STEPPED-NESS

IN MEDIUM DENSITY HOUSING

THE STEPPED DWELLINGS

Emily Batchelor

STEPPED-NESS IN MEDIUM DENSITY HOUSING

By

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*A 120 point thesis submitted to the
School of Architecture & Design, Victoria
University of Wellington, in fulfilment of
the requirements for the degree of Masters in
Architecture (prof)*

Victoria University of Wellington

2014

ACKNOWLEDGEMENTS

It has been an absolute privilege completing this thesis under the guidance of Kerstin Thompson. I have learnt so much and been so inspired by your methods and manners and would like to extend my most sincere appreciation for this.

Mum and Dad, thank you for the listening ears, the study break shouts, the Wellington weekends together, but most of all for your endless support, encouragement, and love.

Sam and Joe, thanks for the reality checks, for the critical reviews and for keeping my music library up to date.

And to everybody who was with me, and has loved and supported me through this (at times seemingly never-ending) journey, I am so grateful. I could not have completed these long six years without your support and understanding.

My thesis year has been one of the best years of my life, and I wouldn't change a thing.

TEN STEPS AND ONE INCIDENT - ABSTRACT

Stepped-ness in Medium Density Housing investigates a new form of design, where the site is organised according to different conditions of public, common, shared and private spaces. Stepped-ness is used as a technique for controlling relations at a range of scales and intimacies —from urban to interior— and as a tool for creating continuity of public to private, inside to outside and building to landscape. As a result, circulation and dwelling become integrated as part of a stepped morphology in which higher density living is able to accommodate both a desire for privacy, and a connection with neighbours.

The typical detached New Zealand house reinforces the nuclear family as unit and precludes the extended family. Local models of medium density housing replicate these conventions and continue to deliver autonomous and identifiably singular buildings defined by lot and footprint size. Challenging these conventions, the architectural hardware of this proposal allows boundaries to be redefined according to the preferred size and configuration of a variety of household types. The identity of 'home' is less determined by size, and more by relations — within the household and between dwelling and public realm.

Insistently organisational, mat-building explores relational distances. The stepped-mat is examined in terms of the design of mediatory devices and ancillary spaces as the primary element of space planning. This was inspired by Atelier Bow Wow, who is known for creating, "not an architecture of spaces, but an architecture of relationships," (Fujimori, 2010, p. 128). Initially concerned with the step as a tool for design, this thesis developed to consider the stepped-mat as a way of both controlling and designing space at a range of scales. How then, could the kinds of interstitial and circulation spaces between dwellings be exploited for incidental meetings between neighbours, to sit outside and read a book, or bring some daylight into a corridor (Barker & Simons, 2012, p.155). Designed to both transport and accommodate us, the stairs' behaviour in the breakdown of vertical and horizontal space drives this design, and forms new relations between households.

THESIS STRUCTURE

This is a design-led piece of research iteratively developed in pursuit of a rigorous final design and acumen.

The work proposes to understand existing contexts, situations, issues, and opportunities, as well as to determine a system for design which provides a tool for future projects.

As such, the configuration of this thesis works through a series of design iterations and outcomes that eventually lead to a final design which most effectively applies the concept of stepped-ness. Though this final iteration is by far the most significant and valuable in terms of the research question, it is important that the previous iterations are included sequentially in order to understand its evolution.

Responsive to site and its specific location in New Plymouth, the underlying argument is that this approach of stepped-ness might be applied to any suburban New Zealand site as a new way of approaching housing. Furthermore, this approach is fundamentally able to be applied at a range of scales or densities, in order to achieve varied desired outcomes.

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TIMELINE

x / Stepped-ness in Medium Density Housing

01

Figure 1: Little Boxes – a typical New Zealand Subdivision plan proposal for Hobsonville, Auckland.

INTRODUCTION

THE PROBLEM AND THE SITUATION

The Problem Of Contemporary New Zealand Housing Models

Little boxes is a befitting title for the peppered housing on ever-decreasing lot sizes which continues to plague New Zealand sub-division developments. These compact but inefficient homes are typically designed for an autonomous household.

The desire for urban living currently outweighs the supply in the housing market. (Un)Affordability of housing in New Zealand is a frequent news topic, and research by demographia places the median house price in New Zealand as 5.3 times median income, a number classed as severely unaffordable (Demographia, 2013).¹

In a society which is well aware of the environmental damage from consumerist attitudes, this method of housing design and of living can only be seen as wasteful and counterproductive.

Further conventional housing in New Zealand still reinforces the notion of the autonomous family. Tsukamoto identifies how this severs the individual from the family, due to the so-called private room

nLDK system, “a format indicating the number of rooms plus letter designators indicating the presence of common areas: Living, Dining and Kitchen” (Tsukamoto, 2012, p. 80). In the same vein, current examples of medium density housing in New Zealand do little to inspire community, support social relaxation, or *neighbourliness*. Many, in fact, place box after box, side by side, in a repeatedly limited condition. Reputed for poor quality design and construction, low amenity, poor layout, insufficient space, and lack of integration with surroundings, it is to be expected that medium density housing is generally resisted and associated with a detrimental stigma (CityScope, 2011).

CHARACTERS

YOSHIHARU TSUKAMOTO
architect, 1965-

Born in Kanagawa, Japan, Tsukamoto graduated from the Tokyo Institute of Technology in 1987 and formed Atelier Bow Wow with Momoyo Kajima in 1992.

Tsukamoto's request of new generation architecture is that it thinks beyond the autonomous, inflexible household. His innovative approach to architecture responds to rigorous contextual studies, and associated challenges.

Tsukamoto's work with Atelier Bow-Wow such as the study of behaviorology has great influence and prominence in this thesis.

Figure 2: Tsukamoto's nLDK system as bubble layout for a house plan which typifies the prescribed and inflexible nature of many design briefs.

Figure 3: Examples of inflexible medium density housing in New Zealand.

Tsukamoto further describes the nLDK state as *intolerant* and dedicates the responsibility of today's architects to creating better relationships between people through architecture. He suggests that the house should include certain spaces that accept people from outside the family, to provide more opportunities for the residents to spend time outside, and to redefine the typical gap spaces between two detached houses (Bow-Wow, 2010, p. 13).

This thesis has identified that much contemporary housing in New Zealand fails to critically engage with these key issues, particularly a responsiveness to a variety of household options.

"When people become familiar with spending time in a semi-outdoor space, communication between residents and pedestrians will take place."

YOSHIHARU TSUKAMOTO 2012

Common Medium Density Housing

A Stepped Morphology

Common Medium Density Housing

A Stepped Morphology

The Common Target Market

The Changing Household

Figure 4: Existing inflexible vs. proposal for stepped medium density housing models.

Stepped-ness (adj): the inherent nature of being carried out in stages or with pauses, rather than continuously.

Embodying new concepts in architecture was a concept inspired by Junya Ishigami. Ishigami explores non-architectural contemplations as a method for design, in order to broaden the scope of the discipline. In his workshop for the Kanagawa Institute, Ishigami seeks “to embody in architecture that which has never been architecture before” (Ishigami, p. 4)². Inspired by this process, and an interest in stepped-ness, the search for an approach to medium density housing was begun. A *mediatory device*, the stair shifts both vertically and horizontally; creating stages, platforms, seats, audiences, or pockets of private space that draw people together in tactical improvisation of use.

Stepped-ness is used then as a technique for controlling relations at a range of scales and intimacies. From urban to interior, stepped-ness becomes a tool for creating continuity of public to private, inside to outside and building to landscape. As a result, circulation and dwelling become integrated as part of a stepped morphology in which higher density living is able to accommodate both a desire for privacy and a connection to neighbours.

In negotiating a criteria for assessing the quality and success of the various design iterations undertaken in this thesis, a code was established and applied to the scheme throughout its development. Inspired by a similar document written by Kazuyo Sejima, for her housing project *In Gifu*, the code guides the decision making process and provides a means of comparative analysis across a varied and irregular modus operandi.

Each clause is written to respond to existing Kiwi living preferences such as privacy, sense of place and independence, but to also transform existing norms. Each clause responds to perceived gaps which contemporary housing fails to critically address. The clauses help to identify certain objectives which will achieve medium density, a balance of personal and spatial relationships, and flexibility of living, all of which are obtained through a physically stepped approach.

Kitagata Apartment Building – Sejima Wing,
SANAA – Sejima and Nishizawa, 1994-2000, Gifu,
Japan.

Density

1. Double existing density (or neighbouring density if site contains little or no housing).

Balancing Public and Private Space

1. Provide public space at site boundaries.
2. Step transitions between adjacent spaces.
3. Provide a front door at ground level for each unit.
4. Provide private outdoor space for neighbouring units at ground level.
5. Provide shared outdoor space for each unit at ground level.
6. Provide common outdoor space for all units to share.

Flexible and Adaptable - Homes for Life

1. Units are prescribed and owned volumetrically.
2. Rooms are allocated as per their degree of privacy, rather than function.
3. Provide a minimum of 25m² parking space for each unit, which designed as a shared space in case of alternate use.

-
4. The dwellings are designed and constructed utilising hardware and software.
 - a. Hardware describes structurally vital elements in permanent position.
 - b. Software describes elements which may be removed and/or changed.

Stepped-ness

Stepped-ness is used as the technique to achieve these objectives throughout the development.

The stepped morphology operates at a range of scales, and creates variations of relationships. Such relationships could be between development and street, between dwelling and common, between internal and external spaces, between rooms within the dwelling, and within rooms as furniture or other elements. Stepped-ness provides a continuum of landscape for inhabitation that is both formal and informal and encouraging of interaction between residents.

PUBLIC OUTDOOR SPACE	gives back to public and the city
COMMON OUTDOOR SPACE	shared by all residents
SHARED OUTDOOR SPACE	shared by neighbouring units
PRIVATE OUTDOOR SPACE	for a single unit alone
COMMON INTERNAL SPACE	for residents and guests e.g. living
SEMI-SHARED INTERNAL SPACE	varying privacy e.g. office
PRIVATE INTERNAL SPACE	for private activity e.g. bedroom

Figure 5: A vision for the outcome of medium density living with integrated garden, degrees of privacy, diversity, and stepped transitions.

The typical kiwi fondness of the ‘quarter acre pavlova paradise’ (Mitchell, 1972) is something that must be understood and reinterpreted for contemporary life if suburban intensification is to have any validity in supporting households of the future. Mitchell notes that the home is the focus of our nation’s life as the hobby you inhabit (Mitchell, 1972, p. 110). Integrating medium density housing which is aware of such critical regionalism supports progressive ways of living now and into the future.

The challenge is in how to meet the need for greater density and housing diversity in ways that respond to the New Zealand context.

This thesis responds to outdated land division and house construction techniques to create a model for higher density and more connected living that respects kiwi preferences for privacy and garden, but also accommodates household diversity and spatial flexibility. Mediating between past and future, it transforms elements of existing conditions, and innovatively accommodates new possibilities for housing.

02

Figure 6: Location of chosen site in Taranaki, New Zealand.

NEW PLYMOUTH
39.07°S 174.08°E

02

Figure 7: Aerial photo of New Plymouth and
Mt Taranaki, Charters and Guthrie Associates
Ltd. 1971

16 / Stepped-ness in Medium Density Housing

OBSERVATIONS ON SUBURBAN LIVING

NEW PLYMOUTH, TARANAKI

39°06'6"S 174°08'3"E

A Typical Neighbourhood

An essential consideration of this thesis is that the site chosen for the developed design is secondary to the theory for stepped-ness. However, the chosen site has significance as a typical example of suburban living in New Zealand. Influential for his work in housing, Harry Seidler explains how the process for design should respond to the physical conditions around the building, "The primary considerations in evolving domestic plan forms will deal first with the basic relationship of the building to its surroundings". He explains how atmosphere of the setting and topographical characteristics are essential to placement and structure on site (Seidler, 1954 (2003), p. 14).

The site occupies a third of a block in a typically suburban New Zealand area, with three street frontages up to 90m long. Well connected to local amenities, its location supports dense living, and reduced vehicle dependence.

Though exceptionally unique with Mt Taranaki as a backdrop, the 'stepped' topography of the site and surroundings is typical of the New Zealand landscape. Seidler notes that the site will often suggest an arrangement of zones on various levels following the contours of the land, and connected by ramps or half flights of stairs with a resulting interplay of interior spaces (Seidler, 1954 (2003), p. 15).

CHARACTERS

HARRY SEIDLER
architect, 1923-2006

Austrian born Harry Seidler arrived in Australia, at the age of 25 (Abel, 2003, p. 6).

Highly critical of the outdated contemporary architecture, he became well regarded for his political commentary as well as his design contributions for residential architecture in Australia.

Seidler is recognised for his ability to cleverly design flexible space. He claims that the pulling apart of planes to open planning in both the horizontal as well as the vertical will remove any feeling of restriction otherwise experienced in small areas (Seidler, 1954 (2003), p. 14).

PETER BEAVEN
architect/lobbyist, 1925-2012

Born in Christchurch, Beaven's medium density housing designs are regarded as perhaps the most important, yet underappreciated of his contributions to architecture in New Zealand (Barrie, 2009).

Much like Seidler, Beaven has been a vocal advocate for good design, and one of New Zealand's most prolific writers, producing numerous articles and one of our first book-length architectural histories. Our first post-modernist, he described his neo-vernacularism as "a concept which allies beauty with the familiar, with common sense, and with an appropriate and convincing lifestyle".

Beaven's Thorndon Mews are analysed for their contribution to medium density housing in New Zealand.

Figure 8: New Zealand suburban housing conditions.

Housing in the neighbourhood is typical of much suburban New Zealand living, with features such as:

- Front, rear and side yards for outdoor living
- Gable roof forms
- Small villas and bungalows
- Fences to demarcate boundary
- Carports or garages on the street front
- A clearly defined front door and sense of address

- Gardens for hobby, identity or growing food
- Space to hang clothes outside to dry
- Small deck areas
- A sense of distance from the street edge

However, this little box typology is lacking in common outdoor space, multiple dwellings per site, or sharing of resources such as driveways. It is therefore identified as a wasteful approach to living, particularly in terms of permanence and in-flexibility.

03

Figure 9: Diller, Scofidio & Renfro's Center for Creative Arts. Floor level offsets create environment for watching and being watched.

Short steps,
with no landings,
tell your body
to move straight
up, no pausing
no turning.

Grand stairways with narrow risers
and spacious landings invite slow
and gracious movement. We pause at the
landings, gazing out into the distance. (Franck, 2007, p.38)

EARLY RESEARCH

MICRO TO MACRO

Stairs And The Staircase

Beyond its primary function of transportation, the stair can be appropriated by its user to suit a further purpose. A stage, a viewing vantage, an audience, a seat, a bench, a ceremonial gathering—its vast ability to accommodate human occupation is achieved through its postulated notions of pause in its staggered choreography of movement. Meticulously controlled by dimensions related to human scale, the step has a strong affinity with inhabitation.

Enabling space either as an attractor or as a visual platform, Diller Scofidio and Renfro use the stair for theatrics as much as circulation in many of their projects. Their Creative Arts Centre, for example, distorts conventional architectural practices in the deliberate offset of floor levels, which has both an activating and self-referential effect on the viewer.

Creative Arts Centre, Diller Scofidio + Renfro, 2010, Providence, Rhode Island, USA.

Figure 10: Standard stair configurations.

“For a stay of any length, the human seeks out the horizontal plane. The treads of stairs, if the dimensions are right, may permit standing still or become places to sit, and can take on the role of tiers of seats, thereby

bringing people together.”

HERMAN HERTZBERGER 2000

CHARACTERS

SOU FUJIMOTO
architect, 1971-

Japanese architect Fujimoto graduated from the University of Tokyo in 1994. Sou Fujimoto Architects was established in 2000.

Described as his manifesto for architecture, his book *Primitive Future*, published in 2008, adopts a philosophy that returns to a primordial, intuitive moment in the process of design, free of constraints and open for possibilities (Fujimoto, 2008).

Fujimoto's creation of relational distance in design is analysed for its ability to provide mental, rather than physical distance.

JUN'YA ISHIGAMI
architect, 1974-

Another Japanese architect, Ishigami graduated with his Masters in Architecture and Planning in 2000. Ishigami worked with SANAA from 2000-2004 before establishing Junya.Ishigami+Associates in 2004.

Recognised for his delicate buildings, landscapes, installations and furniture which present us with possibilities of architecture beyond what we would normally accept, Ishigami introduces new approaches to architecture.

His design for the Kanagawa Institute of Technology Workshop is conceptually based on the notion of planning a forest.

With similar intention for self-actuation and improvised use of space, this thesis could be seen as being aligned with Fujimoto, who in his own manifesto explains two concepts for architecture; the nest and the cave. While the nest has been meticulously prepared for human habitation, the cave is its inverse; a space which must be innovatively occupied by the occupant. As a result of this, the cave alters the behaviour of its occupant as it adapts the space to suit its needs. Offering a flexible architecture, appropriation of the stair achieves the same adaptation of space.

For Fujimoto, architecture exists in how exteriority and interiority are connected (Fujimoto, 2008, p. 77). He attempts to envision an infinite outward expansion.

“Far before the advent of roofs or walls, only the various modulations of distances were recognised. Distance predicated the degrees of interactions amongst persons and objects; thus, the profound spatial expressions of potential expanses were enriched by diverse qualities of gradations and intonations. One can be alienated and yet connected. Close yet separate. Associations are solely indicated by propinquity. These interactions transformed ad infinitum with motion. People can discover places for habitation in those cadences of space.” (Fujimoto, 2008, p. 32)

Fujimoto aims to liberate architecture as a spatialised aperture. With this aim, interior and exterior does not need to be delineated with a wall or frame, but territory in which myriads of territoriality, scales, spatial continuity, discontinuity, transparency and opacity can be subsumed (Fujimoto, 2009).

“Instead of oppressing functions, a cave is a provocative and unrestricted milieu.”

SOU FUJIMOTO 2001

Figure 11: Inhabitation of stepped-surface.

In Japanese architecture extremities of inside to outside are eroded, existing instead in a symbiotic relationship. Thresholds are blurred as inside and outside overlap through intermediary zones (Pollock, 2005). The Japanese term *Ma* is used to describe a spatial in-betweenness that carries temporal connotations (Snodgrass & Coyne, 2006, p. 225). It is a stop or pause in a sequence of actions or events, and thus akin to the effect of stepped-ness. The step, as *mediatory device*, alludes to a continuum that is neither necessarily interior nor exterior. The result is space that is not merely black or white, but grey, suggestive of its indiscrete behaviour and change over time.

Figure 12: Kanagawa Institute of Technology Workshop plan, Junya Ishigami.

In the KAIT workshop Japanese architect Junya Ishigami sets out a scientifically composed architectural proposal based on the planning of a forest (Ishigami, 2010). Beginning with something beyond conventional ways into architecture, this thesis argues that the qualities of the staircase might be explored with a similar rigour. To conceive of architecture as if planning a staircase offers an innovative approach to design scaled to human occupation.

As such, the investigation began with the study of six inspirational great staircases for their effect on the user and their potential for human inhabitation. From the scale of an atrium stair to that of a public plaza, each stair is analogous in the actuality of their need to respond to the scale of the human body.

1. The Spanish Steps – Rome
2. TKTS Times Square – New York NY
3. The Atrium Staircase – School of Architecture and Design, Wellington
4. The Steps of the Met – New York NY
5. Casa Malaparte – Isle of Capri
6. The Great Pyramids – Ancient Civilisations

Kanagawa Institute of Technology Workshop, Junya Ishigami, 2007, Japan.

the spanish steps

tkts times square

soad atrium

stair plans

main stair sections

the occupied stair

the relative levels

the met

casa malaparte

pyramids

stair plans

main stair sections

the occupied stair

the relative levels

1 1. A Couple of stairs, side by side (micro)

2 2. A larger cluster (macro)

3 3. A Multi-layered approach (micro)

4 4. A larger cluster (macro)

1. A Couple of Stairs, side by side:
Considering a dwelling in the form of the stair, and experimenting with the composition of more than one block.

2. A Larger Cluster (micro)
Grouping these blocks together in order to consider their rhythm and sequencing as.

3. A Multi-Level Approach
Rather than thinking of the model as form, these experiments consider the transformation of surface or plane as stepped.

4. A Larger Cluster (macro)
The unit, and how groups of units might interact.

"Stairs can be so developed that they unfold the landscape; creating a sense of space through ever shifting vantage points and views through, they are space-makers par excellence"

HERMAN HERTZBERGER 2000

A

B

C

D

E

F

Area

*Planning and
Orientation*

Off-set

Elevation

Figure 13: Diagrammed tests of stepped housing.

Figure 14: Slope, width and height of stairs and ramps as per D1: NZBC

Section

Route

Figure 15: Inhabitation of the stair.

TYPE A

Figure 16: Stepped-living unit types.

TYPE B

TYPE C

04

Figure 17: A stepped-modification of Heller Street Residences (case study 07).

CASE STUDIES

LESSONS FROM THE PROFESSION

Observations from New Zealand and Abroad

A wide range of housing precedents were reviewed, from which eight were selected for more detailed analysis. A criterion was established which covered scale, circulation, typology, dwelling types, and surrounding contexts and this was applied to each case study. Each project was identified for relevant archetypal ideas which could assist in the subsequent generation of a new housing proposal.

CHARACTERS

HERMAN HERTZBERGER
architect, 1932-

Born in Berlin, Hertzberger studied at the Delft University of technology and was a professor there for nearly 30 years.

Concerned with the role of architecture to provide spatial framework, Hertzberger structures spaces which allow users to interpret and define their own habitation. His flexible approach to the use of architecture is consistent with the thinkings of Bertram, Fujimoto, and Ishigami.

NIGEL BERTRAM
architect

Director of Melbourne based NMBW Architecture Studio, the locally born architect completed his PhD through architectural project at RMIT University where he taught for 11 years.

Working with NMBW, he is well known and respected for widely published work across categories including single and multiple residential design, small public works, adaptive re-use of existing buildings and peripheral urban design strategies. NMBW's process incorporates careful reading of existing conditions, at both an urban scale and the scale of individual inhabitation (Monash, 2013).

NMBW's Kerr Street apartments are influential for their treatment of the vehicle and the individual experience of the home.

Figure 18: Herman Hertzberger's Diagoon Houses, with split level and core separation.

KERR STREET/FITZROY APARTMENTS NMBW

32-34 Kerr Street, Fitzroy, Melbourne, 2003-2010

37°47'47"S 144°58'36"E

SITE PLAN 1:1000

GROUND FLOOR PLAN 1:500

LEVEL ONE FLOOR PLAN 1:500

108_{dph}

Density Summary

2-4pu

The Kerr Street Apartments offer a variety of housing types, unified by a common access space at ground level. This functions as an arcade, encompassing the street on its primary frontage. Large enough to accommodate two vehicles (as per the district requirements) each garage is treated as a flexible space, not solely for the vehicle, that might operate as another room for the house — workshop/studio/social/leisure/exercise space, etc. Glazed garage doors give the space an elegance and openness, encouraging a sense of community through the space.

The apartments above are separated into two separate buildings, and divisions between units are deliberately designed to be ambiguous from the street.

Kerr Street/Fitzroy Apartments, NMBW,
2003-2010, Fitzroy, Melbourne.

Parti

04

Circulation

Connections In & Out

Structure

Programmatic Boundaries

Material Palette

Section 1:500

THORNDON MEWS PETER BEAVAN

8-10 Pitarua Street, Thorndon, Wellington, 1976

41°16'32"S 174°46'16"E

SITE PLAN 1:1000

GROUND FLOOR PLAN 1:500

LEVEL ONE FLOOR PLAN 1:500

70 dph Density Summary

2-4pu

The enclosed layout and centrally facing units imply a sense of community which is supplemented by a sufficient private-ness for each unit. Influenced by high density areas of Europe, the Thorndon Mews were designed in the late '60s when little precedent existed for housing of this type in New Zealand.

Prioritising the vehicle at ground level, a common access space acts as a forecourt which is shared by the surrounding units. However, this space is the detriment of the design; severing any opportunity of street engagement and lacking human amenity.

Encouragingly though, there is a variation of unit types, and each has its own particular ground entrance, providing a unique sense of value to each dwelling.

Thorndon Mews, Peter Beavan, 1976,
Wellington, New Zealand.

04

Parti

Circulation

Connections In & Out

Structure

Programmatic Boundaries

Material Palette

KASSEL HOUSING HERMAN HERTZBERGER

Heinrich Schultz-allee, Germany, 1979-82

51°17'36"N 9°26'40"E

SITE PLAN 1:1000

GROUND

FLOOR PLANS 1:500

LEVEL ONE

LEVEL TWO

80 dph Density Summary

The basic envelope of this serpentine housing block was predetermined and length apportioned between several architects. Commissioned to build housing into two short segments, Hertzberger saw the greatest potential for community life and urban significance in the staircases.

Each flat is paired about the communal stair to which it opens up, creating an extension of the home. Through a careful choreography of threshold spaces, and layering of privacy screening elements, these communal, semi-public spaces become habitable places of pause. Visible from the kitchen, children are free to play on the stair and the landings—apparently well used—have been furnished and decorated by the residents (Buchanan, 1985, p. 43). With similar gradations of public and private, the balconies of each flat are part private, part open for neighbours to overlook.

Though described as ungainly to look at, these walk up flats are a salutary example of how commonplace housing types might be dramatically enriched by experiences offered and functions accommodated (Buchanan, 1985, p. 43).

Kassel Housing, Herman Hertzberger,
1979-1982, Germany.

Parti

Circulation

Connections In & Out

Structure

Programmatic Boundaries

Material Palette

Section 1:500

SLIDE HOUSE KOMADA ARCHITECT'S OFFICE

Nishiogikubo, Tokyo, Japan, 2009

35°42'42"N 139°26'02"E

SITE PLAN 1:1000

GROUND FLOOR PLAN 1:200

70 dph Density Summary

2-4pu

The apartments of the Slide House complex are configured as a series of layered staircases which spiral continuously overtop of one another, around a communal courtyard space. Redesigning the grid-like approach to cooperative housing, Komada Architects centre the dwellings on dynamic movement and active spaces (Menocal, 2013).

Divided with levels rather than with walls, each apartment's program is linearly assembled and linked by a network of stairs. Rooms commonly constitute a whole landing of a unit. No space is wasted, and vertical risers between levels provide storage and shelving. This is fundamentally an architecture of human movement (Menocal, 2013).

Each of the nine units is given access to outdoor space. Four units share the common courtyard, divided with green screens, and five units have private rooftop balconies which are visible to neighbours across the divide. The shallow depth of the apartments and staggered landings mean each receives ample daylight – a rare feat in the otherwise congested neighbourhood.

Slide House, Komada Architect's Office, 2009, Tokyo, Japan.

Parti

Circulation

Connections In & Out

Structure

Programmatic Boundaries

Material Palette

Part Section 1:500

RENTAL FLATS HOUSING CORPORATION NZ

Lemon Street, New Plymouth, 1976

39°03'26"S 174°05'12"E

SITE PLAN 1:1000

GROUND FLOOR PLANS 1:500

LEVEL ONE PLANS 1:500

45 dph Density Summary

2-3 pu

Designed in the '70s, the Lemon Street rental flats by Housing Corporation NZ are a relevant example of existing state suburban housing. Enclosed and private, with little useable or private outdoor space, these flats are dark, compressed and cold. They are not particularly high in density, and are thus neither a good example for high density, nor for quality social living.

Though compact and efficient in resource use, the tight spaces are confined and un-flexible. Each flat has a maximum of two single doors providing external access. Separated with distance, there is little privacy as all access is shared and there is no sense of boundary. At the same time, there is a lack of community, since there is no designed common ground. As a result, lawns are empty and unused; no vegetable gardens, no barbeques, no seats outside on which to read a book.

Rental Flats, Housing Corporation NZ, 1976,
New Plymouth, New Zealand.

Parti

04

Circulation

Connections In & Out

Structure

Programmatic Boundaries

Material Palette

SLITHER DILLER SCOFIDIO + RENFRO

Kitagata, Gifu, Japan, 2000

35°26'0"N 136°41'2"E

850

dph
Density Summary

2-4pu

Slither explores stepped-ness in a subtle, ever shifting continuum of built form. Dimendburg describes the process for this design, akin to a performance score for disrupting a linear housing block by realising standard deviations in plan and elevation; (Dimendburg, 2013, p. 131)

1. Seven units are assembled in a vertical stack. Each stack is interlocked with the next, wedging an increment of 1.5° at the joint.
2. Each unit slips 1.4m in plan from the next unit, thus freeing every entry door to be approached on axis.
3. The floor slab of each unit is offset 200mm vertically from the next unit.

Diller's Slither was one of four *Gifu Kitagata Housing* buildings. In each case, the architect was required to comply with the pre-set parameters. Orienting entrances parallel and offset to the hallway, Slither's success is in its effort to create a unique sense of place for the residents.

Slither, Elizabeth Diller – DSR, 2000, Gifu, Japan.

HELLER STREET PARK AND RESIDENCES SIX DEGREES

BRUNSWICK, MELBOURNE, 2012

37°46'30"S 144°57'05"E

SITE PLAN 1:1000

GROUND PLAN 1:200

25 dph Density Summary

Heller Street Residences are a demonstrative project for the role architecture can play in forming community. This family friendly housing scheme was developed according to a tender win which stipulated that the land be divided as one-third private residential and two-thirds remediated from contamination and turned into a public park. The north-facing strip of land set aside for the dwellings lent itself to the terrace-house typology and rain water harvested from the roofs is used to irrigate the park. Effectively the residents share a huge front yard which both they and the council maintain (Horrocks, 2012). Parking was carefully considered to have the least interference with ground level space. A shared driveway takes all vehicles beneath the units to respective private garages.

Located on the street rather than between houses, the communal space serves a wider community than do other “commons” developments, and is well used by both residents and the public alike. The ambiguity between public and private space adds amenity for the residents, and endorses this project as symbolising the concept of community. Ambiguity of unit size is preserved in a complex and continuous façade, which helps to disguise unit junctions within the assemblage.

Heller Street Residences, Six Degrees, 2012,
Brunswick, Melbourne.

04

THE ALTAIR ARCHITECTURE +
NEWTOWN, WELLINGTON, 2006
41°19'04"S 174°46'40"E

SITE PLAN 1:1000

GROUND PLAN 1:200

88

dph
Density Summary

2-5pu

This development in Newtown, Wellington comprises 71 individually titled units laid out in nine separate blocks.

Nearly all units have private outdoor space in the form of a 20-24m² courtyard facing east or west, as well as small balconies above ground level. The units share two communal open spaces, which are managed and maintained by a body corporate.

The Altair has been designed for maximum profit return and applies a repetitive unit format which is stepped to create difference in plan and elevation. As such, the small common areas are potentially too small, sterile and lacking in variety to be used by the residents and the units lack personality due to necessary approval from the body corporate for alterations to space. The complex lacks flexibility for future growth or change, as well as sense of community, either within the development, or for the public. However, with high density living close to urban centres, it is a successful example of a simple and affordable solution which may have some appeal to the market.

The Altair, Architecture +, 2003-2006, Newtown, Wellington.

Parti

Circulation

Connections In & Out

Structure

Programmatic Boundaries

Material Palette

04

Typology - Row Houses

Typology - Row Houses

Typology - Walk up Flats

Typology - Apartments

Typology - Flats

Typology - Apartments

Typology - Terrace Houses

Typology - Row Houses

Figure 19: Exploded axonometric of case study typologies.

Number of Levels	Levels per unit	Relationship to circulation space	Relationship between private spaces
Fitzroy Apartments

Thorndon Mews

Kassel

Slide

NP Flats

Slither

Heller St

The Altair

Figure 20: Comparative analysis of key case study lessons.

05

Figure 21: Relational analysis of Sejima's
Seijo townhouses.

Seijo Townhouse, Sejima & Associates, 2005- 2007,
Tokyo, Japan.

'WEAK' ARCHITECTURE

TO CONCEIVE OF ARCHITECTURE AS IF PLANNING A STAIRCASE Privacy, Distance and Neighbourliness

One of the perceived adverse qualities of higher density living is a lack of what Emily Cockayne terms *neighbourliness*. Somewhat ironically, it seems that living closer together results in habits of withdrawal, as residents seek to maintain their privacy. With sufficient variation of private, shared and common space, this thesis argues that by providing residents the ability to elect whether they will be social or private, healthy relationships will ensue. Cockayne maintains that architecture cannot determine this spirit or neighbourliness, but that the conditions it creates will have a strong influence, since “the spaces between dwellings and the configuration of living arrangements all affect the ways that people are accessible, audible and visible to neighbour.” (Cockayne, 2012). As such, the organisation of spaces, the boundaries between, options for flexibility of use and ownership and as defined by the step, are under constant investigation in their ability to contribute option and variety.

Fujimoto seeks architecture to create a sense of distance that is not physical, but experiential. He explains that “weak architecture” is made from the relationship between each of the parts, where order is made to incorporate uncertainty or disorder (Fujimoto, 2008, p. 10). Ito describes this as the antithesis of a compositional rule which instantly determines a whole, and is rather laid out between adjacent forms, by means of his own delicate sensitivity (Ito, 2008, p. 9).

Understanding that higher density living results in a closeness, the challenge therefore is lessening the impact of proximity, without increasing the distance. It is this relational distance which the stepped housing seeks to engage; by offering a sense of offset and independence from other residents, the user experiences both privacy and community.

CHARACTERS

KAZUYO SEJIMA
architect, 1956-

Born in Japan, Sejima is a founding member of SANAA with Ryue Nishizawa. Sejima graduated in 1981 from Japan Women's University and launched her own firm – Kazuyo Sejima and Associates in 1987 after apprenticing with architect Toyo Ito.

SANAA's design philosophy is concerned with the social use of space and its potential for adaptation, and as a result, they do not consider a structure finished until it is inhabited (Cunningham, 2010).

Notable works of Sejima's involvement which were influential in this thesis include; the *Gifu Kitagata Apartment Building - Sejima Wing* by SANAA, and the *Seijo Townhouses* in Tokyo by Sejima & Associates.

EMILY COCKAYNE
author

Dr Emily Cockayne is a lecturer at the University of East Anglia. Her book *Cheek by Jowl. A History of Neighbours* reviews a history of friendships and discrepancies between neighbours – how people get along, or don't, with those to whom their only connection is random proximity (Hill, 2012).

Broader View – Love thy Neighbour, in the Architectural Review 2012, accounts for our disappearing notion of neighbourliness since "We have lost the grinding poverty that nurtured it. The Facebook wall has replaced the garden fence." (Cockayne, 2012).

Figure 22: Grouping stepped diagrams and identifying spaces.

Figure 23: Massing the stepped groups together.

WITHIN THE UNITS

Figure 24: Connecting adjacent unit types.

Figure 25: Developing unit types for space allocation.

A: 70m²
 25% Neighbour Shared
 45% Internal Shared
 30% Private
 4 Levels of Occupation

B: 80m²
 20% Neighbour Shared
 40% Internal Shared
 40% Private
 6 Levels of Occupation

C: 100m²
 15% Neighbour Shared
 30% Internal Shared
 35% Private
 8 Levels of Occupation

Figure 26: Incremental pauses as the elevation steps and alternates from private to shared spaces.

Figure 27: Variable views across the site to aid in privacy.

Figure 28: Alternately stepped row house blocks.

A property of the stair as a tool for the design that is developed throughout is that of a *scaling-device*. Working into the massed extrusion, type A and type B are indicative of how row housing could be contrived. Each unit is linearly stepped. Each unit is then stepped in off-set from its neighbour. Repeating this pattern, sensitive arrangement forms a continuum of experiential distances.

Responding to Tsukamoto's request to move beyond the autonomous household, the three developed unit types consider the distribution of space as a percentage of the total area, in order to transform specifically room based allocations.

Figure 29: Circulation of adjacent unit types.

This iteration had some success in the generation of ideas and potentials, but as a design it does little to resolve the problems identified in either medium density housing or stepped-ness. The formal articulation of the building envelope as discrete *figure in the landscape* did not exhibit stepped-ness or continuity between internal and external space. Furthermore, equally apportioned rhythm and repetitively organised private and shared spaces rescind any sense of theatre, flexibility or variety that is sought in a new form of stepped housing. The figure in the landscape that this iteration proposes, is an issue which this research identifies as the ultimate complication that would need to be resolved.

Figure 30: (Opposite) Four blocks of row-house-stepped units elevate in opposite directions. A range of common outdoor space is created and view orientations shift in plan as well as section.

06

Figure 31: Site plan and surrounding grain
1:1000.

STEPPED SITE

TO CONCEIVE OF SITE AS IF STEPPING A FIELD Investigations in Field Conditions

Stan Allen refers to Field Conditions, as a space for propagating effects (Allen, 1985). A field might be any formal or spatial matrix capable of unifying diverse elements while respecting the identity of each. While all grids are fields, not all fields are grids (Allen, 1985, p. 97).

In the previous iteration, the figure in the ground did not create a sense of stepped-ness or continuity of space. The field holds the potential to redefine the relationship between figure and ground; where the figure emerges from the field. Integrating circulation and building as part of a stepped morphology, the field is explored on the site in a set of experiments for continuity. Shifting architecture's attention from its traditional top down forms of control, Allen suggests that field conditions begin to investigate the possibilities of a more fluid, bottom up approach. The field addresses dynamics of use, behaviour of crowds, and complex geometries of masses in motion (Allen, 1985, p. 101). Focussed on relationships between parts, Fujimoto's weak architecture has similar intentions, without the formal method of the field. The field offers a method then, to explore the same delicate sensitivities.

Located on the fringe of the CBD, there is a discrepancy of urban grain surrounding the chosen site. Fundamentally a horizontal phenomenon, the field is used to consolidate the grain, producing irregular systems of organisation. The intention of these models is to refigure the conventional opposition between figure and abstraction.

1. Modelling the site in steps
2. Consolidating the surrounding grain in diagonal gesture
3. Plan becomes section
4. The patchwork site

CHARACTERS

STAN ALLEN
architect

American architect, Stan Allen holds degrees from Brown University, The Cooper Union and Princeton University. Stan Allen Architects was established in 1990.

Allen is concerned with the creation of heterogeneous space in architecture and urbanism, and has worked in partnership with landscape architect James Corner.

His essay *Field Conditions* in *Points and Lines* contributed to thinking about relational (rather than form) organisation.

Figure 32: Examples of Field Conditions, from *Points and Lines*.

Figure 33: Grids derived from surrounding grain.

MODELLING THE SITE IN STEPS

Figure 34: Site is levelled to create platforms and a diagram representing of private-public space is conceived. The notion of a continuous field that accommodates a variety of hierarchy and scale is established.

Figure 35: Nodal consolidation of grain creating circulation routes. The orthogonal grid is precluded in favour of a more dynamic scheme which explores hierarchy. The power of this image might have been envisioned to conceptually structure relationships between functions across the site.

PLAN BECOMES SECTION

Figure 36: Sectional development of stepped forms. In a new way of thinking which prefaces the section, previously generated plan drawings are appropriated into a composition as a vertical form. Form is favoured over choreographed scenario.

Figure 37: Returning to earlier diagrams that spread 'patchwork units' across the site, Allen's intentions for field conditions are explored more comprehensively. Shaded patches allude to varying degrees of public or private space which are arranged in a clear structure. The patchwork is then stepped. The flexibility and ambiguity form a continuous landscape.

DESIGN ITERATION 02

Figure 38: Finally, in an attempt to combine these forms and theories, this experiment favours the scale of the site, and the gesture of a grand staircase. Reverting back to a row typology ultimately misunderstands the intention of field conditions. However, the dynamic forms which shift in their relational distance to one another enable variation.

The most successful experiments were those which consider the idea of continuum and field, and which preface the horizontal. Drawing on external forces in the organisation of site, starts to place the design in a continuum with the city in which it exists. However, the field is a loose concept which was not comprehensively understood in these design experiments. They lacked a necessary rigour that could structure medium density living with interwoven space.

07

Figure 39: Variable stepping in section between and within the units at a variety of scales.

STEPPED TYPES

TO CONCEIVE OF ARCHITECTURE AS STEPPED TYPOLOGIES Clarifying Intentions

The ambiguous flexibility of the stepped landscape of relationships, as field condition, is understood in the following set of diagrams. Stepped divisions might be between individual units, between inside and outside, between public and private (etc.).

Interwoven pockets of space without prescribed use that are free for improvised inhabitation, realise the intent and sensitivity of Fujimoto's weak architecture due to the distortion and modulation of space. Order is found that incorporates uncertainty and disorder, and "totality formed by interrelationships" (Fujimoto, 2008).

Figure 40: Overlapping stepped-ness to create sectional variation.

CHARACTERS

KENNETH FRAMPTON
architect and historian, 1930-

Born in the UK, Frampton is renowned for his writing on 20th century architecture.

'Towards a Critical Regionalism' written in 1983 was an influential essay on modern architecture in which he proposes architecture to resist the homogeneity inherent in modern society, and look to local culture in contemporary work.

ATELIER BOW WOW
Japanese firm, 1992-

Formed by Yoshiharu Tsukamoto and Momoyo Kaijima in 1992, this Japanese firm are known for their domestic and cultural architecture.

Focussing their research on contextual conditions in which architecture and life take place, they are credited with terms such as *behaviorology*, *pet architecture*, *graphic anatomy*, *subdivurban* and *void metabolism* (among others).

Bow-Wow aim for the practice of lively space, responding to the needs of its users, where architecture is attuned to the diversity of spatial practice.

Figure 41: Section through the surrounding landscape of the site.

Figure 42: The stepped field at the scale of the unit. Each level accommodates a different space; inside or outside; public or private.

THE VERTICAL DIVISIONS

Just like the stepped horizontal planes, the key role of the vertical elements is to provide essential privacy, as well as connection between internal and external. Similarly to the altered sense of space and flexible habitation options, stepping the vertical elements creates niches of space for a use which is not necessarily defined. The stepped wall emerges from the horizontal field. Such stepped-ness provides for defined entrances and light apertures into the building, furthering the blurring and ambiguity of boundary, and thus discretely locating the dwelling within the continuum.

Enhancing this ambiguity, a system of vertical opacities is designed to aid in the management of transition from public to private spaces, creating a continuous ribbon of altering transparencies.

Figure 43: Opacities of the stepped wall.

This flow of space was further inspired by the Japanese term *engawa*, which refers to a wooden strip of flooring adjacent to external walls that is either partly inside the building with sliding doors protecting it from the rain, or a completely exposed veranda (JAANUS, 2001). Setting the direction of flow, this open hallway provides circulation, light, air flow, or just a place to sit. As with *Ma*, this is an interstitial space and a typical Japanese concept (Kojima, 2012, p. 74). The engawa in relation to stepped-ness might be used as an extension of the room it passes through, or to connect multiple spaces through flow, rather than division.

Figure 44: Inhabitation of engawa.

Figure 45: The stepped wall and engawa.

STEPPING THE UNITS

The hypothesis in this iteration was that if each unit was sufficiently stepped both within itself, and in relation to its neighbour, their delicate arrangement would generate a stepped field across the site.

Incorporating principles of *engawa* to orient units and direct their flow, six unit types were generated, each based on the form and set-out of a staircase. Spaces were separated according to divisions of level, which would then be prescribed as private, shared or common. Four units were developed further to create a variety of living options. Their irregular walled form left pockets of external space—as private or shared—depending on the resulting adjacent conditions.

In her Seijo town houses, Kazyo Sejima designed the relationship between a housing block and its surroundings while at the same time giving each apartment its own relation to the surroundings (Sejima K., 2012, p. 58). Designing the individual units and their coherent composition, Sejima wanted to bring character to each individual apartment. Similarly, this iteration worked from the unit outwards, in order to compose the block.

Figure 46: Analysis of neighbouring figure-ground densities.

Figure 47: D iagrammatic street elevation.

Figure 48: Site section.

DEVELOPING UNIT TYPE BASED ON STAIRCASE FORMS

four - the 3

The split L
110m² at ground
480m³

five - the U

The U
140m² at ground
500m³

six - the O

200 m²

The split O
150m² at ground
550m³

Figure 49: The typical New Zealand house amenity studies.

Emerging as an architectural concept in the early 1980s, critical regionalism is described as a strong desire for realising identity which seeks to reduce the impact of universal civilisation; a tension between universal modernisation and the idiosyncrasy of rooted culture (Frampton, 1983, p. 158). Frampton offers examples of relevant architects' work, many of which are substantiated in a common interest for place creation and topographic configuration—a commitment to place rather than space—as a process based construct.

Developing Frampton's speculations, Moore claims that it is both politically desirable and ecologically prudent to reproduce regionalism as a practice relevant to contemporary conditions. To extend this, regenerative architecture (as he calls it) will result in life-enhancing and ever changing places which relate human institutions to the natural cycles of a region (Moore, 2001).

If new forms of medium density housing are to have any standing with their residents, this thinking is paramount to the successful integration of new schemes. Newly built architecture should maintain a dialogue between history and the present day, between architecture and the city. In a similar process of *behaviorology*, Atelier Bow Wow assess the relationships created through various timescales of architecture, people and the environment which

reveal the uniqueness of the rhythms embedded in the various objects that surround our daily life (Atelier Bow-Wow, 2010, p. 15). The coordination of these rhythms can result in various encounters, such as the past with the future, which build up a spatial and temporal framework for positioning ourselves in the here and now. This process enables the creation of architecture rich in understanding and thus befitting of its context.

Critical regionalism and behaviorology then, are an ideal lens through which this thesis seeks to operate in order to emphasise the New Zealand way. Surrounding the typical New Zealand home is a minimum of three outdoor areas: the front, back and side yards. Retaining the nature of these yards, but sharing them as common space across the site allows for an effective means of applied behaviorology. By spreading greenery across the site, residents are given more freedom, dwellings are connected to the outdoors and contact is anticipated among residents (Sejima K. , 2012, p. 62). Thus *neighbourliness* might be encouraged in these familiar behaviours of environment and context.

Figure 50: Site Plan 1:1000

Figure 51: Lower level parking plan
1:1,000

Figure 52: Upper level plan 1:1,000

Figure 53: Site Plan 1:500

Figure 54: Ground Plan 1:500

102 / Stepped-ness in Medium Density Housing

C
150m²
400m³
30% private
35% common
35% semi-shared

D
200m²
540m³
30% private
30% common
40% semi-shared

more private

less private

A CLUSTER OF UNITS IN MORE DETAIL

Figure 55: Four unit cluster plan.

Figure 56: Combined layers of the four unit cluster.

Figure 57: Ambition for stepped-ness with greater variation.

Awareness of critical regionalism and behaviorology, and their contextual application to the design help to situate the design of dwellings with familiarity in a New Zealand suburb.

Though stepped-ness and integrated space is starting to become more apparent, the notion of the *figure in the landscape* persists, and the derivation of unit types limits the variation and flexibility of this iteration.

The diagram above suggests the desired fluidity and variation of a stepped design.

08

The Field

Figure 58: Organisational processes of field conditions vs. mat-building .

The Mat

"The housing scheme which starts from an additive system
invariably ends in formalism."
SHADRACH WOODS 1960

MAT BUILDING

MAT BUILDING

The Stepped Mat

Though the creation of field conditions was attempted in previous iterations, each lacked continuity of space, flexibility, and density. Protruding as a demarcated figure within the landscape, these forms, plonked obtusely onto site (though in a stepped manner) are no more effective than the *little boxes* in a new fashion. Field conditions were interpreted for nodal relations and consolidations, which lacked substance.

Mat-building however, is discovered for its rich density in relationship organisation.

Coined by Alison Smithson³, mat-building focuses on three compositional principles: metrics, programme, and place (Calabuig, Gomez, & Ramos, 2013, p. 84).

Metrics

On the basis of an accurately modified grid, the mat-building is a metric process of organisation dominated by functional relationships with no strict format guiding creation (Woods, 1978). Modular by nature, the points and lines, beings and relations, contain no matter or material points, in the same manner as with field conditions. Within the strip of the grid, a volume may (or may not) be built. It is

precisely this ambiguity that enables compositional flexibility. (Calabuig, et al., 2013, p.88).

Programme

Programme of mat-building arises in shared strategies and can be said to epitomise the anonymous collective. Functions come to enrich the fabric, and the individual gains freedoms of action through a new and shuffled order based on interconnection, close-knit patterns of association, and possibilities for growth, diminution and change (Calabuig, et al., 2013, p.88).

Place

This low rise, high density strategy creates possibility for design accidents and improvisation. The author rationally organises, orients and endows specification for proper development, creating a continuum of space which is assigned function by the inhabitant (Calabuig, et al., 2013, p. 84). Under the principle of place, house and city have an identical nature to which the mat-building offers a structural synthesis.

CHARACTERS

ALISON SMITHSON
architect, 1928-1993

Born in the UK, and educated at the School of Architecture in Newcastle, Alison is responsible for the term 'mat-building'. Along with her husband Peter, the Smithsons are reputedly among the most influential and controversial British architects of the mid-20th century (DesignMuseum, 2013).

As open and flexible as the buildings themselves, Alison's description of mat building identifies that the lack of formal definition is precisely the key to the multiplicity of this building type.

SHADRACH WOODS
architect and theorist, 1923-1973

Born in America, Woods studied engineering at New York University. Woods is known for his writing as much as his architecture, and his involvement in Team 10. His partnership—Candilis-Josic-Woods—was established in 1956 to design thousands of suburban housing units in France.

Woods had already referred to the Free University of Berlin as a 'groundscraper' before Smithson called this type of architecture 'mat-building' (Calabuig, et al., 2013, p. 91).

Figure 59: Free University Building, Candilis-Josic- Woods, 1963-1973, Berlin. Model.

SOAD

Pyramid

The Met

TKTS

Spanish Steps

Piano Nobile

Figure 60: Stair as mat.

Drawing from the stair studies in Chapter 03, six great stair cases were applied to the site as a gridded mat arrangement, and analysed against consistent criteria. These experiments, and their development that follows, deal primarily with the scale of the site, and the stepped system which might best apply.

The general problem of what resulted here was the separation of building and green-space, and the failure to identify the open site as a potential opportunity for stepped-ness.

vehicle integration

unit to ground

ambiguity

edge variation

common space

stepped-ness and direction

primary circulation

A SPECIFIC MAT

Figure 61: Developing a specific mat for stepped-ness.

Since the emphasis of the mat is insistently organisational, the system of organisation becomes all the more important to clarify (Fores, 2011, p. 80). Avoiding questions of style or appearance is what gives mat-building its enduring relevance, and legitimacy for exploration. As such, a mat specific to the project was developed. This mat incorporates four shades indicative of public, common, shared and private space.

Figure 62: Intensifying and multiplying the mat.

Operating at a range of scales, the fundamental nature of the mat is that the appropriate abstracted segmented could inform the design of a room/a dwelling/a group of dwellings/the site/the city or so on. This arrangement may represent a single unit, a single room, or a cluster of units.

Structuring relationships based on a gridded pattern allows a holistic contemplation of design. Such process is supportive of flexibility and variation of both internal and external space. This use of the mat rectifies the problems identified in previous arrangement studies which maintained discrete chunks of buildings and landscape, rather than the interspersed organisation offered by the mat.

THE STEM AND CELLS

Work by the Smithsons furthermore develops the concept of the stem and the cells. Similar to *engawa*, this is an orientation driven process concerned with flow. Moving the circulation space to the façade of their buildings accentuates the public character and spatial autonomy of the stem, and allows for the stem to grow or change with greater ease over time (Fores, 2011, p. 78).

Figure 63: The stem and the cells of the stepped-mat.

Figure 64: The Mat as device for site arrangement.

Figure 65: Mat at the scale of the unit.

Figure 66: Mat as unit cluster.

Figure 67: Mat as model.

The outcome of this iteration was too literal an interpretation of the stepped-mat pattern and failed to understand the organisational abilities of the mat. Reverting to the placement of pre-designed types reinforced the un-flexible figure in the landscape, yet again.

The most successfully appreciated application of the mat was discovered in diagrams which favour an openness of program. Rather than arraying unit types over a mat, the mat calls for a holistic organisation, within which living is derived. Finally, the conceptual model (above) works to support the mat with organisation of a multitude of 'activities' into a clear, comprehensible, adaptable order (Fores, 2011, p. 78).

09

Figure 68: A refined abstraction of the stepped-mat pattern.

THE STEPPED-MAT

THE STEPPED-DWELLINGS

Final Design Iteration

In this final and conclusive design iteration, the potential of the *stepped-mat* was fully realised, rife with variation, density and flexibility. The design meets the objectives of the housing code outlined in Chapter 01. Arrayed on a 1200mm grid, this plan establishes a scenario within which the housing scheme would transpire. The result is the creation of something more than just an object—leaving open the social situations that architecture sets up. This phenomenon is further inspired by Nigel Bertram, whose process establishes the notion of hardware and software (Bertram, 2013).

RECOGNISING THE STEP AS SCALING DEVICE

Figure 69: The stepped-mat can operate at all scales; from city—site—dwelling—interior.

DWELLING

INTERIOR

SCALING DOWN: FROM URBAN TO THE ROOM

Figure 70: Creating habitable space within the established organisations.

Figure 71: Designating configurations of space.

- common space
- shared space
- private space
- large unit
- medium unit
- small unit

Figure 72: A variety of distances between the unit and the boundary create a range of relationships with the public realm.

Figure 73: Vehicle organization inspired by Six Degrees' Heller St Residences (Chapter 04). Interference of ground level space is minimized through use of common vehicle entrances to subterranean parking space.

A - Gable *C - Continuous Folded* *B - Flat with Eaves* *D - Parapet*

Figure 74: Developing the roof form.

The treatment of the roof in previous iterations was derived from a limited understanding of critical regionalism, and contributed little to stepped-ness. This shallow application of form would have been criticised by Eggener as an incompetent appropriation of motif (Eggener, 2002, p. 228). A quick study proved that a square parapet roof with vertical emphasis would enhance stepped-ness in silhouette, as well as the emergence of figure from field. A more grounded application of critically regionalist behaviorologies is then revealed.

Also related to the elevation, the ambiguity of unit division is argued for by Bertram and demonstrated in his Fitzroy apartments. As Bertram says, “Knowing whether a home is big or small should not be a concern of the outsider; the resident will know which unit they live in, because it’s theirs!” (Bertram, 2013). The new parapet roof helps to foster this ambiguous continuity.

UNIT VOLUME (m ³)	GARAGE TYPE
A 201-260	L SPLIT LEVEL
B 261-320	J OFF SET
C 321-380	K CARPORT
D 381-440	
E 441-500	
F 501-560	
G 561-700	
H 701-850	

Figure 75: Unit key and location
plan 1:2000
Figure 76: Site Plan 1:1000

Figure 78: SECTION A-A 1:200

Figure 79: SECTION B-B 1:200

Engaging the notion of hardware and software enables a flexible nature in the realised occupation of this design. Stan Allen supports this argument for ‘loose fitting’ architecture designed with space left for tactical improvisation of future users; “It is an architecture not invested in durability, stability or certainty, but an architecture that leaves space for the uncertainty of the real” (Allen, 1985, p. 103). Adherent to the distributed areas of private/common/shared space of the mat, a range of options are implied, which foster various living arrangements.

In the case of this design, 38 dwellings were prescribed in accordance with the code (chapter 01). However, with minor alterations to ‘softwares’ this condition can be altered, and larger (or smaller) dwellings can occupy the same space.

With a bit of necessary kiwi DIY attitude, this scheme offers flexibility over the life cycle of a household. Owners could then expand or reduce the area of their dwelling if, and when, the opportunity arose. A housing complex that retains its structure but is malleable in its layout is an ambitious proposal—but is the line of thinking that must be pursued if we are to have any success in finding new forms of housing for the future.

Rather than by ‘type’ (a problem seen in earlier iterations), units are apportioned based on a given volumetric area of the mat. As a result, potential buyers are able to purchase a piece of the mat sufficient to their needs. From this designated volume parcel, softwares and fittings are constructed to create the desired conditions for living. The only constant is the notion of privacy dictated by the mat, which might mean that a private space is suited to bedroom/bathroom/office and a shared space for living/dining/playing etc.

Within the design then, there are no identical units, and the apportioning system further contributes to variety and diversity of the scheme.

The three following sets of plans and diagrams demonstrate how the same area of the mat might support living arrangements for four, three or two dwellings respectively. As a result, the overall density of the mat decreases, and the software shifts, but the hardware and designations of private/shared/common/public (PSCP) space remains relatively consistent.

Inhabiting the drawings with people and furnishings expresses the sense of privacy which is created with stepped-ness.

Applied as Site Mat

Hardware vs Software

PSCP Mat

Unit Sizes

FOUR DWELLINGS 1:100

Applied as Site Mat

Hardware vs Software

PSCP Mat

Unit Sizes

THREE DWELLINGS 1:100

Applied as Site Mat

Hardware vs Software

PSCP Mat

Unit Sizes

TWO DWELLINGS 1:100

Figure 80: With three children at home, this family utilise their office as an extension of the living area for homework and study.

Figure 81: 20 years on, the youngest daughter has purchased a part of the unit from her parents. The office is converted into a children's bedroom. Granddad lives next door now, and regularly comes over to visit.

THE HOBBY YOU INHABIT

Figure 82: A large family of five has just paid off their mortgage. With three teenage kids, they enjoy a large amount of living space.

Figure 83: Almost 15 years later, one of the children has started a family of their own. With a limited budget, they decide to alter the large family home into two smaller units. With a new bathroom added where the living used to be, both new units are comfortably suited to their occupants.

WALL TYPES FOR PRIVACY

Figure 84: Wall type and composition.

Exploring stepped-ness, ambiguity, and privacy, a catalogue of wall types helps to regulate the elevation in construction, affordability and aesthetic effect. Providing consistency in a panelised, gridded layout as per the mat, these components would be suited to off-site pre-fabrication.

Solid Party Wall – Maximum privacy. Between units (as hardware), could be constructed as precast concrete panel (e.g. SIP).

Solid External Wall – Maximum privacy from the external realm. This wall type is solid and insulated with no openings. Clad in vertical cedar shiplap weatherboards, and stained to finish.

Screened External – Timber framed, this wall allows

for openings but is screened with a combined truss and batten system. The structural truss provides a large cavity between the weather-proofed wall, and the screen which surrounds it. This cavity would be useful for the discrete placement of services. Windows and doors can be located behind the screen, and delicately shaded. Louvres may be operable, providing a control mechanism for the occupant.

Translucent Plastic – Polycarbonate sheets are used in areas where light is desired along with visible privacy.

Glazed – Least privacy. A panelised curtain wall system is the most transparent of the types, allowing maximum views in and out.

Figure 85: Wall type distribution throughout site for creation of varying privacies.

Acting as a continuous ribbon that stretches vertically from the ground upwards and wraps its way around the site, distinction between units is unclear. Altering the layout of the scheme, or reproducing a similar scheme under a new set of criteria, the effect would be maintained as the layout is configured.

Figure 86: SECTION C

The following sections demonstrate how stepped-ness achieves density, while creating pockets of space for inhabitation, privacy and separation from your neighbour. At the same time, common ground is set up between neighbours for shared outdoor spaces on mediatory levels.

Figure 88: SECTION E

SECTION F

STEPPING IN THE VEHICLE

Figure 90: Influential parking arcade –
NMBW – Fitzroy apartments, Melbourne.

The garage is an asset that is identified as indispensable to suburban New Zealand homeowners. The garage has a long tradition in New Zealand culture, and is used for storage, workshops, studios, social space, rumpus rooms, children's play rooms (and the list goes on). Furthermore, many households depend on private vehicles as their primary means of transport.

However, in a progressively focussed design the vehicle becomes subordinate, in favour of alternative transport options. As such, each unit is provided with space for a vehicle which is stepped into the site and dwelling as a semi-private, flexible volume.

FITZROY APARTMENTS

Aware of these generous areas and of the fact that not all residents would require a two-vehicle parking space, NMBW created their garages to be luxurious spaces, useful for other means. Providing primary entry to each unit and enclosed with glazed doors, these spaces are a display of the occupant, and their possessions. The result is a space which feels sociable and communal, and garages which are commonly used as an extension of the home.

Figure 91: Influential underground parking
– Six Degrees – Heller St Residences,
Melbourne.

HELLER STREET

Heller Street Residence's parking spaces are of a similar size and flexible function, but are accessed via a shared driveway abutting the common park space, which stretches from the road to descend discretely beneath the units. By unifying the driveway, the beauty of this scheme is that the vehicle is concealed below the ground, the pedestrian is prefaced, and the habitable outdoor space at ground level is not sacrificed for the car.

GARAGES FOR THE STEPPED DWELLINGS

Each unit is ascribed a garage type, which may alternatively function as an additional room for the home. Three shared driveways provide common access to underground parking for the majority of the dwellings. The remaining units are allocated carport/courtyard space, which may otherwise be used as courtyard dining, greenhouse gardens or hanging out washing to dry.

These alternative occupation ideas are demonstrated in the sections which follow.

Garage as storage and studio.

Figure 93: SECTION H

Garage as storage and children's room.

Figure 94: SECTION I

Carport as washing line, planters, BBQ area.

The density available in the complexity of the mat, the variety of unit volumes and garage types, and their compact assembly, the variety of landscapes and their choreographed stepped-ness is testament to the success of the mat as a strategy for medium density design.

The hypothesis is proven reflectively in the analysis of the layers of the site, and the breakdowns of individual dwellings. While previous iterations attempted to knit together pre-designed unit types to formulate a coherent whole, the mat allows the whole to be organised first, and the units woven in. This method—the success of the mat— is contradictory to Fujimoto’s process of part organisation. Though still attuned to delicate sensitivities of relationship, it works holistically first. Resultantly, each unit has access to a variety of both indoor and outdoor space. It is an efficient and successful approach, which might be applied to any other scheme.

Figure 95: Exploded axonometric of site composition showing the layers of the mat as separate components.

PPSC SPACE ANALYSIS

Figure 96: Unit 01 plan and space diagrams.

internal		external
private		internal
semi		private
common		shared
		common

Figure 97: Unit 02 plan and space diagrams.

PPSC SPACE ANALYSIS

Figure 98: Unit 05 plan and space diagrams.

Figure 99: Unit 11 plan and space diagrams.

Figure 100: Public - Private interfaces. West boundary.

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Figure 103: South-West public corner.
Pedestrian entry to site for public, shared,
common, and private use.

10

COMPARATIVE ANALYSIS OF ITERATIONAL DEVELOPMENT

COMPARATIVE ANALYSIS OF ITERATIONAL DEVELOPMENT

FUTURE STEPS

ONWARDS AND UPWARDS

Further questions and future directions for the Stepped-Mat

The Stepped Dwellings offer a case study for integration of neighbourhood, city, environment and surroundings to create a medium density housing which anticipates future needs, while engaging with familiar sensibilities of typical New Zealand living. Although the design is located in New Plymouth, and responds to specific site conditions, this thesis has lessons for broader New Zealand suburban development. Applying a *stepped-mat* strategy to organise different conditions of public, private, common and shared spaces, the outcome of this thesis is a process which might be applied to any housing development, where a sense of community and density is desirable.

Demonstrated in the comparative diagrams on the previous spread, the final design is successfully more complex, varied, dense, flexible and interesting than the preceding iterations through which it progressed.

Mat-building offers new concepts for articulation with variety and density. An *insistently organisational* process, the mat was discovered as a tool to govern design decisions. The refinement of the final design involved an investigation of the properties of mat-building, through space organisation from the scale of the site to the scale of the room. What appears as a haphazard and indiscriminate array of spaces is in fact anything but. Rigorously organised, each dwelling is apportioned vehicle access, private indoor, private outdoor, shared and common spaces. The composition gives back to the civic realm with provision of additional public spaces. Allocation of such variety of outdoor space for each unit is a principle that is paramount for the success of this design. With this, each resident is afforded the privileges of the existent New Zealand dream, in a redefined vogue.

CREATING MIDDLE GROUND

Establishing scenarios within which living might take place, the design focusses on a range of scales for inhabitation. Living is flexible from the size of the unit to the division of rooms. The stepped-mat develops a new typology that demonstrates alternative ways of configuring and arranging public to private spaces and introduces the idea of mediatory space through living on the step. The success is realised in leaving open the social situations that the architecture sets up.

The nature of this design led research project generates further questions for future exploration. Though the Stepped-Dwellings set a precedent for a new typology, they hold potential interest for questions of ownership, expansion, relocation of the design methodology, and holistic integration with city.

The question of ownership is a fundamental challenge in the market place. Ideally, the title of the dwelling would be freehold and transferrable while the land would belong to a local body corporation or government. In accordance with the flexible intentions of the thesis, title boundaries would be equally flexible, allowing for change. This line of thinking might look to examples such as the Foreclosed exhibition by MoMA, which begins conversation for recombinant housing to meet the needs of 21st century families (MoMA, 2011). Expansion of the units is another opportunity for development. Synonymous with the DIY nature of the New Zealand culture, and the ability for change incorporated in the design, household alterations might include enlargement of the form. The flat roof might be the perfect place for this to occur. Designing the structure of the roof to support further levels, units might grow vertically as they seek further space. This roof-scape might further serve as a landscaped environment for roof-top gardens and the like.

The stepped-mat is certainly a strategy worth investigation on alternative sites. Issues of stepped-ness would become all the more interesting in a flat terrain, where it might result

in the displacement of land. The strategy could be further investigated to incorporate a more holistic connection to the neighbourhood and extended city. In this regard, the concept of mat may take precedence over the step as organisational device.

It should also be noted that the concept of stepped-ness is a challenge with regards to universal access requirements, especially with an aging population. Future directions may include whether the ramp could also be used as an organisational device for similar ends.

This case study also proposes a model for housing that is arguably more responsive to contemporary household demographics, and concepts of homes for life. Understanding that housing in the 21st century exists in a context of complex social and formal relations, this design responds with inherent qualities of privacy, variety and flexibility.

This is the intention of the Stepped Dwellings.

"It's about doing enough and knowing when to hold back."

NIGEL BERTRAM 2013

ENDNOTES

1 The International Housing Affordability Survey by Demographia places New Zealand among the most unaffordable places to live in the New World, just behind Hong Kong and Australia.

They describe the problem as complex in detail, but conceptually simple; it costs too much and takes too long to build a house in New Zealand.

2 Conceiving of the building as if planning a forest, he uses this ambiguous contemplation to become a principle for the formation of space (Ishigami, p. 51).

3 In 1974, her article 'How to Recognise and Read Mat-Building. Mainstream Architecture as it has Developed Towards the Mat-Building' in Architectural Design included a definition, and an extensive list of related works and projects from the 1950s to the '70s (Calabuig, Gomez, & Ramos, 2013, p. 84)

Behaviorology: the study of the behaviours of elements over a variety of timescales. This term is developed by Atelier Bow-Wow who use it to analyse the behaviours of people, buildings and environment, which have impact for their design.

Engawa: a wooden strip of flooring in Japanese architecture adjacent to external walls. It may be either partly inside the building, or completely exposed.

Figure in the landscape: a situation where a form sits on its site, and lacks in a physical integration.

Little Boxes: the problem identified in contemporary New Zealand housing. Obsessed with lot and footprint size, this inflexible and increasingly limited typology is becoming iconic of our housing stock.

Ma: A Japanese concept which refers to in-betweenness. This term carries temporal connotations, and is a sense of pause which is also referred to in musical composition.

Mat-building: A term coined by Alison Smithson, which describes a process for architectural design focussed on organisational tactics of metrics, programme and place. (See chapter 08).

Mediatory devices: Elements which divide spaces, or join them together. Fujimori describes Atelier Bow-Wow's process as a design of mediatory space.

Neighbourliness: Emily Cockayne describes this as the spirit of community which exists between residents and their neighbours.

Scaling device: a tool which might operate at a range of scales.

Stepped-ness (adj): the inherent nature of being carried out in stages or with pauses, rather than continuously.

Stepped-mat: Applying stepped-ness to strategies of mat building.

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