CONSTRAINTLY INHERED HABITATION
CONTRAINTLY INHERED HABITATION

The exploration of spatial configuration that produces efficient, functional and interlocking spaces derived from the Japanese infill strategy within the limitations of confined space

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I  ABSTRACT

“One of the basic human requirements is the need to dwell, and one of the central human acts is the act of inhabiting, of connecting ourselves, however temporarily, with a place on the planet which belongs to us and to which we belong”¹. The ability to inhabit space within our cities has become increasingly difficult; the population continues to increase, while available land decreases. Space within our cities, is often underdeveloped and wasted because of greed, the desire for more personal space than one requires. The spatial boundaries of the space humans inhabit for the purpose of living will eventually have to be confined to basic human requirements. The spaces that humans inhabit are required to be used more efficiently; increasing the functional use and designing for adaptive multiple uses. As spaces become larger the ability to use the space efficiently greatly decreases as the resource to operate the spaces increases.

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1 INTRODUCTION

1.1 INTRODUCTION

The architectural problem that motivates this project is the process of designing confined space that is derived from the Japanese infill strategy. The Japanese have been designing confined space as a direct response to population growth and the limitations of land availability in their densely populated cities. Confined sites in Japan have evolved because of an urban frontage tax and the acceptability of subdivision of sites into properties under 0.1 hectares in size. The spaces designed in Japan are confined, efficient and functional with the ability to be adapted for multiple uses. Their spatial qualities are rich with light, texture and volume (although confined).

As the population of developed cities worldwide continues to increase and the available land decreases, the pressure to increase the city boundaries and to build residential tower blocks grows. The last century has shown us that this method does not work. Tokyo has rejected the urban planning ideals of Europe and America in relation to suburbia, favouring an internal regenerative ideal based on the life cycle of their houses. The Japanese also have rejected the ideal of European and American housing, opting instead for “deprogramming” this type of housing in Tokyo. They no longer accept an “individualised” programme, in turn freeing their houses from intolerance, aiming to increase cooperation, and thereby increase the vibrant tolerance of the city’s living spaces.

Space within our modern cities at times is underutilised, or inefficiently used. We can learn from the Japanese how to use our space more effectively. By using this underutilised space more effectively we can increase density and, at the same time, reduce urban sprawl and tower block developments. The infill strategies that the Japanese employ in their designs can teach the rest of the world how to effectively deal with the issue of underutilised urban space.

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3 ibid.
1.2 RESEARCH OBJECTIVES

The aspiration of this project is to present an alternative approach to living within the inner city in New Zealand. A new strategy is required to bridge the gap between the detached suburban house and the inner city apartments that are available. New Zealanders are reluctant to give up the three bedroom detached house. This is due to the need to be connected to the exterior environment through exterior space that is either indirectly, or directly, connected to the land. The current inner city housing is devoid of this link to the exterior environment that is associated with the detached house.

The objective of this project is to design a residential building that offers a connection to the exterior environment on a confined inner city site. The Japanese infill housing has illustrated that residential building can occupy the smallest pieces of land within the inner city, while still providing private exterior space. This project will investigate and use the strategies developed by Japanese architects when designing a building on a confined site.

The final architectural design will meet the requisite needs of creating efficient and functional space that results in a comprehensive design. The design will enrich the spatial feeling of the available confined space, while also increasing the density and enhancing how the space is inhabited. The context in which the proposed design is sited has influenced the spatial configuration and relationship of spaces within the final building.
1.3 PROJECT OUTCOMES

The underlining motivation of this project is to understand the strategies used in the design of Japanese infill housing. How can this be translated and used for New Zealand housing? Can these Japanese strategies be used to develop good spatial qualities through the use of light and material selection, by the accommodation of multiple functional use of each space within limited site spatial boundaries, but continue to design spaces suitable for human inhabitation within the limitations of confined space for New Zealanders?

Key outcomes include:

• An in-depth understanding of the design strategies employed by Japanese architects when designing confined space.

• A systematic process of designing confined space.

• The functional limitations of confined space.

• Obtain the knowledge of creating confined spaces that has a rich spatial quality.

1.4 PROJECT LIMITATIONS

Discovering the strategies that Japanese “infill architecture” uses by obtaining specific information relating to Japanese infill architectural practice has been difficult. Most of the information available is published in journals and magazines and the articles tend to relate to a simple narrative about the spatial configuration and material used in the building. The imagery from these journals and magazines has been the main source of information for this project. However books published by architects Atelier Bow-Wow and the book "After the Crash: Architecture in Post-Bubble Japan" by Thomas Daniell have given an insight into the reasons for infill architecture in Japan and the methods undertaken to design the infill buildings. There has been a language barrier with some literature on Japanese architecture and architects being written in Japanese, with either no direct or a limited English translation.

A trip to Japan was planned for May 2011. That was cancelled due to the devastating earthquake that happened in Japan in March 2011. The trip could not be rescheduled for financial reasons and because the on-going disruption of the earthquake and recovery would have affected the ability to undertake my research. The trip was going to form a large part of my research and understanding of the Japanese infill architecture along with the architects’ design processes.
2 CURRENT KNOWLEDGE

2.1 PRECEDEENTS

The following is a selection of precedents from both Australasia and Japan that have had the most influence on this project. These precedents represent the intentions of this research project: the creation of an inhabitable space within confined dimensions that creates an atmosphere through occupation. The occupied atmosphere of space is intended to have the same qualities of a nineteen thirties photograph by Hans Baumgartner of a café at a students' hostel of men sitting around and enjoying themselves of which Peter Zumthor asks the following question about the space, which I also ask myself: “Can I achieve an atmosphere like that, its intensity, its mood. And if so, how do I go about it?”⁴. I believe the answer is No, but I can provide the space to be inhabited, it is the occupiers who at the end of the day create the atmosphere, which the photographs of this space records.


Figure 2.1.1: Student Housing, Clausiusstrasse. Hans Baumgartner, 1936, Zurich.
2.1.1 Buildings

2.1.1.1 Sky Box

Architect: Gerald Melling - Melling Morse Architects
Location: Wellington, New Zealand
Year Built: 2001
Size: 8.0 x 3.6 metres, 87 square metres

Sky Box is an inner city house designed and built for the architect as his Wellington residence. The apartment is located above an existing industrial building, within walking distance of Cuba Street precinct. The house is built over three levels and access is gained through the building below.

The Sky Box house is one of New Zealand’s best examples of how buildings in New Zealand can be designed within limited dimensions. Although the house is small, there is an abundance of natural light that pours through the large amount of glass used in the façade from east to west creating the illusion of more space5. The use of simple materials and building techniques in their raw and unfinished state is very similar to Japanese infill buildings. This precedent illustrates that a house can be disconnected from the land, while remaining visually connected.

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Figure 2.1.3: Sky Box Floor Plans.

Figure 2.1.4: Sky Box Photo.
2.1.1.2 Notebook

Architect: David Melling - Architect Central
Location: Wellington New Zealand
Year Built: 2007
Size: 6.8 x 6.0 metres, 120 square metres (40m² garaging, 40m² living, 40m² roof deck)

Notebook is a small house designed and built for the architect on the city fringe of Wellington, within walking distance of Cuba Street precinct. The house is located on a small site on the border between a residential and a light industrial area. The house is a studio apartment over a garage with a rooftop deck that acts as the guesthouse. The garage is for the villa on the adjacent site.

The Notebook house is another good example of the New Zealand response to designing on small inner city sites. Once again the use of large amounts of glass openings on the exterior gives the illusion of more space and a connection with nature in the city. A macrocarpa tree overhangs the roof deck, which further reinforces the connection with nature. This repeats the footprint of the house. The owner and architect, David Melling, describes the deck as "without any interference, and the generosity of space is an affront to the suburban backyard". And that the "nearby apartments suffer the indignity of over-sized barbecues bulging from miniscule balconies like a bodybuilder in a thong". The living space has been planned extremely efficiently with no wasted space, although some areas could benefit from slightly more floor space. The house reflects the New Zealand way of life through material selection.

7 Ibid., 99.
2.1.1.3 Small House

Architect: Domenic Alvaro – Woods Bagot
Location: Surry Hills, Sydney, Australia
Year Built: 2011
Size: 7.5 x 6.0 metres, 225 square metres (45m² garaging, 135m² living, 45m² roof deck)

Small House is designed and built for the architect on an unused site that went unnoticed and was often forgotten by passersby. The house is located on a small corner site, behind a larger residential building. The living areas of the house have been designed over three levels topped off with a rooftop garden.

The Small House is an example of the Australian response to designing single unit housing on small, leftover sites within the inner city. Ted Quinton comments in his article about the house that “it posits a way of living that is effective, efficient and relevant to inner-city locations and it highlights a significant need to re-look and rethink how we consolidate our urban fabric\(^8\). The design of the house has drawn inspiration from Japanese infill housing, with adaptation to Australian culture. The materials used throughout the house are polished and refined, the spaces are spacious and generous, taking advantage of planning rules for the site. The architect, Domenic Alvaro, commented that “the house was designed for “myself and partner Sue, plus one,” and this space can be organized to accommodate an additional sleeping zone should the need arise\(^9\).

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\(^9\) Ibid., 47.
Large amounts of glass have been used in this design to create a connection to nature, with the large rooftop deck reinforcing the connection further. The composition of the façade and the spatial configuration of space within the building have provided guidance in forming this project.
2.1.1.4 Crane House

Architect: Atelier Bow-Wow
Location: Karuizawa, Nagano, Japan
Year Built: 2002
Size: 21.65 x 9.8 metres (triangle shaped), 143 square metres

The Crane House is designed for the clients as a weekend house, set in the lush Japanese countryside. Although the dimensions of a small site do not confine the house, the spatial boundaries of the site have been determined by a number of established trees on the site. The triangular shape of this house is similar to the shape of the site of this project. The spatial configuration and the methods of dealing with the different angles within this house have provided guidance in forming the spatial layout of this project.
Figure 2.1.12: Crane House Floor Plan.

Figure 2.1.13: Crane House Photo.
The Shallow House has been designed for the client as their primary residence. The house is situated at an intersection within a densely built up urban environment, devoid of nature. The only possible access to nature is the vegetation located on the rooftop garden. The house has been designed to maximise all available space within the building controls. The Atelier Bow-Wow architects comment that this “house makes us experience this space as “shallow”, but brings us a sense of openness in spite of the limited space”\(^\text{10}\) This is due to the relationship between the windows and interior of the house\(^\text{11}\). The furniture and stairs have played a major role in the spatial configuration, with the shape determined by the site boundaries. Atelier Bow-Wow have developed their multiple level house around the stairs and their relationship to the interior spaces that they border. This has given them the ability to occupy a narrow site with a circulation system that does not dominate the spatial configuration while relating to the “occupiable” space and has provided guidance in forming the spatial layout of this project.

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\(^{10}\) Yoshiharu Tsukamoto, and Momoyo Kajima. Bow-Wow from Post Bubble City. (Tokyo, Japan: INAX Publishing, 2006), 69

\(^{11}\) ibid., 69
Figure 2.1.15: Shallow House Floor Plans. Figure 2.1.16: Shallow House Photo.
2.1.1.6  Ako House

Architect: Atelier Bow-wow
Location: Setagaya, Tokyo, Japan
Year Built: 2005
Size: 7.4 x 5.6 metres, 85 square metres

The Ako House is situated at Y intersection within a quiet, yet densely built up, urban environment with an urban park across the intersection. The house has been designed around the circulation system and the relationship of the circulation to “occupiable” space. The Atelier Bow-Wow architects comment that this building is an invitation to ascend, which is done by the "vertical circulation being kept along the outside walls, and floor levels and their concomitant staircases become integrated by the addition of deformed or warped surface. By contorting along the right side, the wall gradually changes its inclination towards the horizontal”12. The circulation system is a journey through the building, only revealing the next flight of stairs once the current flight has delivered you to the space you were traveling to. This has been manifested in the house by a series of split levels that facet into the level above and below, creating a dynamic spatial quality within the spaces. The circulation system, spatial configuration and layering of space have a guiding influence, forming the interesting spatial layout and spatial quality of this project.

Figure 2.1.18: Ako House Floor Plans.

Figure 2.1.19: Ako House Cross Section.

Figure 2.1.20: Ako House Photos.
2.1.1.7 Sky Trace House

Architect: Kiyoshi Sey Takeyama - AMORPHE
Location: Kiyoshi, Tokyo, Japan
Year Built: 2006
Size: 10.0 x 8.0 metres, 76 square metres

The Sky Trace House is yet again situated on a cramped, asymmetrical corner site within a built up urban environment. The house has been designed to maximise the strict planning, height and shading regulations imposed on the site, in turn creating a sculptural form. Thomas Daniell writes about the form of Sky Trace: “the house may look like an arbitrary sculptural shape, but the building volume simply follows the site perimeter and rises to the three-dimensional envelope defined by the code. By maximizing the volume in this way, Takeyama exceeded the permitted 60 percent site coverage, so his next move was to excavate a courtyard space within the volume”\(^\text{13}\). The form of the house has been further enhanced by the square openings cut into the white sculptural façade, revealing the solid concrete structure behind, and the faceting of the corner to create a refuge for pedestrians. The sculptural result of designing the house to the strict height and shading regulations provided guidance for the design of the overall form, and its cross sectional spatial quality.

Figure 2.1.22: Sky Trace Floor Plans & Section.

Figure 2.1.23: Sky Trace Photo.
2.1.2 Books

2.1.2.1 Graphic Anatomy: Atelier Bow-Wow

*Graphic Anatomy* is a selection of Atelier Bow-Wow’s house projects that have been drawn to scale in great detail. Each house has been depicted with a floor plan and section drawn as a one point perspective, combined with a high level of detail within the drawing, accompanied by a selection of construction details. Although the drawings read flat, due to the lack of line-weight and shadowing, the drawings have provided incredible elemental insight into the spatial configuration and layering of the building that photos alone of the building cannot portray. The drawings, combined with the interior photos from *Behaviorology*, another of Atelier Bow-Wow’s books, seem like a near substitute for an actual visit to these houses.
2.1.2.2 Behaviorology / Atelier Bow-Wow

Behaviorology is a book based on Atelier Bow-Wow’s research into behaviour of humans interacting with each other, and their relationship to nature and buildings. However, this book is also a selection of their work, from houses to furniture to installations, with very good photography. The photographs of the buildings show occupation, by humans and furniture, while depicting the materiality, quality of light and spatial experience of inhabitation within the space. Each of the following photos has had an influence in forming the spatial quality of this project.
2.1.3 Interior

The quality and observations of the following interiors are the qualities that this research project is exploring and the qualities that I intend to create within this design project. Aspects of each of the interiors, whether it is spatial, volumetric, materiality, light or through the execution of the spaces have had an influence.

2.1.3.1 Tower House

The Tower House is, literally, a tower, it is designed over 10 split levels, with the stairs as the focal point and division between levels. The interior spaces of the house are brutal, consisting of unfinished concrete walls and floors; the dining area within the house is one of the most powerful spaces. The dining room a is double height space that doubles as the entry and office space outside of meal times. The space is furnished sparsely with only a bookshelf, dining table and chairs. The space is dominated by the stairs and the balloon-like light fitting hangs low in the space, providing a blast of colour. Although the space is only 3.5x3.1 metres in plan size, open stairs connect the space to spaces beyond the stairs on the other levels, creating a sense of more space. The windows within the space are above eye level, allowing light into the space while framing a view of the sky and trees beyond. The volumetric spatial quality, materiality, quality of light, and layering of programme, has produced a dynamic space rich in atmosphere with volumetric feel about twice its actual size.
Figure 2.1.27: Tower House Dining Room Photo.
2.1.3.2 Gae House

The Gae House is a three-level house, largely devoid of windows, with the main source of light being from windows in the eave around the perimeter of the upper level. The interior of the house changes as you move up through the house. The basement consists of the foundation wall to approximately 1.2 metres in height with a timber framed wall above, all the timber framing is left unfinished. The ground is completely timber framed and painted white, the first floor is natural timber cabinetry to 0.9 metres with a sloping, unfinished metal ceiling. The study room is one of the most dynamic spaces within the house, the room is located in the basement, but is open to the first floor. The space is lined with light timber bookshelves on all four walls, full of books of different sizes and colours, placed on the shelves without any order or arrangement. The space is rich with texture, colour and material, creating an enclosed heaven to retreat away to, which is bathed in reflected light from the white timber surfaces above.
2.1.3.3 Gak House

The Gak House is a two level house that is divided into individual compartments. The interior is finished in a light plywood on the ceiling, walls and floors. The library space is a passageway to the main bedroom and bathroom, lined with bookshelves housing books of different sizes and colours arranged together according to size. The space is devoid of direct access to natural light, but is bathed in light from an opening in the bookshelves to the stairwell; the step in the ceiling (floor above) creates the impression of a skylight void above the desk at the end of the space. As you move through the library you enter from the light and travel into the dim light of the library before reentering the light at the desk as you exit the space. The quality of this space is similar to that of the study room in the Gae House, yet it is more confined and cave like.

Figure 2.1.30: Gak House Cross Section.
2.1.3.4 Crane House

The Crane House is a single split level house that is completely enclosed by glass with the trees creating privacy from the exterior. The interior of the house is scattered with steel structural columns of varying different diameters, with the floor, wall and ceiling surfaces lined with light timber. The living space is a wedge shape with the widest space being the living room and the narrowest space is the TV room. The atmosphere and quality of the space is enhanced by the direct connection to nature through glazed walls. The quality of light is almost overwhelming, with the eaves and trees acting as the only control. The volumetric change through the space complements and enhances the connection to nature, with the stepping of the floor down to the ground and sloping ceiling, which appears to curve at the narrowest point. The overall quality of this space can only be achieved through constructing the building within nature, but the configuration of the spatial volume along with materiality influenced this research project.
Figure 2.1.33: Crane House Living Space.
2.1.3.5 Asama House

The Asama House is a single level, two rooms plus utility space house with a framed roof that has divisions to symbolise the intended spaces below. Each of the major roof spaces has a skylight in the centre, creating dynamic light that changes the quality of the space throughout the day. The interior spaces of the house are soft, warm and homely with natural timber floors and walls, with plasterboard ceilings painted white. The atmosphere of living space has changed considerably from the sparse architectural photograph at completion to the occupied photograph once the owner has inhabited the space.

The designed intention of a space almost never represents the actual way a space will be inhabited, occupied and used by the occupier. The architect's intention for the space was for cooking, dining and living with the bedroom off this space. The architect's furniture arrangement is sparse, with only the bare essentials for living. The arrangement of furniture creates an illusion of space and openness, giving the impression of more space. Whereas the occupied spaces has largely ignored the architect's intentions by introducing sleeping to the space and a lifetime of treasures that the owner has collected. The space no longer has the illusion of openness, it has become smaller, intimate and livable; the space is now rich with life. The occupied atmosphere of this space has the same qualities as the Baumgartner photograph (figure 2.1.1) and the atmosphere that Zumthor wishes to create through his architecture.
Figure 2.1.35: Asama House Living Space Unoccupied Photo.

Figure 2.1.36: Asama House Living Space Occupied Photo.
2.2 LITERATURE

2.2.1 After the Crash: Architecture in Post-Bubble Japan

This book is a collection of essays that document the evolution of Japanese architecture during the Japanese economic crash of the 1990's. The crash saw the need to use all available land, paved the way for using land that was once considered unusable. In turn, that gave birth to modern infill Japanese architecture and allowed architectural practices such as Atelier Bow-Wow to move from “fieldwork” to actual design work. They quickly demonstrated the ability to transform problematic environments into a positive source of invention14.

There are five essays within the book that relate directly to this research topic, “Kazunari Sakamoto: Keeping the Faith”, “The Refraction House”, “Two Degrees of Separation”, “Pushing the Envelope”, and “Fitting In: Small Sites in Urban Japan”. These essays give an insight into the reasons Japanese infill architecture has developed, the unique volumetric forms, spatial configurations and quality of interior spaces that also relate to contemporary social changes in Japan.

“The narrow living spaces found in many avant-garde house designs are sometimes mistakenly seen as ideological choices, yet they are generally no more than unavoidable consequences of the size of the available building sites”15. “The narrow sites first came about through the medieval jiguchisen [urban frontage tax] law that levied a property tax that was calculated using the width of the street boundary rather than the

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15 Ibid., 51.
The size of sites within cities have further decreased through rapid cycles of demolition and reconstruction, combined with a planning law that does not require planning permission for subdivision of sites under 0.1 hectares in size.

The unique volumetric forms that have come about are not as a result of an aesthetic choice, but as a response to the allowable heights, setbacks, site coverage, floor areas, and building profiles that are strictly defined. “The shapes of the buildings are the direct result of maximizing building volumes inside the legally defined diagonal planes known as shasen”\(^\text{17}\). The intention of the shasen is to prevent buildings blocking their neighbours’ sunlight and air\(^\text{18}\).

The material selection for the infill Japanese architecture has been a direct response to affordable and available materials, often left in their raw unfinished states. The interiors of the Japanese house are designed as free flowing spaces to encourage the social interaction of the family unit. The interior spaces are divided with sliding screens and families sleep in the same room by choice\(^\text{19}\). The private room, which was introduced to Japanese houses after World War II, has lead to a breakdown of family structures. The aspect of communal living that has reinforced social and human interaction, while discouraging behavioural problems that has developed within the Japanese society.

\(^{16}\) ibid., 163. 
\(^{17}\) ibid., 63. 
\(^{18}\) ibid., 165. 
\(^{19}\) ibid., 58.
2.2.2 Bow-Wow from Post Bubble City

The book is a journey through the works of Atelier Bow-Wow up until 2006; the majority of their work consists of individual houses. Principal architect Momoyo Kajima “cannot avoid thinking about both their [the houses] social positioning and their architectural positioning. I then became concerned with how to relate architecture to the appearance of the “individual” in post-war Japan.” Atelier Bow-Wow’s design process has developed from this and is broken down to twelve different issues that each of their projects fit within.

Kajima describes the issues as “an observation of things and phenomena existing in reality, because we want to know what is recurring there. If a phenomenon is caused by such repetition, it is interesting to produce a phenomenon that is slightly different from usual by intervening in the method of repetition.” Yoshiharu Tsukamoto, the other principal, continues to break down their interest in creating phenomena into two methods, inductive or deductive. “The inductive method is guided by the composition of principles and conditions that give rise to a number of phenomena, and the deductive method is to insert the principles so obtained into new conditions, alter the composition of conditions, and produce a distinct phenomenon.” Kajima goes on to say that the inductive and deductive methods “cannot be accomplished in a single project, but implemented across various projects. That is why our house designs are gradually changing.”

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21 ibid., 9.
22 ibid., 9.
23 ibid., 9.
Atelier Bow-Wow’s implementation is clearly illustrated in their twelve design issues. All twelve have provided an insight into their design process, forming an understanding of how they create their house and in turn have informed my design process. There are six that have reinforced the design of this project, “Depth”, “Built Form”, “Site”, “Smallness”, “View”, and “Conventional Element”.

Kajima and Tsukamoto describe the issue of “depth” with the term “Oku”. With “Oku” there are multiple meanings and terms given to the word. Kajima classifies “Oku” as having two grades: “there is Oku as a character of place that results from spatial organisation, and Oku as layered meanings that satisfy various social contexts. The former is a phenomenon caused by topological relationships of spaces (parallel, layered, nested) and connective relationships of rooms due to circulation routes and apertures”24. “Oku” can be characterised into architectural space by the following: division of “in” and “out” defined by inclusion relation, division of “back” and “front” according to circulation, connection to outside by openings, and connection to lifeline25. The idea of “Oku” is generally referred to in western culture as the intimacy gradient, with public activities at the front and the more private activities further back. This idea also translates into the connection of the interior to the exterior, which is an important aspect in New Zealand culture. Oku continues throughout Atelier Bow-Wow’s other twelve issues.

The idea of the “built form” is how to design a building that is connected to the context in which it is built. Tsukamoto describes the detached houses that were built following World War II through to the bubble economy and the collapse as “works of architecture, and I acknowledge their collective cultural value. Yet at the same time, systematically and compositionally they occupy a fairly Manneristic realm, and in this I feel that they exist isolated from the reality of life”26. He continues with “we addressed the question of how to build in the townscape; in other words, by thinking about the “built form”, conversely, we drew in the context that encloses this kind of detached house”27. Atelier Bow-Wow reject the standard approach of designing detached houses in Japan by not giving up the part of the site that has direct access to sunlight to a garden. They occupy the entire site within the planning controls, aligning interior spaces to the sun determined by their hierarchy. Their goal is to create a building that is in harmony with the townscape.

Atelier Bow-Wow defines the “Site” as having two dimensions. The first [“career”] is to do with why such small lots and strange shaped sites emerge in the city of Tokyo, which then becomes a premise for architectural activity. This is also connected with economics and sociology, as an interest in the social climate that surrounds the site and the history of a site. The second is how to treat the physical “shape” of a site, which is an interest in the specificity that comes from within the site28. However, they do not limit their thinking to the shape in plan, but also refer to aspects such as the slope of the topography and the quality of the view29. Their response to the site is specific to the site; they

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24 ibid., 13.
25 ibid., 15.
26 ibid., 25.
27 ibid., 25.
28 ibid., 51.
29 ibid., 61.
are concerned with the junction of the site to the context that the site is situated within. The corner sites have the most important roles due to their positions within the street; they are the place where architecture and city can achieve union to create an urban sense. Tsukamoto believes the corner is “perceived as a place where two surfaces are assembled, or perceived as a singular point”\(^{30}\). How this corner and the junction are treated will determine the continuity of the existing context on the streets that the corner connects.

Atelier Bow-Wow explores the issue of the window through three issues “Smallness”, “View”, and “Conventional Element”. Each issue deals with one part of the creation of the window. “Smallness” deals with the orientation of windows and furniture within a small space. Tsukamoto talks about “smallness” in a small building as, “extremely important to regulate the orientation of objects and the orientation of people”\(^{31}\). The first items to orientate within a house are the people, followed by the furniture; each item has different dimensions and ways of placing. The orientation of windows with the items added creates various possible orientations to the interior, but if these orientations are not skillfully regulated, the space becomes inconvenient and uncomfortable\(^{32}\).

\(^{30}\) ibid., 61.
\(^{31}\) ibid., 85.
\(^{32}\) ibid., 85.
The level of convenience and comfort are farther more enhanced by the “view”. The “view” deals with outlook from the interior and how this is controlled. Whether the outlook is overwhelming nature, picturesque scenery, sky or an urban environment, it is nonetheless important. To completely close off a bad view would be too serious, tense or unimaginative, creating an imbalance in our natural, animal instincts to be connected to the environment. By controlling the view a positive sense of place can be created that is not overwhelming to the senses, this is controlled by framing and filtering the view through the placement of the openings.  

“Conventional Element” deals with the placement and size of the openings within the building. The windows and doors are the boundaries between interior and exterior. A building’s purpose can be understood through the size and proportion of the openings and their layout on the building façades. The impression of the building can be changed through minor changes in the size of very obvious elements. Windows at the same location may be slightly enlarged or reduced; this change in proportion can enhance the appearance of the building.  

33 ibid., 101.
34 ibid., 123.
3 DESIGN / RESEARCH

3.1 DESIGN PROCESS

3.1.1 Programme

The programme of the proposed building is of a mixed-use nature incorporating retail, offices, and predominantly residential housing of no more than two bedrooms. The residents of the building will typically be the occupiers of the retail and office space, with internal connection between the different activities where appropriate.

The retail is designed predominantly for boutique style fashion shops and café with a sheltered courtyard, concentrated on the street frontages. The office space is designed predominantly for small businesses. The residential housing is designed predominantly for people of an age range of 25-35 that are single, or in a relationship with one child under the age of 5.

The existing urban fabric will influence and inform the massing of the building and the composition of the exterior envelope with the intention of adding coherently to that existing urban fabric.

The spaces within the proposed building are to be confined, yet efficient and produce functional space that is easily adaptable for multi-use. The spatial configuration and relationship of spaces are required to create “interlocked” and “woven” spaces that enhance and inform the boundaries of the spaces. The use of material, light, shape and volume will be the key components for the creation of these spaces. The design will enrich the spatial feeling of confined space, while enhancing how the space is inhabited.
Figure 3.1.1: Site Analysis.
3.1.2 Programme Analysis

3.1.2.1 Site

The analysis of the programme in relation to the site has formed the basis for this project. Understanding the elements of the site and its context has allowed decisions on which of these elements are to be included or excluded from the design.

Environmental elements of the site are the biggest considerations that need to be analysed. In every design sunlight and view are the elements that this research project wants to maximise, while blocking out the storm wind, street noise and traffic noise.

The proximity to the urban environment's amenities encourages the residents within the building to use the surrounding shops, business, public transport and public green space.
Figure 3.1.2: Building Analysis.
3.1.2.2 Building

The analysis of the programme in relation to the building has formed the basis for the building layout. Understanding each of the building’s functions and their relationships with the others allows decisions on where each function should be within the building and their connections. The relationships of the environmental elements that are to be included or excluded can be highlighted in relation to the functions of the building and their importance to the functions.

Figure 3.1.3: Building Analysis.
3.1.2.3 Circulation

The analysis of the circulation highlights the different connections required between the different programmes within the building.
3.1.2.4 Apartment

The analysis of the apartment breaks the apartment down to each function that the apartment needs to provide. The relationships between each of the functions are made clear, while showing the level of privacy that is required between functions. The environmental elements that are to be included or excluded are highlighted in relation to their importance to the functions.
Figure 3.1.6: Shop Analysis.
3.1.2.5 Shop & Office

The analysis of the functional arrangement of the shop and office in more detail allows a greater understanding of the relationships between each of the programmes required functions. The function's accessibility between staff, customers or clients, exterior and other programmes within the building can be clearly depicted.
3.2 SITE

3.2.1 Site Requirements

The site for this research project will be located within a built up urban environment that still has potential for redevelopment within confined limitations.

The criteria for choosing the site are:

• The boundaries, dimensions and shape shall confine the site, with the surrounding context imposing limitation and confinement in relation to the boundaries. The maximum width of the site should not exceed 6 metres.

• An existing under-utilised site with the benefit of rejuvenating the surrounding urban fabric. The outcome of the development should enhance the site and local area so that it contributes to the existing urban fabric while conveying the intentions of the building.

• Located in the vicinity of public transportation systems to encourage the occupants to use public transport.
3.2.2 Site Location

The criteria led to an investigation of Karangahape Road in Auckland. Karangahape Road has a large selection of historic buildings with modern buildings integrated into the historic fabric with some success at creating a cohesive urban environment. There are three sites on Karangahape Road that were chosen for investigation: the first site at 1-5 Upper Queen Street, the second site at 166-170 Karangahape Road, and the third site at 170 Karangahape Road.

3.2.3 Council Rules

Building Height: within 6 metres of the Karangahape Road frontage 14 metres above mean street level. With 45 degree recession plane from 14 metres above Karangahape Road mean street level. With a maximum height of 35 metres above the lowest street mean street level.

Site Intensity: 4:1 for basic floor area ratio / 6:1 for maximum total floor area ratio (for sites that give extra public amenity).
3.2.4 Site One

**Site Location:** 166-170 Karangahape Road, incorporating the right of way to 180 Karangahape Road, 170 Karangahape Road and 160 Karangahape Road.

**Site Area:** The area of the site is approximately 486 square metres. The site has an unusual shape that follows the shape of the Ironbank building. The combination of the three sites has given an approximate Karangahape Road width of 10.6 metres, Cross Street width of 6.6 metres and a length of 50.8 metres, becoming wider towards the middle of the site for 3.8 metres.

**Site Characteristics and Land Form:** The site is located on the bustling Karangahape Road and connects through to the quiet Cross Street with Ironbank to the east of the site. The Karangahape Road street frontage consists of two non-descript deco façades, of an approximate height of 14 metres. The building houses a dairy at street level and apartments on the remaining two levels above the street. The Cross Street frontage is a concrete paved alleyway that services the Lim Chour Supermarket Building, 180 Karangahape Road, 170 Karangahape Road and 160 Karangahape Road. The alleyway is under utilised and takes up approximately 60 percent of the site. The topography of the site consists of a slight gradient in the alleyway from Cross Street rising to the north, with an approximate 5 metre rise from Cross Street to Karangahape Road.
Adjacent Properties: The surrounding context is predominantly two to three level buildings, approximately 8 to 12 metres in height, with the exception of Ironbank directly to the east with a Karangahape Road frontage height of approximately 20 metres and 29 metres to the Cross Street Frontage. To the west of the site is the Lim Chour Supermarket Building with a Karangahape Road frontage height of approximately 14 metres through to the George Court Building with a Karangahape Road frontage height of approximately 22 metres.

Massing: This mass model is based on the council rules for the site, and accommodates the neighbouring building windows, providing a light well on the north side to light an internal courtyard.

Site 1 does not fully meet all the criteria for this project. The three sites are under utilized in terms of development potential within the Auckland City Council Planning Rules for the Karangahape Road area. The incorporation of the three sites has removed the element of confinement that this research topic is investigating and the site does not meet the requirements for site selection. The Cross Street part of the site offers confinement in relation to the boundaries, whereas the Karangahape Road part of the site does not because the boundary dimension is greater than 6 metres in length. The site has the ability to design confined space within the boundaries, but is lacking the ability to design to confined space. Site 1 has been eliminated for this research topic as the site does not satisfy the dimensional criteria of the boundaries that determines confinement.
3.2.5 Site Two

Site Location: 170 Karangahape Road, inclusive of half the alleyway from Cross Street.

Site Area: The area of the site is approximately 282 square metres. The site is a long, rectangle shape with a bend and steps towards the middle of the site where the site narrows, with an approximate Karangahape Road width of 5.9 metres, Cross Street width of 3.0 metres and a length of 50.8 metres.

Site Characteristics, Land Form, and Adjacent Properties: Site 2 is a smaller version of Site 1, site characteristics, landform, and adjacent properties are identical.
**Massing:** This mass model is based on the council rules for the site and permissible buildable area.

Site 2 does meet all the criteria for this project. The shape and widths of the site are similar to that of the sites used by the Japanese for their infill projects, although the length of the site is double that of the Japanese sites. The length of the site has, to a degree, removed the element of confinement that this research topic is investigating. The overall mass of the building that can be built has transformed the possible building from a confined infill building into a building of a similar scale of a standard apartment building. For this reason site 2 has been eliminated for this research topic.
3.2.6 Site Three

Site Location: 1 -5 Upper Queen Street.

Site Area: The area of the site is approximately 143 square metres. The site is a triangle shape with an approximate width of 11 metres, and a length of 26 metres. The northeastern corner of the site has a Right of Way for carpark access to the adjacent property of National Bank.

Site Characteristics and Land Form: The site is located on the corner of Upper Queen Street, which is a busy arterial road, and Cross Street. The site frequently experiences a high number of pedestrians being drawn from the Newton area due to the close proximity to the bustling Karangahape Road. The site is currently vacant, having an informal grass park and billboard. The building on the western boundary clearly shows signs of the former building that occupied the site before being demolished to allow the expansion of Upper Queen Street in 1990’s. The topography of the site consists of a gradient. Rising to the northwestern corner from the Upper Queen Street boundary, with a 2 metre fall along the street boundary.
Adjacent Properties: The surrounding context is predominantly three level buildings approximately 10 to 12 metres high. The site has buildings bordering the north and west boundaries with the site open to the south and east boundaries. The National Bank building on the northern boundary has a height of approximately 7 metres, while the building on the western boundary has a height of approximately 12 metres.

Massing: This mass model (figure 3.2.13) is based on the council rules for the site, which produces unusable space on the upper floors. This mass model (figure 3.2.14) is based on the council rules for the site, while ignoring the 6 metre step back at 14 metres above street level. This produces a more usable space on the upper floors, with a sloping exterior wall.

Site 3 meets the criteria for this research project. The shape, dimensions and area of the site are similar to that of the sites used by the Japanese for their infill projects. The site is also currently under-utilised and has more potential than the site’s current use. For these reasons site 3 has been chosen for this research project.
3.3 SITE ANALYSIS

Analysis of the surrounding urban environment was undertaken to successfully integrate the proposed building within the urban context. The investigation was undertaken into the site and the surrounding context through the following subheadings:

3.3.1 The Site

The site is positioned on the corner of a major arterial road and a quiet service lane. The corner position creates a visual gateway to Cross Street, encouraging pedestrians from Karangahape Road, rejuvenating the surrounding urban fabric. The bustling, built up urban environment of Karangahape Road is within walking distance of Myers Park one of Auckland’s major green spaces within the city centre.
Figure 3.3.1: The site context.
3.3.2 Topography

The site is located on the south and descending side of an east west ridge. The gradient on the site itself rises 2 metres to the northwestern corner from the Upper Queen Street boundary, which is visible along the street boundary. The topography of the site was altered after the original building was demolished for the widening of Upper Queen Street. The contours were batted towards the western boundary, with an additional fall of 1.7 metres across the northern boundary, creating a total height difference of 3.2 metres across the site.

Figure 3.3.2: Cross Section Thru Site.
Figure 3.3.3: Topography.
3.3.3 Environment and Vistas

The site is situated in an urban context with southeasterly aspect, enjoying unobstructed morning sun. The neighbouring buildings obstruct the sunlight from midday through to sunset. However, they are only of 7 and 12 metres in height, any part of the building above this will receive unobstructed sunlight all day long. With the winter sun being at a lower angle, the sunlight will be further obstructed below the existing building line.

The area of Karangahape Road is sheltered from the warm northerly winds by the built up urban context. However, this context in combination with a motorway interchange to the south and west intensifies the strong and blustery southerly wind. This wind is funneled through streets, constantly changing direction and creating wind vortices.

The urban context of the site creates a disconnection with natural vistas at street level, where a disjointed urban fabric becomes the vista. Once above the rooftop of the low lying neighbouring buildings Auckland’s natural vista is revealed. With a 360 degree view from the Auckland Harbour through to the Waitakere Ranges in the distance, including the Auckland Domain and Mount Eden, the view is only limited by a small number of tall buildings.
Figure 3.3.4: Environment and Vistas.
3.3.4 Site Context

The photographs below illustrate the following characteristics of the urban context:

- Currently the site is used as an informal city park and billboard.
- The remains of the previous building that occupied the site are clearly visible on the façade of the neighbouring buildings.
- The site is under-utilized at present and, thus, warrants redevelopment.
- The buildings that neighbour the site are of a varied and inconsistent arrangement of building heights, masses, materials and styles.
- The buildings that were built before the 1990’s share a similar architectural language, relating to each other in height and composition.
- The buildings that were built from the 1990’s onwards have largely been composed independently of the surrounding context, in turn creating a disjointed urban fabric. These buildings have largely been developer driven.
- The façades of the neighbouring buildings are visually fighting against each other, allowing for no visual rest and offering little architectural inspiration to inform the new building on this site.
Figure 3.3.5: Upper Queen Street looking east panoramic.
Figure 3.3.6: Cross Street & Upper Queen Street panoramic.
Figure 3.3.7: Upper Queen Street looking west panoramic.
3.3.5 Street Level Activity

Currently street level activity in the surrounding urban fabric for pedestrians is concentrated on Karangahape Road, with a lack of activity on the surrounding side streets. At street level on Karangahape Road the activity is predominately that of retail, cafés and bars, where the surrounding streets are commercial, industrial, car parking and residential. The development of the Ironbank building at 150-154 Karangahape Road has brought a little bit of street level activity to Cross Street of retail and a café; other retail shops are slowly developing within close proximity to this development.
Figure 3.3.8: Street Level Activity.
3.3.6 Patterns of Movement

The following are observations that I have made about the patterns of movement during visits to this urban environment at differing points throughout a day and week. The urban environment in which the site is located has three main patterns of movement: private vehicles, public transport and pedestrians. Each of these movements are in a constant battle with each other to exist simultaneously within the environment at peak traffic flow periods, resulting in large amounts of frustration within their movements and interactions with one another.

3.3.6.1 Traffic

The urban environment has a number of important arterial roads that service the motorway system along with the neighbouring suburbs. These roads are often gridlocked at peak traffic flow times of the day, bringing the traffic in the area to a complete stop. The motorway onramps within the area only add to this congestion, making the arterial roads an extension of the motorway. The surrounding streets either feed the arterial roads or remain completely quiet.
Figure 3.3.9: Traffic.
3.3.6.2 Public Transport

The site is located within close proximity to three of Auckland's major bus corridors that service the eastern, southern, and western suburbs. The bus corridors terminate at the Britomart transport interchange, Downtown and Midtown bus stops within the Central Business District. Bus stops are located within a 5 min walk from the site, allowing for easy access to public transport.
Figure 3.3.10: Public Transport.
3.3.6.3 Pedestrians

Currently the urban environment has a high pedestrian flow both at peak times and in the times between. Karangahape Road is active during the day and even more so after dark when the Road and surrounding streets are injected with life. Karangahape Road draws pedestrians from the Central Business District, the University, the Hospital and Newton; along Queen Street, Upper Queen Street, Symonds Street, Grafton Bridge and Myers Park. However, the flow of pedestrian traffic past the site remains low at all times due to the lack of interactive activities at street level.

The area features four through building links that connect Karangahape Road to the surrounding area. The link through St Kevin’s Arcade connects to Myers Park and is frequently used; the Karangahape Road car park has two links with the link through the Lim Chour Supermarket Building being the preferred link to use; and the newest link through Ironbank connecting to Cross Street.
Figure 3.3.11: Pedestrians.
3.3.7 Conclusions Drawn from Analysis

The analysis of the urban environment and the context has produced the following aspects that will be influential on the design:

- The position of the site on the corner of a major arterial road and a quiet service lane gives the site prominence that requires a building to anchor the corner and provide a visual gateway to Cross Street.
- The site has the opportunity to rejuvenate and activate Cross Street at site level.
- The proximity of the site to Karangahape Road and major bus corridors.
- The overall massing and heights of the neighbouring buildings and the topography will be a generating element in the design.
- The buildings around the site create an urban built environment that offers little or no inspiration to help form the final design outcome.
3.4 DESIGN PROCESS AND DEVELOPMENT

3.4.1 Guiding Principles

Through analysis of the precedents and the urban context of the proposed site the following guiding principles will form the foundations for this design proposal:

• Translation of the programme analysis into a built form.
• Providing for maximum sunlight and visual outlook, while screening unwanted street and traffic noise.
• Massing and integration of the building with the surrounding context.
• Spatial planning: providing volume of space in confinement.
• Provide all the necessary functional elements required for day to day activities of living.
3.4.2 Stair Exploration

The stair exploration was an investigation into the possible location of the circulation system within the building footprint, using the analysis of the circulation. The location of the circulation system within this project is critical and will create additional constraints to the planning and the quality of spaces within the building.

Stair exploration one is based on the mass model for site 3 (figure 3.2.13 & 3.2.14) with a subterranean retail space below ground level entry from the southern corner of the site. The main circulation system is located in the northern corner of the site. Stair exploration two is a continuous stair on the eastern façade of the building, traveling from the northern corner to the southern before doubling back to the north. Both exploration one and two restricted the interior access to the exterior and sunlight. Stair explorations three and four are continuations for stair exploration two. The placement of stairs in the centre of the building divides the building into narrow and long spaces, limiting exterior and sunlight access to the western space. Placing the stairs on the western wall allows all spaces within the building direct access to the exterior and sunlight with no restrictions.
Figure 3.4.2: Stair exploration two.

Figure 3.4.3: Stair exploration three.

Figure 3.4.4: Stair exploration four.
Figure 3.4.5: Stair exploration five.

Stair explorations five through to eight are an investigation of a centralised circulation system with an internal garden to create a connection to nature. Explorations five and six are of a basic scissor stair, with the stairs either on the interior wall or the exterior wall. In five the stairs and movement is protected from the street by the internal garden and vegetation, where six is the opposite. In exploration seven and eight the stairs encompass the interior garden, creating a focal point as a person moves along the stairs. The circular form of exploration eight creates a free flowing stair that forms an organic boundary to the garden. The stair, however, creates problematic space between the stair and exterior boundaries of the building, although these spaces could become interesting stair landings. The notation of a stair that is associated with an internal garden is nice, but is not practical for a confined site.
Figure 3.4.6: Stair exploration six.

Figure 3.4.7: Stair exploration seven.

Figure 3.4.8: Stair exploration eight.
Stair exploration nine continues the investigation of explorations five to eight, minus the interior garden. The placement of the stair in the middle of the building divides the building into separate parts, disconnecting the southern part of the building from northern sunlight. Design exploration one to three has explored the stair in this location and ways to connect the southern aspects of the building to the northern side.

Stair explorations ten through to twelve are an investigation of locating the circulation system in the southern and narrowest point of the site. The explorations explore how to best interact with the point of the corner, as either the point of entry, the stair landing or the elevator. Design explorations four to six have explored the circulation system in the formation of stair exploration twelve.
Figure 3.4.10: Stair exploration ten.

Figure 3.4.11: Stair exploration.

Figure 3.4.12: Stair exploration twelve.
3.4.3 Exploration One

The first exploration was an investigation using the analysis of the programme, site and precedents to manifest a physical form for the site. The massing of the building was a direct response to the topography of the site and the massing of the context. Small gestures within the massing to push the building beyond the physical boundaries were made for two reasons: to give relief and depth to the overall mass, and to provide additional internal space. The Auckland City Council building control rules have informed the maximum buildable height for this massing.

The building is divided into four key elements; retail, office, circulation, and apartments. The basis for the apartment was the traditional narrow, rectangular shaped Japanese infill house, with outdoor space on the roof. The positioning of the apartments in this arrangement was to maximise the footprint area while gaining exposure to sun, light and vistas.
Figure 3.4.13: Ground floor plan exploration one to three.

Figure 3.4.14: First floor plan exploration one to three.
Figure 3.4.15: Second floor plan exploration one.

Figure 3.4.16: Third floor plan exploration one.

Figure 3.4.17: Fourth floor plan exploration one.
3.4.3.1 Outcomes of Exploration One

The unrefined mass form of the building is proportional to the existing site context and suggests a possible successful integration. The expression of massing does not relate or draw any inspiration from the existing context, almost completely ignoring it. The massing gestures made provide a relief and depth to the form that generate interesting characteristics to the massing.

The spatial configuration and planning of the building has developed space and corners within spaces that are unusable. The overall feel of each space lacks the volumetric feeling of the Japanese infill architecture, resulting in bland spatial experience. The southern apartment does not receive northern sun at any point of the day, completely losing sun before midday. With the outdoor spaces being located on the roof, their usability and access from living spaces diminishes to the point of not being used at all.
Figure 3.4.18: Mass perspective in context exploration one.
3.4.4 Exploration Two

The second exploration is a continuation of the first, modifying the overall massing of the building to create an interlocked plan form. Within the massing the gestures of relief are continued with the addition of exterior space that has been subtracted from the mass. This exploration has concentrated on the apartments, leaving the retail, office and circulation space unmodified. The southern apartment remained largely the same, with no attempt to amend the lack of sunlight and access to the exterior space. This was intentional to allow the exploration of interlocking the two north apartments together.

The northern apartments have produced two apartments that sit on top of one another rather than true interlocking. The two apartments derive their forms from each other, creating split level apartments that express their level changes on the exterior. Each apartment has been designed to have direct access from their respective living spaces to outdoor space that is not overlooked from the apartment above.
Figure 3.4.19: Second floor plan exploration two.

Figure 3.4.20: Third floor plan exploration two.

Figure 3.4.21: Fourth floor plan exploration two.
3.4.4.1 Outcomes of Exploration Two

The overall massing of the building has not changed the proportion and relationship to the context, with the integration staying isolated. The gestures to the massing have added additional relief and depth to the building, creating a juxtaposition of forms that are fighting to co-exist with each other.

The spatial configuration and planning has evolved from the rectangular shaped apartments from exploration one, adding volumetric depth to the space. There are still a number of corners within this exploration that are unusable, creating large amounts of wasted space. A large amount of space has been taken over for circulation within each apartment, which is undesirable. The connections to the exterior space of the northern apartments have improved, creating direct connection from the living space. However, the space is lacking the efficiency of spatial use and quality of the Japanese infill architecture.
Figure 3.4.22: Mass perspective in context exploration two.
3.4.5 Exploration Three

The third exploration is a continuation of the second, modifying interlocking mass of the building. The interlocking has been taken to the next level, actually locking each apartment together. The gestures that were created in the previous two explorations have pushed the physical boundaries of the space, giving the mass additional relief and depth. In turn the gestures have created usable exterior space within close proximity to the living spaces.

The three apartments have been interlocked and woven together in a similar form to the game Tetris. The forms of the apartments have been derived from the space left over by the other apartment, in turn creating the possibility of volumetrically small spaces similar to the Japanese infill architecture. Each of the apartment’s spatial planning is a continuation of the last exploration, concentrating on the form of the planning and the connection to the exterior space from the living space.
Figure 3.4.23: Second floor plan exploration three.

Figure 3.4.24: Third floor plan exploration three.

Figure 3.4.25: Fourth floor plan exploration three.
3.4.5.1 Outcomes of Exploration Three

The proportion and form of the massing has changed, creating more height to the building and additional depth to the façade. The relationship to the contexts remains isolated with no integration. The juxtaposition of the forms is still not in harmony with each other.

The spatial configuration and planning of the apartments are still dominated by the circulation creating large amounts of inefficiency. The building’s main circulation system is void of an elevator; the stair is inefficient and occupies too much floor space for the function of movement through the building. When the circulation system is in the middle of the building, functions within the building are divided into two parts, disconnecting the southern end of the building from direct sunlight.

The unusable corners within the spaces have largely been eliminated from the design, with only a small number remaining. All living spaces have direct access to their exterior spaces, however, not all are north facing. The quality of volumetric depth of space is still absent from the design.
Figure 3.4.26: Mass perspective in context exploration three.
3.4.6 Exploration Four

The fourth exploration was an investigation in creating apartments and a building that was not dominated by the circulation system, along with using the site shape more efficiently. For this exploration the circulation system from stair exploration twelve has been used to develop a more efficient circulation system. The placement of the stair and elevator in the southern point of the building has activated the narrowest part of the building. The new stair system has required the design of the building to start from scratch with the outcomes and lessons learnt from the previous explorations used to inform this exploration.

The ground floor has been developed into a shop and café with an exterior dining area. The exterior dining area has been sheltered from the street by placing one of the retail spaces between the exterior space and the street. The entrances into the retail spaces and circulation system have been recessed into the building to create relief from the street and to create a sense of a formal entry. The office spaces on the first floor have been developed around the circulation system and void created to provide light and sun to the café’s exterior dining space. The office spaces are long and narrow, creating a gallery type office space, where all staff sit in a row.

The apartments have remained on the second to fourth floors of the building. This exploration has chosen to respect the physical boundaries of the site and height controls with only minimal breaches for window seats. The apartment planning was further restricted by the void for the café exterior space with three, one bedroom apartments and associated exterior spaces have been developed. Apartment two began to explore an increase in volumetric space over the need for more floor space.
Figure 3.4.27: Ground floor plan exploration four.

Figure 3.4.28: First floor plan exploration four.
Figure 3.4.29: Second floor plan exploration four.

Figure 3.4.30: Third floor plan exploration four.

Figure 3.4.31: Fourth floor plan exploration four.
3.4.6.1 Outcomes of Exploration Four

The proportion and form of the mass has considerably changed, creating additional height and mass. The form has become an extrusion of the plan, void of architectural gestures that create depth to the façade, other than minor window seats and recesses. The circulation space breaches the height controls for the site and creates a further disconnection with the surrounding context. The forms of each function within the building are still not in harmony with each other.

The circulation system within the building is still occupying a large amount of space; the height of the system needs to be decreased to fit within the height controls. The spatial configuration and planning of the apartments is no longer dominated by circulation. The space within each apartment is now being used more efficiently, but the quality of the space has been removed. The apartments are now bordering on “developer style” shoebox apartments; there is also a need for at least one, two bedroom apartment within the building. The problem of unusable corners within the spaces throughout the building has been eliminated from the design. The exterior space associated with the café and the void above the space work will to create a sheltered space with access to direct light.
Figure 3.4.32: Mass perspective in context exploration four.
3.4.7 Exploration Five

The fifth exploration is a continuation of the fourth, with the interlocking apartment spaces from exploration three reintroduced to the massing of the building. The circulation system has been modified to create a more dramatic stair, with the stair breaching the physical boundaries of the site and height controls. These breaches have created sculptural form to the façade, although out of context with the context and massing of the building. The ground and first floors have largely remained the same with very minor changes.

The apartments have continued to develop from exploration four, while reintroducing the quality of spaces that had been developed in exploration three. Apartment one has become rectangular, with a minor pop out to create more space within the living area. The deck is suspended across the void in front of apartment two. Apartment two has become a spilt level apartment with living and sleeping on the second level, with void down to the kitchen space. Apartment three has become the two bedroom apartment with bedrooms on the lower floor and living above. All the exterior spaces are now located on the northern façade with direct access to sunlight.
Figure 3.4.33: Ground floor plan exploration five.

Figure 3.4.34: First floor plan exploration five.
Figure 3.4.35: Second floor plan exploration five.

Figure 3.4.36: Third floor plan exploration five.

Figure 3.4.37: Fourth floor plan exploration five.
3.4.7.1 Outcomes of Exploration Five

The proportion and form of the mass has reverted to the physical boundaries of the site and height controls, with two minor breaches for the stairs and an apartment pop out. The form is still basically an extrusion of the plan, with the breaches and recesses creating more depth to the façade. The form of the building needs to break away from basic massing and form an envelope that will form the final building’s façade. The relationship of the mass to the context has improved and is beginning to respect the neighbouring buildings. The forms of each function within the building are becoming more in harmony and complementing each other.

The circulation system has been compressed in the north-south direction and increased in width to accommodate the stair, creating three different flights of stairs. The height has been reduced to fit within the height controls, with no direct access to the fourth floor. The spatial configuration and planning of the apartments has become more refined, with circulation spaces within the apartments having double uses. The circulation spaces between levels within the apartments create dynamic and volumetric spaces. The outdoor space of apartment one is not desirable being placed within the void to the café exterior space and across the northern face of apartment two. Separating the kitchen and living space in the apartment is undesirable and they should be on the same level to create flow from the kitchen to the exterior space. The ground floor, café exterior space, first floor and apartment three are developing very nicely. The problem of unusable corners within the spaces throughout the building has not been fully eliminated from the design.
Figure 3.4.38: Mass perspective in context exploration five.
The building form exploration was an investigation into possible final building forms based on the floor plans, cross sections and massing of design exploration six. The form of the building is the first impression a viewer gets as they approach the building; their opinions of the building are largely made at this point in time. If the exterior of the building is not beautiful or pleasing to the eye, why would they choose to enter the building to explore the interior spaces?

Building form exploration one was the first attempt at creating a façade over the mass (figure 3.4.40) of design exploration five. The overall form has been draped over the mass, with façade faceted over the footpath and car park entrance to the National Bank, which has a right of way across the site. The height control planes have formed the point at which the building fillets away from the street façade to form the roof of the building. The café exterior space void has been faceted over the mass to create a façade surface that will encourage light, both direct and reflected, to enter the courtyard. The entry fillets in to the building have been expressed across the façade, creating northern facing windows to the upper levels.
Exploration two is a continuation of the first; the entry fillets expression has been continued from the façade to the roof, creating roof windows for the fourth floor. The remainder of the building has remained largely unchanged. The façade has taken on an interesting form that reads as a series of steps, creating intrigue. The entry fillets in both exploration one and two have given relief to the façade and created additional shade lines to give depth to the form.
Figure 3.4.43: Building form exploration three - north.

Exploration three is a continuation of the second, the roof fillet has been removed and the façade has been faceted to apex of the form. This has created a more dynamic and interesting form, but has decreased considerably the useable floor space within the form.

Figure 3.4.44: Building form exploration three - south.
Exploration four has reverted back to the first exploration form; the entry fillets have been closed in at the upper levels of the building increasing usable floor space. The entry fillets have been screened from the street, creating sheltered entry points into the building as pockets instead of the traditional verandahs.
Exploration five is a continuation of the fourth, there have been two changes made to the façade form. The first being the line of the roof fillet that has been changed from a horizontal line to a line that slopes down at edges of the transition between the wall and roof planes. The second being the addition of saw tooth roof lights to the roof that face north and east to encourage sunlight into the upper floors of the building. The form is becoming cohesive and feeling integrated, with the exception of the roof lights.
Exploration six is a refinement of the fifth, removing the multiple faceted faces and replacing them with continuous one piece plane. The roof lights have been integrated into the form creating the impression that the roof surface has been recessed to form the roof lights. The overall form of the façade is very cohesive and all the elements are very integrated with one another. However the form does not comply with the physical boundaries of the site and height controls, the façade that faces Upper Queen Street extends out over the footpath.
Exploration seven is a continuation from the refinement of the fifth and sixth explorations, the form has been pulled back to fit within the physical boundaries of the site and height controls. The Cross Street façade has been lowered in height to match the height of the neighbouring building. The facet has been reintroduced to the Upper Queen Street façade to help lessen the overall impression of the height.
Exploration eight is a continuation of the seventh, with the roof lights being filled in to create exterior volumetric space within the building. By removing the roof lights, the form has become cohesive with all parts of the façade form being integrated and in harmony with each other.
3.4.8.1 Outcomes of Building Form Exploration

The overall proportions and form of the building conforms to the physical boundaries of the site and height controls. The form of the building is a sculptural object that draws lines from the National Bank building to generate the points and angles for the facets to occur. The heights of the neighbouring buildings have been respected. The form will develop and become a building once material selection and openings are added, giving the building scale and proportion.
Figure 3.4.55: Mass perspective in context form exploration.
3.4.9 Exploration Six

The sixth exploration is a continuation of the fifth, with the idea of designing within the physical boundaries of the site and height controls with no breaches through the envelope. The circulation system has reverted back to being identical to stair exploration twelve. The ground and first floors have largely remained the same with the building entrance being modified, the café and retail space being rearranged. The entrances into the building have been modified from recesses into the building to fillets that encourage pedestrians into the building as they move south along Upper Queen Street.

The apartments have continually developed from exploration five, with apartment one and two being modified to resolve the issues from the previous exploration. The quality of the spaces has continued to improve along with the outlooks from each space. No space within the building looks into another, with exception of the café’s exterior space. Apartment one has been modified to incorporate the outdoor space within the form; the bathroom has been moved closer to the bedroom space. The bedroom and kitchen in apartment two have been swapped to create a connection between the living spaces. Indications of window placements and sizes have been shown with an exterior screening system over the windows.

The three sections through the building are an indication of the volumes of the spatial configuration, and their relationships to the exterior of the building and each function. The quality of the spaces has been depicted through the use of furniture, people and windows. The sections show the double height spaces of apartments two and three, and the exterior space of the café. The relationship of the café’s exterior space and the National Bank can be seen, the bank will block sunlight into the courtyard during winter, while allowing sunlight in during summer.
Figure 3.4.56: Ground floor plan exploration six.

Figure 3.4.57: First floor plan exploration six.
Figure 3.4.58: Second floor plan exploration six.

Figure 3.4.59: Third floor plan exploration six.

Figure 3.4.60: Fourth floor plan exploration six.
Figure 3.4.61: Section one exploration six.

Figure 3.4.62: Section two exploration six.
Figure 3.4.63: Section three exploration six.
3.4.9.1 Outcomes of Exploration Six

The overall proportions and form of the mass have not changed drastically from exploration five, the mass now conforms to the physical boundaries of the site and height controls. The form is no longer an extrusion of the plan; the mass has been faceted to meet the height control angles. The mass is now relating to the context in respect to heights of the neighbouring buildings. The form of the functions are now complimentary to each other, forming a cohesive mass with all parts in harmony.

The building entrances work very well in relation to the street, freeing the façade at ground level, allowing the façade to act as advertising for the retail spaces. The entrances also encourage pedestrians to change their path and enter the building. The café space works better with the exterior and interior parts of the café being in a direct line from the street. However, the serving counter needs to move from the northern side of the café to the southern to have a closer link to the kitchen. The retail storage space / back room could move to the southern side of the space to create more efficient retail display space. The office space has become narrow with the space bordering on being inefficient, with office space two being too small to be tenantable. The associated toilets with the offices are in a prime location within the building and dislocated from the services core, making disposal of waste difficult.

The apartment spatial configurations are well on their way to resolution. Apartment one has become very long and narrow, with a tight pinch point as you enter the apartment and pass the kitchen. The outdoor space is half internal, limiting access to direct sunlight. The bedroom and ensuite space is out of proportion with living spaces, creating an imbalance within the apartment.

Apartment two has the beginnings of resolution. The proportions of the living space are developed well, with the access through the kitchen to the living space being undesirable. The voids above the living and outdoor space provide a welcome volumetric change from bedroom and kitchen spaces. However, the location of the bathroom next to the entry is not ideal, nor is the stair to the second level of the apartment.

Apartment three is the most resolved out of the three apartments, with the living space needing further development to make the space more efficient, eliminating bottlenecks within the space. The problem of unusable corners within the spaces throughout the building is almost eliminated from the design.
Figure 3.4.64: Mass perspective in context exploration six.
3.4.10 Exploration Seven

The seventh exploration is a continuation of the sixth, resolving the issues that arose from previous exploration, while refining the spatial planning of the building. The circulation system and the mass of the building have not been modified in this exploration. The ground and first floors have largely been rearranged to accommodate the outcomes of the previous exploration. The café and retail spaces have had the service areas moved from the northern aspect of the spaces, freeing this for the customer. The office space has become one large space, with the services moved from the façade to the western (internal) wall, making disposal of waste more efficient. The space has become more effective, with the creation of spaces that enclosure their proposed tasks.

The apartments have continually developed from exploration six, with apartment one and two being modified to resolve the issues from the last exploration. The spaces within each apartment have become efficient without narrow unusable spaces. The wall between apartment one and two is now dividing the two apartments equally. Apartment one no longer has the tight pinch point through the kitchen space, the space remains long and narrow, with the circulation space doubling as functional space, while allowing for movement through the apartment. The exterior space, although still internal within the building, is now more open to the exterior. The bathroom has been relocated to the northern corner to create a direct connection from the bedroom to the exterior space.

Apartments two and three have largely remained the same, with minor modifications to accommodate the stairs between levels within the apartments and the dividing wall between apartments. The sections also have remained largely the same, with the spatial planning changes and the cross sectional relationships between spaces depicted. The building form has been developed to incorporate the openings, shutters and exterior spaces, adding the openings has given scale to the form. This in turn has begun to transform the form and mass into a physical building.
Figure 3.4.65: Ground floor plan exploration seven.

Figure 3.4.66: First floor plan exploration seven.
Figure 3.4.67: Second floor plan exploration seven.

Figure 3.4.68: Third floor plan exploration seven.

Figure 3.4.69: Fourth floor plan exploration seven.
Figure 3.4.70: Section one exploration seven.

Figure 3.4.71: Section two exploration seven.
Figure 3.4.72: Section three exploration seven.
3.4.10.1 Outcomes of Exploration Seven

The overall form of the mass has not changed, the proportions have begun to transform with the addition of openings within the façade. The openings, along with their associated shutters, are not in harmony with the form. They have been generated only in cross section and plan form; they require further exploration to compliment the form. The openings at ground level work well and are complimenting the form and façade shapes with the openings to the exterior outdoor spaces beginning to solidify with the form.

The circulation system is working well within the allocated space. The café, retail and office spaces are well resolved now, with good connections to the exterior and circulation. The layout of furniture within the spaces needs more refinement to utilise all available space wisely. The spatial configurations of the apartments are largely resolved with only minor modifications to the placement of furniture and to the exterior openings within the façade to compliment the form. Apartment one still needs additional modifications to the spatial planning, the bathroom is disconnected from the living spaces and is located within the northern façade. Overall the spatial configuration of the building is largely resolved with the problem of unusable corners, bottlenecks within the apartments, and inefficient space throughout the building being eliminated.
Figure 3.4.73: Mass perspective in context exploration seven.
4 CRITICAL APPRAISAL OF THE FINAL DESIGN

The purpose of this project was to investigate whether it is possible to design an inner city apartment building on an under-utilised and under-developed site that will bridge the gap between the detached suburban house and the inner city apartments that are available currently. The residential aspect of the building has a direct connection to the exterior environment, with the interior space enriching the spatial feeling of the available confined space while also increasing the density and enhancing how the space is inhabited. The process used for this investigation was research by design. Throughout this process background literature, precedents, design process, and design exploration have been a major contributing factor in reaching the final outcome.

4.1 CIRCULATION SYSTEM

The circulation system is a combination of entry/exit points and vertical movement throughout the building. The building’s entrance has been designed as an extension to the footpath; to engage pedestrians to enter the building as they pass the building heading south along Upper Queen Street and to engage exiting occupants of the building to head towards Karanagahape Road.

The placement of the building’s circulation system has been critical in the conception of the massing and spatial configuration of the building. By locating the stair and lift in the southern and the narrowest part of the site, the northern aspect of the site has been freed up for inhabitation. The placement of the stair in this location allows for the most efficient use of the site, along with the compact design of the stairs, landing / corridors, and lift.

The vertical movement system through the building forms the spine to interact between the different functions. The system has incorporated the vertical elements for movement, as well as horizontal elements where travellers can pass and interact with one another. Throughout the movement path the traveller on the stairs is visually aware of their departure point and their intended arrival point through the openness of the stairs between flights and landings. The circulation system encourages occupiers to use the stairs over the lift, with their movements vertically through the building being visible through the translucent concrete cladding to the exterior.
4.2 MASSING

The massing of the building is a direct response to the shape of the site and Auckland City Council planning rules for the Karangahape Road precinct, minus the 6 metres set back. The height control plane angles, along with the site density ratio, have informed the initial form of the mass. The mass has further been altered to maximise usable floor space while giving relief to the form.

The massing and form of the neighbouring buildings have had a direct influence on the mass. The angular line of the National Bank façade has been projected on to the mass of the building, while being further emphasised. The lines that have been drawn from the National Bank have also formed the additional folds in the façade, which were not dictated by the Council planning rules. The Cross Street façade has been lowered below the height plane angles to match neighbouring buildings heights. By drawing lines and heights from the neighbouring buildings the mass has been anchored to its context.

4.3 SPATIAL CONFIGURATION

The spatial configuration of the building is a direct response to the shape and topography of the site, with the site analysis forming the orientation of the spatial layout within each function. The circulation system within the building has been the generating driver in the creation of the spatial configuration of the building, with all functions in direct relation. The laying of the functions, and internal layout of the functions within the building, are based around the intimacy gradient. Each space has been designed spatial in plan, cross section and three dimension massing to create the interlocking of functions. The interlocked spaces have created unique interior spaces and layouts within the confined dimensions of the site, which have been further enhanced by the internal spatial layout of each function. The building is laid out over five levels, with a retail and café space, along with the main entry on the ground level, an open plan office on the first with three apartments spread across the remaining three levels varying in size from one bedroom to two bedroom apartments.

The apartments have been designed to maximise all the available space within the massing form, while eliminating all unusable corners and space. Each apartment has been spatially laid out to maximise access to direct sunlight throughout the day and year, with direct access to a north facing private outdoor space that overlooks the Karangahape Road area. The interior spaces all receive sunlight throughout the entire year, except the café exterior space which loses sunlight in late winter. No spaces within each apartment are overlooked by another space within
the building, other than the café’s exterior courtyard. Shutters on the exterior of the building are used to control, light, noise and views into the building from the neighbouring buildings. Apartment one is a small one bedroom apartment designed on one level, with varying ceiling heights throughout the apartment. Apartments two and three have been designed over two levels with double height spaces above internal stairs and higher ceilings within the living spaces. The combination of direct sunlight and the vertical volumetric changes throughout each apartment adds to the spatial quality of the space, enforcing the privacy gradient within the apartment. The direct access to the exterior private deck reinforces the residence’s connection to nature and exterior environment through the view that overlooks the Karangahape Road area.

4.4 APPRAISAL

The design that has been produced as a result of this research topic illustrates that unusable or forgotten sites within our in cites have the opportunity for redevelopment as standalone sites, within the boundaries of local council planning rules. This design has produced a highly functional and efficient use of space within the bounds of a confined site. The resulting form of the building, although not in keeping with the surrounding context, compliments the neighbouring buildings.

4.5 FUTURE DIRECTIONS

This research topic is site specific, with numerous different options for each site. The following are possible future directions that this research topic could investigate:

- Analyse and compare traditional Japanese houses built on confined sites with their contemporary counterparts to determine if the methods and techniques have differed over time.
- Analyse infill housing based on the site’s planning rules.
- Research and analyse multi-unit apartment buildings and compare their levels of confinement and density with infill housing.
- Research and analyse infill housing based on site shape, dimension and urban fabric density, comparing the various techniques employed.
- Analyse built examples of infill architecture through visiting and experiencing the buildings.
5 PRESENTATION OF THE FINAL DESIGN

5.1 IMAGERY

CONSTRAINTLY INHERED HABITATION

The exploration of spatial configuration that produces efficient, functional and interlocking spaces derived from the Japanese infill strategy within the limitations of confined space

JOHN BROADBENT - 1229997
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Figure 5.1.4: Ground Floor Plan.

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The exploration of spatial configuration that produces efficient, functional and interlocking spaces derived from the Japanese infill strategy within the limitations of confined space.

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Figure 5.3.2: Final Presentation.
The exploration of spatial configuration that produces efficient, functional and interlocking spaces derived from the Japanese infill strategy within the limitations of confined space.
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