Active Living Architecture

Master Thesis explanatory document

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ABSTRACT

This thesis project is an architectural response to the global obesity epidemic. Obesity prevalence rates are increasing around the world at such an alarming rate, that a problem which was not a pressing issue two generations ago, is now threatening to be a health issue on a scale the world has never seen before. The consequences of the obesity epidemic are far reaching and devastating. Cardiovascular disease, diabetes and premature loss of life are but a few of the possible consequences.

The question for the architectural profession is: Does architecture have a role to play in helping to reduce the prevalence of obesity? Although easy to say that architecture is not responsible for peoples’ increasingly sedentary lifestyles and unhealthy eating, research around the world is beginning to suggest differently. This project is an exploration, based on literature reviews and precedent studies, on how one piece of architecture can be designed to encourage the expenditure of calories through physical activity on a daily basis and promote healthier eating, with the aim of shifting people away from lifestyles that lead to obesity.
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1.0 INTRODUCTION

1.1 Research question

*How can a single piece of architecture be designed to encourage people to expend calories through physical activity on a daily basis and promote healthier eating, with the aim of shifting them away from lifestyles that lead to obesity?*

1.2 Project aim

The aim of this thesis project is to demonstrate that the built environment we inhabit can be designed to help in the currently seemingly futile battle against global obesity.

1.3 Project limitations

The problem for this thesis project is; how can one piece of architecture help prevent a worldwide epidemic? The simple answer is one building cannot. Instead this project aims to display an example only of how architecture can influence physical activity levels and promote healthier eating. It is intended that for the most part only residents living in the proposed development will gain any noticeable difference in their health while residing in the development, and even then only if they make the most of the facilities. It is recognised that only if buildings are designed in mass with the aims of this thesis project (and the New York Active Design Guidelines[^1]) in mind will they make a difference to populations’ obesity prevalence rates.

2.0 CURRENT STATE OF KNOWLEDGE

A wide range of literature, particularly from journals, newspapers, web pages and other online documents has been reviewed for this project, covering topics ranging from the health benefits of nature on people to the un-sustainability of worldwide food systems. Much of this literature has had only a minor, if any, influence on the design of this project. Such a broad range of topics has been surveyed in search of ideas on how to design a building which will help combat obesity. In this ‘sea’ of literature I found useful information on why, and recommendations on how, architecture can or should be used in the fight against obesity. Literature which is of central importance to this project is summarised in the following sections.

2.1 The Obesity Epidemic

Obesity is caused by an individual’s gradual gain in weight. In most cases weight gain occurs over a long period of time due to an imbalance in the amount of calories consumed versus the amount of calories expended. Based on data from national surveys in America it has been estimated that correcting this imbalance by as little as 100 kilocalories per day (by reducing energy intake and increasing physical activity) could prevent weight gain in most the population\(^2\). To put this in scale, an average size apple contains 53 kilocalories, and an average size orange contains 99 kilocalories.

A person is considered overweight if their Body Mass Index is over 25 and obese if it is over 30. This number is calculated by a persons mass in kilograms divided by their height in metres squared. \(\text{BMI} = \frac{\text{Kg}}{\text{m}^2}\)

Nationally and internationally the prevalence of obesity has increased so rapidly in the past two decades it is now described as an epidemic\(^3\). In 2008 the World Health Organisation estimated that globally around 200 million adult men and 300 million adult women were obese, and that a further 1 billion adults were overweight\(^4\). Just as worrying, they state that 43 million children under the age of five were overweight in 2010\(^5\). Perhaps the most worrying fact listed on the WHO website is that the worldwide obesity epidemic has more than doubled since 1980\(^6\).

Although New Zealand isn’t one of the very worst countries in the world for obesity prevalence rates, the New Zealand statistics are still reason to be gravely concerned. In 2006/2007 the New Zealand Health Survey found that 36.3% of adults are overweight and a 26.5% are obese, and 20.9% of children aged 2-14 are overweight and 8.3% are obese\(^7\).

The 2006/2007 New Zealand Health Survey found that only 50.5% of New Zealand adults met the definition of being regularly physically active (defined by the Ministry of Health as doing 30 minutes of physical activity a day, at least 5 days a week). In the Auckland area this rate was found to be even lower at only 41.8%. The survey also found that 12.8% of Auckland adults are sedentary, meaning they are not even physically active for a total of 30 minutes per week\(^8\).


\(^5\) Ibid.

\(^6\) Ibid.

\(^7\) Ministry of Health. Obesity in New Zealand.

The Ministry of Health also lists findings from the 2006/2007 New Zealand Health Survey relating to unhealthy food consumption, which also has known links to obesity rates. They state findings such as 70% of children aged 2-14 had eaten fast food at least once in the seven days before the survey, and one in five children in this age range had consumed more than three fizzy drinks in that period.9

The consequences nationally and internationally of obesity are already beginning to become devastating. Obesity is a risk factor for a number of diseases including coronary heart disease, stroke, diabetes, high blood pressure, osteoarthritis and some cancers.10 The World Health Organisation rates overweight and obesity as the fifth leading risk for global deaths, and estimate that 2.8million adults die each year as a direct result of being overweight or obese, in addition to contributing to heart disease, diabetes and certain types of cancer.11 In New Zealand cardiovascular disease (heart, stroke and blood vessel disease) is the leading cause of death annually, accounting for 40% of all deaths, for which overweight and obesity are a major contributor.12

Type 2 Diabetes, which according to the World Health Organisation, is largely the result of excess body weight and physical inactivity,13 threatens to become a major health concern in itself. Diabetes New Zealand estimates that by 2020, one in eight adults will have diagnosed diabetes, and similar numbers will have developed diabetes without knowing it yet.14 Diabetes increases the risk of heart failure, strokes, kidney failure, blindness and the need for limb amputations. The WHO rates the overall risk of dying among people with diabetes to be at least twice as high as their peers without diabetes.15 The cost of these health problems is massive and threatens to cripple New Zealand’s health system. In New Zealand treating diabetes and its complications costs $340 million a year, estimated to rise to $1 billion in 2021.16

The World Health Organisation suggests a number of global changes have contributed to the obesity epidemic. These include the shift from manual labour to increasingly sedentary forms of work, changing modes of transportation and increasing urbanisation. Poor urban planning in many areas has lead to cities which encourage sedentary rather than manual forms of transportation. The foods we are eating are also becoming increasingly processed, energy dense and high in fats and sugars contributing to the excess consumption of calories.17

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14 World Health Organisation. Diabetes - Fact sheet N°312
2.2 *We’re sitting ourselves to death*\(^{18}\) - newspaper article from The Dominion Post written by journalist Tom Fitzsimons, July 2011.

This newspaper article looks into the phenomenon of New Zealanders’ literally sitting for such long periods each day that it is causing medical issues such as obesity and heart failure.

Grant Schofield, director of Auckland University of Technology’s centre for physical activity and nutrition quotes in the article a cause for New Zealanders’ excessive sitting. "You go back 100 years in New Zealand," says Schofield, "50 per cent of the workforce was involved in primary agricultural production, and it was not mechanised. Now it’s 2 per cent of our workforce and it’s all mechanised. The reality is that most of us sit all day. I call it the new normal."

Tom Fitzsimons states that the shift from the physical nature of our jobs is in addition to how we get to and from work (largely by car), and how we spend our leisure time. Leisure activities such as TV and Play Station add hours to the amount of time people sit each day. Fitzsimons writes experts say some people spend 16 hours sitting down each day.

Later in the article Grant Schofield quotes "Humans are designed for an unstable outdoor environment in which we’re in more or less constant motion," says Schofield. "We just created a world where you’re scrunched up in a chair the whole day. I mean, it’s just bizarre."

Fitzsimons writes that the sitting phenomenon is a problem of modern times, caused by our wealth and abundance, which allows people to live a life of excess and comfort.

When Fitzsimons asks Grant Schofield if we are aware there is anything wrong with what we’re doing, he replies that to an extent we do, and that is why we have invented places such as gyms. Schofield points out, "Pre-World War II, I'd maintain exercise wasn't really something anyone did or thought of. For the most part, we needed a rest because we were too active. It’s just an invention to get over the fact that we actually sit around the whole day."

2.3 Why current structured forms of exercise are alone not enough to meet populations’ exercise needs, and the recommendation to integrate physical activities into everyday lifestyles

If everyone preformed half an hour of organised physical activity (running, walking, biking, playing sport, working-out at the gym, or similar) three to five times a week there would not be a global obesity epidemic close to the scale we are now seeing. Yet even in well relatively affluent cities like Auckland where facilities and spaces for exercise are abundant people are failing to get recommended levels of exercise (only 41.8% of Auckland residents are getting recommended levels of exercise weekly according to the 2006/2007 New Zealand Health Survey\(^{19}\)). This is in spite of educational campaigns such as Sport and Recreation New Zealand’s (SPARC) ‘Push Play’ series of advertisements. Articles in the Newspapers regularly tell us we need to exercise more, as do doctors. Television programmes such as ‘Embarrassing Fat Bodies’ and a number of Jamie Oliver series make it perfectly clear what will happen to us if we fail to exercise. Yet despite this a large portion of the population is not getting recommended levels of exercise, even though largely aware it is detrimental to their health if they do not.


\(^{19}\) Ministry of Health. *A Portrait of Health – Key results of the 2006/07 New Zealand Health Survey. Physical Activity.*
The 2007 Health Survey for England summarises the barriers to exercise for people living in England. It found that the two main barriers to exercise were work commitments and not enough leisure time. Work commitments were cited most by men (45%), while lack of leisure time was the barrier most frequently cited by women (37%). Caring for children or older people was cited by a quarter of women (25%) but only 13% of men. 13% of men and 16% of women cited lack of money, and 10% of men and 13% of women cited poor health as a barrier to exercise. 21% of men and 25% of women reported lack of motivation as a barrier to exercise, however, almost no one thought exercising was a waste of time.\textsuperscript{20}

To avoid these barriers numerous experts and studies are beginning to suggest that exercise needs to be incorporated into peoples’ daily lives. Elinor Olander is one such expert, who promotes integrating small bouts of physical activity into everyday activities; in particular she advocates the use of stairs. Elinor Olander states in her PhD thesis that a study carried out by Marie Murphy, Steven Blair and Elaine Murtagh confirmed that splitting exercise into small bouts made no differences to the cardiovascular fitness accumulated. What matters is the total time spent active in a day. This confirms that multiple small bouts of exercise which can be incorporated into everyday activities can be just as effective as a single structured piece of exercise (>10 minutes).\textsuperscript{21} Elinor Olander’s thesis also suggests such activities require little motivation to initiate. Walking up a set of stairs for example requires no preparation or commitment, unlike gathering enough time and energy to go to the gym or for a run. As small bouts of physical activity can be incorporated into everyday routines it will require minimal extra time to do, largely removing the barrier of being too busy to exercise and it is almost always free.

### 2.4 The effect of stair usage on the human body

Researchers Kong Chuan Teh and Abdul Rashid Aziz have calculated that it takes the mean person 0.11 kilocalories to climb up a step and 0.05 kilocalories to climb down a step (150mm riser height).\textsuperscript{22} Therefore to burn off the typical extra 100 kilocalories a day needed to reduce obesity (as discussed in section 2.1 of this explanatory document) one must climb up and down 93m of stairs daily, if no other factors are altered.

A 10 year prospective study by S Yu, JWG Yarnell, PM Sweetnam, and L Murray found that as little as 7 minutes total of stair climbing a day will reduce a middle aged man’s chances of coronary heart disease by two thirds.\textsuperscript{23} Per minute stair climbing is an extremely efficient way of burning calories, even more so than jogging.

\begin{itemize}
\end{itemize}
2.5 Active design

‘Active design’ is a term used by the City of New York to describe the designing of any part of the built environment which aims to increase the opportunity for daily physical exercise and the living of healthier lifestyles within cities. The Active Design Guidelines (City of New York, 2010), written by seven New York city agencies in addition to the American Institute of Architects, is a 136 page document which outlines strategies based on research to meet these aims. It has been written as the need to prevent obesity and diabetes, which is tied to the population’s over-consumption of calories and under-expenditure of human energy, has become a pressing issue across America and worldwide. The Active Design Guidelines is the seminal document in this area of design, and it has been followed closely to guide the design of this project. Other authorities, researchers and designers are also beginning to explore this area of environmental design, but none have released findings as complete and holistic as the Active Design Guidelines.

American architect Jack L. Robbins writes of the Active Design Guidelines, "Instead of trying to change individual choices by using a moral appeal about what is good for us (you should walk to work because it is better for you)," Robbins writes, "its about changing the environment to reshape the available choices (you’ll want to walk because it is easier, cheaper, faster, or more enjoyable)."24

Active design is set in contrast to sedentary forms of transportation and circulation. Until now the aim of most designers, building owners and urban planners has been to make buildings and cities as effortless as possible to get around. Lifts, escalators, motorways and large numbers of car parks have encouraged sedentary lifestyles, while stairs are often pushed to the back of the building where they are rarely used. Together these elements have encouraged sedentary rather than active lifestyles.

Architect Wil Alsop proposes a simple answer to combat obesity, "If you really wanted to do something about it," he says, "you could take all the elevators out of all the buildings in London. Then people would be fit."25

Some businesses and public buildings are now so keen to get people active they are even installing slides in their atrium spaces, for example the Corus Building in Toronto and Tate Modern in London. Other buildings such as Tom Mayne’s San Francisco Federal Building are fitted with lifts that only stop every third floor (excluding the accessible lift), to force able bodied people to use the stairs. Such buildings are evidence that building owners and architects are becoming aware of the need to encourage daily physical activity through the design of the built environment.


2.5 Active Design Guidelines (2010, City of New York)

The executive summary of the Active Design Guidelines summarises well what active design is, what it is in response to and why it is needed. In the executive summary it is written, “The rise in obesity is tied to the population’s over-consumption of calories and under-expenditure of human energy, both of which are shaped by the built environments in which we live, work, and play. Today, architecture and urban design too often support unhealthy rather than healthy diets, and sedentary rather than active daily lifestyles. Active design is environmental design that encourages stair climbing, walking, bicycling, transit use, active recreation, and healthy eating. Today, physical activity and unhealthy diets are second only to tobacco as the main causes of premature death in the United States. A growing body of research suggests that evidence-based architectural and urban design strategies can increase regular physical activity and healthy eating.”

The Active Design Guidelines state that design of the built environment (environmental design) will be critical in combating obesity, one of the most pressing health issues of our time, just as the design of the built environment has been critical in the past to defeating infectious diseases. For example, “By 1940 (in New York), environmental design strategies, in combination with societal changes, had successfully controlled infectious diseases like cholera and tuberculosis, even prior to the discovery of almost all antibiotics and other modern medical technologies.”

Key recommendations in the Active Design Guidelines which have influenced this research project:

**Mixed use**

“Research has suggested that greater land use mix is correlated with lower obesity. Evidence suggests that the more schools, grocery stores, newsstands, and other useful destinations in an area, the more likely residents are to walk.”

**Facilitate for cyclists**

“Facilitate bicycling for transportation and recreation by incorporating infrastructure like safe indoor and outdoor bicycle parking.”

**Provide shower and locker facilities.**

**Access to fresh food**

“Studies have demonstrated that the presence of full-service grocery stores in a neighbourhood is associated with healthier diets and lower weight among residents. Conversely, research has associated a high concentration of fast food with increased weight and risk of obesity among area residents.”

**Urban planners and designers can assist with increasing access to healthy foods through the provision and placement of food markets.”**

**Pedestrian pathways**

“Provide seating, drinking fountains, restrooms and other infrastructure that support increased frequency and duration of walking.”

**Parking**

“In general when parking is available, people use it. Research in California indicates that increased parking supply may result in reduced active transportation and public transit use.”

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26 Active Design Guidelines- Promoting Physical Activity and Health in Design, p.6
27 Ibid. p.13
29 Ibid. p. 7.
31 Ibid. p.22.
32 Ibid, p. 36.
33 Ibid. p. 40.
34 Ibid. p. 28.
Building exteriors
“Design building exteriors and massing that contribute to a pedestrian friendly urban environment that include variety and transparency, multiple entries, stoops, and canopies.”

Building programming
“In residential environments, place functions such as community and recreational spaces, mailrooms, and management offices on an alternative floor or a pleasant walking distance from individual residences and building entrances, in order to encourage daily bouts of walking and stair climbing.”

“Design spaces and activities to encourage more personal communication between people within the building, and less sedentary, electronic communication. Provide spaces where people can stay together and engage in productive, pleasant and safe social interaction.”

Appealing and supportive internal walking routes
“Incorporate interesting views along paths of travel within a building. These views may include natural and designed landscapes, nearby architecture, interior views of people-oriented activities, and visually appealing interior finishes. Provide day lighting along paths of travel.”

Building facilities that support exercise
“Provide physical activity spaces such as exercise rooms, active play spaces, and multi-purpose recreational spaces in public, workplace, and residential buildings. Provide these spaces with interesting views. Research indicates exercise is more appealing with views to nature and human activities.”

“Locate physical activity spaces in centrally visible locations in the building, to help increase awareness and use of these spaces.”

Stairs
“Increase stair use among the able-bodied by providing a conveniently located stair for everyday use, posting motivational signage to encourage stair use, and designing visible, appealing and comfortable stairs.”

Stair use is encouraged in the Active Design Guidelines as it is one of the most accessible means for city dwellers to integrate physical activity into their daily lives. Stair use has been proven in studies to burn calories, increase cardiovascular health and raise individuals’ good cholesterol levels.

Figure 2.1: The New York Times Building. Manhattan. Renzo Piano Building Workshop. Stairs are a prominent feature of the building.

36 Ibid. p. 82.
37 Ibid. p. 82.
38 Ibid. p. 84.
39 Ibid. p. 84.
40 Ibid. p. 86.
41 Ibid. p.86.
42 Ibid. p.86.
43 Ibid. p. 7.
44 Ibid. p. 70.
Key stair recommendations in the Active Design Guidelines:45

• Include grand staircases and open interconnecting stairs where feasible

• Locate stairs near building entrances and before elevators are reached.

• Locate stairs along main paths of travel within the building, and near atriums, waiting areas, elevators and the like. The more visible they are the more likely they are to be used.

• Design stair environments that appeal to the senses, so that they are more stimulating to use than an elevator. Highlight interesting views, such as to nature or indoor gathering areas. Select bright appealing colours that attract use. Incorporate natural ventilation to improve indoor air quality, and can provide pleasant auditory distractions.

• Make stairs accessible without barriers to the public parts of the building.

• Make stairs wide enough to accommodate travel in groups and in two directions.

• Create visually interesting stairs, which are safe, well light and easily maintained.

• Provide highly visible signage encouraging stair usage.

• Focus on stairs rather than elevators. Limit the number of elevators, slow them down where possible and make them less visible than the stairs. Consider installing skip-stop elevators.

• In high-rise buildings provide stairs as a means of travel between adjacent floors, so that lifts are used primarily for vertical travel between four or more floor levels.

Above: Figure 2.2: Central staircase at the Metropolitan Museum of Art, Manhattan, Richard Morris Hunt- Research indicates that grand staircases in buildings tend to invite use.

Above right: Figure 2.3: Stair prompt

3.0 SITE

3.1 Site selection

370 Queen Street & 17 Wakefield Street, Auckland Central

When selecting the site for this project the intention was to design an inner city 'healthy' supermarket with recycling facilities on it. At this stage, the site was selected primarily because it was in an area where there are currently no major supermarkets, and it is close to a large supply of pedestrians and residents who could walk to the supermarket to buy their food (and drop off their recycling), rather than needing to drive out to a suburban supermarket. Over the course of the first term the programme of the building changed several times. By the start of term two, the building programme of apartments with vegetable gardens over a farmers’ market had been settled on. The question then was whether to find a new site with the new programme in mind, or whether to work with the existing site and its constraints, even if not ideal for new programme? The decision was made that the selected site had enough good qualities to justify continuing to use it, and working with the site constraints would add another layer of challenge to designing the building.

Reasons for remaining with the selected site:
1) Market places are community buildings which rely on large quantities of people using them. The selected site on Queen Street is highly visible to large quantities of people and traffic. It has more pedestrians walking past it throughout the day and night than virtually any other part of the city.

2) In this location the Farmers’ market can provide fresh local food to large numbers of passers-by, providing an alternative to the dairies and fast food outlets which are numerous in the area.

2) Its location opposite the Auckland Town Hall and Aotea Square place it in a landmark part of the city with a high Civic function. As a market place is for all people of the city is expands on the civic quality of this area.

3) The building currently on the site is of a low density for a CBD site.

4) The site has reasonably good access to the sun considering it is in the CBD.

5) No major supermarkets are within a comfortable walking radius of this site. The only farmers’ markets in the area are run in car parks on weekend mornings.

6) Green corridors run close to the site. This is important so that insects needed for plant pollination can reach it. At the same time only a small amount of nature is in the vicinity of the site, therefore providing nature would allow this lack of nature to be ‘mended’.

Site constraints:
1) The tower immediately north east of the site blocks morning sunlight to much of the site.

2) The site is long and narrow, and is angled at its Queen Street frontage.

3) Multi-level buildings or towers are built hard up against a number of the site boundaries. The tower to the NE has a façade full of windows against the NE site boundary.

4) The site has a medium gradient along its length. From its highest to lowest points there is a 9m difference.

5) Although the site has access from three different streets, access to the site for vehicles is still difficult.

6) Large amounts of pollution and noise are created on Wakefield Street and Queen Street.
3.2 Site location & analysis

Figure 3.1: Auckland geographical position

Figure 3.2: Location Plan- Auckland CBD

Figure 3.3: AUT university buildings in the area

Note: as this is only a hypothetical project the adjoining sites of 370 Queen Street and 17 Wakefield Street have been treated as one empty site for the simplification of this project. In reality a low rise building occupies the 370 Queen Street site. The Land value of this site is $6.7million and the value of the building on it is only $1million. The 17 Wakefield Street site is currently a car park with no building value. The site is worth $2.4million. Values taken from the Auckland Council GIS viewer- http://maps.aucklandcouncil.govt.nz/aucklandcouncilviewer/ (accessed September 22, 2011).
Figure 3.4: Contextual site plan

Proposed Site

- 3 Levels
  - Retail + Hotel
- 10 Levels
  - Retail + AUT & NZ Film Academy
- 7 Levels
  - AUT + OceanCo Tech
- 3 Levels
  - Retail + Carparking
Figure 3.5: Site context analysis

Queen Street: high traffic volume and huge numbers of pedestrians
Aotea Street: low traffic volumes and low/moderate pedestrian numbers
Wakefield Street: high traffic volume and moderate/large pedestrian numbers
Queen Street corridor
Aotea Street corridor
Mayoral Drive: high traffic volume, moderate pedestrian numbers

Potential pedestrian link through site
Pedestrian Link/Plaza
Mass residential towers in close proximity
15-level residential tower
6-9 level residential apartments
Retail, AUT, NZ Film Academy
AUT, Open Polytechnic

Metro Centre and Auckland Civic Centre
Aotea Centre
Aotea Square
Rutan Street
Lorne Street
Auckland Public Library
AUT Wellesley Campus
AUT Student Village
Myers Park
Figure 3.6: Site photos

View looking down Queen Street

View of site from Wakefield Street

View of site from Queen Street

View looking down Airedale Street
Figure 3.7: Supermarkets and food markets in central Auckland
Census 2006 Statistics, Statistics NZ

Auckland Central West area unit
Number of people: 7986
Up from 3255 in '91
Median age: 26
Median personal income: $19,100
Number of households: 3735
Main Ethnicities: Asian 51.6%, European 37.5%
Average household size: 1.9 people
Cars per household: 43% no car, 44% 1 car
Dwelling ownership: 76% of people have no ownership in their dwelling
Unemployment rate (15+ years old): 11.5%
Marital status (15+ years old): 70.8% have never married

Auckland Central East area unit
Number of people: 7158
Up from 3627 in '91
Age: 94.7% aged between 15 and 65
Median age: 24
Median personal income: $13,400
Number of households: 3252
Main Ethnicities: Asian 50.6%, European 40.3%
Average household size: 1.8 people
Cars per household: 50% no car, 41% 1 car
Dwelling ownership: 76% of people have no ownership in their dwelling
Unemployment rate (15+ years old): 11.9%
Marital status (15+ years old): 75.8% have never married

Grafton West area unit
Number of people (06): 2247
Up from 1041 in '91
Age: 93.7% aged between 15 and 65
Median age: 25
Median personal income: $17,700
Number of households: 1014
Main Ethnicities: Asian 46.4%, European 43.4%
Average household size: 1.9 people
Cars per household: 32% no car, 50% 1 car
Dwelling ownership: 74% of people have no ownership in their dwelling
Unemployment rate (15+ years old): 12.3%
Marital status (15+ years old): 69.9% have never married

Figure 3.8: Central Auckland statistics
4.0 DESIGN EXPLORATION

4.1 Design phase one: arriving at the building programme

It was a requirement to submit a research proposal for this master’s thesis the year before embarking on the thesis itself. In this proposal I stated I would design a diabetes centre, with the aim of creating a piece of architecture that could help prevent diabetes. The problem with a diabetes centre however is that such a building would rely on medical staff and educators to provide the solution to diabetes. The architecture of such a place would have a limited effect. For example, the Christchurch Diabetes Centre is excellent in helping fight diabetes even though the building itself is devoid of any architectural merit. After realising this problem a new building programme in which the architecture itself could help combat diabetes needed to be found.

The New York Active Design Guidelines provides excellent information on how architecture can be designed to combat diabetes, with recommendations based on evidence from studies. These recommendations were used as a starting point to find a new building programme for this thesis.

The NY Active Design Guidelines recommends increasing access to fresh food to provide an alternative to fast foods and junk foods. Full-service grocery stores and farmers’ markets to compliment them are recommended. As unhealthy eating is a major cause of the obesity epidemic these recommendations became the starting point of this project.

Initially for this thesis the modern supermarket was targeted as a building type that could be improved to encourage healthy eating. Although supermarkets sell fruit and vegetables, they also have shelves loaded with highly processed foods, often high in preservatives, fats and sugars. They are often also commonly located in the suburbs and need to be driven to. To encourage healthy eating as well as exercise, designing a new type of ‘healthy’ supermarket was explored.

This sketch (below) explores how supermarket space can open onto food growing space. The aim of this is for people to see fresh, local food growing and be tempted to buy it, as well to consider the source of their food and how it is grown. This is in contrast to food sold in modern sterile supermarkets which often comes from a largely anonymous source. This food may be heavily processed, engineered, preserved, loaded with salt and sugar and come from a source thousands of kilometres away (therefore may be unsustainable as well).

Figure 4.1: Sketch of supermarket spaces opening out to vegetable growing space.

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46 Active Design Guidelines- Promoting Physical Activity and Health in Design, p. 22,26 & 36
This section looks at the idea of separating healthy and unhealthy foods in a supermarket environment. Healthy foods are sold at ground level where they are most accessible, and unhealthy foods are sold at higher levels where they can only be accessed by walking up the centrally located stairs. Therefore if you want the unhealthy foods you’re going to have to walk up three flights of stairs to get them. The problem with this idea, which eventually led to its abandonment is that if the supermarket chooses to move the unhealthy foods to the ground level, the whole idea is lost.

Figure 5.3 shows the ground level of the multi-level supermarket. Healthy food sales, a farmers’ market and hydroponics vegetable growing are side by side, removing the disjunction that exists between them in modern food systems. The stairwell is the central feature, placed right at the entrance of the building. Unhealthy foods are located above, accessible via the central stairwell. As well as the potential problem that unhealthy foods will be shifted to the ground level, the question is also raised ‘why should all food sold on the premises not be healthy?’ Enough other places exist in the city for people to buy unhealthy foods; perhaps this development should only sell fresh, healthy, local produce? Therefore it was decided that this development should be a dedicated farmers’ market, where the majority of foods met these criteria.
The idea of urban farming was also abandoned at this stage, as land in Auckland is too expensive to make it feasible. Auckland is surrounded by countryside and even suburbs where it would be much cheaper to grow food for sale to the public. Even if I proposed designing a high intensity vertical farming tower, there would still be no need for it to be in the CBD. A vertical farming tower is also shifting too far from my aims of reducing obesity through increasing access to healthy food and encouraging everyday movement.

Instead I decided to keep vegetable gardening in the building, but only for residents (apartments to be included in the development); and to be used more for community bonding, ‘green-exercise’, and for residents to gain knowledge about their food. Food supplying the Farmers’ market is now to be brought in by local growers and producers to sell. If residents grow excess food they can also sell it in the farmers’ market, cutting out all food miles and allowing them to engage further with the market.

Figure 4.4: ‘Healthy’ supermarket model (model 1)
4.2 Summary of literature relating to building programmes

When deciding to design a building which integrates a farmers' market with apartments and vegetable gardens, literature and precedents were reviewed to find whether each is in demand, what the characteristics of each are, how they may be integrated, and what benefits they bring relating to the thesis topic of combating obesity. This section of the explanatory document summarizes important findings and precedents relating to the building programmes and the thesis topic.

4.2.1 Farmers’ markets

Farmers’ Markets NZ describe farmers’ markets as “a food market where local growers, farmers’ and artisan food producers sell their wares directly to the consumer. Vendors may only sell what they grow, farm, pickle, preserve, bake, smoke or catch themselves from a defined area.”47 This means that food is sold fresh, largely avoiding the need for processing and the addition of preservatives. Farmers’ Markets can vary greatly in size and setup, ranging from small outdoor markets to grand indoor markets owned by local governments or entrepreneurs who provide common services and oversee market practices. In its most basic form a market is a group of individual merchants gathered together to sell directly to the consumer.

Karen A Franck writes that indoor markets not only protect from the weather, and offer a wide array of products and activities, but the architecture and the permanence of a market contribute to the character of an area and, possibly, of the entire city.48

Jonathan Dodd from Super Market news identifies farmers’ markets as “the grocery growth story of the future”.49 He estimates that there are now around 50 farmers’ markets operating in New Zealand. He suggests they are becoming popular it is “farmers markets that offer the all-round authentic experience; farmers markets that offer excellent value of both price and enjoyment; farmers markets that offer the ability to access locally-sourced product, often from the grower him or herself; and farmers markets that offer all this without additional food miles or questionable overseas ingredients.”50

Farmers’ markets are recommended in the New York Active Design Guidelines as they encourage the consumption of fresh produce. The Active Design Guidelines state that greater availability of fresh food is related with a lower prevalence of diet-related disease, and the presence of a grocery store or farmers’ market is linked with lower neighbourhood obesity. If they are located close to residential areas they can serve as a walking destination.51

REFER TO APPENDIX SECTION 8.1.1 FOR SELECTED MARKET PRECEDENTS. Included is Besiktas Fish Market, Barceloneta Market, Garak Fish Market, Market Hall Bergen, traditional indoor and outdoor markets and Auckland markets.

48 Karen A Franck, “Food for the City, Food in the City”, Architectural Design 75, No.3 (2005): 41.
50 ibid.
51 Active Design Guidelines- Promoting Physical Activity and Health in Design, p. 36
4.2.2 Urban vegetable gardening

The Active Design Guidelines recommends designing activities in buildings which encourage personal communication between people within a building, rather than sedentary forms of electronic communication. It recommends designing spaces where people can engage in productive, pleasant and safe social interaction. For this thesis project communal vegetable gardens met these recommendations. They provide a productive, non electronic form of activity where residents can bond over a common point of interest. As vegetables grow over time and change, they allow relationships between neighbours to also grow over time, by providing an ever changing point of interest to talk about.

Urban gardening is gaining popularity in developed nations as a reaction against greenhouse gas emissions, our reliance on fossil fuels, contaminated food scares and rising fuel and food prices. Not only are these issues addressed, but urban growers also feel it is a way to better connect with the environment and their community. Gardening is also a form of ‘green’ exercise, proven to be beneficial to both physical and mental health.

Urban gardening is often done as a communal initiative in community gardens and city farms. Even if vegetable gardens are on roof tops or balconies, they can form new urban and social spaces which bring neighbours together. By gardening in a communal way, barriers between people from different backgrounds are broken down, and people commonly feel an elevated sense of ‘ownership’ and pride in their local environment, and are more likely to unite and cooperate on other issues of social concern.

In many parts of developed countries where food seems abundant and cheap, the food production role of urban gardening is often seen as being of secondary importance. The main roles of such urban farms are educational and community bonding roles.

In a number of developing countries urban agriculture is common. For example, Shanghai and Beijing are fully self sufficient in vegetables.

Demand for urban gardening space in cities like London is rising dramatically. In some boroughs of London waiting times for space to grow vegetables in community gardens or private allotments can be up to a year. Similarly, urban gardening is proving to be very popular in schools, for example, the vegetable gardens at Willard School in Berkeley, California, are so popular that between 50 and 100 students choose to work in them during their lunchtimes.

REFER TO APPENDIX SECTION 8.1.2 FOR SELECTED URBAN VEGETABLE GARDENING PRECEDENTS. Included is Co-op Canyon- Re: Vision Dallas Competition, Brooklyn Grange- Eagle Street rooftop farm and Via Verde mixed- income housing development.

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52 Ibid. p. 82.
56 Ibid. p.54.
57 Ibid. p.57.
58 Ibid. p.53.
59 Ibid, p.56.
60 Karen A Franck, “Food for the City, Food in the City”, p.38.
4.2.3 Auckland CBD densification and apartment living

Providing residential apartments in the Auckland CBD allows people to live closer to their places of work and recreation, encouraging walking between them. The Active Design Guidelines state that research suggests a greater land use mix is correlated with lower obesity, as residents are more likely to walk between destinations in close proximity.  

More apartments are also needed as Auckland is undergoing densification, including in the CBD. The number of residents dwelling in the Auckland CBD roughly doubled between the 2001 and 2006 censuses. For example, Statistics NZ lists that the number of residents dwelling in Auckland Central East rose from 3627 people in the 2001 census to 7158 in the 2006 census. As the population of Auckland is projected to increase from 1,485,200 in 2011 to 1,933,200 in 2031, this population growth needs to be catered for.

4.2.4 Integrating food back into our cities

By integrating vegetable gardens and a farmers’ market with apartments, this development places a lot of importance on fresh food; its growing, its selling, and its consumption. Karen Frank supports the need to visibly integrate food back into our cities, and suggests in Architectural Design magazine that; “It is time for the architectural and urban design planning professionals to support and enhance the city’s multiple functions as dining room, market and farm. The Modernist tenets, which too often posited a segmented and sterile city where dining and shopping were hidden in interior spaces and where growing occurred in distant locations, need to be replaced by the encouragement, through planning and design, of a true mixing of land uses that incorporate places (and ways) for growing and selling local produce as well as for consuming it.”

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4.2.5 Key precedent 1 - Market Hall, Rotterdam
Architects: MVRDV, Status: under construction.

The Rotterdam Market Hall by MVRDV is a key precedent for this project as it is a soon-to-be-completed example of apartment living being integrated into a large scale public market place, making it programatically similar to the building being proposed for this thesis. This precedent has served as a guide for how the two main activities may be successfully integrated, as it deals with many of the same issues. Unfortunately though the measures MVRDV have taken to prevent noise entering the apartments has removed virtually the entire link between the functions. It may work, but it seems like a very ‘safe’ response to the problem. It can be questioned whether if they had allowed a little more noise to enter apartments, they may have been able to make the architecture more exciting and strengthen the link between the market and the apartments. This is something this thesis project explores.

Program: 64
-Market Units (Ground Level): 100 stalls, 20sqm each. Overall market floor area is approximately 6000sqm. (Note: Rotterdam population is around 603,000 in the city proper, and 1.3 million overall, therefore similar to Auckland).
-Food and food related stores: 4,600 m2 total (Ground level and 1 level)
-Supermarket (Level -1): 1,500 m2
-Cooling storage and preparation areas (level -1): 1,200 m2
-Apartments: 126 private apartments from 70 to 250 m2 and 102 rental apartments of 70 to 150 m2
-Garage: 1200 places

Figure 4.5 (top right): Market Hall exterior render. Figure 4.6 (mid right): Market Hall interior render. Figure 4.7 (bottom right): Market Hall ground floor plan

ln.projectview&upload_id=12824
Figure 4.8: Partial section, Rotterdam Market Hall

Apartment circulation areas/entrance lobbies and a thick insulated wall, with only small penetrations, block noise from apartments.

Views from apartment circulation areas/entrance lobbies to market area, through small windows.

Glass curtain wall encloses market space at ends.

21.50m to centre.
Reason for covering the market space:
New laws in the Netherlands require covered areas for traditional open air meat and fish markets due to new hygienic constraints.  

How noise is dealt with:
A thick insulated wall separates the market/ food area from the apartments. Only small windows penetrate this wall to limit noise transmission. These windows penetrate into the apartments circulation areas/ entrance lobbies (also possibly their kitchen and dining rooms) where noise is not a major issue. These areas act as a buffer layer. These measures of minimizing noise entry to apartments have the negative effect however of virtually removing all integration between the apartments and the market.

Integration of programmatic functions:
The Market Hall is a sustainable combination of food, leisure, living and parking. Fully integrated to enhance and use the synergetic possibilities of the different functions. During day it serves as central market hall. After closing hours the hall will be an engaged living area with light and liveliness enriched by the restaurants situated on the first floor.

It is a public building emerging from housing. It allows a public building to add to the residential density of the city.

The building aims to be a community hub. Its different functions aim to attract a wide variety of users, and around one third of the apartments are for rent to attract a wider variety of residents than just buyers. Every apartment has a balcony facing outwards to link the building to the surrounding community.

Interior spaces:
The interior of the market is grand in scale, measuring 35m in height. The market space itself is only single level so much of this space is unused. It has the appearance of being a tunnel, and lacks any real sense of human scale.

The windows of the apartments surrounding the market space add another layer of depth to the market space, rather than looking at an unused wall or roof structure. The market space is enclosed with glazed curtain walls at both ends to seal it while still allowing the entry of natural light.

LED panels covering the market interior will feature market images but could also provide the opportunity to set the mood of the market for social and cultural events. This LCD screen may compete with the market food for attention though, detracting from the food.

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66 Ibid.
4.3 Design phase two - integrating vegetable gardens and apartments with a farmer’s market

Note: Exploration models 2, 3 and 4 are not shown in this document due to their irrelevance to the final design this market/apartments.

Model 5 is largely inspired by the MVRDV Market Hall in Rotterdam, where apartments directly form the market space. By creating space in this manner there are no unused roof or wall structures. The apartments are also fully integrated into the farmers’ market, offering good views of the activity below, visually connecting them together, and encouraging residents to use the market. The market space is enhanced as the apartments ensure the development is always in use and lively.

Due to the narrow width of the site there is only enough space to create a half arch, unlike the Rotterdam Market Hall which is a full arch. This has the benefit of allowing the adjacent high rise to have views into the market.

The idea of the ‘box’ units is for the individual blocks to combine to form a cohesive building fabric. It plays with the idea of individual expression coming together to form a community whole. It also creates a form that is more visually interesting, and of a more human scale, than the many extremely repetitive apartment buildings located around Auckland.
Model 6 is a further exploration of model 5. It combines a dynamic roof structure with the apartments. The aim of this is to visually lighten the building, make it more dramatic, and to let more natural light into the market spaces. Pedestrian links between Queen Street, Airedale Street and Symonds Street are beginning to be explored. Privacy between gardens and apartments are an issue in this model, and the apartments are dull in form—they are just extruded oblongs.

Model 7 is the last model which explores the arch form. It further explores the idea of individual boxes forming an overall building fabric. It also explores upper level circulation routes to tie together multiple vegetable gardens and apartments. The overall arch form was discontinued at this stage as it looks like a wave that reaches a point then stops, it doesn’t allow for a high density, and circulation routes are difficult to integrate well. The last point is a major concern in a building which aims to encourage movement around the building. Lastly, all the buildings surrounding the site have vertical walls and a strong street presence. In comparison the arch form appears unsubstantial from the street.
4.4 Design phase three - circulation routes inspired by Piranesi’s Imaginary Prisons etchings

4.4.1 Summary of Piranesi’s Imaginary Prisons etchings

Giovanni Battista Piranesi produced a series of 16 copperplate etchings of imaginary prisons, dating from the 1760s.

These etchings portray a world of hopelessness and misery. Grand stairs lead no where, as if portraying a sense of futility and pointlessness. The architectural forms are gigantic and dwarf the human figures. These human figures, both captive and captor, seem trapped in an inescapable world of inhumane cruelty and despair. Although the architectural forms are massive and never ending they appear to have no useful function. Even when the interior spaces open to the sky, there are hints of more architectural forms beyond. In all instances this prison world appears indefinite and inescapable. The people in the etchings appear as lost souls, with no point to anything they do and no hope for escape.

Despite their bleakness, Romantics of the 19th century who were inspired by the exotic atmosphere of the etchings, and Surrealists of the 20th century admired their irrational portrayal of objects in space. Countless other practitioners of the visual arts have since also been inspired by the etchings. The etchings are relevant sources of inspiration for this project as they are examples of spaces which bring to the fore circulation routes, important for this project to encourage their use, and have grand spaces, much like a number of the market precedents studied for this project. The spaces appear exciting and invite exploration (if they lead somewhere).


Elements of the Imaginary Prison etchings that have been integrated into model 8 onwards include:
- architectural forms and circulation routes that penetrate through space
- highly visible circulation routes
- opportunity for viewing spaces below from upper levels
- the sense that the architectural forms could continue endlessly and seamlessly if continued in the same manner
- grand architectural spaces
- staircases are wide at lower levels and get progressively narrower at higher levels
- interior spaces are neither fully interior nor fully exterior
- architectural forms run in an array of directions

Figure 4.13 & 4.14: Piranesi Imaginary Prison etchings
4.4.2 Model 8 - Imaginary Prisons etchings inspired

The inspiration for model 8 is the Piranesi Imaginary Prison etchings. Circulation routes are highly visible, multi-directional, and penetrating through space. The aim is to make them exciting to use to encourage movement up, through, and around the building (rather than using the lift). Views to the market are always present from the upper levels to add interest to the journey through the building. Similarly viewing people moving around the upper levels adds life to the market; the whole development becomes a place of movement and activity. More density needs to be added to this development though to justify this amount of circulation.

A mezzanine market level now steps up through the site to increase the floor area of the market. This mezzanine wraps around the perimeter of the site, allowing views to the level below, and still allowing the market space to be grand in scale from ground level. The same configuration is used in the traditional Derby Guildhall indoor market (refer to figure 8.1.1.5.).

This model still continues the idea of apartments forming the space over the market, as seen in the Rotterdam Market Hall, but moves away from the half-arch form to become more of a ‘whole’ building. The stepped back form still looks insignificant next to the vertical towers that surround it however. Stepping the building back works well for getting sun and rain to the vegetable gardens, but at the expensive of a good architectural form.

The garden areas need to be improved as they are not positioned to encourage communal interaction. Positioned communally residents are encouraged to work in their gardens as it can be a social activity, and are able to learn from each other.

A pedestrian link runs through the site to encourage the public to enter the market.
4.5 Design phase four - improving the integration of gardens with apartments. Model 9

To begin this design phase vegetable gardens are re-looked at to see how they can be better integrated into the building to better encourage their use. Particular focus is on creating a communal gardening environment, so that the benefits stated in section 4.2.2 of this document can be achieved.

This schematic plan shows circulation running between apartments and allotment style vegetable gardens. As the circulation divides the gardens from the apartments they become part of the communal territory. With this layout residents can feel comfortable walking past other resident’s gardens, consequently increasing the opportunity for interaction.

The gardens also increase the walkability of the building by providing something interesting to look at along that section of circulation.

Model 9 is a development of model 8 and continues its key ideas. The gardens, apartments and circulation routes have been modelled as shown in figure 4.21.

Views from and along circulation routes are an important element in this design. The Active Design Guidelines recommends incorporating “Interesting views along paths of travel within a building. These views may include natural and designed landscapes, nearby architecture, interior views of people-oriented activities.”69 The design shown in this model meets these recommendations by providing views to market spaces (human activity), surrounding streets and architecture, vegetable gardens (human activity and nature), as well as through atrium spaces (designed landscape). Natural lighting is abundant along the circulation routes, as recommended on page 84 of the Active Design Guidelines.

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69 Ibid. p. 84.
The density of the building has been greatly increased from model 8. This helps balance out the high cost of the site, as well as the numerous circulation routes. A larger number of residents are also needed for there to be enough people present at any one time to ‘activate’ the community garden areas.

The massing of the building is now a lot more vertical, to match the vertically faced buildings which surround the site. The building now has a much more dominant street presence. The building masses are positioned in three main rows where the apartments will receive sunlight.

The building mass is broken down to small units and is ‘pushed and pulled’ to create a lively, dynamic façade. The façade and massing are designed to be interesting from every direction you view it, both inside and out; nowhere is there a dull spot. This is to provide an engaging environment for people to walk about in. When combined with views to the market, the street, and passage past vegetable gardens, I aim to create circulation routes that are always exciting to use; to encourage everyday exercise.

The breaking down of the mass into ‘box’ units is done to show individual expression coming together to form a community whole, as well as to provide apartments which are of a more human scale than the majority of apartment towers located around Auckland.

Apartment’s now typically three level terrace apartments. The lowest level will be circulation passages, apartment entrances and laundry, and garden sheds. People can move around outside this lower level without breaching the privacy of the apartments. The upper two levels are living spaces which overlook the vegetable gardens, giving the gardens extra priority than if they were on the roof out of sight.
4.6 Design phase five - model 10

Figure 4.20: Model 10 photographs:

A- Queen Street façade
B- Aerial view
C- Airedale Street entrance- displaying Piranesi Imaginary Prison influence
D- Queen Street façade
E- Roof top gardens
F- Interior space looking towards Airedale Street
G- Interior space looking towards Queen Street
Model 10 focuses on improving the aesthetics and cohesiveness of the building and its circulation routes. A half glazed roof has been placed over the Queen Street end of the market to provide shelter to this area. The other half of the roof is used for vegetable gardening and circulation. The problem with this roof is that it visually separates the top apartments from the market, and it will make this part of the market too dark. The only other major adjustment is the addition of an extra level to add more density.

Number of apartments: 32 two to three level apartments. More if single level studio/one bedroom apartments are incorporated.

Vegetable gardens are typically around 1m x 3m. Not too large for busy urban professionals to manage. Extra gardens can be acquired for keen gardeners. They are not aimed at full self sufficiency.

Apartments are to be owned by a Body corporation, who give priority to leasing an apartment to those who show a willingness to take up the gardening project. Upkeep of the gardens, or organising another resident to do so, is to be part of the tenancy agreement.

Figure 4.21: Queen Street perspective render - based on model 10
Figure 4.22 (right): Terrace apartment section - based on model 10
Figure 4.23: Long section through market & apartments based on model 10
4.7 Precedent studies - externally expressed circulation routes and the use of negative space

4.7.1 Key precedent 2: The Bikuben Student Residence, Copenhagen
Aart Architects, 2003-2006
Student housing: 107 student residences. 7000sqm total floor area

The Bikuben Student Residence is a major precedent for this project as it provides an example of a residential complex which uses a circulation route as a key design feature to encourage social interaction and movement around the building. This circulation route is also linked to a central atrium in which activities occur in or which can be viewed from nearby spaces.

To provide the greatest possible contact between common and private rooms, while at the same time ensuring the privacy of each residence, the residences and the common rooms are connected in a double spiral surrounding an atrium.\textsuperscript{70} As the external circulation route is continuous from ground level to roof level the whole building is accessible to students, expanding students living quarters and increasing their potential areas for social interactions.

The atrium is a complex space whose boundaries are shared by common rooms, terraces linked to the exterior ‘double spiral’ circulation, and a vertical circulation core. It is designed for students to interact within or to view activities across.


4.7.2 Key precedent 3 - 60 Richmond Housing Cooperative, Toronto
Teeple Architects, 2010
Function: 85-unit mixed use building

This housing complex shows that grow walls and vegetables can grow in sheltered atriums or under building masses, provided irrigation is supplied to them.

Similar to the Bikuben Student Residence activity occurs within the building’s negative spaces, and are a visual feature of the complex’s exterior. These negative spaces allow light into, and views across, atrium spaces.

This development incorporates social spaces dedicated to food and its production. Although small-scale, they still help create a full cycle ecosystem. The resident-owned and operated restaurant and training kitchen on the ground floor is supplied with vegetables, fruit and herbs grown on the sixth floor terrace. The kitchen garden is irrigated by storm water from the roofs. Organic waste generated by the kitchens serves as compost for the garden.
Figure 4.29: Richmond Housing Cooperative sixth floor plan
Figure 4.30: Richmond Housing Cooperative section
4. 8 Design phase six - model 11 and detailed floor plans

A key feature that is missing from model 10 is the architectural expression of communal circulation routes. In this model nearly all the circulation is on the interior of the building and looks like an ‘add-on’ to the apartments. The circulation routes need to be more boldly shown and integrated into the architecture to reflect their pivotal role in the building of encouraging everyday exercise. This building aims to be a clear expression of the rejection of hidden stairwells and dull circulation routes.

Two buildings that clearly express circulation routes are the Støperigaten 25 apartments (REFER TO APPENDIX SECTION 8.1.3) and the Bikuben Student Residence.

The Støperigaten 25 precedent successfully uses stairwells for visual excitement, while also blurring the line between public and private space, as well as between street and apartment, so as not to discourage travel along them. This idea of blurring street and building has been introduced into model 11, to the extent that all communal passageways continue on from ground level to apartment front doors, are wide like streets and are loaded with as much activity and visual interest as can be achieved without compromising security around vegetable gardening areas. Only glazed walls, which will need swipe card access to get through, will separate public areas and resident’s only areas. Other than this the building will be open to explore (other than the actual apartments themselves), to encourage physical movement around the building.

The visual form of stairs landing on protruding apartments, as shown in Støperigaten 25, also influenced this design phase. This form works well as it visually ties apartments to the expressed circulation paths in a dynamic way.

The Bikuben Student Residence is a particularly clear example of a continuous communal circulation route being made an architectural feature of the building. The circulation path encourages movement around the building as it makes nearly the entire building accessible to each student, with programmatic activities coming off it along its length, encouraging movement between them. Rather than being an addition to the building, the circulation is ‘cut’ into the building, which when combined with bright orange walls inside the cut, greatly emphasises it as an architectural feature of importance. While walking through the negative space created for the circulation, a person is protected from vertical rain, and also has an interesting journey created for them by alternating building head heights, and views that are only revealed as they move about the building.

To create an enhanced circulation route around the building proposed for this thesis, a Bikuben Student Residence style circulation route is integrated into Model 11, and becomes a major part of its form.

Where the Bikuben Student Residence uses bright orange walls to mark its circulation route, model 11 explores placing living/ green walls (REFER TO APPENDIX SECTION 8.1.4 LIVING WALLS IN ARCHITECTURE). The intention of this is to add visual interest to the walking routes, as is recommended in page 84 of the Active Design Guidelines; “provide visually interesting interior finishes along internal walking routes.” Nature is interesting to view as it is changing and richly textured, and studies have found it is greatly therapeutic, even simply to view (REFER TO APPENDIX SECTION 8.2- EFFECT OF NATURE ON PEOPLE). When combined with vegetable gardens along the main circulation paths, the intention is to create a small scale urban nature walk. Mind, a leading UK-based charity, has released a report saying that 71 per cent of people report depression decrease after a green walk, whereas 22 per cent report depression increase after an urban walk. Findings such as this suggest a walk filled with nature, rather than solely man-made materials and objects, is definitely the preferable option.

72 Active Design Guidelines- Promoting Physical Activity and Health in Design, p. 84.
Figure 4.31: Model 11 aerial view

Communal rooftop gardens

Large openings let more light into market spaces. Openings also allow views through the building.

1 more level of apartments to be added at back

Carpark entry/exit

Section of communal circulation route

Retail and information office to go along Airedale Street to improve pedestrian experience. Mixed with access to market.

Vegetable gardens placed along communal circulation routes. Seating, water fountains, sculptures and other amenities to support walking to be included along main routes.

Major stairwell directly off Queen Street

Market

Market

Living walls

Airedale Street

Queen Stret
Figure 4.32 (left): Model 11 Queen Street façade. Communal activities to be located along main circulation routes; including communal garden sheds, composting areas, exercise facilities, water fountains, sculptures, seating, and retail at lower levels.

Figure 4.33 (above): Model 11 view from Airedale Street, looking towards Wakefield Street. Circulation routes representative of Piranesi Imaginary Prison etchings, especially where penetrating through space.
Fourth Level Plan - Figure 4.38
Upper level floor plans and roof plan under development
5.0 CRITICAL APPRAISAL OF FINAL DESIGN

The purpose of this project was to design a piece of architecture which adheres to expert knowledge found through literature reviews, on how architecture can be designed to help combat obesity through encouraging everyday physical activity and healthier food choices. Research in this field of architecture is critical to help find solutions to the obesity epidemic; which is largely a consequence of life in modern cities; which all too often encourage unhealthy eating and sedentary lifestyles. To a large extent New Zealanders are relying on health professionals, sports organisations, and certain ‘healthy-living’ television programmes and printed articles to combat the obesity epidemic; but the alarming obesity prevalence statistics show that isn’t enough. Our built environments have a role to play as well and need to be designed to help fight sedentary lifestyles rather than encourage them.

The key document this project adheres to is the Active Design Guidelines. This section of the explanatory document summarises the key features of the final building design for this thesis, and states how these features meet relevant recommendations written in the Active Design Guidelines.

5.1 Circulation routes and stairs

The Active Design Guidelines state a number of recommendations to encourage walking both through buildings and along streets. These recommendations are summarised in section 2.5 of this document, and include recommending the use of highly visible and attractive stairs, creating supportive and appealing walking routes, and spreading activities to encourage movement between them. To meet recommendations such as these circulation routes and stairs have become a key feature of the design; with the aim of creating a building which encourages movement through and around it, as an alternative to using the lifts.

The design of the circulation routes and stairs infuses a number of ideas and elements together to create pathways that are truly interesting to use. Firstly, they are based on the circulation routes which are a key feature of the Bikuben Student Residence. The circulation routes run both internally and externally and are clearly visible from nearly anywhere in the building. This high degree of visibility helps emphasise their importance. This is a bold move away from the dark, hidden stairwells seen in many modern buildings. Increasing the visibility of stairs and circulation routes is recommended in the Active Design Guidelines, which state the more visible they are, the more likely they are to be used. The main aim of the Bikuben Student Residence style circulation routes is to create pathways which begin at ground level and run continuously around and up through the building, opening the entire building up for exploration by residents. By limiting the number of circulation routes to one major one in many parts of the building they become much like pedestrian streets and communal in nature. This is especially the case where they are a several metres wide and running past programmatic activities and items of visual interest. To make these communal routes interesting and non-intrusive to residents a lot of consideration has been given. Elements which make the circulation routes attractive to use include:

- Views from the circulation routes have been maximised. From most parts of the building there are views to the surrounding streets and architecture, as well as across atriums and into market spaces. Even if only goods and no food were sold in the market spaces, they would still provide a centre of human activity which would be interesting to view from circulation routes. Providing interesting views along circulation routes is a key recommendation in the Active Design Guidelines to encourage the use of stairs and circulation routes.

74 Active Design Guidelines- Promoting Physical Activity and Health in Design

75 Ibid. p.70, 72, 73.

76 Ibid. p.84.
The typical journey from street front to apartments is filled with things to view and places to stop and interact or relax. Starting from ground level, a resident can travel through or past the market spaces, past retail and office spaces, and then along the resident’s only routes; which are filled with gardens, vegetable gardens, green walls, seating, sculptures, BBQ areas, and communal facility rooms such as garden sheds or exercise rooms. Creating appealing and supportive circulation routes is a key recommendation of the Active Design Guidelines.

The circulation routes and interior spaces have been inspired by the Piranesi Imaginary Prisons etchings. Based on these etchings, circulation routes are always boldly exposed; weave up through grand scale spaces which are dynamic in form; and in parts of the building the circulation routes penetrate through space. The intention is to create circulation routes and building forms which are interesting to move through and explore. Changing building head heights along main circulation paths add to the changing experience a resident will feel while venturing around.

The circulation routes and stairs are external in nature. This meets Active Design Guideline recommendations to provide circulation routes and stairs which are provided with natural light and natural ventilation.

Circulation routes are multi-directional, giving residents and market visitor’s choice in where to move through the building.

Circulation routes are filled with nature to create small urban nature walks. Nature is included in the form of living walls, gardens and vegetable gardens. Nature is used along circulation passages to increase visual interest; which is does as nature is richly textured and constantly changing. Studies also show that nature walks tend to be therapeutic and reduce depression levels, whereas urban walks often lead to increased depression levels. Simply viewing nature is proven to reduce stress levels and mental fatigue. Based on findings such as these the inclusion of nature is intended to create circulation routes which are more relaxing and pleasing to use, than if they were absent of nature. Nature in architecture also has other proven benefits such as absorbing noise pollution and converting CO2 into oxygen.

The beginnings of the circulation routes are always near the street, whereas the lifts are more central. The intention of this is to force a person to walk past the stairs before reaching the lifts. This meets the Active Design Guidelines’ recommendation of locating stairs near building entrances before lifts are reached. The stairs always run along main circulation routes to avoid the need to use the lifts at all unless disabled.

At market levels a pedestrian link runs through the site connecting all three surrounding streets. This encourages people to enter the market, as well as providing an urban short cut. Grand stair cases link the market levels as they cascade down the site. Grand staircases are a feature of the Piranesi Prison etchings at lower levels; and the use of them is a recommendation of the Active Design Guidelines, as studies have found they tend invite more use.

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77 Ibid. p.7, 40, 84.
78 Ibid. p.76, 77, 84.
83 Active Design Guidelines, p. 72, 80.
84 Ibid. p.71, 74, 75.
5.2 Lifts

The number of lifts in the building is kept to a minimum, and they are not placed where they will be seen before stairs. The residents’ lift/s will stop only on selected floors, therefore forcing people to walk to the other levels. The central residents’ lift only begins at the Second Floor Level, at which level the public lift reaches its highest point. This forces residents to walk between them if they wish to take lifts all the way up. The Goods Lift is the only lift in the building intended to be convenient. All other lifts are intended to be inconvenient and limited in number to encourage the use of stairs where able instead. This is in alignment with the Active Design Guidelines’ recommendations to focus on stairs rather than elevators, to limit the number of elevators and slow them down where possible, and make them less visible than the stairs.85

5.3 Building programme

The integration of the main building functions - a farmers’ market integrated with apartments (and gardens) and retail, makes it a mixed typology building. One of the reasons for mixing building typologies is to increase the mix of land use. The Active Design Guidelines state that the greater the mix of land use, the lower obesity rates tend to be as residents can walk between activities.86 In this building, residents and people living nearby can walk to the market for food, rather than having to drive out to a supermarket in the suburbs. The CBD farmers’ market will also provide a source of local ready-to-eat food for passers-by or people working in the area, providing a walking destination for all in the CBD.

The market also provides interesting human activity for residents to look at from their apartments; and the residents of the apartments add constant life to the market place; further reasons for the mix of building typologies.

Another recommendation of the Active Design Guidelines is to increase access to fresh food;87 to encourage people away from fast-foods which are directly linked with obesity.88 To increase access to fresh food in this building, vegetable gardening, as well a market, has been integrated into this largely residential development. Vegetable gardening also provides a form of non-sedentary activity where residents can engage in productive, pleasant and safe social interaction, as recommended in the Active Design Guidelines to get people way from sedentary forms of activity.89

To encourage residents to move around the building, programmatic activities which residents can use have been spread across it. A bike shed, exercise room, garden sheds, gardens, function area, information office, market, and mail room are spread across the building to maximise the chance for daily movement between various activities. The Active Design Guidelines recommends spreading activities in this manner to encourage daily bouts of walking and stair climbing.90

To make access to exercise facilities free and easy, an exercise room has been included on the third level. This location has interesting views of market spaces and is located where it is highly visible to residents. The Active Design Guidelines recommend physical activity spaces such as an exercise room be incorporated into residential developments, and that they should be highly visible to increase awareness and use.91 They also state that they are more commonly used if provided with good views.92

To facilitate cycling, bike stands are located in front of the market along Queen Street, and a lock-up bike shed is located in the basement along with cyclist amenities.

85 Ibid. p.80-82.
86 Ibid. p.6.
87 Ibid. p.22, 36.
89 Ibid. p.82.
90 Ibid.
91 Ibid. p.86.
92 Ibid.
5.4 Building massing and exterior

The form of this building is the result of gradual research by design, as written about in detail in Section 4.0 of this document. The dynamic building form is composed of protruding apartments which reflect individual expression. Each apartment is different from any other, adding to their individuality. These protruding forms are continuously repeated so that they form a cohesive building fabric, representative of individuals coming together to form a community. The building form is a rejection of the repetitive, largely socially isolating apartment towers which are common in Auckland.

The building form is inspired by the Piranesi Imaginary Prison etchings where architectural elements penetrate through space in all directions and give grand spaces the appearance of activity. A visually exciting architecture is created which invites exploration to see it from all angles, and which is complex and subtly changing throughout, to make it an interesting space to walk around time after time.

The massing of the building is inspired by the MVRDV Rotterdam Market Hall where housing directly forms a public building.

The massing is laid out to maximise sun entry into all apartments and the gardening areas in front of them. Allowing rain to reach the apartments is of secondary importance, as they can be irrigated by water collected from the roof, as seen in the 60 Richmond Housing Cooperative precedent. The mass of the building is also laid out to maximise views into the development from neighbouring buildings, especially the tower on the NE property boundary which has a wall full of windows. Large cuts are also taken out of the building to allow more light to enter the market spaces and central apartments, as well as to allow views through the building. Feature circulation routes also run through cuts taken out of the building’s mass.

The building is eight to nine levels high to make it of an adequate density for an Auckland CBD site; while still allowing natural light down into the market spaces and lower retail/office and apartment units.

Retail units run along Airedale Street at lower levels to improve the street’s walkability.

5.5 Structure

Large concrete structural cores and walls run vertically through the building (between which run up to 1.2m deep concrete beams), which will support the relatively lightweight steel framed apartments. These cores and walls are visible at market level and along apartment circulation routes at upper levels. Where visible they help to visually tie the market and apartment levels together. In Model 11 they are typically shown covered with living walls, putting them in contrast with the apartments.

A small number of large structural elements are used rather than a regular grid of small ones, to give the building a simple, clean look. This is important in this building which already has a lively façade, to prevent the façade from becoming cluttered in appearance.

5.5 Parking

The Active Design Guidelines state that “in general when parking is available, people use it. Research in California indicates that increased parking supply may result in reduced active transportation and public transit use.” Due to this parking is only accessible via Airedale Street and is underground, so only once people enter the building will they find out if there are any free parks. The ground level of the basement is only for market sellers to unload and for accessible parking. The general public need to go down to Basement Level 1 to look for a park.

93 Ibid. p. 28.
5.6 Apartments

Apartments range from one to three levels in height. In all cases privacy is a key issue. Where possible, the lowest level of three level apartments opens onto communal circulation routes. This lower level will typically contain an entry lobby, stairs and possibly a garden shed; all which can be seen into without breaching a resident’s privacy. Where apartments are only single level, care is taken in their planning to ensure privacy is not breached. Screening elements will also be explored to help guarantee privacy.

Noise penetration from the market is a big issue for apartments, especially their bedrooms where early morning noise could wake residents. Where possible apartment’s bedrooms have been distanced from the market, or have been placed facing the street rather than the market. Green walls also will be used to help absorb noise. As a backup, all walls will be at least 250mm+ thick and will be loaded with noise insulation. All glazing to noise sensitive areas will be triple glazed. The inclusion of moveable screens, to help block noise from entering apartments, as well as to increase apartment privacy, is to be explored.
6.0 SUMMARY

Obesity is an issue that can no longer be ignored by the architectural profession. As factors which lead to sedentary living and unhealthy eating become more and more common in urbanised areas, architecture (and urban design) needs to start becoming part of the solution rather than the problem. It should now unacceptable to design new buildings which include dominant, highly visible car parking and lifts, escalators, and which have dark hidden stairwells. Elements such as these are only helping to fuel the Obesity Epidemic. In Auckland, selling much of the city’s food in large suburban supermarkets is only adding to the problem. Although supermarkets contain healthy foods, they are mixed with cheap, nearly addictive ‘junk’ foods; and located in the suburbs, supermarkets are generally not pedestrian destinations. Just as city’s built environments were designed with considered thought to prevent the spread of infectious diseases like cholera and tuberculosis in the past\textsuperscript{94}, they now need to be designed to prevent obesity.

The building designed for this thesis demonstrates an example of how a building can be designed to encourage healthier food choices and small bursts of everyday activity. If large numbers of buildings were designed in this manner around the world, collectively they could start making a positive difference in the fight against the Obesity Epidemic. As calorie intake versus expenditure only needs to be balanced by 100 kilocalories (two apples worth) a day for the typical person to avoid obesity, it is realistic that the architectural design of a building should be able to help in this battle.

By itself the building designed for this thesis could help improve the activity levels of its residents on a daily basis, and encourage them to grow their own fresh food. It could also provide a permanent source of fresh, local food for the whole Auckland CBD area and beyond.

\textsuperscript{94} Ibid. p. 6.
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All photographs and images by Will Weavers unless otherwise stated.
8.0 APPENDIX
8.1 Supporting precedents

8.1.1 Markets
The following precedents a small sample in the styles of markets which exist around the world. Markets including the ones shown here have been studied to gain an understanding of what types of environments are successful for selling food within.

8.1.1.1 The Besiktas Fish Market, Istanbul
Global Architecture Development, 2008-09

For this market GAD designed a triangular shaped concrete shell covering the entire site with large openings at street level. The concrete shell provides a column-free interior space, optimizing the project’s programmatic needs.95

This precedent shows that a covered market place does not need to be enclosed. It is acceptable for a market to have enough openness to be open to the public all hours of the day, without it becoming a criminal loitering spot at night.

The lighting is basic in nature, but has the effect of looking like hundreds of burning candles, the effect of which looks somewhat heavenly. As the lighting hangs around head height, it gives human scale to the otherwise large impersonal form.

Everything about this building makes the food the main attraction, from its dark colouring, absence of a focal point and lighting which illuminates the fish for sale.

8.1.1.2 Barceloneta Market
MiAS Arquitectes, Barcelona, 2007

The Barceloneta Market is a new building wrapped over an existing structure. It gives an example of a modern market that is lively in its form, yet has very little colour; instead allowing colour to be provided by the market stalls, food and people.

Like many traditional indoor markets it has a large open plan floor plan, has a high ceiling height (peaking at around 12m), and only uses the ground level. It is fully enclosed, single function and well naturally lit. The market stalls are set up permanently.

**8.1.1.3 Green Roof**  
Competition entry to cover Garak Fish Market, Samoo architects and engineers, Seoul, 2010

The green roof proposed to cover the run-down Garak Fish Market covers a massive 131 acres. It aims to provide an “eco-upgrade to the market and provide a substantial public garden. This project provides an example of the upper limits of the size a wholesale market can be. It is the largest wholesale market in Korea, measuring 1km long and covering an area of 540,000sqm.

**8.1.1.4 Market Hall Bergen, Norway**  
UTA Architects, Honorary mention- international competition, 2009

This market hall gives an example of how uncluttered a market can be when all the service functions are located underground.

The transparency of the building, combined with its smooth grey materials makes the food for sale the focal point of the building.
8.1.1.5 Traditional indoor markets

Many traditional markets have large single level market spaces, sometimes with mezzanine levels. Roof structures are often industrial with exposed steelwork. The steelwork is often intricate and adds detail to the spaces, yet typically isn’t colourful so it doesn’t compete with the food for sale for attention. In traditional indoor markets it is common for vendors to sell from their own covered units. Although this adds human scale to these large spaces, it does seem to defeat the need for being in a covered environment.

8.1.1.6 Traditional outdoor food markets

Around the world outdoor food markets vary considerably in their set up and atmosphere. In developed countries they often are held in grand public squares or traditional narrow streets, and in poorer countries they can simply be held on the ground or on a few steps on the side of the road. One thing that makes almost all food markets powerful is the contrast between the food and the built environment. This is not clearer than in third world countries, where food is often laid out on sacks on the ground, ready for sale. The food is virtually always clean, and pristine looking and generally very colourful. In contrast the surroundings are often muddy, dusty or rundown. The contrast between the fresh food and the imperfect surroundings amplifies the attractiveness of the food; it looks idyllic in contrast. Even grand European squares are often dark and historic in appearance, allowing the contrast between the colourful food and built environment to exist.
8.1.1.7 Auckland Fish Market

The Auckland Fish Market advertises itself as Auckland’s only 7 day-a-week fresh food market. As well as selling a wide range of seafood the Auckland Fish Market has a boutique food market, restaurants, cafes, a wine encounter and a seafood school. Each type of food for sale is separated from other types, but one space opens into another, encouraging movement between them.

On a site visit the food retail section of the market felt like a typical high end supermarket. It lacked the hustle and bustle of a typical market environment. The buildings were also industrial in nature and would not be a destination to travel to for its architectural quality.

8.1.1.8 Takapuna Market, Auckland

6am-12 noon every Sunday

The Takapuna Market is held off Lake Road in Takapuna, Northshore. It runs every Sunday morning in a car park. It sells a variety of food, crafts and products. Typically vendors park their cars or vans up in their chosen place, unload their goods, tables and tents, and then set up for the morning. Around 12pm they pack everything up into their vehicle boots again then leave. They occupy a car park of around 6500sqm.

8.1.1.9 City Farmers’ Market, Britomart

8.30am-12.30pm every Saturday

This market sells only local food and produce. It isn’t as large as the Takapuna market, but sells a wider variety of food; from locally grown vegetables to Indian curries. Unlike the Takapuna Market most vendors’ vehicles were not on-site for the duration of the market. As this market is held in the car park next to Britomart, all tables, tents and the like have to be set up for the market, and then taken away at the end.
8.1.2 Urban vegetable gardening

8.1.2.1 Co-op Canyon, Re:Vision Dallas Competition

Architect: Standard (Los Angeles)
35,000 sqm. | competition entry for re:vision dallas, a net zero energy sustainable city block | honourable mention

I consider this competition project to be a useful precedent, as it shows the level of effort that is going into thinking about creating more sustainable living environments. It also shares a similar programme to the building proposed in for this thesis, but at a much larger scale.

CO-OP CANYON is a cooperative community of 1,000 people living together in terraced cliff dwellings overlooking a lush urban canyon.

Vertical circulation to the dwellings is through SKIP-STOP lobbies, where an elevator stops on one level of multi-story space, and stairs lead to adjacent levels. Skip stop lobbies promote fitness and interaction.

Food is the thread that knits the community together. Garden allotments, both concentrated in the project’s Community Farm, and dispersed throughout the backyard terraces, allow residents to grow, exchange and share canyon-grown produce. Hobbyists grow produce for daily needs and informal exchange in the Backyard allotments, and the terraces host small gatherings and cookouts.

Produce from the Community Farm is consumed in the Community Kitchen and sold in the market spaces below. The Community Kitchen, where the exchange of knowledge about healthy diet, cultural and family cooking techniques is a resource for healthy eating.96

8.1.2.2 Via Verde mixed-income housing development
Dattner Architects and Grimshaw Architects, 2012 completion, South Bronx, New York

This development is a model of the symbiosis of green and active design. The development features a connected series of green spaces that encourage users to walk and engage in recreational activity. Programmed outdoor spaces include private backyard gardens, semi-private courtyards, green roofs, and public learning and gardening spaces, where residents can exercise and relax. An 18-story tower will be used to harvest rainwater for growing fruits and vegetables. Additional planned active design features include pleasant and prominent stairs provided for everyday use, a fitness centre, and a bicycle storage space.  

87 Active Design Guidelines- Promoting Physical Activity and Health in Design, p. 128

8.1.2.3 Brooklyn Grange, Eagle Street rooftop farm
New York, 2009

This is the first rooftop soil farm in NYC.

Brooklyn Grange’s organic produce is grown in 7.5″ deep beds with Rooflite soil. Rooflite is a lightweight soil composed of organic matter compost and small porous stones which break down to add trace minerals that are needed for the produce to grow into a healthy and mature state.  

8.1.3 Støperigaten 25, Stavanger, Norway
-apartments with expressed circulation
Alliance Arkitekter, Residential apartments, 3007sqm, 2007

Figure 8.19: Støperigaten 25 exterior photograph

The stair cases and the wide galleries on the expressive street façade blur the distinction between public street and building and lead to a roof terrace with spacious common areas. The galleries, all open to the public, are wide enough for the residents to create their private outdoor space adjoining the entrance. Roof terraces, wide galleries, play grounds and a passage through the area encapsulates the idea of community.  


8.1.4 Living walls in architecture (also referred to as green walls and living walls)

8.4.1 Quai Branley Museum, Paris
Jean Nouvel, Paris
Green wall- Patrick Blanc
2005

Figure 8.21: Quai Branley Museum green wall

This green wall is designed by Patrick Blanc. He calls it Le Mur Végétal, or Plant Wall, a dense sheet of vegetation that can grow against any surface, or even in midair. It works by doing away entirely with dirt, instead growing plants hydroponically in felt pockets attached to a rigid plastic backing.  

8.4.2 Green walls by Green over Grey

This living wall provides as example of an interior living wall. On the Green over Grey website (http://www.greenovergrey.com/index.php) a number of green walls they have designed are shown, ranging from green wall facades to green walls in large corporate atrium spaces, right down to small green walls inside houses.

Unlike vegetable growing, living walls only need to receive small amounts of UV light to thrive.

Reasons for selecting green walls are listed on the Grey over Grey website. These reasons include:

- They purify the air.
- They are proven to be therapeutic to humans (a summary of the effect of nature on people is given in section 8.2 of this document).
- They have a cooling effect. Studies have shown that the surface of an exterior green wall is up to 10°C cooler than an exposed wall, therefore considerably less heat is radiated inward.
- They tend to increase property values. Studies have shown that by simply having plants in and around a building or home can increase real estate values by up to 20%.
- They can protect building envelopes from the effects of high temperatures.
- They provide excellent acoustics. They insulate against noise, vibrations and reduce sound penetration. In addition they help to absorb the echo bouncing off buildings and dampen the noise pollution of modern cities. Studies have shown that the leaves of plants attenuate sound by reflecting, refracting and absorbing acoustic energy in small amounts.
- They add aesthetic interest to buildings.

8.1.5. Apartments of common form

8.1.5.1. Tietgen student housing, Copenhagen
2002-2006, Lundgaard & Tranberg Arkitekter

Figure 8.23: Tietgen exterior

The building’s circular form, a symbol of equality and the community, is contrasted by projecting volumes expressing the individual residences.

The apartments are set at differing depths in an alternating rhythm, which expresses the individual’s unique identity through its form and gives the exterior form of the building it’s characteristic, crystalline expression and neutralises the possibly monumental shape of the cylindrical space.\footnote{Lundgaard & Tranberg Arkitekter. \textit{Tietgen Dormitory}, http://www.ltarkitekter.dk/en/projects/5 (accessed June 12, 2011).}

8.1.5.2. Huski Apartments, Victoira, Australia
2005, Elenberg Fraser Architecture

Figure 8.24: Huski Apartments exterior

The modulated planes of the north façade emphasise the dynamic quality of the building both in plan and elevation.

Up close, the building is an organic array of eucalyptus boxes. Each room draws its own horizon, setting and disturbing the rhythm of the facade: a collective identity made from individual expression. From afar, Huski addresses the scale of the mountain itself, not the module of the apartment, causing a shift in apprehension and scale as you approach.\footnote{Nico Saieh, \textit{Huski Apartments/ Elenberg Fraser Architecture}, http://www.archdaily.com/1930/huski-apartments-elenberg-fraser-architecture/ (accessed June 6, 2008).}
8.2 Effect of nature on people

Frank Lloyd Wright (1867-1959), advised, “Study nature, love nature, stay close to nature. It will never fail you.”

In the last few hundred years, people have become increasingly disengaged from nature as we move into increasingly artificial environments. Never in history have humans spent so little time in physical contact with animals and plants, and the consequences are unknown. Already, some research has shown that too much artificial stimulation and an existence spent in purely human environments may cause exhaustion and produce a lack of vitality and health.

In recent years numerous studies have found that nature has a positive effect on our well being. Nature especially has a positive effect on peoples’ mental health. Studies show that nature in forms as simple as a plant at work or trees outside apartment complexes help to reduce stress, improve coping skills and develop self-discipline.

As a result of green exercise (which includes gardening and nature walks), there was a significant improvement in self-esteem in 9 out of 10 case studies.

Simply just viewing nature through a window has been proven to reduce aggression by reducing mental fatigue.

Mind, a leading UK-based charity, has released a report saying that 71 per cent (of people) report depression decrease after a green walk. 22 per cent report depression increase after an urban walk.

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105 Ibid.
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Figure 8.35: **Fourth Level Plan**
Formerly Scale 1:200 @ A2
Figure 8.36: Fifth Level Plan
Formerly Scale 1:200 @ A2
Figure 8.37: Sixth Level Plan
Formerly Scale 1:200 @ A2. Incomplete
Figure 8.38: Seventh & Eight Level Plan
Formerly Scale 1:200 @ A2. Incomplete