[**DIVERSE DENSITY**]

AN ALTERNATIVE HOUSING STRATEGY

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AN ALTERNATIVE HOUSING STRATEGY

By

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Thank you all.

"You can not simply put something new into a place. You have to absorb what you see around you, what exists on the land and then use that knowledge along with contemporary thinking to interpret what you see."

- Tadao Ando

FIG 0.01. (LEFT) INTENSIFICATION THROUGH
OCCUPANCY-DRIVEN INTERVENTION. AUTHORS
OWN IMAGE.

FIG 0.02. AUTHOR'S IMAGE OF SITE RESPONSIVE
ENVELOPE ANALYSIS TOOL FOR SCENARIO SITE.

ABSTRACT

Diverse Density proposes an alternative housing strategy to the idealistic top-down process of housing development.

The term 'Top – down' refers to a situation in which decisions are made by a few people in authority rather than by the people who are affected by the decisions (Cambridge).

Problems/Position/Question

New Zealand's urban housing is in a period of flux. Pressures of densification have permitted the intervention of medium density housing development schemes but these are not always successful. These typically top-down processes often result in internally focused design schemes that do not adhere to their specific context. The subsequent design outcomes can cause detrimental impacts to the local, urban and architectural conditions.

With vast quantities of council regulations, building restrictions and design guidelines clouding over the housing sector, commonly referred to as 'red tap', occupant participation in the housing development sector is dwindling. A boundless separation between top-down and traditional housing processes has occurred and our existing neighbourhoods and historic architectural character is taking on the brunt of the problem. The thought provoking, alternative housings strategies of key research theorists Alejandro Aravena and John Habraken frame positions that challenge contemporary densification methods with an alternative strategy.

This position is addressed by endeavouring to answer;

How can demands for denser housing achieve dynamic design responses that adhere to changes in occupancy, function and local site conditions?

Aim

The aim of this thesis is to challenge New Zealand's current housing densification methods by proposing an alternative densification strategy. Explicit devotion will be attributed to opposing top-down building developments. Secondly, this thesis aims to test a speculative site specific housing model. The implementation of a Christchurch housing scenario will situate an investigative study to test the strategy and its ability to stimulate greater diversity, site responsiveness, functional adaptability and occupancy permutation. The post-earthquake housing conditions of Christchurch provide an appropriate scenario to test and implement design-led investigations.

Objectives

The primary objectives of this design-led research investigation is to challenge the idealistic top-down method of developing density with a new method to:

- Develop contextual architectural cohesion
- Encourage residential diversity
- Reinvigorate architectural autonomy
- Respond to, and recognise, existing site conditions
- Develop a housing model that:
 - Adapts to occupant functionality preferences
 - Caters to occupancy diversity
 - Achieves contextual responsiveness

The proposition is addressed through a speculative design-led scenario study. A well-established Christchurch urban environment is adopted to implement and critique the envisioned alternative strategy. Development of the designs responsiveness, adaptability and functionality produces a prototype housing model that actively adheres to its particular context.

Implication

The implications of this research would be an alternative densification strategy to perceive the advancement of punctual assessment of building compliance. With accelerated building processes the research may have implications for addressing New Zealand's housing crisis whilst simultaneously providing diverse, personable and responsive architectural solutions. A more dynamic, up-to-date and responsive housing development sector would be informed.

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FIG 1.01. (ABOVE) MACRO SCALE MAP OF
CHRISTCHURCH BUILDING FOOTPRINTS.

INTRODUCTION

CONTENT UNAVAILABLE. PLEASE CONSULT THE PRINT VERSION FOR ACCESS.

1920 RESTORED VILLA ON PAPANUI ROAD, MERIVALE,
CHRISTCHURCH

CONTENT UNAVAILABLE.

EXETER STREET, MERIVALE, CHRISTCHURCH

"If you went to Merivale and said, do you want more boxes, they'd say hell, no!" But someone's buying them? "Of course they are, because it's still got the vestige of a good environment and it's near the fashionable supermarket." (Matthews)

In the words of the late Peter Beaven, a well-recognised Christchurch architect, the problem is simple, ill-advised architecture not responding to its context, but buyers don't have an alternative choice.

CURRENT HOUSING DIRECTION

EXISTING HOUSING

THE PROBLEM

PROPOSED ALTERNATIVE
STRATEGY FOR HOUSING

FIG 1.04. AUTHOR'S IMAGE OF CURRENT HOUSING MODEL DIRECTION AS OPPOSED TO A PROPOSED OCCUPANCY DRIVEN ALTERNATIVE.

PROBLEM STATEMENT

New Zealand has fallen victim to urban sprawl. Our abrupt response to this problem has been to increase densification through methods such as medium density housing schemes. These typically top-down, monotonous and idealistic solutions, often fail to adhere to specific New Zealand architectural, occupancy and site conditions. Couple these unresponsive and inappropriate design schemes with New Zealand's historic animosity towards intensification and the resulting developments often cause detrimental impacts to the local neighbourhoods.

With the inevitable densification of our urban environments, the current top-down trends of development leave New Zealand's housing sector at risk. We risk disregarding our sense of place. We risk destroying our neighbourhood and historic architectural character. But most poignantly we risk fabricating a greater disparity between occupant and design engagement.

QUESTION

How can demands for denser housing achieve dynamic design responses that adhere to changes in occupancy, function, regulation and local site conditions?

AIM & OBJECTIVES

AIM & OBJECTIVES

The aim of this thesis is to analysis and critique New Zealand's current housing densification issues and combat prominent top-down building processes and developments. The research proposes a speculative and alternative site-specific housing strategy, implemented in Christchurch, allowing greater diversity, site responsiveness, functional adaptability and occupancy permutation. The post-earthquake condition of Christchurch provides an appropriate scenario to test and implement design-led investigations.

The primary objectives of this design-led research investigation it to challenge the idealistic top-down method of developing density with a new method which:

- Develops contextual architectural cohesion
- Encourages residential diversity
- Reinvigorates architectural autonomy
- Responds to, and recognise, existing site conditions
- Develops a housing model that:
 - Adapts to occupant functionality preferences
 - Caters to occupancy diversity
 - Achieves contextual responsivity

A well-established Christchurch community is used as a scenario to explore how this alternative method can achieve diverse densification through a site specific housing model. This model will be implemented to study how distinct local, site, functional and occupant conditions can actively adhere to a particular context.

SCOPE

SCOPE OF THE RESEARCH

This thesis explores the implementation of an adaptive and responsive housing model to increase residential density through an alternative, diversity-driven strategy.

To achieve the design responses it is assumed existing residents are interested and tolerable of identified and/or proposed design decisions to develop neighbourhood architectural cohesion. Amendments to existing conditions are negated by the assumed increase in neighbourliness, and land value generated through high-quality, contextually responsive and diverse architectural resolutions. Along with residential cooperation, a constructive council relationship to implement regulation and guideline changes is assumed.

Issues of affordability are considered in a broad housing concept but overshadowed by design decisions as the well-established, highly demanded context assumes value is of insignificant importance. This is gratified through the explanation of proximate affordable housing opportunities.

Structural analysis and construction details are investigated but limited as the requirement for multiple houses, with detailed resolution, reached beyond the scope of this research. Furthermore, it is assumed typical New Zealand building practices are applicable, therefore minimising the appropriate analysis.

Finally, the most pressing limitation to the scope is context. The thesis timeframe limits contextual analysis to one particular site, with adequate detail. This thesis therefore takes a speculative proposal position as it is beyond the scope to critically involve all realistic parties. It is anticipated that in a real scenario local body, planning or government facility could amend, develop and manipulate the envelope script to implement an austere localised housing model for any substitute context. ──

METHODOLOGY

FIG 1.05. AUTHORS METHODOLOGY

STRUCTURE

THESIS STRUCTURE

This thesis is presented in eight parts.

Part one introduces the scope of this theses research. A written component logically constructs the argument of further exploration by outlining the problem and analysing the concerns with contemporary densification strategies. The rationale behind the research question, aims and objectives and methodology set up a designed res-earch process to construct a linear argument throughout the study.

Part two and three investigates and analyses the site and its corresponding literature. A Christchurch sites local, historic and proposed context is evaluated to explore the application of an alternative densification strategy. A critique of local design guidelines and controls stimulates the requirement of a new approach to design controls and densification.

Part four(i) contextualising the research in the academic field by critiquing alternative housing theories by Alejandro Arevena and John Habraken. This theoretic investigation formulates alternative processes and the design framework for a new method for developing density. Part four(ii) investigates and compares problematic and successful case studies. Case studies are analysed against a series of design criteria, recognized in preceding investigations, and outline their capacity to achieve the thesis objectives.

Part five explores the envelope script. The design of a digital scripting tool is articulated as a viable alternative method for achieving responsive, residential diversity.

Part six consists of the design exploration of a new housing model that responded to the preceding envelope strategy. An iterative design investigation develops an alternative housing prototype. Analysis of the design responsiveness to occupancy, functionality and site conditions is assessed as an ongoing undercurrent during the investigation.

Part seven presents the developed prototype design in the Christchurch context as an alternative housing strategy to achieve diverse density.

Part eight concludes the research paper with a summarising argument and assessment of the design responses ability to resolve the research Problem and Aims & Objectives. A concluding dialogue discusses the potential opportunities of the study outside of the research scope.

An additional bibliography and appendices supports the research paper.

CONTENT UNAVAILABLE.

[CHAPTER TWO]

CONTENT UNAVAILABLE.

RESEARCH POSITION

FIG 2.02. INITIAL DESIGN INVESTIGATION INTO AN INFILL HOUSING STRATEGY LED TO THE QUESTIONING OF THE VALUE OF THE ARCHITECTURAL DISCIPLINE

FRAMING AN ALTERNATIVE POSITION

Diverse Density does not attempt to draw idealistic, highly resolved conclusions. It instead takes a speculative design position to focus attention on attempting to draw realistic conclusions to frame an alternative housing strategy.

This brief chapter situates the position of the research within New Zealand's architectural context. A initial reflection on traditional housing notions is deduced from Austin Mitchell's text, *The Half-Gallon Quarter-Acre Pavlova Paradise*. The position is established via a broad overview of traditional research conclusions, design proposals and New Zealand housing issues that frame the argument for an alternative housing strategy.

New Zealand's urban landscape is dominated by stand-alone dwellings. In the 2013 census approximately 8 out of 10 households dwelled in a stand-alone home (Statistics New Zealand). It has been our affinity with this typology that has caused the urban sprawling issues of today. As Mitchell explained, in 1972 New Zealand's most 'profitable crop' was septic tanks. It is this embedded mentality towards development that has begun to leave our residential environments neglected of architectural character. We have conformed to international pressures of densification by employing a top-down management method to our housing development sector. This strategy often results in contextually unresponsive architectural development just to achieve intensification. This thesis questions the nature and appropriateness of these development processes in a New Zealand context. As Mitchell discusses "A mass society is hierarchical and fragmented; a small one is uniform. Mass societies generalise into categories and classes; New Zealand deals in individuals, being small enough to particularise (Mitchell 20). It is this perspective that leaves the research to question why the current top-down development strategies are being employed. Strategies that hinder individualism and involvement and instead create negative intentions through control (Vernez-Moudon 40).

Framing my Position

This thesis argues that a digression from traditional avenues of research is required to frame an alternative perspective. There would be little value added to the architectural discipline through traditional housing responses as the majority of the project conclusions have been researched before. Whether it's townhouses, unit housing, apartments, co-housing, infill housing, medium density schemes etc.; each example has a limitless amount of literature registered to its subject. The problem with the existing research is it often adheres to contextual ideals, whereas the reality can differ greatly. The majority of these methods of densification are top-down building processes, and it is these methods that are critiqued. Traditional research aims to fine tune the existing systems, regulations, design controls, design guidelines, proposals of different design options, and the like but typically digress from the most important topic, the occupant. An architectural fixation with form, detail and regulator control has led to a housing sector so restrictive, no sane individual dear enter into the process of building.

This thesis attempt to move outside these typical realms of enquiry and frame an alternative housing strategy that can add speculative research value to the architectural discipline. The research explores this position by deriving a design lead enquiry through literature and case study analysis of multidisciplinary issues.

FIG 3.01. COLLECTION OF AUTHORS LITERATURE.

LITERATURE REVIEW

This chapter begins by discussing Jan Gehl's method of involving the occupant in the design process, in order to achieve responsive and diverse living environments. Secondly this chapter looks at two of Peter Calthorpe's four design principles, diversity and regionalism, as they are particularly relevant to the New Zealand condition. Thirdly, the notion of the role of the individual freedom within a collective framework is recognised through John Habraken's theory surrounding 'the open building'. Further discussion on occupant adaptability and individualism is explored through Alejandro Aravena's theory of 'synthesis'.

CONTENT UNAVAILABLE.

JAN GEHL

Specialisation:

Urban Planning and Design

Key extracts from his theory:

Community Planning

Undramatic and Intimate Architecture

CURRENT HOUSING STRATEGY BUILDING FOR THE PEOPLE:

PROPOSED HOUSING STRATEGY BUILDING WITH THE PEOPLE:

FIG 3.03. DIAGRAM EXPLORING PROPOSAL FOR ALTERNATIVE HOUSING RELATIONSHIP BETWEEN OCCUPANT AND DESIGN DEVELOPMENT.

GEHL'S THEORY

In Gehl's text, *Life between buildings*, and film, *The Human Scale*, he transports theory beyond traditional urban analysis strategies of traffic, pedestrian and recreational space to frame contemporary strategies for the formation of social activity and meaningful residential areas. Crucially, Gehl recognises we are in an age of flux, where trends in family patterns, average size and working conditions in modern society are all changing, "what used to be our parents idea of an investment will not be ours" (Dalsgaard). He places great design emphasis on authorising users and occupiers of space the freedom to explore their own activity. He argues our urban and living environments need to better reflect the people. A people which is diverse in nature and looking beyond the home for social activity. Our traditional working conditions are changing and with these are our demands in social and creative needs (Gehl 52).

Integration

Gehl's theories about the Human Scale are particularly relevant to Christchurch and a New Zealand context. He discusses the 'bird shit architect', someone who flies around and drops individual buildings out of context (Dalsgaard). This research will use Gehl's method of a 'processes and project' relationship to actively seek reinvolvement of the individual in housing densification. A process of designing *with* the people, not *for* the people. This will inform occupant responsive, diverse living environments.

CONTENT UNAVAILABLE.

PETER CALTHORPE

Specialisation:

New Urbanism

Key extracts from his theory:

Diversity

Responsiveness

SPRAWL AND DISPARITY

REGIONAL RESPONSIVE ARCHITECTURE

CALTHORPE'S THEORY

Peter Calthorpe introduces the idea of principles. He follows four principles whenever he designs; diversity, human scale, conservation, and regionalism (Calthorpe, Lerup and Fishman 17). All of these principles critically parallel with the research but diversity and regionalism are analysed as the utmost influential.

Diversity

Calthorpe discusses diversity as a multi-meaning term. Beyond the typical recognition of a purely physical form and into the demographics, functionality and financial opportunity of a design. This key principle alone is particularly relevant to my research as the problems identified have been caused by seemingly overshadowing this principle with alternative motives. The lack of housing diversity in functionality, scale, access and economics has caused a range of issues.

Regionalism

Calthorpe argues that regionalism is about the all-encompassing 'regional cities'. His belief is that the networks and connectivity between neighbourhoods, district and urban centres is of equal importance to that of the individual building (Calthorpe, Lerup and Fishman 19). It is this perspective that is vital for critiquing our current housing practices.

As Calthorpe states, "...where we develop is as important as what we develop", he pinpoints the relationship between locality and built work that has often failed in New Zealand (Calthorpe, Lerup and Fishman 19). In the case of New Zealand it is not always the housing quality or liveability of the design solution, which is typically assessed in new research and design propositions, but purely the regional appropriateness of the proposals that is inadequate. Calthorpe's theories bring about questions of designated densification areas or zones, such as Christchurch's proposed 'East Frame'? Areas that encourage intensification, increased amenity and urbanisation without impacting existing neighbourhoods, on the contrary to our current practice of unsympathetically sprawling poor developments throughout the existing fabric of our cities.

This research uses Calthorpe's principle of regionalism and expresses it through the concept of responsiveness.

JOHN HABRAKEN

Specialisation:

Mass Customisation Housing – The Open Building

Key extracts from his theory:

Adaptability

Personalisation + Functionality

Framework

FIG 3.07. DIAGRAM OF SIMPLIFICATION OF THE
COMPLEX EXISTING HOUSING ISSUES.

HABRAKEN'S THEORY

John Habraken, an avant-garde Dutch architect, divulges the framework. A concept developed in his text, *Supports: an alternative to mass housing*, and further critiqued by Koos Bosma, Dorine van Hoogstraten and Martijn Vos in the text, *Housing for the millions: John Habraken and the SAR*.

The Open Building

"The essence of an open building is individual freedom within a collective framework" (DE DRAGER). Habraken's alternative perspective on housing questions a different role for the architect in the design process. Habraken criticises the colleague who 'is in danger of losing himself in empty jargon,' who 'will search for ever-new forms,' and who 'inclines to exaggerated expression' (Bosma, van Hoogstraten and Vos 94). Critical to this research, Habraken opposes top down idealistic approaches, instead encourages a shift from a fixation with form and the arrogance of the artist to the acceptance of an alternative, yet traditional, role (Habraken). This role reflects a 'prototype' design position, focusing on circulation and facade, embracing occupancy freedom, growth and change within (Bosma, van Hoogstraten and Vos 94).

Habraken's theories heavily influence the research of this paper. A shift away from an architecture of imagery, icon and final solution but into the realm of speculation and proposition. The idea of the framework, as a method to control design response and hamper monotonous proposals, will be critiqued against traditional building processes. This sets up the researches fundamental principles and application as a proposed alternative to the existing process.

ALEJANDRO ARAVENA

Specialisation:

Mass Customisation Housing – The Open Building

Key extracts from his theory:

Adaptability

Personalisation + Functionality

Framework

FIG 3.09. DIAGRAM OF DESIGN'S POWER OF SYNTHESIS.

ARAVENA'S THEORY

"The more complex the problem, the more the need for simplicity"

- Alejandro Aravena (TED.com).

In Alejandro Aravena's TedTalk, he discusses design's power of synthesis as "...an attempt to put at the innermost core of architecture the force of life". Aravena has used this design strategy for a multitude of affordability and post-environmental disaster housing responses. He believes that when issues are simply rephrased from the traditional response, completely different design conclusions can be made. It is this unique response that can be employed to the current housing issues of New Zealand to attempt to draw an alternative densification strategy.

This thesis argues the problem is potentially not the regulations, design guidelines and principles but the top-down process of control. A process stripping people of architectural freedom and expression through monetary issues and conditions of regulation. This thesis will attempt to reframe housing regulations and draw an alternative application for their use.

With numerous issues, previously discussed, relative to New Zealand housing sector, a process of synthesis could be applied to produce an alternative housing strategy. Late Architect Peter Beavan believed a regulated synthesis between planners, architects and occupants would convey the idealistic Christchurch (Matthews). Beavan's recognition for the demand of architectural synthesis stimulates the appropriation of an alternative perspective, similar to Aravena's process, for the design process in the Christchurch region. Design's power of synthesis will be applied in this thesis to achieve the outlined aims and objectives.

CONTENT UNAVAILABLE.

[CHAPTER THREE - Part ii]

CONTENT UNAVAILABLE.

PART ONE

ASSESSMENT PROCESS:

FIG 3.11. CASE STUDY ASSESSMENT PROCESS.

PRECEDENTS OF THE PROBLEM

Local examples of failed housing densification

Three local cases will be analysed by addressing their inability to provide a responsive and flexible densification strategy. These precedents will then be assessed through the design criteria, at the bottom of the page, to explore if, and how, they fail to provide diverse and adaptive living environments. Finally, a sketch exploration of each cases key failures will be undertaken to explore resolutions to the negative architectural impact each case presents, providing insite for the research designs.

- 1. Peacock Street Townhouses
- 2. CCC + NZIA Proposal
- 3. Beveridge Street Townhouses

The design criteria below are principles deduced from the preceding literature and adjusted for a housing assessment application.

FIG 3.12. CASE STUDY ASSESSMENT CRITERIA

CASE STUDY ONE

12-18 PEACOCK STREET
TOWNHOUSES

Project by Kerry Mason

FIG 3.13. IMAGES OF PEACOCK STREET
TOWNHOUSES BY KERRY MASON.

LOCATION.

12 - 18 Peacock Street,
Christchurch

DESCRIPTION.

2003
4 high quality architectural
designed townhouses. 3 bedrooms,
2 bathrooms, double garage.

DENSITY VALUE.

1325m² site with 4 units.
= **30.2** units per hectare

FIG 3.14. MODEL OF PEACOCK STREET
TOWNHOUSES BY KERRY MASON.

THIS CONTEMPORARY, NEW YORK STYLED TOWNHOUSE COMPLETELY DISREGARDS THE EXISTING GRAIN AND MAKES NO ATTEMPT TO RECOGNISE THE EXISTING TYPOLOGIES OF THE SITE. THE RESULTING ARCHITECTURE HAS NO RESPONSIVENESS TO THE DEVELOPED CHARACTER OF THE AREA AND ADDS NO VALUE TO THE COMMUNITY'S SENSE OF PLACE.

THE STREET SETBACK DOESN'T RESPOND TO THE HISTORIC AND CURRENT URBAN GRAIN. IT ISOLATES THE OCCUPANTS FROM ENGAGEMENT WITH THE STREET.

THE VAST OUTDOOR SPACE CREATED AT THE FRONT OF THE SITE COULD HAVE BEEN ELEVATED OFF THE STREET LEVEL TO ALLOW CONNECTIONS TO BE CONTINUED. COURTYARD HOUSING MAY HAVE BEEN A MORE APPROPRIATE TYPOLOGY FOR THE LARGE SITE.

RESEARCH SHOWS YOU TYPICALLY MAKE CONTACT WITH 8 NEIGHBOURING PROPERTIES, HOWEVER THIS DESIGNS REAR ACCESS COMPLETELY REMOVES ANY OPPORTUNITY FOR STREET AND NEIGHBOUR ENGAGEMENT. BY CREATING AN EXTERNAL ACCESSWAY THE DESIGN DISREGARDS NEIGHBOURLINESS AND COMMUNITY AS AN IMPORTANT ASPECT OF THE DESIGN. THIS NEGATIVELY IMPACTS ALL THE NEIGHBOURING SITES AND THE COMMUNITY.

THE LACK OF DIVERSITY IN THE UNITS DESIGN LIMITS THE OCCUPANCY AND FUTURE APPLICATIONS. THE ARCHITECTURAL ASSUMPTIONS THAT HAVE BEEN MADE MAY NOT BE ADHERED TO IN A DECADES TIME, LEAVING A PERMANENT REMINDER OF AN UNRESPONSIVE AND UN-ADAPTIVE HOUSING SOLUTION.

FIG 3.15. DIAGRAM ANALYSIS OF CASE STUDIES UNRESPONSIVE URBAN GRAIN AND LACK OF EXISTING STREETScape RECOGNITION.

CONCLUSIONS

Although providing a high quality living environment, this New York styled townhouse doesn't provide any benefit to the wider community. It's lack of neighbourliness, segregates itself from the street and the public interface, which is particularly strong in this suburb. The unresponsive grain of the project can only be seen as detrimental to the architectural makeup of the surrounding area. The architectural solution makes no attempt to develop an existing character and sense of place through design.

A courtyard typology or a rear section vs front section division may have encouraged a greater engagement to the streetscape and neighbouring properties.

RESPONSIVENESS & RECOGNITION OF:

BREAK UP THE FORM AND ORIENTATION OF THE BUILT WORKS TO ENCOURAGE DIVERSITY.

PROVIDE ALTERNATIVE METHODS OF ACCESS TO A VARIED SCALE OF SITES WILL ENCOURAGE A MORE DIVERSE COMMUNITY. SHIFT AWAY FROM DESIGNING PURELY FOR THE AUTOMOBILE. WALKUP ACCESS, MOTORBIKE OR CYCLING WOULD ACTIVATE THE EDGES OF THE SITE AND ENCOURAGE STREET ENGAGEMENT.

FIG 3.16. SKETCH EXPLORING ALTERNATIVE ACCESS ROUTES AND SITE DIVISIONS TO EXPLORE VARIETY, STIMULATING DIVERSITY.

CASE STUDY TWO

FORMER CHRISTCHURCH WOMEN'S
HOSPITAL SITE PROPOSAL

Project by NZIA CANTERBURY

FIG 3.17. IMAGES OF NZIA CANTERBURY'S DESIGN PROPOSAL FOR THE PREVIOUSLY OCCUPIED CHRISTCHURCH WOMENS HOSPITAL SITE.

LOCATION.

47-53 Conference Street
Christchurch

DESCRIPTION.

A residential housing and retail
proposal for the now empty former
Christchurch women's hospital site,

DENSITY VALUE.

148mm² site with 4 units.
= **37** units per hectare

FIG 3.18. MODEL OF NZIA CANTERBURY
PROPOSAL.

THIS NZIA PROPOSAL ONLY PROVIDES 3 ALTERNATIVE HOUSING DESIGNS OVER A SITE WITH EXCESS OF 40 HOUSING UNITS. THIS LACK OF VARIETY DOES NOT RESPONSE TO THE DIVERSE NATURE OF THE SURROUNDING ARCHITECTURAL CONTEXT. A HOUSING STRATERGY THAT EMPLOYED GREATER VARIETY COULD STIMULATE A MORE DIVERSE MIXTURE OF OCCUPANTS.

THE REPETITIVE NATURE OF THE DESIGN LIMITS OCCUPANTS ABILITY TO PERSONALISE THEIR HOME. THIS LEADS TO A LACK OF ‘SENSE OF PLACE’ AND AN OVERALL DECLINE IN NEIGHBOURLINESS TENDENCIES.

THE URBAN GRAIN AND SUBDIVISION STRATEGY OF THE SITE FAILS TO ADDRESS THE SURROUNDING CONTEXTS DISTINCT ARCHITECTURAL QUALITIES. THE SMALL STREETSCAPES OF PEACOCK, BEVERIDGE AND CONFERENCE STREET IS NOT DEVELOPED TO ENCOURAGE PUBLIC SURVEILANCE AND AN ACTIVE PUBLIC MEDIUM. A HOUSING MODEL THAT ENCOURAGED ACTIVE EDGES MAY HAVE BEEN MORE INFORMED. THIS COULD HAVE BEEN ACHIEVED BY HAVE SITE ACCESS LIMITED TO ONE AXIS, NOT TWO. THIS STRATEGY FORCES OCCUPANT ENGAGEMENT TO ACTIVELY OCCUR AT ALL STREET EDGES.

FIG 3.19. IMAGES OF NZIA CANTERBURYS DESIGN PROPOSAL FOR CHRISTCHURCH WOMENS HOSPITAL SITE.

CONCLUSIONS

The study and analysis of the site, undertaken by the NZIA, reveals accurate assumptions for the requirements of the area yet are lacking successful resolution. A more diverse, responsive design, developing the existing grain, typologies and architectural status of the area would be considerably more beneficial, and valuable, to the community. The design for a keystone site requires a greater range of architectural and living diversity.

RESPONSIVENESS & RECOGNITION OF:

THE LACK OF ALTERNATIVE FLOOR PLANS,
LAYOUTS OR SPATIAL ARRANGEMENTS EVIDENT
IN THIS HOUSING SCHEME BRING ABOUT THE
CONCEPT OF MODULATION. CLUSTER HOUSING
OR MICRO MODULES COULD BECOME A TOOL
FOR OCCUPANTS TO ASSEMBLE THE APPROPRIATE
PARTS OF THEIR PERSONALISED FLOORPLAN.

FIG 3.20. DIAGRAM ANALYSIS OF POTENTIAL
ALTERATIONS TO THE DESIGN PROPOSAL TO
DEVELOP A MORE RESPONSIVE RESOLUTION.

CASE STUDY THREE

BEVERIDGE STREET
TOWNHOUSES

Project by
Shepard & Rout Architects

FIG 3.21. (LEFT) IMAGES OF BEVERIDGE STREET TOWNHOUSES BY SHEPARD & ROUT. (RIGHT) AUTHORS IMAGES.

LOCATION.

47-53 Beveridge Street
Christchurch

DESCRIPTION.

2007.
Contemporary townhouse development consisting of 4 freehold properties with standalone homes. Identical reflected layouts with a central shared accessway. All townhouses feature double garaging, 3 bedrooms and a private courtyard.

DENSITY VALUE.

1480m² site with 4 units.
= **27** units per hectare

FIG 3.22. MODEL OF BEVERIDGE STREET
TOWNHOUSES BY SHEPARD & ROUT.

THE SHARED ACCESSWAY ASSUMES THE REQUIREMENT OF CAR SPACE, POTENTIALLY WASTING SPACE FOR ALTERNATIVE OCCUPANTS AS THEY LEAD ALTERNATIVE LIFESTYLES.

THE FORCED OUTDOOR LIVING AREAS DON'T ALLOW THE USERS TO OCCUPY THE SITE IN THEIR OWN UNIQUE MANNER. IT REMOVES THE ABILITY FOR USERS TO ADAPT SPACES TO INCREASE OR DECREASE OUTDOOR LIVING BASED ON PERSONAL PREFERENCE OR LIFESTYLE

260 WRDS

THE LARGE ENCLOSING BOUNDARY WALLS DISCOURAGE NEIGHBOURHOOD ENGAGEMENT, WHILST DISTANCING THE DESIGN FROM LOCAL DESIGN CONDITIONS SUCH AS HIERARCHY, HISTORIC TYPOLOGIES AND MATERIALITY. THIS BREAKS UP THE ARCHITECTURAL LANGUAGE OF THE AREA AND ALTHOUGH PROVIDES HIGH QUALITY LIVING CONDITIONS, FAILS TO ADD ARCHITECTURAL VALUE TO THE EXISTING AREA

THE DESIGN DOES RECOGNISE THE LOCAL CONDITION OF STANDALONE HOMES BUT DOESN'T EXPLORE A DEFINED CONNECTION TO THE HISTORIC LANGUAGE OF THE AREA, PREVIOUSLY BEING A SPECIAL AMENITY AREA. VITALLY, THE DESIGN COULD BE PLACED IN ANY SURROUNDING SUBURB, AS IT HAS NO DISTINCT CONNECTION TO IT'S ARCHITECTURAL CONTEXT

THE REPETITION OF THE DESIGN LIMITS THE POTENTIAL OCCUPANTS, AS THE LACK OF VARIETY, SCALE AND LAYOUT FORCES USES TO ADAPT THEIR LIFESTYLE TO THE ARCHITECTURE. NOT ALLOWING THE ARCHITECTURE TO EXPRESS OR REFLECT PERSONAL LIVING SITUATIONS, THE DESIGN THEREFORE DISCOURAGES ALTERNATIVE OCCUPANTS WITH DIVERSE FAMILY, CULTURAL AND MONETARY CONDITIONS

THE DESIGN RESPONSE FAILS TO RECOGNISE THE OPPORTUNITIES A CORNER SITE POSSESSES, OPTING TO DISREGARD THE POTENTIAL LANDMARK CONNECTION TO THE THOROUGHFARE OF DURHAM STREET SOUTH

THE INWARD FOCUSED DESIGN REMOVES ANY CHANCE OF ARCHITECTURAL INDIVIDUALISM OR EXPRESSION AS THE LIMITED STREETSCAPE MINIMALISES THE OPPORTUNITY TO EXPRESS PERSONALISATION

FIG 3.23. DIAGRAM ANALYSIS OF THE LACK OF NEIGHBOURLINESS AND ENGAGEMENT TO THE EXISTING CONTEXT.

CONCLUSIONS

This design optimises the inspiration for this research. Four high-quality stand-alone dwellings with trees around them, undeniably the Garden City, right? No. It discards half the site with unusable public/private space, whilst completely blocking out the neighbourhood and any potential engagement. It is examples such as this which stimulate great discussion. So much internal focus is placed on privacy aspects of the built work and the internal living environment that no attention is paid to the surrounding environment. This researches design proposal shall yearn for recognition of both.

RESPONSIVENESS & RECOGNITION OF:

FIG 3.24. SKETCH EXPLORING HOW THIS DESIGN LACKS ENGAGEMENT TO THE STREETScape AND SURROUNDING CONTEXT.

PART TWO

PRECEDENTS OF THE SOLUTION

Examples of successful responsive housing

3 precedents will be critically analysed, with an additional 4 documented, as to their ability to provide examples of responsive housing. Precedents were selected based on their alternative methods that could be developed to inform an alternative housing strategy, not just full scale densification projects. Sketch explorations and discussion allow conclusions to be developed in the design exploration stages in the development of an alternative housing strategy.

1. Quinto Monroy
2. Reflections of Mineral
3. Montblanc House
4. Holes House
5. Gallery of five trees
6. Tekapo Shed
7. Tower House

CASE STUDY ONE

QUINTA MONROY
'Incremental Housing Set 93'

+

VILLA VERDE
'Incremental 484 Houses'

Projects by ELEMENTAL

QUINTA MONROY
'Incremental Housing Set 93'

VILLA VERDE
'Incremental 484 Houses'

FIG 3.25. IMAGES OF ELEMENTAL HOUSING
PROJECTS STATED ABOVE.

LOCATION.

Iquique,
Chile

DESCRIPTION.

2001

A 93 family social housing project with a 36m² initial housing model which can be expanded into a 72m² duplex scheme

DENSITY VALUE.

5025m² site with 93 units.
= **54** units per hectare

FIG 3.26. MODEL OF PEACOCK STREET
TOWNHOUSES BY KERRY MASON.

THE INCREMENTAL AND PERSONALABLE APPROACH TO DESIFICATION ALLOWS OCCUPANTS TO ADAPT THEIR HOUSING SITUATION TO THIER PERSONAL CIRCUMSTANCE. THIS STRATEGY COULD BE DEVELOPED TO INFORM AN ARCHITECTURAL MODEL THAT ALLOWS USER ADAPTION, A RESEARCH OBJECTIVE.

QUINTO MONROZ EMPLOYS THE USE OF A STRUCTURAL FRAMEWORK THAT OCCUPANTS CAN EVOVLE GIVEN THEIR PERSONAL CONDITIONS. A STRUCTURAL DEVELOPMENT FRAMEWORK OF MODULAR CONDITIONS COULD BE USED TO DEVELOP AN OCCUPANT RESPONSIVE ARCHITECTURAL RESOLUTION.

QUINTO MONROY EMPLOYS A STIMULATION DENSIFICATION STRATEGY. A SEEMINGLY 'KICK START' ARCHITECTURAL TYPOLOGY. THIS IDEA OF AN EXPANSIVE FRAMEWORK COULD BE ADAPTED TO AN INDIVIDUAL SITE CONTEXT.

ALEJANDRO'S PERSPECTIVE ON THE POWER OF SYNTHESIS COULD BE IMPLEMENTED TO ATTEMPT TO DEVELOP AN ALTERNATIVE APPROACH TO NEW ZEALANDS HOUSING ISSUES. THIS COULD INFLUENCE A COHESIVE DENSIFICATION STRATEGY THAT IS RESPONSE TO ITS OCCUPANCY AND SITE CONDITIONS.

FIG 3.27. DIAGRAM ANALYSIS OF MASS CUSTOMISATION STRATEGY.

CONCLUSIONS

Although providing a high quality living environment

HALF HOUSE
CONCEPT
CONTROLS
THE ENVELOPE

FRAMEWORK
FOR ADDITION

CHANGING.

• ADAPTIVE FRAMEWORK

• RESPONSIVE TO
LOCALISED DESIGN
CONDITIONS.

FIG 3.28. SKETCH OF EXPANSIVE STRUCTURAL
FRAMEWORK, WITHIN A DESIGNED FRAMEWORK.

CASE STUDY TWO

REFLECTION OF MINERAL

Project by Atelier Tekuto

FIG 3.29. IMAGES OF REFLECTIONS OF MINERAL.

LOCATION.

Tokyo,
Japan

DESCRIPTION.

2006

A micro home, nestled into a small irregular shaped site. The form responds to 3 different height plains in the local building code.

DENSITY VALUE.

44.62m² site with 1 unit.
= **54** units per hectare

FIG 3.30. MODEL OF PEACOCK STREET
TOWNHOUSES BY KERRY MASON.

SITE RESPONSIVITY INFORMED BY INFLUENTIAL DESIGN REGULATORY CONDITIONS. THIS STRATEGY COULD BE EXPLORED TO ATTEMPT TO INFORM SITE RESPONSIVITY TO ADHERE TO A SPECIFIC SITE CONTEXT.

PROCESS OF SUBTRACTION AS A TOOL TO INFORM SITE SECIFIC RESPONSIVITY.

FIG 3.31. ANALYSIS OF REFLECTIONS OF MINERAL SITE RESPONSIVE SUBTRACTIVE TECHNIQUE.

CONCLUSIONS

Reflections of Mineral is the epitome of responsiveness. The idea of creating a physical subtraction tool out of regulator conditions could be developed further to encourage site specific responsivity. The alternative strategy may help frame architecture as cohesion between the physical realm and the theoretical, informing design. In other words the built works directly reflects the proposed regulation, a delineator’s process.

THE POWER OF
SUBTRACTION. MAKING
NO ATTEMPT TO BE SUBTLE
BUT INSTEAD DEVELOP THE
PROPOSED SITE LIMITATIONS
INTO PHYSICAL FORM.

A BUILT FORM RESPONDING
TO AN UNBUILT FRAME

FIG 3.32. SKETCH EXPLORATIONS

CASE STUDY THREE

MONTBLANC HOUSE

Project by Studio Velocity

FIG 3.33. MONTBLANC HOUSE IMAGES

LOCATION.

Okazaki,
Japan

DESCRIPTION.

2009

A home within a home. This mixed-use home provides a liveable canopy, responding to the tight connections to 3 bounding sites.

DENSITY VALUE.

Unknown.

MONTBLANC HOUSE USES THE IDEA OF THE ENVELOPE IN AN INTERESTING DESIGN RESPONSE. ITS HIGHLY SITE RESPONSIVE STRATEGY FOR SOLVING THE HOUSING ISSUES WITH NEIGHBOURING SITES, SETS A PRECEDENT FOR RESPONSIVE DESIGNS MOVING FORWARD.

THE IDEA OF A BUILT FRAMEWORK, NOT THE CONTEMPORARY THEORETICAL APPROACH, COULD BE INFLUENTIAL IN DESIGN TESTING STAGES.

CONCLUSIONS

The unique response to typical site challenges engages with an interest idea of the frame. The design somewhat reflects a Habraken influenced 'Open Building' where the interior aspect of the house may be altered. The ideas of building within a frame, and through an alternative approach make this case study particularly relevant to the thesis.

ADAPTIVE OCCUPANT FUNCTIONALITY

HOLES HOUSE

BY MICHAL NOWAK

CONTENT UNAVAILABLE.

ADAPTIVE OCCUPANT FUNCTIONALITY
- the house as a kitset of parts

FIG 3.34. (ABOVE) HOLES HOUSE IMAGES.
FIG 3.35. (BELOW) SKETCH EXPLORATION OF A
INPUT FRAMEWORK.

GALLERY OF FIVE TREES

BY YOUNGHANCHUNG ARCHITECTS

CONTENT UNAVAILABLE.

RESPONSIVENESS

- the site is part of a collective, recognise
and respond to the existing

FIG 3.36. (ABOVE) FIVE TREES IMAGES.
FIG 3.37. (BELOW) SKETCH EXPLORATION OF SITE
RESPONSIVITY TO EXISTING CONDITIONS.

TEKAPO SHED

BY C NOTT ARCHITECTS

CONTENT UNAVAILABLE.

ADAPT

- the house as a collective mechanism, activated by the user
to respond to site and personal conditions

FIG 3.38. (ABOVE) TEKAPO SHED IMAGES.
FIG 3.39. (BELOW) SKETCH EXPLORATION
OF A ADAPTIVE STRUCTURAL SYSTEM
TO RECONFIGURE THE SPATIAL ENVIRONMENT.

TOWER HOUSE
BY ANDREW MAYNARD

CONTENT UNAVAILABLE.

SCALE
MODULATION - ADAPTABILITY
OCCUPANT FUNCTIONALITY

FIG 3.40. (ABOVE) TOWER HOUSE IMAGES
FIG 3.41. (BELOW) SKETCH EXPLORATION OF A
INPUT FRAMEWORK.

FIG 4.01. THE ENVELOPE SCRIPT.

A hand-drawn architectural sketch on a light-colored paper. The sketch depicts a building footprint with a central rectangular area and four trapezoidal extensions at the corners. The drawing is composed of dark, slightly irregular lines. A large, faint rectangular frame surrounds the central shape. Numerous thin, light-colored lines crisscross the background, some parallel to the main shape and others at various angles. In the center of the sketch, the word "CONCEPT" is written in a bold, black, sans-serif font. It is flanked by two short, horizontal orange lines, one above and one below the text. On the left side of the sketch, there is some faint, handwritten text that appears to say "CONCEPT DETAIL". At the bottom of the page, there is more faint, handwritten text that includes the words "BUILDING SEPERATION" and "BACK".

CONCEPT

BUILDING SEPERATION

WANT:

DIVERSITY

NEED:

RESPONSIVENESS

FIG 4.02. (LEFT) INITIAL SKETCH OF CONCEPT TO
CONTROL BUILDING FOOTPRINT.
FIG 4.03. (ABOVE) THE TWO CHALLENGES OF THE
DESIGN PROCESS.

FOOTPRINT - SLAB CONTROL.

CONTROLS ENVELOPE
FOOTPRINTS SHELL
SETBACKS DEFINED.
ALLOWS OPEN FORM
CUSTOM ADDITION

3 STOREY AREA
FORMATIVE SHELL
CONTROLS SKYLINE DIVERSITY

POSSIBLE
SOLUTIONS
ENDLESS.

2 STORY

3 STORY

SINGLE.

FORMULA - DESIGN CONTROL TO MANAGE FOOTPRINT IT SETS UP - FRONTAGE

- SETBACK
- SHADING POTENTIAL
- RELATION TO
NEIGHBOURING
BUILT WORKS.
- BOUNDARY CONTROL
- SITE COVERAGE
- DENSITY $\uparrow$ only up.
- WHAT AREA COULD

FORMS SETBACKS.

2D FOOTPRINT CONTROL

FIG 4.04. (LEFT) INITIAL SKETCHES OF CONCEPT TO CONTROL BUILDING FOOTPRINT.
FIG 4.05. (ABOVE) 2D STUDIES OF POSSIBLE FOOTPRINT CONTROL CONCEPT INFLUENCES.

ATTRACTOR POINTS
 META BALLS
 INTERSECTS
 OFFSET LINE
 EXTRUDE
 DIVIDE
 TOOLS
 4. USED

FOOTPRINT CONTROL CONCEPT

The footprint control concept came to fruition following the research into John Habraken's 'open building' theory. The idea was a formal structural framework that extended to the parameters of a site given potential, based on existing regulatory conditions. This framework would then be infilled according to the occupancy preference to inform a responsive architectural solution. It explored the notions of building coverage, site green space, minimum and maximum floor areas and footprint to site ratios. The concept was through the control of these elements, through percentage or regulations, a vertical structural framework could actively response to a changing site condition.→ Users could have the potential to increase or decrease the relative conclusions based on personal occupancy conditions, for example they could decrease site coverage but allow a greater house to site ratio.

PARAMETRIC REALISATION

It may not be the most striking image, but potentially the most important. This image symbolises a vital realisation and discussion about parametric application. At this key stage the research established the use of Grasshopper, a plug in to Rhinoceros, as a parametric tool to inform individual site responsivity.

FIG 4.06. THE TRANSITION FROM THE 2D REALM TO THE 3D, PARAMETRIC REALM.

FIG 4.07. (LEFT) SKETCHES OF PARAMETRIC REALISATION.

CONTENT UNAVAILABLE.

CONTENT UNAVAILABLE.

CONTENT UNAVAILABLE.

CONTENT UNAVAILABLE.

DELINEATION - HUGH FERRISS

The work of delineators, in particularly American Hugh Ferriss, explored the opportunity of subtraction to control the potential envelope of a New York City tower, based on the 1922 zoning laws. This iterative development of multiple setbacks and volumes could be adopted into a contemporary digital realm. Without limiting architectural freedom, a responsive parametric envelope could control the maximum mass but allow internal customisation and architectural freedom.

SCRIPT CONCEPT #1

Concept one objective:

Make the scripts primary function a direct parametric tool that responds to the parameters of any given site.

This series of images show how this is achieve. Any given sites parameters can be input into the script to allow the assessment of the building envelope to directly respond to its contexts. This primary function is maintained

FIG 4.08. DELINEATION PROCESS FOR A NEW YORK BUILDING BY HUGH FERRISS.

SCRIPT CONCEPT #2

Objective: Make the envelope responsive to the surrounding neighbourhood housing.

Achieved by: Scripting an offset tool for all neighbouring building footprints, influencing the possible building footprint on the site.

SCRIPT CONCEPT #3

Objective: Develop the footprint tool into the envelope tool.

Achieved by: Extruding the footprint concept into the 3d realm to create a visual analysis tool. The work of delineator Hugh Ferriss influenced a subtractive system to inform the envelope.

SCRIPT CONCEPT #4

Objective: Respond to the existing character of the area.

Achieved by: Developing a tree script to allow setback from established trees. Adding Northwest site setback to encourage outdoor living.

SCRIPT CONCEPT #5

Objective: Create a compliance assessment visual analysis tool.

Achieved by: Adding parametric site regulations into script to control height plane angles, height plane reference heights, building height limitations and existing setbacks from streetscape.

FIG 4.09. DELINEATION PROCESS FOR A NEW YORK BUILDING BY HUGH FERRISS.

3D PRINTING THE ENVELOPE

Testing the envelope through 3D printing technology. This process was trailed as a dynamic digital process to complement the script and allow rapid physical assessment. This process was discontinued due to the failed structural integrity, as shown, and the anticipation of a more transparent tool.

This modeling process was explored as it presented the opportunity to develop a conjunctive tool for site analysis.

FIG 4.10. IMAGES EXPLORE THE POTENTIAL APPLICATION OF 3D PRINTING AS A PHYSICAL ANALYSIS TOOL TO COMPLIMENT THE ENVELOPE SCRIPT.

MODELLING THE ENVELOPE

Testing the full scale envelope models on the scenario site allowed visual connections to be made between the responsiveness of the script to it's given context and the site parameters.

FIG 4.11. IMAGES EXPLORE THE POTENTIAL APPLICATION OF 3D PRINTING AS A PHYSICAL ANALYSIS TOOL TO COMPLIMENT THE ENVELOPE SCRIPT.

FIG 4.12. THE ENVELOPE SIMPLIFIED.

+ EXISTING SITE CONDITIONS

+ HEIGHT PLANES - HEIGHT LIMITS

+ RESULTANT ENVELOPE

FIG 4.13. THE WORKING INTERFACE OF INFLUENCING ELEMENTS OF THE SCRIPT.

FIG 4.14. TURNING THE ENVELOPE INTO A 3D COMPONENT

FIG 4.15. EXPORT THE ENVELOPE TO THE PREFERRED USER INTERFACE

LOCKING THE SYSTEM

3.1 Regulated Management

The envelope responds to simple site survey dimension inputs, with the exception of existing site conditions such as impacting neighbouring properties and vegetation. This allows all nonessential functions of the script to be hidden and locked to users, negating the opportunity for adjustment and interference. Locking the script ensures governing bodies can regulate the output of the system.

EXPORTING THE ENVELOPE

3.1 User Application

The simplicity of the envelope system allows users, architects, councils or planners to export the 3D component to their preferred user interface. With the site boundaries simultaneously exported, the enveloped can be directly overlayed onto proposed or existing built works to swiftly assess compliance with input regulations and controls.

FIG 3.42. ASSESSMENT OF COMPLIANCE DIAGRAM

FIG 4.16. SITE ANALYSIS WITHIN THE SCRIPT.

THE ENVELOPE AS A DIGITAL TOOL

Live site analysis tool

With a large separation between occupant-driven housing developments and top-down methods of development the envelope may serve as a medium to develop a relationship. The dynamic properties of the tool could stimulate engagement between the occupant and the design process. Quick assessment of design ideas and possibilities may allow occupants themselves to inform design solutions. This will lead to diverse housing solutions within the collective envelope framework.

Brownfield Development

The envelope tool could be used as a visualisation tactic to explore the housing typologies and conclusion that can be achieved with the subdivision strategies. This may lead subdivisions to encourage more diversity, more densification

Accelerated Approval Process

With such disparity between demand and housing supply in New Zealand the envelope tool could be developed as a process accelerant to improve the consent approval timeframe of future development.

SIMPLE / DYNAMIC ASSESSMENT

User Application

The simplicity of the envelope system allows users, architects, councils or planners to export the 3D component to their preferred user interface. With the site boundaries simultaneously exported, the envelope can be directly overlaid onto proposed or existing built works to swiftly assess compliance of input regulations.

Diverse Density

An alternative housing strategy

HOW TO guide to your sites potential.

Section A.

The Process – in Rhinoceros

- Before the process all local regulations and design controls are predetermined and preloaded within the specific script at this point -

You must begin with surveyed plan dimensions.

1. Determine the primary direction of access onto your site (See Fig A
 - a. Where necessary, determine the secondary direction of access if appropriate. (Primary access should be the most exposed, accessible boundary).
2. Open the relative access script in Grasshopper (type grasshopper into the command selection, then open document).
3. Determine the dimensions of your site according to Section B below.
4. Input these values into the Grasshopper script. X-axis being the E-W dimension and Y axis the N-S dimension.
5. Determine the distance to boundary, distance from boundary corners and heights of all existing neighbouring properties within 10m of the relative boundary.
6. Input these dimensions to the relative boundary.
7. Determine the position, radius and number of trees relative to site boundary, within 20m.
8. Input each trees position and dimensions into the script.
9. Right-click on the SUnion and PlaneSRF components and select bake (individually).
10. In the Rhinoceros platform, select the envelope and site base rectangle.
11. Export the selected objects to your preferred user program.
12. Ensure your architectural intervention fits within the envelope shell and meets the specified design conditions.
13. Remove protruding elements.
14. Reassess results until compliant is achieved.

Section B.

The Site

Determining accurate site dimensions is the primary objective of the process as their accuracy greatly influences the resulting building envelope. The current script limits the input to a rectangular site dimension with boundaries facing due north-south and east-west. Some quick analysis tools of a complex site may be adopted to simplify input values to broadly reflect the potential envelope of a site.

Development of a digital typography responsive script was under investigation but was rendered incomplete given the scope and timeframe of the research.

Section C.

Script customisation – Localise the inputs, appropriate the resolution.

The key objective of the DIVERSE DENSITY script is to create an adaptable tool to aid future developments, in-turn producing more apposite architectural interventions. Every component of the script is strategically coded to allow alteration of the input codes to inform site specific resolutions within the existing or proposed built environment. The variables within the script allow versatility within the base framework.

The variables of this particular script, based on the surrounding built environment and the proposed architectural direction of the area, are discussed below.

- The distance of boundary setbacks (zero lot alignment potential)
- The distance of setbacks from neighbouring built forms in all N, S, E, W directions.
- The height limitations of the local area.
- The height planes reference height relative to boundary.
- The height plane angles in all N, S, E, W directions.
- The number and location of established trees on and off your site.
- The individual radius and buffer-zone % offset (tree's potential growth volume, currently 40%) (may be adapted to suit tree variety and/or form)
- The individual height and height buffer-zone offset (for growth potential, Currently 1.2m) (may be adapted to suit tree variety and/or form)
- The setback distance of upper floors from relative boundary (allowing or limiting daylighting/wind/view conditions relative to neighbouring properties).
- The distance and scale of entrance setbacks from streets or walkways.

- The distance and scale of secondary entrance setbacks from streets or walkways.
- The maximum setback from primary access way
- The site coverage allowances within envelope floor plan
- The distance and angle of North corner setbacks to allow sunlight through to adjacent properties.
- The inter-floor height of each finished level (Currently set at 3.5m)
- The percentage, height and dimension of a northwest outdoor living setback.

Custom scripts, determined through the analysis of localised site conditions and the architectural progression of the suburb or community can be added with a wide range of variances and controls. See Fig E for parametric example.

Fig A. Site Access (primary as arterial route).

Fig B. Baking/exporting the envelope

Fig C. Process of inputting tree values into the script.

Fig D. Process of entering neighbouring buildings based on survey plans.

Fig E. Example of the Parametric qualities of the script. Custom inputs can be added or adjusted.

THE SITE RESPONSIVE ENVELOPE SCRIPT

THE SCRIPT WILL SEEM LARGE TO EXPERIENCED GRASSHOPPER USERS. THIS IS BECAUSE ALL THE ELEMENTS OF THE SCRIPT ARE SEPERATED INTO INDIVIDUAL FUNCTIONS. THIS IS TO ALLOW ADAPTION OF THE SCRIPT AND ONGOING PARAMETRIC ANALYSIS TO OCCUR WHEN UPDATING THE FILE. THE SCRIPT IS ALSO SEPERATED TO ALLOW GREATER PARAMETRIC FUNCTION WITHIN THE SCRIPT.

APPLICATION

+ SITE

+ SITE ENVELOPE

+ ENVELOPE INFLUENCES
Existing neighbouring buildings and substantial vegetation require setbacks to minimise functional, shading and visual impacts.

+ RESPONSIVE BUILT WORK

+ RESPONSE TO LOCAL CONTEXT

KEY:

SETBACK DISTANCE FROM VEGETATION

SETBACK DISTANCE FROM BUILT WORKS

KEY AREA REQUIRING ASSESMENT
(INPUT INTO SCRIPT)

SUBURBAN CONTEXT

Low Density Application

URBAN CONTEXT

Medium Density Application

TOWNHOUSE/ INNER-URBAN

High Density Application

+ SITE

+ MULTIPLE SITE ENVELOPES

Individualised site envelopes explore visual studies of a sites potential, based on localised design conditions.

+ ENVELOPE INFLUENCES

Existing natural vegetation identified as vital site conditions to retain.

+ SUBDIVIDED BROWNFIELD SITE

A diverse subdivision pattern automatically produces alternative site conditions and envelope studies, therefore limiting monotonous opportunity. Alternatively, a regular subdivision pattern may enforce monotonism, when intended.

+ ENVELOPE VISUALISATION

The visual envelope allows buyers, developers even planners to quickly assess a sites potential based on the localised conditions, potentially influencing changes to proposals or a buyers opinion.

BROWNFIELD / UNDEVELOPED CONTEXT

Application for a Proposed Density

The envelope script can be used as a visualisation tool to analyse a subdivisions potential development or assess proposed regulation changes.

FIG 3.43. THE PROPOSED NEW BUILDING
PROCESS STRUCTURE

CONCLUSIONS

You may question how it differs from the existing. It differs in two ways. Simplicity and Responsivity.

Architecture Freedom

The envelope method of development allows site specific regulator and design controls to be manipulated and changed simply and effectively. Its parametric capability will allow planning and design proposals to keep up with changing societal and architectural direction. A simple analysis tool, shifting away from the jargon and complexity of regulatory documentation, will allow more architectural freedom and opportunity to be explored. The rapid analysis of a solutions compliant will allow more iterative design processes to strive for *Diverse Density*.

Instead of separation between occupant and design the envelope encourages engagement. It allows architectural freedom and occupancy preferences to inform the architectural solution within a collective framework. A framework which has been specifically developed for the site, neighbourhood, area or suburb under analysis. It will become a dynamic responsive tool to all the engaged parties of a built development. It will attempt to reinvigorate architecture engagement at the occupancy level as the simplicity, and presumably low costs, of the system would allow exploration of concepts and alterations by occupants, leading to more diverse housing resolutions.

Inclusive Strategy

The flexibility of the system allows community integration. Top-down development processes provide physical limitations and restrictions on one's lifestyle and occupancy, as they are designed through generalisations. The prototype design chapters, and the accompanying diagram, explore examples of the envelopes ability to embrace inclusion.

The final question is how can it challenge 'boxy', unresponsive typologies? Like the current system, the reality is there will always be people taking shortcuts to make a quick dollar. Firstly, this strategy aims not to control the built form but make developers question their conclusions. Developers may be forced to design more responsive and integrated solutions as the demand for this new market could stimulate a shortfall in their potential profits. Secondly, the envelope is not a singular strategy. It works in conjunction with subdivision and urban strategies. Appropriate and responsive subdivision strategies would allow the grain of existing communities to be controlled. For example, controlling maximum site area or maximum households per site could regulate potential development scale. This would force developers to design new housing models that can response to specific site conditions, not generalisations. It would hinder developer's ability to accumulate land and develop large scale schemes in an unresponsive manner.

Essentially it attempts to make the building design process faster and inexpensive. Encouraging designs solutions to become more responsive and appropriate to there context. Shifting away from cheap, standardised constructions methods, generally realate to 'boxy' typologies because all the relative expenses of the current consent process are digitally absorbed.

[CHAPTER FIVE]

THE SCENARIO SITE

FIG 5.01. MAP OF CHRISTCHURCH BUILDING
FOOTPRINTS

FIG 5.02. SITE MAP

THE SITE

The site is located in Christchurch, positioned in the North-Western most area of the 'Four Avenues'. The site surrounding Durham Street south was selected for its unique opportunities to apply a new housing strategy.

The existing character area is experiencing an intensification conflict between existing architectural conditions and new housing developments. The sites idyllic location to Christchurch's CBD provides a unique opportunity to challenge existing intensification methods in a highly demanded area.

Post-earthquake circumstances have provided substantial amount of brownfield sites offering the opportunity to investigate and implement an alternative housing strategy. The established conclusions can then be transferred to the neighbouring, formerly Christchurch Women's Hospital, site as a full scale contextual investigation.

APPLICATION OPPORTUNITIES

EXISTING OPEN SPACE - BROWN FEILD SITES

FIG 5.03. (ABOVE) BROWNFIELD SITES.
FIG 5.04. SITE PHOTO'S.

EXISTING TYPOLOGIES

FIG 5.05. MAP OF SITE PHOTO'S.

FIG 5.06. (ABOVE) BROWNFIELD SITES.
FIG 5.07. SITE PHOTO'S.

SITE VALUE

The site was historically occupied by workers housing. Predominately bungalows, with the additional of later villas, made up the architectural typology of the streetscape. Small street setbacks with active public edges and large private rear sections were the typical section structure. Due to its distinct inner avenue history, small streetscape, fine urban grain, active neighbourliness, architectural character and close proximity to Christchurch's inner centre the site was recognised in the 1995 Christchurch District Plan as a Special Amenity Area (SA_m) (Christchurch City Council). Through the course of the next decades, SA_m sites 25 and 26 had to adhere to extra regulator design conditions to retain the existing character of the area. These actions failed. As the sites SA_m recognition was voided shortly after the 2015 City Plan release.

Due to the actions taken by the Christchurch Council, this thesis does not attempt to align with heritage positions. Attention is instead concentrated on the retention and progression of the existing character of the neighbourhood.

FIG 5.08. EXISTING SITE INFRASTRUCTURE
FIG 5.09. HISTORIC PLANNING MAPS OF SITE
WITH SPECIAL AMENITY DECLARATION. SOURCE :
(CHRISTCHURCH CITY COUNCIL)

EXISTING CONDITIONS

EMPTY

20
BROWNFIELD SITES

STAND ALONE

%30
OF 162 HOUSEHOLDS

DUPLEX

%27

UNIT / APARTMENT / HOUSING DEVELOPMENT

%43
22% OF TOTAL TRIPLEX

INVERTED DENSITY

This model studies the infill potential of the existing built environment. Inverting the typical density study process helps identify the overall areas brownfield sites. This perspective leads to the appropriate selection of a case study site for the application of a new strategy across the entire neighbourhood.

SITE CONDITIONS:

+ 2 EMPTY SITES

- CORNER OF DURHAM STREET SOUTH AND PEACOCK STREET
- NEIGHBOURING DENSITY DEVELOPMENT SITE

+ ESTABLISHED VEGETATION ON NORTHERN SITES AND VILLA HOME SECTION

+ EXISTING TYPOLOGIES

- CONTEMPORARY DUPLEX
- MEDIUM DENSITY HOUSING SCHEME
- TRADITIONAL VILLA
- TRADITIONAL BUNGALOW
- CONTEMPORARY DWELLING

+ STAND ALONE HOUSING ENCOURAGED TO MAINTAIN URBAN GRAIN

The two site were treated as connected thoroughfare to allow a onnection walkway from Peacock Street to Beveridge Street. This subdivision allowed the implementation of a more varied section

SITE 1. 37 BEVERIDGE STREET

SITE 2. CORNER DURHAM STREET SOUTH AND
PEACOCK STREET

FIG 5.10. AUTHOR'S FULL SCALE SITE MODEL OF EXSITING BUILT ENVIRONMENT.

Author's full scale site model of exsiting built environment.

**ESSENTIAL FUNCTIONS FOR
CHRISTCHURCH SCRIPT PBC #001**

PBC = PEACOCK, BEVERIDGE, CONFERENCE STREET

Site Boundary
Primary function of the script responded to the simple site dimension input.

Boundary Setback
A minimum 600mm setback to all site boundaries is employed to develop the distinctive pre-existing standalone typology and urban grain of the neighbourhood.

Vegetation
Christchurch is most commonly recognised as New Zealand's 'Garden City'. Preserving the existing heritage and established vegetation, alongside new architectural intervention, will enrich the existing site conditions and situate the built works. Adjustable setback dependant on tree type and growth potential.

Neighbouring Buildings
Neighbouring buildings can be input on all four boundaries to determine placement, height, depth and quantity. Setbacks vary depending on orientation to minimise overshadowing existing built works.

Buildings are separated by the following values: North 3.0m, East & West 1.75m and 1.5m South.

Primary Access

To create opportunity for public interaction a minimum 2.0m setback in enforced at the primary point of access to a site. This is accompanied by a 3.0m x 3.0m corner setback to encourage the protrusion of an obvious entranceway in to the home.

Height Limitations

The Christchurch city plans existing height plain limitation of 11.0m, in a Living 3 Zone, is employed as an accurate assessment of the area.

Secondary Access (when applicable)

A 2.4m high, 1.0m setback applies along the secondary access boundary. A further 1.6m setback, excluding the central third of the boundary, encourages a highlighted secondary point of access.

NORTH

Corner Setbacks

The first 7.0 meters above ground level has a 3.5m adjacent setback in the two northern corners of the site. The remaining height has a 4.5m setback. This is implemented to limit architectural impact on neighbouring sites sunshine hours and potential view shafts whilst increasing density occurs.

EAST

Height Plains

The overly complicated compass system, the Christchurch city plan currently employs, is simplified to North facing 60°, East & West facing 50° and South 45°, all starting 3.60m above the site boundary. The increase in starting height is to encourage architectural verticality and consequential densification.

SOUTH

Outdoor Abundance

The northern half of the west boundary has a 3.0m setback to encourage outdoor space in this high sunshine hours area of the site.

WEST

SITE INPUTS FOR ENVELOPE ANALYSIS

Site 1:			
Site Dimensions X x Y X= East West Axis Y = North South Axis -(neg) values mean away from site boundary + values mean onto site area	Dimensions -	21000mm x 9700mm	
	Access -	SINGLE access from -	East
	Access type -	Road (car)	
	Tree 1 -	OFF Property	
		Radius (Dia) -	2500mm (5000mm)
		Height -	10000mm
		Distance to SOUTH boundary -	-600mm
		Distance to EAST boundary -	10000mm
	Neighbouring Building 1 - Ground Floor		
		Relative Boundary -	South
		Distance from SE corner -	17200mm
		Distance from SW corner -	0mm
		Distance from Boundary -	2200mm
		Height (up to 3500) -	3500mm
	Neighbouring Building 1 - First Floor		
		Relative Boundary -	South
		Distance from SE corner -	17200mm
		Distance from SW corner -	0mm
		Distance from Boundary -	2200mm
		Height (+3500) -	800mm
Summary: 1 existing building over 2 floors, 1 existing tree, single car access from the EAST.			

Site 2:

Dimensions -	16900mm x 9800mm		
Access -	DOUBLE access		
	Primary -	East	
	Secondary -	North	
Access type -	Road (car) + Road		
Tree 1 -	OFF Property		
	Radius (Dia) -	1250mm (2500mm)	
	Height -	4500mm	
	Distance to WEST boundary -	-1000mm	
	Distance from North boundary -	500mm	

NO Existing Neighbouring Buildings

Summary: 1 existing tree, double car access from the EAST (primary) and North (Secondary).

Site 3:

Dimensions -	14100mm x 9700mm		
Access -	SINGLE access from -	West	
Access type -	Walkway (bike)		
Tree 1 -	OFF Property		
	Radius (Dia) -	2000mm (4000mm)	
	Height -	5500mm	
	Distance to SOUTH boundary -	-1300mm	
	Distance to WEST boundary -	2800mm	
Neighbouring Building 1 - Ground Floor			
	Relative Boundary -	South	
	Distance from SE corner -	0mm	
	Distance from SW corner -	13400mm	
	Distance from Boundary -	2200mm	
	Height (up to 3500) -	3500mm	
Neighbouring Building 1 - First Floor			
	Relative Boundary -	South	
	Distance from SE corner -	0mm	
	Distance from SW corner -	13400mm	
	Distance from Boundary -	2200mm	
	Height (+3500) -	800mm	

Summary: 1 existing building over 2 floors, 1 existing tree, single bike access from the WEST.

Site 4:

Dimensions -	18000mm x 9800mm	
Access -	DOUBLE access from - Primary - Secondary -	North West
Access type -	Road (car)	
Tree 1 -	ON Property Radius (Dia)- Height - Distance to EAST boundary - Distance to NORTH boundary -	1250mm (2500mm) 4500mm 1000mm 500mm
NO Existing Neighbouring Building		
Summary: 1 existing tree ON site, double access from the NORTH (car) and WEST (bike).		

Site 5:

Dimensions -	17100mm x 19100mm	
Access -	DOUBLE access Primary - Secondary -	North East
Access type -	Road (car) + Walkway (bike)	
Tree 1 -	ON Property Radius (Dia) - Height - Distance to WEST boundary - Distance to NORTH boundary -	2250mm (4500mm) 7000mm 6500mm 3300mm
Neighbouring Building 1 - Ground Floor	Relative Boundary - Distance from NW corner - Distance from SW corner - Distance from Boundary - Height (up to 3500) -	West 9300mm 0mm 4500mm 3500mm
Neighbouring Building 1 - First Floor	Relative Boundary - Distance from SE corner - Distance from SW corner - Distance from Boundary - Height (+3500) -	West 9300mm 0mm 4500mm 3000mm
Summary: 1 existing neighbouring building, 1 existing tree ON site, double access from the NORTH (car) and EAST (bike).		

Site 6

Dimensions -	18000mm x 9800mm	
Access -	DOUBLE access Primary - Secondary -	North East
Access type -	Road (car) + Walkway (bike)	
Tree 1 -	ON Property Radius (Dia) - Height - Distance to WEST boundary - Distance to NORTH boundary -	2250mm (4500mm) 7000mm 6500mm 3300mm
Neighbouring Building 1 - Ground Floor	Relative Boundary - Distance from NW corner - Distance from SW corner - Distance from Boundary - Height (up to 3500) -	West 9300mm 0mm 4500mm 3500mm
Neighbouring Building 1 - First Floor	Relative Boundary - Distance from SE corner - Distance from SW corner - Distance from Boundary - Height (+3500) -	West 9300mm 0mm 4500mm 3000mm
Summary: 1 existing neighbouring building, 1 existing tree ON site, double access from the NORTH (car) and EAST (bike).		

Site 7:

Dimensions -	17900mm x 14000mm	
Access -	SINGLE access from -	East
Access type -	Walkway (bike)	
Trees -	NO	
Neighbouring Building 1 - Ground Floor		
Relative Boundary -	West	
Distance from NW corner -	450mm	
Distance from SW corner -	400mm	
Distance from Boundary -	2900mm	
Height (up to 3500) -	3500mm	
Neighbouring Building 1 - First Floor		
Relative Boundary -	West	
Distance from NW corner -	0mm	
Distance from SW corner -	0mm	
Distance from Boundary -	4300mm	
Height (+3500) -	3500mm	
Neighbouring Building 1 - Second Floor		
Relative Boundary -	West	
Distance from NW corner -	0mm	
Distance from SW corner -	0mm	
Distance from Boundary -	4300mm	
Height (+3500) -	500mm	

Summary: 1 existing neighbouring building, single access from the EAST (bike).

Site 8:

Dimensions -	17900mm x 15100mm	
Access -	DOUBLE access	
Primary -	South	
Secondary -	East	
Access type -	Road (car) + Walkway (bike)	
Trees -	NO	
Neighbouring Building 1 - Ground Floor		
Relative Boundary -	West	
Distance from NW corner -	1900mm	
Distance from SW corner -	5850mm	
Distance from Boundary -	2050mm	
Height (up to 3500) -	3500mm	
Neighbouring Building 1 - First Floor		
Relative Boundary -	West	
Distance from NW corner -	0mm	
Distance from SW corner -	7700mm	
Distance from Boundary -	4300mm	
Height (+3500) -	3500mm	
Neighbouring Building 1 - Second Floor		
Relative Boundary -	West	
Distance from NW corner -	0mm	
Distance from SW corner -	7700mm	
Distance from Boundary -	4300mm	
Height (+3500) -	500mm	

Summary: 1 existing neighbouring building, double access from the SOUTH (car) and EAST (bike).

THE ENVELOPE SCRIPT STUDY OF THE SCENARIO
SITE UNDER INVESTIGATION.

THE EXISTING

- envelope overlay

THE ENVELOPE SCRIPT STUDY OF THE EXISTING
BUILT WORKS ON THE SCENARIO SITE UNDER
INVESTIGATION.

THE PROPOSED

- envelope overlay

THE ENVELOPE SCRIPT STUDY OF THE EXISTING BROWNFEILD SITES ON THE SCENARIO SITE UNDER INVESTIGATION.

A black and white aerial photograph of a city, likely Los Angeles, showing a dense urban landscape with numerous buildings and trees. In the background, a range of mountains is visible under a sky filled with scattered clouds. The text "[CHAPTER SIX]" is centered over the middle of the image.

[CHAPTER SIX]

CONCEPTUAL DESIGN

DEVELOPED DESIGN

The developed design is constructed in 4 parts, exploring 4 different modulation methods. It is envisioned these modules could transition simply into typical building practices to add adaptability properties to a housing model. This would allow occupants to change the primary functions of a home to meet their individual requirements. The modularity are designs with semi-permanent architectural intentions. Not day to day changes but adhere more to changes in season, occupancy and personal functionality.

Module 1 - Fold

The fold module was developed to explore connectivity within the a built structural form. The idea stemmed from having multiple unit or scales of housing that could be connected and disconnected with ease to inform occupant adaptability. The issues with the fold module is it has a very limited application. Although interconnection between functions of the home are important, the development

Module 2 - Slide

The slide module attempts to create a working floor slab that allows occupancy preference to determine their internal or external space. A sliding floor slab shifts along an axis for an internal courtyard to beneath and mezzanine floor and then to above an outdoor area.

Module 3 - Hinge

The never ending hinge model reflects a housing model that allows increases spatial performance to achieve an ongoing adaptive module.

Module - Shift

Shift explores wall, roof and shell modules that shift to redefine the internal space. This module is easily adapted to develop functionality preference.

MODULATION

FIG 6.01. AUTHOR'S FULL SCALE SITE MODEL OF EXSITING BUILT ENVIRONMENT.

FOLD

FIG 6.02. (LEFT) THE HINGE MODULE IN CONTEXT.
FIG 6.03. (ABOVE) THE HINGE MODULE DIAGRAM.

FIG 6.04. THE FOLD MODULE RENDERED
PERSPECTIVE

SLIDE

FIG 6.07. BASIC ADAPTIVE FUNCTION OF THE SLIDE MODULE.
 FIG 6.08. ABSTRACT OVERLAY OF ADAPTIVE OPPORTUNITIES OF THE SLIDE MODULE.

FIG 6.09. THE SLIDE MODULE EXPLODED

FIG 6.10. BASIC ADAPTIVE FUNCTION OF THE SHIFT MODULE.
FIG 6.11. ABSTRACT OVERLAY OF ADAPTIVE OPPORTUNITIES OF THE SHIFT MODULE.

FIG 6.12. THE SHIFT MODULE EXPLODED

HINGE

FIG 6.13. BASIC ADAPTIVE FUNCTION OF THE PIVOT MODULE.
FIG 6.14. ABSTRACT OVERLAY OF THE ENDLESS ADAPTIVE OPPORTUNITY OF THE PIVOT MODULE.

FIG 6.15. THE MODULE EXPLODED

FIG 6.16. ABSTRACT OVERLAYED PERSPECTIVE OF THE INFILL OPPORTUNITIES OF AN ELEVATED PIVOT MODULE.

SHIFT

FIG 6.17. BASIC ADAPTIVE FUNCTION OF THE SHIFT MODULE.
 FIG 6.18. ABSTRACT OVERLAY OF ADAPTIVE OPPORTUNITIES OF THE SHIFT MODULE.

FIG 6.19. THE SHIFT MODULE EXPLODED

ALTERNATIVE SPATIAL LAYOUTS AND COMBINATIONS

OPTION 1.
WALL/ROOF/WALL

OPTION 2.
WALL/ROOF

OPTION 3.
SINGLE WALL/ROOF

FIG 6.21. (TOP) RENDERED PERSPECTIVE OF THE
OPEN OUTDOOR AREA.
FIG 6.22. (BOTTOM) RENDERED PERSPECTIVE OF
THE HALF ENCLOSED OUTDOOR AREA.

[CHAPTER SEVEN]

A PROTOTYPE DESIGN

THE HOUSING CASES IN THE FOLLOWING SECTION ARE RENDERED
BLACK AND WHITE TO DRAW A SINGULAR SPECULATIVE CONCLUSION.

FIG 7.01. ABSTRACT HOUSING OVERLAY TO INFORM CASE SPECIFIC RESPONSIVE ADAPTION.

HOUSING CASE ONE

site:

- the traditional house -

The traditional house explores a private wing composition. It creates a separation between public engagement and the privacy of personal space. It allows both the private and personal spaces to increase in scale depending on the occupancy requirements.

- Middle-aged family
- Retired couple
- First home buyers

FIG 7.02. (LEFT) LOCATION OF SITE WITHIN SCENARIO CONTEXT.

FIG 7.03. (ABOVE) HOUSING CASE ONE ITERATIVE ADAPTION OVERLAY.

FIG 7.04. HOUSING CASE ONE REAR LAWN
PERSPECTIVE ABSTRACT OVERLAY.

FIG 7.05. HOUSING CASE ONE BEVERIDGE STREET
PERSPECTIVE ABSTRACT OVERLAY.

FIG 7.06. ABSTRACT HOUSING OVERLAY TO INFORM CASE SPECIFIC RESPONSIVE ADAPTION.

HOUSING CASE TWO

site:

- the workshop house -

The workshop house explores a duplex styled conclusion where a studio can be separated from the predominant dwelling. This example could respond to cases such as:

- An intergenerational family home
- The seperated private/kids space
- A home office or seperate studio space
- A rented studio as a young family matures
- Two completely separate households

FIG 7.07. (LEFT) LOCATION OF SITE WITHIN SCENARIO CONTEXT.
FIG 7.08. (ABOVE) HOUSING CASE TWO ITERATIVE ADAPTION OVERLAY.

FIG 7.09. HOUSING CASE TWO REAR LAWN
PERSPECTIVE ABSTRACT OVERLAY.

FIG 7.10. HOUSING CASE TWO WALKWAY
PERSPECTIVE ABSTRACT OVERLAY.

FIG 7.11. ABSTRACT HOUSING OVERLAY TO INFORM CASE SPECIFIC RESPONSIVE ADAPTION.

HOUSING CASE THREE

site:

- the flat house -

The flat explores a micro scale conclusion to inform a basic, typical housing response. The primary requirement is for abundant sun and outdoor space. This example could respond to cases such as:

- The single mother and friend
- The flat
- The young professional couple(s)
- The displaced shift worker (half time dweller)

FIG 7.12. (LEFT) LOCATION OF SITE WITHIN SCENARIO CONTEXT.
FIG 7.13. (ABOVE) HOUSING CASE THREE ITERATIVE ADAPTION OVERLAY.

FIG 7.14. HOUSING CASE THREE EAST
PERSPECTIVE OVERLAY OF ADAPTION POTENTIAL.

FIG 7.15. HOUSING CASE THREE WALKWAY
PERSPECTIVE OVERLAY OF ADAPTION POTENTIAL.

HOUSING CASE FOUR

site:

The Core Framework Concept.

HOUSING CASE FIVE

site:

The Gallery/studio house

HOUSING CASE SIX

site:

A Remastered Jennian Home

HOUSING CASE SIX

site:

The Reinstated Bungalow

HOUSING CASE EIGHT

site:

The International

DENSITY

FIG 7.16. NORTH-EASTERN ORTHOGRAPHICAL
PERSPECTIVE OF THE SITES POTENTIAL
DENSIFICATION VIA THE CURRENT PROCESSES OF
DEVELOPMENT.

[DIVERSE DENSITY]

FIG 7.17. NORTH-EASTERN ORTHOGRAPHICAL
PERSPECTIVE OF THE SITE'S POTENTIAL
DENSIFICATION VIA DIVERSE DENSITY STRATEGIES.

FIG 7.18. FINAL JUXTAPOSITION OF THE EXISTING
CONTEXT, THE CORRESPONDING ENVELOPE
STUDIES AND THE ALTERNATIVE HOUSING
STRATEGY.

DENSITY

FIG 7.19. NORTH-EASTERN ORTHOGRAPHICAL
PERSPECTIVE OF THE SITES POTENTIAL
DENSIFICATION VIA THE CURRENT PROCESSES OF
DEVELOPMENT.

[DIVERSE DENSITY]

FIG 7.20. NORTH-WESTERN ORTHOGRAPHICAL PERSPECTIVE OF THE SITE'S POTENTIAL DENSIFICATION VIA DIVERSE DENSITY STRATEGIES.

FIG 7.21. BIRDS-EYE PERSPECTIVE OF THE
SCENARIO SITES DIVERSE DENSITY SCHEME.

THE PROBLEM

New Zealand housing development is at a critical period of friction. On one side there are pressures to intensify our urban environments to limit urban sprawl and counteract the 'housing crisis', whilst on the other calls are being made to retain our distinct existing architectural character. This conflict, often made poignant by poor quality, large scale housing developments, has stimulated the problem of contextual responsiveness. A subject often overlooked by top-down methods of development.

The architectural discipline needs to address this problem by overhauling the current perceptions of intensified housing and stimulate engagement with the occupancy back into the design process. The traditional affinity to the home is seemingly losing its significance through the development of the notion of a house. Architecture needs to address this direction and strive to propose alternative housing strategies before New Zealand's rich housing history is neglected for box apartments.

LESSONS FROM THE RESEARCH

Through investigative studies and theoretical positions this research taught me that architecture is about answering questions. Quality design therefore becomes a process of elimination, with the simplest of questions often drawing the most cohesive conclusions. Throughout the course of the research it was challenging to critically engage with one aspect or area of the design as it seemingly shifted weight away from the research position.

In the process of design a realisation occurred that the system operates in its current method because it is so complex with so many influencing factors. I learnt that attempting to solve issues on the macro scale was a seemingly impossible task very early in the process, and this perspective hindered the thesis development throughout.

One of the most pressing lessons was that architecture is about ideals. Throughout the research I attempted to hold the stance of 'realistic application' that the research could seamlessly transition into the existing architectural realm. At the conclusion of this research this position still resonates with the envelope scripting tool. However, it became apparent that without ideals, you cannot draw highly developed design conclusions. In the end this broad housing position led the thesis research to fall short of its envisioned potential, as the lack of critical engagement to a defined area of research meant only speculation would be the research outcomes. I learnt that when undertaking such an immense topic that ideals need to be set up in order to define the area of investigation and reach a critical level of design resolution.

THE STRENGTHS

THE ENVELOPE TOOL IS A SUCCESS.

It is successful because it proposes an alternative housing strategy, which was the research aim. It proposed an unpolished vision of what could be developed and implemented today on the greatest scale, whilst still providing a speculative framework to compare and critique the differing densification strategies. It challenges the value of complicated documentation and regulator conditions that limit architectural freedom of expression factors of New Zealand's housing sector.

It is responsive. The parametric quality of the script allows diverse application of the envelope tool. Its unique parametric function responds specifically to a given context and therefore already informs contextual responsivity, as the objectives outlined. The nature of the envelopes scripts also allows the site conditions to directly influence the

design parameters of the script. This ensures proposed or existing site development directions recognise the existing natural and built environments.

In addition to the thesis research objectives, a personal research aim was to take the over analysed, often mundane subject of housing developments, and attempt to provide alternative conclusions to the architectural discipline. The research achieved this. In my opinion it highlights a call for change. Or at least a different perspective. But most importantly it offers an alternative strategy. It proposes a new framework for the engagement of the occupant and a reinvigoration of architectural autonomy. This would be achieved through a process that councils and planners could use to revolutionise traditional housing compliance practice and attempt to reengage the occupant back into the housing sector.

THE WEAKNESSES

THE ENVELOPE TOOL IS A FAILURE.

In this case scenario, the envelope tool is a failure because it fails to implement the development of a detailed site responsive design. This is due to two reasons; scope and timeframe. The tool is not nearly developed to it's full potential application. Following its conceptual design, this research couldn't fully apply the tool as the timeframe limited it's ongoing development. Secondly, because of the scope of the research. It is envisioned the tool be implemented through a process of synthesis between government planners, councils, communities, architects, urban designers, developers and most importantly occupants, however a realistic case study of that scale was unachievable. Without the vital input of the occupant only speculative housing conclusions could to be made.

The final housing design did not have enough iterations. Because of all the complexities of the site and influential factors it seemed endless design exploration was always met with multitudes of issues and thereby discarded. In hindsight, this research and experimentation should have been added to the research body to give weight to the complexity of the system and provide assessment of an iterative process to reach the design conclusions.

AN ALTERNATIVE SCENARIO

The complexity of the site and it's current architectural state set a very tough premise for design intervention. With a site ranging in demographic, financial, architectural and scale issues it was challenging to decipher, without community engagement, the direction the architecture of the area was heading, or even a proposed direction. This led to a level of resolution that couldn't critically engage with one specific group or topic. There was no one client to critique decisions made or challenge solutions. This limited the application of the research as it deviated from a typical design response. This was however the object of the thesis, to simply challenge the existing development methods with an alternative, which is accomplished.

RESEARCH ADVANCES

Given the potential application of the research this process of design synthesis, as previously discussed, could be undertaken for a real-world scenario to test its implementation. A greater time investment into the critique, analysis and eventual simplification of existing regulations and design guidelines would allow the proposal of a detailed analytical tool, with site-specific applications.

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LIST OF FIGURES

DISCLAIMERS:

ALL FIGURES NOT ATTRIBUTED ARE AUTHOR'S OWN.

ALL BACKGROUND MAPS CAN BE ATTRIBUTED TO KOORDINATES LIMITED, < [HTTPS://KOORDINATES.COM/](https://koordinates.com/)>

FIG 1.02 (LEFT) MERRIVALE ACCOMODATION. APHRODITE BOUTIQUE ACCOMODATION. 2010. WEB
<[HTTP://WWW.APHRODITE-BOUTIQUE-ACCOMMODATION-NZ.COM/IMAGES/TEMPLATE/THE-APHRODITE-HOUSE.JPG](http://www.aphrodite-boutique-accommodation-nz.com/images/template/the-aphrodite-house.jpg)>

FIG 1.03 (RIGHT) TRADE ME PROPERTY / RESIDENTIAL. TRADEME. 2016. WEB
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FIG 3.17 BEVERIDGE STREET TOWN HOUSES. SHEPPARD & ROUT. 2007. WEB
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FIG 3.29 REFLECTIONS OF MINERAL IMAGES. ARCHDAILY. 2014. WEB.

FIG 3.33 MONTBLANC HOUSE. ARCHDAILY. 2011. WEB.
<[HTTP://WWW.ARCHDAILY.COM/133039/MONTBLANC-HOUSE-STUDIO-VELOCITY](http://www.archdaily.com/133039/montblanc-house-studio-velocity)>

FIG 3.34 HOLES HOUSE BY MICHAL NOWAK. HOME DSGN. 2015. WEB
<[HTTP://WWW.HOMEDSGN.COM/2015/01/09/HOLES-HOUSE-BY-MICHAL-NOWAK/](http://www.homedsgn.com/2015/01/09/holes-house-by-michal-nowak/)>

FIG 3.36 FIVE TREES, BY YOUNGHANCHUNG. ARCHDAILY. 2015. WEB.
<[HTTP://WWW.ARCHDAILY.COM/778080/FIVE-TREES-YOUNGHANCHUNG-ARCHITECTS](http://www.archdaily.com/778080/five-trees-young-hanchung-architects)>

FIG 3.38 TEKAPO SHED. CHRIS NOTT ARCHITECTURE. 2015. WEB.
<[WWW.CHRISNOTTARCHITECTURE.CO.NZ](http://www.chrisnottarchitecture.co.nz)>

FIG 3.40 TOWER HOUSE / AUSTIN MAYNARD. AUSTIN MAYNARD ARCHITECTURE. 2016. WEB.
[HTTP://WWW.ARCHDAILY.COM/607733/TOWER-HOUSE-ANDREW-MAYNARD-ARCHITECTS](http://www.archdaily.com/607733/tower-house-andrew-maynard-architects)

FIG 4.08 THINKING AND MAKING. MAXIMUM MASS. TUMBLR. 2015. WEB
<[HTTP://BH-A.TUMBLR.COM/POST/126536091322/MAXIMUM-MASS-PERMITTED-BY-THE-1916-NEW-YORK](http://bh-a.tumblr.com/post/126536091322/maximum-mass-permitted-by-the-1916-new-york)>

APPENDIX

A BODY OF DESIGN EXPERIMENTATION
THROUGH SKETCH MEDIUMS

COMPACT..

ANDREW
MAYNARD
IMAGE...

SPRAWLED.

TREES
HOUSE
IMAGE-

ADAPT TO SCRIPT VARIATIONS.

ADAPTIVE CONNECTIONS.

TIMBER.

STEEL.

WHAT TO DESIGN.

STRATEGY FOR ORIENTATION

- RANGE OF DEGREES?
- MULTIPLE RELATIONSHIPS
- EFFECTS OF EXISTING NEIGHBOURS

MODULE ONE(S)

- 1 BEDROOM + 1 KITCHENETTE + 1 BATHROOM.
- 1 BED + 1 OFFICE/STUDIO

HOW DOES IT INFORM CHARACTER?

ENVELOPE RESPONSE.

ANAGRAMMATION & JUNCTURE OF FORM EMULATES THE TRADITION VILLA RECREATION, HIERARCHY & SCALE.

GALAPAGAS? ROOM FORMULATION.

- 3 BED, 1 BR.
- 2 BED, KITCHEN, LIVING, BATH.
- WC, KITCHEN, LIVE, LOUNGE, OFFICE.
- 1 BED, 1 BR
- LIVING, LOUNGE

ANDREW MAYNARD VILLAGE. (TOWER HOUSE)

N↑

ARRANGEMENTS.

DESIGN PODS

- PROGRAM
- CIRCULATION
- INTER CIRCULATION
- ADADTION

HOW THEY RESPOND TO FORM.

- NOT IMITATING FORM.
- BUT DEVELOPING A SUBTLE CHARACTER.

EXPOSED FIXING FLANGES. ADDITION + ALTERATION.

ADAPTION CAN INFORM

- ROOF'S
- ROOM'S
- WALLS
- FLOOR HEIGHTS?
- VIEW SHAFTS
- SUN CONDITIONS
- PRIVACY

2.4 2.7 3.0
2 2 4 STAIRS.

↑ EXTENSION OF THE EXISTING URBAN FABRIC.
PROTECTING EXISTING CONDITIONS.

TOWERS PODS
THAT CONNECT.

IDEAS.

LIVING POD
SOCIAL POD.
SLEEPING POD.

→ MULTIPURPOSE.
→ SINGLE FAMILY POD.
ETC.

WEDNESDAY

REFLECT ON DESIGN ONE'S
ABILITY TO ACHIEVE GOALS.

DESIGN ONE.

1. ✓ INDIVIDUALISM
2. ✓ ADAPTION 80%.
→ LARGE INTERVENTION. NOT ONGOING.
3. X LACKS CRITICAL ENGAGEMENT
WITH THE EXISTING ARCHITECTURAL
TYPOLOGIES.

→ SET GOALS → AIMS OF THE ENTIRE
SCRIPT SYSTEM.

1. INDIVIDUALISM
(DIVERSITY)
2. ADAPTABILITY TO CONTEMPORARY
DEMOGRAPHIC / WIDER (BROAD).
3. RESPONSIVENESS TO SITE & CONTEXT.

DESIGN ONE

DESIGN ONE TOOK A HOLISTIC APPROACH
TO SOLVING EVERY ISSUE.
LEADING TO A GREATER FOCUS ON
AMENITY AND SERVICE WHICH IS NOT
THE TYPOLOGY OF THE CHARACTER AREA.

DESIGN TWO.

1. INDIVIDUALISM
2. ADAPTION
3. RESPONSIVE

FOLD DOWN
DECK OR
ROOF.

DESIGN FEATURES OF VILLA.

DORMERS.

EAVES

COLUMNS

GABLE PITCH

SMALL WINDOW
TIMBER FRAME

SYMETRY + SCALE OF
WINDOWS

FRONT
FACADE.

COPPER
EDGE.

3 STOREY.

ENTRY.
2 STOREY.

COVERED.

UNCOVERED.

PUBLIC. VS PRIVATE.

DORMERS.

RIDGE
PANEL.

SIDE
PANEL.

MODULAR FRAMEWORK

2.0. 3.0. 4.0. 3.2. 3.6. 5.0. 4.8.

ROOFLINES.

STACKING
SUNSHAFTE.

SUPERING ROOF
CANOPY.

MANUVOURABLE + MANIPULATIVE ARCHITECTURE
FAST PAGED.

CREATE
SPACE
BETWEEN
SPACES.

INTERNAL
ENVELOPE.

NORTH SECTIONS.

CONCEPT ONE..

SECTIONS...

HALF HOUSE.

NEEDS TO BE.

- 2 BEDROOM
- 1 OFFICE
- 2 1/2 - 3 STOREY
- GARAGE / STORAGE ON LOWER FLOORS
- BEDROOMS ON AROUND FLOOR
- OUTDOOR AREA
- DECK - ELEVATED OUTDOOR SPACE.

EXTENSION - FILL IN

ADDITIONS MADE LIKE DOORMIERS.

• EQUAL DISTANCE MEANS STREETS OF IRON CAN BE TRANSFERRED.

DESIGN GUIDELINES

ENGAGE WITH CONTEXT AND ORIENTATION

RESPECT PROPORTION, SYMMETRY , HIERARCHY AND REPETITION

RESPONSIVE TO CHARACTER OF EXISTING URBANSCAPE

WITHIN A **2.0m** SETBACK (OR FORWARD) OF EXISTING NEIGHBOURING CONDITION

NATURAL LIGHTING (RECESS, EXTRUDE, PITCH)

20% MINIMUM GLAZING ON MAIN STREET FACADE TO ENCOURAGE ENGAGEMENT AND NATURAL SOCIAL SURVEILLANCE

CONSOLIDATE PROGRAM

CONNECTION

SEPERATION

60% SITE COVERAGE

15% OPEN SPACE REQUIREMENT (GREEN AREA)

11m BUILDING HEIGHT MAXIMUN, ENCOURGAE VERTICALITY WITH 3 1/2 STOREY DWELLINGS + OUTDOOR ROOF AREAS ENCOURAGED

120m² MINIMUM SITE AREA

BUFFER UP TO **75%** OF SITE COVERAGE WHEN AREA INCREASED IS DOUBLED AS UPPER STOREY OUTDOOR LIVING SPACE

RESIDENTIAL FLOOR AREA RATIO:
LV4 CHCH - 1.4 LV3 CHCH - 1.2

0.6

0.8
LV2

1.0

1.3

1.5 TARGET RATIO

1.6 WITH ROOF GARDEN/
OUTDOOR AREA

50% FENCE TRANSPERANCY, **1.8m** MAXIMUM HIEGHT

55° HEIGHT PLANE AT **2.5m** (NORTH 270° TO 90°)

45° HEIGHT PLANE AT **2.5m** (SOUTH 91° TO 269°)

TYPICAL NZ MEDIUM DENSITY RANGE

EXISTING DENSITY VALUES

PROPOSED DENSITY THROUGH INCREMENTAL INTERVENTION

DESIGN STANDARD.

100m²

150m²

200m²

S.1

S.2

S.3

HALF HOUSE

ADDITIVE HOUSE

COMPLETE

EXTENSION OF FORM FOR GARAGE.

GROUND FLOOR CORE.

→ EXTENSIONS.

+ STAIR SPACE FILLER.

BOOKCASE.

THE RESPONSIVE CORE
A SECONDARY SCRIPTING TOOL THAT CREATES A

1 YEAR UNDER CONSTRUCTION