INTERLOCKING:
THE
PHENOMENOLOGICAL
APARTMENT

An exploration and enrichment of the spatial and bodily experience of urban apartments.

JARED SHEPHERD
By Jared Shepherd

A Thesis Submitted to the Victoria University of Wellington in partial fulfilment of the requirements for the degree of Master of Architecture (Professional).

2014
ACKNOWLEDGEMENTS

First I would like to thank my supervisor, Chris McDonald, whose dedication and energy towards architecture, the urban world and myself was inspiring and encouraging.

Thank you to the class, flatmates and all who have helped make this year, and the previous four so enjoyable.

My sister, Marie, for her motivation in the first three undergraduate years.

And most of all my parents, Trevar and Louise for their continual support and interest.
New Zealand faces the need for more housing over the coming decades due to increasing population and a decreasing household size. An existing response is a trend of higher density apartment buildings within our inner cities. However, these small standardized apartments have created a negative view toward urban apartments, commonly being described as ‘shoe-boxes’. Can urban inner-city higher density housing be better designed? This becomes the focus of this research in regards to quality of space in small apartments.

A critique of existing ‘shoe-box’ apartments is developed, proving they lack spatial quality, have lost a crucial connection with the dweller and are largely irrelevant to their site. The research seeks to remedy the ‘shoe-box’ apartment by applying principles from the theory of phenomenology and an interlocking typology. Phenomenology is introduced as a key theory to help develop a grounding in specificity and re-instill the notion of bodily experience in space. This theoretical position, based on Steven Holl’s architectural interpretation of phenomenology, with a bodily emphasis, is applied through four strategies to integrate a spatial experience. Typologically, interlocking apartments provide a precedent, where by their very nature, the interlocking produces an interesting relationship between spaces. This precedent analysis provides seven techniques which are coupled with the strategies from Holl, and applied to the design. The resulting design is a successful mixed-use urban solution, with a focus on the outcome of interlocking apartments.

ABSTRACT
# TABLE OF CONTENTS

CHAPTER ONE:  
1  Introduction

CHAPTER TWO:  
7  The New Zealand Context and the Problem of the ‘Shoebox’

CHAPTER THREE:  
41  Phenomenology & Hall Strategies

CHAPTER FOUR:  
65  Interlocking Precedents: Analysis and Abstraction

CHAPTER FIVE:  
111  Context and Site

CHAPTER SIX:  
135  Design Case Study

CHAPTER SEVEN:  
253  Conclusion

259  Works Cited List

269  Figures List

APPENDIX ONE:  
295  Design Process

APPENDIX TWO:  
355  Economic Analysis
CHAPTER ONE: INTRODUCTION
RESEARCH QUESTION
How can an exploration through a phenomenological lens influence the design of interlocking apartments providing an enrichment of spatial and bodily experience in inner city living?

PROBLEM
With a shift in the way the population is living, New Zealand is presented with an issue that questions the existing pattern of development of the built environment. This shift has the greatest presence on the city and wider urban metropolis, with the domestic home at the core of the problem. The decreasing average persons per house has developed due to the change in the makeup of the home. The nuclear family idealised in western society in the post-war period has begun to evolve into smaller families, couples without children, single parents and single person dwellers. These smaller households, combined with the increasing population of the country requires a significant amount of new housing stock. If provided at the traditional accustomed-to approach; namely the stand-alone suburban house, it would result in significant pressure on the urban environment to sustain the demand of New Zealand’s ingrained suburban dream.

The well documented issues of suburban sprawl form the basis of the initial step in this problem. The call for a greater focus on higher density housing especially in the form of high-rise buildings has occurred. As a response to this and the desire to live in the city, Wellington and Auckland has seen the construction of numerous apartment buildings, however many comprise largely of small standardized ‘shoe-box’ apartments. These apartments are simplistic in plan and rectangular in section, allowing straightforward replication and stacking. The buildings which consist purely of these small units provide the initial critical basis for this research.

THESIS STRUCTURE
This research looks at the apartment, but instead of the emphasis on quantity, it will focus on the greater quality of the apartment. Chapter Two; The New...
Zealand Context and the Problem of the ‘Shoebox’, will begin to look at the context of New Zealand’s apartments, focusing especially on the result of the first generation apartments which have developed in the last 20 years. A timeline presents a basic representation of the shift from the early 1920’s purpose-built flats, fitted into inner city suburbs, to the rise of the apartment tower of the 1990’s and the resultant products seen today. This will be highlighted by five recent examples of ‘shoe-box’ apartment developments which portray issues associated with the current approach.

The introduction of the theoretical study of architectural phenomenology will provide the basis for the grounding in site specificity and reconnect the notion of the body and a greater spatial experience in the architecture. This is developed in Chapter Three; Phenomenology & Holl Strategies through a literature review of experiential strand of architectural phenomenology. The review looks at the influence of Maurice Merleau-Ponty on Steven Holl and Holl’s interpretation of Merleau-Ponty’s ideas into architecture. This is then used to develop four strategies which will be used in the design process:
- Anchoring and Intertwining
- Parallax
- Attention to Detail
- Hinged space + Void Space

Chapter Four; Interlocking Precedents: Analysis and Abstraction documents and analyses a range of precedents of the interlocking apartment which provide a shift from the ‘shoe-box’ type. These precedents by their very nature, create interlocking forms and produce an interesting relationship between spaces. The result of this analysis will provide a visual and text based list of techniques that can be applied to the design which will be tested and developed later in Chapter Six. These techniques are not specific, but rather a combination of ‘ideas’ which can be used in the design to create a greater quality of spatial experience.

Chapter Five; Context and Site creates the basis and sets the scene for the design. It includes site selection, site analysis, site abstraction and diagramming and the ‘limited-idea’ concept informed by the site.

Chapter Six; Design Application and Discussion looks at the final design of this research process. It illustrates the key design moves to achieve interlocking apartments through the phenomenological process. It looks at the building as an addition and a catalyst to the urban fabric of Victoria Street and also focuses on the resultant interlocking apartments themselves. This is followed by discussion of the design in reference to the aims of the research.

Chapter Seven; Conclusion provides a reflective account of the research, both the process and final outcome. It discusses how the research has met the intention providing a spatial experience to inner city residential apartments. Limitations of the design and further opportunities are discussed.
CHAPTER TWO:
THE NEW ZEALAND CONTEXT
AND THE PROBLEM OF THE
'SHOEBOX'

Fig. 2:01.
Eleven Apartment building under construction.
The term 'shoe-box' requires definition within the scope of the New Zealand context. The term can be seen as something that the New Zealand public intrinsically align with overcrowding, low quality and high density within Auckland and Wellington's city centres. These references lie wholly in relation to floor area alone and resulting streetscape of same scaled units repeated within the building facade.

Though minimum standards for the two dimensional floor size is generally referred to when describing these apartments, size does not necessarily correlate to a 'shoe-box' apartment, as a small unit can be well designed and have spatial qualities which exclude it from this classification.

In terms of aspect, many 'shoe-box' apartments have only one exterior wall allowing light in, though multiple aspects is important and desired, some apartments with multiple aspects can still be described as 'shoe-boxes'. Therefore use of 'shoe-box' within this research refers to apartments of repetitive attached rectangular cellular construction.

3 However greater floor area can help to mitigate the 'shoe-box' deficiencies.
4 The spaces that are created in the 'shoe-box' apartments, need not be repetitive and indistinct. Small spaces are not necessarily a bad thing, as they can be well created and provide efficient use of space. Chan describes the ability of "small residential spaces that turn constraints to an advantage" and create a "meaningful living experience derived from a logic of compactness, efficiency and distinctness". Yenna Chan, Small Environments: Contemporary Design in Detail (Gloucester: Rockport Publishers Inc, 2007), 8.

5 This simplistic construction described as rectangular includes parallelograms, and also shapes added to the basic rectangular form.
6 It is important to note that the extremity of the 'shoe-box', as seen in Asian centres such as Hong Kong or Singapore are by far more alarming, however they fall outside this line of research.
Compared to the ‘shoe-box’ apartment, where the relationship between apartments is simplistic and formed generally by a simple grid in section (fig. 1), the interlocking apartment looks to a more complex arrangement which involves apartment forms to be arranged in an irregular way in plan and in section, which results in spatial interest. Interlocking apartments generally have at least two stories which provide greater spatial complexities through the conscience use of the third dimension. The interlocking nature also allows two opposite aspects of outlook which is not often seen in ‘shoe-box’ apartments. Therefore the use of term interlocking apartment within this research, looks to the shift from the regular form of the ‘shoe-box’ to an apartment which develops complexity and variation in layout and spatial experience.
2.2 INTRODUCTION AND PROBLEM

The social factors that are closely connected to housing in New Zealand was the initiation of this research. The statistics show that the projected increasing population is coupled with reduction in household size, which results in a demand for more homes. The population growth of New Zealand, and also the change in the makeup of the household, posed questions to how these extra people would be housed, and where and how these houses would be constructed (fig. 2.05-2.09). The average size of New Zealand households is projected to decrease from 2.6 people in 2001 to 2.4 people in 2021 resulting in the need for smaller houses, relevant to the process of intensification at the city centre.  

In New Zealand the perception created by ‘shoe-box’ apartments is negative and therefore any attempts by planning authorities to intensify areas are seen as unattractive and forced, as seen with the Auckland Unitary Plan. The term of intensification or high-density leads to

---

However, despite this negative view of intensification there is still a demand for inner city apartments; the increasing number of people living in inner city apartments has risen in Wellington City from 1410 in 1996 to 12954 in 2013 (fig. 2.05). Recent consents for New Zealand apartments follow a similar increase to that of other non-apartment residential consents (stand-alone houses and terraced houses)(fig. 2.04). These statistics show that there is still a constant demand for inner city apartments. The ‘shoe-box’, however, is seen as undesirable\(^9\) and therefore this research will reject the ‘shoe-box’ by focusing on making an urban intensification an attractive option through the combination of a phenomenological process and the


\(^10\) Cameron Broere, Unitary Plan means intensification is coming to you (accessed 19 May 2013).
typology of interlocking apartments. Therefore to begin this research, a review of New Zealand apartments is required to help understand the negative attributes that they hold.

2.3 NEW ZEALAND APARTMENT HISTORY

In this section, a visual timeline is created for the development of the apartment in New Zealand with some social, economic and political milestones which have shaped the change. The apartment building is not a new occurrence to the built environment of New Zealand’s cities, but the quantity and scale is. New Zealand apartments have been constructed in the CBD fringe and inner suburbs throughout the 20th Century. Beginning as luxury flats along sought after streets such as Oriental Parade during the inter-war period, they developed into the modern tradition of tower in the park, seen in suburbs e.g. along The Terrace and Thorndon’s Grant Road, and also ‘slab tower’ public housing exemplified by the Gordon Wilson Flats on The Terrace.

The inner city apartment however began to develop quickly only in the last 20 years. This development in the inner city also saw the reduction in size and quality of the apartment. Wellington saw the approach of converting aging office buildings into apartments at the low quality end, and at a higher quality end, the conversion of old warehouses (in the New York tradition). Also the development of rooftop apartments were carried out to allow feasible structural upgrade and interior re-fits of the host building.

This process of retrofitting and change of use occurred throughout the 1990’s and only since the beginning of the 21st Century, purpose built apartment buildings have been developed to fill the demand of inner city dwellings.

The population growth of the inner city is sustaining the need for more inner city housing. Inner city population in Auckland, Wellington and Christchurch has “almost quadrupled, from 4,974 to 19,020” between 1996 and 2006. These extra 14,000 people are largely housed in apartment buildings that were constructed in a short period of time, were a product of economics, and not necessarily having a high architectural or urban quality importance. The reduced size and great number of apartments in one building permitted this population increase. The result, a large number of ‘shoe-box’ apartments, making up the first generation of inner city apartments.

Fig 2.10.
Timeline of New Zealand apartments.
2.4 NEW ZEALAND ‘SHOE-BOX’ EXAMPLES

In *Places of the Soul*, Christopher Day is not specifically explaining the New Zealand apartment, however his comments are readily comparable to the current situation. He describes buildings having “rooms that are rectangular with hard smooth finishes” and “are indeed designed as boxes for storing people”.12 This description is highly relevant to the ‘shoe-box’ apartment, where small spaces and their resultant basic rectangular shape, as seen in ‘shoe-box’ apartments, by their very nature “have function problems that are a direct result of their size” and also “often fail to satisfy their owner’s visual, spatial and emotional needs”.13 This section analyses five ‘shoe-box’ apartment buildings built or planned within the last five years.

---

Fig. 2.11. Plans and section adapted from:
LEUSCHKE GROUP:
SOHO URBAN APARTMENT TOWER

SITE PLAN 1:2000

APARTMENT: 30-69m²

TYPICAL SECTION 1:500

DESIGNED IN PLAN, WITH SECTION SHOWING REPEITION OF SHOE-BOX LIKE APARTMENTS.

FORM OF BUILDING SHADIES ALL THE APARTMENTS OUTDOOR SPACES AND INTERIOR SPACES.

INTERNAL ROOMS-LACK NATURAL VENTILATION AND LIGHT, RELIANCE ON MECHANICAL SOURCES. EVEN THOUGH IT IS A LIVING/BATHROOM, IT IS A UTILITY/APARTMENT WHICH RESULTS IN POOR SPATIAL QUALITY OF SPACE WHICH OTHERWISE COULD BE ACHIEVED.

AREAS OF AWKWARD STRUCTURAL INTEGRATION WHICH RESULT IN LITTLE LIGHT TO INTERIOR OF APARTMENTS. CORRIDORS LOOK MONOTONOUS WITH NO AREA FOR ACTIVITY OR ACTIVE DESIGN.

BOND LEASES TO PRIVATE OR PUBLIC SPACES. THOSE HAVE AN ABSENCE DUE TO THE PRIVATE SPACE OF THE APARTMENT BEING LOCATED NEXT TO IT. DOORS ARE SOLID AND WINDOWS RAISED HIGH TO PREVENT A TRANSITION OCCURRING.

Fig. 2.12. SINGLE LOADED CORRIDORS WITH LIMITED LIGHT. ELEVATORS PROVIDE LITTLE LIGHT TO INTERIOR OF APARTMENTS. CORRIDORS LOOK MONOTONOUS WITH NO AREA FOR ACTIVITY OR ACTIVE DESIGN.

NEARLY 2M DECK, SMALL AND UNABLE TO CATER FOR ANY OUTDOOR SEATING, LET ALONE A TABLE.

Fig. 2.11a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z. THE WALL APARTMENTS LOOK MONOTONOUS WITH LIMITED LIGHT TO INTERIOR OF APARTMENTS. CORRIDORS LOOK MONOTONOUS WITH NO AREA FOR ACTIVITY OR ACTIVE DESIGN.

Fig. 2.12a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z. THE WALL APARTMENTS LOOK MONOTONOUS WITH LIMITED LIGHT TO INTERIOR OF APARTMENTS.
Fig. 2.13.

Fig. 2.14.

Fig. 2.13a.

Fig. 2.13b.

Fig. 2.13c.

Fig. 2.13d.

Fig. 2.14a.

Fig. 2.14b.

Fig. 2.13e.
Fig. 2.15

Designed in plan, with section showing repetition of "shoe-box cell like" apartments.

Fig. 2.16

Section 1:500

Typical units 1:200

Typical floor 1:500

Fig. 2.15a

Fig. 2.15b

Fig. 2.15c

Fig. 2.15d

Fig. 2.16a

Fig. 2.16b

SUGARTREE
GROUP: SUGARTREE
URBAN APARTMENT TOWER

Plans and section adapted from: www.sugartree.co.nz

SUGARTREE
GROUP:
SUGARTREE
URBAN APARTMENT TOWER

Apartment receives natural light and sunlight from single source and direction. Light received is sheltered by upper apartment deck. A deck is provided on some apartments however it is small and unable to cater for outdoor activities.

Kitchen is a great distance from living space creating a distinction and difficulty between the two. A sock is provided on some apartments however it is small and unable to cater for outdoor activities.

In 'A Pattern Language' Christopher Alexander notes that single lit spaces should be a maximum of 12 feet (3.6m) wide (34).

A mixture of double and single loaded corridors. Little natural light into corridor where possible. Apartments along single loaded area do no take advantage of a possible second aspect.

A study room is fully internal, provides an interesting space for flexibility for inhabitant.

Bathroom could have natural light and light due to transom on exterior wall.

Kitchen receives light from single source, requires supplementary artificial light.

Kitchen is 8m from light source resulting in dark space.

Kitchen is in 'A Pattern Language' where natural light enters in groups of 12 feet (3.6m) wide (34).

Long internal circulation contributing to usage space.

Awkward internal junction on exterior where apartments meet. Users on deck can easily look into apartment of neighbours.

No outdoor space is provided for some apartments.

Light received is sheltered by upper apartment deck.

A mixture of single and double loaded corridors. Little natural light into corridor where possible. Apartments along single loaded area do no take advantage of a possible second aspect.
OUTDOOR GARDEN/LAWN FOR USE OF INHABITANTS. THIS APARTMENT RECEIVES LITTLE LIGHT, DUE TO RECESSED LOCATION.

SIMPLE STACKING OF APARTMENTS, THE CLEAREST APPROACH TO SHOE-BOX APARTMENTS.

APARTMENTS PROVISION FOR DECKS OF OUTDOOR SPACES ATTACHED TO APARTMENTS. STUDIO APARTMENT RECEIVES LIGHT THROUGH A VERY SMALL WINDOW WHICH HAS TO PROVIDE FOR A LARGE SPACE, SPACE AROUND CORNER WOULD RECEIVE LITTLE LIGHT.

APARTMENTS DESIGNED AS DUAL-KEY APARTMENTS WHICH ALLOWS 2 APARTMENTS TO BE SEPARATE OR AS 1 BEDROOM AND STUDY, MORE THAN LIKELY THEY WILL BE USED AS SEPARATE APARTMENTS DUE TO THE ECONOMIC GAINS FROM THE SEPARATE RENTAL PRICES. STUDIO APARTMENT RECEIVES LIGHT FROM LIVING AREA, SHARED ENTRANCE BETWEEN DUAL-KEY APARTMENTS PROVIDES A TRANSITION SPACE, BUT IS DULL AND UNINVITING.

STUDIO APARTMENT RECEIVES LIGHT THROUGH A VERY SMALL WINDOW WHICH HAS TO PROVIDE FUNCTIONAL LIVING SPACE.

STORAGE IS NOT PROVIDED ELSEWHERE IN BUILDING.

APARTMENTS FACING GHAZNE STREET ONLY RECEIVE LIGHT FROM THE SOUTH, THEREFORE NO ACCESS TO ANY SUNLIGHT.

OUTDOOR GARDEN/LAWN FOR USE OF INHABITANTS. THIS APARTMENT RECEIVES LITTLE LIGHT DUE TO RECESSED LOCATION.
Perspective, plans and section adapted from: Highprofiles.co.nz

McDONOUGH, MARSHALL-HARRINGTON ARCHITECTS: ZEST URBAN APARTMENT TOWER

Photos of apartment 229 from www.trademe.co.nz

SECTION 1:500

SITE PLAN 1:2000

APARTMENT: 20-37m²

APARTMENTS STACKED REPETITIVELY LIKE 'SHOE-BOXES'.

Fig. 2.19.

Fig. 2.19a.

Fig. 2.19b.

Fig. 2.19c.

Fig. 2.20.

Fig. 2.20a.

Fig. 2.20b.

Fig. 2.20c-e.

McDONOUGH, MARSHALL-HARRINGTON ARCHITECTS: ZEST URBAN APARTMENT TOWER

SECOND BEDROOM IS ONLY A SINGLE ROOM. LIKE SOHO BEDROOM HAS SMALL WINDOW FACING EXTERNAL GALLERY RECEIVING NO SUN. TERRACES ARE PROVIDED BUT ARE ONLY ONE METRE WIDE. VERY LITTLE STORAGE PROVIDED.
2.5 ANALYSIS OF FINDINGS

The analysis of the ‘shoe-box’ apartments has provided visualisation of the issues associated with their design. These have been categorised into six issues which are explained and illustrated further in this section. The following findings are based directly on the five precedent ‘shoe-box’ apartment buildings. It is important to note that some of these findings can be attributed to design deficiencies with multi-storey apartment buildings in general, but nevertheless are extremely relevant to this research.

Design in plan.

One of the most salient issues is the way ‘shoe-box’ apartments are designed in plan. The rejection of designing in section means that all the apartments can be standardised and therefore simply stacked above or next to the neighbour. This simplistic design allows a regular structure and therefore economical construction. The resulting spaces are functional, however monotonous with a consistent stud height of 2.4m throughout the apartment. This process excludes floor and ceiling variety and results in little definition of space. Rooms are only achieved through vertical wall partitions to break the space.

Repetition.

The ‘shoe-box’ examples do show a range of apartment sizes which vary across one floor, however, the simplistic nature of the apartments allow them to be repeated numerous times vertically and horizontally (as seen in ‘Soho’). The result of the repetition of the apartments is greatest on the exterior of the building which results in a negative urban facade. The building has the same module or grid repeated with no defining forms which break up the facade. The rather monolithic facades do not contribute to an exciting streetscape.
Lack of Access to Outdoors.

“High rise living takes people away from the ground, away from the casual, everyday society that occurs on sidewalks and streets. Formal and awkward, resulting in a tendency to stay home alone.”

In ‘A Pattern Language’, the importance to have residential apartments within four stories from the ground is stressed to reduce isolation simply due to the proximity. However this is not a practical solution due to the density required for inner city sites. The current approach to inner-city living has very little in terms of access to outdoor spaces. The verticality of the apartment building results in a large ‘built’ volume with little space left over for outdoor space or facilities. The very nature of ‘shoe-box’ apartments, being multiple stories up, results in the physical connection to the ground, wider city and outdoor landscape being greatly reduced by the elevation of the apartments. The apartment does not have a physical connection to the ground and therefore, accessing the outdoors is a lengthy process which requires a conscious need or decision to go outdoors. The process to access outdoors, involves passing through common spaces of horizontal circulation (corridors) and vertical circulation (lifts or stairs). These provide distinct barriers to access the outdoors.

The most minimal requirement for access to outdoors would be visual connection with the events of the outside world and street life. The ability to connect with street life is greatly reduced above four stories, however these higher floors can achieve views of the harbour or hills and even sky. An outdoor space would be the next minimal requirement, however this is likely to be filled with a drying rack or bike which renders the view more unsightly. However the design of the ‘Soho’ resulted in a loss of almost all visual connection to the outside. The inward looking apartments, provide views from the living spaces and decks to the apartments in the opposite wing. The ability to access outdoors could be achieved by a semi-private courtyard (as seen in ‘Ink’ Apartments) or a private deck or balcony where people can enjoy outdoor space. However some apartments have no personal outdoor space at all. Some apartments in ‘Elevate’ have a narrow strip of deck (no more than 500mm deep) which allow larger sliding doors to be incorporated, however this strip cannot be counted as usable outdoor space. Three quarters of the apartments surveyed had access to a small deck or terrace which provided outdoor access at a minimal level. It is suggested an outdoor space of at least “6 feet deep” (1.8m) be provided to allow a functional outdoor space. All apartments that had outdoor spaces were less than 1.8m deep. These outdoor spaces, as seen in ‘Soho’, are too small to place outdoor furniture. This private outdoor space, when provided, is often limited to one aspect, which reduces its possible use during the day as the sun moves from the outdoor space, leaving it shaded and unappealing.


**Single Aspect.**

Many ‘shoe-box’ apartments have a single exterior face with a single aspect. Though not fundamental to the definition of a ‘shoe-box’, it contributes to the lack of spatial quality and feeling of confinement. The issue with aspect is the access to sun at multiple times of the day, cross ventilation and the feeling of being confined. It was found that some of the ‘shoe-box’ apartments surveyed had multiple aspects; corner apartments or apartments with rear bedrooms facing into light wells or onto open single-loaded corridors. These apartments still can be defined as ‘shoe-box’, as these aspects provide little to the overall apartment.

Apartments which have a single aspect result in sun being received between a short period of time each day. The apartment would be cold and uninviting in the morning or afternoon depending on the orientation. Over half of the ‘Ink’ apartments faced south-east or south-west as their only aspect.

Many living spaces are very deep (8m), with a single wall of natural lighting, and the kitchen is usually at the rear and resulting in a dark workspace. The reliance of mechanical ventilation and lighting to increase the quality of these spaces is common to all of the surveyed apartments.

**Poor Common Circulation**

The public circulation designed to access the apartments is long and monotonous. The long uninviting corridors, either double loaded in ‘Ink’ or parts ‘Sugartree’, or the exposed windswept single loaded corridor of the ‘Soho’, do not provide exciting spaces to transition from the public realm to the private realm of the personal apartments. The public circulation has abrupt spaces between outdoor and indoor which is enforced by the lobby, lift and corridor. These spaces are distinct and not gradual and do not provide for places of rest or allow activities to occur, resulting in empty unused circulation spaces.

The abrupt threshold between the individual apartment and corridor reinforces the privacy of the interior of the apartment and removes any accidental social contact with neighbours.
Small Cellular Rooms

The ‘warren’ of small rooms in ‘shoe-box’ apartments adds to the confinement of the space. These small rooms are always separated by a traditional partition wall, which gives no sense of interest or ability to manipulate the boundaries of the space. These small rooms are connected via internal circulation with emphasis on singular function of each room. The ability to fit as many rooms into the apartment is a desirable economic outcome for the developer, but the ability to shift from the notion of ‘room’ to ‘space’ would be more effective for the overall apartment. Internal rooms with no access to natural ventilation or lighting are seen in all of the surveyed apartments. All of these apartments have internal bathrooms, but some also have internal bedrooms or ‘studies’ which rely on the sharing of light and ventilation from the main living space. These spaces are not desirable habitable spaces and the desire for light (resulting in internal windows) conflicts with any sense of privacy required with a bedroom.

2.6 ANALYSIS CONCLUSION

This chapter has looked at five ‘shoe-box’ apartment buildings which highlight the issues of this type of apartment. The resulting diagrammed six issues provide a critique of the problem and therefore these issues can be consciously eliminated during the design process. It is interesting to note that building scientist Jessica Bennett also found six similar problems associated with the current apartments. The problematic areas found in her study focus on functional and environmental conditions, however when coupled with the architectural issues explained in this chapter, all can be mitigated in the final design. Many of these issues relating to spatial deficiency may have a correlation to cost effectivity, this research recognises this, however looks to the examining the limits of architectural possibility, rather than being constrained by cost.


- inadequate natural light
- poor noise control
- limited outdoor access
- inadequate ventilation
- small unit sizes
- inadequate storage provisions
CHAPTER THREE: PHENOMENOLOGY
Phenomenology provides the theoretical grounding for the development of spatial experience to be applied to the design. The literature review looks closely at the wider scope of architectural phenomenology, before focussing on the phenomenological philosopher, Maurice Merleau-Ponty as influential to architectural phenomenologist Steven Holl. The architectural ideas of Holl are developed into four strategies which are applied to the design process of this research. The four strategies are; Anchoring & Intertwining, Parallax, Attention to Detail and Hinged space/Void Space. These are discussed at the conclusion of the literature review.

3.1 PHILOSOPHICAL PHENOMENOLOGY

Phenomenology developed during the early 20th Century as a response to the “crisis” of an excessive reliance upon scientific rationalism.17 Founder Edmund Husserl’s ‘modern’ phenomenology provided a ‘descriptive psychology’ of a return to ‘things themselves’, forming a rejection of science.18 Philosophical phenomenology, by its very nature, defies the ability for it to be defined.19 However for use in this research, Neil Leach’s description of phenomenology as the “study of how phenomena appear”, being not limited to the visual sense, but rather “a receptivity to the full ontological potential of human experience”, will be used as a definition to help to understand the application to architectural phenomenology.20

3.2 ARCHITECTURAL PHENOMENOLOGY

Phenomenology's call for a ‘return to experience’ was relevant for architectural thought following the Modern Movement, where the rationalist approach to functionality and form provided the basis of thinking. The increased reference to sciences and technical information dominated the discourse of western thinking in the early twentieth century and placed the experience of the human body in architectural space at a lower importance. Adam Shar notes that, Heidegger plead that the immediacies of human experience shouldn't be forgotten.”

Heidegger believed the purpose of the architect within this rational industry was to enforce the human experience. Similarly, Christian Norberg-Schulz argues that following decades of scientific theory, a “qualitative, phenomenological understanding of architecture” involving an interrelationship of the body, architecture and context, should be introduced. Amongst other post-modern movements, architectural phenomenology creates a reaction in response to the rationality of modernism. This “re-injection” of human and contextual elements aimed to defuse this stronghold of the modernist agenda. The interdisciplinary nature of phenomenology relates well to architectural thinking. Phenomenology gives an intellectual legitimacy to spatiality which otherwise is not considered by other professions. Jacques Benoist explains that phenomenology has the ability to connect “sensitivity and sensibility” to a resolved constructed building.

Architectural phenomenology can be described as a discourse, with individual researchers sharing a similar intention, but the range of investigation methods results in a range of outcomes. Therefore phenomenology can be considered to be a process rather than a product. M. Reza Shirazi explains that phenomenological discourse in architecture can be separated into two lineages of two philosophers; Martin Heidegger and Maurice Merleau-Ponty. Architectural phenomenology provides a tension between the two lines of thought; Heidegger’s dwelling and place and Merleau-Ponty’s dialogue with space and bodily experience. These two phenomenologists and their associated ideas provide the basis for an architectural interpretation of phenomenology. Jorge Otero-Pailos categorises the coherence of architectural phenomenology into three strands: experience, history, and theory. History and theory can be seen to dominate the first generation of architectural phenomenologists, while experience has a greater influence in the second generation. Heidegger had a greater influence on this first generation of architectural phenomenologists who focused enquiry on the definition of place (Norberg-Schulz) and notions of dwelling and its constructivity (Charles Moore and Kenneth Frampton).

These three architects concluded that sensory experience was the “timeless constant” and that architecture was an “elemental language of basic bodily experiences”. It is this sensory experience and its forced bodily interaction with the architecture that is created through “spatial richness”.


28 Otero-Pailos also highlights the critique of this, where architectural phenomenologies were required to defend the uniqueness of the experience of the architect. Architecture’s Historical Turn: Phenomenology and the Rise of Postmodernism. (Minneapolis: University of Minnesota Press, 2010), xxiii.
32 The first generation of architectural phenomenologists worked separately and resulted in separate areas of enquiry, however the outcome of their work was clearly phenomenological. The three architects were all influenced within their works (Otero-Pailos xxiii). Otero-Pailos names Lahanat, Moore, Norberg-Schulz, and Frampton as the first generation of architectural phenomenologists. The notion of sensory experience and bodily experience became a combined understanding as the basis for architectural phenomenology. This can be read in the built of works of the second generation of architectural phenomenologists such as Steven Holl, Peter Zumthor, Tadao Ando and Gehry and St John.
However the second generation of architectural phenomenological writers (e.g. Juhani Pallasmaa and Alberto Perez-Gomez) and architects (e.g. Peter Zumthor) have a greater understanding of both Heidegger and Merleau-Ponty. Second generation architect Steven Holl however, is largely grounded in Merleau-Ponty’s thinking. Merleau-Ponty’s combination of existentialism and bodily experience in space over time is brought to the fore by Holl. Heidegger placed emphasis on notions of dwelling and building. These two terms were interconnected in the context of his understanding of experience to be fully explored. Merleau-Ponty’s “account of perceptual experience” to be fully explored.

Merleau-Ponty’s influence on Pallasmaa is seen in his Pallasmaa’s definition of architecture and “existential metaphor”. Compared to Heidegger, Merleau-Ponty embraced change and “placed less emphasis on the historicity of experience”, which partly explains why he was so influential for a second generation of architectural phenomenologists, including Steven Holl, who were less concerned with the questions of historiography and more interested in theory and experience. Shirazi explains that Merleau-Ponty’s thinking on perception, body and the “sensible dimension” of human experience allowed for application to architectural issues. Merleau-Ponty placed experience at the forefront of his writings and provides the basis for Holl’s work. This review will now turn to focus on Merleau-Ponty and Holl in further detail.

Merleau-Ponty described the body as the “vantage point” where objects were perceived. It is the “vehicle of my perception and movement in the world”; from this understanding, spatiality and bodily motility could...
be considered neither geometric nor discrete. Therefore Merleau-Ponty’s phenomenal body is a both a “matrix of human existence” \(^{46}\) and a “sensory apparatus” in which “things” could be understood. \(^{47}\)

Like Merleau-Ponty, Steven Holl’s work is centred on the body. The body and its senses is the fundamental vehicle for bodily experience. Pallasmaa explains that the fundamental understanding of the body in making architecture is “grossly undervalued” in today’s culture. \(^{50}\) Described by Davide Scarso as “a Merleau-Pontian architect”, Holl’s early career actually developed through a focus on typology as seen in his early houses and publications “Pamphlet Architecture”. It was the reading of Merleau-Ponty that provided a shift in his production of architecture from a rational typological basis to a process based phenomenology approach in 1984. At this point Holl began to develop a position in which a project could derive concepts from outside of architecture; these could be “used as a point of departure of architecture”\(^{51}\). Though this change resulted in a focus on phenomenology, (seen as a reactionary theory to modernism) Holl self proclaims, that his built works are not from the canons of modernism nor postmodernism. \(^{52}\) Joseph Masheck explains that this “freedom from the established clichés” allows him to create the spaces of his buildings. \(^{53}\) It is this freedom of phenomenology that provides key characteristics salient to providing a solution in this research. “Shirazi explains that using a phenomenological lens to view architectural themes allows a deeper thought resulting in ideas, images and details to be evoked.”\(^{54}\)

Due to this influence, Holl’s work shifts from the basic understanding of phenomenological sensory experience, to a deeper role with a full body experience of architecture. \(^{55}\) In Intertwining, Holl refers to Merleau-Pontian ideas with a direct shift to the application to architecture;

“It phenomenology concerns the study of essences; architecture has the potential to put essences back into existence. By weaving form, space, and light, architecture can elevate the experience of daily life through the various phenomena that emerge from specific sites, programs, and architectures. On one level, an idea-force drives architecture; on another, structure, material space, colour, light, and shadow intertwine in the fabrication of architecture.” \(^{56}\)

In The Visible and the Invisible, Merleau-Ponty develops the rejection of the subject-object dualism. \(^{57}\) Instead the body is privileged and can be seen as

---

50 J. Pallasmaa, The Thinking Hand, (West Sussex: John Wiley & Sons Ltd 2009), 15.

---

Phenomenology 23:3 Fall 2012, 12.
both subjective and objective. The concept of Merleau-Ponty’s flesh provides the ability to understand the intertwined condition of subject and object “between the visible and the interior armature which it manifests.” This “fusion” of the subjective and objective creates the foundation for Holl’s body experience with architecture. According to Holl, the body is at the very essence of our being and our spatial perception. Merleau-Ponty’s writings on the tactile world in *The Visible and Invisible*, where two persons hands can have different experiences on the same surface have been applied to architecture through the notion of geometrically criss-crossing two systems applied together. Holl then literally translates this term “interlocking” into form of the Kiasma Museum of Art, and also as an intertwining of “visible” and “invisible”. In terms of a sensory experience, the visible can be considered the visual sense, while the invisible can be seen as the non-visual senses. Holl develops this further to introduce the idea of a poetic architecture.

“If we consider the order (the idea) to be the outer perception and phenomena (the experience) to be the inner perception, then the physical construction, the outer perception and inner perception are intertwined” The influence of Merleau-Ponty helped Holl develop his approach, which added the “fundamental notion of context”. Through a site survey (or reading of the site), Holl includes the cultural and historical context as well as the physical. It also includes his personal experience of observable phenomena which is the architecture’s “physical and metaphysical foundation”. This mental-phenomenon (physical and non-physical aspects) is vital to perceive a range of diverse experiences. Holl’s reflection on the ‘feel’ and identity of the place is then condensed into watercolour sketches. According to Kourosh Mavash, the more comprehensive and inclusive this “perceptual immersion” is, the more the resulting design will be successful and engaging. Holl believes that the task today for architects and planners is to “awaken senses”, and “rekindle a psychological realisation of space in people”.

3.4 CRITIQUE OF MERLEAU-PONTY AND HOLL.


The intertwining of the subjective and objective, the visible and the invisible, is a key concept in understanding Holl’s approach to architecture. Holl’s work is deeply rooted in the idea of the body as a central component of architectural experience. This is evident in his projects such as the Kiasma Museum of Contemporary Art, where the interplay between the visible and invisible is a central theme. Holl’s approach to architecture is heavily influenced by the writings of phenomenologists such as Merleau-Ponty, who argue that the body is at the very essence of our being and our spatial perception. Holl’s work is a testament to this idea, as he develops the concept of “interlocking” to create a poetic architecture that is deeply rooted in the physical and metaphysical foundation of the place.

---


Ponty’s failure to develop a definable system of thought, resulting in higher than usual range of interpretations of this thought. According to Olkowski, Luce Irigaray has the greatest impact on feminist interpretation and critique of Merleau-Ponty. Irigaray is concerned with body (and his gendered bias), chiasm, the privileging of visibility and subject/object dualism.

Holl’s interpretation of Merleau-Ponty’s work can be disputed as to being a poor reading of his work. Whether his interpretation is accurate or not, it highlights the issue of philosophy being translated to architecture. Even if the interpretation is truthful to the original works, it opens up new ideas and thinking architectural thought. This interpretation provides much discussion, as Gareth Griffiths questions the notion of a phenomenological architect, as building on the environment is a contradiction to phenomenology’s fundamental ideas. The construction of a “parasitic” building is in itself “devouring” of the host environment. Holl defends this explaining that the new building is “folded into the experience” and is additive to the environment. Patricia Locke questions Holl’s interpretation of Mealeau-Ponty’s ‘visible’ and ‘invisible’ with reference to the relationship between Holl’s watercolours and the built buildings. Holl’s use of watercolours as early ideas which “fuse intuition with concept” are critiqued as being an easy solution. Locke believes that the “intuitive” watercolours are too similar to the built building, explaining that the “self-conscious mind cuts off the eye to hand circuit, so one dare not think too much”. She further notes that Holl uses a rigorous mathematical proportion system, similar to the Golden Section, though the “body could never actually be in a position to experience this”. It is important to note that even Holl claims that “one grows from the

fundamental ideas. The construction of a “parasitic” building is in itself “devouring” of the host environment. Holl defends this explaining that the new building is “folded into the experience” and is additive to the environment. Patricia Locke questions Holl’s interpretation of Mealeau-Ponty’s ‘visible’ and ‘invisible’ with reference to the relationship between Holl’s watercolours and the built buildings. Holl’s use of watercolours as early ideas which “fuse intuition with concept” are critiqued as being an easy solution. Locke believes that the “intuitive” watercolours are too similar to the built building, explaining that the “self-conscious mind cuts off the eye to hand circuit, so one dare not think too much”. She further notes that Holl uses a rigorous mathematical proportion system, similar to the Golden Section, though the “body could never actually be in a position to experience this”. It is important to note that even Holl claims that “one grows from the

misuse of philosophy” and he had “definitely misused the philosophical territory”. Rachel McCann sees Holl’s ‘limited-concepts’ that inform his design as not the sole driver. McCann implies that his own creativity and talent play a role which are generally ignored in his text. William Curtis critiques Steven Holl’s practice of architecture as “smoke and mirrors”, mesmerising his clients with popularised phenomenology. However, Hartoonian alludes to Holl as a “stone diverting a flood” where his contemporary sculptural tectonics are standing against the global age of digital reproductivity.
In this section, Holl has been analysed and four key strategies have been created, based on his writings and work, to be applied to the design. The approach of these 'Holl Strategies' can be used to develop bodily experience and spatial experience in the design. His phenomenological approach is closely related to the issues concerning the ‘shoe-box’ apartments. Holl’s critique of common architecture, is similar to that of the ‘shoe-box’ apartment, and by applying Holl’s approaches, this shift from the ‘shoe-box’ can occur. Though it can be argued every building has experiences and interaction (even the ‘shoe-box’) they are of low quality and repetitious. Holl stresses the role of architects today to reintroduce the “psychological realised" of space in people.

**Anchoring and Intertwining**

Steven Holl’s initial manifesto *Anchoring* provides the basis for his ideas of anchoring a building to its site. His second manifesto, *Intertwining*, develops the ‘anchoring’ idea and applies it to the design of the building resulting in a holistic product, having an “organic link between site, concept and form”.

To achieve this product, Holl carries out an intensive site analysis; historical, experimental and conceptual to create a ‘limited concept’. This site derived limited concept is based on Holl’s belief that architectural meaning is the “intertwining of site, phenomena and its idea”, which is then pushed and applied to all elements in the design. Holl believes the importance of this design process is that the “conceptual structure is always different depending on the site, the situation and the programme", resulting in individual, unique buildings. This results in Holl’s work defying a consistent architectural language due to his individual approach to each project. Instead his work consists of distinctive phenomenological qualities which are present throughout all buildings.

Exemplified by the Berkowitz-Odgis House, the notions of ‘anchoring’ and ‘intertwining’ can be seen through the design concept, detailing and the construction method of the house. The history of the site, based on Native American tribes who inhabited the island of Martha’s Vineyard, provided the driving idea. The tribes would use a whale skeleton found on the beach, where skins would be stretched over to provide shelter, transforming it into a ‘skeletal inside-out balloon frame’.
construction with a rubber membrane stretched over the roof, mirroring the Native American shelter. The lightness of the exposed wooden structure of the veranda is experienced through the shadows it casts on the adjacent wooden volume. The approach is applied to detailing e.g. pile foundations are used to not disturb the sand dunes and the skeletal frame is exposed and celebrated on both the interior and exterior.

Authoring and Intertwining provide a basis for the initiation of site analysis for this research and also the development of a limited-concept. This concept will be derived from the site, therefore will be unique and drive the design. The uniqueness of the concept will provide a key shift from the repetitive economic focused ‘shoe-box’ apartment. As the site analysis is based on experienced phenomena significant to the site, the subsequent concept will be intertwined, therefore relevant and ‘anchored’ to the site. This limited-concept will inform the development of the design including the form, light, materiality, detailing, and construction.66 It is important to note that Holl believes that this intertwining of idea and phenomena only occurs when a building is realised. Therefore, due to the nature of this research and the fact it is not a built building, the design will be an indication of the observable phenomenology.

Parallax

Parallax performs two tasks for Holl’s architecture; first a design process and secondly, as a resultant experience for the user through the building. Holl introduces the concept of parallax as a design strategy to create a shift from the orthographic projections of plan and section. Holl explains parallax as the “change in the arrangement of surfaces that define space as a result of the change in the position of a viewer”.67 The inclusion of the body in this concept reinforces that the “body is at the very essence of our

66 For example, light can inform or be informed by programme, cutting height, change in levels, define space and play on materials.
slices of views with doors cut diagonally, broken open corners or pushed in walls. In terms of this research, parallax will perform as both the design process and experiential journey of the user as seen in Holl’s work. By using parallax as a driver in the design process, the third dimension of space will be included from the initiation of the design. This shift from plan based design, as seen in the planning of ‘shoe-box’ apartments, to having a greater emphasis and integrated consciousness of the third dimension will result in apartments of superior spatial quality. The form of the interlocking apartment, being interlocked complexly in both vertical and horizontal directions, requires this realisation of the three dimensions to occur throughout the design process. Perspective drawings will be used to form key moments and develop a sense of journey or narrative through the building. This will result in the experiential journey for the user as seen in Kiasma.

These moments will occur in three different spheres; the public exterior and urban context, the semi-public spaces of the apartment building (circulation, outdoor gardens) and also internal spaces of the apartments.

**Attention to Detail**

Holl’s attention to detail is prominent in all of his projects, however his smaller projects due to their size, show an in-depth articulation of architectural elements. The ‘limited-concept’ can be carried through and applied to small scale elements of the building, which exemplify his holistic approach. This level of refinement and design at a small scale results in an intense spatial experience. The apartments in this research will be at a size which will allow this closer detailing to occur on smaller elements. Holl undertook the Scarsdale Pool and Sculpture Studio with a “very free hand”. This project provided Holl with “the idea that elements at a small scale could operate

---

at a heightened material intensity".97 The scale of the project being only 11 feet wide “does not work well as a space” and resulted in “a large, blank wall”. Therefore Holl focussed on smaller elements including stained glass windows to increase the architectural experience of the space. According to Holl, “the result was an intensification of a certain area and a stirring blankness in others”.98 Similarly, in other projects, such as the kitchen door pulls at the Stretto House and the door latches at the Berkowitz-Odgis House, were designed specifically to align with the ‘limited-concept’ of the overall design. However, this approach can be detrimental also, where J. Kipnis critiques the St Ignatius Chapel, for the need to “touch every square inch” which took away from the design concept.99 Holl agrees and noted that not every moment of a project has to be hyper-articulated to achieve this.100

Hinged space/Void Space

Holl works using a combination of tectonics and phenomenology, which according to Hartoonian, is developed through cuts in surfaces, apertures, planar elements. This results in a play between light and dark and solid and void created by cuts which break down the relationship and threshold between inside and outside.101 Holl applies this to urban housing which are designed around the concepts of hinged space and void space. These two ‘spaces’ are developed in the Fukuoka Housing, where there is a “play” between the two.102 The interiors of the Fukuoka Housing revolve around the notion of ‘hinged space’, where two types of hinging occur. Diurnal hinging is over the span of a day, where spaces can be changed from morning to night depending on the requirement, and also episodic hinging, which reflects the change in family makeup and requirements over years. Holl describes this shift from “room-by-room space to interactive space” as the ability to reorder domestic environments using “participating walls” to create “adjustable space”.103 The ability to change a space using hinging requires a physical contact and force with a hinged element. This creates a forced interaction with the architecture and therefore a bodily experience including the sense of touch is created. This interaction implies a sense of time, which is inherent in Holl’s interpretation of perception of space. Void space, however, is a purposefully literal flooding of space to create a quiet, peaceful and uninhabitable space. Holl notes that the “perceptual spirit and metaphysical strength of architecture” are driven by the quality of light and shadow shaped by the solids and voids.104

---

3.6 CONCLUSION
Phenomenology has been introduced as a key theory in this research. The thread of phenomenology, outlined by philosopher Merleau-Ponty, which places greatest importance on bodily experience and spatial experience of space, has been focused on to initiate a shift within urban apartment architecture. The architectural interpretation of Merleau-Ponty’s phenomenology outlined by the practicing architect Steven Holl resulted in emphasis being placed on Holl’s theoretical writings. From these writings, four strategies (Anchoring & Intertwining, Parallax, Attention to Detail and Hinged & Void Space) have been created to focus the design process and give a measurable evaluative tool. The implementation of Holl’s phenomenology will force a conscious shift when designing the resultant building of this research.
CHAPTER FOUR: INTERLOCKING PRECEDENTS: ANALYSIS AND ABSTRACTION

Fig. 4.01
Kanchanjunga Apartments.
4.1 Analysis of Interlocking Apartment Precedents

The interlocking apartment provides a key precedent which develops a shift from the ‘shoe-box’ apartment. This chapter analyses precedents and develops a list of techniques, which can be applied to the design of the research. This chapter is a distinct research task; separate from the influence of Phenomenology, Steven Holl and the four strategies from Chapter Three, however they will overlap and create a relationship between them. The two strands, Steven Holl’s interpretation of Phenomenology from Chapter Three, and this chapter’s typological interlocking apartments will be fused together in the final design in Chapter Six.
Long sightlines achieved along staircases to allow long point-to-point view distances, making spaces appear larger.

Overlapping units allow great access to sun with access to all four orientations.

Due to suburban context, each apartment has own entrance on ground floor.

Same floor and ceiling height is used throughout with no variation, even around vertical circulation stairs.

Overlapping units allow greater access to sun with access to all four orientations.

Room deck is a semi-private space open to allow three apartments. Barriers, areas of privacy could be achieved, but also interaction can occur between users also.

Overlapping units allow greater access to sun with access to all four orientations.

Sections are still designed in a traditional design with separate rooms and levels.

Long sightlines are achieved along staircases to allow long point-to-point view distances, making spaces appear larger.

Sky light to roof deck, light allowed into lower space, provides interesting sightlines between roof deck users and apartment users.
NEXT ARCHITECTS: VILLA OVERGOOI
ROTATED APARTMENTS

1. Due to lack of room above, dining area receives additional light from above via skylights.
3. Flexible space in basement.
4. Open space in basement for storage, cars, social events?
5. Private entrances achieved due to low-rise development.
6. Designed at a suburban scale, these are effectively rotated townhouses. Without rooftops, it would not be applicable to a taller building with stacking, whereas without roofers, it would not be applicable to a taller building with special emphasis on access and central vertical circulation.

Plans and section adapted from:
A Housing Typology: Freestanding Houses
Ed. Günter Pfeifer and Per Brauneck

TYPICAL ATTACHED UNITS
ROTATED ON UPPER LEVEL TO MAXIMISE ACCESS TO SUN, LIGHT, VIEWS AND ABILITY TO ACHIEVE ALL FOUR ORIENTATIONS.
OVERSIZED OUTDOOR TERRACES ALLOW FOR BUILDING TO BE BROKEN UP INTO INTERMEDIATE SCALE ELEMENTS.

DRIVING CONCEPT WAS BASED ON AN ENVIRONMENTAL APPROACH SEEN IN VERNACULAR INDIAN HOMES, WITH CROSS-VENTILATION, VIEW TO COAST AND SHIELD FROM THE SUN AND MONSOON RAINS RESULTING IN THE DEEP APARTMENTS WITH OUTDOOR SPACES ON MULTIPLE FACES.

SIGHTLINES INTO LARGE VOLUMES VIA INTERIOR WINDOWS BREAKING THE PUBLIC/PRIVATE INTERFACE OF BEDROOM AND LIVING SPACE.

SIGHTLINES INTO LARGE VOLUMES VIA INTERIOR WINDOWS BREAKING THE PUBLIC/PRIVATE INTERFACE OF BEDROOM AND LIVING SPACE.

LARGE, TALL EXTERIOR SPACES ALLOW FOR GREATER EXPERIENCE OF OUTDOORS.

LARGE, TALL EXTERIOR SPACES ALLOW FOR GREATER EXPERIENCE OF OUTDOORS.

MULTIPLE DECKS INCREASE OUTDOOR SPACE OF APARTMENT.

MULTIPLE DECKS INCREASE OUTDOOR SPACE OF APARTMENT.

UNITS RECEIVE THREE ORIENTATIONS.

UNITS RECEIVE THREE ORIENTATIONS.

IMPORTANT SPACES DEFINED BY CHANGE IN FLOOR OR CEILING LEVELS REMOVE STANDARDISATION OF UNITS.

IMPORTANT SPACES DEFINED BY CHANGE IN FLOOR OR CEILING LEVELS REMOVE STANDARDISATION OF UNITS.

RANGE OF CEILING HEIGHTS AND FLOOR LEVELS REMOVES STANDARDISATION OF UNITS.

RANGE OF CEILING HEIGHTS AND FLOOR LEVELS REMOVES STANDARDISATION OF UNITS.

TYPICAL FLOOR 1:500

TYPICAL FLOOR 2:1,000

TYPICAL FLOOR 3:1,000

TYPICAL FLOOR 4:1,500
LE CORBUSIER: UNITE D'HABITATION
APARTMENT BUILDING

SITE PLAN 1:2000
APARTMENT: 155m²

TYPICAL INTERNAL CORRIDOR
ACCESS WHICH IS FULLY INTERNAL WITH LITTLE ACCESS TO NATURAL LIGHT. THE SPACE IS HOMOGENEOUS WITH NO VARIATION.

ROOF DECK
CREATED FOR PUBLIC FACILITIES FOR APARTMENT INHABITANTS

Plans and section adapted from:
Unité d'habitation in Marseilles
Jacques Sbriglio.

TYPICAL FLOOR 1

TYPICAL FLOOR 2

TYPICAL FLOOR 3

SECTION 1:500

VERTICAL L-SHAPED UNITS TO PROVIDE DOUBLE HEIGHT LIVING AREAS AND TWO ASPECTS FOR SUN/VIEW

TYPICAL INTERNAL CORRIDOR
ACCESS WHICH IS FULLY INTERNAL WITH LITTLE ACCESS TO NATURAL LIGHT. THE SPACE IS HOMOGENEOUS WITH NO VARIATION.

FLOOR AND CEILING HEIGHT SAME THROUGHOUT EXCEPT IN DOUBLE HEIGHT LIVING SPACE

DOUBLE HEIGHT EXTERIOR SPACE OFF LIVING SPACE AND ALSO SINGLE HEIGHT DECK OFF BEDROOMS

VERY DISTINCT PUBLIC/PRIVATE BARRIER SET UP BY CORRIDOR.
DEVELOPED FROM A IDEA TO CREATE HOUSING THAT COULD SYMBOLISE THE CITY OF TOKYO AS HE EXPERIENCE IT. TRANSLATED INTO THE BUILDING BY USING SMALL ARCHETYPICAL, GABLED-ROOF HOUSES STACKED SOMEWHAT HAPHAZARDLY, LIKE THE DEVELOPMENT OF CITY OF TOKYO. THE STACKED UNITS CREATE A COMPLEX RELATIONSHIP WITH WHEN WALKING UP OR THROUGH THE BUILDING, THE FEELING OF WALKING THROUGH A CITY.

FORMS ARE STACKED ON ANGLES TO ACHIEVE AS MANY ORIENTATIONS AND ASPECTS AS POSSIBLE. TINY SPACES REQUIRE MULTIPLE FUNCTIONS, PERSONAL AND ARTICULATED STAIRS ONLY POSSIBLE IN LOW RISE DEVELOPMENT.

INTERESTING SIGHTLINES ARICHED THROUGH THE LAYOUT OF APARTMENTS DUE TO LAYOUT.
STRUCTURAL NATURE OF APARTMENTS ALLOWS BOTH APARTMENTS TO HAVE WIDE FRONTS TO SOUTH FOR LIVING AND TWO NARROW FRONTS TO NORTH FOR BEDROOM AND ENTRANCE.

L-SHAPED UNITS WITH TWO ASPECTS AND VOID LIVING SPACES WITH BETTER PROPORTIONS THAN UNITE D’HABITATION.

INTERLOCKING NATURE OF APARTMENTS ALLOWS BOTH APARTMENTS TO HAVE WIDE FRONTS TO SOUTH FOR LIVING AND TWO NARROW FRONTS TO NORTH FOR BEDROOM AND ENTRANCE.

HORIZONTAL CIRCULATION MORE EXISTING THAN UNITE D’HABITATION, ALLOWS ROOMS TO OPEN TO OUTSIDE AND ALSO WITH WINDOWS INTO APARTMENTS BREAKING DOWN THE PUBLIC-PRIVATE DISTINCTION.

TYPICAL LOWER 1:500

TYPICAL UPPER 1:500

FORM OF BUILDINGS ON SITE TO INCREASE VIEW ANGLES AND REDUCE UNPLEASANT CONTACT ISSUES.

TWO STORIED APARTMENTS ALLOW FOR EXAGGERATION OF SPACE THROUGH Voids.

HORIZONTAL CIRCULATION MORE EXISTING THAN UNITE D’HABITATION, ALLOWS ROOMS TO OPEN TO OUTSIDE AND ALSO WITH WINDOWS INTO APARTMENTS BREAKING DOWN THE PUBLIC-PRIVATE DISTINCTION.
DELUGAN MEISSL: CITY LOFTS
APARTMENT COMPLEX

Fig. 4.14

SITE PLAN 1:500
SITE AREA: 0.23HA
47 DWELLINGS
DENSITY: 204/HA
APARTMENT: 80-110m²

UNITS ENTER OFF ALTERNATE FLOORS WITH
SPLIT LIVING/BEDROOM AREAS, A COMPLEX VERTICAL
L SHAPE WHICH ALLOWS 2.3m AND 3.3m STUD SPACES

THESE RANGE IN CEILING HEIGHTS
ALLOW DEFINITION OF ACTIVITIES IN A LARGER SPACE.

Fig. 4.15

TYPICAL LOWER FLOOR 1:500
TYPICAL MIDDLE FLOOR 1:500
TYPICAL UPPER FLOOR 1:500

DELUGAN MEISSL: CITY LOFTS
APARTMENT COMPLEX

Fig. 4.16

Fig. 4.16a

Fig. 4.16b

Fig. 4.16c
Designed in response to the site and urban conditions, the site has three frontages including a busy and loud boulevard and crossroad. In response to this unattractive frontage, the development of multiple internal terraces which allow for use without disruption from the boulevard. The inward-looking nature of the apartments with high-level windows provides visual and audible privacy from the boulevard while allowing light and sun to enter.

Articulation of each apartment gives definition and individuality to each apartment.

Designed in response to the site and urban conditions, the site has three frontages including a busy and loud boulevard and crossroad. In response to this unattractive frontage, the development of multiple internal terraces which allow for use without disruption from the boulevard. The inward-looking nature of the apartments with high-level windows provides visual and audible privacy from the boulevard while allowing light and sun to enter.

Articulation of each apartment gives definition and individuality to each apartment.
UNITS STACKED PLAYFULLY WITH A SIMPLE GABLE HOUSE FORM TO ARTICULATE EACH AREA AND REDUCE MASS.

ARTICULATED APARTMENTS ALLOW FOR 3-4 ORIENTATIONS.
INTERLOCKING FORM OF APARTMENTS ALLOWS FOR FACADE TO BE BROKEN UP INTO INTERMEDIATE ELEMENTS, EMPHASISING INTERLOCKING INTERIORS.

DIFFERENT TO THE SMALLER VM APARTMENTS, THE KATANA RESIDENCES HAVE A WIDER LIVING FRONTAGE AND ALSO TWO SMALLER FRONTAGES TO BOTH WEST AND EAST. THE LONGER (RATHER THAN WIDE) SITE IN VM ALLOWS ORIENTATION TO WEST AND EAST TO BE MORE BENEFICIAL TO ALL APARTMENTS.

INTERLOCKING FORM OF APARTMENTS ALLOWS FOR DOUBLE HEIGHT LIVING SPACE.

APARTMENT BLOCK IS SPLIT INTO 3 TOWERS WHICH REVOLVE AROUND A SINGLE LIFT. THIS REMOVES THE NEED FOR BANDED CIRCULATION AND WASTE OF SPACE ON EACH FLOOR.

INTERLOCKING APARTMENTS ALLOWS FOR DOUBLE HEIGHT LIVING SPACE.

INTERLOCKING FORM OF APARTMENTS ALLOWS FOR FACADE TO BE BROKEN UP INTO INTERMEDIATE ELEMENTS, EMPHASISING INTERLOCKING INTERIORS.

INTERLOCKING FORM OF APARTMENTS ALLOWS FOR FACADE TO BE BROKEN UP INTO INTERMEDIATE ELEMENTS, EMPHASISING INTERLOCKING INTERIORS.

SCDA ARCHITECTS:
KATANA RESIDENCES
Fig. 4.20a.
Fig. 4.20b.
Fig. 4.20c.
Fig. 4.20d.
Fig. 4.20e.
Fig. 4.20f.
Fig. 4.20g.
Fig. 4.20h.
Fig. 4.20i.
Fig. 4.20j.
Fig. 4.20k.
Fig. 4.20l.
Fig. 4.20m.
Fig. 4.20n.
Fig. 4.20o.
Fig. 4.20p.
Fig. 4.20q.
Fig. 4.20r.
Fig. 4.20s.
Fig. 4.20t.
Fig. 4.20u.
Fig. 4.20v.
Fig. 4.20w.
Fig. 4.20x.
Fig. 4.20y.
Fig. 4.20z.
Fig. 4.21a.
Fig. 4.21b.
Fig. 4.21c.
Fig. 4.21d.
Fig. 4.21e.
Fig. 4.21f.
Fig. 4.21g.
Fig. 4.21h.
Fig. 4.21i.
Fig. 4.21j.
Fig. 4.21k.
Fig. 4.21l.
Fig. 4.21m.
Fig. 4.21n.
Fig. 4.21o.
Fig. 4.21p.
Fig. 4.21q.
Fig. 4.21r.
Fig. 4.21s.
Fig. 4.21t.
Fig. 4.21u.
Fig. 4.21v.
Fig. 4.21w.
Fig. 4.21x.
Fig. 4.21y.
Fig. 4.21z.
Fig. 4.22a.
Fig. 4.22b.
Fig. 4.22c.
Fig. 4.22d.
Fig. 4.22e.
Fig. 4.22f.
Fig. 4.22g.
Fig. 4.22h.
Fig. 4.22i.
Fig. 4.22j.
Fig. 4.22k.
Fig. 4.22l.
Fig. 4.22m.
Fig. 4.22n.
Fig. 4.22o.
Fig. 4.22p.
Fig. 4.22q.
Fig. 4.22r.
Fig. 4.22s.
Fig. 4.22t.
Fig. 4.22u.
Fig. 4.22v.
Fig. 4.22w.
Fig. 4.22x.
Fig. 4.22y.
Fig. 4.22z.
SIMPLE CONCRETE FORMS HIDE THE ARTICULATE AND
COMPLEX NATURE OF THE INTERLOCKING APARTMENTS
WHICH ARE ALL UNIQUE.

DESIGN USING A DUALITY OF VOID SPACE AND HINGED SPACE.
The northern active void contrast to the southern voids
which are flooded with water above retail height.

HINGING OCCURS INSIDE WITH HINGED PARTITIONS, WALLS AND
DOORS WHICH CAN BE MOVED BASED ON OCCUPANT DESIRE,
OVER TEN DAY OR YEARS.

INTERLOCKING OCCURS WITH APARTMENTS ENTERING ON
THE SAME FLOOR. ONE APARTMENT GOES UP, WHILE
THE OTHER DOPS UNDERNEATH.

THIS SHIFT IN LEVELS ALLOWS A RANGE OF CEILING AND
FLOOR HEIGHTS,

INTERNAL HINGED SPACE ALLOWS TRADITIONAL BEDROOMS TO
BECOME LIVING SPACES DURING THE DAY WHEN SPACE IS NEEDED.

SOUTHERN Voids ALLOW EACH APARTMENT TO RECEIVE
SOUTH, WEST AND EAST ASPECTS WITH THE ADDED PRIVACY OF
HINGED AWNINGS OVER THE WINDOWS.

INTERLOCKING OCCURS WITH APARTMENTS ENTERING ON
THE SAME FLOOR. ONE APARTMENT GOES UP, WHILE
THE OTHER DOPS UNDERNEATH.

THIS SHIFT IN LEVELS ALLOWS A RANGE OF CEILING AND
FLOOR HEIGHTS,
4.2 INTERLOCKING TECHNIQUES

4.2.1 Range of Ceiling and Floor Heights.

This technique sets up the shift from the salient approach of design in plan as seen in 'shoe-box' apartments. By shifting the dominance of plan to section and perspective, it gives emphasis to the horizontal planes that make up the apartment; the floor and ceiling. This ultimately allows the space to be visualised in terms of all three dimensions and prevents the design of repetitive cellular rooms. The nature of the vertical interlocking immediately creates a more interesting section.

The introduction of a range of floor and ceiling heights, results in split levels, shorter stairs and allows multiple views that connect spaces better, all greatly relating with the Holl Strategies of Parallax and Void Space. This creates internal sightlines where the perception of space is increased by using geometry (further discussed in 4.2.2).

The 'shoe-box' apartment is designed in one plane, a 2D apartment, where the third dimension is ignored, spaces are designed with a consistent 2.4m stud height which ignores the spatial requirement of the space. Closets, sleeping areas through to large living spaces and corridors all have the same ceiling height.

The "Kanchanjunga Apartments" are salient in showing this shift to section in section and perspective, resulting in range of different floor and ceiling heights. Here Correa "pushed his capacity for ingenious cellular planning to the limit", the results, interlocking types of apartments which range from three to six bedrooms.
4.2.2 Internal Sightlines.
The ability to introduce a greater perception of space can be created using geometry and internal voids. Using simple Euclidian geometry, where the hypotenuse is the longest dimension, spaces can feel larger or longer than they physically are. Circulation using the hypotenuse, or visual sightlines from corner to opposite corner allows this dramatised effect to occur. Predictably, this technique works in the third dimension, when used in conjunction with the two-dimension, the hypotenuse increases the feeling of space again. The use of voids is important to provide the perception of the third dimension and intrigue to space. These internal sightlines allow spaces to be shared to imply a greater sense of overall space.

Fig. 4.32. Technique Two: Internal sightlines; perception of space increased using geometry and internal voids.

Fig. 4.33. Technique Two: Internal sightlines; perception of space increased using geometry and internal voids.

Fig. 4.34. Technique Two: Internal sightlines; perception of space increased using geometry and internal voids.

Fig. 4.35. Double height spaces in Katara Residences results in the perception of greater space.

Fig. 4.36. Mostor + Dahlia’s ‘In Der Hohl’, are designed to split over lower apartment, where the internal sightline is dramatically increased when looking up the stair void.

Fig. 4.37. Villa Overgoot, when standing in centre, one can see in four directions.

Fig. 4.38. The use of long spaces which connect to other spaces gives the notion of greater space using the hypotenuse. Looking through an outdoor terrace increases this notion.

Fig. 4.39. Kandanjwa Apartments internal sightlines.
4.2.3 Shared Views.

This technique shifts from the interior parameters of ‘Internal Sightlines’ to an approach which involves shared views and common spaces between apartments. The use of horizontal and vertical voids allows shared light and views to add to the apartments internal space. This integration of voids for this technique implies a relationship with the Holl Strategy of Void Space. Light wells and voids which are external to the apartment envelope allow views to be shared, which increases potential for openings, uninterrupted sightlines to courtyards, and contribute to having an apartment with ‘multiple aspects’, as described in 4.2.6. However, this technique, requires an awareness for privacy between apartments. Privacy implications must be ensured with these shared voids.

The articulated forms of the ‘Tokyo Apartments’ result in apartments which have exciting view shafts and internal spaces derived from the external form. The connection between the different articulated forms require stairs and ladders to provide innovative spatial experiences. The negative spaces created by the gable roofs allow views through the building to the outside, which otherwise would not be seen if conventionally designed.
4.2.4 External Sightlines + Range of Outdoor Spaces.

This technique shifts again to a full external parameter, where view shafts are created in the external space in combination with a range of private outdoor spaces. Access to the outdoors is an important aspect of higher density living, which the ‘shoe-box’ apartments fail to provide successfully. One issue, as highlighted in Chapter Two, is the “fear of living” in apartments due to “limited access to outdoors”. The outdoor spaces are an asset for dense housing, according to P. Ebner et al, the “green room” is most desirable, where the lack of such exterior space has the most lasting influence on dissatisfaction with an apartment. In combination with the recommendation of outdoor spaces being a minimum of 6 feet (1.8m) deep and the ability to have informal outdoor interactions, J. Bay et al explains the positive effects of the “provision of semi-open forecourts and balconies”, having a range of outdoor spaces, semi-public circulation sky streets, semi-private forecourts and private decks and courtyards is necessary. This reduces the notion of being attached to adjoining apartments, in turn reducing the strong interiority/exteriority duality attached to ‘shoe-box’ apartments. Outdoor spaces such as forecourts can result in a threshold, a transition of public to private, which can vary based on the conditions desired by the users. According to A. Forster, outdoor spaces must be suited to various activities including “dining, relaxation, children’s games, sunbathing, socialising and an additional living room in summer”. This is explained further in 4.2.5.


112 A. Forster. Detail 46 no 3 2006, 156.
The terraces of ‘Alfonso Reyes 58’ are designed as dividers between apartments, acting almost as courtyards, doubling as light wells and allowing living spaces to open up on multiple faces, rather than apartment having one external face and surrounded by party walls.

The ‘Kanchanjunga Apartments’ provide in excess of five outdoor spaces for each apartment allowing for a range of uses in different times of day and weather conditions. A large double height exterior space is supplemented by smaller private terraces which are accessed off bedrooms and the kitchen. The large double height terrace includes space for plantings to reduce the perception of high-rise living.

The unique, articulated forms of the ‘Tokyo Apartments’ results in voids in both plan and section, which allows slithers of up to three aspects for a low rise development. According to Kuranishi, this “subtle staggering” of differing sized apartments, results in a different narrative approach to them. The staggering results in voids and in turn gives a sense of parallax to the journey; “the gaps between them meant that the view changes every time one moves”.

Roof terraces are used in ‘In der Hub’ (picted) and ‘Villa Overgooi’ to supplement lower decks.
4.2.5 Threshold between Inside + Outside and Public + Private.

This technique looks at the threshold between public and privacy in the apartment building. This focuses primarily on the relationship between the common circulation and the interior of the apartments. This threshold in ‘shoe-box’ apartments has a sharp definitive threshold. This poor threshold is the result of maximising space, by placing the apartment’s private spaces against the common circulation to condense space; the threshold is privatised to stop looking into the apartment. Coupled with a cost-effective narrow hallway, this harsh edge results in no informal interaction between neighbours resulting in poor perception of security and a space no-one lingers in. However, these circulation spaces can act as positive spaces of interaction, where according to Ebner et al, Jane Jacobs explains that “access and circulation could serve as a place for social interaction”. The notion of being isolated by living above the fourth storey as explained by Alexander et al, is backed up by Ebner et al, where apartment buildings can “contribute significantly to making people feel alone” due to their “hotel character”, which are not suitable for residential form. As explained in 4.2.4, an outdoor space, such as a forecourt which is semi-private allows activity to occur along the circulation space. Bay et al explains that the visual connectivity with a sky street contributes to a high level of social interaction resulting in casual encounters and daily activities which promotes a sense of community. A forecourt of minimum two metres in width connected to a 1.4m sky street provides these results.

The outcome from these precedents hint toward a type of external gallery circulation or a variation on this. These types of access have been implemented before, with varying results. Ebner et al explains the critiques of the external gallery and the desire to form communities using this approach. There are many factors which determine the success, including width, situation relative to exterior, orientation and number of floors. Ebner et al continues to stress the importance of wide galleries, where interaction and transitions can occur, otherwise a narrow gallery results in a closed edge due to privacy with “above eye-level windows, executed with transom-type openings”, somewhat similar to an interior corridor.

---

113 In interiors of buildings, interaction areas among apartments are likewise generally reduced to the minimum degree necessary, in stairwells and corridors. Floor space is typically dedicated to achieve a maximum of pure dwelling-unit floor space” (from Schneider Floor plan manual 3rd Ed p40). check book.

---

Fig. 4.53-4. A parallax-like journey is set up in the Tokyo Apartments.
5. Threshold between interior and exterior, and public and private.

6. Technique Five: Threshold between inside & outside and threshold between public and private.

Fig. 4.56.
Technique Five: Threshold between inside & outside and threshold between public and private.

"Tokyo Apartments", due to its low rise structure, allows for individual external staircases. Not feasible for application for this larger building, but can provide hints to other applications.
4.2.6 Multiple Aspects.

'Shoe-box' apartments generally have one (sometimes two for end or corner units) external faces which are possible for natural lighting, ventilation and outlook. It is more advantageous for multiple aspects allowing sun to enter the apartment for a larger part of the day, resulting in more light, wider views and a reduced 'feeling' of urban enclosure.

The ideas developed in 4.2.3 'Shared Views', through the use of voids will be able to maximise the number of aspects. This will result in an increase in access to view and light.
4.2.7 Integrate Internal Circulation + Double Duty.

This technique looks at the celebrating and making the most of each space. By integrating circulation into the designed space, this otherwise functional and mundane space can give additional spaces for living. Staircases and halls can be inhabited, turning them into studies, sitting spaces or galleries. Stairs can become features of spaces, where they can act as a divider removing the need for an impenetrable wall. The stair can allow inhabitation, allow light to filter through to below and be integrated into the design aesthetic.

These ideas introduce the idea of ‘double duty’, where other rooms can be used as multiple spaces, e.g. a bedroom could be a study, office, bedroom, toys room, TV room etc. This use of double duty relates directly with the Holl Strategy of Hinged Space.
4.3 Hierarchy of Visual Modules

A residential building "speaks" to its surroundings through its facade. Therefore the effect of the interlocking apartment on the facade can be used to create a facade which shifts from the repetitive 'shoe-box' facade. 'Shoe-box' apartment buildings generally have two element sizes; the individual apartment module and overall building form, with no intermediate scaled elements in between. This lack of mediation between the two (e.g. Zest Apartments, refer fig 2.19a) results in the highly repetitive and bland facade. The effect of interlocking apartment modules, provides a higher likeliness to produce a wider range of visual modules. This can be exploited on the exterior and results in a range of sized elements which can break up the building mass, provide greater visual interest and result in the integration of the building positively into the immediate context more successfully.

4.4 Conclusion

These seven Interlocking Techniques have been extracted from the precedent analysis to allow spatial opportunities to emerge to provide alternative approaches to urban apartments. The abstracted techniques are explored through diagrams and are discussed to offer positive implications for the design process in this research. Though the Interlocking Techniques are standalone from the Holl Strategies, the relationships between the two are already clear. The emphasis on the body in space from Holl, can be seen in the focus of the typological Interlocking Techniques which emphasise a range of spaces, movement and ability to perceive space. The Interlocking Techniques may also create a means to help concretely understand the conceptual ideas of Holl. However, as the techniques and strategies support each other, conflict may arise between them also, requiring areas of compromise.

CHAPTER FIVE: CONTEXT AND SITE
This chapter provides a brief and the physical siting for the resolved outcome. It explains the development of a 'limited-concept' which, based on Steven Holl’s approach to ‘anchoring’ architecture, is used to drive the design in the following chapter.

The programme for the building is implicit to this research, urban apartments. However for an urban building to be successful, it requires a mixed used approach to the programme. The building will include parking for apartments, ground floor retail and also office space. The introduction of office space on the first floor gives an advantage to the apartments, this ‘buffer’ zone distances the apartments from the traffic of Victoria Street. However, only one floor of office space would still retain the sense of connection with the street.

To attract a range of residents, a range of apartments are to be designed. A mix of one, two and three bedroom apartments will result in a variation of households.
5.3 AMALGAMATION

Victoria Street, an addition to the urban grid, was designed as a south bound street to relieve traffic from nearby Willis Street, allowing Willis to become the one way north bound street. The design of the street, an amalgamation of a range of unaligned smaller lanes and streets, had a focus on traffic flow requirements. The removal of built fabric to allow for the alignment of the smaller streets resulted in an over scaled street with a number of vacant building spaces and triangular parking spaces. The buildings built since its construction contribute to the inconsistent built fabric (refer Fig. 5.05.7). 124

The chosen site; 79 Dixon Street /161 Victoria Street, is a consequence of this urban amalgamation. The site has been carved in half, to allow for Victoria Street, resulting in a ‘left-over’ triangular shaped site. The ‘left-over’ site has not been built on since the amalgamation and is still currently used as a car park. To activate this corner, a building is required to redefine the edges of the site. In the same approach as Holl’s ‘anchoring’, ‘amalgamation’ becomes the ‘limited-concept’ for this site and architecture. This concept, an essence derived from site, will be ‘intertwined’ through the architecture, resulting in a building which explains the site it is built on.

Fig. 5.05-7 Victoria Street between Dixon and Ghuznee Streets.
5.4 SITE SELECTION + PROCESS

The selection was limited to Wellington’s city centre to determine an appropriate site, where many of the ‘shoe-box’ apartments analysed are located. The selection process is explained over three different scales of diagrams, Wellington CBD, Upper Victoria Street and finally the final site. The process of site selection began by analysing the central city area through the existing amenity provided (refer Figures 5.10-18). Different areas of the central city were highlighted for having an abundance of amenity which justified residential development in these locations; Victoria Street was one of these.

In parallel, identification of Victoria Street as a key focus area of the city by the WGTN2040 framework helped to determine this precinct as the focus. The WGTN2040 framework, develops Wellington City Council’s planning ideas and visualises their goals for the central city within the next 30 years. This ‘spatial structure plan’ forms the direction of development with a focus on attractive streets, improved green spaces, vibrant shopping areas and smoother traffic flows. Victoria Street is outlined by the framework as an important street due to its current urban condition and also location, allowing it to be of great potential for future residential development.

Due to the position of Victoria Street, it is described as an “ideal position” near business and entertainment areas, walking distance to important institutions and above the low lying flood-prone areas of the Te Aro flat. The framework emphasises its importance as a possible high quality residential precinct. The framework explains that a realignment of the carriageway, review of building controls and development incentives, is required to initialise development on the street.  


---

The development of apartment buildings within the Wellington CBD area has followed a clear pattern. A number of buildings have been built along the waterfront with view in mind. However most of the other buildings have been built along the narrow lanes and streets of eastern Te Aro clustered around Tory Street. This is due to the close proximity to Courtenay Place and Moore Wilsons supermarket, but are located in quiet streets without the effect of the noise from Courtenay Place. Few buildings are built on the wide boulevards of Kent/Cambridge Terrace, Taranaki Street and Victoria Street, possibly due to traffic volumes. However these wider streets allow a greater outlook, lack of enclosure and chance for greater street planting.
CBD AMENITY DIAGRAMMING

Fig. 5.13-14
CBD Amenity Diagramming
1:40 000

Fig. 5.15-18
CBD Amenity Diagramming
1:40 000
Five sites along Upper Victoria Street were initially analysed. The range included large vacant carpark lots (192 Victoria Street) and smaller triangular spaces created by Karo Drive (236 and 251 Victoria Street). However the decision to progress with 79 Dixon Street / 161 Victoria Street was because the site had the tallest height restriction. This allowed a design to be developed which was of a similar scale to the other 10+ storey ‘shoe-box’ apartments. A smaller (e.g. four storey building) would appear ‘boutique’ and would not provide a fair opportunity or test to prove the aims of this research.
Urban analysis of Upper Victoria Street showing development patterns. One key role of the design of this research will be to form an urban edge to form a streetscape for Victoria Street.

A gradient of grain occurs from the modern buildings of the CBD towards the fine grain traditional buildings of Upper Te Aro. Pockets of undeveloped sites and parks occur towards Upper Te Aro.

Building age:
- 1920-29
- 1930-39
- 1940-49
- 1950-59
- 1960-69
- 1970-79
- 1980-89
- 1990-99
- 2000-10
- 2010-15

Buildings of Upper Victoria Street start are primarily post 1970 due to amalgamation of parcels except some original front boundaries. Overall the street requires a consistent urban edge to form the streetscape, especially at empty corners.

Due to the amalgamation of the lanes and streets resulted in a new continuous thoroughfare which varied from the tight Te Aro grid. This created new and skewed sightlines of the city. However, buildings have not been built to form this skewed frontage, rather resulting in 'left-over' residual triangular spaces.
Design of the building.

Approach for the maintenance this mixed-use is important to maintain this mixed-use.

It is important to maintain this mixed-use. It is especially along the CBD, especially along Victoria Street, including Upper Victoria Street, and along the transact of Te Aro is evident.

The mixed use nature of Te Aro is evident.

Inclusion of retail spaces and semi-public space open results in little institutional space for public use. A lack of retail spaces along Victoria Street, frontage towards the edge. This lack of retail spaces results in little institutional space.

The lack of retail spaces in Victoria Street, from the civic centre of the city and also in the civic centre of the city and also in Te Aro. A lack of areas of Upper Te Aro occurs in clusters. The densely built cultural functions are located in clusters. The underdeveloped areas of Upper Te Aro cluster together in cultural functions and the triangular amalagamations of buildings of different use.

The densely built cultural functions occur in clusters. The underdeveloped areas of Upper Te Aro cluster together in cultural functions and the triangular amalagamations of buildings of different use.

The densely built cultural functions occur in clusters. The underdeveloped areas of Upper Te Aro cluster together in cultural functions and the triangular amalagamations of buildings of different use.

Please refer to pages 126 and 127 for further details.
5.6 THE SITE

The site chosen to demonstrate this research on is 79 Dixon Street/161 Victoria Street, on the corner of Dixon and Victoria Streets. One block back from the Golden Mile on Manners Street, this site is located very close to a range of amenities (refer Fig. 5.10-18). The site is currently 651m², however following the WGTN 2040 guidelines, the site increases in size, reducing the effect of the narrow triangular shape. The site is flat, narrow and runs lengthways north-south providing the possibility to achieve east and west aspects to the apartments. Dixon Street runs along the small northern boundary and Victoria Street along the long western boundary. Currently a car park is on the eastern boundary however, both sites have the same height restriction of 43.8m, \(^{127}\) therefore potentially a tall building will be built here in the future. The southern boundary is bordered by an earthquake prone two-storied car parking building used by the Farmers Department store, which again has an uncertain future. Therefore the potential for new buildings to be built on these two boundaries is likely within the future decades.

\(^{127}\) Wellington City Council. District Plan Map 32.
Fig. 5.34
Farmers Department store carparking building providing a southern edge to 79 Dixon Street/161 Victoria Street.

Fig. 5.35
79 Dixon/161 Victoria Street. Existing boundaries.
1:2000

Fig. 5.36
79 Dixon/161 Victoria Street. WGTN2D00 boundaries.
1:2000

Fig. 5.37
79 Dixon Street/161 Victoria Street looking from corner (overleaf).
CHAPTER SIX: DESIGN CASE STUDY

Fig 6.01
Interlocking apartment.
Chapter Six: Design Case Study presents the design outcome of this research. The design tests a number of the strategies and techniques identified in Chapters Three and Four. The chapter concludes with a detailed evaluation of the design, focusing on the effectiveness of these strategies.

The design, including the process, is described in 6.1 Design, where the building is introduced and explained through drawings and text. 6.2 Strategy & Technique Discussion, discusses the application and relevance of the four Holl Strategies and seven Interlocking Techniques in a format which highlights their relationships. 6.3 Design Critique looks at the overall process of the research critically, evaluating each chapter topic including ‘shoe-boxes’, phenomenology, Steven Holl and interlocking apartments.

This section also provides a feasibility study for the design outcome and a cost comparison to a ‘shoe-box’ design for the same site. 6.4 Key Findings discusses the three key findings of this research:

1. Voids allowed the Strategies and the Techniques to be implemented effortlessly.

2. The Intermediate Module produced an articulated and controlled urban facade.

3. The Intermediate Module allowed Voids and Structure to be integrated without compromise.
6.1 DESIGN DESCRIPTION

DESIGN PROCESS

The process of the design had four key stages of iterations, with smaller iterations within each stage. The process initially focused on the development and design of the apartment itself with an emphasis on the interior. After this was determined, the interior was developed simultaneously with the exterior of the building (refer Appendix One).

Iteration A.
The first design stage looked at a single apartment design which interlocked with adjacent apartments, but was duplicated across the entire building. The design of these apartments resulted in interesting interiors, views and met many of the interlocking techniques, however this approach resulted in the same unit module replicated twenty times, resulting in a repetitious facade, which was an attribute of ‘shoe-box’ apartment, which was to be avoided. This approach was developed with four different apartment layouts, with different approaches to interlocking (refer A1-A8 in Appendix One).

Iteration B.
This approach resulted in the design of all the apartments being different and interlocking in a variety of ways. Having all apartments unique was an economic feasibility issue and also planning issue which resulted in a less resolved building. The result of the uniqueness was read on the external form, which is highly articulate, but lacked consistency or order.

Iteration C.
The third iteration involved a reduction in the variety of apartments, resulting in the design of a module. The module was tested with five, then four and finally three floors which was then replicated vertically. It was also decided to have two distinct modules (north and south separated by a 14 storey atrium) which allowed for four larger apartments in the north and six smaller apartments in the south module. These two modules were repeated vertically four times resulting in 40 apartments. The variety of interlocking was reduced and restrained to within the boundaries of the modules giving spatial experience within a controlled overall space. Vertical and horizontal circulation was excluded from the modules and located to the rear via circulation decks at every third floor.

Iteration D.
Developing from the last design, the circulation decks were removed and inserted into the modules. This resulted in the three circulation voids in the final design, which in turn split the two north and south modules in half again to become more porous. Iteration D resulted in the final design.
Process sketches of the overall building.

Fig. 6.03

Fig. 6.04
Process sketches of interlocking apartments.
1. The current approved envelope of the site. The site is extruded up to the Wellington City Council’s District Plans height restriction of 43.6m.

2. The site is widened to the WGTN 2040 plan.

3. The building mass is focused on the street edges and corner to create a strong urban edge and emphasise the corner. To achieve double aspect apartments (east and west) of 11m, the mass is removed from the back. The ground and first floor use the footprint of the entire site.

4. Three circulation voids are inserted to allow access to the apartments, and give the apartments three or four aspects.

5. Vertical circulation is introduced into the circulation voids for the apartments and the office entrance. This is located in the centre of the building to provide minimal disruption to the apartments. The multiple circulation cores allow separate entrances for each tower on Victoria Street and also an office entrance on Dixon Street. Egress stairs are located opposite each the lift shafts.

6. The horizontal circulation is introduced at every third floor (the central floor of each three story module). The horizontal circulation is a small terrace between the lift and stairs and extends to the entrances of each apartment. This is broken up with semi-private outdoor sitting areas.
A roof form and a floor form which houses the basement is introduced which reduces the perceived regular form of the building. The terraced roof planes introduce a stepping in height which is lowest at the southern boundary and highest at the corner. This emphasises the corner and also is more considerate to the southern neighbour. This emphasised corner breaks through the height restriction at the corner, but steps down to below the restriction at the southern boundary.

The introduction of the eight modules.

Final building with interlocking apartments inserted into the modules.
Basement plan (opposite).

Ground floor plan.
Fig. 6.09-10
First floor plan (opposite).
Second, fifth, eighth and eleventh floor plans.
Third, sixth, ninth, and twelfth floor plans (opposite).

Fourth, seventh, tenth, and thirteenth floor plans.

Fig. 6.11-12

Third, sixth, ninth and twelfth floor plans (opposite).
Fourth, seventh, tenth and thirteenth floor plans.
Fig. 6.114
Roof plan.
Section AA (opposite).
Fig 6.11
Section BB.
Perspective from corner of Victoria and Dixon Streets.
Perspective from Victoria St looking north.

Fig. 6.17
Fig. 4.38
Perspective from Dixon Street.
Perspective from Victoria Street looking north.

Fig. 6.19
Fig 6.20-21
External circulation void (opposite). Rooftop.
Entrance Lobby (opposite).
Office space.
Retail space.
To control the complexity of the interlocking, intermediate modules was introduced (Figure 6.25, opposite). The final design module is three stories high, spanning the length of the building with 10 unique apartments. This is replicated four times vertically. The exploded module below highlights the intricacy of the interlocking between the apartments. Figure 6.26 highlights the resultant facade treatment due to the use of the intermediate module.
Apartment One

Interior Area 130.66m²
Deck Area 31.88m²

- This apartment enters on its upper floor, down two steps from the circulation void, and into an outdoor area serving as a threshold between the private space within. This terrace overlooks the west terrace below.

- Two bedrooms with two bathrooms are served from the upper circulation before the stairs lead down to the living space. This unfolding of spaces along the circulation provides drama and illusion of greater space within the apartment.

- The main internal void and the external void open up as you descend the stairs, where you pass an informal north facing sitting nook on the landing overlooking Dixon Street.

- The living space opens up at the foot of the stair with the living area to the right and the double-height north-east terrace to the left.

- The dining and kitchen space are down two steps. These spaces are separated by a folding screen which hinges to give distinction to the spaces.

- The dining and living space open to the west terrace which overlooks Victoria Street.
6.1.1 APARTMENT ONE

Fig 6.29
Apartment One sectional perspective.
6.1.1 APARTMENT ONE

Fig. 6.30-31
Apartment One ensuite;
Apartment One terrace sectional perspective (opposite).
6.1.2 APARTMENT TWO

Apartment Two

Interior Area 78.34m²
Deck Area 20.24m²

• An external stair rises from the circulation void to a small sitting terrace which overlooks the circulation void. From here you enter the apartment.

• The entrances opens into a small space, before opening into the kitchen and dining area.

• The kitchen and dining overlook the circulation void to the south and extend to a deck which overlooks Victoria Street to the west. The kitchen and dining have a four metre stud.

• The living space is half a level higher, which acts as snug with a lower ceiling height. Its location on the corner gives it north and west aspects and also hinged doors allow the space to be connected or disconnected from the lower dining and kitchen.

• The two bedrooms and two bathrooms are located on this higher floor, served by a second stair. These bedrooms are both on corners where they face north east and south east.
6.1.3 APARTMENT THREE

Apartment Three

Interior Area 139.71m²
Deck Area 26.18m²

• This apartment enters into an entrance lobby from the circulation void. From here, to the right is a large double height terrace which faces to the west and back toward the circulation void. Inside to the left is the large living area and the stair to the upper floor.

• The secondary living space, dining and kitchen occur at the top of this stair. The stair runs along the east wall allowing light into the both floors. The upper living spaces have a four metre stud. These spaces face west to Victoria Street, north and east overlooking the lower terrace and also to the south into another circulation void, giving all four aspects.

• The master bedroom and ensuite open off the living space with the same tall stud, but is able to be fully opened and transformed into an extension of the living space.

• Two extra bedrooms and a second bathroom are up half a floor, which overlook the lower terrace and lower living room.
6.1.3 APAR

Apartment Three sectional perspective. Fig. 6.37
6.1.4 APARTMENT FOUR

Apartment Four

Interior Area 150.63m²
Deck Area 28.14m²

• This apartment enters from the middle circulation void, via a stepped down outdoor terrace providing a public/private threshold.

• The entrance overlooks the living area below and serves the master bedroom and ensuite.

• The stair leads down the south and east walls with a grand three storey space which allow light to filter in.

• On the lower level the kitchen, dining and living open up facing west and east, and also filtered views to the south. To the north lies an internal courtyard which is surrounded by living space and the two secondary bedrooms, bathroom.

• This courtyard can be split up with hinged screens or used as one large space. A secondary double height terrace faces directly on Victoria Street.

• Two small push outs provide small sitting spaces facing east and west. These have an intimate two metre stud height.
Apartment Four sectional perspective.
6.1.5 APARTMENT FIVE

Apartment Five

Interior Area 125.22m²
Deck Area 18.01m²

• This apartment wraps around Apartment Six on the entrance floor, initially with an outdoor sitting threshold space, before entering into another sitting space which can be opened fully to the entrance.

• Up two steps is the living space, which wraps round to the kitchen and dining providing all four aspects in one space.

• Hinged doors allow the space to separated if desired.

• A double storey terrace opens off the dining space which faces north west to the circulation void and Victoria Street.

• Up half a floor lies a private living space or childrens play area which overlooks the terrace. The master bedroom and ensuite open off this space.

• Up another half floor lies two other bedrooms and a bathroom. One bedroom opens up over the dining space providing a two storied dining area below.
Apartment Five sectional perspective.

Fig. 6.43
6.1.6 APARTMENT SIX

Apartment Six

Interior Area 71.56m²
Deck Area 19.04m²

• This apartment enters into a small entrance, which descends downstairs surrounded by internal voids giving sense of greater space to the one bedroom apartment.

• The living space is at the foot of the stair facing east with a outdoor terrace which opened up by a three storey void slice above.

• The bedroom and bathroom open up off a small hall from the living space facing north east.

• The kitchen and dining space are separate to the north west with a west facing terrace. This separation gives a greater sense of space and revelation. This separation allows the living to be separated over the greatest hypotenuse of the apartment.

• The bedroom also opens from the dining to give flexibility for a different use during the day.
6.1.6 APARment

Apartment Six sectional perspective. Fig. 6.46
Apartment Seven

Interior Area 75.92m²
Deck Area 17.64m²

• This apartment enters on the middle floor before descending stairs to the main apartment. Alongside the stair and entrance is the double height courtyard, which is overlooked when descending the stairs. This gives a greater spatial boundary to the space and integrates a narrative of views whilst descending the stairs.

• The living space opens off the bottom of the stair, where the courtyard is accessed. A second external balcony faces Victoria Street.

• A single bedroom and bathroom look to the west and to this courtyard also.
6.1.7 APARTMENT SEVEN sectional perspective. Fig. 6.49
6.1.8 APARTMENT EIGHT

Apartment Eight

Interior Area 92.51m²
Deck Area 11.80m²

• This apartment enters into a double height space which then makes way for the stair up to the living area.

• On the entrance floor, down a private hall is one bedroom and bathroom.

• Upstairs the living space opens up to all four aspects. It includes a large kitchen and west facing balcony. The length of the apartment opens to a void giving less distinction to the boundaries of the space.
6.1.8 APAR
6.1.9 APARTMENT NINE

Apartment Nine
Interior Area 72.54m²
Deck Area 11.82m²

- This apartment is accessed by descending a flight of stairs before entering at the interior of the apartment at the lower level.
- Here it opens up onto the living space, terrace and dining/kitchen area, which face north, south and west.
- Two bedrooms are separated at the rear by the circulation void and are served by two bathrooms. The hall has a strong axial view down the circulation void back to Victoria Street.

Fig. 6.53
Apartment Nine floor plans.

Fig. 6.54
Apartment Nine perspective.
Fig. 6.55
Apartment Nine section.
Apartment Ten

Interior Area 111.73m²
Deck Area 15.04m²

- This apartment enters through a small threshold sitting space, before entering the dining area. The kitchen and living then open up toward the west and also to the south looking down Victoria Street due to its corner location. A double storey terrace opens off the living space.

- Upstairs is three bedrooms and two bathrooms.

- The front bedroom acts as a mezzanine, overlooking the double height dining space below.

- The rear bedrooms face north east and south east.
6.1.10 APARTMENT TEN

Fig. 6.58
Apartment Ten sectional perspective.
6.2 STRATEGY & TECHNIQUE
DISCUSSION

6.2.1 INTRODUCTION

The strategies and techniques are listed again to reinforce their importance:

**Holl Strategies.**
- Anchoring & Intertwining
- Parallax
- Attention to Detail
- Hinged Space & Void Space

**Precedent Techniques**
- Range of Ceiling and Floor Heights
- Internal Sightlines
- Shared Views
- External Sightlines & Range of Outdoor Spaces
- Threshold between Inside & Outside and Public & Private
- Multiple Aspects
- Integrated Internal Circulation & Double Duty

The use of strategies and techniques provided an analytical, measurable way of developing the design. The comprehensive number of strategies and techniques (four Holl and seven interlocking) resulted in large number of ideas or elements to integrate into the design. Some of the Holl Strategies and Interlocking Techniques overlapped which resulted in emergence of stronger ideas which had a greater emphasis in the research. These ideas became primary to the design, whilst other techniques and strategies became secondary to the research or even additive to the design. This overlap of techniques and strategies proved their importance, even though they are not intrinsic to each other and emerged from two quite separate studies (an interpretation of Holl's theory-led phenomenological design or from a typological precedent approach), but ultimately shared a concern for spatiality and bodily experience. Therefore it can be suggested that the link between the Holl Strategies and the Interlocking Techniques were strong due to this overlap. The following sections are developed from the overlapping strategies and techniques, grouped together under a (mostly) new common theme. All of these sections highlight the strength of the overlap of the strategies and techniques, as tools in developing the design. However 6.2.4 ‘Anchoring and Intertwining and application through Attention to Detail’ additionally looks toward how building elements integrate the ‘limited-concept’. Their order also provides a hierarchy of importance when reflecting on the design. Each of the following sections explain the extent of the success of Holl Strategies and Interlocking Techniques:

- Interstitial Space
- Spatial Complexity
- Anchoring & Intertwining and application through Attention to Detail
- Integrated Internal Circulation & Double Duty
- Outdoor Space
- Hinged Space
6.2.2 INTERSTITIAL SPACE

Void space from the strategy of ‘Hinged Space & Void Space’ has become a primary technique, creating interstitial space, which has resulted in meeting most of the aims of the research. The internal voids are closely related to the interlocking techniques of ‘Range of Floor and Ceiling Heights’ and ‘Internal Sightlines’.

Externally, the three circulation voids have become a defining structure in the design. The external circulation voids have allowed the techniques of ‘Multiple Aspects’, ‘Shared Views’ and ‘External Sightlines’ to be easily applied.

Internal Voids:
The use of voids internally have allowed a ‘Range of Floor and Ceiling Heights’ and ‘Internal Sightlines’.

A range of ceiling heights that stagger in combination with the floor heights allow greater sightlines which introduce the notion of space. The hypotenuse has been used to help maximise the perception of space inside an apartment, especially through mezzanine spaces that share sightlines with spaces below and create a dialogue between the two (refer Figure 6.60a).

External Voids:
The external circulation is located within the three external circulation voids to create a parallax experience when using the lift or stairs. The framed views to the east and west are designed to be part of the narrative as you ascend the building, with the different altitude comes a different view or perspective (refer Figure 6.59).

The twelve storey voids act as an extension to the interstitial space of the internal voids and external terrace voids. In the external circulation voids, the interlocking is seen, where apartments overlap each other penetrating in or recessing out from the external void.

Here the interlocking is integral with the circulation. The external circulation voids act as interstitial space, which replace the need for solid, impenetrable party walls with adjacent apartments. This is beneficial to the spatial experience of the apartments and allow the apartments to have multiple aspects letting light filter in.

Due to the lack of these party walls and replacement with penetrable external voids, ‘Shared Views’ is easily achieved. The voids allow these sightlines, which
are designed to extend the notion of space within the apartment, externally to a mutual space shared by others, but otherwise inhabitable. However, this introduces issues with privacy, therefore controllable hinged screens have been introduced to minimise this. The staggering of floors, and the introducing of half floors helped to reduce this problem also (refer Figure 6.60b). The use of openings to the voids have also been designed to be slots at floor height or at ceiling height in private bedroom spaces to eliminate overlooking. Though the external circulation voids have been successful allowing this condition to be achieved, the use of horizontal voids, highlighted in the technique in Chapter Four, have not been developed enough and applied to give a successful result.

A key design step was reducing the building mass, by the creation of a narrow building on a north-south axis to allow all apartments to be dual east-west aspect. This gives all apartments sun at different times of the day and promotes cross ventilation. In addition, the external circulation voids are located at short intervals, allowing the apartments to have multiple external corners allowing access to the north and/or south giving all apartments three or four aspects successfully achieving the technique of ‘Multiple Aspects’ (refer Figure 6.61).
6.2.3 SPATIAL COMPLEXITY

Spatial complexity is primarily created through the strategy of ‘Parallax’, however the overlap of techniques including; ‘Range of Ceiling Heights and Floor Heights’ and ‘Internal Sightlines’ are incorporated here too.

Parallax is used by Steven Holl simultaneously as a design tool and also as a method to create a narrative or journey through a building. Parallax was very useful as a design tool to help provide an understanding of the complex interlocking space. In addition to this achieved spatial complexity, bodily engagement was created through the ability to create a journey within the building.

Parallax as Design Tool

The interlocking typology enforces an interesting relationship between spaces, however using parallax as a design process helped to integrate spatial complexity, allowing the third dimension to be intrinsic to the design. The requirement to consistently consider the third dimension gives ease to designing interlocking space which has created dynamic interlocking conditions (through techniques such as ‘Range of Ceiling Heights and Floor Heights’). This link between the interlocking typology and parallax as a design tool has been salient in developing and understanding the design intimately. This has been exploited in the apartments to allow a minor change in stud height to form spatial boundaries without the requirement for walls, and allowed to scale the space suited to the use or type of room128. The bathrooms are designed to have low ceilings due to the importance of the room, size and imply intimacy. Likewise bedrooms are designed generally to have low ceiling to imply intimacy, privacy and comfort and generally feature on the quiet eastern side of the building. While living spaces are design to have a range of heights, from the low sitting spaces, medium dining spaces or grand double height living spaces (refer Figure 6.62-5).

This relationship of scaled spaces is developed from the scale of the body, giving the body a range of different interior spatial experiences. These are translated into the outdoor terraces, which range from single to double height, allowing for occupancy based on the dwellers use. The strategy intrinsically introduces double height and void spaces which allows the exploitation of internal sightlines, developed through the design process of parallax. This strategy reintegrates the human relationship with architecture. Proving spaces are designed for people, for different comfort, different uses, and are not just a container for living in, stacked up repetitiously.

This approach to space has resulted in a reliance on the three dimensional sectional perspective to help understand not only the interior spaces, but also how they interlock and relate to their neighbours. However, the complexity of the interlocking forced a consideration of the plan more than initially expected, giving the plan similar importance to the perspective. This approach

was beneficial, however against Holl's repression of the plan, due to a conscious concern for the planning of the building. An initial perspective sketch of a space helped to describe the space that is to be created, but required a consistent circular method back to plan to see if the planning can incorporate this change, especially with the resulting effect on a neighbouring interlocking apartment. Therefore, as a compromise, the iterative design was performed as a process of perspective-section-plan occurring repetitiously, which allowed a consideration of planning whilst still having the focus on the three dimensional perspective (refer Figure 6.66).

The process of design was found to be largely interior focused due to the parallax emphasis. The design of the apartments planning, interiors, and modules was fundamental to the design, and therefore the exterior appearance and urban relationship came secondary. This interior-out design resulted in the interior spaces influencing the exterior facade. The controlled complexity within the structured and ordered modules was key to organising the exterior. However, the focus on the interior can be seen as a fault, where a compromise could have been introduced to create a dialogue between the two conditions.

Parallax as Narrative
The consistent application of three dimensional drawings reintegrates the crucial connection with the dweller, which is lacking in 'shoe-box' apartments. This human relationship with the architecture gave back a bodily experience, which through the design, the perspective of the dweller is of primary concern, as it is what they experience through their sight. This emphasis on dwelling implies movement, time and therefore a sense of journey and narrative into the interior and exterior of the apartments (refer Figure 6.67a-k). Therefore this strategy has become primary in developing the design (refer Appendix One). It is to be noted that the effect of parallax on the urban design and exterior was beneficial to the design, where it can be compared to Gordon Cullen’s Serial Vision. 129

Parallax as a narrative helped to give circulation a greater role, more than just functional. Parallax introduced bodily experiences, where views are designed as one ascends or descends, applying Holl’s notion of the changing fore, middle and backgrounds. As noted in Chapter Three: Phenomenology, that only a built building can allow these phenomenological experiences to occur, a critique of this research is that the images presented are purely a representation of the experienced phenomena. Parallax can also be criticised to be privileging the visual sense through this drawing approach. This is reinforced by the form of the representation in this research.

View heading south on Victoria Street.

Underneath corner of building at street level.

Outside a ground floor entrance lobby.

Inside a ground floor entrance lobby.

Parallax series from street to living space of Apartment One.
Exiting the lift on the third-floor landing.

Looking into the entrance threshold space outside Apartment One.

Inside Apartment One’s entrance, looking down the hall.
Walking down the stairs to the living space.

Entering the kitchen area.

Looking toward the dining area from the kitchen.

The living space looking toward the west terrace.
6.2.4 ANCHORING & INTERTWINING AND THE APPLICATION THROUGH ATTENTION TO DETAIL

The two Holl Strategies of 'Anchoring & Intertwining' and 'Attention to Detail' are fused together to create the holistic approach of the site specific 'limited-concept'.

This research forms a 'limited-concept' from the amalgamation of sites and small streets to create today's Victoria Street. One of the resultant left-over sites from this amalgamation, is the chosen site for the design; 79 Dixon Street/161 Victoria Street. The 'amalgamation' is then translated throughout the design of the whole building including the interlocking apartments. This strategy implies a built empathy with the site, where the building is relevant to the site, something that 'shoe-box' apartment buildings do not consider. The disregard to the four cardinal points in 'shoe-box' apartments is avoided and the different conditions of the four aspects is acknowledged in this case study design.

This term amalgamation was used to develop structure, construction, the façade and interior details. This metaphorically intertwines the site and Victoria Street's history into the design, which is where the architecture is created130. The amalgamation acts as an organising idea that is a "hidden thread, tying disparate architectural elements into a larger whole".131 The metaphorical meaning of this strategy, helped drive key decisions in the design, including the design of the structure and creation of the modules which are intrinsic to the design success. As the research found, this strategy is closely linked to 'Attention to Detail'. 'Attention to Detail' provides the means to develop the smaller details in the design allowing the amalgamation to be intertwined. Many of these details are purely additive to the design and can be deemed as superficial. However, it is these details, that reinforce the amalgamation and exaggerate the interlocking, resulting in a holistic design.

**External screens**

External screens are used to develop the idea of hinged space to incorporate dualistic notions of light/dark, enclosure/exposure and privacy/publicity which the dweller can control. The external screens are located on the exterior of all four sides of the design. The screens are designed to be suited to specific conditions of that external elevation.

**West and East screens**

The eastern elevation requires shading from the morning sun, but more importantly has to respond to the future eastern neighbour. Until the eastern neighbour is built, the facade is highly visible from the Cuba Street precinct and therefore must be designed acknowledging this. However, once the future building is built, the facade must provide privacy to the interlocking apartments as it is unclear if overlooking will occur from the neighbour. The western elevation, however, requires shading from the intense afternoon sun and from the street. A timber screen system is introduced to these two elevations to resolve these issues. Vertical and horizontal timber slats are overlapped to create a porous screen to control views and sun. These slats are independent from each other allowing the dweller total control of the screen. This gives another tactile experience which gives the dweller control of their spatial experience. The screens allow the interior and exterior to be blurred when open, or defined the spaces when closed. The individual vertical and horizontal slats of the screens allow a gradient of open to closed to be achieved, the extremities of light and dark (when open or shut respectively) and allows privacy to be controlled. The screens can also be completely hinged up, creating an awning like pergola on the exterior, adding interest to the street edge. This is a positive effect for the urban experience, where the position influences the façade’s impact on the street environment. This consistently changing façade makes the building exciting and gives it spectacle qualities from the street (refer Figure 6.69a-b and 6.70a-c).
North and South condition
The encasing skin of the north and south elevations are combined with the roof to create a unitary outer surface that contrasts the delicacy of the eastern and western facades and the fissure-like external circulation voids. This encasing element forms a large form, which aggregates the modules within. This screening facade allows the north elevation to allow privacy from the office building directly across Dixon Street and also give the south elevation an articulate form, which is highly visible heading south down Victoria Street due to the recessed neighbouring buildings (refer Figure 6.16-9).

Structure
The structure was a key element in the architecture to be ‘amalgamated’. The apartment floors are constructed of moment resisting steel frames which provide seismic resistance. However the columns from this frame would interrupt the office and retail spaces on the ground and first floors, therefore reinforced concrete shear walls are used instead on these two floors. The structural forces from the apartment floors are ‘amalgamated’ together using an one metre deep transfer beam above the office floor. This transfer of forces from the moment resisting frame to the reinforced concrete shear walls allows the office and retail spaces to be free of columns. The shear walls are designed along the south and east boundaries and also placed as dividers between retail units with minimal impact on the leasable space, whilst giving a the building a large centre of resistance.

The structure of the apartments is developed in relation to the intermediate apartment modules. As each module is three stories high, a mega-frame is used for each three-storey module, therefore the three floors act as a single structural element (refer Figure 6.71). If conventionally designed where each floor was a concrete floor diaphragm, the large number of voids would have weakened the strength of the diaphragms. Therefore by making every third floor a strong diaphragm, the two middle floors could be lightweight timber construction connected to the structure with pin joints, allowing flexibility to where the voids are placed within the module. ‘Amalgamation’ is designed into the structure detailing also. The columns and beams are designed to express the individual steel sheets that create the column or beam. These columns and beams have been designed to be exposed, integrated into the interior design, creating an amalgamated spatial experience.
Non-apartment Amalgamation
The same aesthetic and palette of materials has been applied to the non-apartment spaces of the building: the office, retail and vertical circulation cores (refer Figure 6.72-3).

Internal Stairs
The balustrades and stair treads of the interior stairs are designed to be amalgamated into one element. The painted black steel materiality similar to the structural columns and beams is used on the stairs to make a consistent interior aesthetic. The balustrade is formed from the same piece of steel of the tread, simply folded vertically (refer Figure 6.74). The open riser stairs allow the treads and balustrade to be read as one amalgamated element expressed with a small gap between each piece riser of steel.

Doors and Door Handles
The timber doors are designed specifically in combination with the door handles. Phenomenologically, “the door handle is the handshake of the building”132, a key sensorial connection, and therefore intertwined into the design to create a bodily interaction with the architecture. The design of the black steel door handle itself is amalgamated into the door, where the handle only functions with the design of the door (refer Figure 6.75). The black steel lever handle is designed to be flush with door surface and to rotate 90 degrees clockwise. Therefore the door is notched to create a negative detail for the handle rotate in. This notch is continued across the whole door to exaggerate this detail.

Kitchen cabinetry
The doors to the kitchen cabinetry are designed to match the other interior doors with the same door handles (refer Figure 6.76). The kitchen islands are designed to be amalgamated into the design of the wider interior space. The timber floor of the living spaces is wrapped up the side and over the island bench top, amalgamating and anchoring the island into the floor through the use of materiality.

Shelving & Built-ins

Storage is an important component in apartments due to the small interiors with no external garaging. Therefore a storage locker is provided for each apartment on the ground floor. However inside the interior of the apartment, shelving is built into the design to maximise storage space. Shelving is amalgamated with the exposed structural columns and underneath the open rise stair treads (refer Figure 6.77), using the same painted black steel aesthetic. These built-ins allow for additive traditional loose furniture to be minimised giving the impression of greater open space.

Bathroom vanity units

The bathroom vanity units are designed to show ‘amalgamation’ using varnished laminated timber construction (refer Figure 6.78). The basin is carved from layered timber veneers to create a sufficient depth. The curved ‘bowl’ shows each layer of timber expressing the amalgamation of fusing the layers together.

6.2.5 INTEGRATED INTERNAL CIRCULATION & DOUBLE DUTY

‘Internal Circulation & Double Duty’ act alone as one technique, however provide key ideas for the small spaces of apartments.

Internal circulation, due to the use of parallax, resulted in a heightened importance in the design. Circulation became integrated into the movement of the dweller. The insertion of wider pocket spaces into the circulation allow dwellers a place to sit or work, giving circulation a second use. Apartments were given oversized landings or hallways with designated space for sitting areas or workspaces.

A key circulation element; the stair, gained a role in the interior as a statement and a space divider. The stair became a feature of the room. The open risers allowed the stair to divide a space visually whilst still allowing a spatial dialogue to occur (refer Figure 6.79).

Double Duty is required due to the restricted amount of interior space in the apartments. The ability for one space to perform two functions gives the space added value. This was achieved through multipurpose rooms, which can act as secondary living spaces, bedrooms and offices. The hinged bookcases, allowed an otherwise simple pivoting wall to gain added function, with the ability to display or store books. Convertible furniture or hinged furniture allowed this to occur, providing an overlap with ‘Hinged Space’ and ‘Attention to Detail’.
6.2.6 HINGED SPACE

Hinged Space looks at the effect of movable elements in creating a range of spatial conditions. It includes *Void Space & Hinged Space*, *Integrated Internal Circulation & Double Duty*, *Internal Sightlines* and *Parallax*.

Hinged Space has been developed primarily on diurnal hinging which occurs over a day, or the need to change the spatial condition for a specific function of a space. The notion of ‘hinging’ was taken less literally where the ‘hinging’ ultimately resulted in the ability to change the space dependent on the desired use, with movements such as hinging, sliding or folding.

Internally, Hinged Space is set up by partitions. Internal partitions which can hinge or pivot are designed into living spaces to allow the large area to be divided into smaller spaces. This could allow a living space to be closed off from the kitchen turning it into a TV room. In some cases, the hinged partitions are developed with book cases to achieve added storage to the apartment by exploiting the hinged elements (refer Figure 6.80a-c). The ability to change a space through moving a partition allows the use of the interlocking technique ‘Double Duty’ to be greatly enhanced. A tactile relationship with the dweller and the architecture is created using the notion of hinged space. This interaction with the participating elements requires a physical contact and force to adjust the space, resulting in a bodily interaction with the space they control and create. It also introduces the sense of time which is related to the perception and movement through space.

Externally, the threshold is primarily set up by the external screens (as explained earlier, refer Figure 6.69a-b and 6.70a-c) which allow for controllable conditions to be achieved. Salient to the design, these screens allow the dwellers to create semi-private or semi-public spaces depending on the desired situation (refer Figure 6.81). This layering of screens gives a transition between the extremes of interior and exterior and public and private, unlike the abrupt boundaries of the ‘shoe-box’ apartment.
6.2.7 OUTDOOR SPACE

‘External Sightlines + Range of Outdoor Spaces’ and ‘Threshold between Inside + Outside and Public + Private’ overlap to extend the apartments interiors to the exterior.

All the apartments have access to a range of outdoor living spaces. These are designed to allow greater flexibility for the users, as different spaces can be used for different functions and different times during the day. Most apartments have at least one private living space which can allow outdoor dining. Access to outdoor space was a key factor in the negative perception of inner city living.\(^{133}\)

The private terraces are also designed to blur the interior and exterior dualism to provide the perception of added interior space. This is achieved through a continuous use material inside and out with a flush surface (figure 6.83).

Rooftop gardens have been implemented to give all apartments a further choice of outdoor spaces.

The Level 14 rooftop and Level Two rooftop are semi-public spaces, where only residents of the building can access it. The Level 14 rooftop gives a larger outdoor space with plantings, grassed area and a community garden which the residents can share. This is to promote play and also a community atmosphere (refer Figure 6.82a). The outdoor sitting spaces at the entrance to the apartments create a threshold between the semi-public circulation core and the private interior of the apartment (refer Figure 6.82b). The spaces are also a blurring of interior and exterior due to their covered and enclosed quality. These outdoor sitting spaces at the entrance to the apartment are separated by two steps to give definition and implied ownership to the space, signaling a boundary to other users. As an extension, the external circulation stairs directly outside the apartments provide a small localised space which allows children to play within watch of adults inside of from these threshold sitting spaces. This has resulted in the circulation acting as a social space, more than its functional use.

6.3 DESIGN CRITIQUE

Repetition was a critique of ‘shoe-box’ apartments in Chapter Two. However the final case study design repeats the modules four times. This can be argued as a failure, but rather it is an acknowledgment that each apartment within the building cannot be different for feasibility reasons. The introduction of four intermediate sized modules vertically is less noticeable and detrimental to the urban face compared to 40 identical apartments repeated vertically and horizontally. The use of the intermediate module prevented both excessive variation and excessive repetition in apartment type, which in turn had a positive effect on the exterior facade.

A building with a range of scaled elements is much more effective than a single small element repeated endlessly. The modules provide an intermediate sized element which contain a range of smaller scaled elements which help to break up the bulk of the facade. This has been a result of the interlocking apartments and their double height spaces being observed from the outside.

\(^{133}\) United Nations Environment Programme, Task Force on Sustainable Lifestyles.
The boundary realignment of Victoria Street, as designed in the WGTN2040 plan, would result in many buildings needing to be altered with respect to their new street boundary. Considering the significant amount of development to occur, this design acts as a catalyst design for the new buildings. Therefore the design becomes the context for future development, freeing it from scale of the existing buildings. The height, scale, modules and intermediate scales elements that are introduced within the design set the context for these future developments (refer Figure 6.85-7). It also sets up an urban edge and places greater emphasis on the corner. The building tower mass, designed to give all apartments a dual east-west aspect also resulted in a development of an urban edge to define the adjusted Victoria Street boundary. This definition is hoped to be continued on other new buildings on the street. The placement of the tower mass on the Victoria Street edge also resulted in the greatest possible space on the eastern boundary. This was beneficial as it gave flexibility to the neighbouring site, when it is developed.

As a result of the focus on the interiors of the apartments, resulting in the desired spatial quality, the voids had an effect on the functional layout of the structural columns. The detailed level of structural design suffered, resulting in larger columns in staircases (reducing the width in half), or small spaces where columns are encountered due to the generous use of voids reducing usable floor area. It has been acknowledged that designing simple rectangular spaces and repeating them is much easier than irregular spaces with angles which require an greater emphasis on furniture planning and greater space designated for circulation, reducing efficiency. A result of this is some apartments have disproportionate spaces. Apartment Eight has one of the largest kitchens, however is only a one bedroom apartment.

The excessive use of voids in the design is a key factor in its success. In comparison to a ‘shoe-box’ apartment where every available floor area is used to saleable or usable floor area, the use of voids have resulted in an overall more spatiality exciting environment for the dwellers. The internal and external voids have helped to achieve many of the strategies and techniques outlined in the earlier chapters. It is important to note, that the use of external voids has resulted in apartments which appear to be less confined by connected neighbours, boundaries and party walls, but has ultimately increased the cost due to the significant extra area of external walls. The added external surface, including extensive use of glass and additional screening has contributed to the added cost premium, making the design less feasible. The light condition of these voids, especially at the bottom can be questioned. Without a roof, the higher floors facing the voids receive light well, however further down, the light loses its intensity and is dependent on light to penetrate from the sides. The external circulation voids would unquestionably work successfully with a smaller number of levels, however for twelve stories deep the effect is less effective for every apartment.

This approach of controlling the complexity of the design (rather than a completely repeated, or a completely unique approach with every apartment different) coupled with the interlocking typology of the apartments has had a positive effect on the urban facade of the building. (refer Figure 6.86)

The iterative design process was more convoluted than expected with two distinct phases; the first with different options or approaches with an emphasis on reflection (outlined by concepts A1-8, then the decision to focus on one approach; concept C)(Refer Appendix One: Design Process), which was then followed by the iterative process of developing the design in regards to all strategies and techniques. These approaches focused primarily on the apartment, but this design required a concern for the whole building, including parking, retail, office, roof etc which was ignored early on. This separation of the apartments and the other elements resulted in the office spaces and retails space being less developed, especially in articulating the idea of ‘amalgamation’. The internal and external voids have helped to achieve many of the strategies and techniques outlined in the earlier chapters. It is important to note, that the use of external voids has resulted in apartments which appear to be less confined by connected neighbours, boundaries and party walls, but has ultimately increased the cost due to the significant extra area of external walls. The added external surface, including extensive use of glass and additional screening has contributed to the added cost premium, making the design less feasible. The light condition of these voids, especially at the bottom can be questioned. Without a roof, the higher floors facing the voids receive light well, however further down, the light loses its intensity and is dependent on light to penetrate from the sides. The external circulation voids would unquestionably work successfully with a smaller number of levels, however for twelve stories deep the effect is less effective for every apartment.
Comparable Design and Economic Feasibility

Assisting as a tool for evaluating the design, a second design has been created. Conventional in design, it is an example of what could be built on the same site with apartments comparable to the ‘shoe-box’ apartments seen in Chapter 2. The interlocking design and the ‘shoe-box’ design is tested through a construction cost plan (refer Appendix Two) and then translated into a development feasibility study.

The nature of the comparable design has a greater saleable floor area in relation to overall construction costs due to the lack of voids, external areas and more compact apartments. These apartments are single storey, served by an external gallery and generally have one predominant aspect (west) unlike the interlocking design.

The resulting ‘shoe-box’ apartments (refer Figure 6.84) are smaller, simpler and repeated across the whole building. It includes 60 two bedroom and ten four bedroom apartments across ten floors with four floors of retail/office and one floor of basement parking. This is comparison to the twelve floors of interlocking apartments (40 apartments), two floors of retail/office and a car stacker.

The arrangements are more conventional allowing more units to be built, hence the ‘shoe-box’ sale price is much lower which can be seen in the feasibility study. The ‘shoe-box’ and interlocking design cost $37.8m and $51.5m respectively, however neither design returns a profit for the development. It was assumed that the ‘shoe-box’ apartment would be profitable, however it is not and suggests further research is required to finalise this cost otherwise it could be assumed that the current market cannot produce a profitable inner city development. The resultant construction cost premium of the interlocking design is 37% over the ‘shoe-box’ design. This premium is very high and would need to be lowered to around 15% to make the interlocking design feasible and attractive to purchasers. The extra elevators, rooftop gardens, extensive surface screens and car stacker are all added costs which make this design more expensive.

Fig 6.84

'Shoe-box' apartment building design for 79 Dixon Street/161 Victoria Street.
### 'SHOE-BOX' APARTMENT DEVELOPMENT

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Cost</td>
<td>$1.5 Million</td>
</tr>
<tr>
<td>Construction</td>
<td>$30.40 Million</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$31.90 Million</strong></td>
</tr>
<tr>
<td>Professional Fees</td>
<td>10% of construction cost</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$34.94 Million</strong></td>
</tr>
<tr>
<td>Holding Costs</td>
<td>3.5% of construction costs</td>
</tr>
<tr>
<td>Legal/Consents etc (fixed)</td>
<td>$1.8 Million</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$37.80 Million</strong></td>
</tr>
<tr>
<td>Apartment Sales</td>
<td>60x 2 bedroom apartments @ $350,000</td>
</tr>
<tr>
<td>10x 4 bedroom apartments @ $600,000</td>
<td>$6.00 Million</td>
</tr>
<tr>
<td>Retail Income</td>
<td>770 m² net Wellington Fringe CBD @ $500/m²</td>
</tr>
<tr>
<td>Office Income</td>
<td>2250 m² net Wellington Fringe CBD @ $180/m²</td>
</tr>
<tr>
<td><strong>Sales Income</strong></td>
<td><strong>$27.00 Million</strong></td>
</tr>
<tr>
<td><strong>Annual Income</strong></td>
<td><strong>$790,000/pa</strong></td>
</tr>
<tr>
<td><strong>Gross Profit</strong></td>
<td>Sales Income $27.00 Million - Building Cost $37.80 Million = <strong>$10.8 Million</strong></td>
</tr>
<tr>
<td><strong>Rental Income for 10 years</strong></td>
<td>+ $7.90 Million - <strong>$2.09 Million</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$10.8 Million</strong></td>
</tr>
</tbody>
</table>


### INTERLOCKING APARTMENT DEVELOPMENT

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Cost</td>
<td>$1.5 Million</td>
</tr>
<tr>
<td>Construction</td>
<td>$42.48 Million</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$43.98 Million</strong></td>
</tr>
<tr>
<td>Professional Fees</td>
<td>10% of construction cost</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$48.22 Million</strong></td>
</tr>
<tr>
<td>Holding Costs</td>
<td>3.5% of construction costs</td>
</tr>
<tr>
<td>Legal/Consents etc (fixed)</td>
<td>$1.8 Million</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$51.50 Million</strong></td>
</tr>
<tr>
<td>Apartment Sales</td>
<td>Type 1x4 2 bedroom apartments @ $1,000,000</td>
</tr>
<tr>
<td>2x4 2 bedroom apartments @ $800,000</td>
<td>$3.20 Million</td>
</tr>
<tr>
<td>3x4 3 bedroom apartments @ $1,300,000</td>
<td>$5.20 Million</td>
</tr>
<tr>
<td>4x4 3 bedroom apartments @ $1,300,000</td>
<td>$5.20 Million</td>
</tr>
<tr>
<td>5x4 3 bedroom apartments @ $1,300,000</td>
<td>$5.20 Million</td>
</tr>
<tr>
<td>6x4 1 bedroom apartments @ $600,000</td>
<td>$2.40 Million</td>
</tr>
<tr>
<td>7x4 1 bedroom apartments @ $600,000</td>
<td>$2.40 Million</td>
</tr>
<tr>
<td>8x4 1 bedroom apartments @ $600,000</td>
<td>$2.40 Million</td>
</tr>
<tr>
<td>9x4 2 bedroom apartments @ $800,000</td>
<td>$3.20 Million</td>
</tr>
<tr>
<td>10x4 2 bedroom apartments @ $800,000</td>
<td>$3.20 Million</td>
</tr>
<tr>
<td>Retail Income</td>
<td>400 m² net Wellington Fringe CBD @ $500/m²</td>
</tr>
<tr>
<td>Office Income</td>
<td>480 m² net Wellington Fringe CBD @ $180/m²</td>
</tr>
</tbody>
</table>

139 Wellington City Council. Pre WGTN2040 adjustment.
140 Refer Appendex Two
### 6.4 KEY FINDINGS

1. **Voids allowed the Strategies and the Techniques to be implemented effortlessly.**

The use of voids, the internal, the external and the external circulation voids, all contributed to the success of achieving the strategies and techniques. The use of voids allowed the objectives to be accommodated to result in apartments with three or four aspects, double height spaces, shared views and develop a narrative to the space. The result of not close-packing the interlocking apartments allowed room for the voids to break up spaces internally and externally, where traditional impenetrable party walls would be used. This traditional definition to apartment boundaries is blurred, where these voids act as buffers between apartment dwellers.

2. **The Intermediate Module produced an articulated and controlled urban facade.**

A simple system for controlling the interlocking of the apartments resulted in the development of the use of modules. Developed neither specifically from phenomenology of interlocking, but rather as a result of the design process. This intermediate scale (between single unit and whole building) resulted in a positive outcome for the street frontage and facade of the building. The ability to articulate the intermediate scaled elements automatically results in a breaking up a mass of a large building, which is a pleasing outcome for an urban building of this scale. The intermediate module helped to prevent both excessive variation and excessive repetition in apartment type. Visually, the intermediate module could be read as the greatest form of amalgamation, acting as the connection between the single unit and whole building.
3. The Intermediate Module allowed Voids and Structure to be integrated without compromise.

The use of an intermediate module allowed all these voids to be integrated easily without compromising the structural integrity of the building. Derived from the ‘amalgamation’ limited-concept’, the structure was developed simultaneously with the modules, where a moment resisting steel structure encases each three storey module. This resulted in only the outer floors of the modules to be reinforced concrete, allowing the two internal floors to be lightweight timber construction. This allowed the freedom to introduce the voids which are intrinsic to the interlocking apartments without weakening the what would otherwise be reinforced concrete diaphragms.

Fig. 6.85 Regulating lines for future development on Victoria Street based on this catalytic design.

Fig. 6.89 The final case study design facade compared to a ‘shoe-box’ facade with endless repetition.

Fig. 6.87 Facade broken down into scaled elements emphasizing the intermediate scale.
CHAPTER SEVEN: CONCLUSION
This research looked toward the theoretical and typological studies of architecture to help provide a solution to the existing mundane, quantitative approach to urban apartments. The research into these two distinct areas of architecture led to the design of an apartment building which hope to break down perceptions of urban apartments. The following concluding comments highlight the success of this research and also the limitations it produces.

Process

The introduction of a theoretical framework helped to shift from a highly analytical and measured approach with a great concern for typology to an approach which dealt greatly with the body and spatial experiences. Phenomenology as this theoretical framework, was successful in adapting with typology and shifting the approach to a holistic design. However, as discovered through the research of phenomenology, its interpretations vary greatly and can be applied whimsically if not controlled. The ability to restrain phenomenology to the ideas and built works of Steven Holl helped to analytically process the theory. Reflecting on Holl, who has a grounding in practice and theory, was key to help understand phenomenology. By using his interpretation of phenomenology to drive one part of the research, it gave a clear structure and critical understanding of the wider theory of phenomenology. However it can be discussed that another theory may have been just as successful and relevant when applied to the research e.g. Affect, which is also intrinsically associated with the body. Secondly, the parallel frameworks of the interlocking typology and phenomenology, each having a shared interest, but ideologically different, allowed a greater and more compelling influence on the situation of urban apartments. The two parallel ideas also offered a greater grasp on the details of the design and legitimatised the application of phenomenology to urban apartments, an uncommon fusion, especially in the context of New Zealand.

Key Findings

1. Voids allowed the Strategies and the Techniques to be implemented effortlessly.
2. The Intermediate Module produced an articulated and controlled urban facade.
3. The Intermediate Module allowed Voids and Structure to be integrated without compromise.

The three key findings highlights the success of the case study design, resulting in findings which are developed from the problem of integrating all the strategies and techniques together. The key findings, especially the introduction of the intermediate module, proved a defining role in the success of the design and meeting the objectives. The use of voids highlights the positive role they can play when used correctly, especially when space is scarce. Though, the use of voids may seem counterproductive when space is limited and when maximising saleable floor space takes priority, their use can result in a higher quality space proving their success in a design.

Comments & Limitations

The findings presented could provide interest to a wide range of individuals, including developers, planners and also urban dwellers. The design provides a more attractive and positive approach to urban apartments which would be positive to developers and planners promoting inner-city or higher density living. The design also provides a catalyst design for the redevelopment of Victoria Street based on the WGTN2040 plan, providing ideas for planners in the future.

This research was not driven by cost (but rather used as a check), however further research could look into the techniques to allow this type of construction to be cost effective and also profitable for a developer. This may include research into application to a different city (New Zealand or elsewhere), economies of
scale, a different structural system, different materials, or a reduction in the interstitial space to improve spatial efficiency. It may be applied to smaller and larger developments also. Due to the use of intermediate modules, a single module may be used in a smaller development, or more modules may be used in multiple towers or taller towers elsewhere. The module itself can be altered in terms of number of floors or width or length also. This research could also provide the basis of further research which look into the current stock and approach to urban apartments in New Zealand. This would give greater emphasis to this area of study and help to prove the results of this research.

This research was a good test for the future of urban apartments at this density within the context of New Zealand. It proves that apartments do not have to be mundane and repetitive. They do not have to be the result of poor design with little access to the environmental qualities that standalone houses achieve. The design fundamentally gives a catalytic basis for the future development of urban apartments in the city and ultimately the country. It gives apartment living many positive qualities, which in turn hope diminish today’s reservations and concerns for inner-city living.


Bennett, Jessica. How do Apartments Measure Up? Build. 117: 2010 April/May 71-72


Council bans ‘shoe-box’ apartments in Auckland. www.goodreturns.co.nz 3 June 2005


Pallasmaa, J., *The Thinking Hand*. West Sussex: John Wiley & Sons Ltd 2009


Chapter One

Figure 1.01 Soho Apartment Building. Image by Author.
Figure 1.02 Soho Apartment Building. Image by Author.

Chapter Two

Figure 2.01 Elevate Apartment Building. Image by Author.
Figure 2.02 Diagram of typical ‘shoe-box’ apartment building. Image by Author.
Figure 2.03 Diagram of interlocking apartment building. Image by Author.
Figure 2.04 Graph showing trend of new dwelling consents monthly in New Zealand. Adapted from Statistics New Zealand. http://www.stats.govt.nz/~/media/Statistics/Browse%20for%20stats/BuildingConsentsIssued/HOTPFeb13/BuildingCon\nsentsIssuedFeb13HOTPpdf.
Figure 2.05 Graph showing population of inner city apartment dwellers. Adapted from Statistics New Zealand. Apartment Dwellers: 2006 Census. Wellington: Statistics New Zealand, 2010.
Figure 2.06 Graph showing household trends in New Zealand. Adapted from Statistics New Zealand. Subnational Family and Household Projections: 2001(base) – 2021 Update. Wellington: Statistics New Zealand, 27 October 2005.
Figure 2.07 Graph showing household sizes in New Zealand. Adapted from Statistics New Zealand. Subnational Family and Household Projections: 2001(base) – 2021 Update. Wellington: Statistics New Zealand, 27 October 2005.
Figure 2.08 Graph showing types of household in New Zealand. Adapted from Statistics New Zealand. Subnational Family and Household Projections: 2001(base) – 2021 Update.
Figure 2.09 Graph showing types of households in New Zealand as a proportion. Adapted from Statistics New Zealand. Subnational Family and Household Projections: 2001(base) – 2021 Update.
Figure 2.10 Timeline of New Zealand apartments. Photographic Timeline. Image by Author. Collected with images by author and other sources as noted.
Figure 2.11a Soho Apartment photographs. http://www.conradproperties.com.au/.
Figure 2.11b Soho Apartment site plan. Image by Author. Image adapted from Google Maps.

Figure 2.11c Soho Apartment section. Image by Author.
Figure 2.11d Soho Apartment elevation. Image by Author.
Figure 2.12a Soho Apartment typical floor plan. Image by Author. Adapted from Leuschke Group.
Figure 2.12b Soho Apartment typical apartment plan. Image by Author. Adapted from Leuschke Group.
Figure 2.12c Soho Apartment kitchen. Photograph Apartment 417. www.trademe.co.nz
Figure 2.12d Soho Apartment living space. Photograph Apartment 417. www.trademe.co.nz
Figure 2.12e Soho Apartment deck. Photograph Apartment 417. www.trademe.co.nz
Figure 2.13a Elevate Apartment exterior. http://www.elevateapartments.co.nz/
Figure 2.13b Elevate Apartment site plan. Image by Author. Image adapted from Google Maps.
Figure 2.13c Elevate Apartment section. Image by Author.
Figure 2.13d Elevate Apartment elevation. Image by Author.
Figure 2.14a Elevate Apartment typical floor plan. Image by Author. Adapted from http://www.elevateapartments.co.nz/
Figure 2.14b Elevate Apartment typical apartments. Image by Author. Adapted from http://www.elevateapartments.co.nz/
Figure 2.15a Sugartree Apartment exterior. www.sugartree.co.nz.
Figure 2.15b Sugartree Apartment exterior. www.sugartree.co.nz.
Figure 2.15c Sugartree Apartment site plan. Image by Author. Image adapted from Google Maps.
Figure 2.15d Sugartree Apartment section. Image by Author. Adapted from www.sugartree.co.nz.
Figure 3.02  Kiasma Museum of Contemporary Art. Photograph. www.stevenholl.com

Figure 3.03  Kiasma Museum of Contemporary Art. Photograph. www.stevenholl.com

Figure 3.04  Berkowitz-Odgis House. Watercolour. Steven Holl. www.stevenholl.com

Figure 3.05  Berkowitz-Odgis House. Photograph. www.stevenholl.com

Figure 3.06  Berkowitz-Odgis House. Photograph. www.stevenholl.com

Figure 3.07  Berkowitz-Odgis House. Photograph. www.stevenholl.com

Figure 3.08  Kiasma Museum of Contemporary Art. Watercolour. Holl, S., Written in Water. Baden, Switzerland: L. Muller, 2002.


Figure 3.14  Berkowitz-Odgis House. Photograph. www.stevenholl.com

Figure 3.15  Stretto House. Fukuoka Housing. Photograph. www.stevenholl.com

Figure 3.16  Hinged Space. Fukuoka Housing. Photograph. www.stevenholl.com


Chapter Four

Figure 4.01  Kanchanjunga Apartments. Photograph. http://www.archdaily.com/151844/ad-classics-kanchanjunga-apartments-charles-correa/

Figure 4.02a  In Der Hub exterior. Photograph. www.morger-dettli.ch/projekte/203

Figure 4.02b  In Der Hub exterior. Photograph. www.morger-dettli.ch/projekte/203

Figure 4.02c  In Der Hub interior. Photograph. www.morger-dettli.ch/projekte/203


Figure 4.03c  In Der Hub floor interlocking diagram. Image by Author.


Figure 4.12b  VM Apartments site plan.  
Image by Author.  

Figure 4.12c  VM Apartments interlocking diagram.  
Image by Author.

Figure 4.13a  VM Apartments floor plans.  
Image by Author.  

Figure 4.13b  VM Apartments section.  
Image by Author.  

Figure 4.14a  City Lofts exterior.  
Photograph.  

Figure 4.14b  City Lofts site plan.  
Image by Author.  

Figure 4.14c  City Lofts interlocking diagram.  
Image by Author.

Figure 4.15a  City Lofts section.  
Image by Author.  

Figure 4.15b  City Lofts floor plans.  
Image by Author.  

Figure 4.16a  Alfonso Reyes 58 Apartments exterior.  
Photograph.  

Figure 4.16b  Alfonso Reyes 58 Apartments site plan.  
Image by Author.  

Figure 4.16c  Alfonso Reyes 58 Apartments section.  
Image by Author.  

Figure 4.17a  Alfonso Reyes 58 Apartments floor plans.  
Image by Author.  

Figure 4.17b  Alfonso Reyes 58 Apartments interlocking diagram.  
Image by Author.

Figure 4.18a  Habitat 67 exterior.  
Photograph.  

Figure 4.18b  Habitat 67 site plan.  
Image by Author.  

Figure 4.18c  Habitat 67 section.  
Image by Author.  

Figure 4.19a  Habitat 67 floor plans.  
Image by Author.  

Figure 4.19b  Habitat 67 interlocking diagram.  
Image by Author.

Figure 4.20a  Katana Residences exterior.  
Photograph.  
Image from en.urbarama.com/project/the-katana-residences

Figure 4.20b  Katana Residences site plan.  
Image by Author.  
Image adapted from en.urbarama.com/project/the-katana-residences

Figure 4.20c  Katana Residences floor plans.  
Image by Author.  
Image adapted from en.urbarama.com/project/the-katana-residences

Figure 4.21a  Katana Residences section.  
Image by Author.  
Image adapted from en.urbarama.com/project/the-katana-residences

Figure 4.21b  Katana Residences interlocking diagram.  
Image by Author.

Figure 4.22a  Fukuoka Housing exterior.  
Photograph.  
Figure 4.49: Kanchanjunga Apartments
Image by Author.
Image adapted from www.ctbuh.org

Figure 4.50: Tokyo Apartments interlocking diagram.
Image by Author.

Figure 4.51: In Der Hub roof terrace.
Image by Author.

Figure 4.52: Tokyo Apartments.
Image by Author.

Figure 4.53: Tokyo Apartments.
Image adapted from www.dezeen.com

Figure 4.54: Tokyo Apartments.
Image adapted from www.dezeen.com

Figure 4.55: Threshold between inside & outside and public and private diagram.
Image adapted from www.dezeen.com

Figure 4.56: Threshold between inside & outside and public and private diagram.
Image by Author.

Figure 4.57: Tokyo Apartments.
Image by Author.
Image adapted from www.dezeen.com

Figure 4.58: Tokyo Apartments.
Image by Author.
Image adapted from www.dezeen.com

Figure 4.59: Multiple Aspects diagram.
Image by Author.

Figure 4.60a: City Lofts interlocking diagram.
Image by Author.

Figure 4.60b: VM Apartments interlocking diagram.
Image by Author.

Figure 4.60c: Unite D'Habitation interlocking diagram.
Image by Author.

Figure 4.60d: Kanchanjunga Tower interlocking diagram.
Image by Author.

Figure 4.60e: Katana Residences interlocking diagram.
Image by Author.

Figure 4.60f: Alfonso Reyes 58 Apartments interlocking diagram.
Image by Author.

Figure 4.60g: In Der Hub floor interlocking diagram.
Image by Author.

Figure 4.60h: Villa Overgoosi interlocking diagram.
Image by Author.

Figure 4.61: Integrate internal circulation diagram.
Image by Author.

Figure 4.62: Double duty spaces diagram.
Image by Author.

Figure 4.63: Double duty spaces diagram.
Image by Author.

Figure 4.64: Hinged Space, Fukuoka Housing.
Image by Author.
Image adapted from www.stevenholl.com

Figure 4.65: Hinged Space, Fukuoka Housing.
Image by Author.
Image adapted from www.stevenholl.com

Figure 4.66: Katana Residences interior.
Image by Author.
Image adapted from en.urbarama.com/project/the-katana-residences

Figure 4.67: Katana Residences exterior.
Image by Author.
Image adapted from en.urbarama.com/project/the-katana-residences

Chapter Five

Figure 5.01: 79 Dixon/161 Victoria Street Aerial 1:100 000.
Image by Author.
Image adapted from Google Maps.

Figure 5.02: 79 Dixon/161 Victoria Street Aerial 1:5 000.
Image by Author.
Image adapted from Google Maps.

Figure 5.03: 79 Dixon/161 Victoria Street Aerial 1:000.
Image by Author.
Image adapted from Google Maps.

Figure 5.04: Victoria Street development 1842-2007.
Image by Author.
Images adapted from WCC Morphology Study

Figure 5.05: Photograph of Victoria Street.
Image by Author.

Figure 5.06: Photograph of Victoria Street.
Image by Author.

Figure 5.07: Photograph of Victoria Street.
Image by Author.

Figure 5.08: Recent construction of apartment buildings within Wellington CBD.
Image by Author.
Figure 6.04 Process sketches of interlocking apartments. Images by Author.

Figure 6.05 Design Moves Diagram. Images by Author.

Figure 6.06 Design Moves Diagram. Images by Author.

Figure 6.07 Basement Floor Plan. Image by Author.

Figure 6.08 Ground Floor Plan. Image by Author.

Figure 6.09 First Floor Plan. Image by Author.

Figure 6.10 Second, Fifth, Eighth and Eleventh Floor Plans. Image by Author.

Figure 6.11 Third, Sixth, Ninth and Twelfth Floor Plans. Image by Author.

Figure 6.12 Fourth, Seventh, Tenth and Thirteenth Floor Plans. Image by Author.

Figure 6.13 Roof Plan. Image by Author.

Figure 6.14 Section AA. Image by Author.

Figure 6.15 Section BB. Image by Author.

Figure 6.16 Perspective from corner of Victoria and Dixon Streets. Image by Author.

Figure 6.17 Perspective from Victoria Street looking south. Image by Author.

Figure 6.18 Perspective from Dixon Street. Image by Author.

Figure 6.19 Perspective from Victoria Street looking north. Image by Author.

Figure 6.20 External circulation void. Image by Author.

Figure 6.21 Rooftop. Image by Author.

Figure 6.22 Entrance Lobby. Image by Author.

Figure 6.23 Office space. Image by Author.

Figure 6.24 Retail space. Image by Author.

Figure 6.25 Module diagram. Image by Author.

Figure 6.26 External visual modules diagram. Image by Author.

Figure 6.27 Apartment One floor plans. Image by Author.

Figure 6.28 Apartment One sectional perspective. Image by Author.

Figure 6.29 Apartment One sectional perspective. Image by Author.

Figure 6.30 Apartment One ensuite. Image by Author.

Figure 6.31 Apartment One terrace sectional perspective. Image by Author.

Figure 6.32 Apartment Two floor plans. Image by Author.

Figure 6.33 Apartment Two living space. Image by Author.

Figure 6.34 Apartment Two sectional perspective. Image by Author.

Figure 6.35 Apartment Three floor plans. Image by Author.

Figure 6.36 Apartment Three sectional perspective. Image by Author.

Figure 6.37 Apartment Three sectional perspective. Image by Author.

Figure 6.38 Apartment Four floor plans. Image by Author.

Figure 6.39 Apartment Four sectional perspective. Image by Author.

Figure 6.40 Apartment Four sectional perspective. Image by Author.

Figure 6.41 Apartment Five floor plans. Image by Author.

Figure 6.42 Apartment Five sectional perspective. Image by Author.

Figure 6.43 Apartment Five sectional perspective. Image by Author.

Figure 6.44 Apartment Six floor plans. Image by Author.

Figure 6.45 Apartment Six sectional perspective. Image by Author.

Figure 6.46 Apartment Six sectional perspective. Image by Author.

Figure 6.47 Apartment Seven floor plans. Image by Author.
Figure 8.02 A1. Two interlocking 'L's with stepped floors and ceilings close packed. Image by Author.

Figure 8.03 A1. Two interlocking 'L's with stepped floors and ceilings close packed. Image by Author.

Figure 8.04 A2. Infinite sectional 'Z' apartments stacking close packed. Image by Author.

Figure 8.05 A2. Infinite sectional 'Z' apartments stacking close packed. Image by Author.

Figure 8.06 A2. Infinite sectional 'Z' apartments stacking close packed. Image by Author.

Figure 8.07 A3. Two interlocking 'Z's in section and plan, wrapping over each other resulting in four aspects. Image by Author.

Figure 8.08 A3. Two interlocking 'Z's in section and plan, wrapping over each other resulting in four aspects. Image by Author.

Figure 8.09 A3. Two interlocking 'Z's in section and plan, wrapping over each other resulting in four aspects. Image by Author.

Figure 8.10 A4. Two rectangle spaces (one E-W and one N-S) stacked to achieve four aspects. Image by Author.

Figure 8.11 A4. Two rectangle spaces (one E-W and one N-S) stacked to achieve four aspects. Image by Author.

Figure 8.12 A4. Two rectangle spaces (one E-W and one N-S) stacked to achieve four aspects. Image by Author.

Figure 8.13 Form 'A1' from previous page:'L' shaped apartments on a podium. Image by Author.

Figure 8.14 Form 'A1' from previous page:'L' shaped apartments on a podium. Image by Author.

Figure 8.15 Form 'A1' from previous page:'L' shaped apartments on a podium. Image by Author.

Figure 8.16 Form 'A4' from previous page. Image by Author.

Figure 8.17 Form 'A4' from previous page. Image by Author.

Figure 8.18 Form 'A4' from previous page. Image by Author.

Figure 8.19 Facade testing and introduction of 'slits' for added light. Image by Author.

Figure 8.20 Facade testing and introduction of 'slits' for added light. Image by Author.

Figure 8.21 Facade testing and introduction of 'slits' for added light. Image by Author.

Figure 8.22 A5. Boomerang iteration. Image by Author.

Figure 8.23 A5. Boomerang iteration. Image by Author.

Figure 8.24 A5. Boomerang iteration. Image by Author.

Figure 8.25 Concept 'A5' Image by Author.

Figure 8.26 Concept 'A5' Image by Author.

Figure 8.27 Concept 'A5' Image by Author.

Figure 8.28 Concept 'A5' Image by Author.

Figure 8.29 Concept 'A5' Image by Author.

Figure 8.30 Concept 'A6' Image by Author.

Figure 8.31 Concept 'A6' Image by Author.

Figure 8.32 Concept 'A6' Image by Author.

Figure 8.33 Concept 'A6' Image by Author.

Figure 8.34-a-b Concept 'A7' Image by Author.

Figure 8.35 Concept 'A7' Image by Author.

Figure 8.36-a-b Concept 'A8' Image by Author.

Figure 8.37-a-b Concept 'A8' Image by Author.

Figure 8.38-a-b Iteration B Image by Author.

Figure 8.39-a Sketch plans. Image by Author.

Figure 8.39b Concept 'C'. Image by Author.

Figure 8.40 Concept 'C'. Image by Author.

Figure 8.41 Concept 'C'. Image by Author.
ITERATION A - THE INDIVIDUAL APARTMENT MODULE

Iteration A consisted of initial card modelling, which resulted in the development of A5 ‘Boomerang’. ‘A5’ was further tested with Concepts ‘A6’, ‘A7’ and ‘A8’ which had different typologies, however were concerned with the approach of the single apartment interlocking with its neighbours.


Fig. A01-3
A1. Two interlocking ‘L’s with stepped floors and ceilings close packed.

Fig. A03-5
A3. Two interlocking ‘Z’s in section and plan, wrapping over each other resulting in four aspects.

Fig. A04-6
A2. Infinite sectional ‘Z’ apartments stacking close packed.

Fig. A07-9
A4. Two rectangle spaces (one E-W and one N-S) stacked to achieve four aspects.

Fig. A09-12
A4. Two rectangle spaces (one E-W and one N-S) stacked to achieve four aspects.
Form 'A1' from previous page: 'L' shaped apartments on a podium.

Fig. 8.13-15

Form 'A4' from previous page.

Fig. 8.16-18

Facade testing and introduction of 'slits' for added light.

Fig. 8.19-21

A5. Boomerang iteration.

Fig. 8.22-24

Lower floor 'V' facing south, while upper floor 'V' faces north. Results in a number of different aspects and views and slits between each neighbouring apartment (residual space). The overlap of each 'V' resulted in a double height space which allows a third 'half' floor. This was developed into the final Concept 'A' on the following pages.
CONCEPT A
KITCHEN, DINING, LIVING SPACE

LIVING, DINING, KITCHEN SPACE WITH ENTRANCE ABOVE

REPEATED TWO STOREY MAISONETTES

ENTRANCE IS ON LEVEL 1.5, TOWARD THE PLANTED AREA ABOVE THE KITCHEN, THE SPACE IS THEN EXPLORED FURTHER BY WALKING THE DISTANCE TO THE STAIRS AND DOWN TO THE LIVING SPACE.

DOUBLE HEIGHT SPACE IN KITCHEN DINING SPACE REDUCING TO A SINGLE STOREY OVER THE LIVING AREA (STEP DOWN).

DUE TO THE DOUBLE STOREY NATURE OF THE MASONETTES, ACCESS IS ONLY REQUIRED ON EVERY SECOND FLOOR. MEANS NOW IN THE CIRCULATION SPACE GREATER NUMBER OF DOORS ON ONE ACCESS LEVEL MINIMIZING CORRIDOR ACTIVITY AND ALLOWING FOR AN ADDITIONAL HEIGHT SPACE TO BE CREATED.

POTENTIAL TO TREAT ROOF AS AN ARCHITECTURAL ELEMENT (THE LIVING FIFTH FACADE) WHICH WOULD BENEFIT THE PENTHOUSE MAISONETTE.

OVERSIZED INTERFLOOR HEIGHTS ARE KEY TO MAXIMIZE INTERFLOOR HEIGHTS TO BE ENSURED. 불구하고 THE THIRD FLOOR IS NOT LIKELY TO BE OCCUPIED AND DOES NOT CONSTITUTE A GREAT BENEFIT. THE INTERFLOOR HEIGHTS IN THE LIVING AREAS ARE BIGGER THAN THE LARGE INTERFLOOR HEIGHTS IN THE LIVING AREAS (STEP DOWN).

TYPICAL APARTMENT HAS MINOR INTERFLOOR IN SECTION.

MIXED USE DEVELOPMENT TO RESULT IN A MORE SUCCESSFUL PUBLIC INTERACTION AND INCREASED VERTICAL INVESTMENT RETAIL ON GROUND AND OFFICE ON FIRST + SECOND FLOORS.

EXTERNAL PERSPECTIVE

ENTRY

KITCHEN, DINING, LIVING SPACE WITH ENTRANCE ABOVE

KITCHEN, DINING, LIVING SPACE
Large outdoor spaces are provided, ranging from open at the edges transitioning to an internal space in the middle. Multiple spaces allow for different uses at different times of the day. The scale of the space allows for children to play compared to ‘shoe-box’ apartment outdoor spaces. This transition between internalised outdoor space and ‘open’ outside space on the terrace and the full internalised interior begins to develop a sense of thresholds between inside and outside as highlighted in the toolbox. However, this range is provided, the progression is less clear.

The effects of shading and sunlighting will need to be analysed to ensure the space would be attractive and function as a usable space.

The space is to be designed with multiple levels to produce spaces for spontaneous meeting and activity.
Natural light is flooded into the living spaces due to the clerestory windows. All bedrooms and bathrooms are on external walls to allow for easy access to natural light and ventilation also.

The inverted boomerang shape allows for lower floor spaces to face north, east and west, while upper floor spaces face south, west and east. This results in all four aspects to be accessed from the use of voids in the layout. The use of angles allows all four into this space also.

Interior circulation spaces for sitting, eating, etc., can be used more than just accessing rooms.

The geometry of the layout (use of angles) allows for the design to be adapted to achieve a greater spatial perception. This is increased in the third dimension by the range in ceiling heights and void spaces.

The maisonettes interlock by overlapping each of the boomerang ends. This close packing allows a greater number of units. However, the design only results in 20 units.

The overlap of the boomerangs allows external voids which are used as skylights to allow added light to lower areas to the west and as a glazed planter to the east.

The design does not facilitate built-in furniture which can be converted as noted in the toolbox, however, the upper floor mezzanine space with voids preconceived use. This double duty space can be used as an extra living space, bedroom or office.

Fig A.29
Concept 'A5'
THE DIXON STREET FACADE IS ARTICULATED WITH PROTRUDING FORMS EVERY SECOND FLOOR WHICH REDUCED THE PERCEIVED HEIGHT OF THE BUILDING. THE CORNER, HOWEVER, IS NOT ADDRESSED AND THE DESIGN DOES NOT CELEBRATE ITS IMPORTANCE AT ITS LOCATION OF THE CORNER SITE.

A DOUBLE HEIGHT OPEN AREA IS INSERTED IN THE NORTH EAST CORNER TO BREAK DOWN THE PODIUM DOMINANCE. THIS WOULD ACT AS A SECONDARY OUTDOOR SPACE FOR RESIDENTS.

THE USE OF VOIDS PROVIDES GREATER INTERNAL SIGHTLINES AND ALSO A RANGE OF CEILING HEIGHTS.

OUTDOOR TERRACE IS A MIX OF SINGLE STOREY AND DOUBLE STOREY SPACE. SIMILAR TO THE LAST CONCEPT, THE TERRACE RUNS FROM EAST TO WEST TO PROVIDE MULTIPLE OUTDOOR SPACES DURING THE DAY.

THE RECESS BETWEEN EACH UNIT ACTS AS A LIGHT WELL AND PROVIDES ADDITIONAL LIGHT TO EACH UNIT. THE KITCHEN RECEIVES LIGHT FROM THE EAST, BUT ALSO WEST THROUGH THIS WINDOW.

IN AN ATTEMPT TO CELEBRATE THE CORNER, ANOTHER FLOOR WITH TWO PENTHOUSES IS INTRODUCED TO ADD TO THE CORNER, WHILE STEPPING DOWN TO THE NEIGHBOURING BUILDING BEHIND.

OUTDOOR LIVING SPACE

CONCEPT B

OUTDOOR TERRACE

KITCHEN DINING

ENTRY

KITCHEN LOOKING TOWARD LIVING SPACE

IN AN ATTEMPT TO CELEBRATE THE CORNER, ANOTHER FLOOR WITH TWO PENTHOUSES IS INTRODUCED TO ADD TO THE CORNER, WHILE STEPPING DOWN TO THE NEIGHBOURING BUILDING BEHIND.

THE DIXON STREET FACADE IS ARTICULATED WITH PROTRUDING FORMS EVERY SECOND FLOOR WHICH REDUCED THE PERCEIVED HEIGHT OF THE BUILDING. THE CORNER, HOWEVER, IS NOT ADDRESSED AND THE DESIGN DOES NOT CELEBRATE ITS IMPORTANCE AT ITS LOCATION OF THE CORNER SITE.

A DOUBLE HEIGHT OPEN AREA IS INSERTED IN THE NORTH EAST CORNER TO BREAK DOWN THE PODIUM DOMINANCE. THIS WOULD ACT AS A SECONDARY OUTDOOR SPACE FOR RESIDENTS.

THE USE OF VOIDS PROVIDES GREATER INTERNAL SIGHTLINES AND ALSO A RANGE OF CEILING HEIGHTS.

OUTDOOR TERRACE IS A MIX OF SINGLE STOREY AND DOUBLE STOREY SPACE. SIMILAR TO THE LAST CONCEPT, THE TERRACE RUNS FROM EAST TO WEST TO PROVIDE MULTIPLE OUTDOOR SPACES DURING THE DAY.

THE RECESS BETWEEN EACH UNIT ACTS AS A LIGHT WELL AND PROVIDES ADDITIONAL LIGHT TO EACH UNIT. THE KITCHEN RECEIVES LIGHT FROM THE EAST, BUT ALSO WEST THROUGH THIS WINDOW.

IN AN ATTEMPT TO CELEBRATE THE CORNER, ANOTHER FLOOR WITH TWO PENTHOUSES IS INTRODUCED TO ADD TO THE CORNER, WHILE STEPPING DOWN TO THE NEIGHBOURING BUILDING BEHIND.

THE DIXON STREET FACADE IS ARTICULATED WITH PROTRUDING FORMS EVERY SECOND FLOOR WHICH REDUCED THE PERCEIVED HEIGHT OF THE BUILDING. THE CORNER, HOWEVER, IS NOT ADDRESSED AND THE DESIGN DOES NOT CELEBRATE ITS IMPORTANCE AT ITS LOCATION OF THE CORNER SITE.

A DOUBLE HEIGHT OPEN AREA IS INSERTED IN THE NORTH EAST CORNER TO BREAK DOWN THE PODIUM DOMINANCE. THIS WOULD ACT AS A SECONDARY OUTDOOR SPACE FOR RESIDENTS.

THE USE OF VOIDS PROVIDES GREATER INTERNAL SIGHTLINES AND ALSO A RANGE OF CEILING HEIGHTS.

OUTDOOR TERRACE IS A MIX OF SINGLE STOREY AND DOUBLE STOREY SPACE. SIMILAR TO THE LAST CONCEPT, THE TERRACE RUNS FROM EAST TO WEST TO PROVIDE MULTIPLE OUTDOOR SPACES DURING THE DAY.

THE RECESS BETWEEN EACH UNIT ACTS AS A LIGHT WELL AND PROVIDES ADDITIONAL LIGHT TO EACH UNIT. THE KITCHEN RECEIVES LIGHT FROM THE EAST, BUT ALSO WEST THROUGH THIS WINDOW.

IN AN ATTEMPT TO CELEBRATE THE CORNER, ANOTHER FLOOR WITH TWO PENTHOUSES IS INTRODUCED TO ADD TO THE CORNER, WHILE STEPPING DOWN TO THE NEIGHBOURING BUILDING BEHIND.

THE DIXON STREET FACADE IS ARTICULATED WITH PROTRUDING FORMS EVERY SECOND FLOOR WHICH REDUCED THE PERCEIVED HEIGHT OF THE BUILDING. THE CORNER, HOWEVER, IS NOT ADDRESSED AND THE DESIGN DOES NOT CELEBRATE ITS IMPORTANCE AT ITS LOCATION OF THE CORNER SITE.

A DOUBLE HEIGHT OPEN AREA IS INSERTED IN THE NORTH EAST CORNER TO BREAK DOWN THE PODIUM DOMINANCE. THIS WOULD ACT AS A SECONDARY OUTDOOR SPACE FOR RESIDENTS.

THE USE OF VOIDS PROVIDES GREATER INTERNAL SIGHTLINES AND ALSO A RANGE OF CEILING HEIGHTS.

OUTDOOR TERRACE IS A MIX OF SINGLE STOREY AND DOUBLE STOREY SPACE. SIMILAR TO THE LAST CONCEPT, THE TERRACE RUNS FROM EAST TO WEST TO PROVIDE MULTIPLE OUTDOOR SPACES DURING THE DAY.

THE RECESS BETWEEN EACH UNIT ACTS AS A LIGHT WELL AND PROVIDES ADDITIONAL LIGHT TO EACH UNIT. THE KITCHEN RECEIVES LIGHT FROM THE EAST, BUT ALSO WEST THROUGH THIS WINDOW.

IN AN ATTEMPT TO CELEBRATE THE CORNER, ANOTHER FLOOR WITH TWO PENTHOUSES IS INTRODUCED TO ADD TO THE CORNER, WHILE STEPPING DOWN TO THE NEIGHBOURING BUILDING BEHIND.
THE CURVE IS DEVELOPED AS A
FORMAL ELEMENT ON THE
EXTERIOR, BUT ALSO TO
SOFTEN THE CORNER,
ALLOWING SUN TO PENETRATE
INTO THE NEIGHBOURS
TERRACE EASIER.

LOWER LIVING SPACE IS
CREATED WITH ADDITIONAL
INTERIOR SPACE. THE
NONSECTIONAL INTERLOCKING
APARTMENT WHICH IS LARGER
THAN THE TYPICAL SIZE.

LOWER LEVEL
MIXED USE;
RETAIL, OFFICE
ETC ARE NOT
INTEGRATED INTO
DESIGN SUCCESSFULLY.

MAISONETTES IS
INTERLOCKING IN
ONLY SECTIONAL
DIRECTION. THE
TIGHT PACKED
NATURE OF THE
DESIGN ALLOWS
EFFICIENCY, BUT
REDUCES FOR
EXISTING VIEWSHAFTS AND
SPACES CREATED.

Fig. 8.32
Concept ‘A6’

Fig. 8.33
Concept ‘B’
OVERHEAD CLERESTORY WINDOWS OVERLOOKING UPPER TERRACE ALLOW ADDED LIGHT, SUN, VIEW TO SPACE.

INTERIOR SPACES DEVELOPED OVER SPLIT FLOORS WHICH PROVIDE VIEWS FROM LOWER SPACES TO UPPER SPACES.

OVERHEAD CLERESTORY WINDOWS OVERLOOKING UPPER TERRACE ALLOW ADDED LIGHT, SUN, VIEW TO SPACE.

INTERIOR SPACES DEVELOPED OVER SPLIT FLOORS WHICH PROVIDE VIEWS FROM LOWER SPACES TO UPPER SPACES.

3D AXONOMETRIC

THE SECTION SHOWS THE SPLIT FLOORS ALLOWING FOR VIEWS BETWEEN FLOORS.

THIS SPLIT PLACED A GREATER IMPORTANCE ON THE INTERIOR SPACE WHICH ALLOWS FOR GREATER ARTICULATION AND POTENTIAL USE OF THE VERTICAL CIRCULATION AS THEY ARE VISIBLE FROM ALL SPACES.

UNITS ARE DEVELOPED TO SHARE EXTERNAL VOID SPACES. THE VERTICAL AND HORIZONTAL ARRANGEMENT OF UNITS ALLOWS THIS TO OCCUR. HERE THE UPPER UNIT LOOKS OUT OVER THE LOWER UNIT'S OUTDOOR SPACE, PROVIDING FOR GREATER QUALITY OF SPACE. HOWEVER PRIVACY IS REDUCED. THIS IDEA WAS DEVELOPED FROM THE KANCHANJUNGA APARTMENTS; HOWEVER THE EXTERNAL VORDS ARE OVERLOOKED BY THE UPPER FLOOR OF THE SAME UNIT IN THE PRECEDENT, THEREFORE NOT LOSING PRIVACY.

ENTRY
KITCHEN/DINING
BEDROOM
BEDROOM
LIVING

KITCHEN/DINING LOOKING TOWARD UPPER LIVING SPACE

Fig. 8.34a
Concept A7

Fig. 8.34b
Concept A7

310

311
The design achieves four aspects due to the use of the external voids, which alternate between each side of the unit.

A range of outdoor spaces are integrated: the bedroom balcony, the living terrace (north-west) and the upper floor terrace (north-east).

Fig. 8.35
Concept 'A7'
Fig. 8.36a
Concept 'A8'

Fig. 8.36b
Concept 'A8'
Concept ‘A8’

Fig. 8.37a
Concept ‘A8’

Fig. 8.37b
Concept ‘A8’
ITERATION B - EVERY APARTMENT UNIQUE

Following Iteration A and its focus on the single apartment repeated, iteration B looks toward every apartment being unique.

Fig. 8.38a
Iteration B section.

Fig. 8.38b
Iteration B perspective.
ITERATION C1 - THE 5 APARTMENT MODULE

Following Iteration B where every apartment was unique, iteration C looks to compromise both A and B, by introducing an intermediate scaled module. Here a five apartment module is developed which is repeated six times. This reduces repetition, but allows the design to be managed feasibly. The modules are split by a full height atrium void over spanning 13 stories.
Rather than repeating a single module, working at a large module with multiples allows for a greater range of spaces to be achieved. The interlocking nature is therefore easier to exploit. This large module is then replicated across the building.

Using this form of interlocking allows a simpler extraction of the tool kit ideas. Including internal voids/sightlines shared between units, range of ceiling/floor heights and a great range of use of thresholds.

The introduction of an atrium which is extended to the building allows for an internal view which allows for planning to be achieved. Units can have a mix of external and internal views. The large module is therefore easier to exploit. This large module is then replicated six times. This results in a mix of small, intermediate and larger scaled units. This contributes to a more exciting urban building.

This approach to the design also allows for a shift from the focus on the individual unit to a greater holistic approach which includes the whole building, including mixed use spaces on the ground floor.

The design results in approx. 16 apartments compared to earlier concepts. This approach is beneficial. As a second module could be designed to incorporate the units to increase the total number.

The entrance is deck is to be designed as a semi-public space, similar to earlier concepts. All the apartments access from this level for maximum activity and also reduced number of entrance decks.

Fig. 8.40

Concept 'C'

Fig. 8.41

Concept 'C'
ITERATION C2 - THE 7 APARTMENT MODULE

Iteration C2 involved the shift from a four storey, five apartment module, to a five storey, seven apartment module. This was conceived to reduce the number of external circulation of galleries on the rear of the building. This would result in a greater number of front doors on each gallery, increasing activity. A shift from physical modelling to a parallax perspective journey is introduced as a design generator.

Fig. 8.42
Sketch plans.

Fig. 8.43
Sketch plans.
Fig. 8.44
Parallax progression of Apartment One

Fig. 8.45
Parallax progression of Apartment One
Parallax progression of Apartment Two.

Fig. 8.46
Parallax progression of Apartment Two.

Fig. 8.47
Parallax progression of Apartment Two.
Parallax progression of Apartment Three.

Fig. 8.48
Parallax progression of Apartment Three.

Fig. 8.49
Parallax progression of Apartment Three.
Fig. 8.40
Parallax progression of Apartment Four.

Fig. 8.41
Parallax progression of Apartment Four.
Parallax progression of Apartment Five.

Fig. 8.52
Parallax progression of Apartment Five.

Fig. 8.53
Parallax progression of Apartment Five.
Parallax progression of Apartment Six.

Fig. 8.54
Parallax progression of Apartment Six.

Fig. 8.55
Parallax progression of Apartment Six.
Fig. 8.14
Parallax progression of Apartment Seven.
ITERATION C3 - THE 5 + 7 APARTMENT MODULES

Iteration C3 involved the design of a second module which housed seven smaller apartments. This resulted in the a triple stack of the five-apartment module and a triple stack of the seven-apartment module. This resulted in a larger range of apartment sizes.

Fig. 8.17
Five apartment module (left) and seven apartment module.

Fig. 8.18
Five apartment module (above) and seven apartment module.
**ITERATION C4 - THE 4 × 6 APARTMENT MODULES**

Iteration C4 reduced the module height from 5 stories, down to three. This resulted in less apartments in each module, but allowed an extra two repetitions, resulting in 40 apartments. The key reason for this change was apartments being up to three stories tall, resulting a large use of interior space for circulation and disconnected spaces.

![4 × 6 module axonometric](image1)

*Fig. 8.62*
4 × 6 module axonometric.

*Fig. 8.63*
External perspective

*Fig. 8.64*
External circulation gallery
Fig. 8.67
Section through C4

Fig. 8.68
Section through C4
Fig. 8.67  
Apartment Four sectional perspective.

Fig. 8.68  
Apartment Six sectional perspective.

Fig. 8.69  
External screens.
Physical model of site and surrounding buildings.

Fig. 8.70-2

Model of each apartment.

Fig. 8.73
Following iteration C4, Iteration D formed the final design. Iteration D removed the reliance on the external galleries and the dominance of the central atrium void. Instead the two modules were divided into four which are serviced by smaller circulation void cores which break up the building mass. Here the void and circulation are intertwined and essential to the design, which is last iteration.
APPENDIX TWO: ECONOMIC ANALYSIS
## SHOEBOX ECONOMIC ANALYSIS
### BREAKDOWN

<table>
<thead>
<tr>
<th>Element</th>
<th>Sub Element</th>
<th>Elemental Unit Rate</th>
<th>Quantity</th>
<th>Description</th>
<th>Total Cost of Element</th>
<th>Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Preparation</td>
<td>Site Clearance</td>
<td>$10.00/m²</td>
<td>651m²</td>
<td>Lowest Floor Area</td>
<td>$6,510.00</td>
<td>150m m deep, disposal of surplus at completion</td>
</tr>
<tr>
<td></td>
<td>Bulk Excavitation</td>
<td>$33.20/m³</td>
<td>2458m³</td>
<td>Lowest Floor Area x depth</td>
<td>$81,048</td>
<td>Light soil or sand</td>
</tr>
<tr>
<td>Substructure</td>
<td>Piling</td>
<td>$1130.00/m</td>
<td>200m</td>
<td>Depth x quantity</td>
<td>$225,000.00</td>
<td>900mm dia, in soil</td>
</tr>
<tr>
<td></td>
<td>Foundation Beams</td>
<td>$1330.00/m</td>
<td>114m</td>
<td>Perimeter</td>
<td>$151,620</td>
<td>30MPa concrete,</td>
</tr>
<tr>
<td></td>
<td>Floor Slab on Grade</td>
<td>$181.00/m²</td>
<td>560m²</td>
<td>Lowest Floor Area</td>
<td>$101,360.00</td>
<td>300mm thick</td>
</tr>
<tr>
<td></td>
<td>Lift Pits</td>
<td>$4700.00/#</td>
<td>1</td>
<td>Number</td>
<td>$4,700.00</td>
<td>For 2200mm x 1800mm lift shaft,</td>
</tr>
<tr>
<td></td>
<td>Tanking and Protection and Drainage</td>
<td>$30.50/m²</td>
<td>560m²</td>
<td>Lowest Floor Area</td>
<td>$17,080.00</td>
<td>Gripset® 51 bitumen rubber liquid membrane</td>
</tr>
<tr>
<td>Frame</td>
<td>Columns</td>
<td>$1040.00/m</td>
<td>1260m</td>
<td>Length</td>
<td>$1,310,400.00</td>
<td>310UC137</td>
</tr>
<tr>
<td></td>
<td>Beams</td>
<td>$406.00/m</td>
<td>2520m</td>
<td>Length</td>
<td>$1,023,120.00</td>
<td>410UB54</td>
</tr>
<tr>
<td>Structural Walls</td>
<td>Concrete Walls</td>
<td>$388/m²</td>
<td>3780m²</td>
<td>Structural Wall Area</td>
<td>$1,466,640.00</td>
<td>Concrete Precast Walls, 200mm</td>
</tr>
<tr>
<td>Upper Floors</td>
<td>Timber Floors</td>
<td>$113.00/m²</td>
<td>n/a</td>
<td>Sum of Upper Floor Area</td>
<td>$1,681,680.00</td>
<td>150mm thick</td>
</tr>
<tr>
<td></td>
<td>Suspended Concrete Floors</td>
<td>$231.00/m³</td>
<td>7280m²</td>
<td>Sum of Upper Floor Area</td>
<td>$1,681,680.00</td>
<td>150mm thick</td>
</tr>
<tr>
<td>Roof</td>
<td>Concrete Roof Slabs</td>
<td>$205.00/m²</td>
<td>560m²</td>
<td>Roof Area</td>
<td>$114,800.00</td>
<td>100mm thick</td>
</tr>
<tr>
<td></td>
<td>Waterproof Membrane Roofing</td>
<td>$168.00/m²</td>
<td>560m²</td>
<td>Roof Area</td>
<td>$94,080.00</td>
<td>comprising 1.5mm black butyl rubber with Quartz chip finish</td>
</tr>
<tr>
<td></td>
<td>Eaves Gutters</td>
<td>$58.00/m</td>
<td>114m</td>
<td>Roof Perimeter</td>
<td>$6,612.00</td>
<td>Fascial/ Concealed Gutter System,</td>
</tr>
<tr>
<td>Exterior Walls &amp; Exterior Finish</td>
<td>Timber Framed Walls</td>
<td>$300.00/m²</td>
<td>5880m²</td>
<td>Exterior Wall Area</td>
<td>$1,764,000.00</td>
<td>150mm x 50mm</td>
</tr>
<tr>
<td>Windows and Exterior Doors</td>
<td>Precast concrete</td>
<td>$2520.00/m rise</td>
<td>42m</td>
<td>Rise per Metre</td>
<td>$105,840.00</td>
<td>Flights with one intermediate landing 1000m precast concrete</td>
</tr>
<tr>
<td></td>
<td>Pine Stairs</td>
<td>$940.00/m rise</td>
<td>n/a</td>
<td>Rise per Metre</td>
<td>$28,800.00</td>
<td>Pine stringers with MDF treads</td>
</tr>
<tr>
<td></td>
<td>Handrails</td>
<td>$400.00/m</td>
<td>72m</td>
<td>Length</td>
<td>$28,800.00</td>
<td>150mm x 50mm</td>
</tr>
<tr>
<td></td>
<td>$140/m²</td>
<td>3363m²</td>
<td></td>
<td>Interior Wall Area</td>
<td>$45,682.00</td>
<td></td>
</tr>
</tbody>
</table>
### Exterior Works
- **Sundries**
  - $82.00/m² 91m²

### Preliminaries
- **Margins**
  - $2,000.00

### Margins
- **Contract Contingencies**
  - 13% $2,389,239.54
  - 5% $918,972.90
  - 15% $2,756,918.70

### Total
- **Total excl GST**
  - $24,444,589.14
- **Total incl GST**
  - 15% $28,111,277.51
- **Total 2014 NZD**
  - 4% per year $30,405,157.76
## INTERLOCKING ECONOMIC ANALYSIS BREAKDOWN

<table>
<thead>
<tr>
<th>Element</th>
<th>Sub Element</th>
<th>Elemental Unit Rate</th>
<th>Quantity</th>
<th>Description</th>
<th>Total Cost of Element</th>
<th>Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Preparation</td>
<td>Site Clearance</td>
<td>$10.00/m²</td>
<td>651m²</td>
<td>Lowest Floor Area</td>
<td>$6,510.00</td>
<td>150m d/m deep, disposal of surplus at completion</td>
</tr>
<tr>
<td></td>
<td>Bulk Excavation</td>
<td>$33.20/m³</td>
<td>543m³</td>
<td>Lowest Floor Area x depth</td>
<td>$18,028</td>
<td>Light soil or sand</td>
</tr>
<tr>
<td>Substructure</td>
<td>Piling</td>
<td>$1130.00/m</td>
<td>200m</td>
<td>Depth x quantity</td>
<td>$226,000</td>
<td>900m d/m dia. in soil</td>
</tr>
<tr>
<td></td>
<td>Foundation Beams</td>
<td>$1330.00/m</td>
<td>130m</td>
<td>Perimeter</td>
<td>$172,900</td>
<td>30MPa concrete</td>
</tr>
<tr>
<td></td>
<td>Floor Slab on Grade</td>
<td>$181.00/m²</td>
<td>651m²</td>
<td>Lowest Floor Area</td>
<td>$117,831</td>
<td>300mm thick</td>
</tr>
<tr>
<td></td>
<td>Lift Pits</td>
<td>$4700.00/#</td>
<td>4</td>
<td>Number</td>
<td>$18,800</td>
<td>For 2200mm x 1800mm lift shaft</td>
</tr>
<tr>
<td></td>
<td>Tanking and Protection and Drainage</td>
<td>$50.50/m²</td>
<td>651m²</td>
<td>Lowest Floor Area</td>
<td>$19,855</td>
<td>Gripsett 51 bitumen rubber liquid membrane</td>
</tr>
<tr>
<td>Frame</td>
<td>Columns</td>
<td>$1040.00/m</td>
<td>1440m</td>
<td>Length</td>
<td>$1,497,600</td>
<td>310UC137</td>
</tr>
<tr>
<td></td>
<td>Beams</td>
<td>$406.00/m</td>
<td>2880m</td>
<td>Length</td>
<td>$1,169,280</td>
<td>410UB54</td>
</tr>
<tr>
<td>Structural Walls</td>
<td>Concrete Walls</td>
<td>$388/m²</td>
<td>660m²</td>
<td>Structural Wall Area</td>
<td>$256,080</td>
<td>Concrete Precast Walls, 200mm</td>
</tr>
<tr>
<td>Upper Floors</td>
<td>Timber Floors</td>
<td>$113.00/m²</td>
<td>3840m²</td>
<td>Sum of Upper Floor Area</td>
<td>$4,332,920</td>
<td>Particle Board Floors and Timber Framing, 300mm x 50mm joists, @ 600crs</td>
</tr>
<tr>
<td></td>
<td>Suspended Concrete Floors</td>
<td>$231.00/m²</td>
<td>3980m²</td>
<td>Sum of Upper Floor Area</td>
<td>$919,380</td>
<td>150mm thick</td>
</tr>
<tr>
<td>Roof</td>
<td>Concrete Roof Slabs</td>
<td>$205.00/m²</td>
<td>573m²</td>
<td>Roof Area</td>
<td>$117,465</td>
<td>100mm thick</td>
</tr>
<tr>
<td></td>
<td>Waterproof Membrane Roofing</td>
<td>$168.00/m²</td>
<td>573m²</td>
<td>Roof Area</td>
<td>$96,264</td>
<td>comprising 1.5mm black butyl rubber with Quartz chip finish</td>
</tr>
<tr>
<td></td>
<td>Eaves Gutters</td>
<td>$58.00/m²</td>
<td>218m</td>
<td>Roof Perimeter</td>
<td>$12,644</td>
<td>Fascia/Concealed Gutter System,</td>
</tr>
<tr>
<td>Exterior Walls &amp; Exterior Finish</td>
<td>Timber Framed Walls</td>
<td>$300.00/m²</td>
<td>9120m²</td>
<td>Exterior Wall Area</td>
<td>$2,736,000</td>
<td>150m x 50mm</td>
</tr>
<tr>
<td></td>
<td>Stairs and Balustrades</td>
<td>$732.00/m²</td>
<td>6220m²</td>
<td>Window/Door Area</td>
<td>$4,553,040</td>
<td>Double glazed opening</td>
</tr>
<tr>
<td></td>
<td>Precast concrete</td>
<td>$2520.00/m rise</td>
<td>126m</td>
<td>Rise per Metre</td>
<td>$317,520</td>
<td>Flights with one intermediate landing 1000mm precast concrete</td>
</tr>
<tr>
<td></td>
<td>Pine Stairs</td>
<td>$940.00/m rise</td>
<td>120m</td>
<td>Rise per Metre</td>
<td>$112,800</td>
<td>Pine stringers with MDF treads</td>
</tr>
<tr>
<td></td>
<td>Handrails</td>
<td>$400.00/m</td>
<td>562m</td>
<td>Length</td>
<td>$224,800</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$140/m²</td>
<td>2267m²</td>
<td>Interior Wall Area</td>
<td>$31,738</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regular Doors</td>
<td>$1000.00/#</td>
<td>296</td>
<td>Number</td>
<td>$296,000</td>
<td>Stdard hollow core</td>
</tr>
<tr>
<td></td>
<td>Fire Doors</td>
<td>$1490.00/#</td>
<td>54</td>
<td>Number</td>
<td>$80,460</td>
<td>30 minute rating</td>
</tr>
<tr>
<td>Floor Finishes</td>
<td>Finish Floor Area</td>
<td>$860.00/²</td>
<td></td>
<td>Number</td>
<td>$860,200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interior Wall Area</td>
<td>$424,296.00</td>
<td></td>
<td>Number</td>
<td>$424,296.00</td>
<td>GIB toughline</td>
</tr>
<tr>
<td></td>
<td>Ceiling Finish Area</td>
<td>$391,000.00</td>
<td>13mm thick F4 finish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Kitchens</td>
<td>$1,050,000.00</td>
<td>High quality kitchen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Bathrooms</td>
<td>$1,575,000.00</td>
<td>High quality bathroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gross Floor Area</td>
<td>$1,840,080.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gross Floor Area</td>
<td>$613,360.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gross Floor Area</td>
<td>$1,019,260.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Cost of Element</td>
<td>$25,680,143.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special Services</td>
<td></td>
<td></td>
<td>Number</td>
<td>$94,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Lifts</td>
<td>$1,449,000.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roof Gardens</td>
<td>$1100/m²</td>
<td>573m²</td>
<td>Roof Area</td>
<td>$573,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Car Stacker</td>
<td>$5000.00/PC/#</td>
<td>1</td>
<td>Number</td>
<td>$500,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External Screens</td>
<td>$200/m²</td>
<td>9120m²</td>
<td>Exterior Wall Area</td>
<td>$1,824,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drainage</td>
<td>$132.00/m</td>
<td>106m²</td>
<td>Drainage Run Length</td>
<td>$13,992</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External Works</td>
<td>$82.00/m</td>
<td>0</td>
<td>Net Site Area</td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sundries</td>
<td>$2.00/m³</td>
<td>9020m³</td>
<td>Gross Floor Area</td>
<td>$18,040</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SUBTOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$25,680,143.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preliminaries</td>
<td></td>
<td></td>
<td>13%</td>
<td>$3,338,418.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Margins</td>
<td></td>
<td></td>
<td>5%</td>
<td>$1,284,007.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contract Contingencies</td>
<td></td>
<td></td>
<td>15%</td>
<td>$3,852,021.45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL excl GST</td>
<td></td>
<td></td>
<td>15%</td>
<td>$39,277,728.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL incl GST</td>
<td></td>
<td></td>
<td>4% per year</td>
<td>$42,848,845.83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL 2014 NZD</td>
<td></td>
<td></td>
<td></td>
<td>$42,848,845.83</td>
<td></td>
</tr>
</tbody>
</table>