Waste to Worth
Adaptive re-use of recycled waste in existing structures

Master Thesis explanatory document

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ABSTRACT

For architects material selection is one of the most crucial choices faced when designing. They clothe their creations, offering protection and shelter, ultimately setting the tone and appearance of a building. Generic building materials such as plaster, timber and concrete, clad and coat the majority of buildings within our cities: but this does not need to apply to all buildings.

Waste materials such as scrap metals, plastics, rubber and other products are generated in substantial quantities everyday. Architects have the ability to change how materials are used offering the opportunity to re-use and recycle waste materials efficiently and expressively through building design.

The concept of recycling waste doesn’t just apply to materials, but also to buildings themselves. Architecture needs to allow for change in use otherwise there is a risk of demolition, creating further waste. When designing buildings it is necessary to think beyond the current designated use of a building. Future adaption is critical for all architecture because if a building doesn't have the ability to change use it risks facing demolition. The concept of radical reconstruction implies a situation in which it is not clear what needs to be done. This project will explore the potential of adaptive re-use of an existing building using only waste materials that are predominately sourced from the surrounding sites.
KEY DEFINITIONS

Disguise

Lebbeus Woods describes disguise as; the masking of reality in every society. One of the three elements that effect architecture today.¹

Free Spaces

Defined by Lebbeus Woods; the spaces that are free from the conventions of society, with no specified programme and free from traditional conventions of occupying space.²

Re-use

When elements are minimally reprocessed and reinstalled in a building without having to be remanufactured³

² Ibid
³ Sassi, Study of current building methods that enable the dismantling of building structures and their classifications according to their ability to be reused, recycled or downcycled.
LIST OF FIGURES

Figure 3.1: Standard Movement-typologies from “Labyrinths, Mazes and the Spaces Inbetween” - http://bldgblog.blogspot.co.nz/2010/04/switching-labyrinth.html
Figure 3.2: Adjusted movement-typologies - http://bldgblog.blogspot.co.nz/2010/04/switching-labyrinth.html
Figure 4.1: Multiple images of Masons Bend Windshield Chapel - http://forrestfulton.com/masons-bend-community-center/
Figure 4.2: Multiple images of Drop City buildings - http://prismofthreads.blogspot.co.nz/2013/05/drop-city.html
Figure 4.12: BEST Product store - http://sitenewyork.com/projects/best/best01.htm
Figure 4.13: BEST product store - http://sitenewyork.com/projects/best/best01.htm
Figure 4.14: BEST product store - http://sitenewyork.com/projects/best/best01.htm
Figure 5.1: Location map of Auckland
Figure 5.2: Site map of building
Figure 5.3: Access to site by rail and road
Figure 5.4: Site surrounding Scrap steel building
Figure 5.5: Site Surroundings
Figure 5.6: Site Surrounding Building
Figure 5.7: Existing building front façade
Figure 5.8: Existing Building floor plan
Figure 5.9: Typography site plan
Figure 5.10: Typography site section
Figure 5.11: Scrap container storage
Figure 5.12: Plastic recycling
Figure 5.13: Scrap steel yard
Figure 5.14: Existing site
Figure 6.1: Building's dominant axis
Figure 6.2: Building's current journey line
Figure 6.3: Design exploration, building break
Figure 6.4: Design exploration, building break
Figure 6.5: Design exploration one plan
Figure 6.6: Design exploration one external sketch
Figure 6.7: Design exploration one section sketch
Figure 6.8: Design exploration one external sketch
Figure 6.9: Design exploration two plan, lower level
Figure 6.10: Design exploration plan upper level
Figure 6.11: Design exploration two internal sketch
Figure 6.12: Design exploration two plan, lower level
Figure 6.13: Design exploration two plan, upper level
Figure 6.14: Design exploration two external sketch
Figure 6.15: Design exploration three plan
Figure 6.16: Design exploration three model photos
Figure 6.17: Developed design exploration three plan
Figure 6.18: Design exploration three model image
Figure 6.19: Design Exploration internal section
Figure 6.20: Internal section of journey
Figure 6.21: Design exploration three entrance
Figure 6.22: Detail of typical internal sleeping layout
Figure 6.23: Diagram of hot air box
Figure 6.24: Design exploration three roof intervention
Figure 6.25: Photographs of model showing external facade development
Figure 6.26: Photographs showing public space external openings
Figure 6.27: Model overview

Figure 10.1: Existing Building front facade
Figure 10.2: Existing building internal view
Figure 10.3: Existing building, southern edge
Figure 10.4: Existing building internal view
Figure 10.5: Existing internal structure
Figure 10.6: Site plan
Figure 10.7: Site surrounding recycling plants
1.0 INTRODUCTION
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1.1 Research Question

How to address the issue of recycled materials/waste being used as building elements? How can these materials be re-used in an innovative architectural manner.

1.2 Objectives

With the current population growth rate in Auckland, predicted to rise by an extra 500,000 people by 2031⁴, the need for future expansion and intensification in urban areas is inevitable. This project will address an existing building within South Auckland and look at how its function can be transformed using as much waste material as possible. This will offer a more sustainable method of adaption and construction, having the potential to create interesting spaces internally and externally through the combination of the existing structure and the contrast of new material qualities.

After some time a building’s use may become out dated and inadequate. In these cases the exploration of changing a building’s function or programme is a very real architectural problem. This project will transform a building’s current use into a new program that will benefit the wider community. It will also explore how to treat waste materials in a new manner, reducing the need for recycling and landfill.

1.3 Scope

The scope of the project was to redesign an existing building to house a different role(s) from its original purpose. The new additions and interventions to the existing fabric will be created from waste materials. The research by design will explore new construction techniques linking art and architecture and testing the efficiency of building with non-conventional materials.

This project seeks to address the issue of how to express raw materials in a bold way that gives an existing structure new life and meaning, as well as prolonging the life span of materials and buildings. The project’s site is situated in the city of Auckland for a number of reasons. Mainly to help contain the large urban spread of the city. Auckland’s urban sprawl has continued to expand outwards over many years resulting in a 30% loss of productive farming land over 30 years.⁵ Projections of population growth for Auckland anticipate an extra million people to be living within the city in the next 30 years.⁶ This means the future development of the city needs to be carefully planned, preventing the loss of further farmable land and stopping further urban sprawl. This can be achieved by building up rather than out, utilizing vacant spaces and most importantly by renewing dead structures.

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⁵ NZ must stop urban sprawl to protect farmland, http://tvnz.co.nz/national-news/nz-must-stop-urban-sprawl-protect-farmland-5312370
2.0 PROJECT STRUCTURE

2.1 Literature research

In order to establish ways of using waste materials as architectural elements a literature study of past examples was carried out to understand the ways and approaches previously used to execute a project of this nature. As the topic is relatively unexplored, there are no built precedents known to the writer that embrace all attributes covered in this study, although there are some that could be considered to make use of one or two similar architectural strategies.

2.2 Site investigation

An in-depth site investigation was crucial for this project as the surrounding facilities are a direct driver of the project. What occurs in the immediate context related to the activity of the building. A thorough understanding of the selected building’s previous uses and purpose also contributed factors to the new design and to the program formulated for the adaptive re-use of the building.

2.3 Design Research

The development of a design itself is perhaps the most crucial part of the research, as it involves a personal interpretation and translation of theories into something closer to an actual building. This process involves not only the application of the strategies derived from precedent studies, but also the solving of general problems arising in any architectural design. These include suitable planning, appropriate material selection and scale, to name only a few. Design exploration explores the limits and potentials of adaptive re-use along with the important characteristics of the existing building. It explores what elements of the building are critical for formulating a new design. The question of how to design for the unknown needed to be addressed by formulating suitable strategies that were fitting for the site and program. This design tested the limits to discover what is achievable and how far the boundaries can be stretched in modern design. The design process was remarkably different from what might have been used for a typical new building, as much of the design work involved working with an existing building and using locally sourced materials as well as re-using any materials removed from the existing structure.
3.0 CURRENT STATE OF KNOWLEDGE
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3.1 Project Overview

The original idea behind this project was to address the issue of adaptive re-use and the converting of a building or structure. Two initial site explorations were abandoned due to the lack of scale and depth they offered. The project quickly gained momentum when a suitable site was found, providing a new direction of exploration. It was surrounded by various recycling plants and a large scrap steel works. The sheer scale of the building also provided the opportunity for extensive planning and architectural opportunities. Integration of non-conventional building styles and materials posed a further challenge to re-designing this building.

The construction and demolition industry in New Zealand accounts for fifty percent of total waste entering our landfills. This figure is ten percent higher than the global average, something the country needs to improve on. The waste materials that are recycled are usually transported overseas, closer to where most manufacturing takes place for example plastics and steel that are exported to Asia and parts of Australia.

The Netherlands is setting the standard, being the most efficient country in re-use/recycling with more than ninety five percent of construction and demolition waste reused or recycled. This is achieved, in part, through high landfill taxes imposed by the government. The lack of new and appropriate landfill sites saw the taxes almost tripled in the 1980’s as a result of this policy.

As a result there are over two hundred thriving companies that deal with the collection of waste material and their re-use or recycling in the Netherlands.

3.2 Recycled Waste within New Zealand

The life span of waste varies depending on the substance and amount of use the material is faced with. What happens to materials at the end of their life span? How can that life span be further explored and invested into something new? An example of this can be seen in the way birds nests are created; old grass, broken straw and branches, are gathered up to form a new structure creating a home for birds and their eggs. How then, can architects apply such techniques to the spaces people inhabit.

The waste situation of this country needs re-evaluating. New Zealand

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8 Plastics New Zealand, Recycling Plastics in New Zealand, 2003,
10 Ibid
should be striving to reduce building related waste firstly, and to complement this by developing a re-use and recycling industry similar to the Netherlands. New Zealand should be using its waste as a resource to manufacture useful materials within this country, rather than sending it to landfill, or shipping it overseas for recycling. This would help address our waste problems, create employment, show the world New Zealand is truly committed to our aim of Zero Waste by 2015,\(^{11}\) rightfully becoming something at least a little closer to “100% Pure New Zealand.”

Developing building resilience can, therefore, be seen as fundamental to reducing construction waste. The promotion of material re-use can significantly extend the life of a material or building component in its existing state, and hence, is preferable to recycling.

### 3.3 Architectural effects

When designing a building, respect and adaption to its surroundings by engaging with the immediate context is standard practice in most designs. Respect for the building’s environmental and economical placement also need to be recognized and acknowledged.

A building site and its context need to be seen as a living organism within its natural environment; they rely on resources and information from the local area in order to be sustainable. Thriving examples are those that are best fitted to their environment due to their strong “energetic and material engagement with place, and an interdependent relationship to it.”\(^{12}\) A building should be environmentally, economically and culturally connected with its surroundings. It should become one of many nodes within a system of material and energy exchanges that are beneficial to all involved parties.\(^{13}\)

Building construction comes at a considerable expense and, in the case of architecturally designed projects, usually comes the assumption of an even greater expense. This project investigates how waste can form architectural design with raw inexpensive materials. It is a sustainable method of work as the provider of the material saves time and money in disposal/recycling costs and the purchaser is provided with material(s) at a low price. Sourcing of local materials is seen as one of many sustainable design initiatives that can be employed in construction, due to the reduced energy and carbon emissions involved in transporting them from source to site.

\(^{11}\) In 1999 twenty five New Zealand councils agreed to adopt Zero Waste policies, with a target of Zero Waste to landfill by 2015, http://www.mfe.govt.nz/publications/waste/waste-strategy-mar02/

\(^{12}\) Michael Braungart and William McDonough, *Cradle to Cradle - Remaking the way we make things* (London: Vintage, 2009) 120

3.3.1 Architectural Effects - Internal space

Perception and formation of space can have dramatic effects on people through size, shape and location. Movement through a space also has this same impact and needs to be appreciated when designing paths and journeys through architecture. Engaging people and how they move through a space can be compared to a maze or a labyrinth, two types of interior experiences that engage people's minds. There is a clear divide between the two types of spaces however, with the experience of walking these two topologies is very different. A path system can be multi-layered: a network of interconnecting routes, intended to disorient even the cunning. It may contain multiple branches and dead ends, specifically designed to confuse the occupant. This is a maze. Alternatively, a path can form a single, monocursal route. Once embarked upon, this may fold, twist and turn, but will remain a constant and ultimately reach a destination; this is a labyrinth.

All space is found, experienced and inhabited in a state of ‘switching’ flux between the diametrically opposed topologies of maze and labyrinth. This offers insights into how we might evoke a sense of continual delight in the user of the buildings that we go on to design. It then must be asked how architects might actually construct “a path that switches from a labyrinth into a maze (and vice-versa)” to form engaging internal spaces. This can be a place or moment within any building where the spatially unfamiliar will erupt and from movement pathway studies we can extrapolate architectural form. This will in turn create familiar and disorienting, adventurous and strange moments within an internal journey through a building.

The spatial and visual appeal of morphological images is inescapable for architects, designers and engineers willing to explore new geometries and structures for architectural space making and the fundamental order of space underlying structures across the disciplines. The experimentation of geometry imposes such an order for the structure and shaping of space and its improvements. Basic morphological principles are present at varying levels of complexity through architecture and a design process, the knowledge of these principles is essential for architects willing to create lasting works through the integration of art and architecture.

Figure 3.1: Standard Movement-typologies from “Labyrinths, Mazes and the Spaces Inbetween”

16 Ibid
17 Ibid
Twisting of basic form, or creating irregular shaped spaces also known as a ‘space labyrinth’, forces people to engage with a space with an individual response on interpretation. Reminiscent of the Cretan legend where the labyrinth designed by Daedalus was a single “sequential” linear space, the space labyrinths described here are “distributed” spaces in three or more dimensions. These labyrinths are spatial structures composed of a continuous surface (called manifold) that divides space into two parts, one on the “inside” and the other on the “outside.” Seen as surfaces, these configurations are not unlike the commonly used box-shaped rooms in architecture or the familiar donut shape, with the essential difference that these space labyrinths are surfaces that are “open” and can be extended finitely as well as infinitely, whereas the box is a finite “closed” region of space.  

Space labyrinths are inherently interesting for architecture because of their continuously winding three-dimensional space, using irregular shapes with abrupt angles.

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19 Ibid, 410
3.4 Adaptive Re-use

What is adaptive re-use?
“Adaptive reuse deals with the issues of conservation and heritage policies. Whilst old buildings become unsuitable for their programmatic requirements as progress in technology, politics and economics, moves faster than the built environment, adaptive reuse comes in as a sustainable option for the reclamation of sites. In many situations, the types of buildings most likely to become subjects of adaptive reuse include industrial buildings.”

A building’s life cycle can be seen as its own form of evolution. Buildings change and develop over time and may grow into new more invigorating places. The adaptive re-use system is what enables these building changes and works along with its selected systems to cater for a new programme and new occupant needs. It provides an energy efficient system of construction and also displays history in a modern manner.

Original building designs should incorporate flexibility for future change and the ability for spaces to be changed to accommodate future use allowing movement within a space.

Demolition, on the other hand, requires additional energy to break the building down. As a high proportion of demolished building becomes waste, the stored material and energy is essentially dissipated and lost.

By limiting or avoiding demolition/disassembly in the first place, monetary and energy savings are able to be made through a reduced dismantling process, reduction of transporting and sorting, along with disposing of the resultant wastes. To replace a building also entails additional energy and the use of fresh materials essential in new construction. It is for these reasons that the concept of adaptive reuse for buildings can be seen as the most efficient form of construction.

The extent to which a building can be adaptively reused is a testament to its design quality. This means it can survive the inevitable changes of building evolution and stand for a longer period of time. Different building types; historical, residential, industrial, require different approaches to re-use. Material re-use has always occurred. Structural items such as columns, dressed stone and ornamental items, from early ruins were re-used between buildings, with materials checked for quality before selection. Material re-use doesn’t just have to be limited to building materials; the exploration intent for this project is to test the limitation of raw materials placed without additional treatment into existing building structures. Common re-use in residential buildings in New Zealand is seen in older house types such as refurbished villas and bungalows. They re-use old timber and other existing materials to maintain character and to reduce renovation costs.

3.5 Building Diversity

For a business or building to be successful it needs to attract people, and one way to do this is through building diversity. If we were all the same, we would all want to do and be the same things. Diversity offers new and different ideas, skills and opportunities to grow and develop. The building needs to contain elements for people to see and engage with. The idea behind the particular building which is the subject of this study is to create an internal urban feel within a large existing structure. This is achieved by transforming the bland existing industrial/warehouse building into a more lively active set of spaces that cater to a vast range of people and ages. This will ultimately bring together into one space, communities and people, from not just the surrounding areas, but also from greater regions. It sets out to achieve this by housing a number of varying entertainment, retail and community activities, and also through the extensive use of common plain raw material that produces out-of-the-ordinary architecture.

3.6 Building Efficiency

Building efficiency involves minimising a building’s running costs through design methods that engage natural systems. This can be achieved in various ways, with large amounts of sustainable building options being available including thermal mass, water treatment and solar gain. The sustainable aspects to this building will be formed in many ways, including re-using all the materials removed from the existing structure into the new scheme. Water collection systems will also be included. Thermal mass will be created through the layering of scrap car carpets and other suitable dense materials to the parts of the building that require insulation.

The large roof area offers plenty of space for the inclusion of solar panels to provide lower energy costs and the incorporation of natural lighting to areas of the building will further reduce energy costs.

Re-use in a construction sense is defined by Paola Sassi, as “when elements are minimally reprocessed and reinstalled in a building without having to be remanufactured.”23 Reuse is a commonly confused and overlooked approach to dealing with waste that is, in fact, ranked higher than recycling within the Waste Management Hierarchy.24 This is due to the minimal loss in quality and minimal reprocessing involved, which in turn mean less energy is used and fewer emissions are generated.25

3.7 Town layouts

Generating ideas of how to develop and design a town almost essentially require studies of ancient towns and their buildings as well as contemporary ones. It must be realised however, that it is not possible to

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23 Sassi, Study of Current Building Methods that enable the Dismantling of Building Structures and their Classifications according to their ability to be Reused, Recycled or Downcycled, 2
24 The waste Management Hierarchy is a guideline used by the Ministry for the Environment. The follow strategies are ranked from most beneficial to least beneficial: Reduce, Reuse, Recycle, Energy Recovery and Residual Management
25 Sassi, Study of Current Building Methods that enable the Dismantling of Building Structures and their Classifications according to their ability to be Reused, Recycled or Downcycled. 1
reproduce the conditions they were made under. These traditions are
gone, we must grow with time and consider what will create the best
results suited to modern conditions.\textsuperscript{26}

Roman cross roads, Greek city states and American colonial settlements
all revolved around central cores which in modern design is often over-
looked or even absent. The interweaving of town centres and residential
neighbourhoods remains key to the creation of places that have enduring
value, a strong identity and constant activity. The central cores present in
traditional design did not stand alone, they were woven into an overall
town fabric. This is seen in Bruges, a Belgium city which has a variety of
plazas and squares, rather than a single large hub. This is possible by the
city’s irregular grid pattern of blocks and streets.\textsuperscript{27}

The town centre or sub-centre is a destination. Arrival at this destination
can be enhanced by making the journey to them more dramatic. This can
be achieved through size and scale of buildings and walk ways, passing
through arches, and by arriving at the town centre from an angled road
that doesn’t clearly reveal the open space ahead. When forming a city, it
should be built outwards from a main centre, not developed then added
in once a town is formed. The centres are major focal points that act as
the hearts of towns and city’s.

A crucial characteristic in crafting good public gathering places is
enclosure. These places needn’t involve complete enclosure such as a

\begin{itemize}
  \item continuous ring of buildings, but instead can provide a general sense
  of enclosure formed from a fairly continuous frame of buildings. These
  buildings act as boundaries between private and public sectors, defining the
  form of the public space.
\end{itemize}

Formation of new towns need to return to the Greek idea of the agora.
The agora of ancient Athens is often cited as embodying many of the ideal
qualities and characteristics such as centrality, concentration, and mixture,
that today’s town centres aspire to recreate.\textsuperscript{29} The movement of modern
town planning should be to re-establish public spaces where people can
meet and talk, ultimately creating a sense of place.

\textsuperscript{26} Bohl, Charles C. \textit{Placemaking: developing town centers, mainstreets, and urban villages.}
\textsuperscript{27} Ibid
\textsuperscript{28} Ibid
\textsuperscript{29} Bohl, Charles C. \textit{Placemaking: developing town centers, mainstreets, and urban villages.}
4.0 REPRESENTATION IN ARCHITECTURE
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4.1 Art as Architecture.

Waste materials are constantly being transformed into art and sculptural items. The techniques involved with this process have been used for architectural design. Precedent building studies of projects that have followed similar strategies were essential for grasping an understanding of how to achieve possible means of execution in this project.

4.2 Precedent Studies

4.2.1 Windshield Chapel - Alabama

The first main precedent study this work is based on is “The Windshield Chapel” located in Alabama, designed and built by Rural Studio, a part of Auburn University’s architecture programme. The town of Masons Bend is a small community in Alabama, part of the Hale County, which is the second poorest region in Alabama. The community presented a group of local Auburn University students the task of designing a town community centre, holding church services and hosting book and health mobiles, with a very small budget. Recycled materials were selected to be used in order to fit within the tight budget, but also to provide a unique building type and to create successful architectural spaces.

A large number of old windscreens from eighty scrapped Chevy

Caprice cars were layered over each other for the front facade, creating an architectural, breathable, skin.

The soil excavated for the site was reused as rammed earth to complete the main base of the building along with old sheet metal to clad the remainder of the facade, with laminated timber trusses made from locally grown timber creating the internal structure.

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31 Masons Bend Community Center, Masons Bend, Alabama, http://forrestfulton.com/masons-bend-community-center/
4.2.2 Drop City - Colorado

Secondly a precedent study was carried out on the Drop City project located in Colorado.
The city was founded in 1965 by a group of four art students; Gene Bernofsky, JoAnn Bernofsky, Richard Kallweit and Clark Richert. The idea started with Richard and Clark dropping Artistic statements such as painted rocks from their New York apartment, to observe human reaction as they landed closely to passing pedestrians. They called this “drop art”. This helped form the intention to create a livable work of art, forming their own civilization which would be called ‘Drop City’, a hippie commune.
The materials used in this project were geometric panels from car roofs and other inexpensive, boldly coloured goods that coated the structures created by the cities occupants.

Inspired by the architectural ideas of Buckminster Fuller and Steve Baer, great public interest and awareness was established through media, with people from all around the world coming to work and stay on the construction projects. With the city expanding, and new structures being formed, the end result for the site was eight domes and several geometric buildings. By the 1970’s a fall-out within the community saw the demise of Drop City with the original occupants moving to Boulder, Colorado, and by 1977 the site was abandoned. Debris and building remains still occupy the site today, with the last of the domes being taken down in the late 1990’s.

34 DROP CITY, a new documentaryhttp://www.dropcitydoc.com/#about/c101k
4.2.3 Lebbeus Woods - Radical Reconstruction

A study investigated the conceptual work of Lebbeus Woods who developed a scheme called Radical Reconstruction. Within this book, Woods states that there are three elements effecting architecture and its development in todays world: Disguise, illusion and passivity.

Woods uses places and buildings torn apart by the devastation of war as examples of societies disguising the wretchedness and the healing process experienced. Sites will not be disguised, method should find its way out of illusion and it is with ethics that one will face positivity. This is portrayed through the rebuilding of cities freeing themselves of the generated havoc, adding new and improved interventions to buildings and structures that have inflicted wounds. Taking these damaged goods with bad pasts create opportunities for development. In order for them to recover they need to present their cities with new directions and choices.

Woods sets out to remove the three limiting elements of disguise, illusion and passivity, replacing them with radical sites, methods and notions of ethics and morality. He opposes the modernist idea of functionalism, rather proposing an architecture that ignores the old boundaries of a building, an architecture that explores the opportunities of occupying space, “the body that makes architecture possible”. When the comfort of this essentially bureaucratic thinking is denied and when reconstruction powers are returned to those formally called victims, the scenario becomes radically different.

The devastation of war creates opportunities for new creation, clearing existing patterns and conceptual order, even when people want the original pieces restored to retain a sentimental value. There is purpose in restoring what is valuable and has been lost, but also there is value in erasing tragedy and memories. While it seems rational to restore or replace the damaged building, it celebrates the past and the social order that has resulted in its destruction. Restoring the building to its previous state is a backwards step as the design doesn’t progress from its previous knowledge and repeats the same mistakes. The act of restoration ignores the hardship and catastrophe that has occurred erasing all memories the building faced. Respect for the tragedies suffered by the buildings is also important, to expand on these buildings would be to acknowledge the warfare that has occurred, exposing the strengths and weaknesses of a building, that have caused it to fall.

Woods describes the radical locations he proposed be used as the “walls” of every community, in a literal sense but also metaphorically with them being the boundaries and edges of a community. Woods’ definition of the ‘walls’ entails the areas in which peace and order fall apart as they are neglected areas of the city limits. These areas are often where the disguise of order and financial security falls apart with them generally being abandoned and disused due to dysfunction. The process of deconstruction is to create space for progress, this in turn can be related to effect of destruction. In the spaces voided by destruction, new structure can be injected.
creates an opportunity to move forward by seeing destruction as a way to progress, allowing people to inhabit spaces in new ways and to change the worlds’ perception of these areas without completely destroying them. The new structures do not exactly fit in the voids but exist as spaces within spaces making no attempt to reconcile the gaps between what is new and old.40

Woods treats the process of recovering from the impact/destruction of war on a building the same as a flesh wound to a human, the concept of a scab and a scar. This architectural process has been created to shield the wounds of war, to remove any reminders of the events that initially damaged it. The scab is seen as the first light layer of reconstruction, which aims to protect exposed internal structures or voids whilst undergoing its transformation. The scar being a deeper level of reconstruction that fuses the new and old designs together. In doing so, it bears the rise and decay of the building, proudly revealing its history and not allowing it to be ‘disguised’ through cosmetic restoration. Architects should invent geometries and new methods of construction to provoke new ways of moving and resting within these places to provide a transformed relationship between people and structures,41 to help nourish the development of pre-existing knowledge and enhance it.

40 Ibid, 16
41 Ibid,
Woods describes architectural spaces of today as ‘uncertain’ by which he means lacking in determination.\footnote{Woods, \textit{Radical Reconstruction}, 25} In modern ‘functionalist’ architecture labels dictate the functions and how people occupy a space. The modernist approach to the designing of spaces is to accommodate the machine (technology) and human habitation is being shaped to satisfy the designed space, rather than a space for human use. Along with how people inhabit the quality of spaces, there needs to be an understanding of the type of people who inhabit ‘free spaces’. People from every social class are the occupants of ‘free space’, more specifically people who have the desire or necessity to transform their everyday patterns of life.\footnote{Ibid., 16} The labelled spaces present in modern design dictate how they are to be used and how one should feel while inside; they provide peace and order resulting in comfort within a controlled space. This application of labelled spaces is suitable for certain building types but generally limits individual creativeness when occupying the spaces. The spatial forms present within ‘free spaces’, and the means in which they are occupied, is a continuous and inventive process that forms a stronger relationship between an individual and the architecture, rather than a predetermined outcome for each space within a building.

Following Lebbeus Woods ideas and approach of Radical Reconstruction to architecture means a building can expand on knowledge gained from its past and previous state, developing it to a more evolved structure. Woods defines the meaning of radical reconstruction by saying “The way in which you do not already know how to behave”\footnote{Ibid., 19}, essentially meaning
to design the unknown - to push the limits of what a building can do. The architect must now design the rules of the rules, making second order architecture: that is to design the architecture of architecture, embracing not only the so-called normal conditions of living but also its extremes.\textsuperscript{45}

\textsuperscript{45} Ibid., 25
4.2.4 S.I.T.E Sculpture in the environment.

S.I.T.E was a multi-disciplinary architecture and environmental arts organization based in New York City. The firm is distinguished by its works integrating buildings and their surrounding environments, generating site-specific projects. S.I.T.E’s main purpose is to create architecture and public spaces that respond to social, psychological, cultural and ecological information.46

The firm was originally driven by political revolutions questioning the stylistic dominance of Modernist, Cubist, and Constructivist influences in architecture throughout the late 1960’s.47 In response to this critical climate, the studio advocated a total fusion of the arts - challenging those conventions that have traditionally separated visual art, buildings and landscape.

The group’s work then became not about architecture as an object sitting in the environment; but rather, it was more about integrating structure and context as a total fusion of elements, which can then be interpreted as the environment. S.I.T.E believes that buildings and public spaces should move beyond Industrial Age traditions - inclusive of their conceptual, functional and aesthetic origins. These ideas are represented in their BEST product stores projects located throughout various US Cities48, The projects derived from one original BEST building called the peeling project. Eight further buildings were developed all taking the same architectural concepts, treating the standard “big box” prototype as the subject matter for an art statement. This sculptural innovation produces the effect of architecture in a state of tentativeness and instability. By engaging a context of normalcy, this intervention becomes a combination of routine utility with visual ambiguity.49

5.0 URBAN ANALYSIS

Site Criteria

As stated earlier the process for site selection required a site that would allow sufficient complexity and offer diverse opportunities to explore conventional methods of construction and building design. Auckland’s high population growth rate made it the clear city to start exploring potential site options. The site needed to be suitable for the ideas of ‘waste to worth’ to be applied, with a supporting context and suitable surrounding environment being a contributing factor. The building also needed to be currently vacant and in need of an architectural intervention to develop it’s current structure and programme.

Figure 5.1: Location map of Auckland
5.1 Site location

The site chosen for the project is the industrial area of Wiri, South Auckland. Wiri is a small area located within the Manukau district that consists of a range of industrial activities in close proximity to residential and commercial areas. The particular building selected at 21 Hobill Avenue, is positioned in the very heart of an industrial area and is approximately 30 years old. The building itself, is currently split into varying segments that are occupied by a number of different businesses; however the two largest parts of the building are currently vacant. The building is of a grand scale, extending over 195 metres in length and 70 metres in width.

Figure 5.2: Site map of building
5.2 Site accessibility

Even though the building is remote from the centre of the city, means of access by road and rail to the site are direct and easily accessible.

The Manukau Westfield shopping centre is located less than a kilometre away from the building and within the shopping centre perimeter is a large public bus hub with various routes spanning right throughout Auckland coming and going from this location.

Along the western side of the building is the major Auckland rail line that operates train services from the Britomart railway station, a direct link into the heart of Auckland City. Numerous other stops are positioned along this route make access to the location very easy.
Private motor vehicles are able to access the site easily as well, with both major motorways also being in very close proximity.

Figure 5.3: Access to site by rail and road
5.3 Surrounding building types and uses

Surrounding buildings are made up of numerous engineering and automotive wholesalers. The buildings these businesses occupy are of standard warehouse configuration with colour being the main architectural intervention.

A big part of this Wiri industrial area is dedicated to housing a number of recycling plants and systems with a number of recycling processes happening directly around the site. These numerous recycling plants are what generated the idea of working with recycled materials on this building.

The building is located in close proximity to the Manukau Westfield shopping mall, the Rainbows End theme park and the Vodafone Events Centre; Auckland’s most iconic Pacific themed venue that is used for conferences, exhibits, concerts, theatre performances, weddings, meetings and more.
5.4 Existing Building

History

The main open space in the building has been occupied by two major parties, Mainfreight Logistics and Aluminium Distribution. Both companies used the building as a location/site for loading large vehicles through a series of set routes within the building before moving out for distribution throughout New Zealand. This can be recognised as a formulated journey throughout the building. The building is constructed with a concrete block base supporting the first story, with the remainder of the cladding consisting of corrugated steel.

Internally, the building is a bold set up, with all supporting structure being exposed. Large structural steel columns support the roof and house tracks for the gantry system found within the building. Sufficient spacing has been provided to allow fork lifts and other vehicle types to pass comfortably between the two main building spaces. These large columns allow for large open spans over 25 metres, creating a wide open area for storage and large vehicle access. The building is currently not in use and hasn’t been for the past 2 years, with only a temporary lease currently in place. The temporary occupants, Timpack, are using a small portion of the building’s main space to store and repair damaged wooden pallets. The remaining smaller segments of the building are occupied by PBT couriers, Waste Management and a Plastic Recycling Firm.
5.5 Site Typography

The building site has no height variations with the entire site being flat. A gentle slop runs the length of Hobill avenue, with the greatest difference in slope being a small convergence of contours at a rear point of the site creating a gentle fall. This naturally occurring landform continues around the majority of the area without disturbing the buildings formation.

Figure 5.9: Typography site plan

Figure 5.10: Typography site section
5.6 Recycling processes/activity in Wiri

The first major recycling process in close proximity to the site is the treatment of old shipping containers. The containers are stored to the rear of the site in the open space indicated in figure 5.11. They are refurbished for two main purposes. The first is as portable storage units that are rented out. The second method of refurbishment is transforming the containers into mobile pop up stores and other contemporary shelters like offices or work stations. The remaining containers which have been damaged beyond repair are cut up and melted down. It is these damaged containers that will be used as building materials in this project.

The second recycling process present within Wiri is a large scrap metal plant known as National Steel Recycling. They treat crushed cars and all other forms of scrap or unused steel. This plant runs parallel to the site selected for this project, with scrap metals covering the entire ground along the southern end of the building. The result of this makes the site appear untidy and neglected. These site conditions are what justify the extensive architectural interventions proposed for this building; the large scale of the building and its surroundings allow for a dramatic redesign.

The third and final recycling system is present on the northern side of the building. A small firm collects used plastics such as shrink wraps, plastic films/perspex and plastic bottles, treating them for various end results.
5.7 Developing a programme to fit the site.

Since part of this project is about adaptive reuse, the programme for the site needed to engage with an element of the building’s history. The large idea for dealing with recycled goods was generated by the surrounding context. These same issues were appropriate for generating the programme. Rainbows End theme park is located less than a kilometre away from the building and since the site is in need of more life the concept of developing entertainment venues was adopted. The key concept used in the building’s previous uses was that of a journey through spaces within the building. This has been adopted into the concept of entertainment by creating a series of spaces within the existing building for entertainment purposes positioned in some form of order and connect them through the use of internal streets. In order for the building to be successful it needs to cater for many types of people. This will be achieved through mixed-use entertainment activities. Mixed-use developments consist of a diversity of compatible building functions grouped within one building, or multiple buildings in close proximity. This helps foster relationships among local businesses, and creates vibrancy and variation within an area due to the diverse range of activities taking place.

6.0 DESIGN PROCESS AND EXPLORATION
6.0 DESIGN PROCESS AND EXPLORATION

6.1 Guiding Principles

The fundamental organisational principle for this building was to break its exceptionally large volume into more usable areas. The building has a strong horizontal axis with very minor vertical axes.

Key Aspects of the design at this stage
- Building Axis
- Journey through the building
- Entertainment
- Entry and exit points
- Organisation of the main areas.

The old main movement line through the building was used by vehicles for collecting and then transporting goods, with the journey running between the large entry and exit doors on the front facade of the building. This existing journey line is what has formed the original internal axis of the building and it helps determine the placement for a new layout. The internal activities are positioned in a way that replicates an appropriate sequence of stages. This journey line also helps define the divide between public and private spaces within the building. This axis/movement line was a dominant feature in the previous use of the building to establish efficient operation and it is in keeping with the theme of adaptive reuse that it is important and acknowledged as a strong design relation between the new and old fabric.
6.2 Design Process

The design process of this project is critical for finding suitable methods of establishing relationships to resolve design issues. It explores options to convert Lebbeus Wood’s idea of radical reconstruction into a suitable scheme that is appropriate for adaptive re-use projects.

6.2.1.1 Formulating design approach one

The initial design idea was to experiment with the minor transverse axes to break the building up into more usable areas and to create a more dramatic journey between the parts of the building.

With a proposed base layout established, the next step was to see how the new program and proposed events might fit into these adjustments to the existing form.

The design process for this building began by placing a series of entertainment events in a logical order of operation on the established journey line throughout the building. The initial idea was to dedicate the building to the generation of young adults that have outgrown the enjoyment of Rainbows End. An investigation into what people aged between their late teens to early twenties do for enjoyment revealed night life was the highest form of socializing and entertainment.
Taking this into account, the concept of celebration was established, with the initial idea at this stage of the design being to transform this large warehouse into a large night club/performance facility. This idea was inspired after visiting a Spanish club in Barcelona called ‘Rassmatazz’, that catered for several thousand people at any time. Rassmatazz was broken into several parts with various stages allowing numerous musical acts to perform, satisfying a range of different musical tastes.

From here, the processes of night life celebration was broken down into suitable segments involved with this age group, such as the consumption of alcohol, among other things. Research revealed that there are five major parts to the process of alcoholic enjoyment.

Firstly is the creation of alcohol through brewing, requiring the building to house a brewery.

Secondly is a place for the completed product to be consumed. This can involve several different set ups such as indoor and outdoor bar environments, smokers sections and seated/standing areas with suitable bench/table tops for food consumption from snacks to a full meal.

Thirdly a location for people to engage in with on stage performances. This third stage also involves the need for a variety of regions within the area such as a dance floor, a place for people to enjoy sporting events of all types on large screens and opportunities for people to interact that have no interest in the music being performed.

At the completion of a night out people become tired/hung over, therefore the fourth main segment in the building is dedicated to recovery. Sleeping spaces need to be incorporated in this design stage for numerous reasons, firstly to stop drink driving and secondly, rest is a key source to recovery and restoring energy. Rehydration is another key involvement for the recovery process. This will involve natural drinking bars built up with a variety of rehydrating drinks and fresh mineral waters along with suitable healthy foods to replenish energy. Swimming pools and spas will also be incorporated to refresh the body.

The final stage of this process is the recycling of any waste created in the process of partying, in keeping with not only the recycling hubs within Wiri, but within the programme of this project.

Once this strategy was identified, the process of positioning the various entertainment segments into the new form of the building began. The five processes are positioned into a logical order of events as listed above and placed upon the established journey line.

The movement of the minor axis’ established suitable placement for the outdoor bar regions and suitable places for creating divides within the large existing building. The previous movement line has been shifted to engage people more with the building and to further explore areas throughout the structure.
The plan then created the opportunity to explore how the new interventions penetrated the existing skin and how the materials could create sculptural additions to the building and shelter various regions. The idea was to create bold interventions to separate the large scale of the building that clearly indicated the breaks, and define the location of the five segments internally but also externally. This would be achieved through random arrangements and layering of scrap metals and other waste material, piercing the existing fabric. This also led to the exploration of varying the journey vertically to further engage people at different levels throughout the building, creating more interesting apertures and enjoyment when moving through the building.

Figure 6.5: Design exploration one plan
6.2.1.2 Outcome for Exploration One

The conclusion from this first design stage was that it was viable to work within the existing major/minor axes and not to split the structure in ways that disregarded the building’s existing form. This established a direction for how to work with the existing structure, keeping the notion of the building’s long form and working with it, rather than breaking it up. The large scale of the building allows for a wide range of proposed activities to fit within its existing walls. Where necessary new spaces can be created by cutting away parts of the building as well as by extruding out. A review of the programme was also needed to engage a broader audience.

The large interventions extruding through the shell lack order, revealing randomness and not forming a clear architectural statement. Such large penetrations of the shell also pose unnecessary weather tightness issues in sealed areas inside the building, requiring a further review of how these interventions are established.

The sequence of events described works well in the arranged order within the building’s area and portrays the idea of journey throughout the building. This can be further improved by developing the routes through the building, making them more exciting and adding events along the way. The idea of the journey can also be further extended by starting it before the occupants enter the building and by engaging better connections to between spaces.
6.2.2 Design Exploration Two

The design exploration which developed from here was to keep the front facades of the building in their original form and to deconstruct the building’s external facade progressively as the journey through the building continued.

The internal layout of the building was originally defined by packing areas between the gantry tracks and existing structural supports. Existing walls and dividers, further shape potential areas within the internal region of the building.

6.2.2.1 Formulating design approach two

The notion of de-constructing the building as the journey through it progresses, is reflected in plan through the five main stages earlier mentioned, with the more engaging stages of entertainment being located in the de-constructed segment shown in figures 6.9 and 6.10. This is related to the level of entertainment each stage provides the visitors with the extremeness of each stage being reflected in the architecture.

The removal of major dividers between areas creates a more well-formed building with the opportunity for better connections between spaces. Further attention was given to the plan by utilizing the height of

Figure 6.9: Design exploration two plan, lower level

Figure 6.10: Design exploration plan, upper level
the building adding a second level containing a restaurant. This provides the opportunity for people to look down on the events occurring below and welcomes a further age group to the building. Separate routes at the beginning of the building/journey would offer the visitor a choice of routes.

The journey continues beyond the building and site by adding a monorail running to the major hub of Wiri/Manukau. This links the building to all the major bus stops in the area and with the large population of people present in Westfield Manukau. Furthermore this will help draw people into the site and make them aware that a building of this nature exists in the area. The idea is to make the monorail’s structure sculptural, out of scrap metals and other suitable recycled materials to intrigue human awareness and draw more people to the space.

This stage of the design process resulted in a closer review of the original idea of Lebbeus Woods concepts. This revealed smaller strong interventions are better suited to existing buildings, rather than re-building half the building meaning the overall feel of this design approach didn’t feel appropriate to how the building should be treated externally. Structural feasibility of the proposed design at this stage was also difficult to construct.

The original plan generated the idea of working within the boundaries set by the main columns placed throughout the building, rather than by splitting the form. This allows for new interventions to fit within the existing building frame and reduces the number of external interventions, creating a more powerful architectural statement towards the existing cladding and building form. This approach is intended to produce smaller but stronger interventions, developing a more suitable intervention to the cladding of the building. Architectural forms/areas can be formed by cutting into the existing fabric rather than pushing right through the building.

Further development of the journey through the building was created. The roads take more undefined routes with activity stations placed along the walk way to view and engage with the building’s activities.
6.2.2.2 Outcome of design exploration two

The conclusion drawn from this segment of the planning exercise was that the floor surface of the plan wasn’t being utilized to its full potential. The large scale of the building needed more spaces and activities to fill it.

The original overall approach was not functioning properly as a concept nor was it catering for the number of people the building’s potential allows. The programme idea didn’t justify getting the required amount of people for only evening and morning use. It limits the time people can occupy the building and didn’t cater for a wider age range, with the proposed function being primarily focused on people of a younger generation. A new approach was needed to create a suitable architectural strategy for the scheme on this building. A developed idea needs to be formed that has constant engagement with the building space as well as forming a stronger relationship between the new and old structure.
6.2.3 Design exploration three

Translating the theory of Lebbeus Wood’s concepts needed to be adjusted to suit buildings and environments that haven’t been war damaged for this project to function. This can be achieved through applying the concept of radical reconstruction to buildings that are dead or ‘destroyed’ in the sense of their previous use no longer being suitable, or for spaces that have been abandoned. These building’s have been destroyed, not from the effects of war, but by no longer living as suitable active spaces. These dead, vacant spaces require new life that emerge from the building’s previous function. To simply refill the space without development or by simply demolishing the entire building coincides with Woods theory of erasing its history and the life the building has already lived. Constructing a complete new building or continuation of use in its current state is a backwards step for the building and its environment by not developing the previous properties of the building. Bearing this in mind, further thought needed to be put into the translating of theories in order for the project to be developed into a suitable, successful scheme.

The idea formulated for this project engages Wood’s concept of the ‘scab’ and the ‘scar’\textsuperscript{51} by fusing a new programme with the old structure, intervening a bright new a life which celebrates the building’s history. This effects not only the previous building but the area in which the building resides through progression. It takes the previous knowledge portrayed in the building and develops it, transforming the building towards a new generation, the next layer of evolution to the site. It must achieve this whilst remembering its past but also showing new life to the building and materials.

The idea of new life and reviving a dead building through entertainment and atmosphere requires suitable treatment of the internal floor plan as well as exterior facade development, creating a stronger link between the two.

6.2.3.1 Formulation design approach three

Taking these new ideas, along with the conclusion from the outcome of design exploration two, formed a radical change to the floor plan system. This is achieved by transforming the initial building programme to a small internal city, forming a broader environment that can cater for a wider range of occupants. The new inclusion of a main food market hub will lift the internal activity of the building as market places are bright lively places drawing crowds from all generations. South Auckland has a large mix of cultures meaning a huge variety of international goods can be offered and be accessible to a large audience of people from far and wide. Personal international travels revealed the idea of market places as a big part of many European cities, that draw large crowds and offer a generous variety of fresh produce. The theoretical approach from here was to apply the concept of the scab and the scar through layering a new developed floor plan over the existing layout, with radical interventions occurring each time the plan penetrates the existing fabric.

\textsuperscript{51}Woods, Radical Reconstruction.
The re-evaluated plan contains several new sectors that intersect the original building with different levels of intensity. New additions such as a gymnasium, and a sculpture and welding school pack the inside of the building. Internal car parking was removed to maximise the internal floor area and promote the public transport options present to access the site. Public spaces located internally are opened up through the roof with radical interventions tying them together, forming a stronger sculptural image over the building.

Figure 6.15: Design exploration three plan.

Figure 6.16: Design exploration three model photos
6.2.3.2 Initial outcome of design exploration 3

A further revaluation of the floor plan formed the conclusion that it needs to be alive and adventurous in its layout to match the external interventions. This will achieve more suitable formations for the public spaces and form separate journeys throughout the inside of the building. The market place layout has been generated with the intention of containing smaller routes forcing people to move around a larger area of the building. An irregular grid has been used in this area to form a more engaging floor plan, with the shape of the stalls influencing the form of other internal spaces. The stalls enclose the ‘centre’ of the building, forming a major public space for people to interact, sample produce and turn space into place. The central core placed here can also be used for community events such as fairs and festivals. The layout formed from this developed layout is then reflected in the formation of the roof structure, which is also influenced through a reformation of the main journey route through the building and development in the accommodation sector. The development of the floor plan has been refined from random extrusions of the skin to a more internally focused project, penetrations are only made for the main areas.

Figure 6.17: Developed design exploration three plan

Figure 6.18: Design exploration three external intervention image
6.2.3.3 Development of internal areas

The market place is packed full with a range of international foods and produce held in varying sized stalls that are constructed from pieces of suitable recycled material. Stalls that edge the perimeter of the public space will act as structural replacements for the removed columns to support the roof structure. The irregular spaces formed by the edge of the stalls have formed areas that fit four restaurants of varying ethnic back grounds. These restaurants transform produce from the markets into fresh dishes that best represent each nation, engaging people with a mixture of cultural foods. The remaining back space of the markets is housed by a bar/brewery that produces its own range of speciality beer. Special attention was paid in forming the brewing tanks as stainless steel must be used with it being the only material that doesn't taint the flavour throughout the brewing process. A pressurised steam system is used to heat the beer tanks so suitable sized piping free of any penetrations is required. The bar space can also be opened up into a separate events area available for private functions, whether it be for business or pleasure.

The idea of human interpretation of free spaces stated in Woods’ radical reconstruction has been applied to this developed design through the major journey route beginning at the front of the building. This is achieved through setting unclear routes engaging people to think about how to occupy the space and move through to the buildings main hub, the newly formed markets and large open public space.
Sam McElhinney’s ‘The Switching Labyrinth’, further developed the experience of the journey by applying his ideas from “Labyrinths, Mazes and the Spaces Inbetween”. Translating his studies of how people occupy and move through internal spaces, he states “that all space is found, experienced and inhabited in a state of ‘switching’ flux between the diametrically opposed topologies of maze and labyrinth”\(^\text{52}\). With the building containing a gantry crane, movement of panels and walls forming the internal labyrinth can be adjusted and relocated forming new and developing spaces to continuously engage repeat occupants. Raising the height and angle of floor planes plays on J. Francois Gabriel’s theory of Space beyond the cube. It takes the idea of spaces, labyrinths and three dimensional spaces that neglect the commonly used box shape with “open” surfaces forming areas and rooms that are out of the ordinary.

The main entrance to the building is the beginning for the journey throughout, meaning a suitable treatment to the area was needed. Large intervening walls have been positioned, separating areas for foot traffic and entrance for the mono rail. Large planes punch through the buildings original facade and entrance, creating a strong focal point for the front of the building that is suggestive to the radical formations within.

\(^{52}\) The switching labyrinth, http://bldgblog.blogspot.co.nz/2010/04/switching-labyrinth.html
The sleeping sector has been designed as a low-cost hotel scheme creating a temporary accommodation facility. The internal dwellings have been broken up to replicate the layout portrayed within the market area, further developing the overall structure of the plan. A range of single and double bedroom rooms have been grouped together in clusters forming irregular shapes that define further internal roads and form an internal public space for people residing within the complex. This idea further enhances the interest of movement within space. The final development of this sector resulted in dwellings puncturing up and through the buildings roof space along with the facades, allowing bolder architectural opportunities and generating roof top spaces. Creating thermal treatment for the sleeping areas is achieved through the use of layering car carpets and rubber backed floor mats, to block out moisture, present in the automobiles sentenced to the scrap heap located next to the building. This will offer an inexpensive option to insulate the areas within the building that require it.

When insulation is not enough, and sourced methods of heating are required, a hot air box consisting of painted black connected cans and a sealed glass panel of adjustable size, but are generally 2000mm x 1000mm x 100mm deep, will be used as a sustainable way to heat the designated areas. This hot air box is set at 90 degrees to the sun. An inlet at the base and a duct at the top fitted with a tiny computer fan, itself driven by a tiny photocell which forces naturally heated air into the required room. This can raise air temperatures 30 or 40 degrees in just over a minute. Examples of these have been seen at PER (Parco Energie Rinnovabili) in Umbria. These hot air boxes are ideal for use in this project as they are constructed from easily accessible waste materials (which are inexpensive to build) and are naturally powered by the heat of the sun.

54 http://www.per.umbria.it/
The rear of the building has been dedicated to a learning environment that will show-case and sell student work. The purpose of this learning environment is to educate students on forming sculpture out of scrap steel from the adjacent building, teaching them the skills of sculpting art. The area is broken into three main parts consisting of a gallery space to display finished works that will be incorporated into a retail segment for customers to purchase sculptures. This will help cover any expenses involved in running the facility. The second area will consist of a classroom/workshop area where students will be taught how to work with steel and tools such as welders and pipe benders. Materials will be fed into the workshop space through the use of a conveyer belt system, this will allow a constant variety of different types/sizes of scrap steel to pass through the workshop allowing a fine process of material selection, leaving unsuitable materials on the conveyer belt returning them to the steel works plant. Items such as work benches, stools and tool shelves have all been sculpted out of waste with various sized scrap steel sheets forming table tops. The tools used in the complex have been selvaged and restored, reinforcing the idea of re-birthing waste products. This area of the building also acts as a service centre for repairs and maintenance required on all other areas of the building.

Sports facilities have been incorporated to continue with the idea of life throughout building, catering for the people who get enjoyment out of being active, creating a unique arena that differs from typical sports centres. A large basketball/gymnasium area allows for a mixed use of sport-related activities along with the indoor tennis and squash courts.

Participation in sports goes hand in hand with viewing large sporting events such as national and international level competition matches. Sporting matches draw extensive crowds to the stadiums hosting these events, however, not everyone can attend due to seat number restrictions, potential locations of the event and ticket prices. Atmosphere is everything when experiencing a live sports game with large crowds supporting and cheering on their team. Replicating this atmosphere for the people unable to attend such events has been achieved in this building through the inclusion of a cinema set up taking the concept of a movie theatre but screening all major sporting events. A smaller sized crowd is formed through filling the cinema space with avid supporters cheering with involvement in the game, recreating a scaled down version of actually attending a match. Formation of the grandstand was established through stacking of the wooden pallets currently being stored and repaired by Timpack. Seating is formed by using the seats from the cars situated at the neighbouring wreckers, offering an efficient method of comfortable seating.

The front area of the building has been refined to two major sectors. The first main sector houses a large cafe and gallery space for exhibitions and events. This engages people with the building from the moment they enter. This cafe/events space also opens up onto a smaller public forecourt before rejoining the major journey line through the building. The second main area at the front of the building is dedicated to a day care/child minding
facility. This allows adults with young children to have the freedom to move through the building, partaking in their desired activities, while the child enjoys a creative playing environment. This area will also contain playground facilities for older children to play.

6.2.3.4 Development of facade intervention

The facade treatment follows on from Lebbeus Woods’ idea of radical reconstruction, replicating the main areas of the plan into a new architectural intervention to the exterior. The journey through the building forms a major part of the internal shape of the building that snakes its way through the existing space. Reinforcing this move has been shown by forming the sculptural intervention of the roof. This ties in with the idea of forming irregular shapes and spaces present in the internal journey by layering materials and clothing the occupants in an interesting sculptural way replicating the boldness of the internal intervention. The new and the old skins fuse together by stitching the new materials into the existing, with rough edges representing the ‘scar’. The new skin is formed by layering scrap metal sheets from old truck trays and disassembled containers, along with other suitable recycled materials to form a weather-tight, light-weight skin. A ridged steel structure is formed to tie into the existing steel trusses for support. Used glass and perspex sheets are placed between selected panels to allow natural light to dramatically illuminate the internal area. Openings have been made to the internal public spaces allowing natural elements into the formed spaces, creating an external environment within internal walls. The new skin also follows the minor journey route leading to the private sleeping area, revealing a smaller public hub for its occupants. Several of the sleeping block dwellings penetrate the buildings facade requiring them to be fused into the structure also using the technique of the scab and scar healing the two elements of the scheme together.

Figure 6.24: Design exploration three roof intervention
Development of the scheme has been extended to the northern outside area of the building that currently houses the plastics recycling facility. The large open space that is filled with waste plastics needs to be better utilized. Transforming this space into an area better suited with the programme present in the building offers engagement for all age brackets of people but also acts as another entertainment opportunity for younger children while parents utilize the food markets. Development of this area started with a revised function of an exterior mini-golf course. The course is formed by taking the plastic waste coating the concreted area and sculpting the course outline along with the inclusion of other local waste to form a unique and intriguing sculptural mini-golf course.

Accessing the site of this building is helped with the mono rail running from the main hub in Manukau directly to the building. Positioning of the rail system here is ideal with it already containing large car park facilities, the major bus hub of Manukau and a large number of occupants shopping at the Manukau Westfield. The building can be seen as a continuation from the large mall therefore the rail system will follow the existing road routes to the building. The supporting columns of the mono rail are structurally formed sculptures from scrap steel. With the rail route running down the centre axis of main road creates awareness of the buildings presence, drawing them to the space.

Figure 6.25: Photographs of model showing external facade development
Figure 6.26: Photographs showing public space external openings

Figure 6.27: Model overview
7.0 CRITICAL APPRAISAL OF FINAL DESIGN
7.0 CRITICAL APPRAISAL OF FINAL DESIGN

The formation of the project changed over time from a simple adaptive re-use project to dealing with not only waste buildings but waste materials as well. The developed purpose of this project was to experiment with the possibilities of applying Lebbeus Woods conceptual idea of Radical Reconstruction to an existing building that hasn't been effected by war. The selected site largely formed the project with the new intervening structure being formed with the waste materials sourced locally to the site.

7.1 Formulating the theoretical approach

This project was essentially “designing the unknown”, developing knowledge and architectural elements shown in the previous building. Formulating a new theory of design, new rules of adaptive re-use were established for dramatically reconfiguring an existing building. Translating the fundamental idea of Woods into a suitable design strategy was formed through design experimentation until a rational approach was found. The use of typical adaptive re-use ideas, fusing the new and old, along with creating interesting spaces through the use of labyrinths and irregular spaces engage people with the building forming a relationship between with the internal and external layouts. This example of applying the translated theories is by no means a perfected way to accomplish a project of this nature, but instead a suggestive way of approaching the idea.

7.2 Translation of the formed theories

The development of theories then needed to be applied to formulating and developing the suitability of these interactions with this building due to the structure of the site and surrounding context. The building needed to sculpturally engage with the context and surroundings to create a fitting visual appearance. The journey line of the previous building dramatically developed from a system to arrange and position internal elements into a journey running to, and through the building. This formed approach relates back to the concept of entertainment creating an active environment. The entertainment idea applied to the journey, combined with Wood's idea of interpreting space, formed the idea of using a space labyrinth to make the journey more interesting. The anticipation of entering the markets is heightened by reaching them at the end of the labyrinth as it makes arriving at the destination more dramatic through the changing surface angles and floor levels, with no clear indication of when you will arrive. Dramatically increasing the idea of journey to extend well beyond the building through the use of a mono rail and then linking to the internal labyrinth further relates back to the previous journey line and development of the building.

The massing/formation of the internal and external areas of the building takes Wood's idea of repairing only the damaged areas of a war devastated building, not demolishing or restoring the whole building. The final internal design was the most fitting application for creating
an adventurous layout that could be positioned into the buildings existing area. The architectural strategy of the external facade was to indicate the main movement line and formation of internal activities while keeping a suitable amount of the existing structure. It provides a sculptural addition to the building giving it new life while keeping connected to its surrounding context. There are many limitations involved in the application of the strategies proposed. Applying them to a site with suitable context is an initial problem along with fitting/finding appropriate used materials to construct individual areas of the building and how well the materials will then perform.

7.3 Method of construction

The programme formulated is efficient through cost and accessibility of materials; however a project of this nature requires a large amount of human input to form the structural and functional elements. The finer elements within the building require special effort in sorting through suitable waste as fitting materials. A suitable response to this issue would be to take the idea of ‘drop city’ formulating a working community that people can add and help construct parts of the building, reducing the work load.
8.0 SUMMARY

Throughout the entire exploration and design process, research by design has been the major contributing tool to reach a final outcome. The challenge of merging the process of adaptive re-use and the conceptual idea of radical reconstruction into a sculptural building has established the fundamental principles for a plausible solution. The formulated result promotes public interaction and integration of the building entity with the surrounding urban context, bringing new life to an existing structure.

The final exploration demonstrates a radical approach to adaptive re-use offering an artist, cost effective strategy for site suitable buildings. A large part of problems involved in resolving this project were the formulating of theories into suitable concepts for developing this building; how to radically intervene the existing structure with a new improved design, formulating a suitable structured idea that offered the most resolved approach. The overall result from this design approach is a conceptual idea that isn’t an efficient method of construction and design. It does, however, form sculptural out of the ordinary architecture suitable for a site of this nature.

The large effort to create the radical forms requires extensive time to assemble everything, however, the end result of sculpted, unique forms and architectural style out weighs the negatives. With material costs almost being nonexistent, time is the only expense with selecting suitable waste materials fitting for each area and then forming them into weather tight surfaces and structurally safe frames.
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10.1 Existing building
10.2 Existing structure
10.3 Site plan

Figure 10.6: Site plan
10.4 Recycling areas around the site
Section B-B