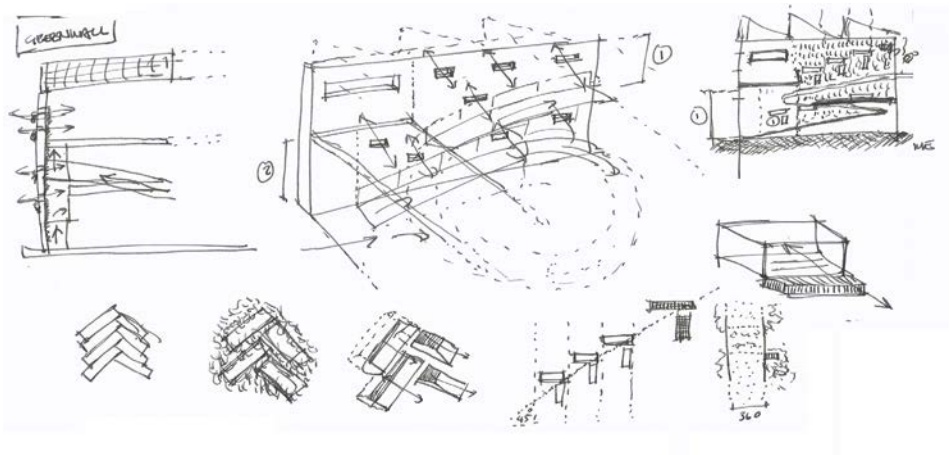


Figure 5.5.6 Green wall explorations

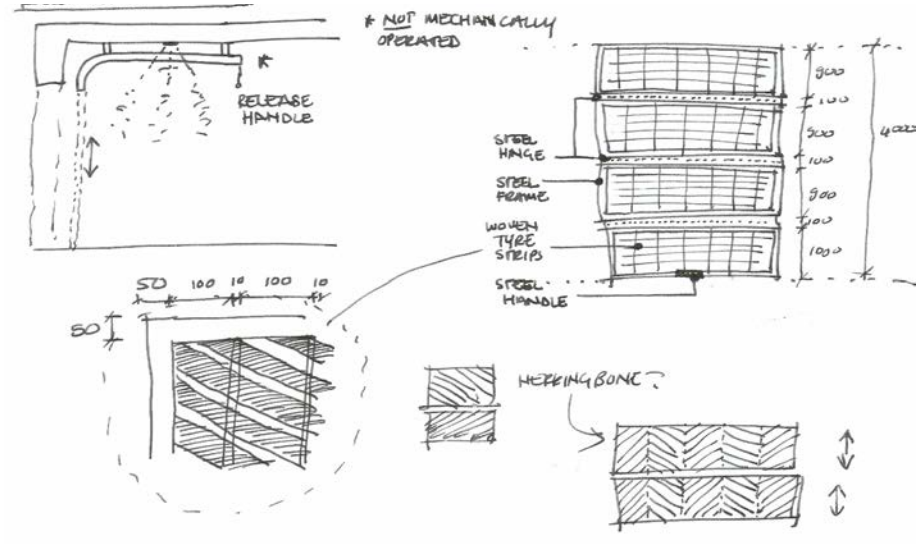


Figure 5.5.7 The overhead shutter door

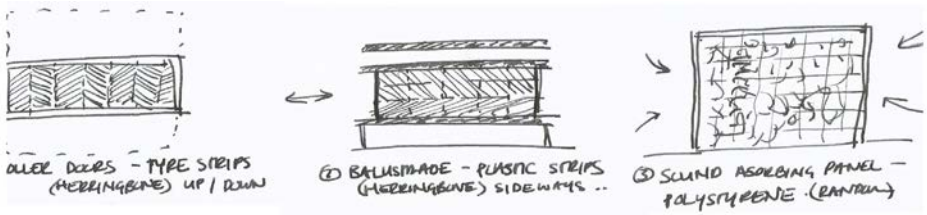


Figure 5.5.8 Symbolic motif of the herringbone pattern on thresholds and boundary objects

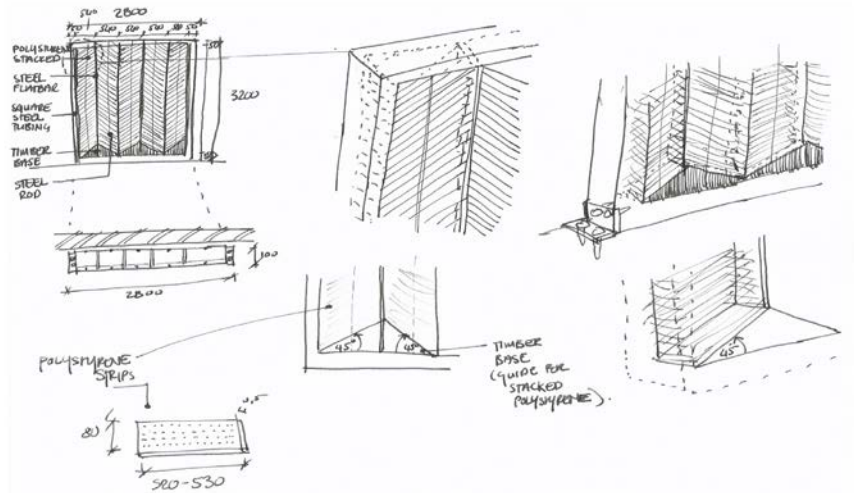


Figure 5.5.9 The sound absorbing waste panels located in the workspace areas

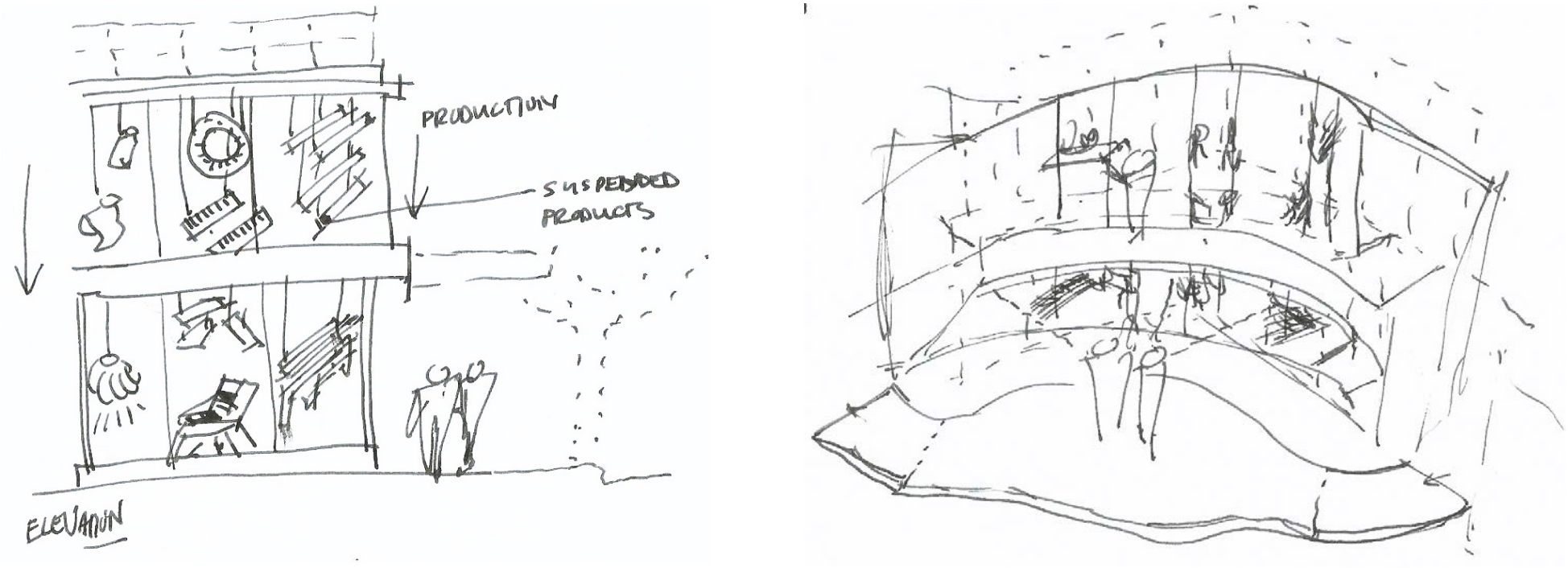


Figure 5.5.10 Double volume display space on the corner of Visagie and Bosman Streets

reducing the high afternoon temperatures that may be experienced. It further works at reducing carbon emmisions, vollatile organic compounds (VOC's) and high frequency noise (Plant Connection Inc., 2017). This type of green wall will be a pre-planted system on a structure of vertical fixed panels. Voids will be placed strategically along the wall to promote air movement and sunlight penetration in the afternoon. These voids are imagined as herringbone patterns, connecting this wall back to the street furniture arrangements, overhead shutter doors and balustrades, as can be seen in Figure 5.5.6. The green wall is a design device which aligns to the regenerative principles of using nature to coexist with the intervention as well as coexisting with the interior space for occupant benefit. The green wall also relates to the indoor plants, reduces exposure to air pollutants and improves the quality of the internal air, as per the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).

The development of overhead shutter doors to lock up the centre at night is shown in Figure 5.5.7. These doors are similar to a garage door. They exist of a series of panels containing a steel frame with tyre strips woven into a herringbone pattern. These slide up and are stored horizontally against the first floor slab when in the open position, act as a ceiling detail and recreate the herringbone pattern on the floor from shadows of the lights above, suggesting the movement and adaptive re-use of car tyres.

The use of car tyres is reponsive to the service staion and original function of the building. The herringbone pattern is a recurring symbolic motif (see Figure 5.5.8), used differently through materiality and function, as a pattern made from plastic strips (e.g. from milk bottles) as a balustrade detail, the overhead shutter doors (e.g. car tyre strips), street furniture spatial arrangement (in plan view) and openings in the western green wall. This relates to the local sourcing and assembly sections in the materials category of the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).

Re-using polystyrene materials that will be collected in the centre to compose sound absorbing wall panels is considered in Figure 5.5.9. These panels will be in the form of a timber frame structure, with polystyrene waste infill packed densely to reduce noice reflection and transferrance from noisy areas of the workspaces.

The double volume display space is explored in Figure 5.5.10, where passers-by can interact below suspended products, showing the material origin and final product in a vertical sequence.

The significance of the reccuring herringbone pattern among interior design ensembles and taste goods, is to symbolise movement, progression and transformation from one state to another (users or waste material). This is juxtaposed with the reclaimed materials as the herringbone pattern has associations with elegance.

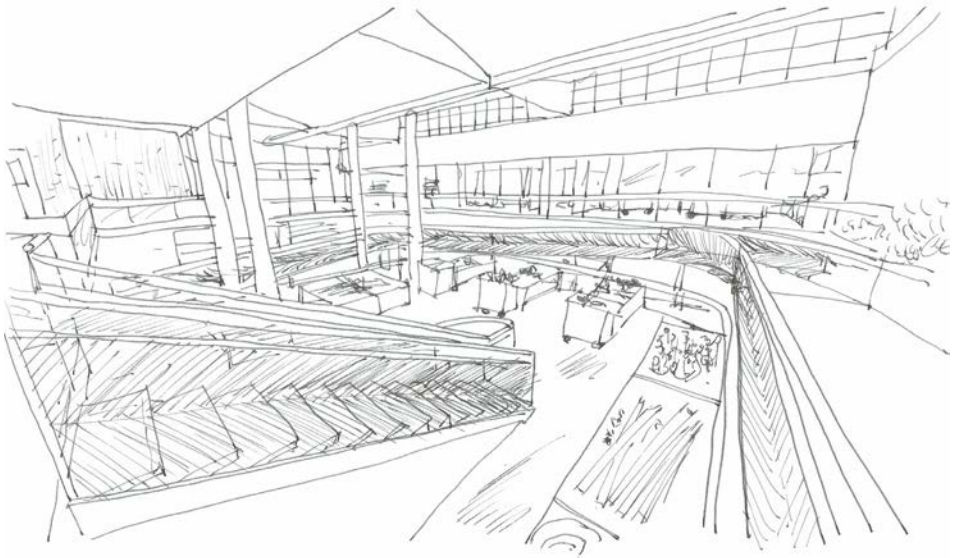


Figure 5.5.11 Double volume workspace sketch

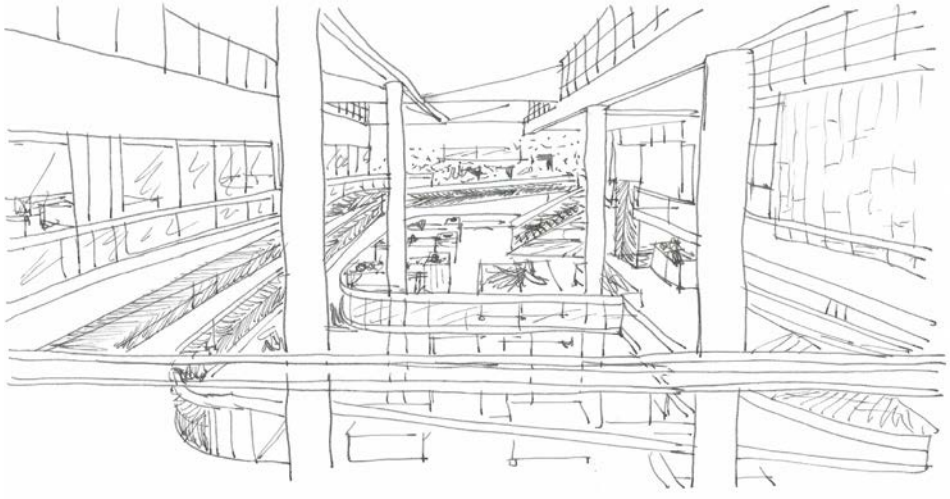


Figure 5.5.13 Double volume sketch

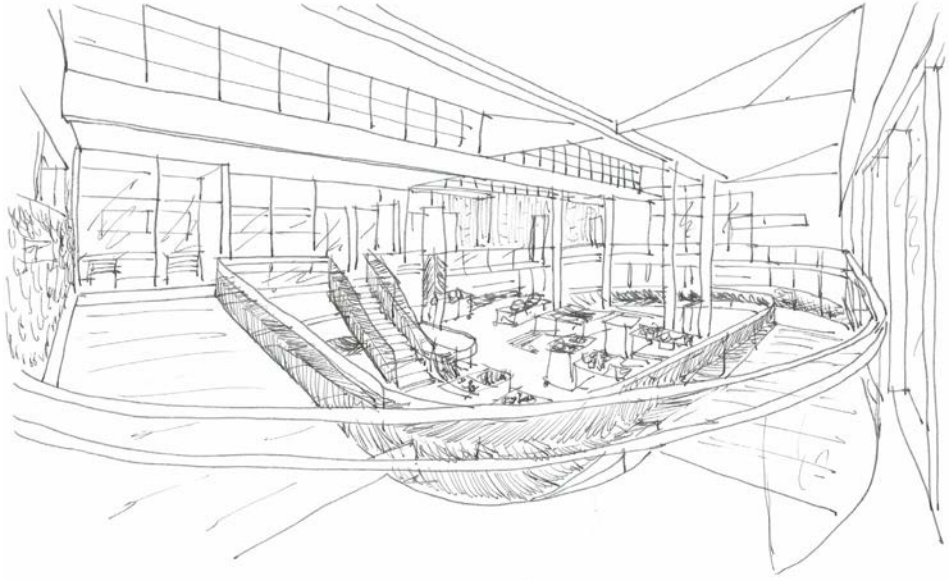


Figure 5.5.12 Double volume ramp sketch

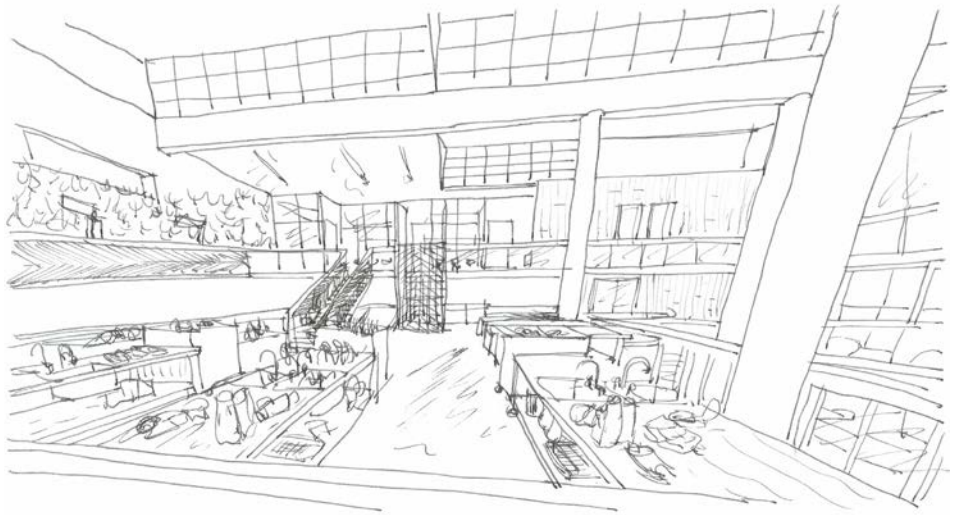


Figure 5.5.14 Double volume mezzanine sketch

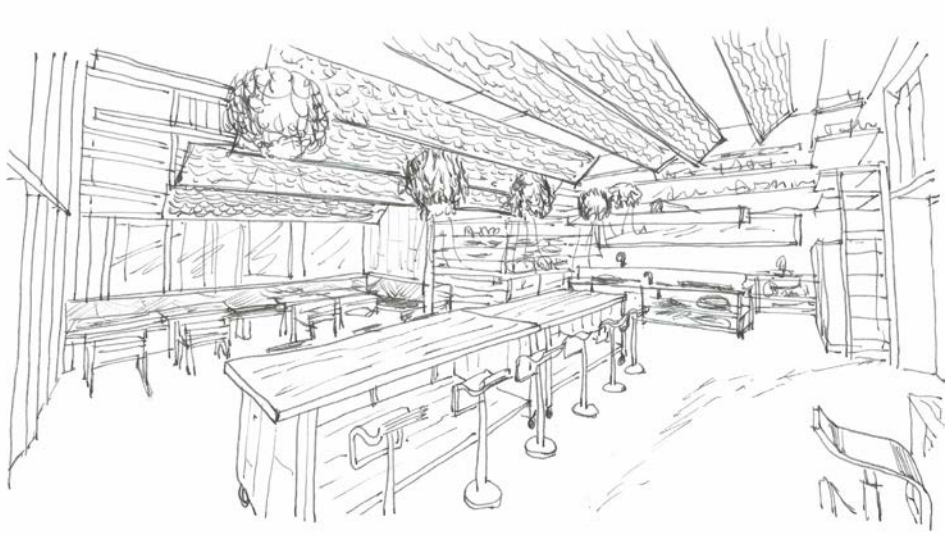


Figure 5.5.15 Canteen sketch

Figure 5.5.17 Entrance sketch

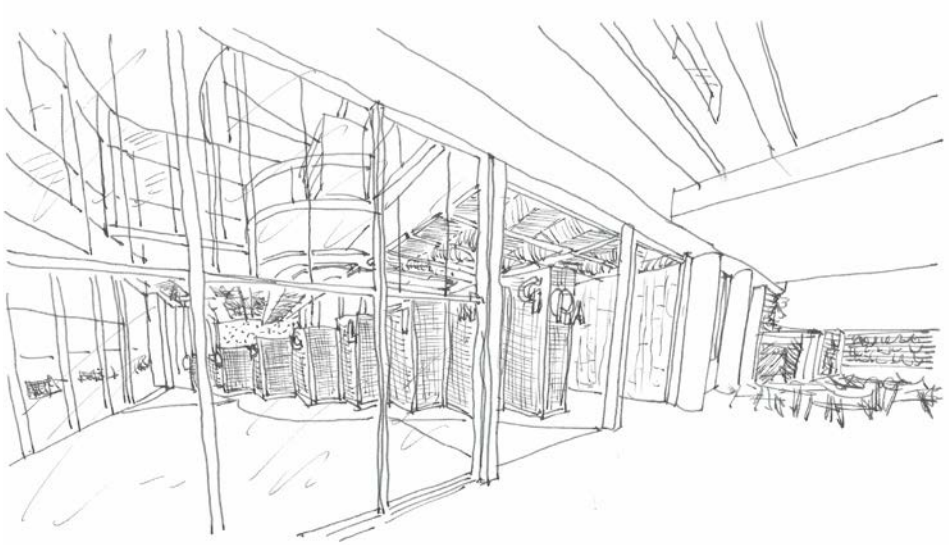
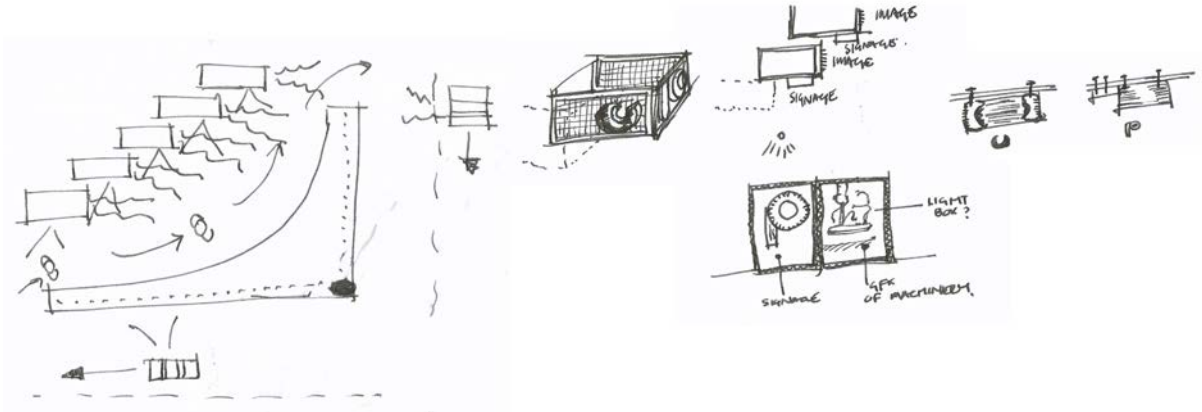


Figure 5.5.16 Double volume product display sketch



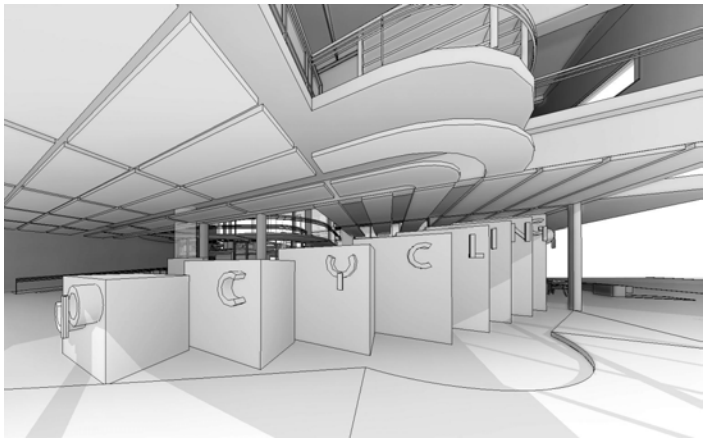


Figure 5.6.1 Pedestrian signage on the corner of Visagie and Bosman Streets

5.6 BRANDING

Branding for the upcycling centre has been carefully considered. The branding is intended to communicate the space as a creative workshop, using discarded waste products.
The building branding is imagined as 'Upcycling Pretoria'. This refers to upcycling both in terms of upcycling waste in Pretoria and upcycling the precinct as a catalyst initiative. The signage should be representative and symbolic of the activities taking place inside the building. To that end, signage for pedestrians and traffic has been developed, as can be seen in Figures 5.6.1 and 5.6.2. The pedestrian signage is located on the back end of the steel mesh trolley garages, which are uniformly stepped in height, thereby leading the viewer's gaze up as they read the individual letters on the signage. This is symbolic of the upwards movement of both product transformation and human endeavour (i.e. skills development). This corner signage is located in the building, as an extension of the pavement. The placement of this signage encourages passers-by to interact with the centre branding and suspended products in the double volume space above. The arc-shaped spatial arrangement of the trolley garages/signage also leads the viewer around the corner of the building, revealing the user's reaction upon entry and exit of the building.

Made from discarded car tyres and timber offcuts or pallet components, the main signage and branding is intended to stand proudly on the cantilevered slabs on the south and east façades of the building, as shown in Figure 5.6.2.

Signage and branding also communicate the identity of the waste pickers on the ground floor space. This is interpreted as freestanding glazed frames with the story of a waste picker. This graphic will recognise a specific waste picker's achievements and goals, and create cohesiveness and support within the waste picker community that frequently visits the upcycling centre. The story is aimed to be a rotational profile every week/month, placing focus and attention on different members within this user group. The inclusion of these stories further adds to the centre's sense of place and emotional ownership, particularly as they will be placed in the general collection area for all to see.
The trolleys, which the waste pickers will receive, have branding and advetisments with reflective stickers on them so as to increase their visibility on the roads (refer back to Figure 5.5.1). This connects to the branding of their uniforms and registration as being part of the MBO of the upcycling centre noted in Chapter 1. This membership is similar to a labour union which recognises and acknowledges the waste picker's identity and role in society. Waste pickers can gain health benefits, as well as financial and occupational advice upon registration when they become part of the upcycling centre MBO.

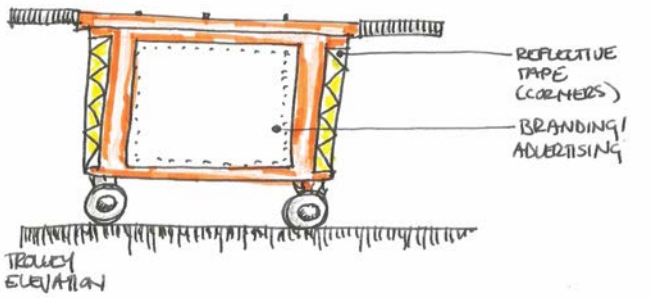


Figure 5.6.2 Main signage to the Upcycling Centre using discarded car tyres and timber pallets (south and east façades) - above
Trolley (Raborife, 2016) and uniform branding - right (Working person's store, 2017).

5.7 FINAL DESIGN

The final design section incorporates the design development sketches and model explorations into a synthesised design proposal. Attention is drawn here to the final iteration of the roof, ramp, mezzanine and spatial zoning allocations.. How users navigate the space, as per the environmental psychology theory, is taken into account in the creation of cohesive and comfortable interior spaces aligning to the project concept of a cyclic journey of renewal.

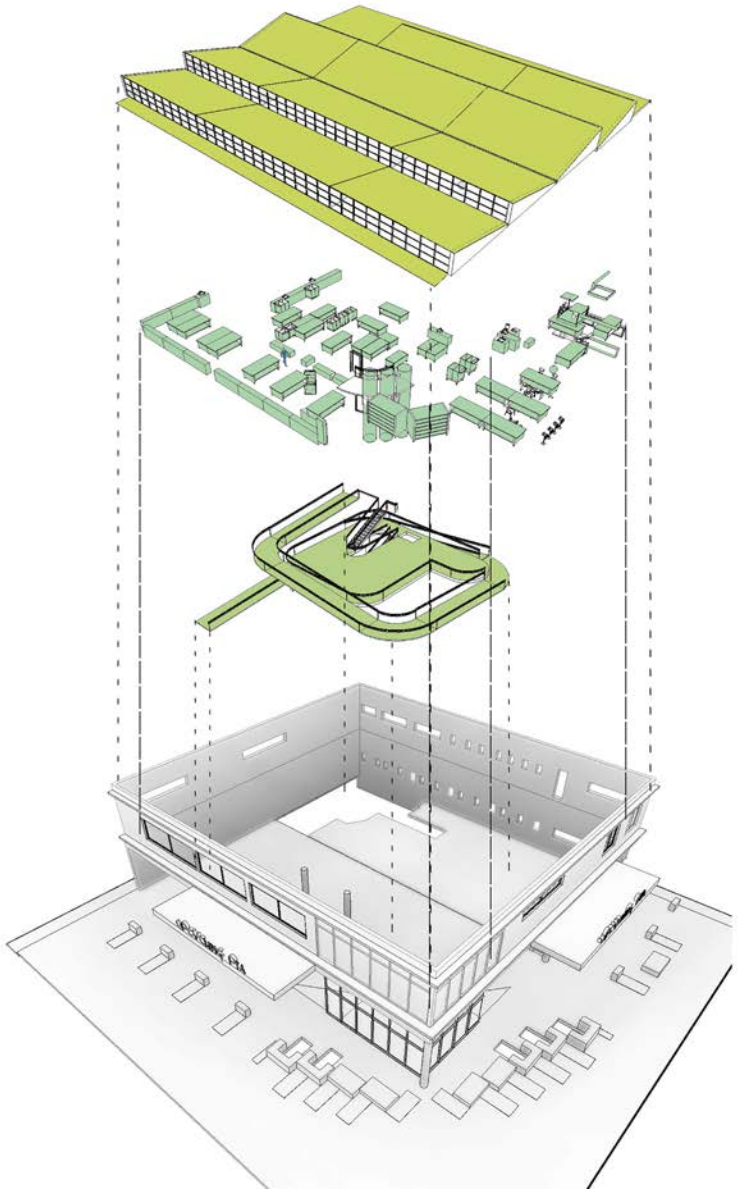


Figure 5.7.1 Axonometric intervention overview

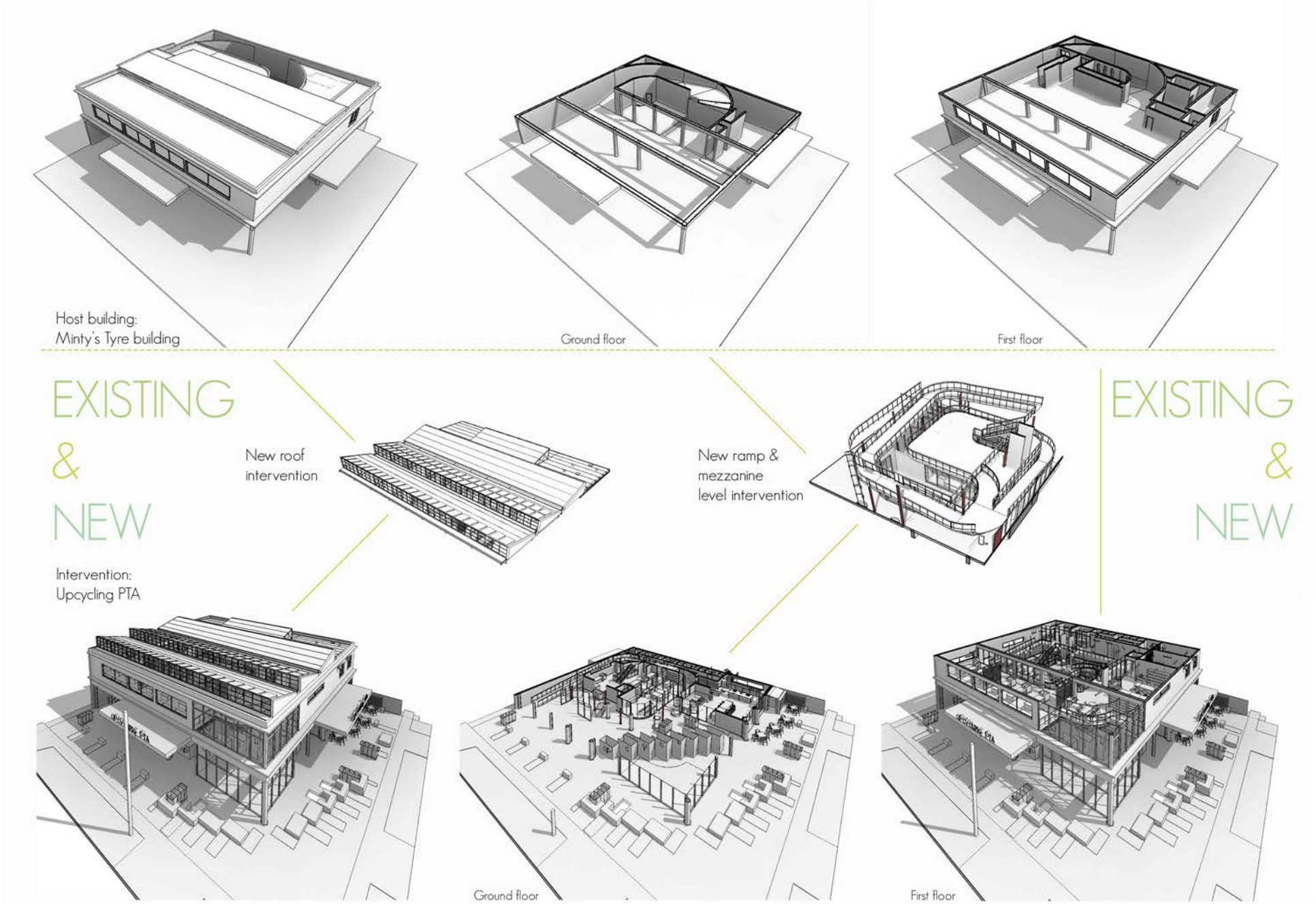


Figure 5.7.2 Existing and new axonometric overview

Figure 5.7.3 View looking East from the host building

Figure 5.7.4 View looking South from the host building

Figure 5.7.5 Site plan

Figure 5.7.6 Ground floor layout

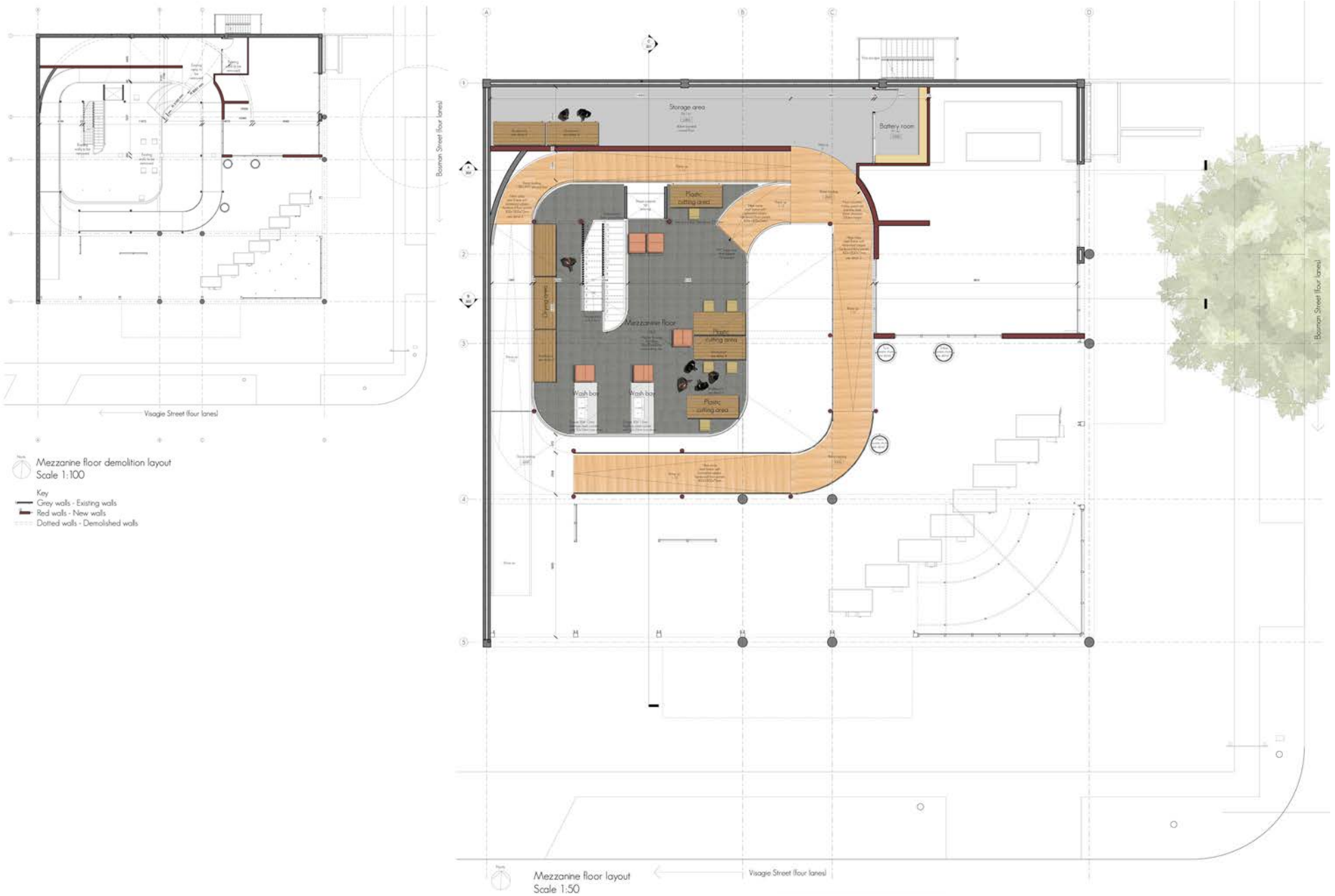


Figure 5.7.7 Mezzanine floor layout

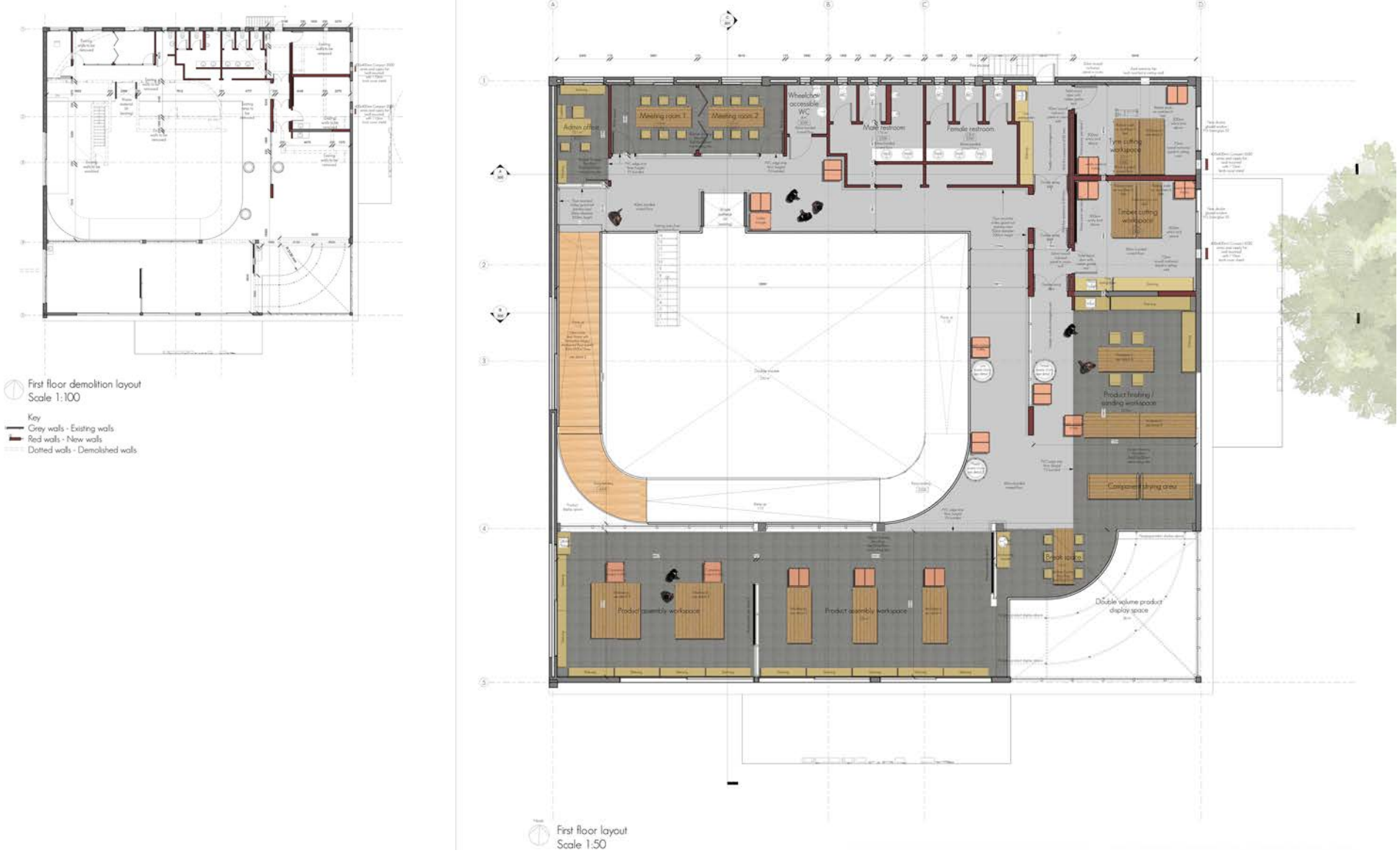


Figure 5.7.8 First floor layout

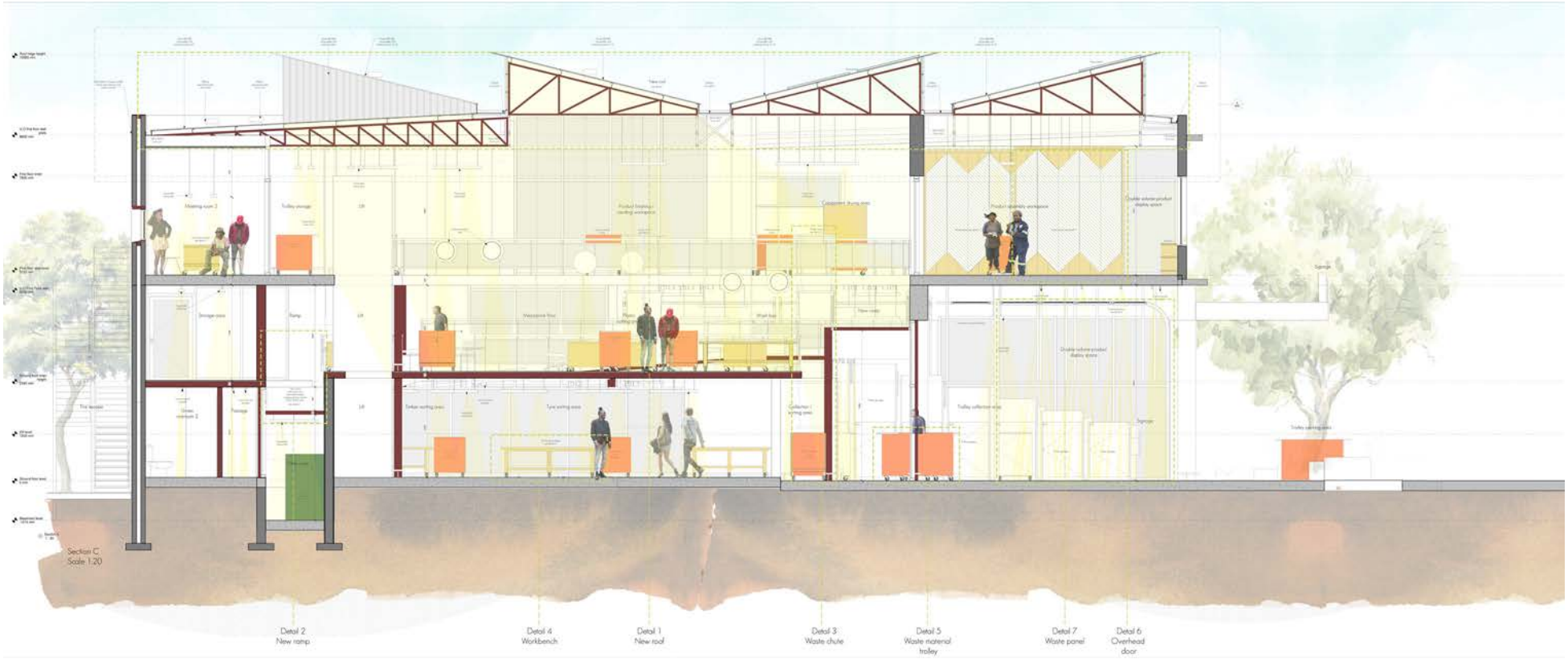


Figure 5.7.9 Section C

Figure 5.7.10 Sections A and B

South perspective

Figure 5.7.11 South elevation

Figure 5.7.12 East elevation

Figure 5.7.13 Exterior street perspective

Figure 5.7.15 Exterior street night perspective

Figure 5.7.14 Entrance perspective

Figure 5.7.16 Entrance night perspective

Figure 5.7.17 Exterior facade perspective

Figure 5.7.18 Exterior facade night perspective

Figure 5.7.19 Double volume product display perspective

Figure 5.7.20 Canteen perspective

Figure 5.7.21 Waste chute perspective

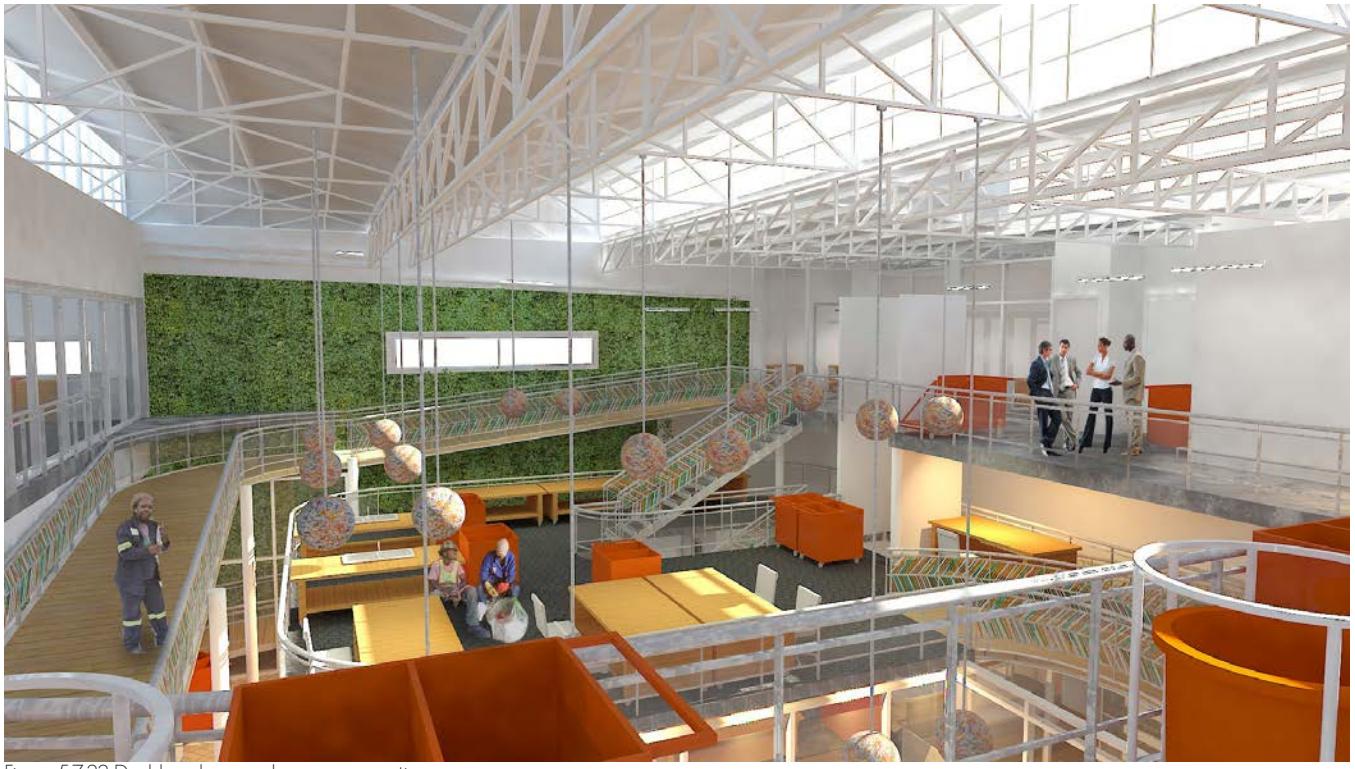


Figure 5.7.22 Double volume workspace perspective

Figure 5.7.23 Double volume ramp perspective

Figure 5.7.24 Double volume mezzanine perspective

Figure 5.7.25 Double volume perspective

5

Technical resolution Part 2

5.7.1 DETAILS

Details within the final design have been selected using theoretical, contextual and conceptual informants, where the focus has been placed on manipulating the interior space so that it aligns with the concept of a cyclic journey of renewal. The new roof and ramp (architectural), waste chute, workbenches, trolley, overhead roller doors and waste panel (shopfitted) are discussed in more detail in the following sub-sections.

5.7.1.1 THE NEW ROOF

The new roof intervention (see Figure 5.7.1.1.1) is the result of external factors such as natural light, ventilation, rainwater catchment, opportunity for photovoltaic panel placement and aesthetic form. It has always been the objective of this intervention that the new roof should carry values which are rooted in the interior experience of the users, and which allow a connection to the cultivation of human endeavour. Therefore, the orientation of clerestory windows is guided by the activity or circulation which takes place on the interior levels.

Due to the northern light being more intense, the roof has been positioned to allow this light to permeate into the centre of the building reaching the ground floor (refer back to Figures 5.7.9 and 5.7.10 at the beginning of this section), whereas the southern light is positioned along the work areas for a softer illumination in focus areas, with the assistance of artificial light. The northern clerestory windows would have a film installed which reduces the heat gain and glare. The new roof and visible steel truss work become features – opening the roof void and lighting the top level. The roof and truss work also leave services exposed (e.g. down pipes and lighting fixtures), reinforcing the workshop qualities associated with the original building and programme of upcycling.

The existing steel-mullioned clerestory windows are to be re-used in the new roof, as a connection to the building's past responding to the new workshop qualities of the upcycling programme. These windows will be adjusted to be bottom-hung, with the addition of whirly birds on the roof, allowing for ventilation and causing hot air to be exhausted out as it rises through the building volumes. The roof sheeting is to be constructed out of IBR profiled Chromadek, with galvanised steel gutters and PVC downpipes converging to the rainwater harvesting tanks on the ground floor. The new roof responds to the energy, innovation, visual and thermal comfort categories of the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).

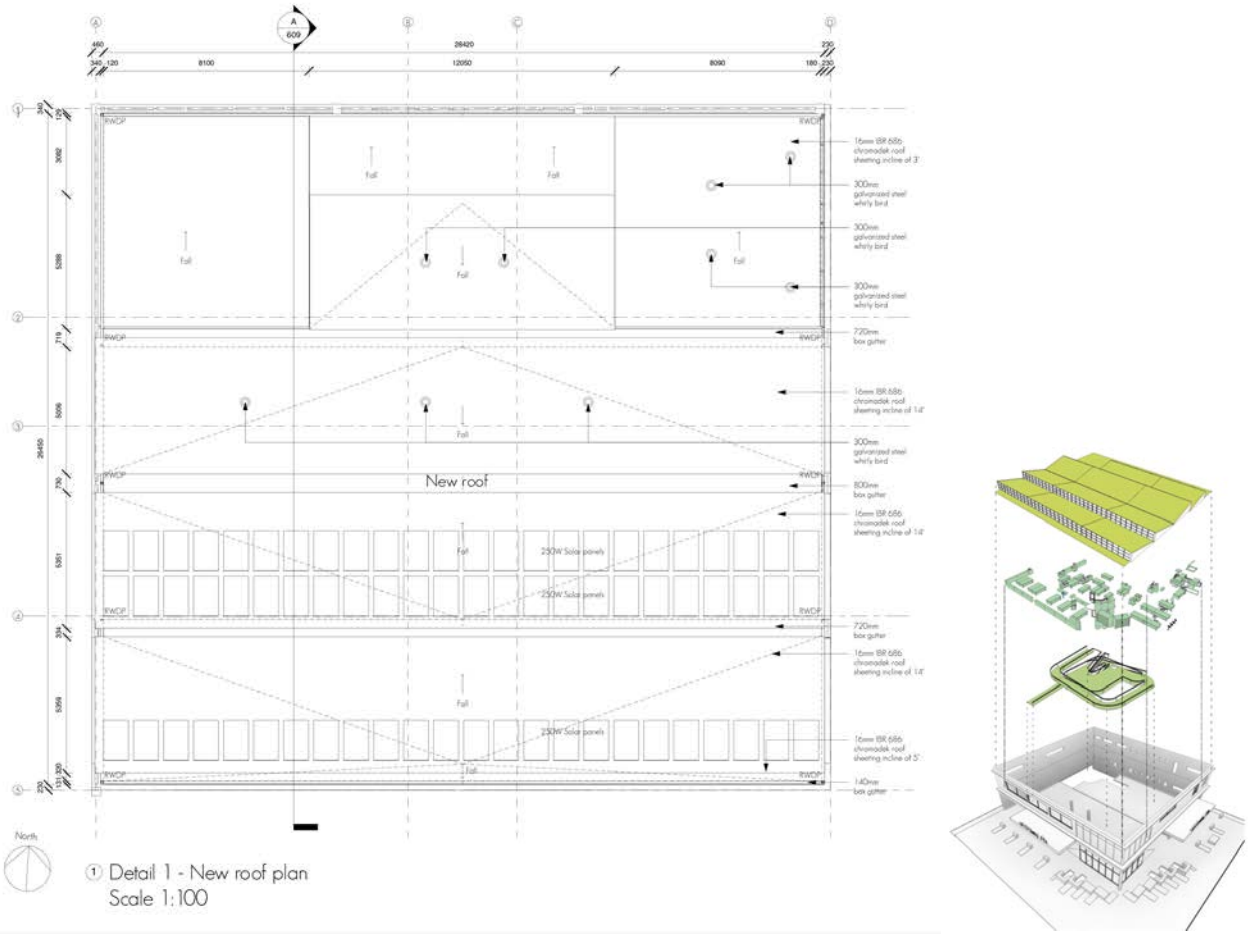
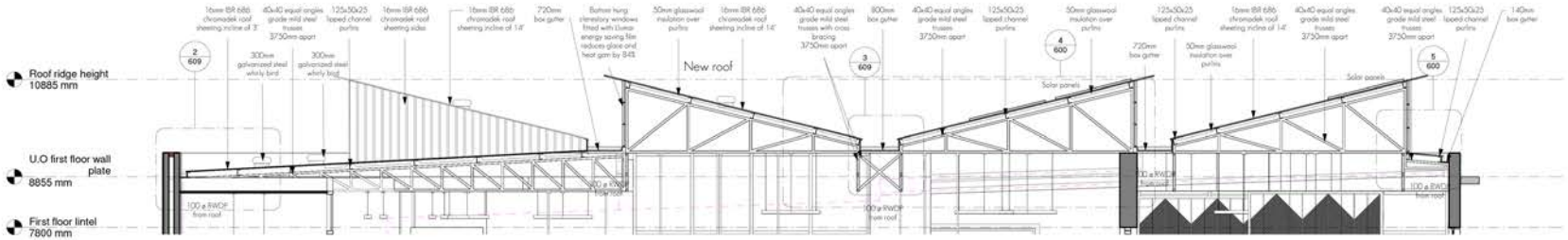
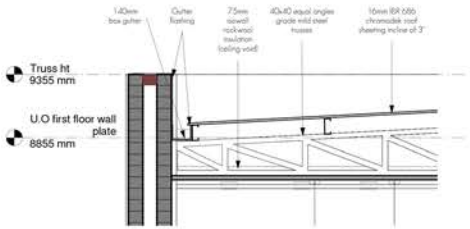


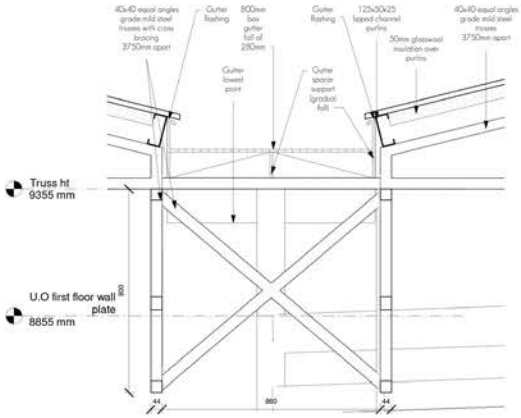
Figure 5.7.1.1.1 The new roof detail



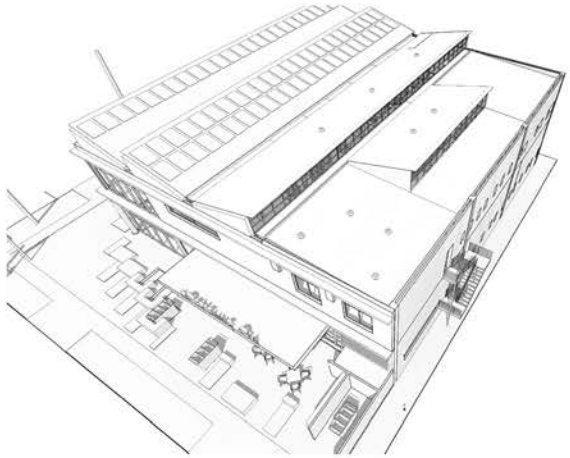
A Detail 1 - Roof section A
Scale 1:50



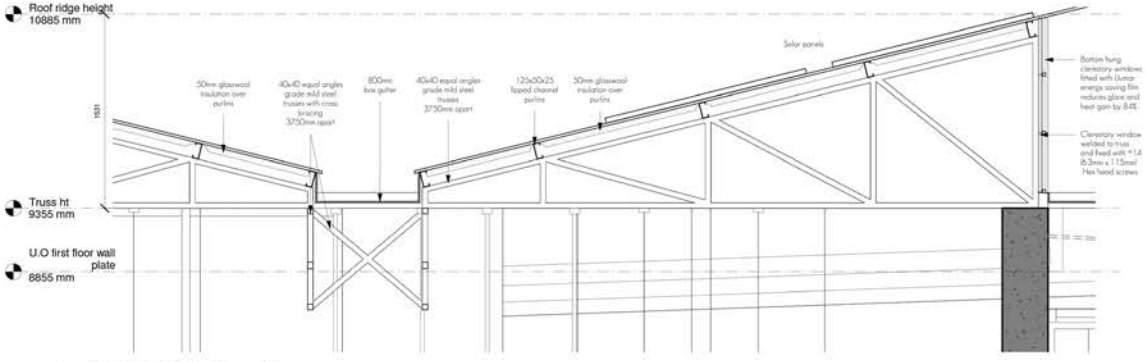
2 Detail 1 - Roof gutter (north) detail
Scale 1:20



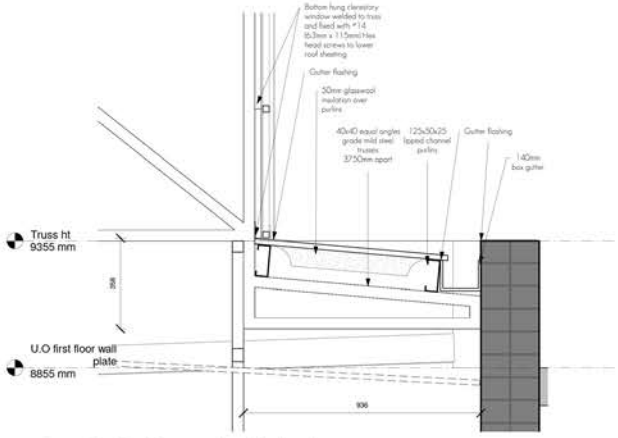
3 Detail 1 - Butterfly roof gutter
Scale 1:10



5 Roof perspective



4 Detail 1 - Butterfly roof truss
Scale 1:20



5 Detail 1 - Roof gutter (south) detail
Scale 1:10

5.7.1.2 THE NEW RAMP

The new ramp, as discussed earlier and which is visible in Figure 5.7.1.2.1, creates movement around the mezzanine level. It opens up the interior space from the inside and creates visual connections for all users within the space. Made from 75mm laminated Saligna hardwood planks, the tread surface is supported by two steel stringers which run along either side of the ramp. These are connected to concrete columns which span each ramp section at the base, middle and top before reaching the landings (i.e. on each corner of the ramp route). The balustrades are brushed steel railings with flat balusters and HDPE (Class 2) plastic strips in a woven horizontal-orientated herringbone pattern similar to the overhead roller doors (see Detail 6 in Figure 5.7.1.6.1). The plastic strips are only positioned on the ramp balustrades as an indication of transition. The rest of the balustrades (horizontal) on the mezzanine and first floors consist of a safety clear glass, so as to provide visual access from and to the other floors.

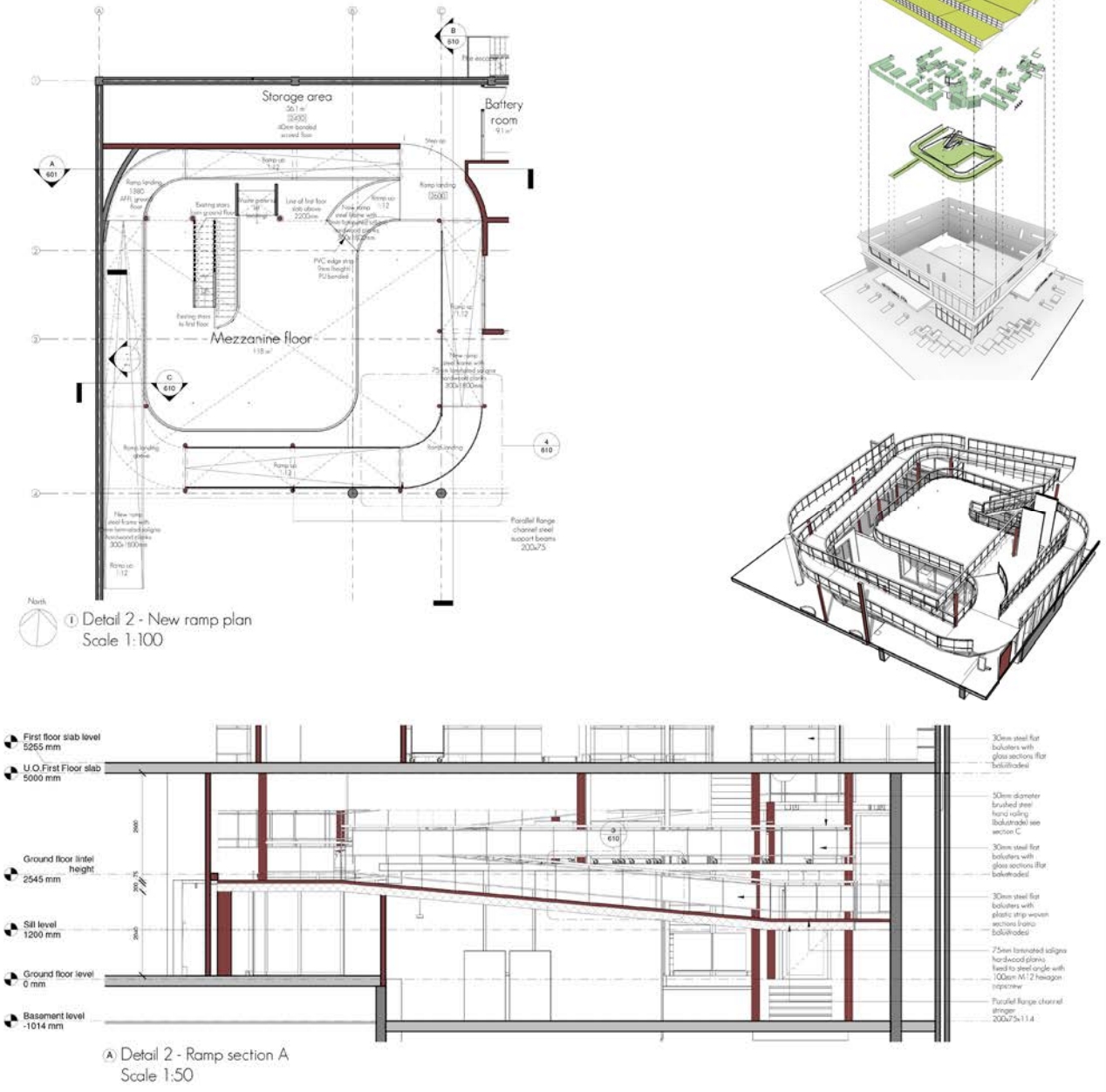
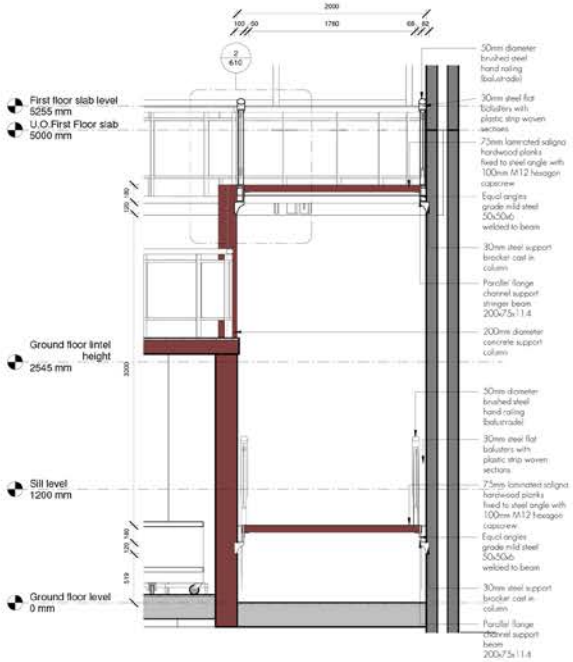
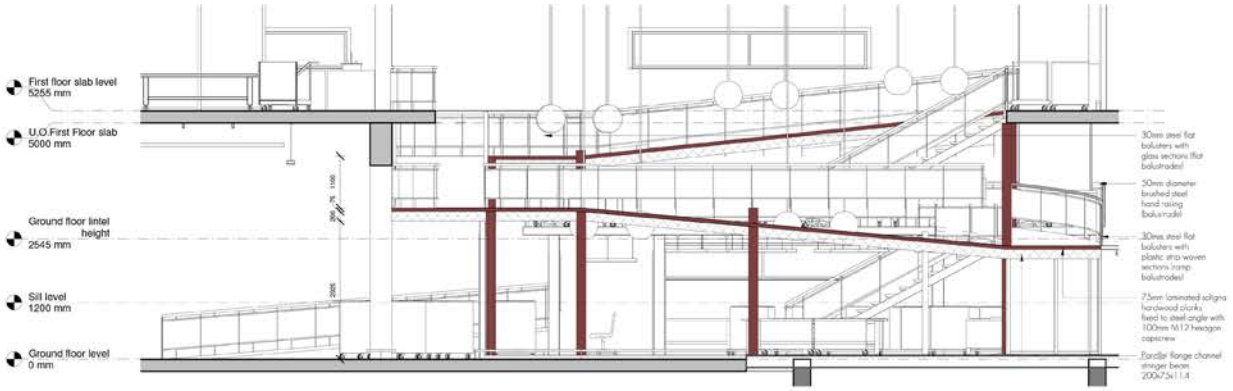


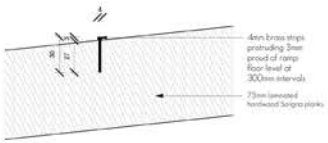
Figure 5.7.1.2.1 The new ramp detail



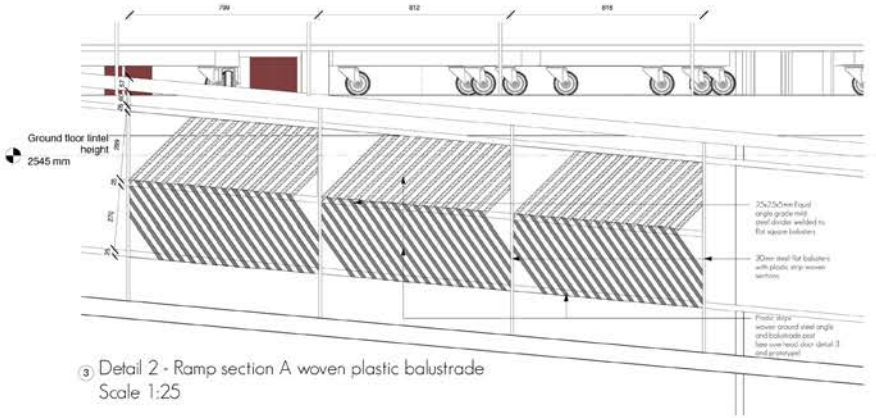
© Detail 2 - Ramp section C
Scale 1:25



Ⓑ Detail 2 - Ramp section B
Scale 1:50

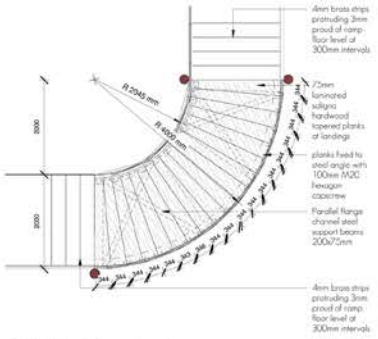


Ⓓ Detail 2 - Ramp brass strip inlay detail
Scale 1:2

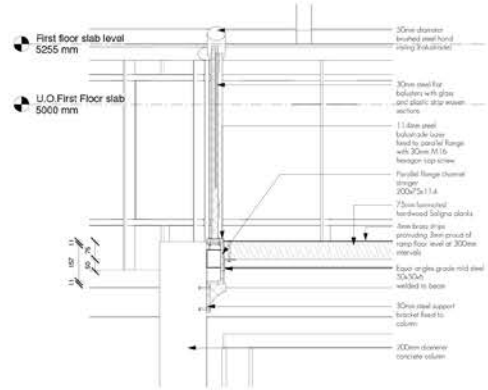


③ Detail 2 - Ramp section A woven plastic balustrade
Scale 1:25

Ramp perspective



④ Detail 2 - Ramp landing
Scale 1:50



② Detail 2 - Ramp stringer and support beam
Scale 1:10

5.7.1.3 THE NEW WASTE CHUTE

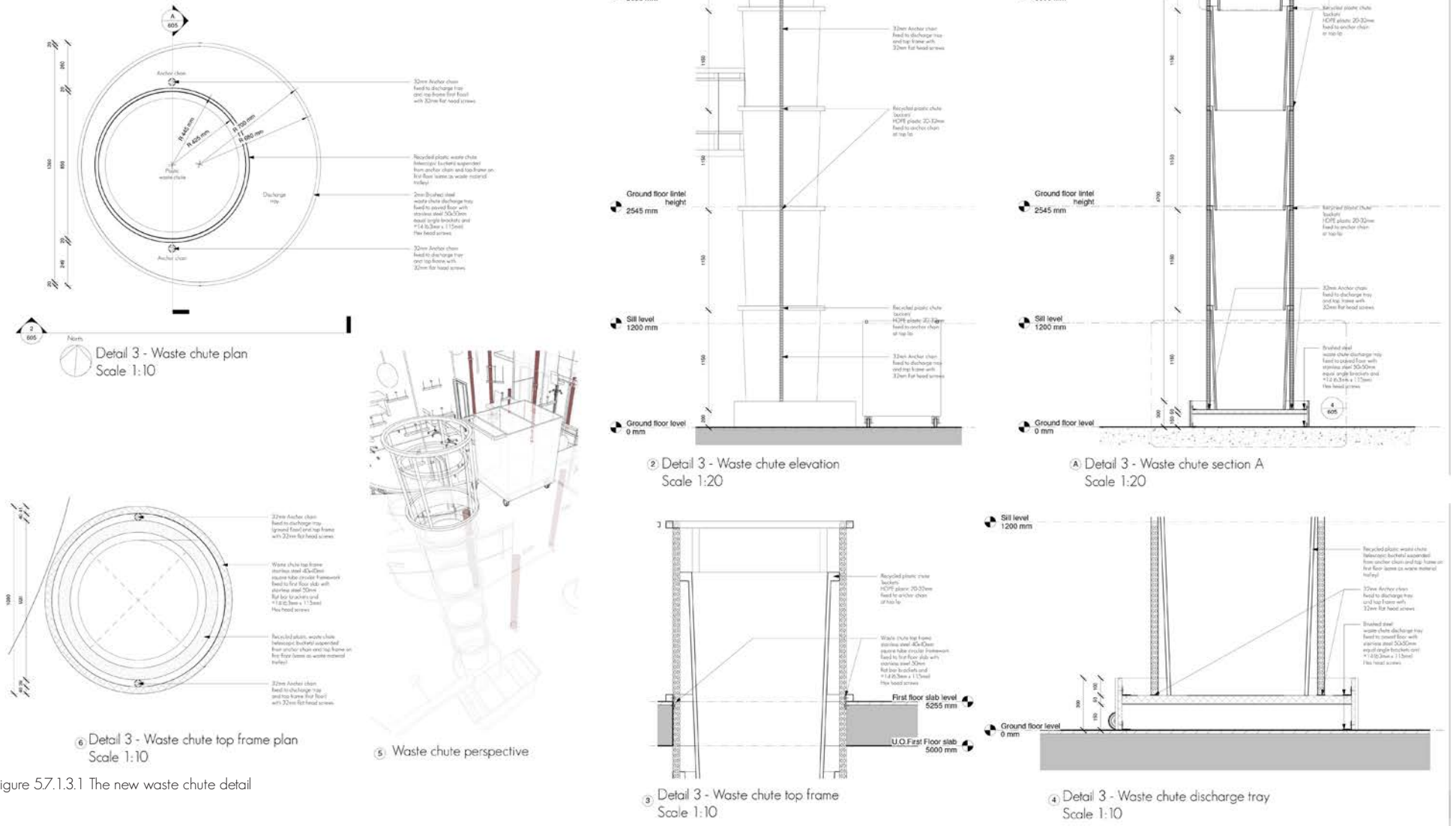
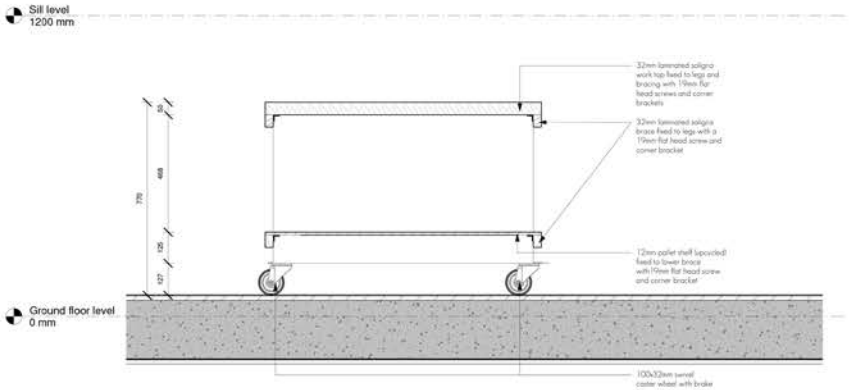


Figure 5.7.1.3.1 The new waste chute detail

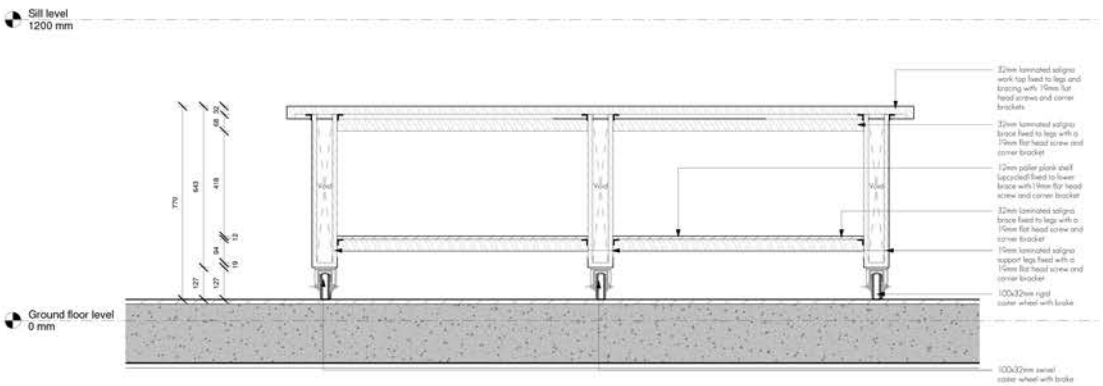
5.7.1.4 The new work benches

The workbenches (see Figure 5.7.1.4.1) are detailed as a symbol of multi-use and flexibility of taste goods. These workbenches will be used in the workspaces, the canteen (at counter level), the skills development area and as meeting tables. Such use responds to the 'workshop' symbolic motif that echoes the original building's purpose. Made from a 32mm laminated saligna worktop and sides, the workbenches are designed to have a bottom storage shelf made from pallet planks. These are representative of the grouping of new and re-used materials.

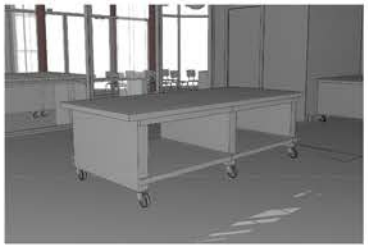
The workbenches are flexible in their ergonomics of height and width, as their use will differ throughout the centre. All workbenches are in line with the concept of flexibility and mobility (in adaptable work space configurations) and are to have two rigid caster wheels with locking brakes on one short side and two swivel caster wheels with locking brakes on the other short side. The workbenches relate to the furniture section in the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).



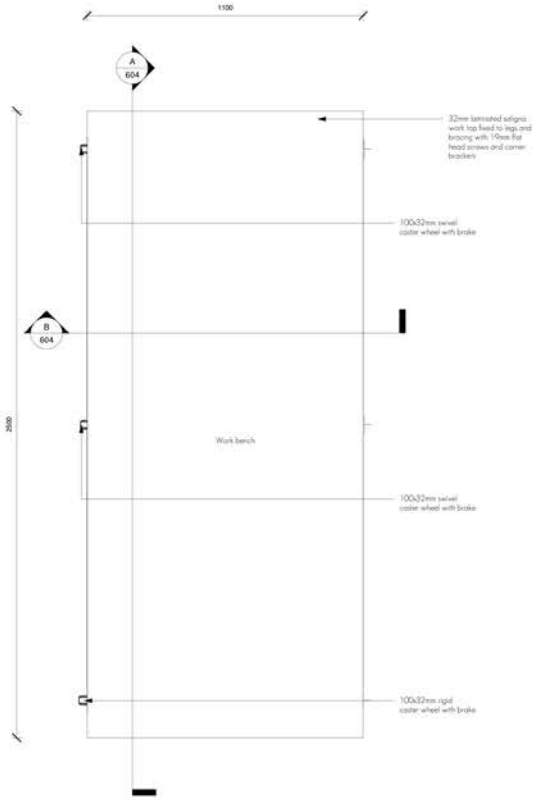
B Detail 4 - Work bench section B
Scale 1:10



A Detail 4 - Work bench section A
Scale 1:10



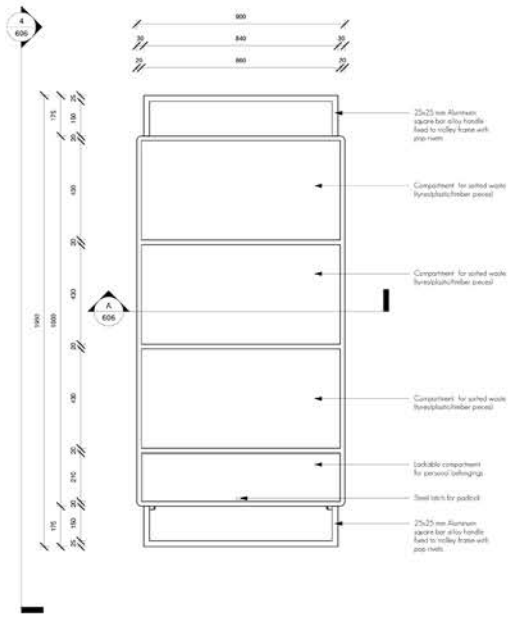
2 Work bench - Perspective



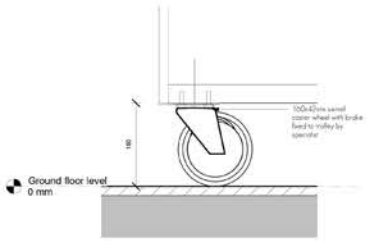
1 Detail 4 - Work bench plan
Scale 1:10

Figure 5.7.1.4.1 The new work bench detail

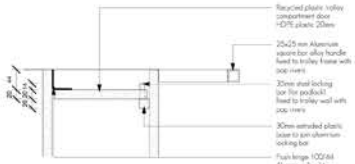
5.7.1.5 The new Trolleys



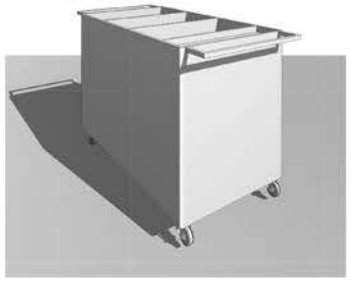
① Detail 5 - Waste material trolley plan
Scale 1:10



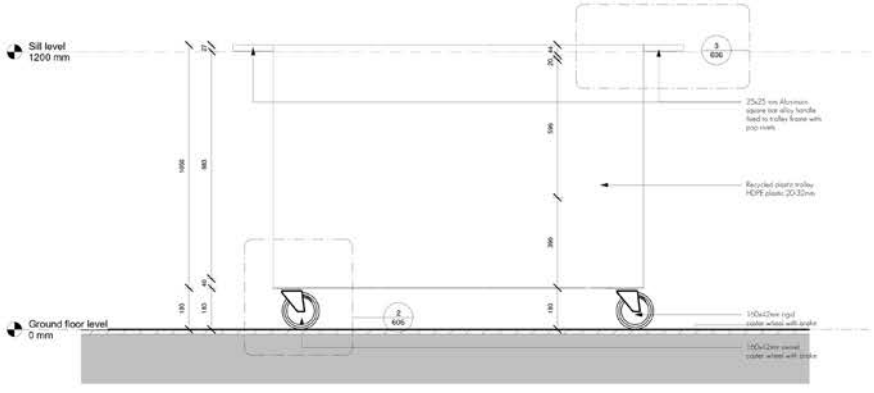
② Detail 5 - Waste material trolley - wheel detail
Scale 1:5



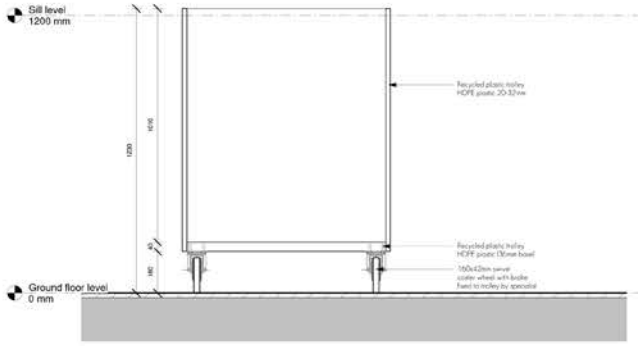
③ Detail 5 - Waste material trolley elevation - lockable compartment
Scale 1:5



⑤ Waste material trolley perspective



④ Detail 5 - Waste material trolley elevation
Scale 1:10

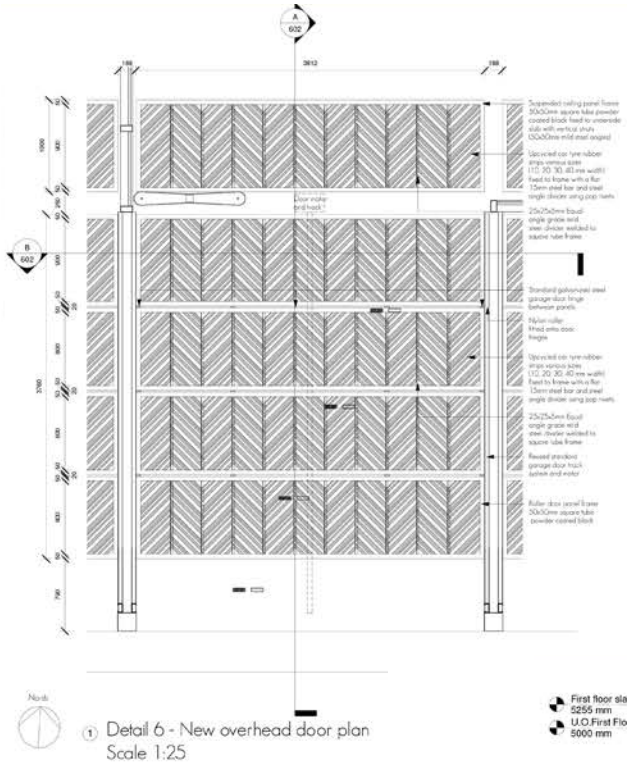


Ⓐ Detail 5 - Waste material trolley section A
Scale 1:10

Figure 5.7.1.5.1 The new trolley detail

5.7.1.6 The new overhead doors

The new overhead doors (see Figure 5.7.1.6.1) are based on a garage door concept. That is, these doors use an existing channel frame to guide the rollers on the sides of each door panel with a central motor to pull the door up and down. The new overhead doors function as security doors at night (and during the day if the centre is closed). When they are upright, they become a ceiling detail which interacts with spotlights above, creating a shadow play on the paved floor surface below (refer back to Figure 5.7.14). These doors consist of a square tube frame with equal angle divisions around which rubber strips are woven in a herringbone pattern. This rubber is re-used from car tyres in different widths, as the elastomer material has qualities of elasticity and strength. The herringbone pattern is envisioned to imply movement and transition when down in the vertical position, and as a horizontal shadow on the floor when upright. Each of the four panels are joined by the standard steel garage door roller hinges, with lockable latches on the lower panel for security.



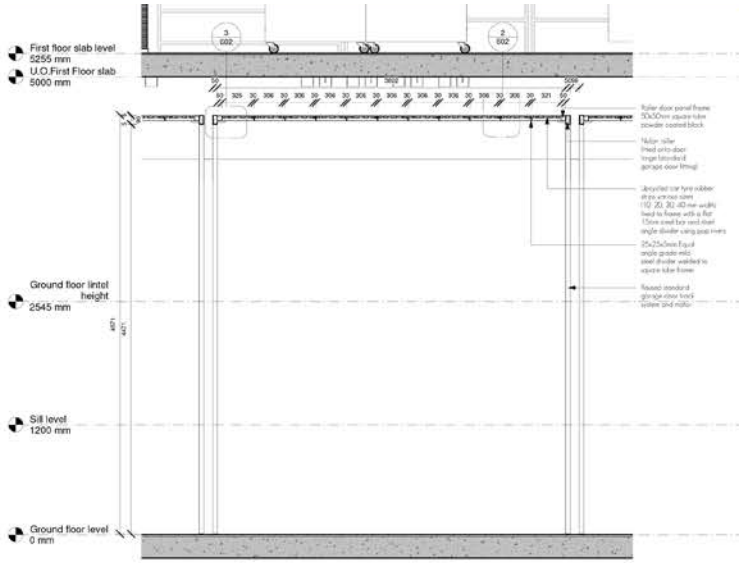
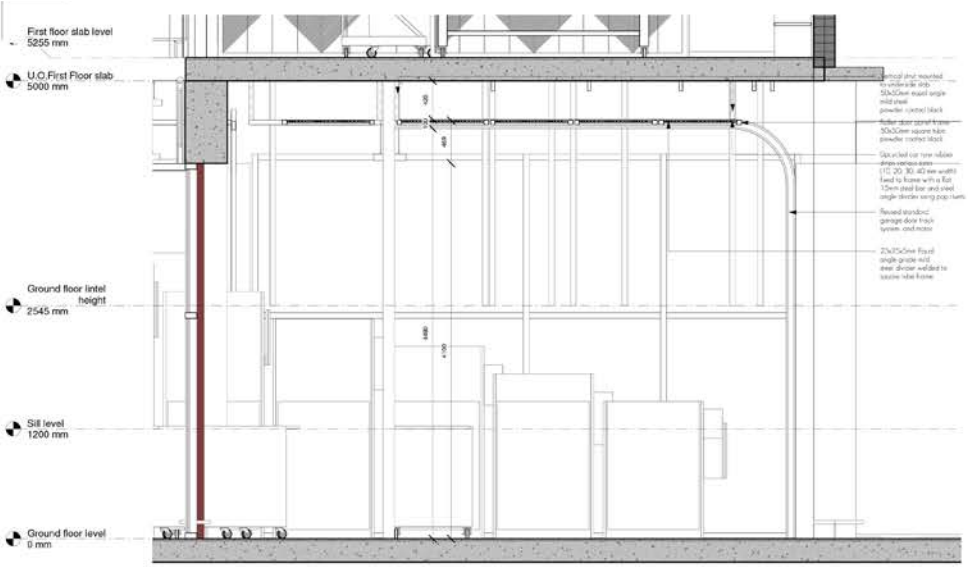
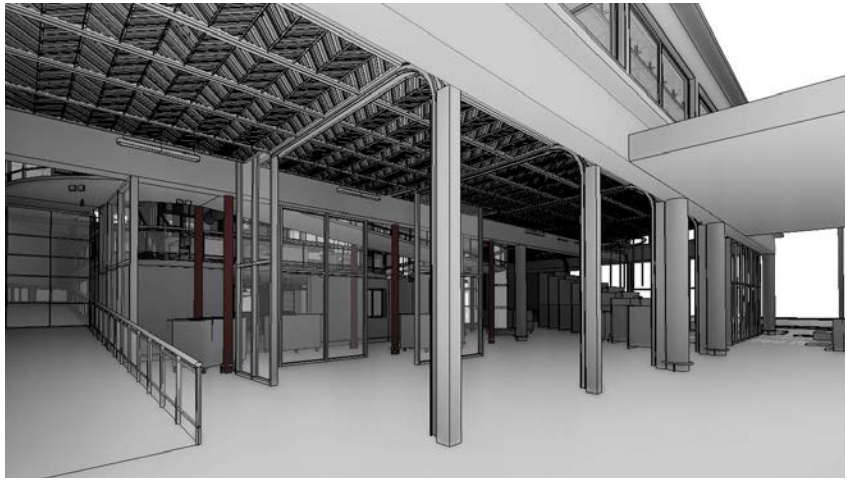


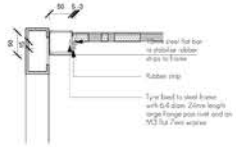
Figure 5.7.1.6.1 The new overhead door detail



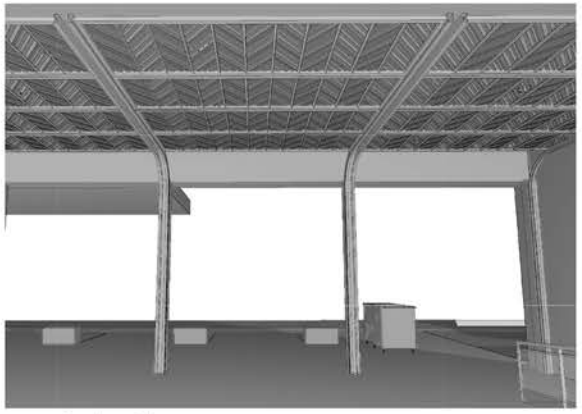
A Detail 6 - Overhead door section A
Scale 1:25



② Detail 6 - Overhead door rubber fixing detail 1
Scale 1:5



③ Detail 6 - Overhead door rubber fixing detail 2
Scale 1:5

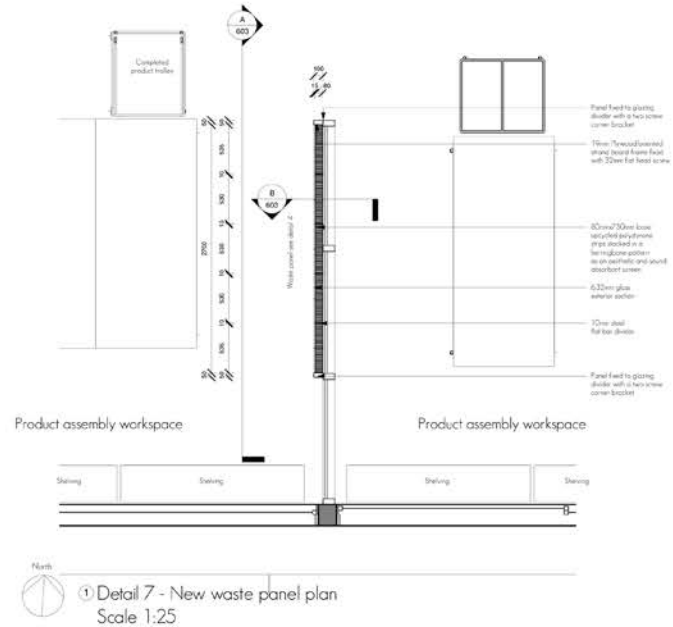


④ Overhead door perspective

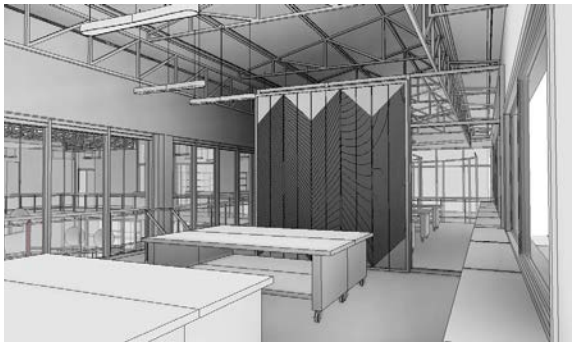
5.7.1.7 The new waste panels

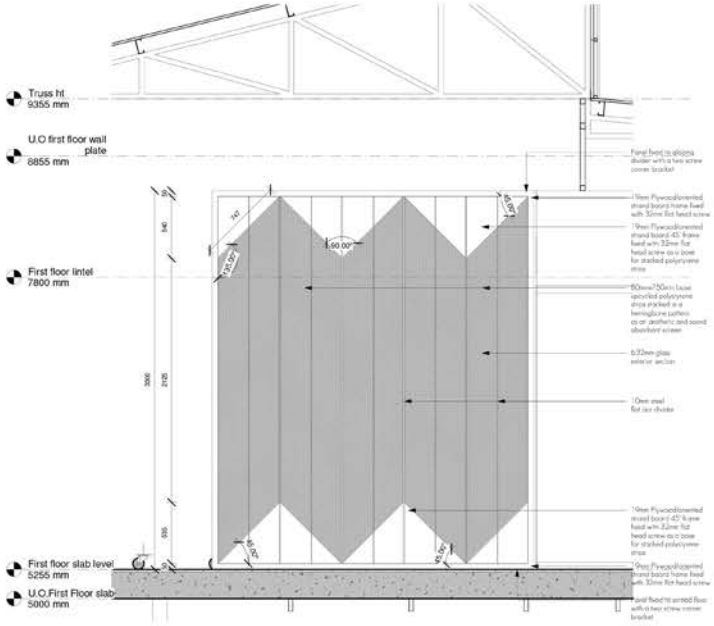
The waste panels (see Figure 5.7.1.7.1) are intended as a method for sound absorption with the inclusion of re-used polystyrene – which is one of the materials the waste pickers will collect (refer back to Table 2.1.1 in Chapter 2). This material forms the main infill to contain and control sound from the hand tools in the cutting and assembly workspaces.

The panel were initially envisioned to be made from oriented strand board frames with a 45-degree base and top. This creates a template for the polystyrene strip infill which is then stacked one on top of the other at the same 45-degree angle in a herringbone pattern, thereby connecting back to the balustrades and overhead doors. Through testing and further research, however, it has been discovered that polystyrene has no acoustic properties and that these panels have now become merely a feature of material re-use and spatial division within the large workspaces.

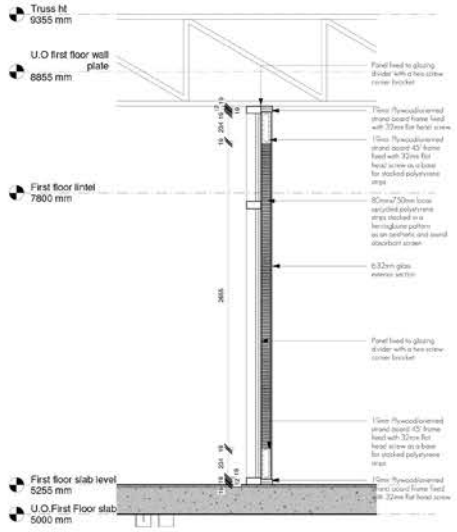


① Detail 7 - New waste panel plan
Scale 1:25





Ⓐ Detail 7 - Waste panel section A
Scale 1:20



Ⓑ Detail 7 - Waste panel section B
Scale 1:20

Figure 5.7.1.7.1 Waste panel detail

5.7.2 MATERIALS

Materials (see Figure 5.7.2.1 for the whole palette) have been selected on the basis that they are either recycled, re-used or in some other way reinforce the concept of aiming to inspire and stimulate the site users.
The flooring types are interlocking recycled rubber tiles, which require no embodied energy or equipment to install (apart from a rubber mallet). Properties of the rubber flooring applicable to the upcycling centre are: its ability to reduce sound and vibration in open spaces, it being a durable surface and that it is easy to clean and maintain. The rubber floor tiles are designated for the admin and meeting rooms, assembly and finishing workspaces, mezzanine floor, collection and sorting area, waste pickers' bathrooms and the skills development area. Note that the rubber floor is not used in the cutting workshops as it is flammable and may be exposed to sparks from cutting tyre treads and timber in this particular area (The Spruce, 2017). This material relates to the flooring category in the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool).

A 40mm bonded screed is allocated to circulation areas, the canteen, double volume exhibition space, storage areas and the bathrooms on the first floor. This screed has been chosen for its low maintenance requirements and embodied energy, as well as for its durability. Laminated Saligna has been selected for the ramp, as it is capable of carrying heavy loads over the 1800mm length span. The timber is also an honest and warm material, with associations to craftsmanship. Paving remains on the ground floor collection area, as this surface material is capable of withstanding trolley cars and heavy pedestrian traffic. Floor pattern changes are visible (seen in figure 5.7.6 - ground floor layout) as demarcating movement zones for waste pickers and their trolleys. To break the hard paving surface, grass pavers are positioned near to street furniture and break spaces.

Furniture in the upcycling centre is mostly made from timber, recycled plastic and steel. The furniture is created to be simple, functional pieces with associations to the workshop and educational environment. Re-claimed timber is used for the vertical gardens and canteen furniture, with a grade 304 1.2mm stainless steel serving counter. Recycled steel is used for the trolley garages and gabion seating platforms on Visagie and Bosman Streets. The waste chute 'buckets' are made from a recycled plastic similar to the new waste pickers trolleys. These are supported by steel frames on the first floor and suspended with 25mm anchor chains.
Plascon white (VLW 1) low VOC water-based paint is used on the walls with a matt finish. This is to lighten the space around by placing focus on furniture and furnishings created from re-used materials.

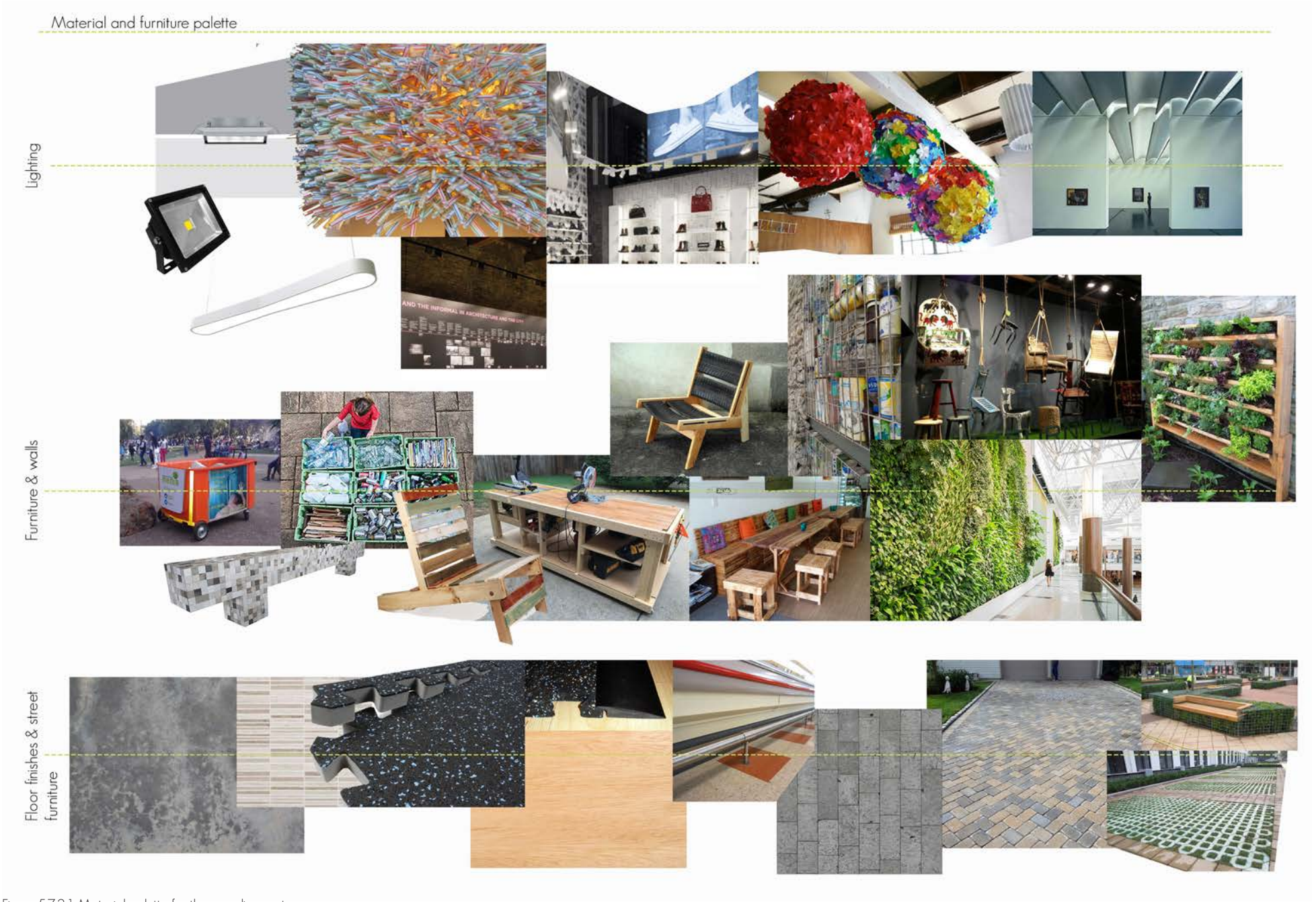


Figure 5.7.2.1 Material palette for the upcycling centre

5.7.3 GREEN WALL

The green wall is a vegetated mat wall, organised into a panel system that has plants pre-grown into the panels. The system is composed of synthetic fabric pockets and backed by a waterproof membrane supported by a steel framework. Examples of this living wall can be seen in Figures 5.7.3.1 and 5.7.3.2.
Plants selected for the green wall must have a high tolerance for survival. Therefore, the plants are selected according to the climatic zone in which the wall frame is installed. In other words, Pretoria is situated in the temperate interior zone and plants for the green wall are selected based on what best grows in this climate. The ground floor green wall in the upcycling centre is mostly in the shade, with the first floor receiving sun and partial shade. Figure 5.7.3.1 shows suitable plants for this climate and level of sunlight, namely species such as the Boston fern, Golden Pothos and Rabbits Foot fern. All these plant types prefer well-watered acidic soil or structural media (i.e. growth medium blocks) and can thrive in partial shade. The Golden Pothos is also a highly ranked plant that removes VOC's from the air (Wallgarden, 2017).

The living wall uses a drip-irrigation system installed with an automated timing pre-set to minimise water wastage. The green wall makes use of the collected rainwater from the roof in a water recirculation system. The irrigation system is recommended to use 2-5L/m^2 per day. The green wall area is roughly 130m^2 and therefore the water requirement is about 260-650L per day. This can easily be gained from the harvested rainwater.

Figure 5.7.3.1 The Boston fern - top (Sebobo, 2017), Rabbits Foot fern - middle (Plantsale, 2017) and Golden Pothos - bottom (Animalialife, 2017).

Figure 5.7.3.2 Example of the living wall (Execuflora, 2017)

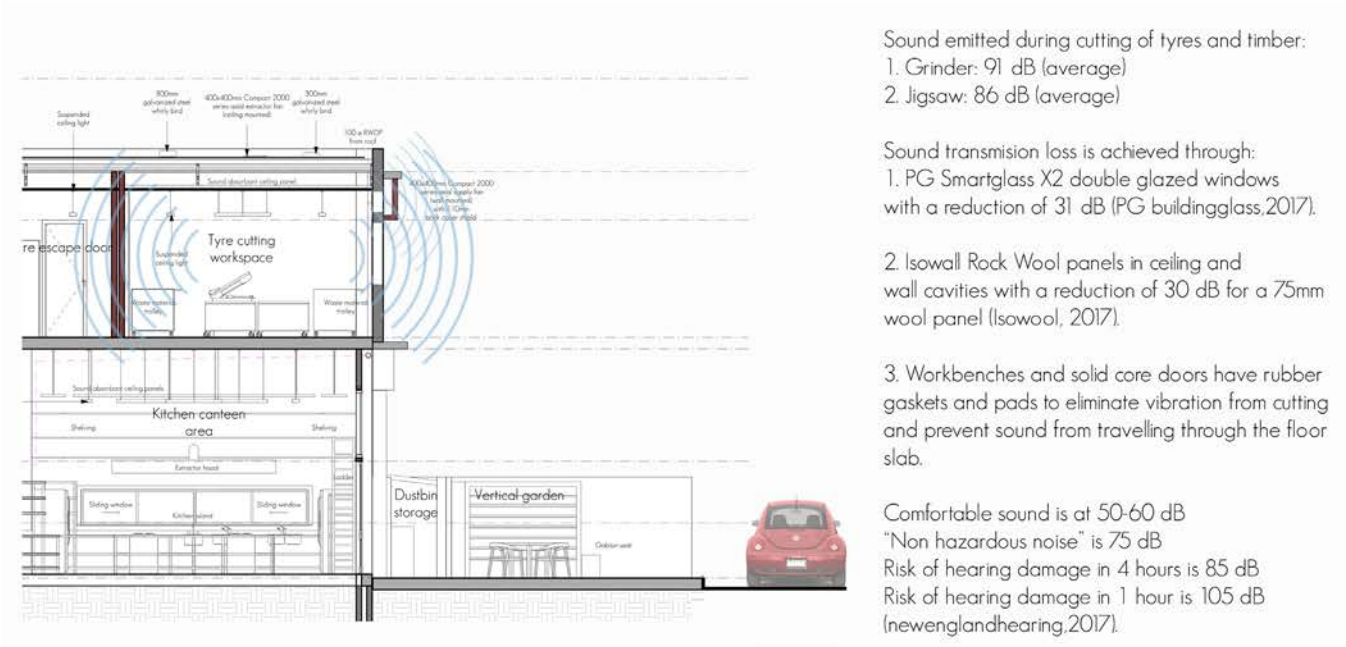


Figure 5.7.4.1 Diagram of sound transmission loss in the cutting workspaces

5.7.4 INNOVATION

Various innovative strategies specific to the programme of upcycling have been considered so as to create an experience which rejuvenates and revitalises the model inhabitants and surrounding community of the host building.

Noise levels from equipment in the cutting and sanding workspaces need to be controlled and contained, as part of occupant wellbeing. A rainwater harvesting investigation has been conducted to account for the demand and storage required to operate sanitary and irrigation systems in the centre. Natural ventilation systems have also been examined to uncover how air currents will move throughout the centre as these currents heat up. These considerations align to the occupant comfort and indoor environmental quality of the interior which encourages productivity, interaction and healthy spaces.

Firstly, noise and acoustic containment is focussed in the cutting and sanding workspaces for tyres and timber components. In order to lessen such noise, two isolated rooms have been dedicated to these activities in the north-east corner of the upcycling centre. Sound transmission loss is achieved through using PG Smartglass X2 double-glazed windows and Isowall Rock Wool panels in the ceiling void and cavity walls (product specifications are available in Appendix D: Sound Transmission Loss Materials). This noise reduction relates to the Green Star Rating Tool for acoustic quality (refer to Appendix A: Green Star Rating Tool).

The solid core doors have rubber gaskets and the workbenches have pads on the legs to eliminate vibration and prevent noise travelling through the floor slab. Figure 5.7.4.1 shows a diagram and calculations where sound transmission is reduced to a comfortable level of 60dB (as per the noise levels indicated in Figure 5.7.4.2).

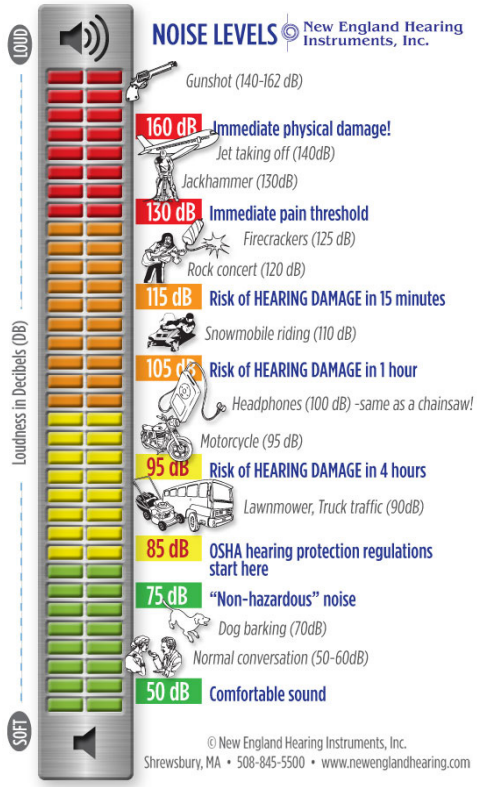


Figure 5.7.4.2 Noise levels according to New England Instruments; calculations show that noise can be effectively reduced to the green zone of 60-75 dB (New England Hearing Instruments, 2012)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
Average Precipitation mm (in)	3 (0.1)	6 (0.2)	22 (0.9)	71 (2.8)	98 (3.9)	150 (5.9)	154 (6.1)	75 (3)	82 (3.2)	51 (2)	13 (0.5)	7 (0.3)	732 (28.8)
Precipitation Litres/m² (Gallons/ft²)	3 (0.07)	6 (0.15)	22 (0.54)	71 (1.74)	98 (2.4)	150 (3.68)	154 (3.78)	75 (1.84)	82 (2.01)	51 (1.25)	13 (0.32)	7 (0.17)	732 (17.95)
Number of Wet Days (probability of rain on a day)	1 (3%)	1 (3%)	3 (10%)	7 (23%)	11 (37%)	12 (39%)	12 (39%)	10 (35%)	10 (32%)	5 (17%)	3 (10%)	1 (3%)	76 (21%)
Percentage of Sunny (Cloudy) Daylight Hours	89 (11)	89 (11)	76 (24)	70 (30)	66 (34)	67 (33)	62 (38)	57 (43)	63 (37)	74 (26)	87 (13)	85 (15)	74 (26)

Figure 5.7.4.3 Average rainfall and collection amount from the new roof (ClimaTemps, 2017)

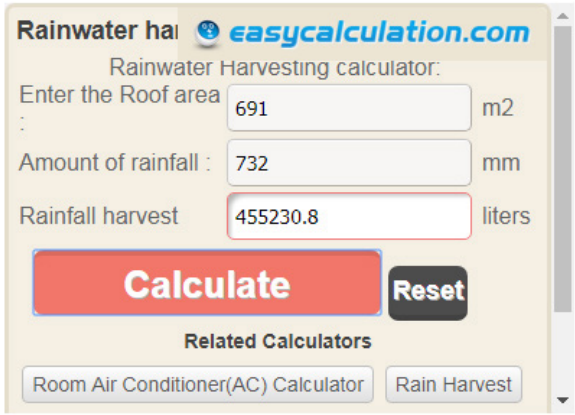


Figure 5.7.4.4 Rainwater calculator (Rainharvest, 2013)

Secondly, the water demand for the centre is based on how much water is need to adequately supply the toilet cisterns, green wall, showers, basins, prep bowls, wash troughs and vertical garden. It should be noted that the urinals are waterless and so do not form part of the water demand considerations. Rainwater collected is stored and treated with an ultra violet (UV) purification system before being re-used for toilet cisterns, irrigation and wash troughs. This relates to the water section in the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool). The filtration system is found on the basement floor level near to the storage tanks (details on the UV filtration system can be found in Appendix E: Ultra Violet Water Disinfection Systems). Figures 5.7.4.3 and 5.7.4.4 show the average rainfall in the Pretoria CBD region and rainwater collection possibility of the roof area, respectively. These are followed by the calculation for the total water demand for the upcycling centre (see Figure 5.7.4.5).

RAINWATER HARVESTING CALCULATION

THE SIZE TANK REQUIRED TO STORE THE RAINWATER NEEDS TO EXCEED THE DAILY DEMAND:

DEMAND FOR THE UPCYCLING CENTRE :

TYPE	AMOUNT	USAGE RATE	PER DAY	TOTAL USAGE PER DAY
GREENWALL	1	9 LITRES PER MINUTE	10 MINS	90 LITRES
VERTICAL GARDEN	1	9 LITRES PER MINUTE	10 MINS	90 LITRES
SHOWERS	5	35 LITRES FOR 5 MINS	LOW FLOW SHOWERHEAD	700 LITRES (20 PEOPLE)
TOILETS	11	6 LITRES PER FLUSH (DUAL FLUSH)	4 FLUSHES (AVERAGE)	264 LITRES
WASH HAND BASINS	10	5 LITRES PER BASIN (AVERAGE)	FLOW RESTRICTING TAPS	50 LITRES
WASH TROUGH	6	20 LITRES PER BASIN (AVERAGE)	FLOW RESTRICTING TAPS	120 LITRES
SINK / PREP BOWL	4	10 LITRES PER BASIN (AVERAGE)	FLOW RESTRICTING TAPS	40 LITRES
URINALS	2	WATERLESS URINALS	0	0
TOTAL DEMAND FOR THE UPCYCLING CENTRE				**1,354 LITRES PER DAY**

IF THE DEMAND IS 1,354 LITRES PER DAY THE TANK MUST HOLD MORE THAN THE DEMAND FOR AT LEAST
50 DAYS (http://www.rainharvest.co.za/) WHICH AMOUNTS TO:
50 DAYS X 1,354 LITRES = 67,700 LITRES

IT IS RECOMMENDED THAT 3 X 20 000 LITRE TANKS ARE
STORED ON THE BASEMENT FLOOR OR IN THE NORTHERN SERVICE ALLEY AS SHOWN ON THE GROUND FLOOR PLAN

www.jojotanks.co.za

Figure 5.7.4.5 Calculation for the total water demand for the upcycling centre.

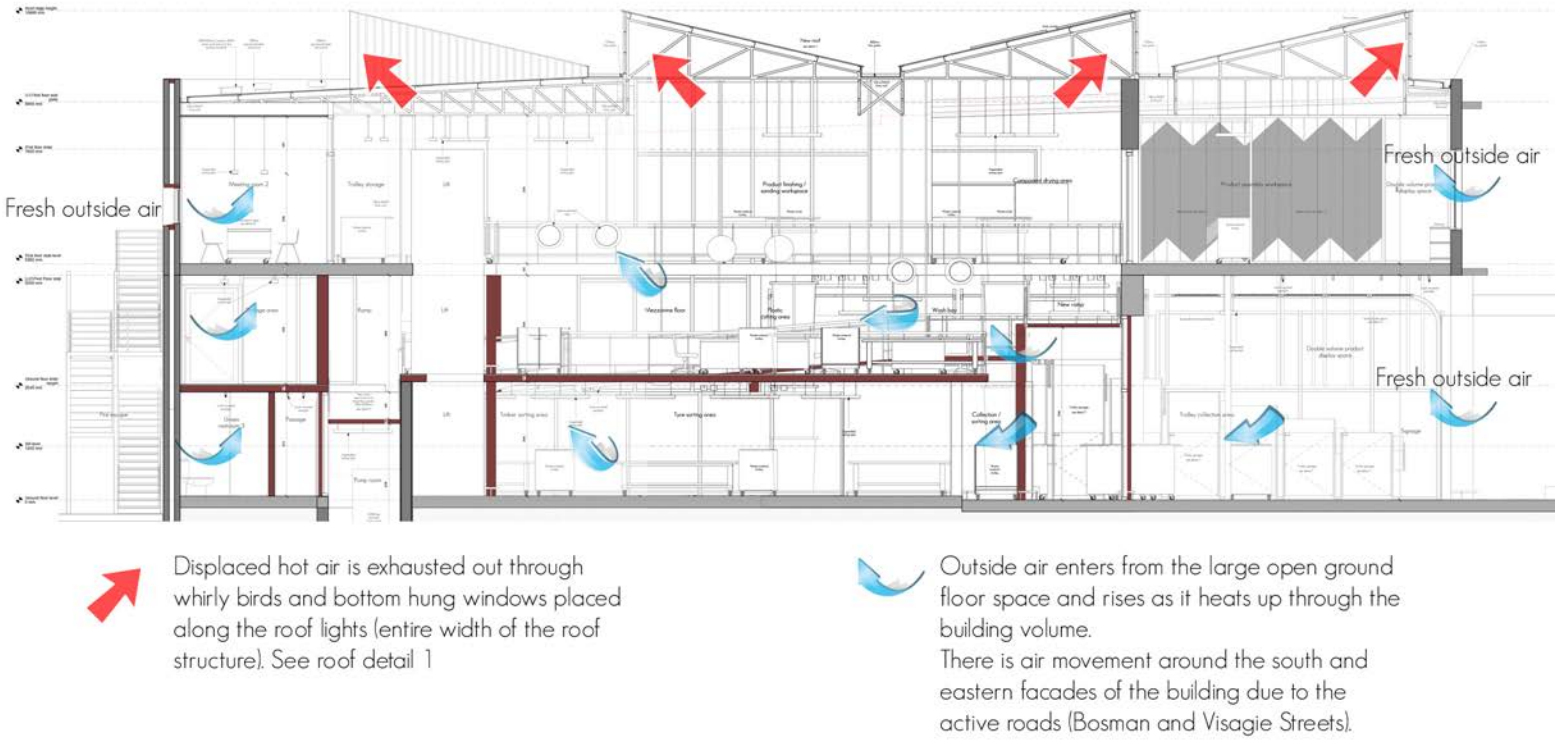


Figure 5.7.4.6 Ventilation diagram of the upcycling centre

Finally, ventilation in the centre is also important. The circulation of fresh air through the building is included in the indoor environmental quality for occupants, as relating to the Green Star Rating Tool (refer to Appendix A: Green Star Rating Tool). The new roof intervention is intended to exhaust hot air out through the clerestory windows in the central atruim space. Furthermore, the ground floor level is open and allows air currents to enter the building before heating up and rising through the open mezzanine and first floor levels. Figure 5.7.4.6 shows the air movement throught the central volume space.

5.7.5 LIGHTING

LED lamps have been selected on the basis of efficiency. The light fittings (see Figures 5.7.5.1 to 5.7.5.5) are chosen for their simple and unobtrusive appearance. The intention here is to see the light without seeing the fitting as competing with other materials and forms. The pendant feature lights are, however, positioned in the double volume spaces for maximum exposure. This is because they are products of the upcycling process and demonstrate product reuse. In areas such as storerooms and toilets, lights with sensors are placed to minimise energy use when there are no occupants in the vicinity. In areas where there is an exposed concrete slab, track lighting is used. In this way, the services that are exposed to the fittings are minimalistic and unnoticeable.

The suspended ceiling lights exhibit a linear movement narrative about them. They are intended to be positioned on circulation routes and areas to suggest traffic flow and paths within the centre. The recessed spotlights are found in the first floor bathrooms. These light fittings aim to be functional and concealed. The external floodlights are positioned on top of the cantilevered slab and shine from the freestanding signage towards the building. The desired effect of these floodlights is to light up the building façades and to create a negative shadow play on the freestanding words (see Figure 5.7.5.2). The external bench lights are intended to be indirect lighting, with the light source underneath the seats shining through the re-used concrete, brickwork and hedge gabion framework.

Lighting calculations have been conducted to quantify the amount of energy required to run the lighting systems throughout the centre, and to determine how many solar panels are required to achieve this (see Figure 5.7.5.1).

AVERAGE ILLUMINATION CALCULATION

AVERAGE ILLUMINATION = TOTAL LUMINOUS FLUX X UTILISATION FACTOR X MAINTENANCE FACTOR / AVERAGE WORKING PLANE

AVERAGE ILLUMINATION = 712,630 X 0.43 X 0,79 / 750
242,08 / 750
323 LUX

TOTAL LUMINOUS FLUX = NUMBER OF LUMINAIRES X NUMBER OF LAMPS X LUMEN PER LAMP

TYPE	NUMBER OF LUMINAIRES	NUMBER OF LAMPS	LUMEN PER LAMP	TOTAL
CFL FEATURE PENDANT LIGHTS	18	1	2400	43,200 LM
LED SUSPENDED CEILING LIGHTS	94	1	3250	305,500 LM
LED TRACK SPOTLIGHTS	129	1	2650	341,850 LM
LED RECESSED SPOTLIGHTS	12	1	1840	22,080 LM

TOTAL LUMINOUS FLUX — TOTAL = 712,630 LM

UTILIZATION FACTOR — TOTAL = 0.43

MAINTENANCE FACTOR = LAMP LUMEN MAINTENANCE FACTOR X LAMP SURVIVAL FACTOR X LUMINAIRE MAINTENANCE FACTOR X ROOM SURFACE MAINTENANCE FACTOR

TYPE	LAMP LUMEN M.F	LAMP SURVIVAL FACTOR	LUMINAIRE M.F	ROOM SURFACE M.F
CFL FEATURE PENDANT LIGHTS	0,87	0.99	8.86	0.96
LED SUSPENDED CEILING LIGHTS	0,7	1	0,9	0,94
LED TRACK SPOTLIGHTS	0,7	1	0,9	0,94
LED RECESSED SPOTLIGHTS	0.7	1	0,9	0,94

TOTAL MAINTENANCE FACTOR — TOTAL = 0,79

AVERAGE WORKING PLANE
SIZE OF INTENDED AREA = 28,500 mm X 26,300 mm

AVERAGE WORKING PLANE — TOTAL = 750 m^2

ROOM INDEX = WIDTH / 2 X HEIGHT
28,300 / 2 X 8,400

ROOM INDEX — TOTAL = 1.68

THEREFORE:	WATTS	
18 X CFL FEATURE PENDANT LIGHTS	30	540 W
94 X LED SUSPENDED CEILING LIGHTS	40	3760 W

Figure 5.7.5.1 Lighting calculation for the upcycling centre

Figure 5.7.5.2 Exterior lighting effect on the freestanding signage

129 X LED TRACK SPOTLIGHTS	30	3870 W
12 X LED RECESSED SPOTLIGHTS	21	252 W
		TOTAL = 8422 W

ENERGY CONSUMPTION = POWER X TIME

8422W X 8 HRS
LIGHTS CONSUME TOTAL = 67.37 KWH (P/DAY)
LIGHTS CONSUME TOTAL= 2,021.1 KWH (P/MONTH)

67,37 KWH REQUIRED PER DAY / 8 HRS OF AVAILABLE SUNLIGHT

67,37 / 8 = 8,4 KW OF AC POWER REQUIRED (PER HOUR)

ONLY 80% OF DC POWER IS CONVERTED TO AC POWER VIA PV PANELS

THEREFORE 8,4 KW OF AC REQUIRED POWER X 0.8 CONVERTING FROM DC TO AC
8,4 X 0.8 = 6,72 KW (DC POWER REQUIRED)

6720 W / 250 WP PV PANEL = 27

27 X 250 WP PV PANELS REQUIRED TO POWER ARTIFICIAL LIGHTS

THERE IS ROOF SPACE FOR 72 250w PANELS WHERE 27 ARE REQUIRED
THE ADDITIONAL 45 PANELS CAN SUPPLY THE SURROUNDING BUILDINGS GENERATING
11250 W OF SOLAR POWER

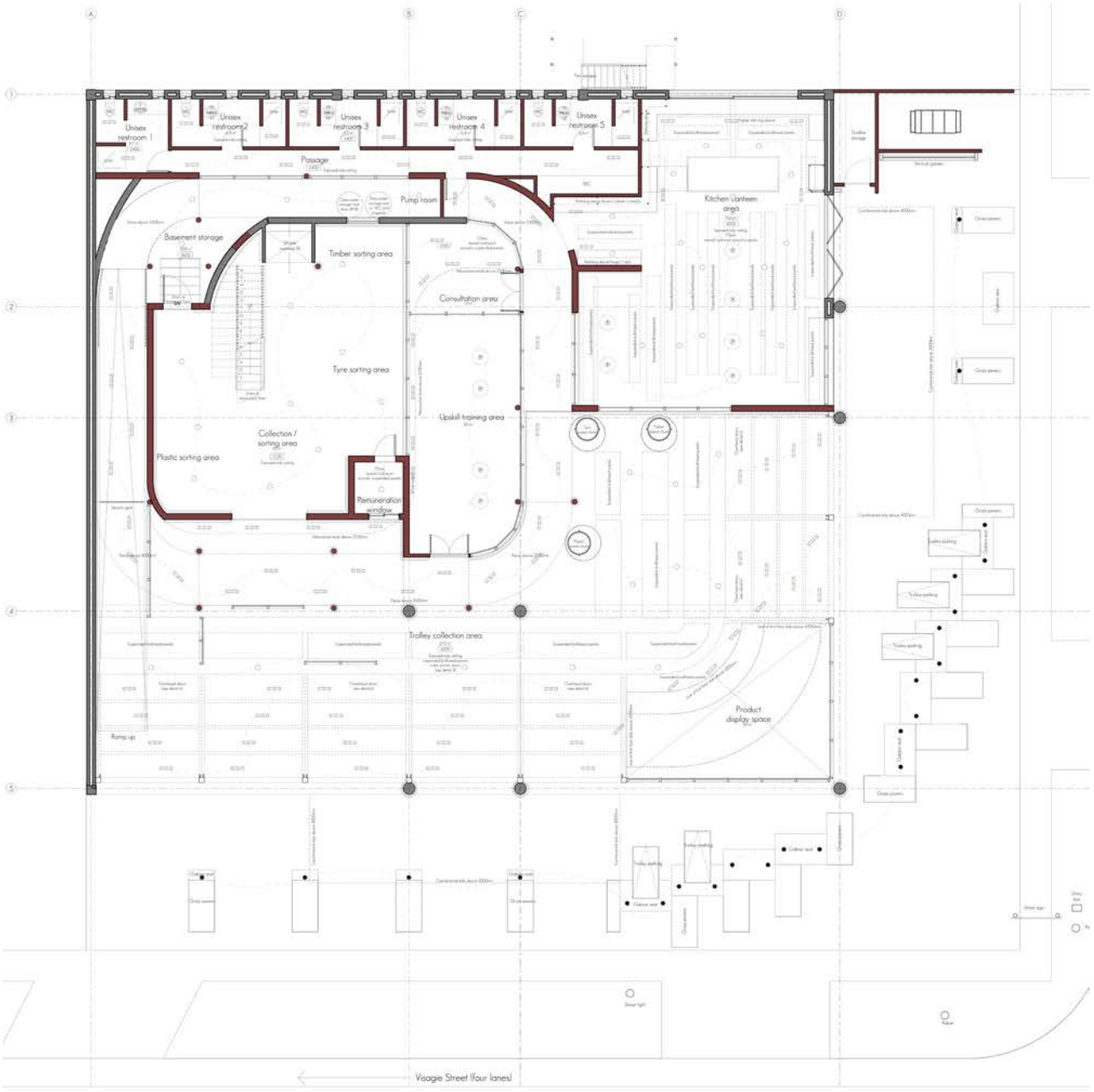
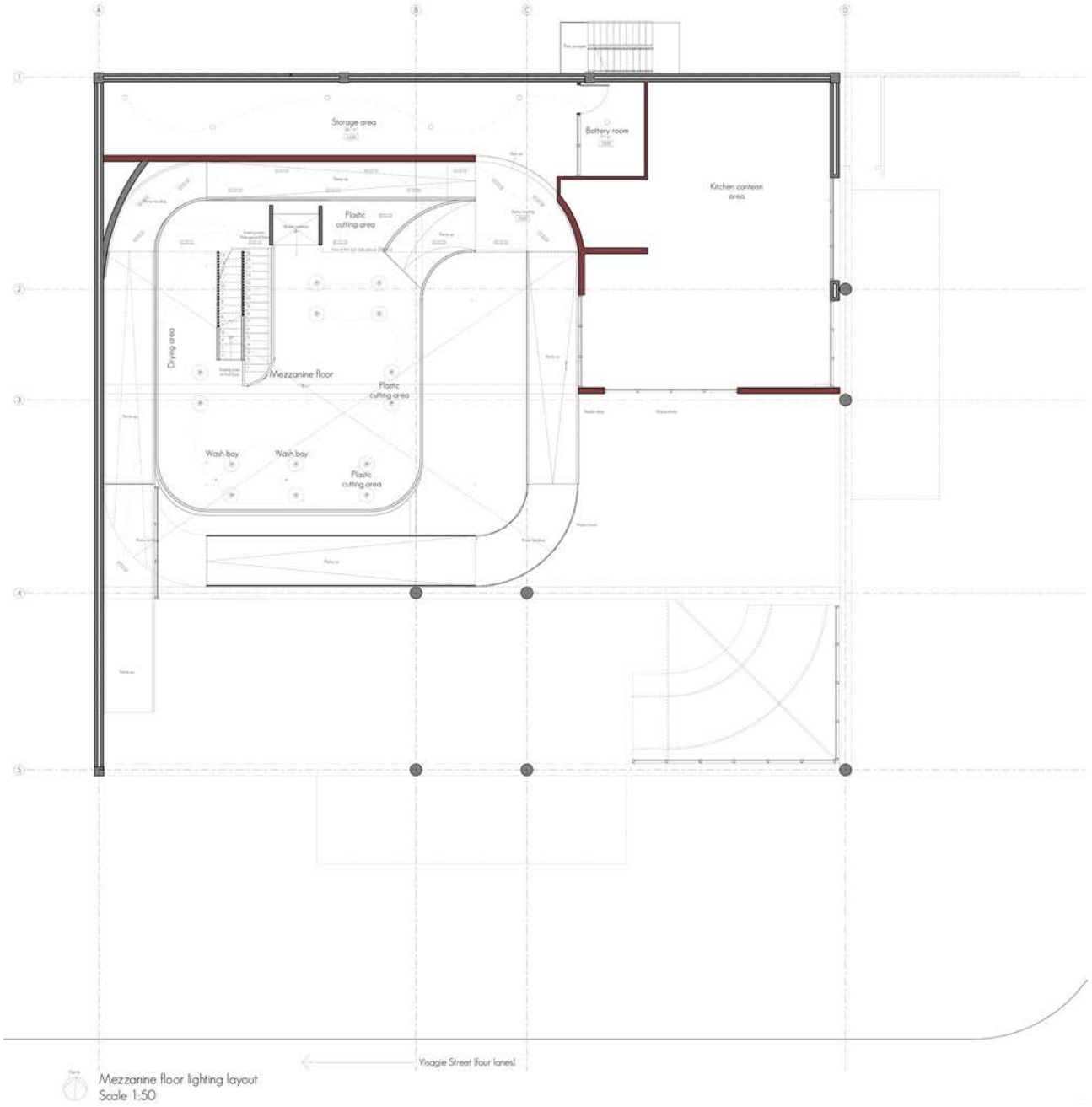


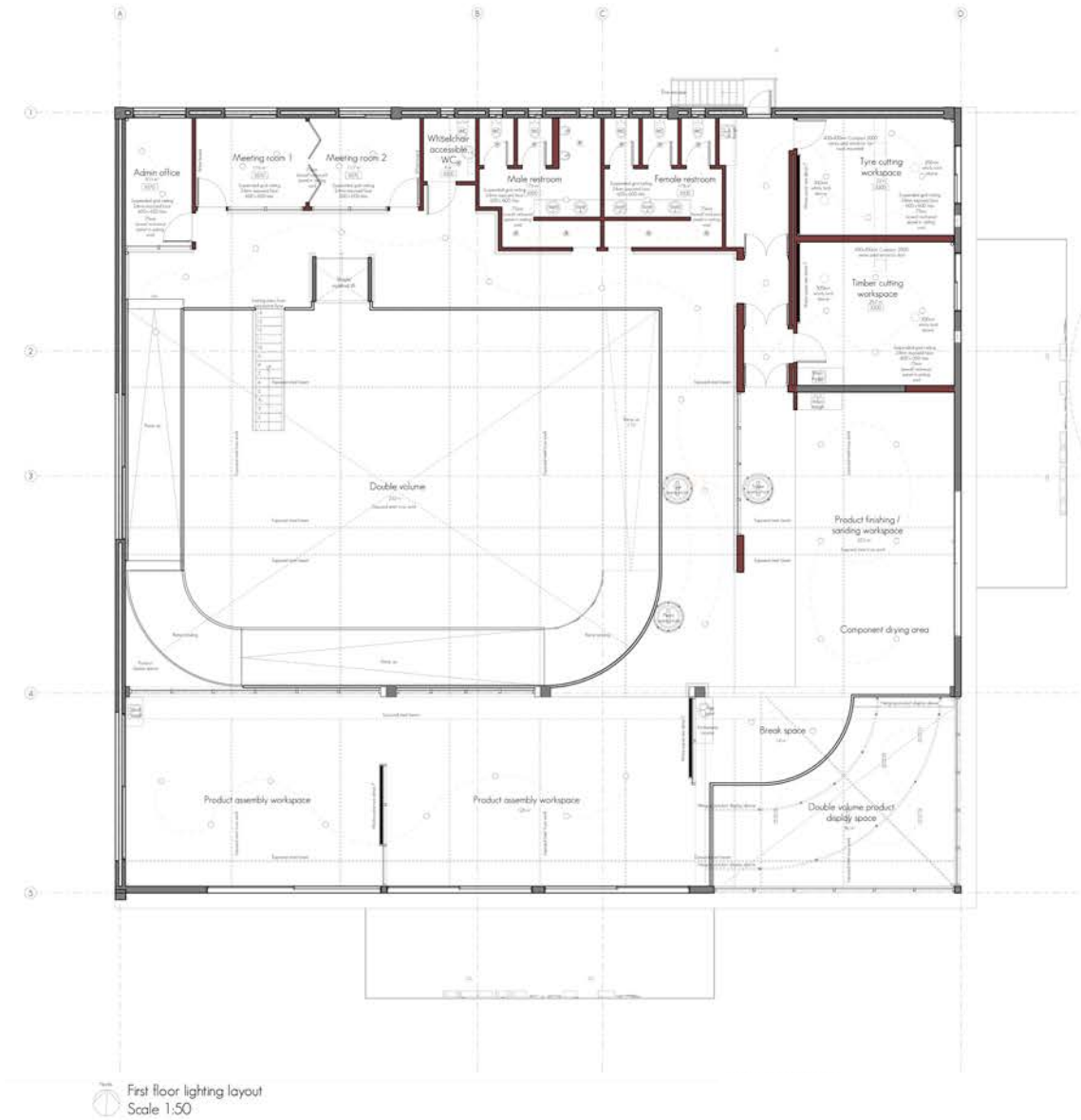
Figure 5.7.5.3 Ground floor lighting layout



Lighting legend

Ⓟ	Pendant feature light made from upcycled HDPE plastic 30W CFL lamp 2400lm 3000K warm white	
○	Suspended ceiling light NW-LED-L10080S-25 White aluminium die-cast linear bar with opal diffuser 40W LED lamp 3250 lm 4000 K warm white 240V	
Ⓡ	Recessed spotlight Laserblade wall washer die-cast aluminium & thermoplastic 21W LED lamp 1840 lm 3000 warm white CRI 90	
○ ○ ○	Track mounted spotlight Deux pieces T Aluminium white body with polycarbonate optic 30W LED lamp 2650 lm 4000K warm white CRI 95	
⊣	External floodlight Black aluminium housing 20W LED lamp 1500 lm Cool white CRI 70 12V	
●	External bench mounted light (concealed) Small oval black polycarbonate with frosted glass 5W Led lamp 450 lm cool white 6500K	

Figure 5.7.5.4 Mezzanine floor lighting layout



Lighting legend

(P)	Pendant feature light made from upcycled HDPE plastic 30W CFL lamp 2400lm 3000K warm white	
○	Suspended ceiling light NW-LED-L10080S-25 White aluminium die-cast linear bar with opal diffuser 40W LED lamp 3250 lm 4000 K warm white 240V	
(R)	Recessed spotlight Laserblade wall washer die-cast aluminium & thermoplastic 21W LED lamp 1840 lm 3000 warm white CRI 90	
	Track mounted spotlight Deux pieces T Aluminium white body with polycarbonate optic 30W LED lamp 2650 lm 4000K warm white CRI 95	
	External floodlight Black aluminium housing 20W LED lamp 1500 lm Cool white CRI 70 12V	
●	External bench mounted light (concealed) Small oval black polycarbonate with frosted glass 5W Led lamp 450 lm cool white 6500K	

Figure 5.7.5.5 First floor lighting layout

Figure 5.7.5.6 Ground floor lighting view

Figure 5.7.5.7 First floor lighting view

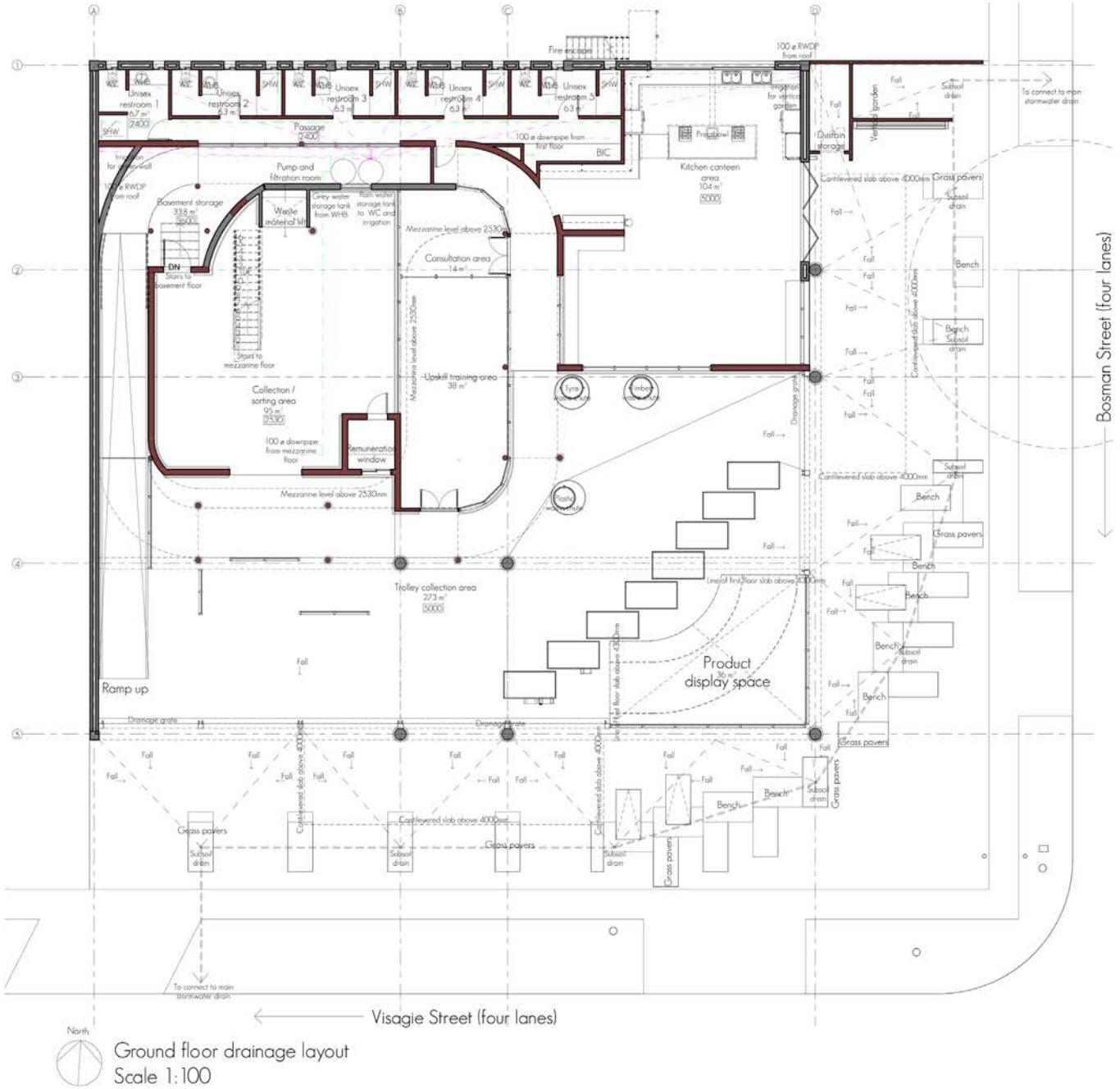


Figure 5.7.5.8 Ground floor drainage layout

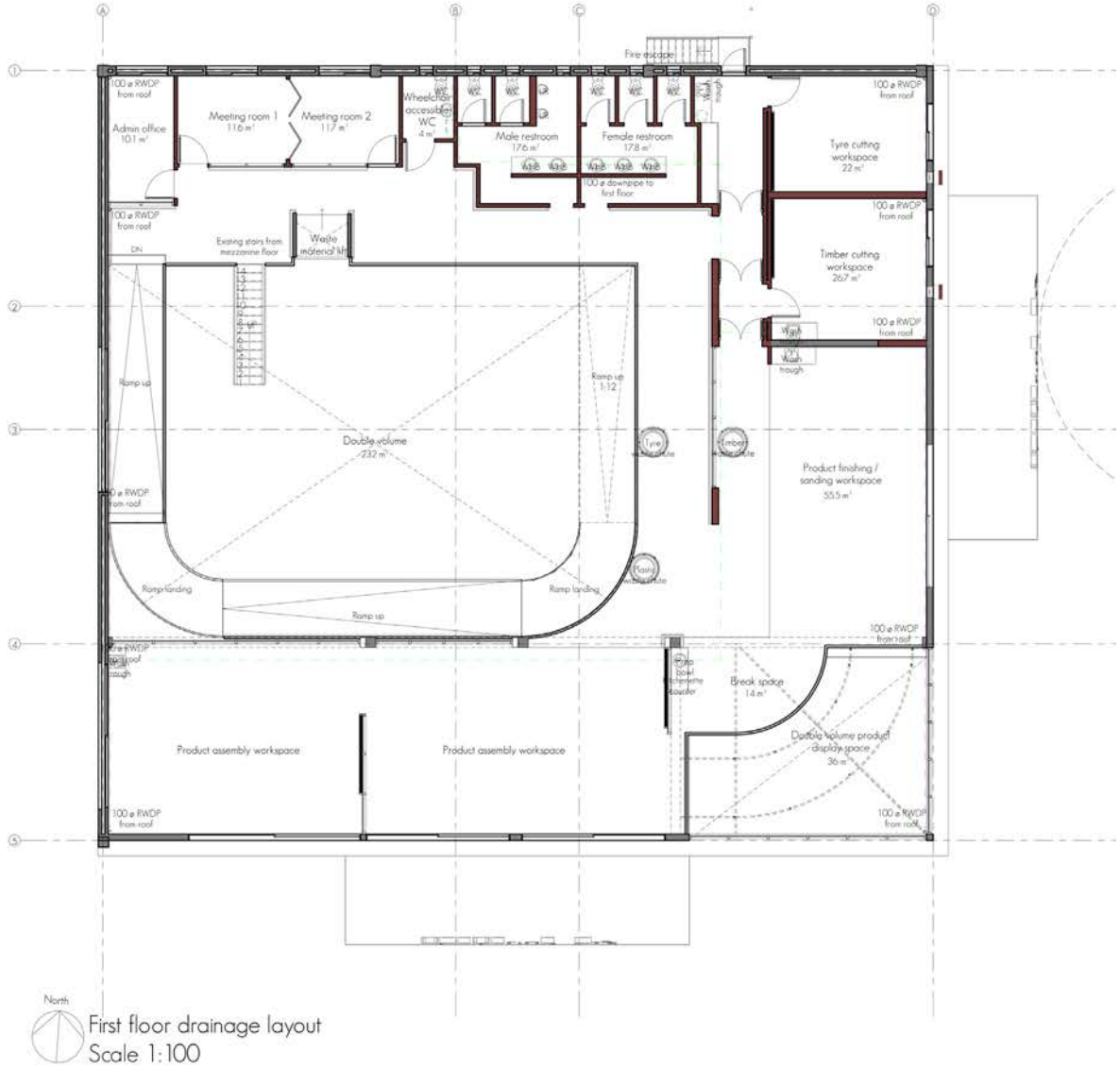


Figure 5.7.5.9 First floor drainage layout

5.7.6 INCLUSIVE DESIGN

Inclusive design in the upcycling centre caters for people with disabilities by providing access to the various floors via the circulation ramp, as well as a wheelchair-accessible toilet on the first floor. The ramp surface is incorporated with brass strips which prevent slipping on the ramp slope, as can be seen in Figure 5.7.1.2.1 The new ramp detail 2.

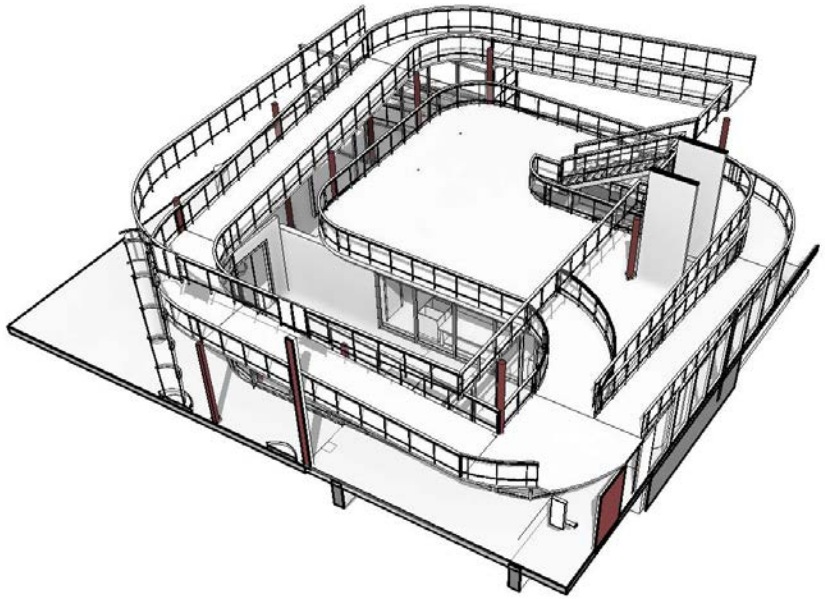


Figure 5.7.6.1 The new ramp circulation for inclusive design

5.8 GREEN STAR RATING TOOL

The Green Star Rating Tool has been used to assess the design intervention from an ecological and resource efficient standpoint, with minimal impact on the environment.

The full rating score can be found in Appendix A: Green Star Rating Tool. This intervention, as mentioned throughout the design development chapter, focusses on management, indoor environmental quality, energy, transport, water, materials and innovation and socio-economic categories.

A total score of 74 points has been achieved for this intervention which is recognised as a 5 Star Green Star SA Certified rating of South African Excellence. The socio-economic category is an additional category which focusses on empowerment, job creation, skills development and training.

An additional 10 points out of 13 was awarded for the socio-economic category as follows:
1. Employment creation 2/2
2. Economic opportunity 3/4
3. Skills development and training 3/3
4. Community benefit 1/2
5. Empowerment 1/1
6. Safety and health 0/1

(Green Building Council of South Africa [GBCSA], 2017).

5.9 CHAPTER CONCLUSION

This chapter explores the conceptual development and informants, how the design drafts (with iterations) have been expanded and the overall design development. The intervention is shaped by technical, contextual and ergonomic considerations which aim to communicate an inspiring and reviving experience of the user within the space.

The concept, rooted in social cohesion and upliftment, is manifested in selected details ranging from architectural to taste-goods, with materiality, form and user interaction contributing to a cyclic journey of renewal. Here, the model inhabitant finds solace and self-development as they navigate the interior narrative and interpret design devices.

6

CONCLUSION

6.1 STUDY CONCLUSION

This study aims to knit together conditions informing a framework design addressing income generation and skills development, cultural production in taste-making, furniture making and waste upcycling. This desired outcome aligns with a normative position of human upliftment through interior design ecology and social systems, as presented in the study. The value of upcycling and product reuse in the chosen context, namely the Pretoria CBD, is illustrated by the statistics of high unemployment levels, the high rate of current waste picker work force reporting limited education and the low amounts of recycled waste in the city.

Through this intervention's creative reuse of existing materials, collaboration and social inclusion of waste pickers, cohesive human capital cultivation is achievable. The social role of an upcycling facility is therefore a conduit towards and framework for developing human capabilities that are currently ignored. This, in turn, can result in an injection of employable and self-confident people into the manufacturing and recycling industry, thereby boosting local economy and trade. It also works to serve in the development of a knowledge-base to reach other similar industries in Pretoria and other regions of South Africa.

The circulation and movement between programme and user groups in the centre is important, because the integration of users as part of a larger system can work to enrich such users' self-worth and economic standing. This movement can also positively influence the surrounding environment that is at the centre of the design hierarchy.

Environmental psychology informs the spatial proximity and user behaviour to a dialogue with the building. Social inclusion and a sense of place is what guides the spatial elements as a means of responding to or counteracting the noted social inferiority to which waste pickers are currently subjected. Adapting the current building and physical aspects with the envisioned social transactions aligns with the concept of a cyclic journey of renewal, where the user experiences an educational, inspiring or revitalising circulation and occupation through the building.

Synomorphy as an extension of public and exhibition space is also mentioned, as integration of community and cultural identity play a significant role in this proposed upcycling centre's design. Upcycling or creative reuse, as presented in this study, is the vehicle for the development of human capital and social integration.

Adaptive reuse of the current building is based on permeability and transparency of activity and user. This is to ensure that users are visually accessible and connected from one floor to the next, which establishes a sense of belonging and value within the upcycling process. Such connectedness is achieved through the linked collaborations between users. The collaborations also enrich the concept of a cyclic journey of renewal, with the movement between phases of upcycled products and people as the central 'current'. Adaptive reuse of the building also informs the basis for adapting the structure either as a permanent or temporal alteration. This has been illustrated through such interventions and inclusions as a new ramp, mezzanine level and roof. Installation is evident in the adaptive and flexible workspaces on the first floor that accommodate experience of renewal. These workspaces are also accommodating of change in user and activity.

Regenerative architecture is the underpinning for an ecological and energy efficient approach to the alteration of the current Minty's Tyres building. This is discussed through the addition of natural lighting and ventilation strategies, rain water harvesting, renewable energy generation and material reuse throughout the structure.

Further research will help to quantify other types of waste materials with the potential of being upcycled, thereby extending on skills development in other production industries and training facilities. What remains to be known is the response from the public domain regarding the acquisition of and financial support for the produced items, as these will work to fund the upcycling centre.

The upcycling applied in this proposal has the potential to improve the users, programme and building in response to current conditions and contextual surroundings. The upcycling centre can also provide (or at least attempt to provide) the waste pickers and broader Pretoria CBD community with a sense of hope and better quality of life.

1

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APPENDIX

A: GREEN STAR SOUTH AFRICA ASSESSEMENT RATING TOOL

GREEN BUILDING COUNCIL SOUTH AFRICA

Score Sheet
Green Star SA - Interiors v1

Credit	Credit Name	Aim of Credit	Points Available	Points scored	Credit criteria
Management Category					
Int-Man-1	Green Star SA Accredited Professional	To encourage and recognise the engagement of professionals who can assist the project team with the integration of Green Star SA aims and processes throughout all stages of a fitout's design and construction phases.	1	1	
Int-Man-2	Commissioning & Tuning	To recognise effective commissioning and tuning processes during a project's design and construction phase that ensure all services and installations can operate to their optimal design potential.	2	1	
Int-Man-3	Occupant Users' Guide	To encourage and recognise the provision of information to fitout owners and users that helps them understand a project's systems, environmental attributes, and maintenance requirements.	1	1	
Int-Man-4	Environmental Management	To encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction.	1.5	0	
Int-Man-5	Construction Waste Management	To recognise and encourage management practises that minimise the amount of demolition and construction waste going to disposal.	2	2	
Int-Man-6	Work space efficiency	To recognise the design of workspaces that provide spatial efficiency and improve productivity and occupant performance.	2	2	
Int-Man-7	Green Lease	To recognise and encourage collaboration between the building owner and tenants in order to manage and operate the building along environmentally sustainable principles whilst realising mutual benefit.	2	1	
Int-Man-8	Learning Resources	To encourage and recognise sustainability initiatives implemented in the development as learning resources for building users and visitors	1	0	
Management credits			**12.5**	8	
Indoor Environmental Quality Category					
Int-IEQ-1	Quality of Internal Air	To encourage and recognise projects that provide high quality air to occupants.	4	3	
Int-IEQ-2	Thermal Comfort	To encourage and recognise fitouts that achieve a high level of thermal comfort.	2	2	
Int-IEQ-3	Lighting Comfort	To encourage, recognise and reward well-lit spaces that provide appropriate levels of lighting comfort to occupants.	3	2	
Int-IEQ-4	Visual Comfort	To recognise the delivery of well daylit spaces that provide high levels of visual comfort and views to fit-out occupants.	3	2	

Int-IEQ-5	Acoustic Quality	To encourage and recognise buildings that are designed to provide appropriate acoustic qualities to enable the functionality of the space.	2	2	
Int-IEQ-6	Reduced Exposure to Air Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	5	4	
Int-IEQ-7	Mould Prevention	To encourage and recognise the design of services that eliminates the risk of mould growth and its associated detrimental impact on occupant health.	0.5	0	
Int-IEQ-8	Ergonomics	To recognise the choice of equipment and design of spaces that promotes wellbeing, efficiency and effectiveness	2	2	
Int-IEQ-9	Indoor Plants	To encourage and recognise the installation of indoor plants that improve indoor environment quality and also provides occupants with a connection to nature.	1.5	1	
Indoor Environmental Quality credits			**23**	18	
Energy Category					
Int-Ene-1	Greenhouse Gas Emissions	To encourage and recognise projects that minimise the greenhouse gas emissions associated with tenant fit outs.	12	5	
Int-Ene-2	Electrical Sub-metering	To encourage and recognise the installation of electrical energy sub-metering to facilitate on-going management of electrical energy consumption.	2	1	
Energy credits			**14**	6	
Transport Category					
Int-Tra-1	Commuting Mass Transport	To encourage and recognise developments that select a site near public transport and facilitate the use of mass transport.	1	1	
Int-Tra-2	Local connectivity	To encourage and recognise projects that are located within walking distance of high quality amenities such as shops and parks, thus reducing private vehicle use and the associated negative environmental impacts.	1	1	
Int-Tra-3	Alternative Transport	To encourage and recognise projects that promote and facilitate the use of alternative modes of transport over the use of private cars.	2	2	
Transport credits			**4**	4	
Water Category					
Int-Wat-1	Potable Water	To recognise projects that minimise potable water consumption	6	6	
Int-Wat-2	Water Sub-metering	To encourage and recognise the installation of sub-metering to facilitate on-going management of water consumption	2	1	
Water credits			**8**	7	
Materials Category					
Int-Mat-1	Operational Waste Management	To encourage and recognise developments which include space and an operational waste management plan that facilitates the recovery of resources used within the developments to reduce waste going to disposal.	2	1	
Int-Mat-2	Furniture	To recognise the selection of fit-out furniture that has a reduced environmental impact when compared to available alternatives.	8	6	
Int-Mat-3	Assemblies	To recognise the selection of fit-out assemblies that have a reduced environmental impact when compared to available alternatives.	8	4	
Int-Mat-4	Flooring	To recognise the selection of flooring that has a reduced environmental impact when compared to available alternatives.	6	5	
Int-Mat-5	Wall coverings	To recognise the selection of wall coverings that have a reduced environmental impact when compared to available alternatives.	3	2	
Int-Mat-6	Local Sourcing	To encourage and recognise the environmental advantages gained, in the form of reduced transportation emissions, by using materials and products that are sourced within close proximity to the site.	2	1	

Int-Mat-7	**Sundries Materials Sourcing**	To recognise the selection of fitout finishes that have a reduced environmental impact when compared to available alternatives through responsible manufacturing, product stewardship and resource efficient design.	**1**	1	
Materials credits			**30**	20	
Land Use and Ecology Category					
Int-Eco-1	**Site selection**	To recognise and reward a tenant for selecting their space in a building that reduces their environmental impact due to the building's base building design attributes.	4	2	
Land use and Ecology credits			**4**	2	
Emissions Category					
Int-Emi-1	**Impacts from refrigerants and insulants**	To encourage and recognise developments that minimise light pollution into the night sky.	1.5	1	
Int-Emi-2	**Light Pollution**	To encourage and recognise the avoidance of substances that contribute to the deterioration and long-term alteration of the Earth's atmosphere.	3	2	
Emissions credits			**4.5**	3	
Innovation Category					
Int-Inn-1	**Innovative Strategies & Technologies**	To encourage and recognise pioneering initiatives in sustainable design, process or advocacy.			
Int-Inn-2	**Exceeding Green Star SA Benchmarks**	To encourage and recognise projects that achieve environmental benefits in excess of the current Green Star SA benchmarks.	10		
Int-Inn-3	**Environmental Design Initiatives**	To encourage and recognise sustainable building initiatives that are currently outside of the scope of this Green Star SA rating tool but which have a substantial or significant environmental benefit.			
Innovation credits			**10**	6	
		TOTAL POINTS AVAILABLE	100	74	

Figure A 1 Green Star rating tool (GBSA, 2017)

B: FIRST DESIGN DRAFT

The first iteration (figure 1 and 2) was centered on allowing waste pickers to deposit their waste material on the ground floor, before storing their trolleys in garages provided. From there, male ablutions and a canteen area where they could eat and rest were located on the north eastern side of the building.
The first floor was restricted to crafts people, the designer and public visitors. Using the original car ramp to access the first floor, visitors could view the collection process on ground floor and manufacturing processes and displayed products on the first floor before returning to the collection space on ground floor via a new staircase.

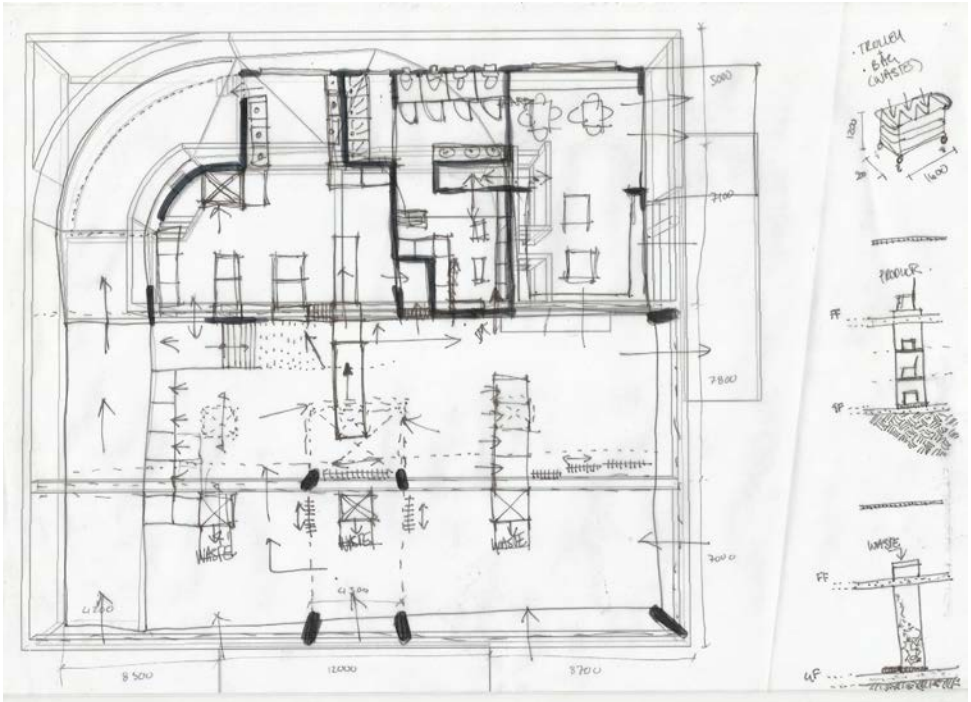


Figure B 1 Ground floor first design draft

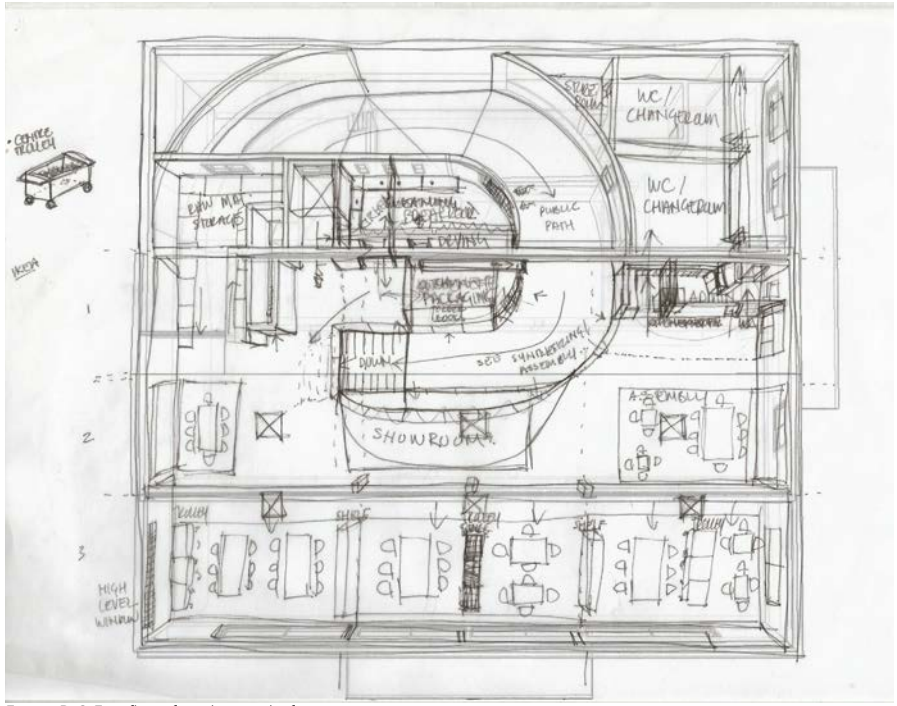


Figure B 2 First floor first design draft

C: SECOND DESIGN DRAFT

The second iteration (figure 8.3 and 8.4) saw waste pickers and collection areas on the ground floor, with ablutions and the canteen as amenities dedicated for them. A ramp was added to serve as visual access and narrate a journey for public visitors up the the first floor, adding an educational element and inviting visitors to experience the space. The original car ramp was divided into a ramp exit point and exhibition space for completed products (on first floor level). The first floor space remained as workshop, crafts peoples restrooms, break space and admin space.

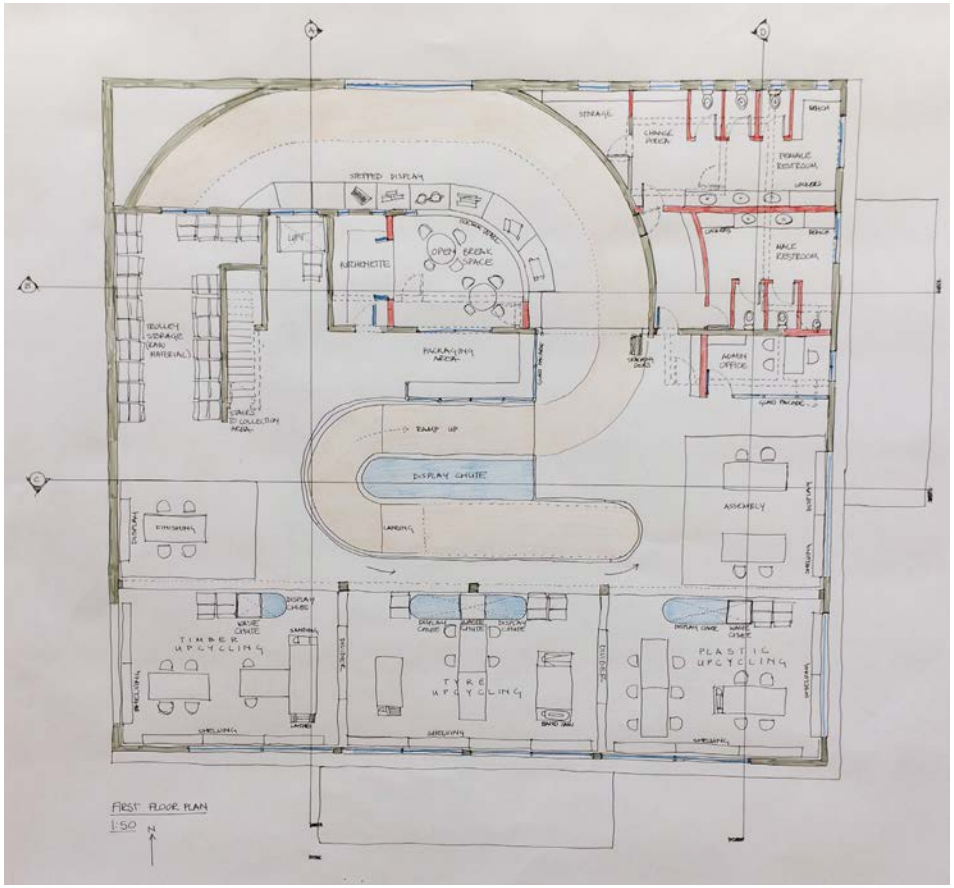


Figure C 1 Ground floor second design draft

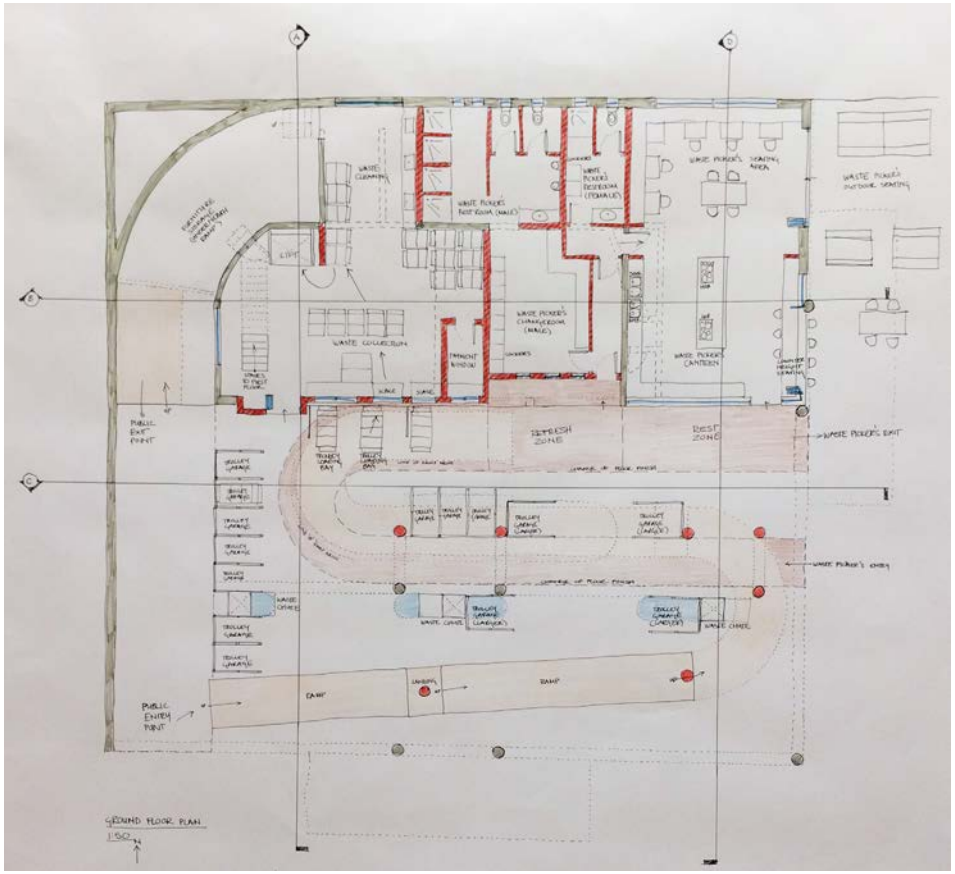


Figure C 2 First floor second design draft

D: SOUND TRANSMISSION LOSS MATERIALS

Isowall
Isowall Southern Africa (Pty) Ltd

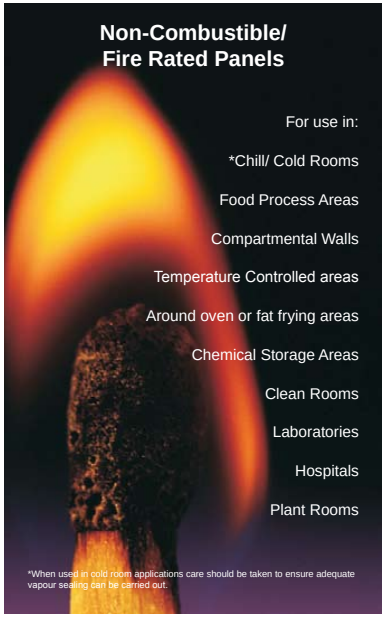
Rock Wool

Rock Wool is a high quality resin bonded slab, with a predominantly vertical fibre structure. The product provides an insulation core for use in sandwich panel systems. Rock Wool panels offer a significant contribution towards improved fire safety.

If exposed to fire, rock wool products will not release dense smoke and will withstand temperatures in excess of 1000ºC.

Advantages:

- Excellent thermal & acoustic properties
- Fire safe
- High compressive strength
- Dimensionally stable
- Water repellant
- Chemically inert
- Completely recylable
- CFC and HCFC free





Data sheet 3

Figure D 1 Rockwool specifications (Isowall, 2017)

PERFORMANCE DATA

PG SMARTGLASS X2™ + 12mm air gap + Clearvue® (IGDB 16015)		Visible Light		Solar Energy							Noise
		Trans.	Reflect.	Total Elim.	Reflect.	Absorpt.	Direct Trans.	S.H.G.C	Shading Coeff.	U-value (Centre of glass) W/m2.K	S.T.L. (dB)
Standard		80	15	25	13	19	68	0.75	0.86	2.73	31
Plus		69	13	45	22	30	49	0.55	0.63	1.88	31
Elite		65	26	59	40	23	37	0.41	0.47	1.67	31
Superior		71	14	66	41	28	31	0.34	0.40	1.65	31

Note:

The performance data in the above table is calculated in accordance with NFRC 100-2010, and given as an indication only.

Actual values may differ due to manufacturing tolerances.

S.H.G.C. and U-values quoted are "Centre of Glass", and exclude any frame effects. SANS 204 should be consulted for total fenestration values.

Thermal safety warranties are available on application.

Sound Transmission Loss (S.T.L.) values are mean, measured at the centre frequency of the 1/3 octave band, over the frequency range 100 to 5000Hz, centre of glass.

*IGDB: International Glazing Data Base
**SAGDB: South African Glass Data Base

0860 695 695 PG SmartGlass® www.pgbuildingglass.co.za edition Feb 2016

Figure D 2 Double glazing specifications (PGsmartglass, 2017)

E: ULTRAVIOLET WATER DISINFECTION SYSTEM

Ultraviolet filtration system considered to purify and treat the rainwater collected in the centre is the Viqua IHS22-E4 integrated 22 GPM UV system with pre-sediment, pre-carbon and lead reduction filters. This system is recommended for small businesses and public facilities, more details are found in the below spec sheet (espwaterproducts; 2017).

VIQUA simply safe water | **IHS22-E4**

Ultraviolet Water Disinfection Systems from VIQUA

The quality of drinking water can change with time and become contaminated with harmful bacteria. The **PROFESSIONAL family** of compact UV disinfection systems with integrated pre-filtration provide a **reliable, economical,** and **chemical-free** way to safeguard drinking water in any residential application. VIQUA's products have been designed and tested to ensure quality drinking water is at everyone's finger tips.

Regardless of your need, there is a VIQUA system to suit your requirements. **The VIQUA IHS22-E4 offers a maximum flow rate of 22 GPM (5 m^3/hr), which is ideal for many small businesses and public facilities.**

Features of VIQUA UV water disinfection systems

- The special lamp plug ensures that no one can power the UV lamp if it's not in the UV chamber.
- Lamps and sleeves are assembled together for ease of handling. They can be replaced separately, in minutes and without tools.
- The reference card outlines the most important system functions and maintenance for quick, on-the-spot questions.
- Our high output validated UV lamp is engineered to treat variable water conditions.
- System comes supplied with sediment filter and carbon block filter to reduce odours, colour and particles commonly found in water. Reduces the need for expensive pre-treatment systems.
- The system comes equipped with high flow filters allowing the water pressure to remain consistent.
- Bracket is a gauge steel that is powder coated for both durability and aesthetics.
- **NEW** LCD controller features a large backlit display for easy reading, simultaneously displaying lamp life remaining, support contact information, and lamp replacement reminder that indicates when the lamp needs to be replaced, ensuring continued water safety. The intuitive, user friendly menu is dealer programmable and allows the user to quickly find the replacement parts needed for the system by using the replacement parts menu, as well as on board quick-reference instructions for system troubleshooting.

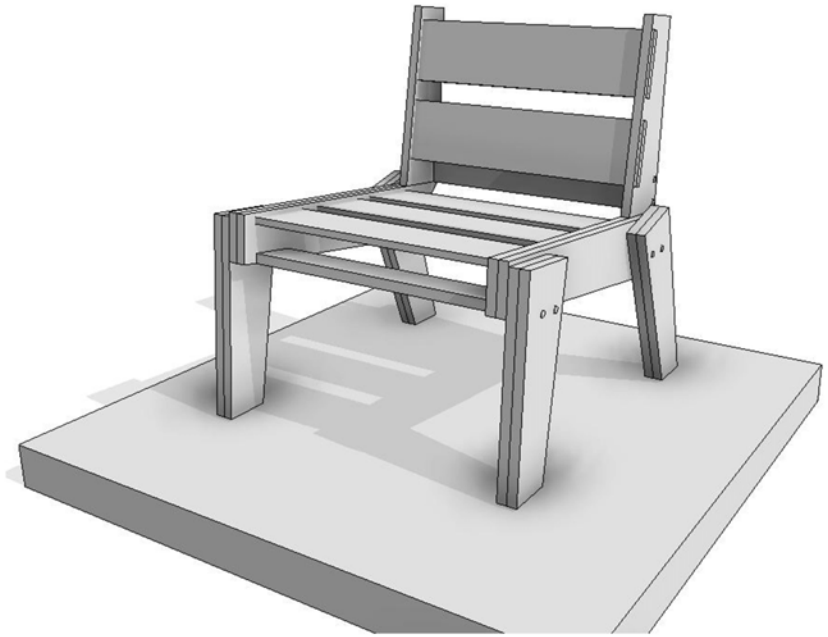
Figure E 1 Water purifying system (ESPwaterproducts, 2017)

F: CATALOGUE OF FURNITURE PRODUCED IN THE UPCYCLING CENTRE

Diagram showing the process of product manufacture (chairs, coffee tables, light fittings).

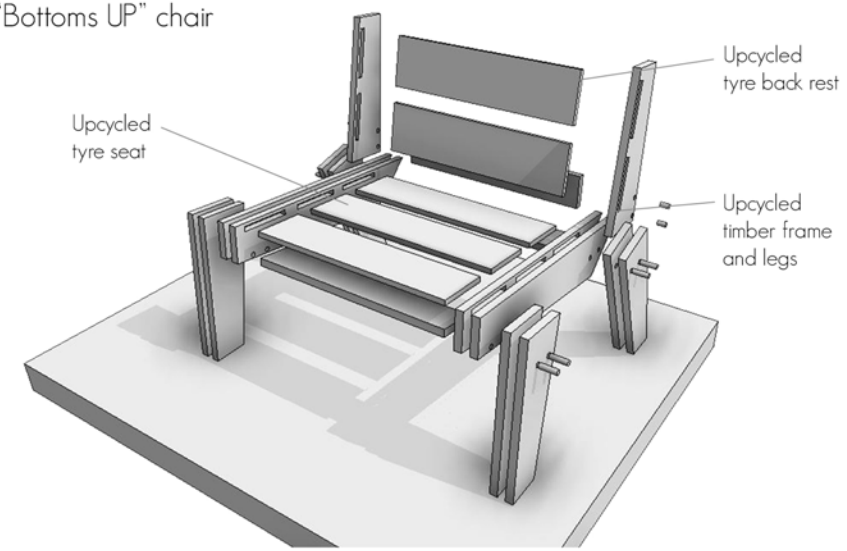
Figure F 1 Production process diagram

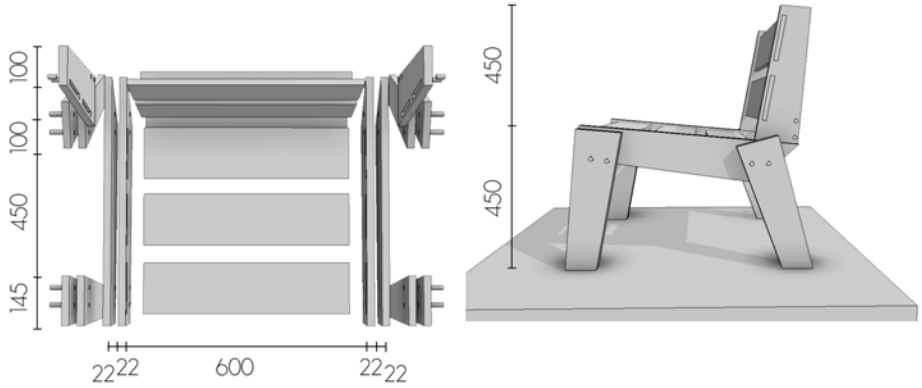
Upcycled Chair
"Bottoms UP"



UPcycle PTA

"Bottoms UP" chair





Tools required	Joinery	Surface finishing
Mallet	Mallet fit	Face/edge
Allen key	Press fit	Face/edge
M6 bolt	Push fit	Glued surface
PVA glue	Slide fit	

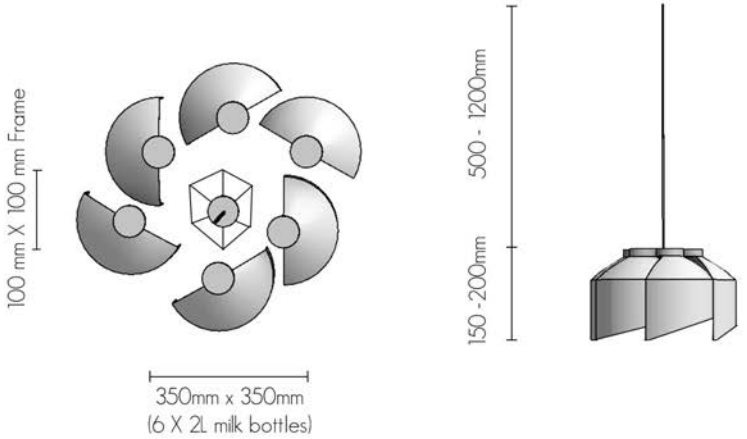
Rubber hose chair inspired. Available at: http://www.instructables.com/id/Rubber-Hose-Chair/

Figure F 2 Chair catalogue

Upcycled Luminaire
"Light it UP"

UPcycle PTA

"Light it UP" table

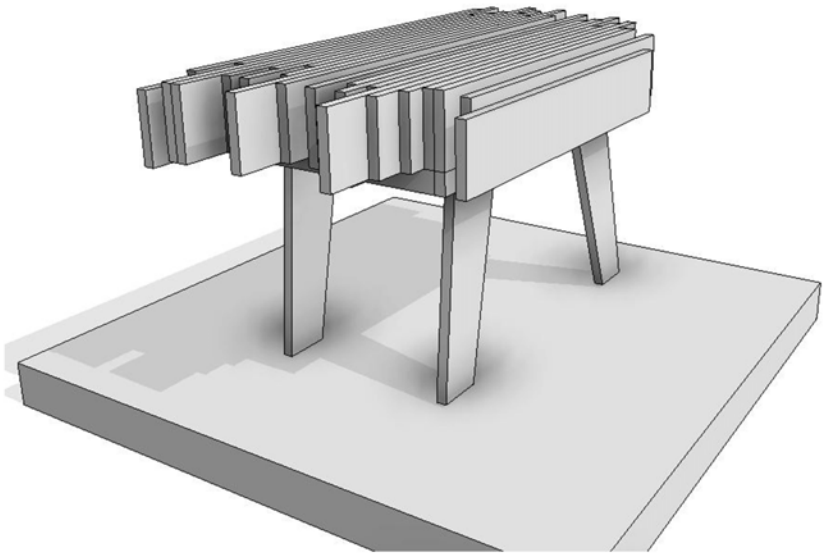


Compact fluorescent lamp recommended:
13 - 18W
800 - 1,100 (lumen output)
Warm white (3,000 K)
Equivalent to 60 - 75 W incandescent lamp

Plastic lamp inspired. Available at: http://www.core77.com/posts/20761/one-mans-trash-is-another-mans-lamp-matteo-de-colles-upcycled-lighting-20761

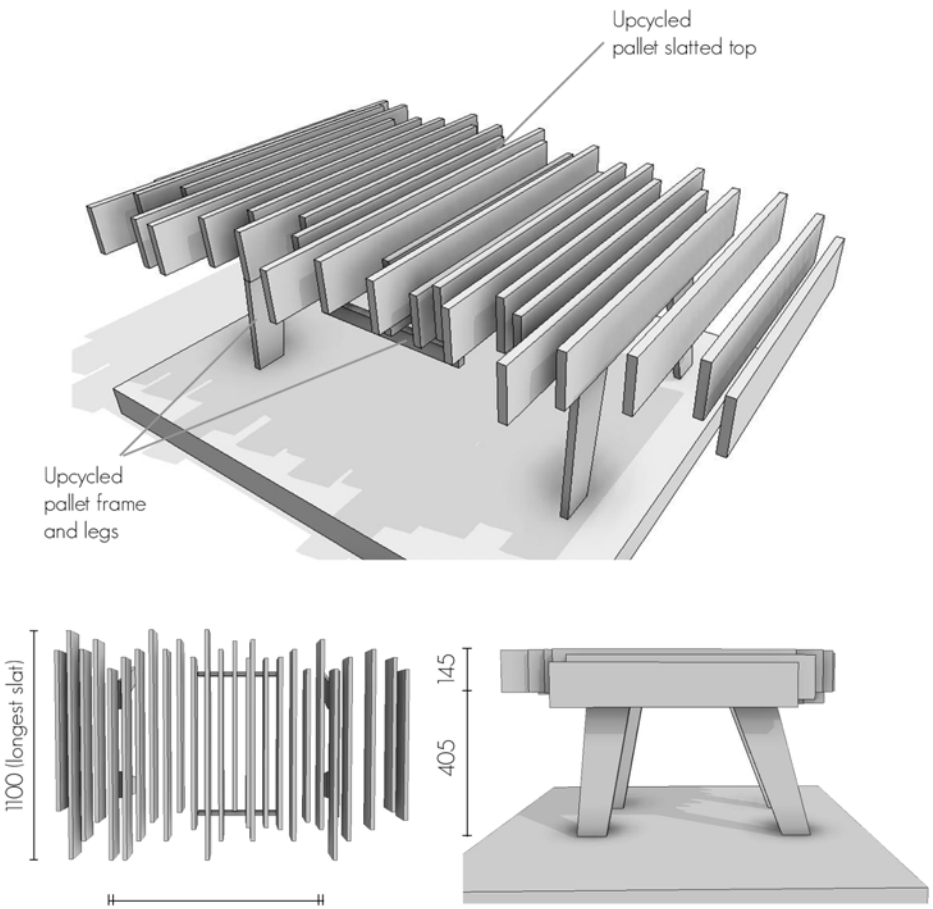
Figure F 3 Light fitting catalogue

Upcycled Table
"Spice UP your life"



UPcycle PTA

"Spice UP your life" table



Tools required	Joinery	Surface finishing
Allen key (base & legs) M6 bolt (base & legs) PVA glue - Gorilla Glue (table top)	Press fit Push fit	Face/edge Face/edge Glued surface

Pallet table inspired. Available at: http://www.instructables.com/id/Coffee-Table-from-Pallet/

Figure F 4 Table catalogue

G: FINAL EXAM CRIT

4: FINAL EXAM CRIT POSTERS

CONSTRUCTING A CULTURE CYCLE

An upcycling waste centre in Pretoria CBD

Environmental potential

M.Dickinson
21072525

CONSTRUCTING A CULTURE CYCLE
M.Dickinson
21072525

Constructing a Culture Cycle: An upcycling waste centre in Pretoria CBD

Environmental potential

CH 1 Study proposal

Locality

Locality map

Contextual aerial map

Background

Problem statement

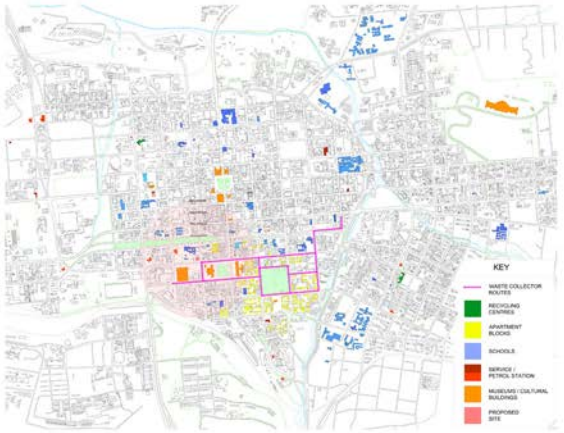
Research question

Interior provisional analysis

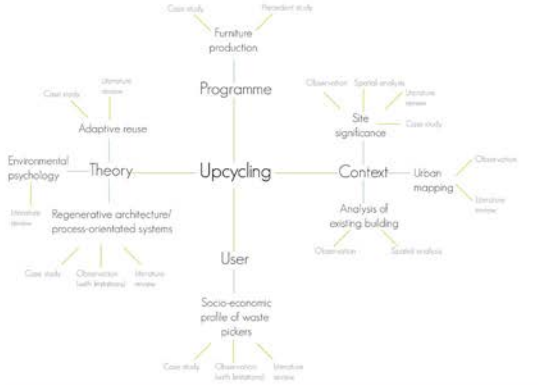
Southern façade

Aim

Significance of study



Research method

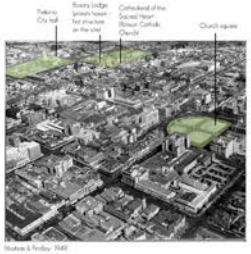


Conclusion

Some statistics

Mapping analysis

Central area of Pretoria looking south-east, 1949

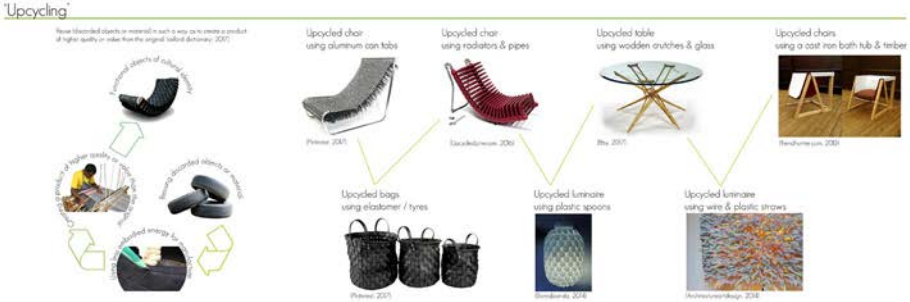


The proposed culture cycle

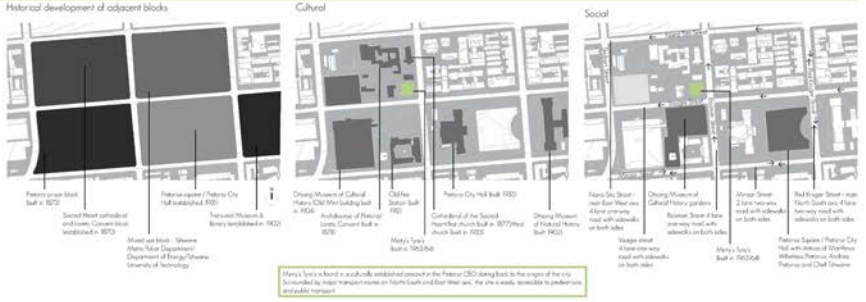
Eastern façade

CH 2 Contextual

"Upcycling"



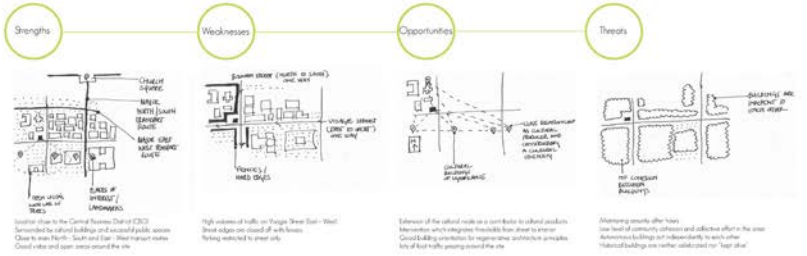
Context



Timeline

Religious heritage of the site

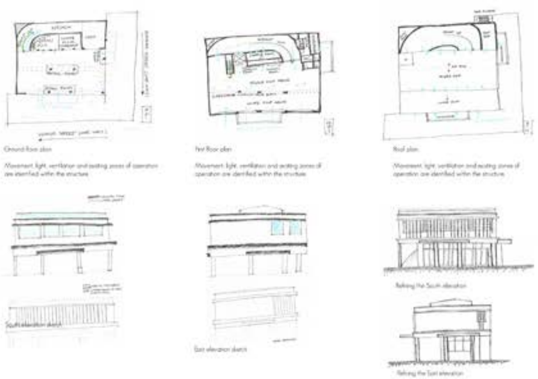
S W O T analysis



Building analysis

Exterior façade (Southern)

Sketch explorations



Unique building features /aspects

West facade (no openings)

Existing kitchen (back of house) opportunity as existing services

Paving and car ramp drainage (ground floor) continous of the sidewalk

Car ramp

Storage under the car ramp

Car ramp (from first floor)

First floor workshop

First floor lift

First floor workshop view

Entrance to the first floor workshop

Assessement of building

Location	Feature	Function	Material	Space	Reappropriation
Exterior	South facing windows (FF)	Admitting soft indirect light	Steel framed windows	South facade full width	Good natural light (daylight/ventilation/viewing views to Cultural Museum gardens
Exterior	Cantilevered slabs	Architectural/visual/shelter	Concrete slab	South and East facades	Architectural feature/shelter
Exterior	Car ramp	Access from GF to FF (cars/loads)	Concrete	North facing	Transporting heavy loads/cars from ground to first floor/potential interior design feature
Interior	Open ground floor space	Multifunctional/good circulation space		South/East facade	Good open workshop/sorting/display/circulation space
Interior	Concrete columns	Load bearing	Concrete	Ground/first floor	Opportunities for features as interior design boundary objects
Interior	Lift	Heavy load transfer from GF to FF	Steel cage with motor on FF	Centre of building	Transportation of materials/objects and potential of interior design feature
Interior	Kitchen	Amenities for cafe	Appliances	Back/northern side of building	Amenities for waste pickers/homeless/community members/workers
Interior	Open first floor space/clerestory windows	Multifunctional/good circulation space		South and East facades	Good open workshop/sorting/display/circulation space
Interior	High ceilings (GF & FF)	Good light admittance on both floors		Ground and first floors	Good natural light and ventilation strategies

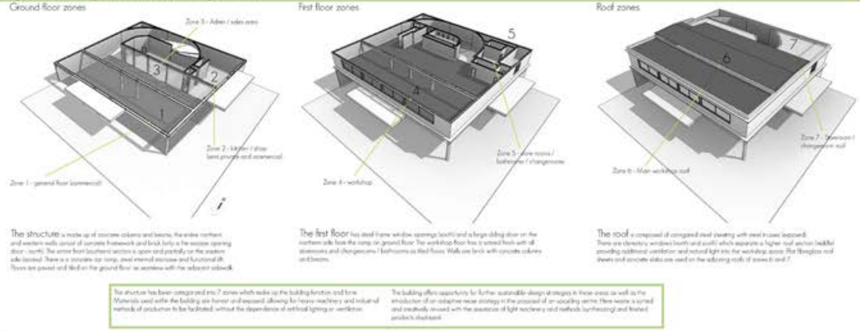
Architect

John Albert Hoogterp / Jolliffe Architects

Were the appointed architectural firm for the construction of the Minty's Tyre building. Hoogterp was born in 1892 in Johannesburg and known for his partnership and association to Herbert Baker. He was involved in the construction of The Union Buildings and acted as Bakers representative on projects in Nairobi where he established a prominent office advising the Governor on certain buildings. Hoogterp worked in London, Netherlands, New York, Italy, Kenya and Zambia.

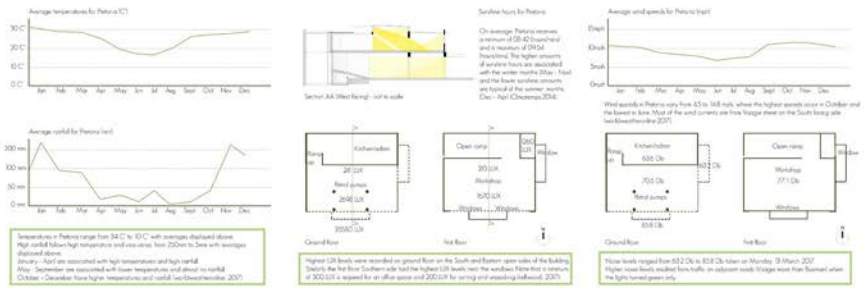
Decoding the building structure (building zones)

Ground floor zones | First floor zones | Roof zones



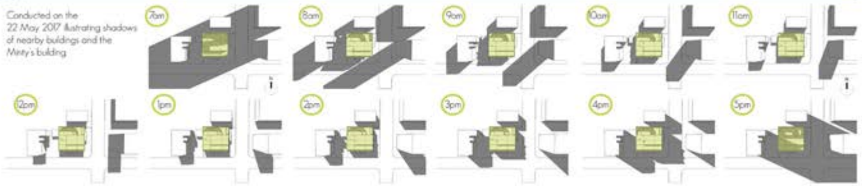
Climate

Temperatures and rainfall | Sunshine hours and lux levels | Wind speeds and noise levels



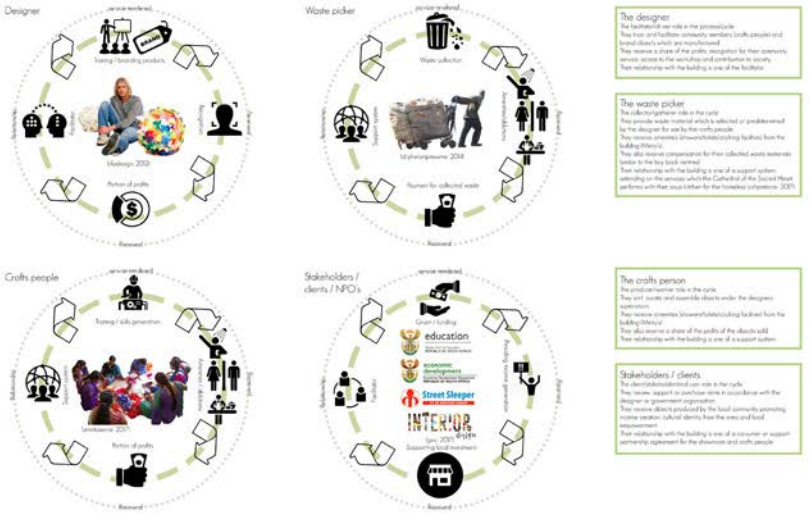
Solar study

Conducted on the 22 May 2017 illustrating shadows of nearby buildings and the Minty's building



Municipal regulations

User profiles



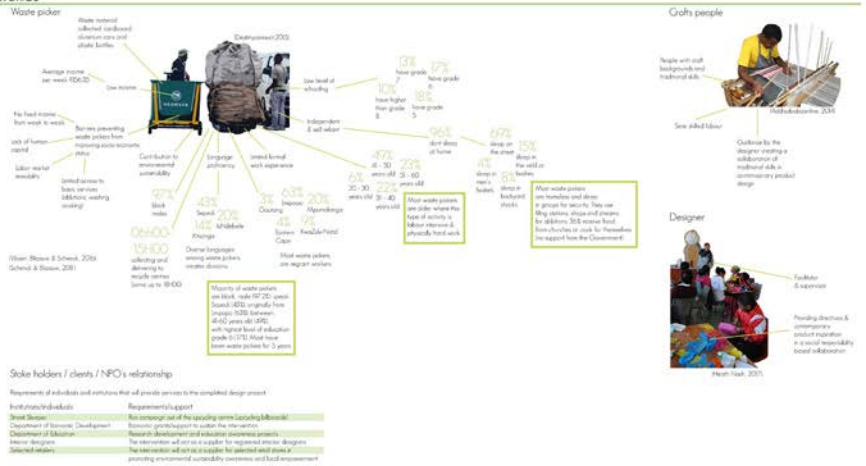
The designer
The facilitator/enabler role in the process/cycle
They train and facilitate community members (crafts people) and brand objects which are manufactured
They receive a share of the profits, recognition by their community, service, access to the workshop and contribution to society
Their relationship with the building is one of the facilitator.

The waste picker
The collector/gatherer role in the cycle
They provide waste material which is collected or predetermined by the designer for use by the crafts people
They receive amenities (showers/toilets/cooking facilities) from the building (Mary's)
They also receive compensation for their collected waste materials (similar to the buy back centres)
Their relationship with the building is one of a support system
attending on the services which the Cathedral of the Sacred Heart performs with their sous (chefs)en for the homeless (cafeteria) 2011

The crafts person
The producer/worker role in the cycle
They sort, curate and assemble objects under the designers supervision
They receive amenities (showers/toilets/cooking facilities) from the building (Mary's)
They also receive a share of the profits of the objects sold.
Their relationship with the building is one of a support system

Stakeholders / clients
The client/stakeholder/end user role in the cycle
They review, support or purchase items in accordance with the designer or government organisation.
They receive objects produced by the local community promoting income creation, cultural identity, trade the area and food empowerment
Their relationship with the building is one of a consumer or support partnership agreement for the showroom and crafts people

User profiles



Stake holders / clients / NPO's relationship

Institutions/individuals	Requirements/support
Street Sleeper	Run campaign out of the upcycling centre (upcycling billboards)
Department of Economic Development	Economic grants/support to sustain the intervention
Department of Education	Research development and education awareness projects
Interior designers	The intervention will act as a supplier for registered interior designers
Selected retailers	The intervention will act as a supplier for selected retail stores in promoting environmental sustainability awareness and local empowerment

Conclusion

The study proves the need for an upcycling centre in the Pretoria CBD due to its historical development, cultural significance and social condition. Through analysis completed, the Mary's Syns building is able to be re-appropriated for an upcycling centre as proposed, as the new function responds to the current operations of the building as well as being contextually relevant.

CH 3 Theory and strategies

Environmental psychology

Definition The study of transactions between individuals and their physical settings (Gifford, 2002)

Principles and theories of environmental psychology for design (Kaser, 2001)

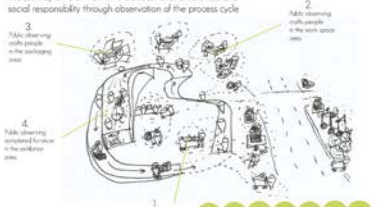
Synomorphy - the principle that physical and social aspects of an environment should fit together (Gifford, 2002)

Environmental psychology is the theory that guides the alteration of the building to respond to community and social inclusion strategies
Environmental elements should reflect the social interactions in the space

Design application Informing the spatial experience of the users and accommodating their needs

New function zones activate the ground floor where waste picker's deposit waste and revitalize themselves

The journey of retail / exhibition, educational awareness and social responsibility through observation of the process cycle



Inspiring the crafts people and designer with creative workspaces, collaborative zones and break areas (waste reuse design features)

Community parks, playgrounds and schools are the reflection of the larger community (Kaser, 2012: 190). Relevant to upcycling, repurposing of functional interior spaces using waste materials, where the layers of waste materials is described as giving more personality to a space in which "a distinctive yet functional interior space can be created through the process of converting waste materials or useful products into new goods which also contribute to a higher environmental value" (Beck-Lin et al, 2013: 706).

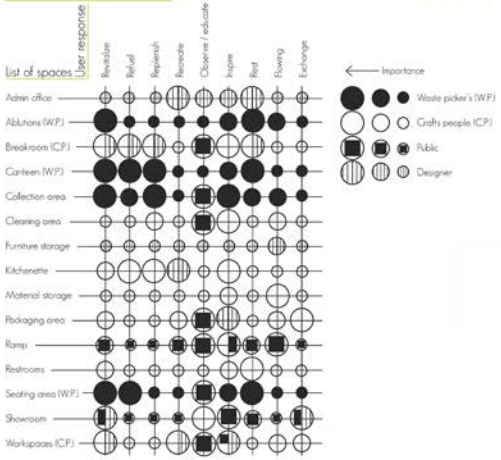
Through the integration of community and awareness, reusing waste materials as a sustainable initiative are possible. Integration, in this sense, is the acceptance and elimination of the rarity, to which waste pickers are subject to regarding their role in society. This is achieved by, providing amenities and services to which they, as mostly homeless, can build a relationship of support with.

The ground floor space of the proposed building is intended to be a framework of waste picker's collects and exhibition space which reflects this larger community and cultural aspects established in the precinct. It would therefore be prudent to include elements of developmental and break away spaces to achieve a synthesis of community integration. This would include surface materials, seating options, foliage, artworks, colours and textures to support socializing, quiet and play areas (Kaser, 2012: 198).

Product display in a space such as the proposed, should be centered on being relevant to its context and cultural background, in order to construct an identity. To construct an identity, an understanding of how consumers use furniture and objects to create individualities and projected perception. This is based on an assessment of intricate influences such as class, age, gender, sexuality, household composition and geographic location upon furniture consumption (Leslie & Reimer, 2003: 408). The material culture of objects and their meaning is "generated and produced in cultures through phenomena used as signifiers (Kopp, 2015: 28).

The eclectic nature of reused upcycled products in this case can be seen as consumables which been value according to their creativity and function as "temporal and spatial transformations, leads to the fashioning of furniture are imposed by the nature of the commodity and the materials embedded in it" (Leslie & Reimer, 2003: 406).

Requirements of interior spaces



Routes and movements throughout the interior space

Public routes (ground floor / first floor)
Intended journey of public visitors through the space where they are educated and exposed to manufacturing and collection of waste processes. The journey offers to empower or "upcycle" them in creativity and social responsibility of the products.

Waste picker's routes (ground floor)
The journey and areas intended to improve the waste picker's livelihood. From building entry, waste material deposits, ablution facilities, canteen and seating / rest areas.

Crafts people's routes (ground floor)
The movement path which crafts people access the building space to reach the first floor work spaces.

Crafts people's routes (first floor)
From the ground floor, the crafts people inhabit the majority of the first floor space. This includes open working spaces, separate indoor and outdoor break spaces, restrooms, exhibition and storage areas.

Waste routes (ground floor)
The routes which the waste materials travel, from collection, cleaning, sorting and disposal after use. The waste cycles through the centre returning to waste picker's for further recycling at other facilities.

Waste routes (first floor)
The waste arrives in trolleys on the first floor via the lift, which is then stored until use or moves to applicable waste upcycling stations for processing. Discarded pieces are thrown down the waste chute returning to the waste picker's.

Adaptive reuse

Definition: The process that **changes a disused** or **ineffective item into a new item** that can be used for **a different purpose**. Sometimes nothing changes but the item's use (Australian Department of the Environment and Heritage, 2004).

Principles of Adaptive reuse

Intervention

A procedure that activates the potential or repressed meaning of a specific place. It only truly works when the architectural response of the modifications draw all their cues from the existing building (Brooker & Stone, 2004).

Permanent

Precedent

Transforming the old and new, intertwined and dependent on each other, activating the space.

Insertion

A practice that establishes an intense relationship between the original building and the remodelling and yet allows the character of each to exist in a strong and independent manner (Brooker & Stone, 2004).

Semi-permanent

Precedent

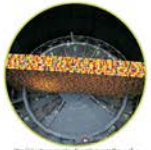
Inserted object can be seen as independent and confrontational, establishing a surprising dialogue between itself and the host space or structure.

Installation

The placement of a series or group of related elements within the context of an existing building (Brooker & Stone, 2004).

Temporary

Precedent

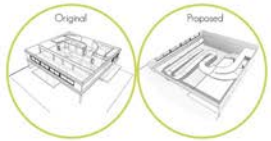


Heightens the awareness of the existing building by successfully combining the new element without compromising or interfering with either.

Adaptive reuse has changed the Minty's building to accommodate for the new programme

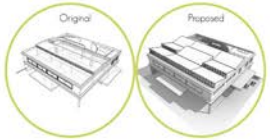
Design application

The new ramp in the collection space



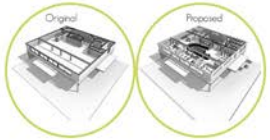
Using the existing large volume, the ramp encourages public to move through the space among the waste picker's in an educational journey of the product process and social responsibility.

The new Roof with light shafts



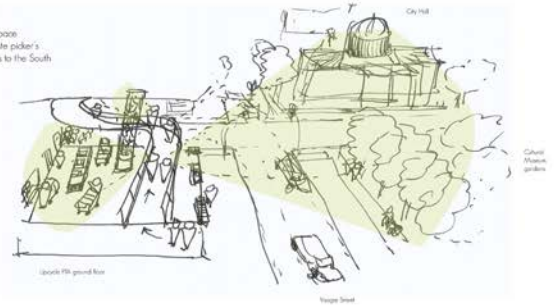
Light shafts admit natural light into the first floor workshop enhancing productivity and positive work ethic.

The new work spaces and showroom exhibition



Working spaces promote cohesive creative collaboration. The exhibition showroom proudly displays the talents of the crafts people for retail to the public.

New ramp activates the space integrating public with waste picker's collection and surroundings to the South



Regenerative architecture

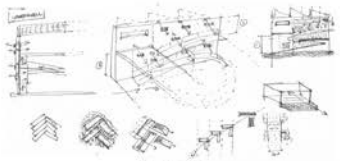
Definition: Regenerative design is a theory based on interactions within a **system that ultimately enhance itself**. It relies heavily on restorative actions, sustainability, and technology to produce a system that is both efficient and sustainable. In order to do so, the architecture itself, (the physical building, materials, structure) is developed alongside with the actual site (ecological surroundings) (Energyinitiative, 2015).

The principles of regenerative architecture

Sustainable strategies focus on energy, material and product performance. This would be done in accordance with regenerative principles in sustainable design strategies, as a means of upcycling the building (Peters, 2015).

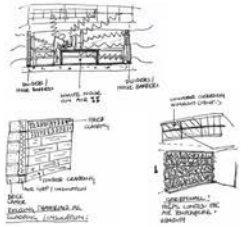
Design application

The new roof activates the space creating improved lighting conditions and air movement in the workshop space (indoor environmental quality). The use of reclaimed materials (timber and steelwork as cladding and surface covering) its increase insulation and address energy transmittance.



Green wall strategies
Addressing high frequency noise
Volatile Organic Compounds (VOC's)
temperature reduction and carbon emissions
(Floral Connection Inc, 2017)

Adaptive strategies are considered with reference to ecological and regenerative design which responds spatially to the proposed new programme in the existing Minty's Tyre building. Using multi functional design, or addressing multiple uses with one solution is considered to be characteristic of green design.

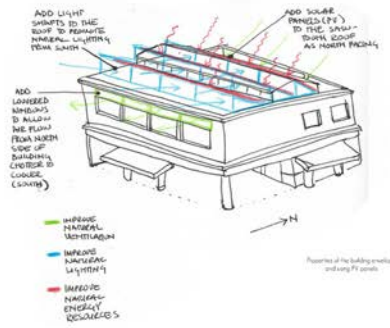


Maximizing diversity, modular components for simple solutions and making use of readily available materials and energy are centered at the driving force behind regenerative design strategies applicable to the upcycling of the Minty's tyres building.

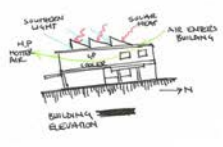
By nature, as measure - The Biomimicry guild, Janr Peters, accounts for taking advantage of repeating phenomena as sources of energy in a cyclic process, in which a biomimetic approach favours ecological performance (Peters, 2015). The intention here is to use the context of the site and existing building as design informants in shaping a frame to improve the energy performance of the new programme.

Environmentally responsible building for a socially responsible programme

Response to the site (ecological surroundings)	Optimizing the buildings energy and performance



Properties of the building envelope and using PV panels



CH 4 Precedent and case studies

Recycling centre precedent

Cyberjaya recycling centre, Cyberjaya, Selangor, Malaysia

(ATSA Architects, 2015)

This recycling center was selected as it shows principles of green and sustainable design. The facility deals with collection and sorting of waste material, it is able to accommodate and promote recycling and environmental awareness initiatives. The building functions well in its environmental impact and programmatic function.

What is appealing here is the direct influence which waste products have on the building envelope, as well as the contemporary manner in which it is synthesised. The roof is made from solar panels and the exterior walls from steel mesh with waste products and stone as infill and brick. The PV panels on the roof supply the energy needed to power the LED lighting system.

There are porous paved areas around the building which manage on-site storm water infiltration and reduce soil erosion. Using drought tolerant species and native plants with a mangled grassed areas, water requirements are low as well as the need for fertilizers and pesticides.

Restrictive water fittings and low flow fixtures further reduce the amount of water required by the building. The waste products as infill also adds to the reduction in building material for the structure in addition to displaying the operation purpose of the centre. Areas in the mesh walls are left open to encourage passive ventilation and natural lighting strategies.

PV panels | Rain water harvesting | Regenerative architecture | Passive ventilation | Low embodied energy finishes / building materials

Upcycling workshop precedent

Jockey Club Upcycling centre, Wanchai, Hong Kong

(SLHO & Associates ITD, 2015)

The Jockey Club Upcycling Centre is a large space with separate workshop compartments rented out by upcycling designers Kevin Cheung, is one of these designers who's values include: enriching the environment, users and society (refer to chapter 3 for information on Kevin Cheung). What is appealing most in this precedent study is the reused and upcycled materials seen throughout the centre, as fixtures, in a contemporary way.

The design approach to the centre was "1 product design can make use of the upcycling concept, so can interior design". The signage and door handles use discarded steel horse shoes to make the letters "L and C" standing for Upcycling Centre, in a repetitive way becoming a feature wall pattern.

Examples of materials that have been upcycled here are, salvaged timber pallets, wooden red wine boxes and recycled egg cartons which together with steel frames, make up the dividing walls between the individual workshop studios. Lighting fixtures were made from discarded plastic magazine racks, which once disassembled, become diffusers as light shades.

Wooden wine boxes and pallets become functional shelves and storage units for displayed products. Egg cartons function as signage on the sliding doors and due to the material properties also act as sound-absorption buffers. The space works well to accommodate different users and model inhabitants, whether they are in groups or single designers. The clean, organized and well planned interior results in a pleasant working environment, with the possibilities of creative collaborations and exhibition associations.

Meeting space | Material reuse as interior finishes | collaborative / private spaces

Heath Nash studio, Woodstock, Cape Town, South Africa

(Designboom, 2012)

Heath Nash, the Cape Town upcycle designer, uses a medium size building, which could pass as a retail space as his product workshop. In this example, there is no regenerative or ecological approach to the interaction between the building and site. There is no design method to the re-appropriation of the building into an upcycling product workshop. The space uses most of its spatial zoning for product display and storage of raw materials.

Here, the focus is placed on the interior use of space and operational purpose. This has value to the proposal as it shows a real world example of the same type of activity and material usage as the proposed intervention. Emphasis here is placed on storage of unused waste materials, working spaces, administration and displayed products. According to his website, heath nash makes cool things. There are workshops and skills development classes which take place in schools and craft institutions, contributing to the social responsibility of the Heath Nash brand (heathnash, 2017).

This is important as it extends the production of cultural items (upcycled waste products) to generate skills and uplift people in other communities as to the possibilities of reusing waste in a contemporary manner.

Despite the myriad of lighting products which they manufacture here, the work spaces are makeshift and messy. Improvement could be made to the experience and contribution of interior design (as an upcycled interior) in an effort to invite visitors and educational groups into the imaginative world of Heath Nash.

Storage required | Admin office | Shelving required | Work spaces required | Product display | Social responsibility

Max McMurdo workshop, United Kingdom

(Cochrane, 2017)

The focus of this precedent study is the upcycled items which Max has incorporated into his workshop space, the equipment which he uses for product manufacture and social responsibility. The workshop is a warehouse structure but the interior objects are of his own creations, which hold functional value. Take for example the airplane wing which he uses as his office desk, in a converted office container. The work shop doesn't respond to the ecology or nature of the site, it is a workshop with discarded waste items which are used to upcycled and adapt.

The value here, is also the amount of space required for storage and the low embodied energy or machinery used for operational purposes. The caravan which you see in the background of figure 4.6.3, was upcycled into a 'soupervan' which travels around Britian aiding 'rough sleepers' and homeless people with a warm bowl of gourmet soup. This is appealing as using upcycling as a vehicle (literally) Max has created a framework to wash pur and uplift the surrounding community, another objective of the proposed upcycling centre.

Waste products are scattered and unorganized in the workshop, as the operation is run only by Max, there seems to be no system and management of production. The workshop appears to be exclusively for product manufacture and storage, with little interaction with public or collaborative initiatives.

Workshop space required | Tools required | Social responsibility

Adaptive reuse precedent

San Mateo High School, California, United States

(AARedwoodEmpire, 2016)

An example of adaptive reuse in a 1920's shops building, which was converted into school art studios, meeting spaces and educational classrooms. The building was restored on the exterior (red brick and new shopfront glazing and mullions) with improved with seismic resilience and modern amenities.

Apart from being a celebration of the school's history, the building alterations were directed by light and interior volumes of the east facing clerestory windows and 'sawtooth' roof shape, typical of a factory typology. The sawtooth roof shape defined the spaces of the different studios below providing an assortment of multi-functioning learning spaces.

What is noticeable in this example is the way the windows and doors have been replaced to open up the space to natural light and ventilation. New services have been added as well as a white (and bluish) layer depicting the original structure as a blank canvas, with new flooring and furniture as the accented colours and finishes.

A successful example of an intervention where old and new live together harmoniously for a new program and function.
Material reuse and the limited use of artificial lighting (due to the natural lighting strategies) align to the proposed upcycling centre's intention of improving the building while remaining on resources and environmental impacts.

New openings in the envelope | New services | Original structure painted white as a foil/contrast

CH 5

Design informants

Contextual

Minty's tyres building shares a close proximity to:

The cultural and historic region of Pretoria, educational institutions with accessibility on major transportation routes.
The building has unimpeded vistas to the South with various public landmarks nearby.

Mapping analysis revealed several waste generators within the area (public space, schools and apartment blocks), which waste pickers depend on for collecting waste.
This location reduces distances which waste picker's must travel to recycle centres, as well as being an appropriate platform for producing current artefacts.
The reappropriation of the service station was justified by the large number of similar services nearby.

Current routes and direction to traffic of waste pickers
Informed entrance and exit points for the proposal.

Building analysis

The Minty's building was identified as having:

Good natural lighting and access on the Southern and Eastern facades (as well as open vistas)

Easy accessibility between levels via the car ramp / lift

Open work spaces on the first floor

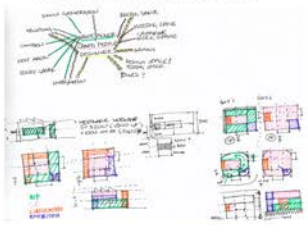
Architectural features such as the cantilevered slabs and floating first floor (South & East facades)

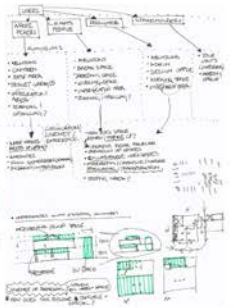
Theories

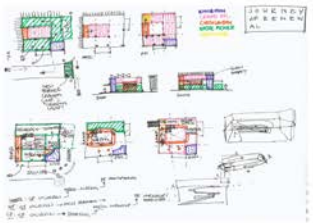
Environmental psychology is applied to the rejuvenation / renewal and revitalization experience of the users within the space, through navigation of activities (refuel, refresh, revitalise and rest) and interaction across all levels (visually). The canteen is a common place for all users to interact. All activities encourage learning, upskilling and recognition.

Behavior setting theory | Integration theory | Affordances | Preferance model

Spatial informants according to user groups







Adaptive reuse

Roof Intervention
(better lighting & ventilation)

Workspace intervention
(responding to the varied programmes)

Ramp insertion
(visual and physical access across levels)

Regenerative architecture

Natural lighting and ventilation strategies

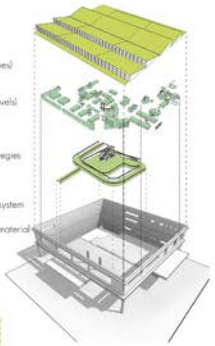
Solar panel - electricity generation

Rain water harvesting / grey water system

Reclaimed / low embodied energy material usage

Flexible / adaptible work spaces

Green wall / vertical garden



Areas throughout the building intend to train, acknowledge and form bonds between users.

Vertical gardens offer subsistence food (managed by waste pickers)

The kitchen can accommodate training in basic cooking skills

The upskilling area is intended to be for consultation & training of waste pickers in manufacturing and industrial processes as a knowledge economy (functioning during the day and night).
The centre forms a member based organization with waste pickers (registration, acknowledgement, cart and uniform) offering health benefits and insurance.

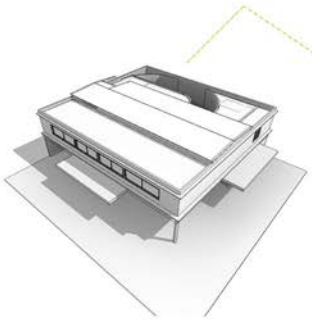
Ground floor zones
Collection / trolley garages / circulation
product display zone / pavement extension
Waste picker's ablution zone
Waste picker's canteen / seating zone
Waste material sorting zone
Upskilling / consultation zone

Mezzanine floor zones
Workspace zones
Storage zone

First floor zones
Workspace zones
Meeting zones
Exhibition Zone
Ablution zone

EXISTING & NEW

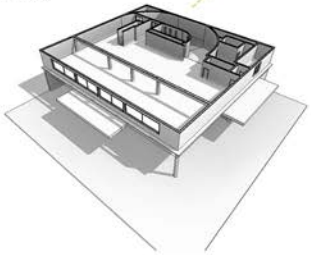
Host building:
Minty's Tyre building



New roof intervention

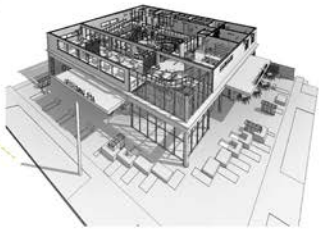
Intervention:
Upcycling PTA

First floor

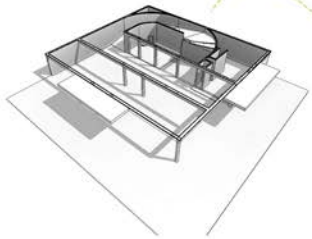


New spatial layout and programe

First floor

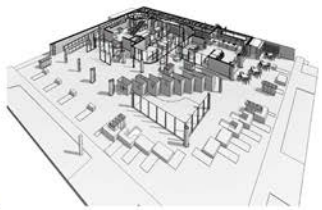


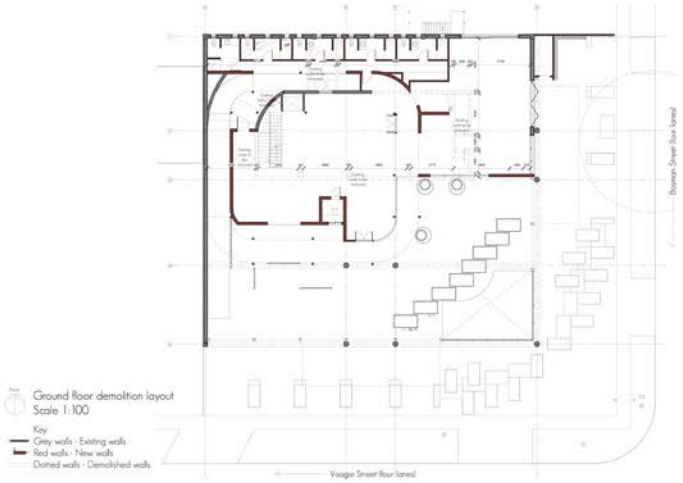
Ground floor

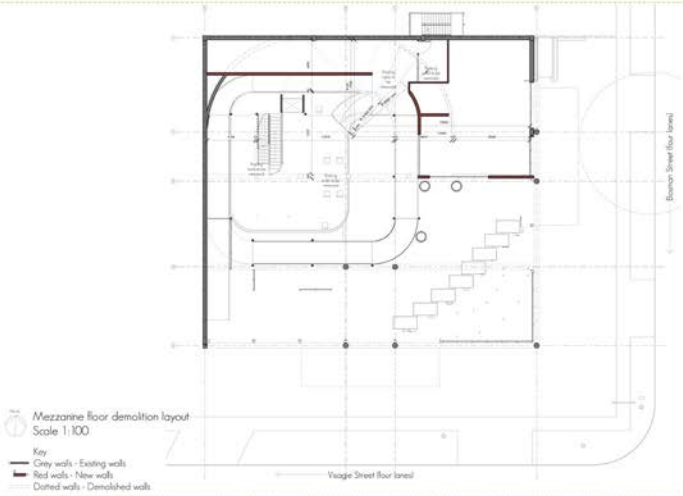


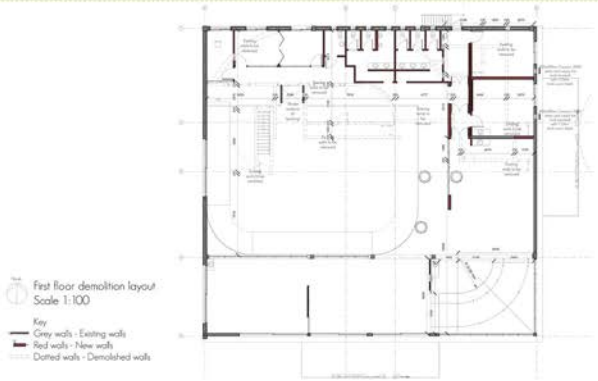
New ramp & mezzanine level intervention

Ground floor

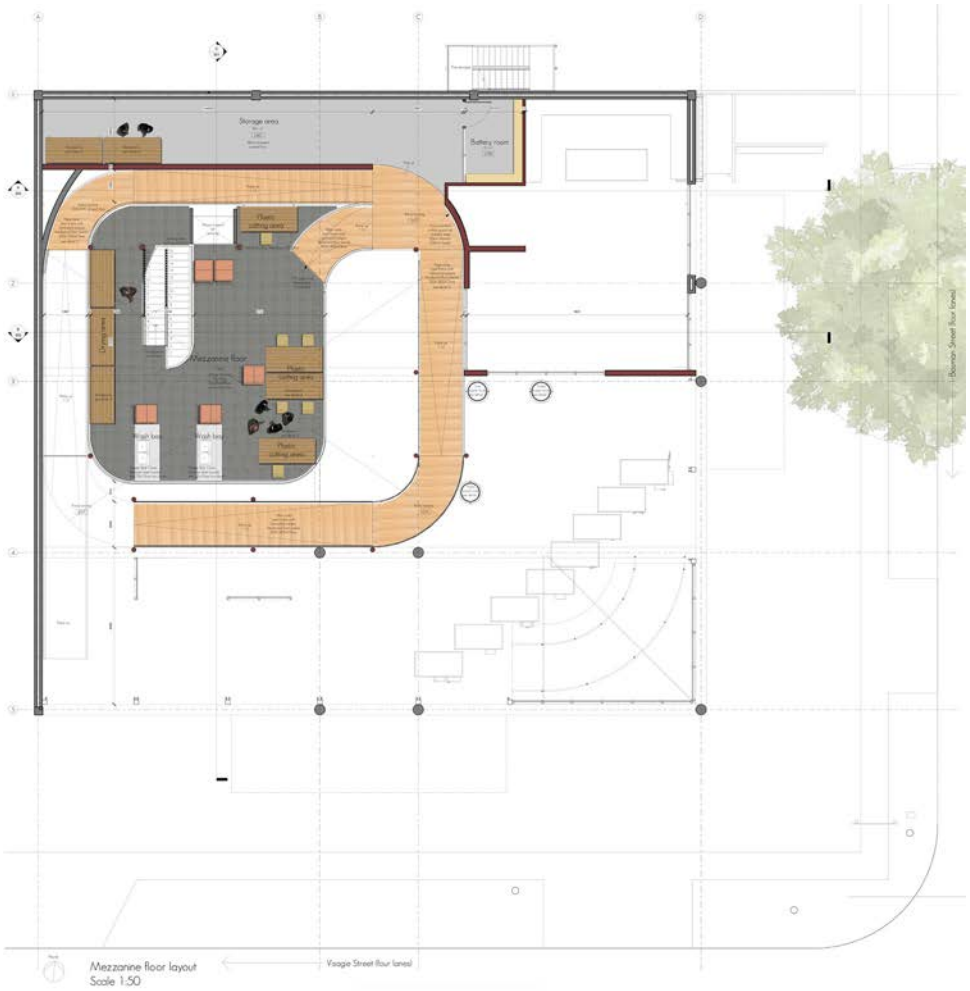








Material and furniture palette



Mezzanine floor layout
Scale 1:50

Orientation diagram / Mezzanine floor

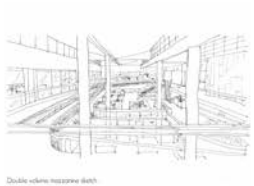
Mezzanine floor sketch

Material and furniture palette

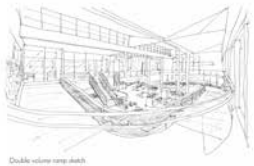
Furniture & walls

First floor layout
Scale 1:50

Orientation diagram - First floor



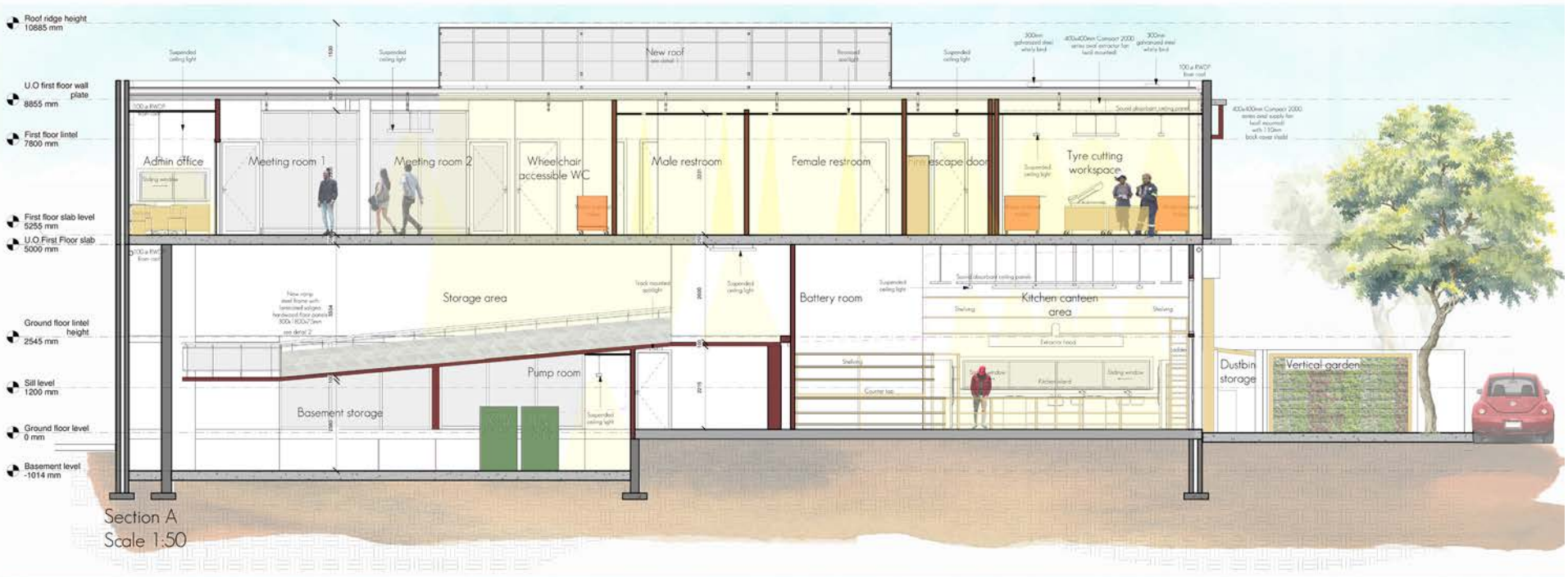
Double volume mezzanine sketch

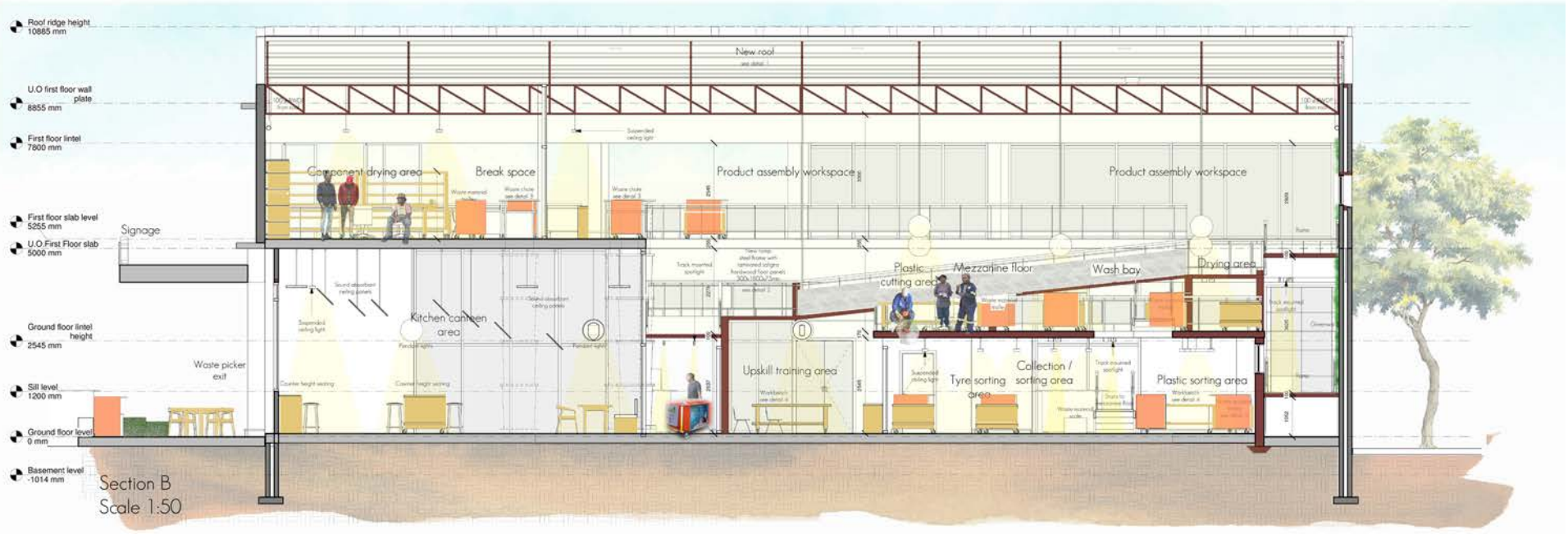


Double volume ramp sketch

Material and furniture palette

Lighting





South perspective

East perspective

3D Perspectives

Exterior street perspective

Entrance perspective

Double volume product display perspective

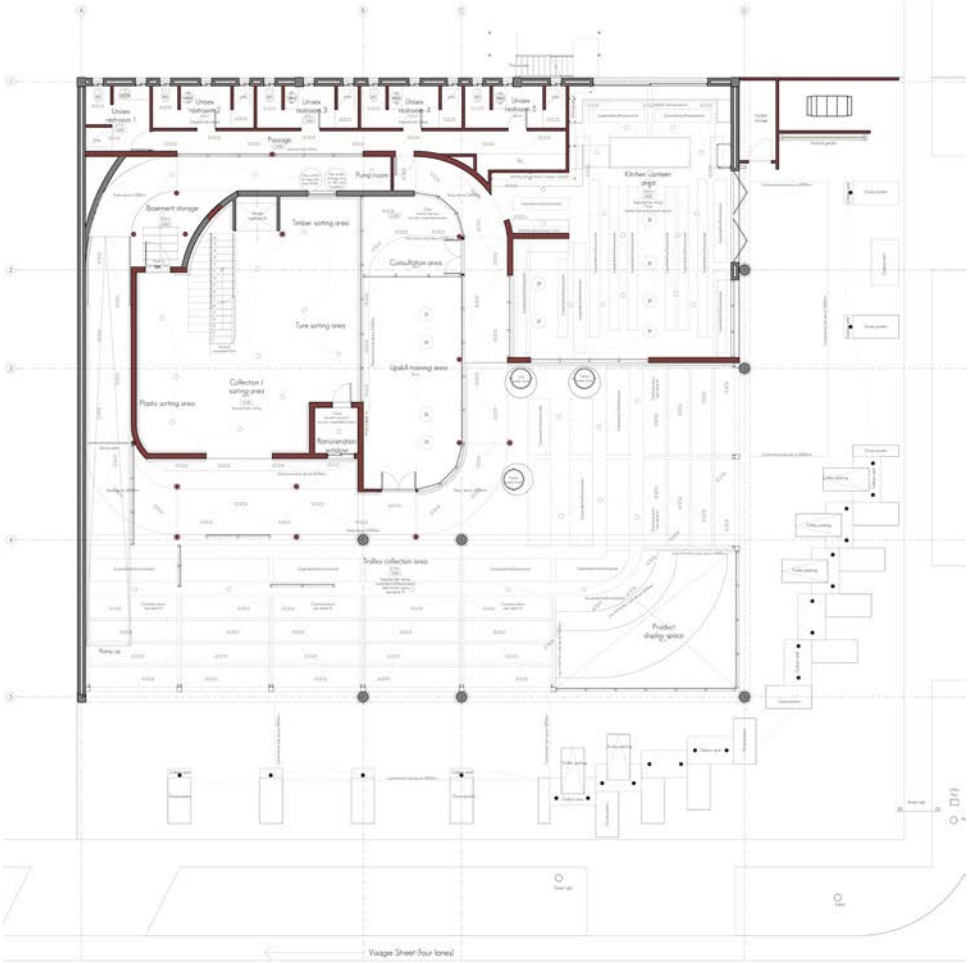
Waste chute perspective

Canteen perspective

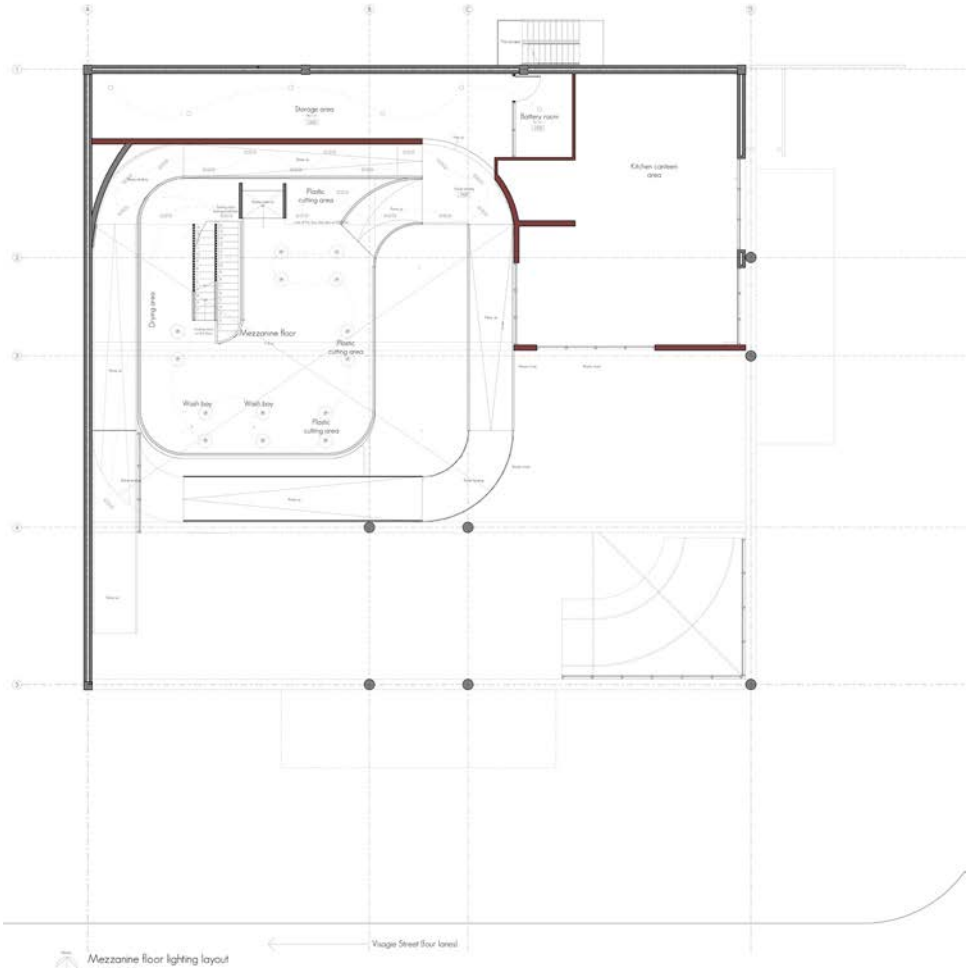
Double volume workspace perspective

Double volume mezzanine perspective

Double volume perspective



Ground floor lighting layout
Scale 1:50



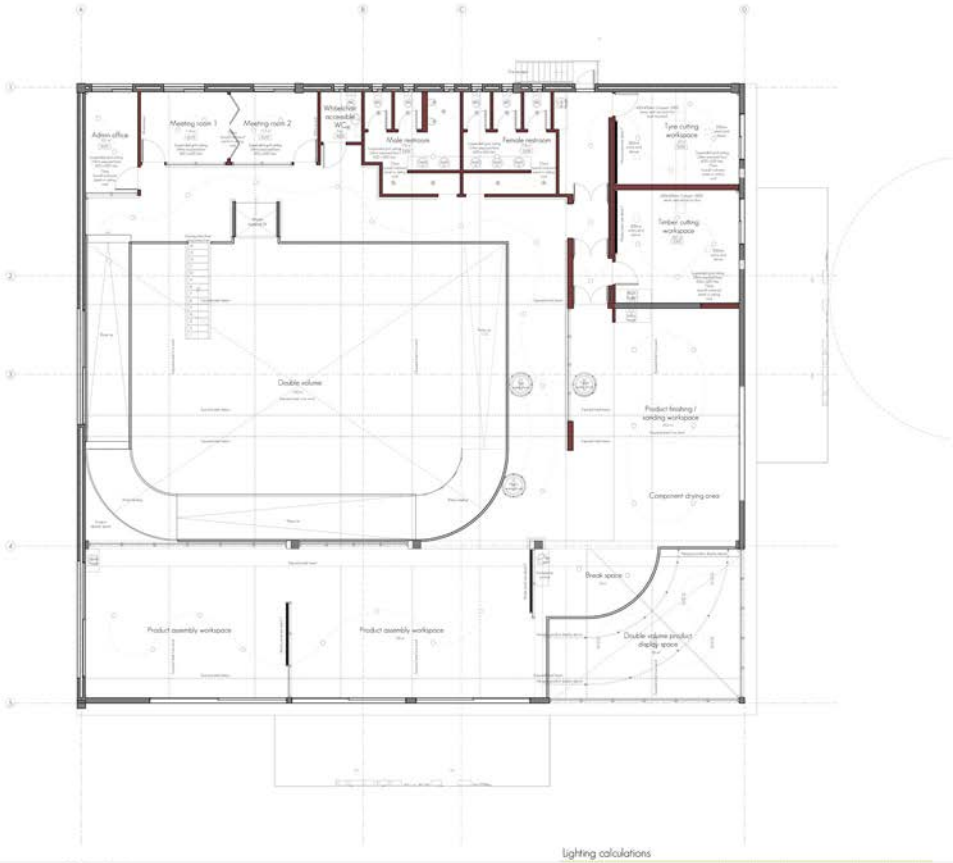
Mezzanine floor lighting layout
Scale 1:50

Exterior street night perspective

Ground floor lighting view

Exterior facade night perspective

Mezzanine floor lighting view

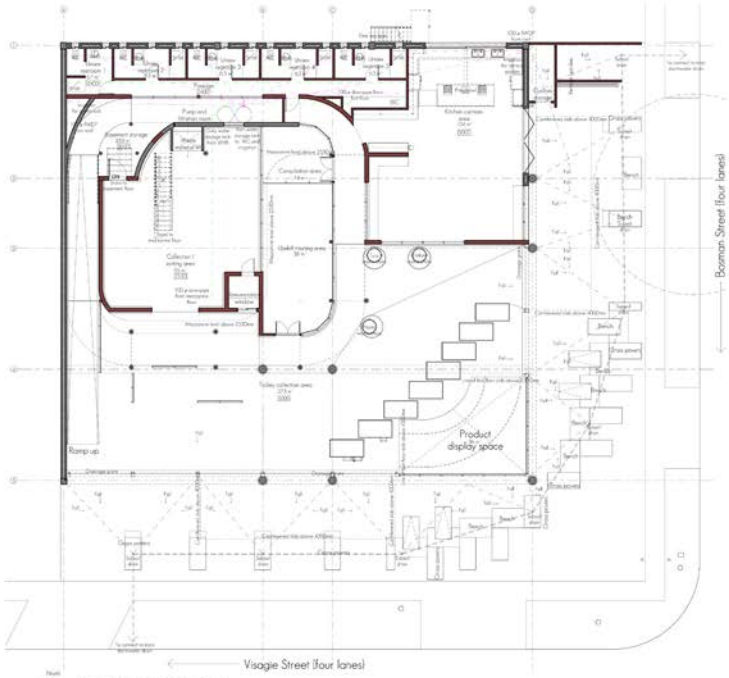


First floor lighting layout
Scale 1:50

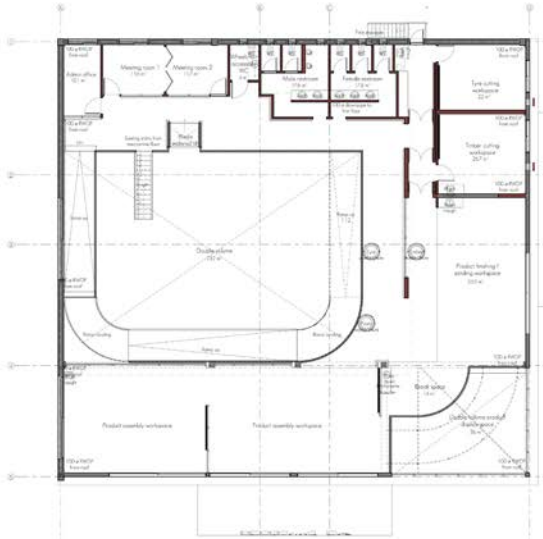
Lighting calculations

Entrance night perspective

First floor lighting view

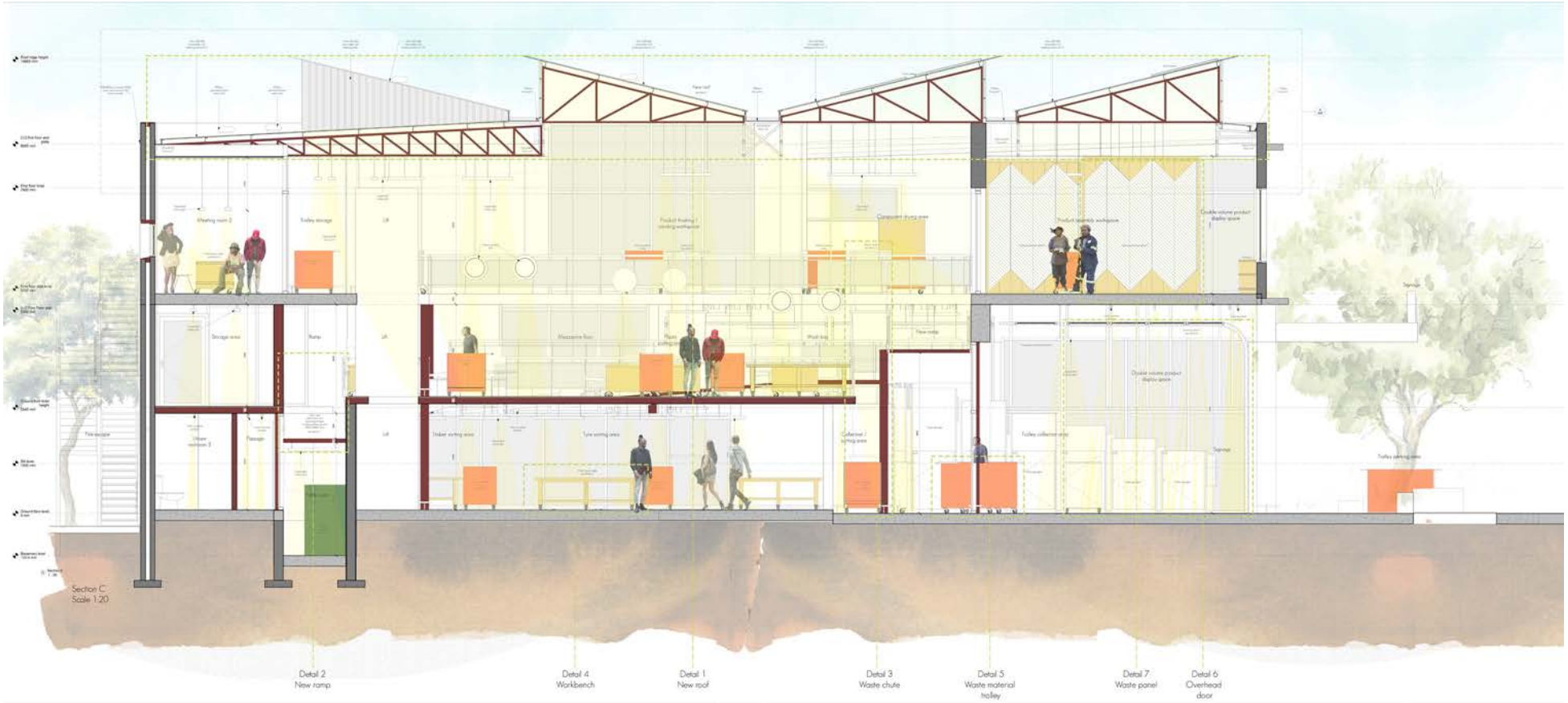


Ground floor drainage layout
Scale 1:100



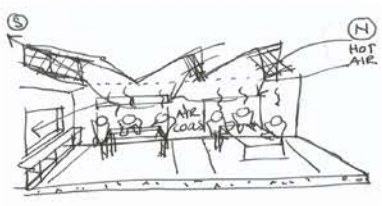
Rainwater harvesting

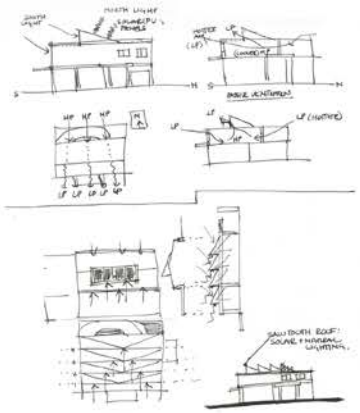
First floor drainage layout
Scale 1:100

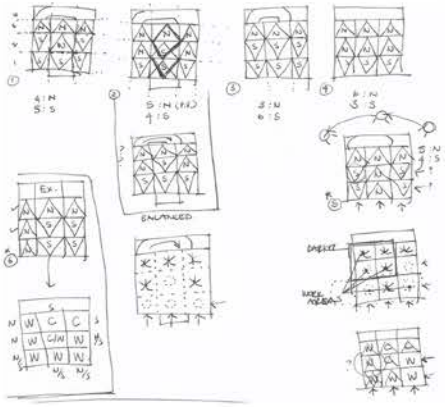


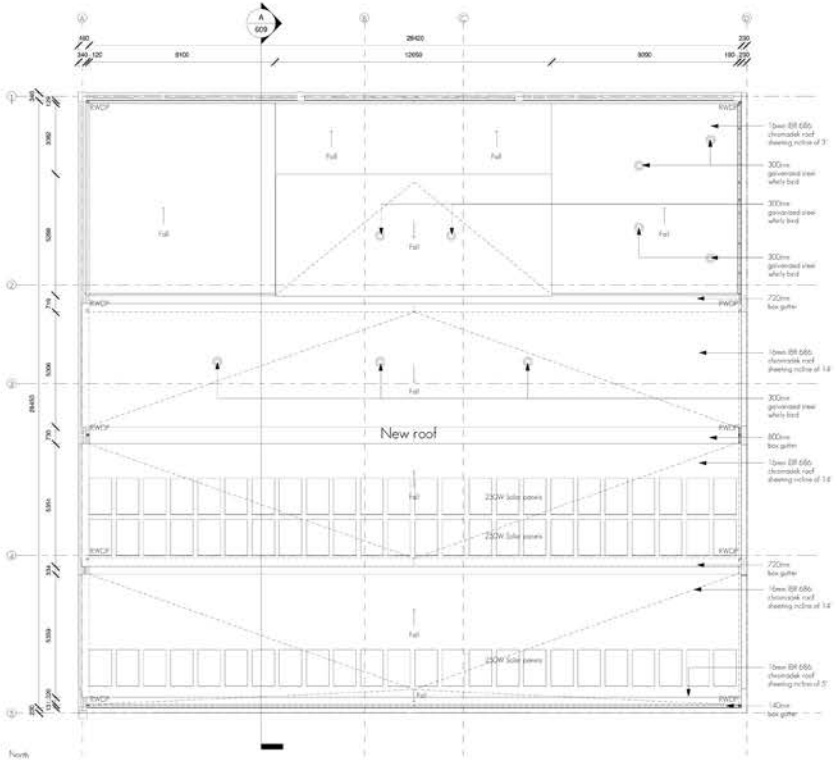
Detail 1 - New roof

Sketch development

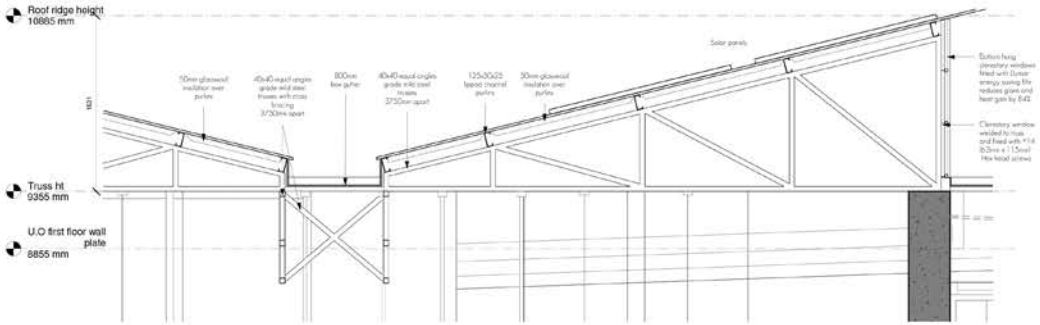




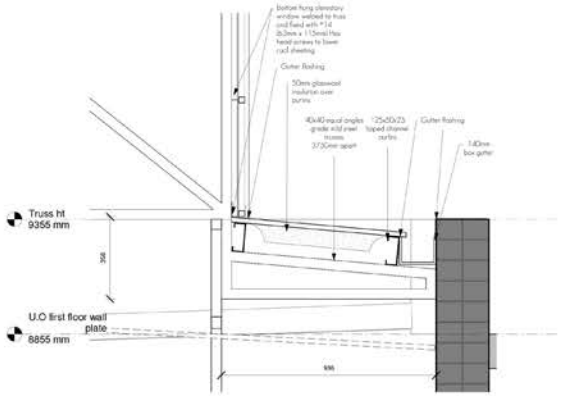




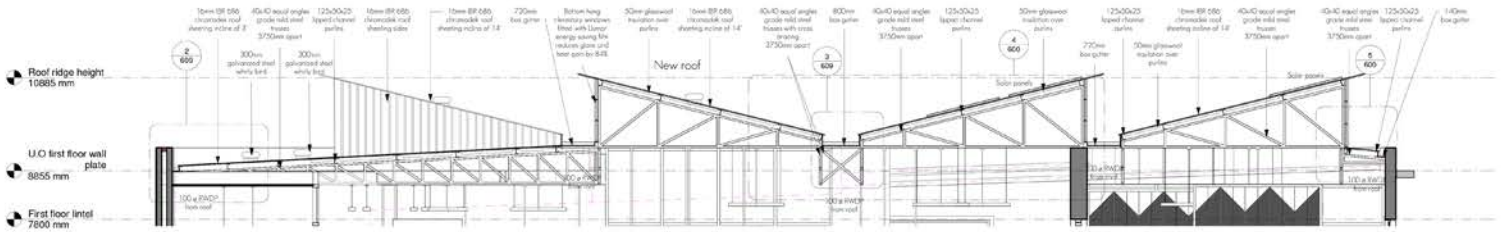
① Detail 1 - New roof plan
Scale 1:100



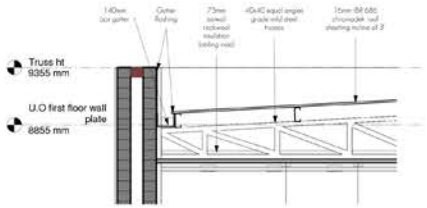
④ Detail 1 - Butterfly roof truss
Scale 1:20



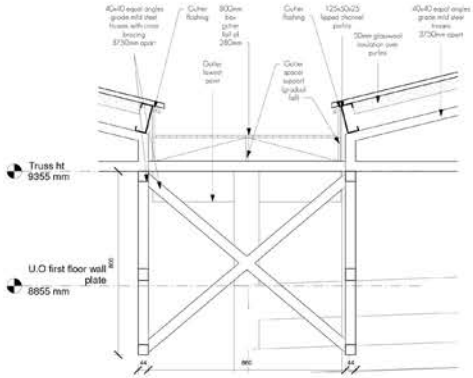
⑤ Detail 1 - Roof gutter (south) detail
Scale 1:10



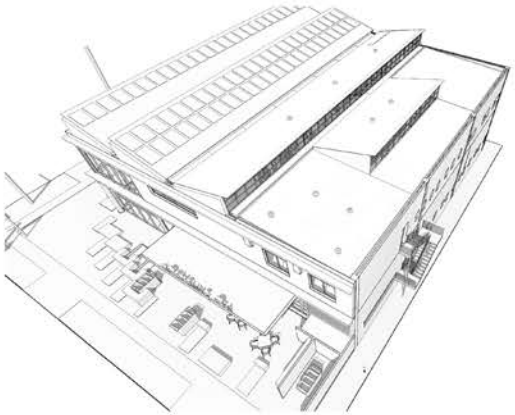
A Detail 1 - Roof section A
Scale 1:50



2 Detail 1 - Roof gutter (north) detail
Scale 1:20



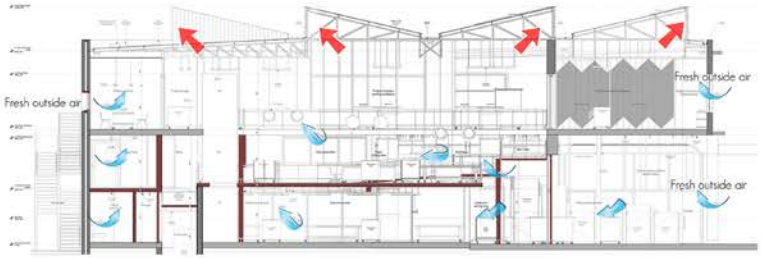
3 Detail 1 - Butterfly roof gutter
Scale 1:10



5 Roof perspective

Interior roof perspective

Natural ventilation system

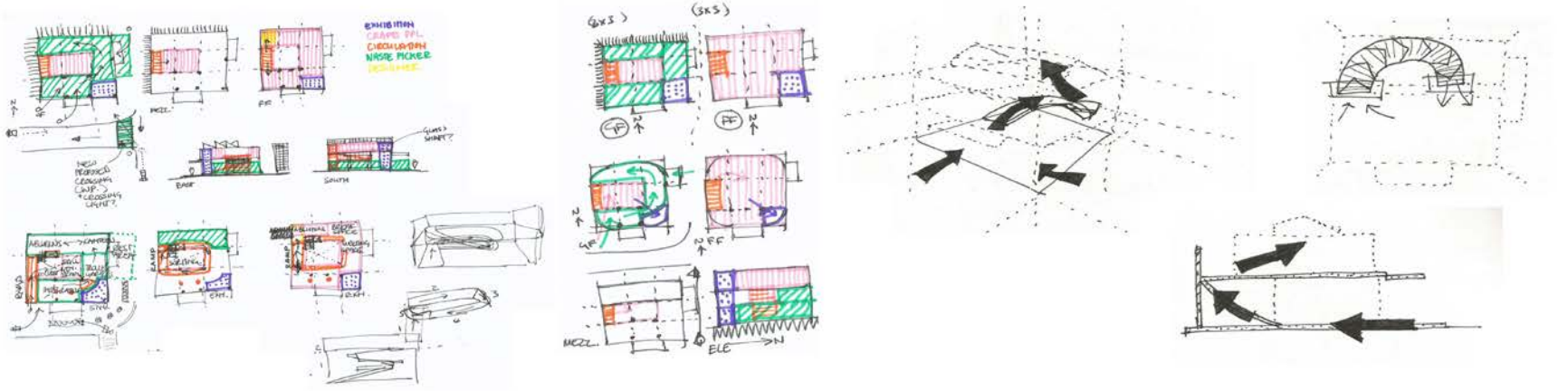


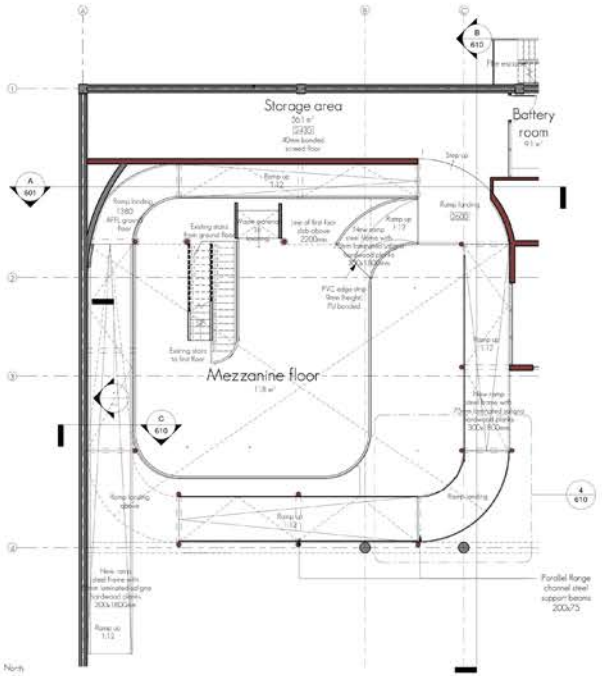
Displaced hot air is exhausted out through whirly birds and bottom hung windows placed along the roof lights (entire width of the roof structure). See roof detail 1

Outside air enters from the large open ground floor space and rises as it heats up through the building volume.
There is air movement around the south and eastern facades of the building due to the active roads (Bosman and Visagie Streets).

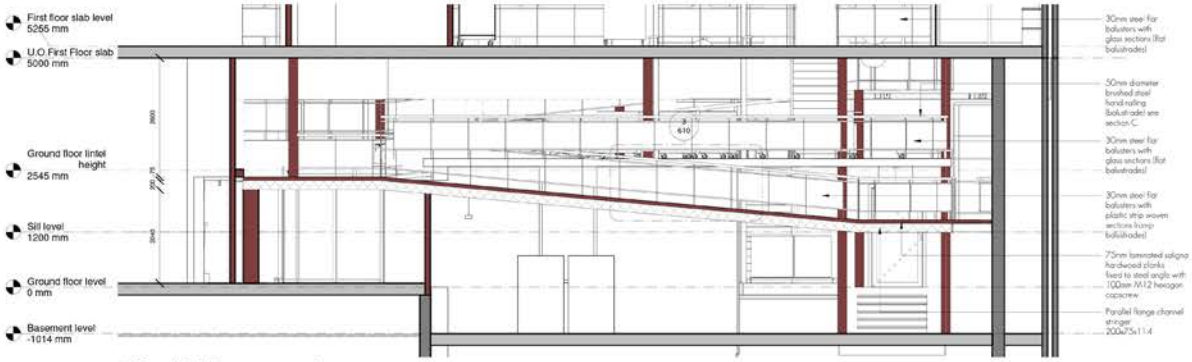
Detail 2 - New ramp

Sketch development

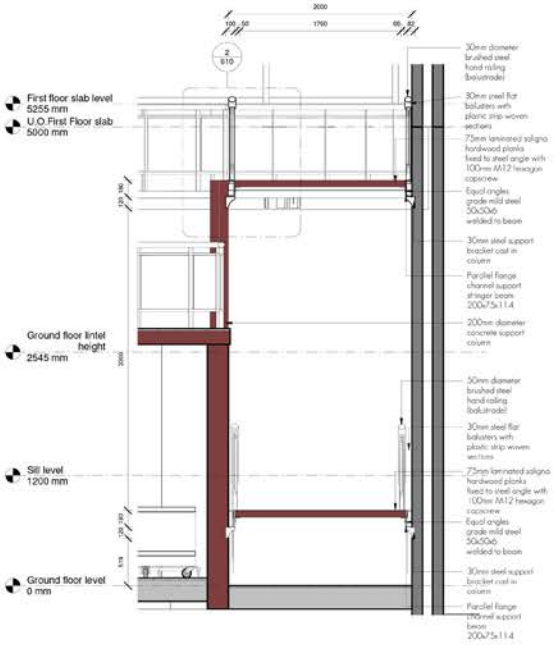




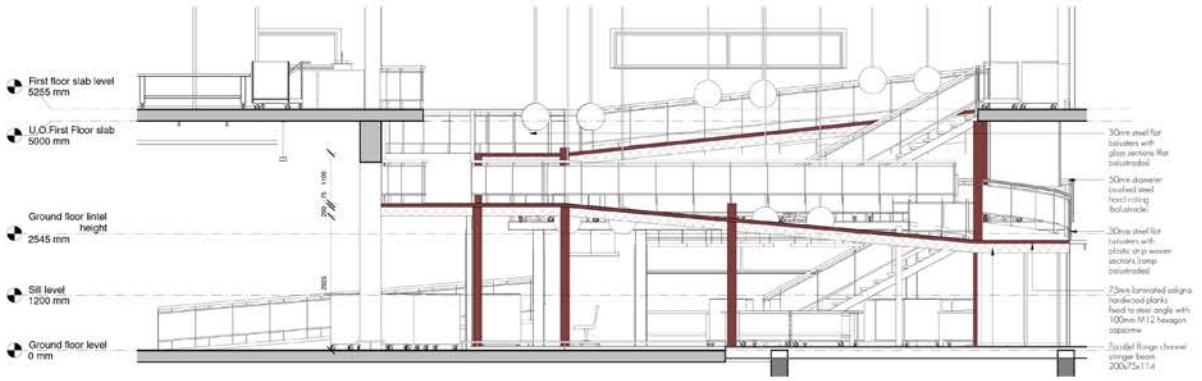
① Detail 2 - New ramp plan
Scale 1:100



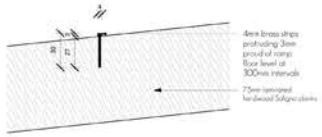
Ⓐ Detail 2 - Ramp section A
Scale 1:50



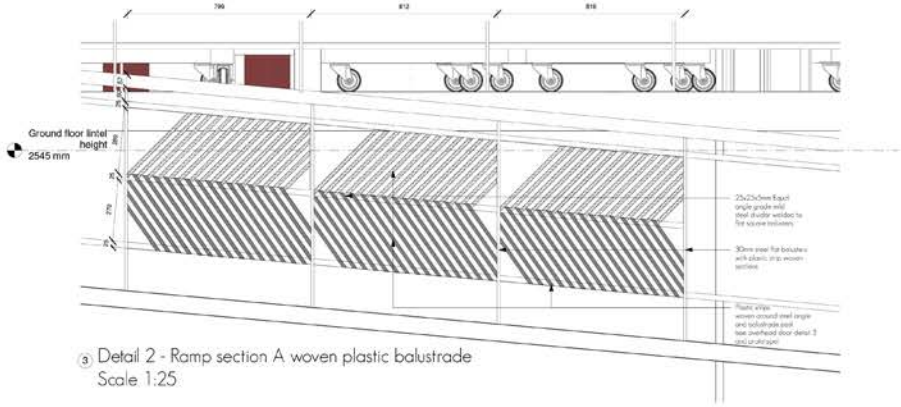
Ⓒ Detail 2 - Ramp section C
Scale 1:25



Ⓑ Detail 2 - Ramp section B
Scale 1:50

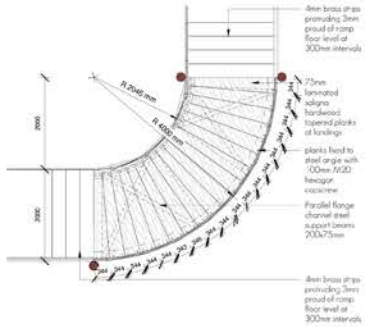


Ⓓ Detail 2 - Ramp brass strip inlay detail
Scale 1:2

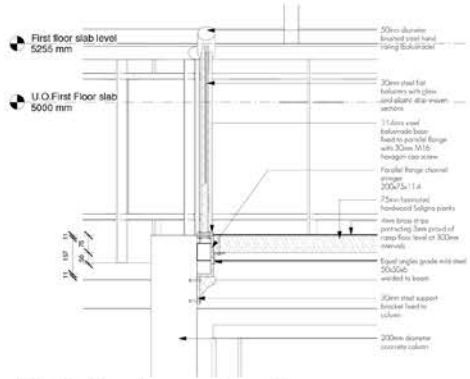


③ Detail 2 - Ramp section A woven plastic balustrade
Scale 1:25

Ramp perspective



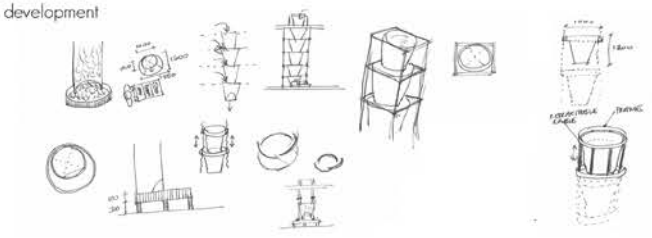
④ Detail 2 - Ramp landing
Scale 1:50

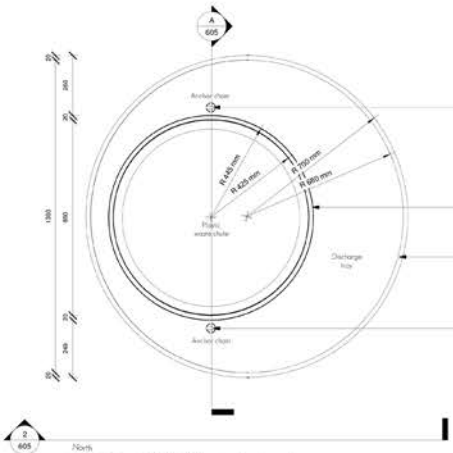


② Detail 2 - Ramp stringer and support beam
Scale 1:10

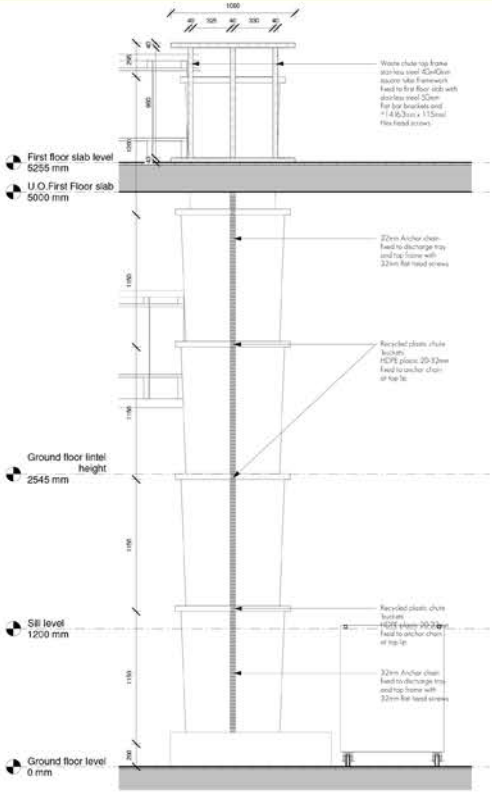
Detail 3 - New waste chute

Sketch development

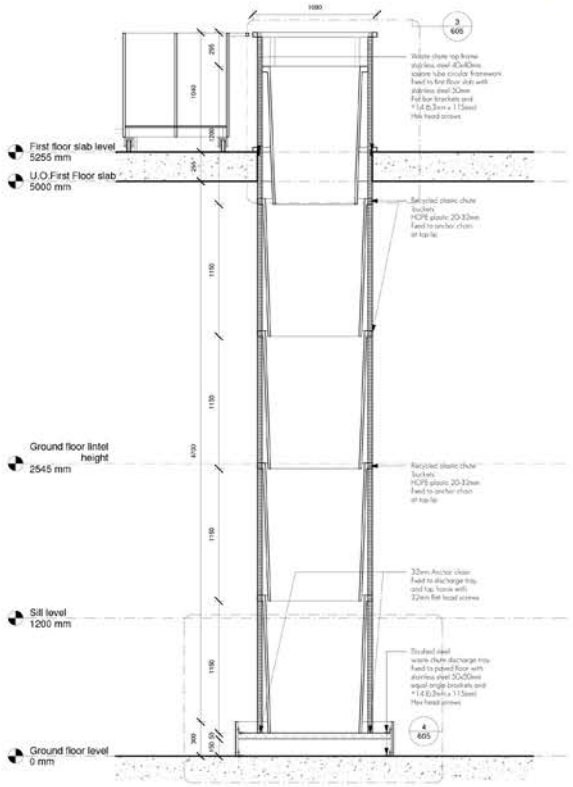




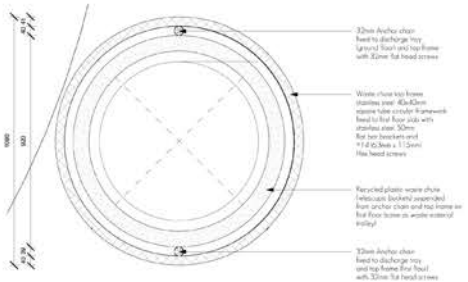
Detail 3 - Waste chute plan
Scale 1:10



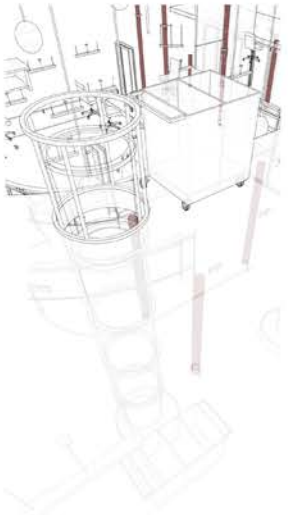
② Detail 3 - Waste chute elevation
Scale 1:20



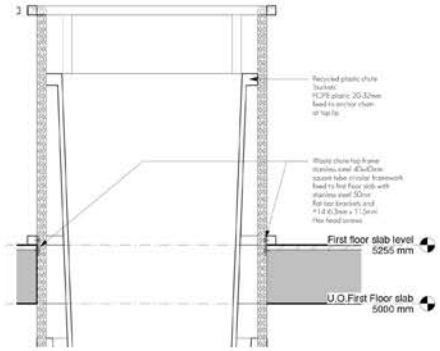
Ⓐ Detail 3 - Waste chute section A
Scale 1:20



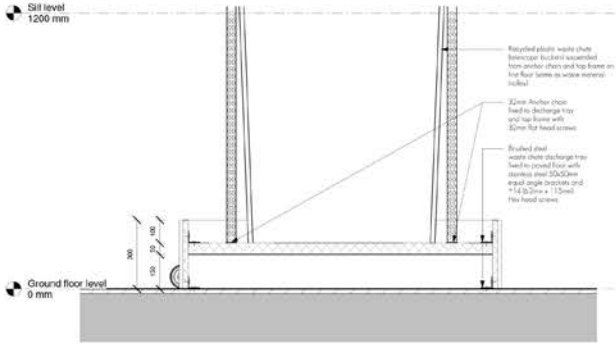
⑥ Detail 3 - Waste chute top frame plan
Scale 1:10



⑤ Waste chute perspective



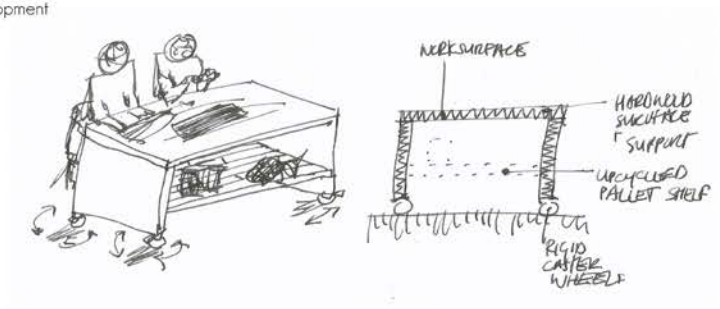
③ Detail 3 - Waste chute top frame
Scale 1:10

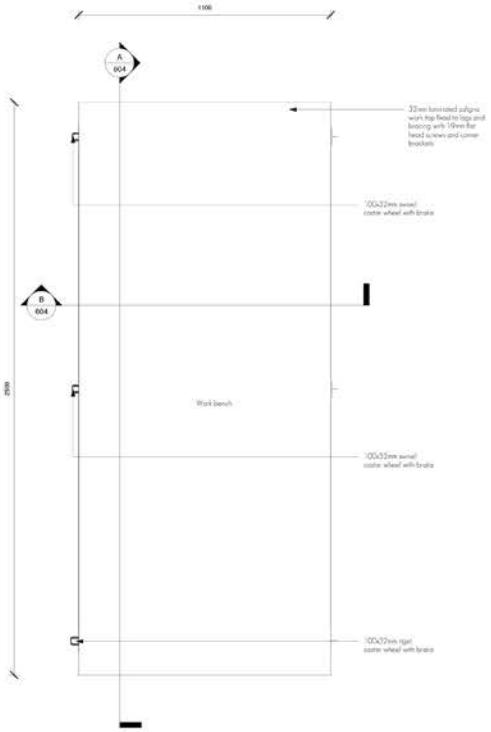


④ Detail 3 - Waste chute discharge tray
Scale 1:10

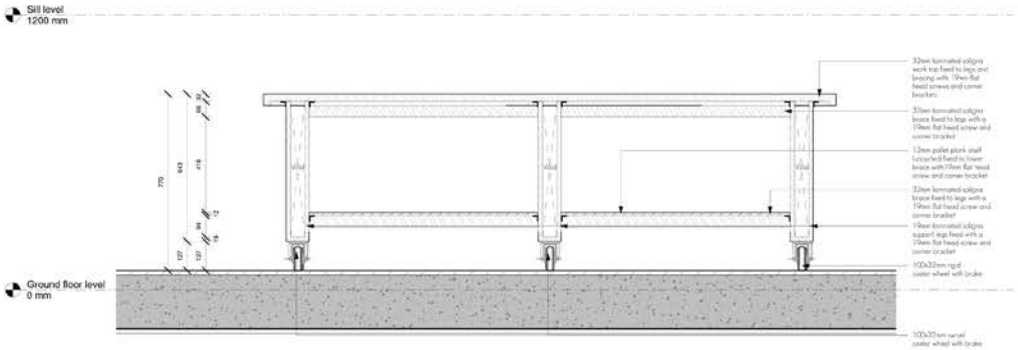
Detail 4 - New work bench

Sketch development

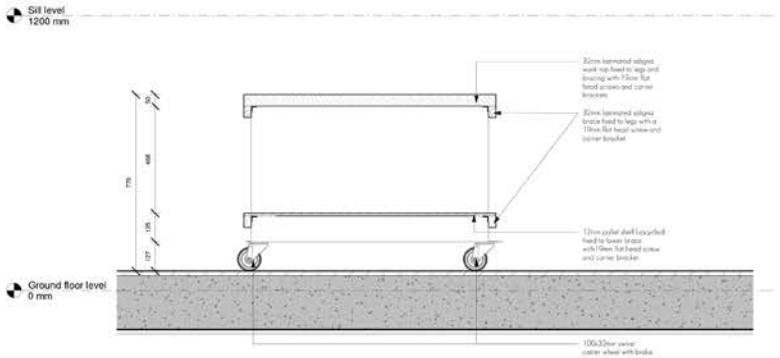




① Detail 4 - Work bench plan
Scale 1:10



Ⓐ Detail 4 - Work bench section A
Scale 1:10

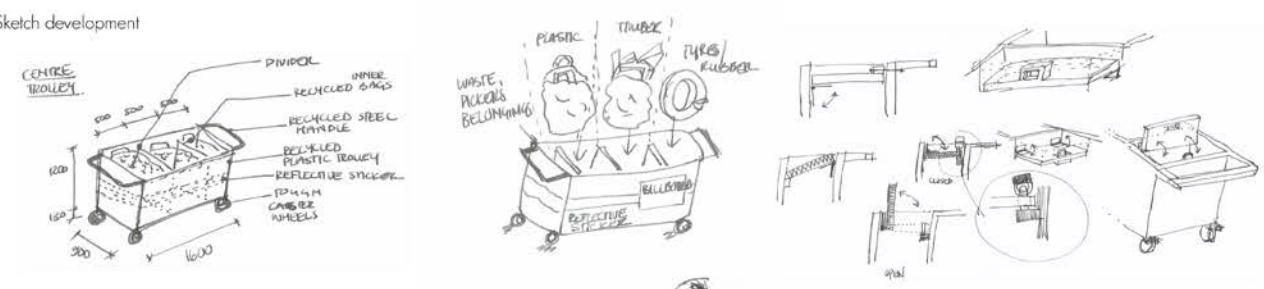


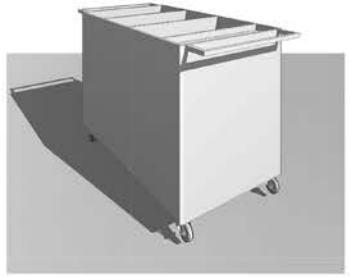
Ⓑ Detail 4 - Work bench section B
Scale 1:10

② Work bench - Perspective

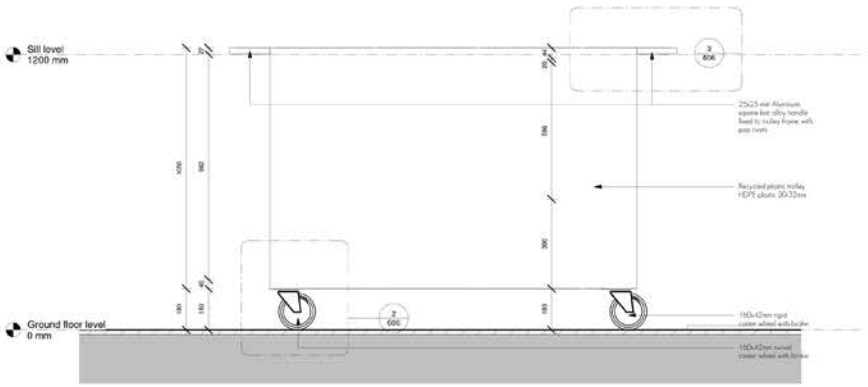
Detail 5 - New trolley

Sketch development

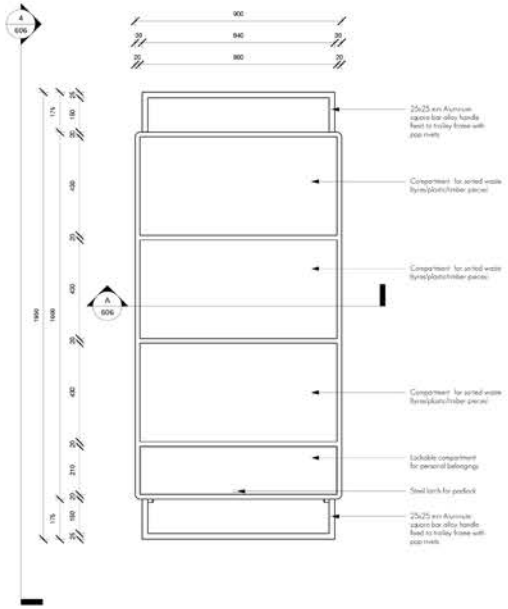




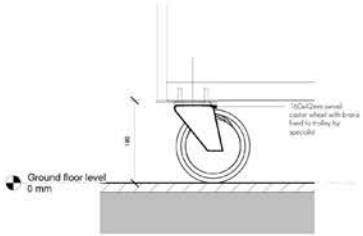
⑤ Waste material trolley perspective



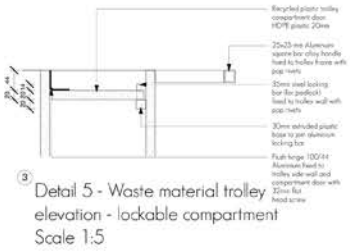
④ Detail 5 - Waste material trolley elevation
Scale 1:10



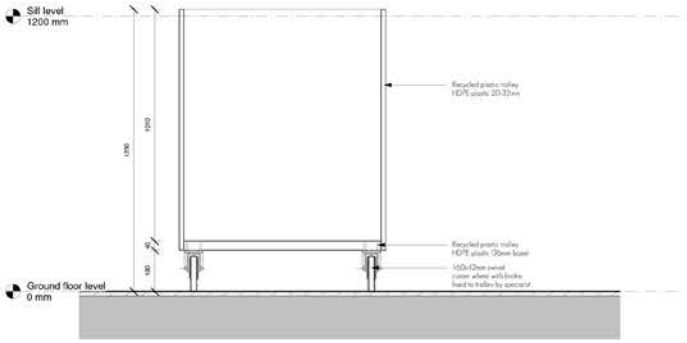
① Detail 5 - Waste material trolley plan
Scale 1:10



② Detail 5 - Waste material trolley - wheel detail
Scale 1:5



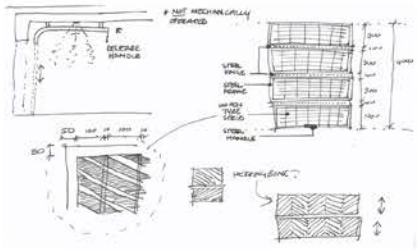
③ Detail 5 - Waste material trolley elevation - lockable compartment
Scale 1:5

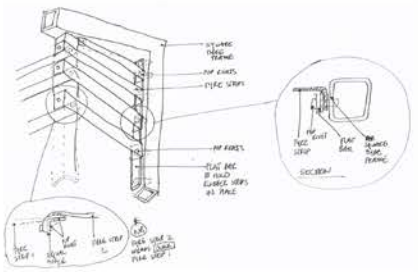


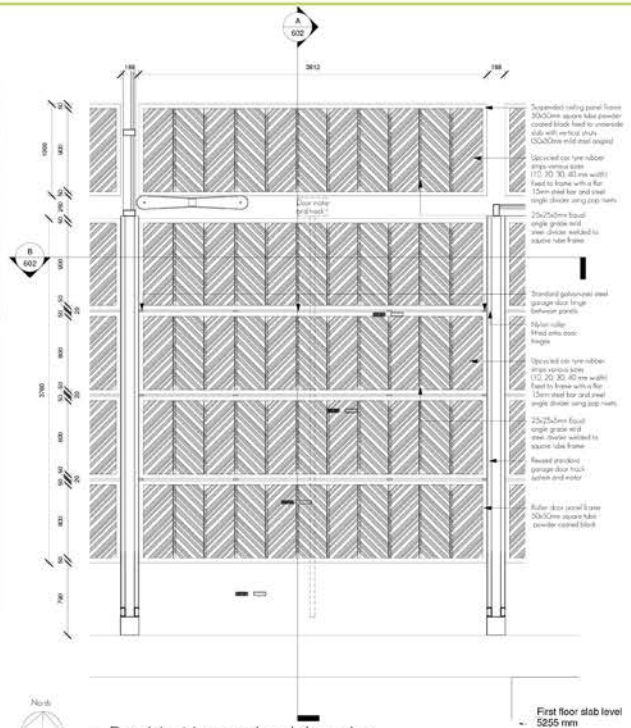
Ⓐ Detail 5 - Waste material trolley section A
Scale 1:10

Detail 6 - New overhead door

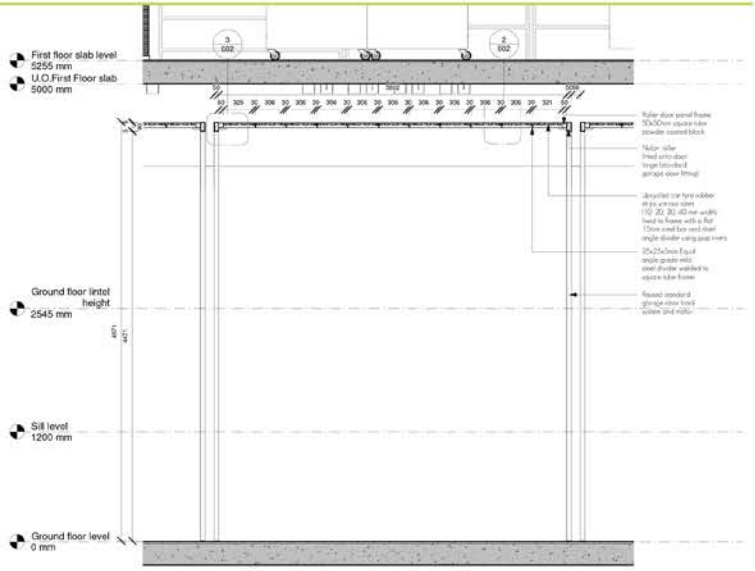
Sketch development



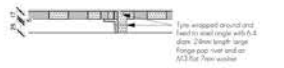




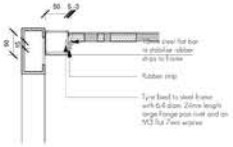
① Detail 6 - New overhead door plan
Scale 1:25



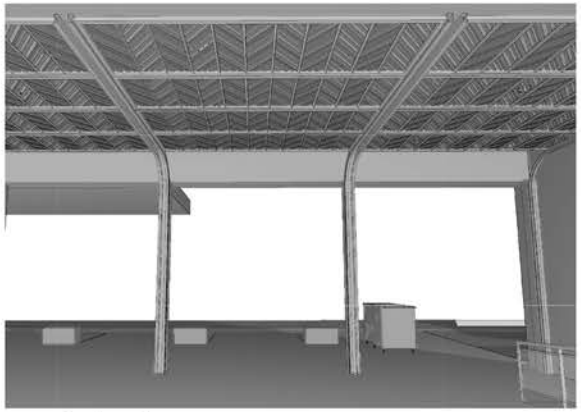
Ⓑ Detail 6 - Overhead door section B
Scale 1:25



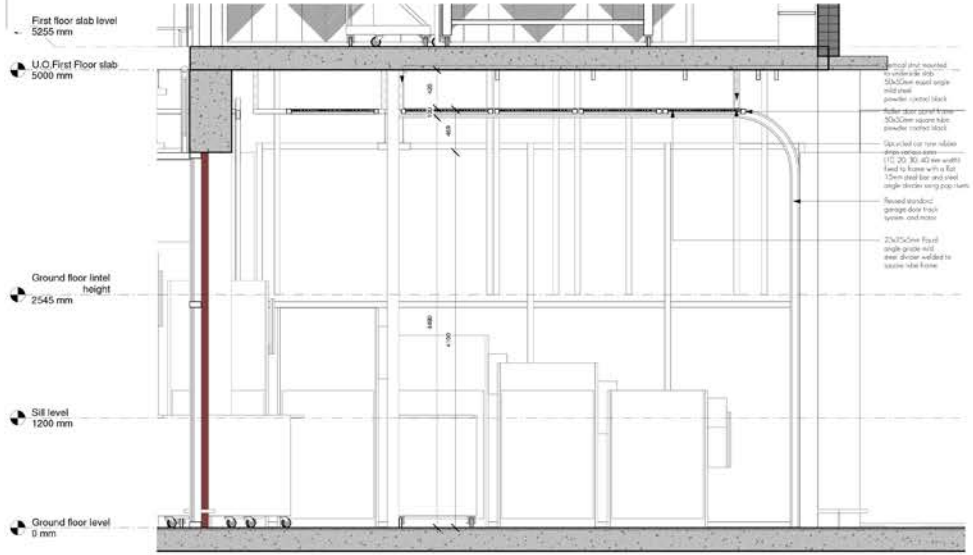
② Detail 6 - Overhead door rubber
fixing detail 1
Scale 1:5



③ Detail 6 - Overhead door rubber
fixing detail 2
Scale 1:5



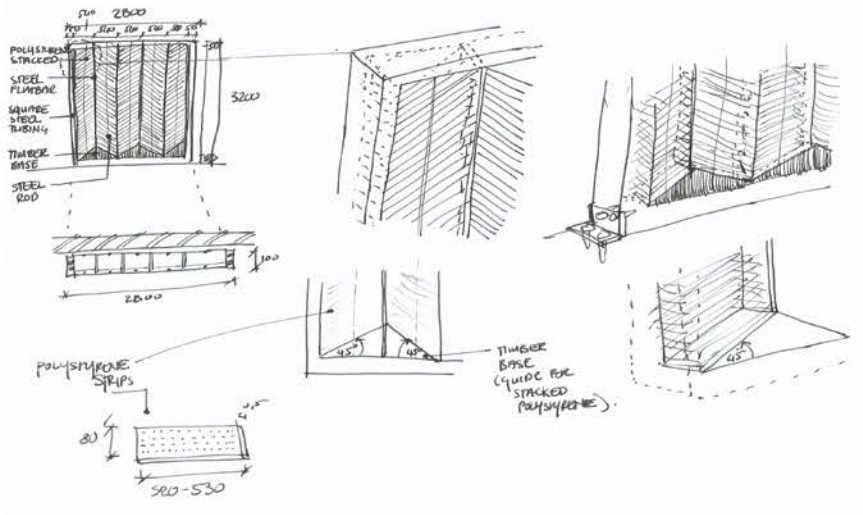
④ Overhead door perspective

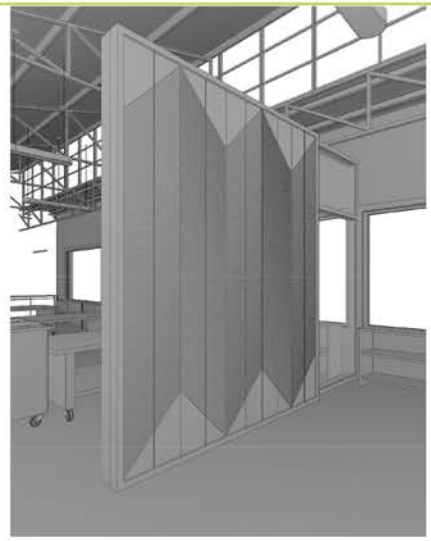


Ⓐ Detail 6 - Overhead door section A
Scale 1:25

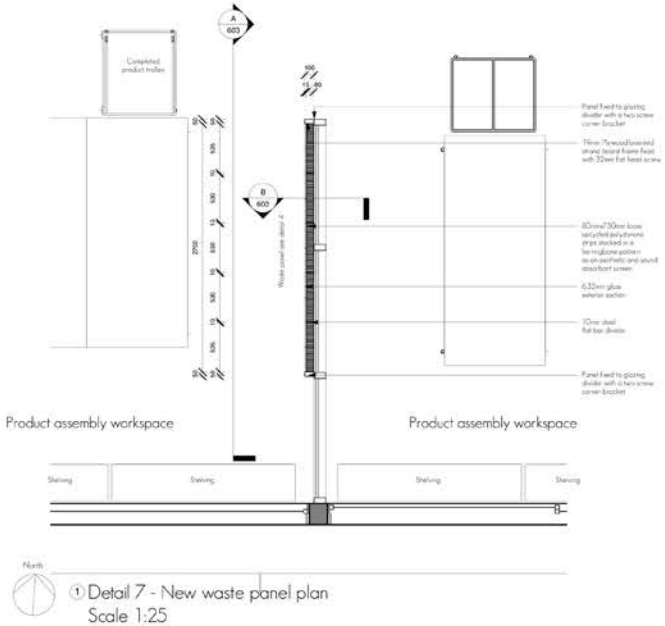
Detail 7 - New waste panel

Sketch development

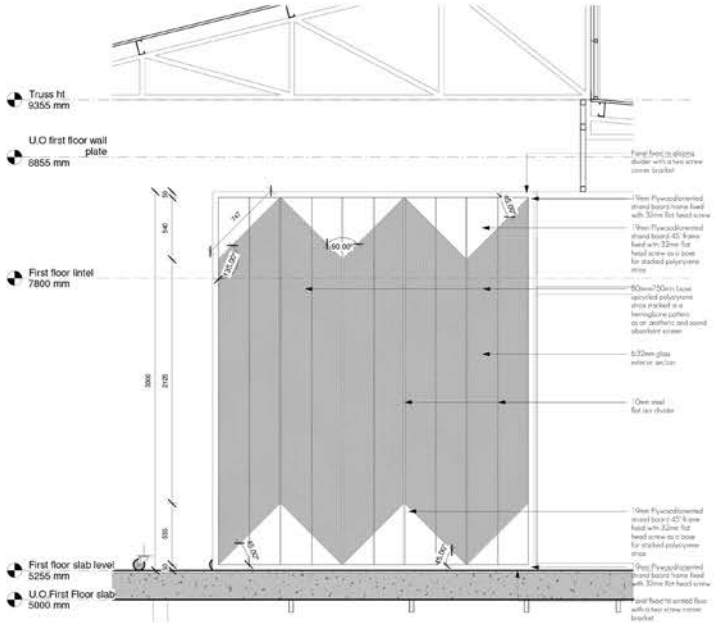




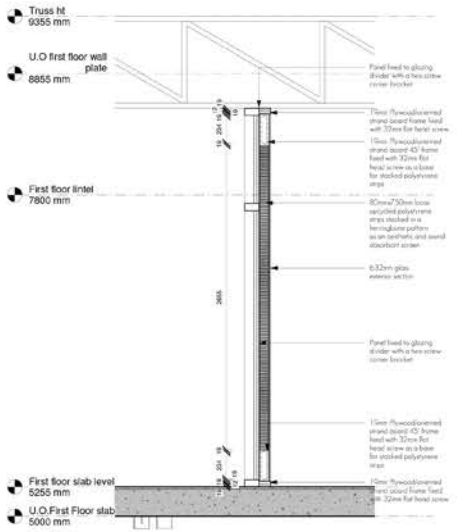
② Waste panel perspective



① Detail 7 - New waste panel plan
Scale 1:25



Ⓐ Detail 7 - Waste panel section A
Scale 1:20



Ⓑ Detail 7 - Waste panel section B
Scale 1:20

Innovation

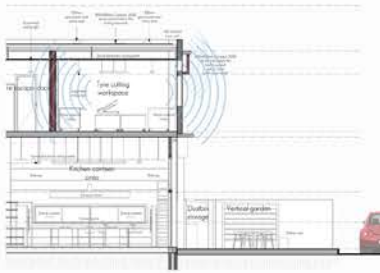
Greenwall

Golden Pothos fern | Rabbits Foot fern | The Boston fern | An example of the green wall

Plants selected for the green wall must have a high tolerance for survival. Therefore, the plants are selected according to the climatic zone in which the wall frame is installed. In other words, Pretoria is situated in the temperate interior zone and plants for the green wall are selected based on what best grows in this climate. The ground floor green wall in the upcycling centre is mostly in the shade, with the first floor receiving sun and partial shade. Suitable plants for this climate and level of sunlight, namely species such as the Boston fern, Golden Pothos and Rabbits Foot fern. All these plant types prefer well-watered acidic soil or structural media (i.e. growth medium blocks) and can thrive in partial shade. The Golden Pothos is also a highly ranked plant that removes VOC's from the air (Wallgarden, 2017).

The irrigation system is recommended to use 2-5L/m^2 per day. The green wall area is roughly 130m^2 and therefore the water requirement is about 260-650L per day. This can easily be gained from the harvested rainwater.

Sound transmission loss



Sound emitted during cutting of tyres and timber:
1. Grinder: 91 dB (average)
2. Jigsaw: 86 dB (average)

Sound transmision loss is achieved through:
1. PG Smartglass X2 double glazed windows with a reduction of 31 dB (PG buildinggloss,2017).

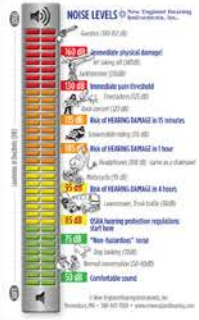
2. Isowall Rock Wool panels in ceiling and wall cavities with a reduction of 30 dB for a 75mm wool panel (Isowool, 2017).

3. Workbenches and solid core doors have rubber gaskets and pads to eliminate vibration from cutting and prevent sound from travelling through the floor slab.

Comfortable sound is at 50-60 dB.
'Non hazardous noise' is 75 dB.
Risk of hearing damage in 4 hours is 85 dB.
Risk of hearing damage in 1 hour is 105 dB (newenglandhearing,2017).

Therefore the grinder noise of 91 dB (average) can be reduced to:
91 dB
- 31 dB (double glazed windows)
- 30 dB (Isowool acoustic panels)
+ 60 dB (normal conversation)

The Jigsaw noise of 86 dB (average) can be reduced to:
86 dB
- 31 dB (double glazed windows)
- 30 dB (Isowool acoustic panels)
+ 51 dB (normal conversation)



Green Star rating tool

GREEN BUILDING COUNCIL

Score Sheet
Green Star SA - Interiors v1

Credit	Credit Name	Aim of Credit	Points Available	Points scored	Credit criteria
Management Category					
Int-Man-1	Green Star SA Accredited Professional	To encourage and recognise the engagement of professionals who can assist the project team with the integration of Green Star SA aims and processes throughout all stages of a tenant's design and construction phases.	1	1	
Int-Man-2	Commissioning & Tuning	To recognise effective commissioning and tuning processes during a project's design and construction phase that ensure all services and installations can operate to their optimal design potential.	2	1	
Int-Man-3	Occupant Users' Guide	To encourage and recognise the provision of information to tenant owners and users that helps them understand a project's systems, environmental attributes, and maintenance requirements.	1	1	
Int-Man-4	Environmental Management	To encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction.	1.5	0	
Int-Man-5	Construction Waste Management	To recognise and encourage management practices that minimise the amount of demolition and construction waste going to disposal.	2	2	
Int-Man-6	Work space efficiency	To recognise the design of workspaces that provide spatial efficiency and improve productivity and occupant performance.	2	2	
Int-Man-7	Green Lease	To recognise and encourage collaboration between the building owner and tenants in order to manage and operate the building along environmentally sustainable principles whilst realising mutual benefit.	2	1	
Int-Man-8	Learning Resources	To encourage and recognise sustainability initiatives implemented in the development as learning resources for building users and visitors	1	0	
Management credits			**12.5**	**8**	
Indoor Environmental Quality Category					
Int-IEQ-1	Quality of Internal Air	To encourage and recognise projects that provide high quality air to occupants.	4	3	
Int-IEQ-2	Thermal Comfort	To encourage and recognise Tools that achieve a high level of thermal comfort.	2	2	
Int-IEQ-3	Lighting Comfort	To encourage, recognise and reward well-lit spaces that provide appropriate levels of lighting, comfort to occupants.	3	2	
Int-IEQ-4	Visual Comfort	To recognise the delivery of well-daylit spaces that provide high levels of visual comfort and views to fit-out occupants.	3	2	
Int-IEQ-5	Acoustic Quality	To encourage and recognise buildings that are designed to provide appropriate acoustic qualities to enable the functionality of the space.	3	2	
Int-IEQ-6	Reduced Exposure to Air Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	5	4	
Int-IEQ-7	Mould Prevention	To encourage and recognise the design of services that eliminate the risk of mould growth and its associated detrimental impact on occupant health.	0.5	0	
Int-IEQ-8	Ergonomics	To recognise the choice of equipment and design of spaces that promotes wellbeing, efficiency and effectiveness	2	2	
Int-IEQ-9	Indoor Plants	To encourage and recognise the installation of indoor plants that improve indoor environment quality and also provides occupants with a connection to nature.	1.0	1	
Indoor Environmental Quality credits			**23**	**18**	
Energy Category					
Int-Ene-1	Greenhouse Gas Emissions	To encourage and recognise projects that minimise the greenhouse gas emissions associated with tenant fit outs	12	5	
Int-Ene-2	Electrical Sub-metering	To encourage and recognise the installation of electrical energy sub-metering to facilitate on going management of electrical energy consumption.	2	1	
Energy credits			**14**	**6**	
Transport Category					
Int-Tra-1	Commuting Mass Transport	To encourage and recognise developments that select a site near public transport and facilitate the use of mass transport	1	1	
Int-Tra-2	Local connectivity	To encourage and recognise projects that are located within walking distance of high quality amenities such as shops and parks, thus reducing private vehicle use and the associated negative environmental impacts.	1	1	
Int-Tra-3	Alternative Transport	To encourage and recognise projects that promote and facilitate the use of alternative modes of transport over the use of private cars.	2	2	
Transport credits			**4**	**4**	
Water Category					
Int-Wat-1	Potable Water	To recognise projects that minimise potable water consumption	6	6	
Int-Wat-2	Water Sub-metering	To encourage and recognise the installation of sub-metering to facilitate on-going management of water consumption	2	1	
Water credits			**8**	**7**	
Materials Category					
Int-Mat-1	Operational Waste Management	To encourage and recognise developments which include space and an operational waste management plan that facilitates the recovery of resources used within the development to reduce waste going to disposal	2	1	
Int-Mat-2	Furniture	To recognise the selection of fit out furniture that has a reduced environmental impact when compared to available alternatives.	6	6	
Int-Mat-3	Assemblies	To recognise the selection of fit out assemblies that have a reduced environmental impact when compared to available alternatives.	8	4	
Int-Mat-4	Flooring	To recognise the selection of flooring that has a reduced environmental impact when compared to available alternatives.	6	5	
Int-Mat-5	Wall coverings	To recognise the selection of wall coverings that have a reduced environmental impact when compared to available alternatives.	3	2	
Int-Mat-6	Local Sourcing	To encourage and recognise the environmental advantages gained, in the form of reduced transportation emissions, by using materials and products that are sourced within close proximity to the site	2	1	
Int-Mat-7	Sundries Materials Sourcing	To recognise the selection of fit out finishes that have a reduced environmental impact when compared to available alternatives through responsible manufacturing, product stewardship and resource efficient design.	1	1	
Materials credits			**30**	**20**	
Land Use and Ecology Category					
Int-Eco-1	Site selection	To recognise and reward a tenant for selecting their space in a building that reduces their environmental impact due to the building's base building design attributes.	4	2	
Land use and Ecology credits			**4**	**2**	
Emissions Category					
Int-Emi-1	Impacts from refrigerants and insulants	To encourage and recognise developments that minimise light pollution into the night sky.	1.5	1	
Int-Emi-2	Light Pollution	To encourage and recognise the avoidance of substances that contribute to the deterioration and long-term alteration of the Earth's atmosphere	3	2	
Emissions credits			**4.5**	**3**	
Innovation Category					
Int-Inn-1	Innovative Strategies & Technologies	To encourage and recognise pioneering initiatives in sustainable design, process or advocacy.	10		
Int-Inn-2	Exceeding Green Star SA Benchmarks	To encourage and recognise projects that achieve environmental benefits in excess of the current Green Star SA benchmarks.			
Int-Inn-3	Environmental Design Initiatives	To encourage and recognise sustainable building initiatives that are currently outside of the scope of this Green Star SA rating tool but which have a substantial or significant environmental benefit			
Innovation credits			**10**	**6**	
		TOTAL POINTS AVAILABLE	**100**	**74**	

UPCYCLING PTA

The Upcycling Centre branding is shown in the following images of Trolleys and uniforms which are given to the waste pickers (in-line with the member based organization).
The branding aims to promote supporting partners, sponsors and resident designers occupying the Upcycling Centre building, as mobile advertising and an awareness campaign.
Trolleys and uniforms are equipped with refelective tape to increase their visibility during sunrise or sunset as research has shown waste pickers are in danger from motorists during these times.

Profits from advertising go towards the meal preparation in the canteen and running costs of the Upcycling Centre.

Trolleys

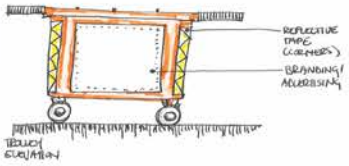


Image source:
https://www.news24.com/SouthAfrica/News/sowetan-entrepreneurs-fresh-take-on-trash-collection-20160419

Image source:
https://amaphiko.redbull.com/en/projects/abomakgereza-recycling-hustlers

Uniforms

Image source:
http://uncoventionalmediacoza/uvw/
https://workingperson.com/bulwark-mens-fr-deluxe-reflective-blue-orbit-rb-coveralls.html

Study conclusion

This study aimed to knit together conditions informing a framework design addressing income generation and skills development, cultural production in taste-making, furniture making and waste upcycling. This desired outcome aligns with a normative position of human upliftment through interior design ecology and social systems, as presented in the study. The value of upcycling and product reuse in the chosen context, namely the Pretoria CBD, is illustrated by the statistics of high unemployment levels, the high rate of current waste picker work force reporting limited education and the low amounts of recycled waste in the city.

The following conclusions were realised through research and exploration into the social stability the upcycling centre can offer:

- Through this intervention's creative reuse of existing materials, collaboration and social inclusion of waste pickers, cohesive human capital cultivation is achievable.
- The social role of an upcycling facility is therefore a conduit towards and framework for developing human capabilities that are currently ignored. This, in turn, can result in an injection of employable and self-confident people into the manufacturing and recycling industry, thereby boosting local economy and trade.
- The circulation and movement between programme and user groups in the centre is important, because the integration of users as part of a larger system can work to enrich such users' self-worth and economic standing. This movement can also positively influence the surrounding environment that is at the centre of the design hierarchy.

The following theoretical principles were applied to the upcycling centre:

- Environmental psychology informs the spatial proximity and user behaviour to a dialogue with the building. Social inclusion and a sense of place is what guides the spatial elements as a means of responding to or counteracting the noted social inferiority to which waste pickers are currently subjected.
- Adaptive reuse of the current building is based on permeability and transparency of activity and user. This is to ensure that users are visually accessible and connected from one floor to the next, which establishes a sense of belonging and value within the upcycling process. Such connectedness is achieved through the linked collaborations between users.
- Adaptive reuse of the building also informs the basis for adapting the structure either as a permanent or temporal alteration. This has been illustrated through such interventions and inclusions as a new ramp, mezzanine level and roof.
- Regenerative architecture is the underpinning for an ecological and energy efficient approach to the alteration of the current Minty's Tyres building. This is discussed through the addition of natural lighting and ventilation strategies, rain water harvesting, renewable energy generation and material reuse throughout the structure.

The upcycling applied in this proposal has the potential to improve the users, programme and building in response to current conditions and contextual surroundings. The upcycling centre can also provide (or at least attempt to provide) the waste pickers and broader Pretoria CBD community with a sense of hope and better quality of life.

I would like to thank Antonette, Leandra and Laurika for their kind support through this year.

To my parents for their patience and enthusiasm.

To Raven, Jessy, Baz and Skullprit for their encouragement, and lastly to my wonderful study leader Zakkiya, thank you for your guidance.