Hidden Territories: Integrating New Zealand
Secondary schools with their Suburban Contexts

Submitted in partial fulfilment of the
Master of Architecture (Professional)
Victoria University of Wellington
School of Architecture

Kelly Clark Hidden Territories

KELLY CLARK HIDDEN TERRITORIES
Suburban High School Integration
December 2010

Kelly Clark School Urbanism

Abstract

High schools are a significant physical and social component within the suburban environment. These campus like institutions represent a marked change from the homogenous residential suburban environments they are situated within. These school environments possess many urban qualities such as building density and enclosure.

This thesis investigates the physical relationship between high schools and the suburban environment and examines how this relationship can be improved.

A review of the relevant literature has been conducted in unison with a graphic analysis of sixteen existing New Zealand High schools. Several concepts emerged from these investigations. Of greatest significance were the concepts of New Urbanism, of which the ideas of walkable and multi-use environments, and increased density were of greatest relevance. These ideas were found to align cohesively with those of Roy Stricklands City of Learning concept. Further, the graphic analysis revealed that the school and suburban environments are deficient in three key areas. These are permeability, the built interface between school and suburb, and the suburban environments functional segregation.

The research then investigates how both physical and functional connections between school and suburb can be increased to correct these deficiencies. Cashmere High School, Christchurch, was selected for the design case study as it was representative of many of the salient issues identified.

The research finds that permeability within the studied suburbs is poor; secondly it finds that school buildings are disengaged from their surrounding context. In addition it finds that school environments possess many urban like qualities such as density, variety and walkability. Finally the research concludes that school environments can be better integrated into their suburban environment.

Acknowledgements

I would like to acknowledge Victoria University staff and fellow students for their help and critique. Particular thanks goes to Chris McDonald for his patience in supervising this research. Additional thanks goes to the Ministry of Education staff and Cashmere High for offering their time and knowledge. Finally I would like to acknowledge Paul, Jenny, Gus and Jack for their unwavering support throughout the duration of this research.

Chapter 1

1.0 Introduction	19
------------------	----

Chapter 2

2.0 Introduction	23
2.1.1 The Suburban Condition	24
2.1.2 Historical Background	25
2.1.3 Opportunity	27
2.1.4 Large Suburban Sites	31
2.1.5 Suburban Preference	34
2.1.6 Summary of Suburban Condition	35
2.2.1 Schools and suburbia	36
2.2.2 Historical Background	36
2.2.3 Isolated Suburban Schools	37
2.2.4 An Integrated Future	39
2.2.5 Summary of Suburban High Schools	41
2.3 Discussion	42

Chapter 3

3.0 Mapping Studies	45
3.1 Figure Ground studies	46
3.2 Zoning	47
3.3 Barriers	48
3.4 Topography	49
3.5 Roads	50
3.6 Public Amenities	52

3.7 Park Areas	53
3.8 Discussion and Conclusion	53

Chapter 4

4.0 Cashmere High – Design Case Study	91
4.1 Purpose of Design	91
4.2 Client and Brief	97
4.3 Assumptions, limitations and qualifications	99
4.4 Description of design process and outcome	101
4.4.1 Circulation	101
4.4.2 Built Interface	107
4.5 Implications for research	119

Chapter 5

5.0 Discussion and Conclusion	179
5.1 Incentive	179
5.2 Permeability	181
5.3 Built Interface	183
5.4 Implications and future research topics	186
5.5 Conclusion	187

Works Cited	189
--------------------	-----

Further Reading	193
------------------------	-----

List of Figures

Review of Literature

Fig 1: Cité contemporaine pour trois millions d'habitants (1922) From *Le Corbusier. Early Buildings and Projects, 1912-1923*.

Fig 2: Cité contemporaine pour trois millions d'habitants (1922) From *Le Corbusier. Early Buildings and Projects, 1912-1923*.

Fig 3: Frank Lloyd Wright, Broadacre City, From *The Living City* (1953)

Mapping Studies

Fig 4: Figure Ground Plan Avonside Girls High Christchurch

Fig 5: Additional Graphic Analysis Avonside Girls High Christchurch

Fig 6: Figure Ground Plan Awatapu College Palmerston North

Fig 7: Additional Graphic Analysis Awatapu College Palmerston North

Fig 8: Figure Ground Plan Cashmere High Christchurch

Fig 9: Additional Graphic Analysis Cashmere High Christchurch

Fig 10: Figure Ground Plan Christchurch Boys High

Fig 11: Additional Graphic Analysis Christchurch Boys High

Fig 12: Figure Ground Plan Epsom Girls' Grammar Auckland

Fig 13: Additional Graphic Analysis Epsom Girls' Grammar Auckland

Fig 14: Figure Ground Plan Linwood College Christchurch

Fig 15: Additional Graphic Analysis Linwood College Christchurch

Fig 16: Figure Ground Plan Napier Girls High

Fig 17: Additional Graphic Analysis Napier Girls High

Fig 18: Figure Ground Plan Newlands College Wellington

Fig 19: Additional Graphic Analysis Newlands College Wellington

Fig 20: Figure Ground Plan Papatoetoe High Auckland

Fig 21: Additional Graphic Analysis Papatoetoe High Auckland

Fig 22: Figure Ground Plan Paraparaumu College Wellington

Fig 23: Additional Graphic Analysis Paraparaumu College Wellington

Fig 24: Figure Ground Plan Rangitoto College Auckland

Fig 25: Additional Graphic Analysis Rangitoto College Auckland

Fig 26: Figure Ground Plan Rongotai College Wellington

Fig 27: Additional Graphic Analysis Rongotai College Wellington

Fig 28: Figure Ground Plan Saint Bede's College Christchurch

Fig 29: Additional Graphic Analysis Saint Bede's College Christchurch

Fig 30: Figure Ground Plan Saint Patrick's College Wellington

Fig 31: Additional Graphic Analysis Saint Patrick's College Wellington

Fig 32: Figure Ground Plan Shirley Boys High Christchurch

Fig 33: Additional Graphic Analysis Shirley Boys High Christchurch

Fig 34: Figure Ground Plan Waitakere College Auckland

Fig 35: Additional Graphic Analysis Waitakere College Auckland

Cashmere High Design Case Study

Fig 36: Map of Cashmere High School Zone

Fig 37: Aerial Photo of Cashmere High and Surrounds

Fig 38: 4km² Figure Ground Plan of Cashmere High and surrounds

Fig 39: Existing Road Network

Fig 40: Figure Ground Plan showing local Amenities

Fig 41: Map showing council zoning definitions

Fig 42: Map showing Deprivation Index

Fig 43: Existing Bus Routes

Fig 44: Site Topography

Fig 45: Diagram of North - South connections to Heathcote River

Fig 46: Diagram Showing proposed new circulation routes intersecting superblock

Fig 47: Diagram Showing proposed new building works

Fig 48: Diagram supplied by Cashmere High showing proposed Building and Infrastructure Projects 2010-2012

Fig 49: Diagram supplied by Cashmere High showing proposed Landscape Projects 2010-2012

Fig 50: Photo of existing Barrington Street entrance

Fig 51: Photo of existing Rose Street entrance

Fig 52: Aerial view looking Southward accross redeveloped site

Fig 53: Aerial view looking Northward accross redeveloped site

Fig 54: Diagram of Building to be removed

Fig 55: Diagram showing footprint of proposed buildings

Fig 56: Diagram showing location of existing car parking

Fig 57: Diagram showing location of new car parking

Fig 58: Diagram of circulation network

Fig 59: Diagram showing location of trees

Fig 60: Masterplan of Existing site

Fig 61: Proposed Masterplan

Fig 62: Aerial view looking Southward accross redeveloped site, New development indicated in red and black

Fig 63: Aerial view looking Northward accross redeveloped site, New development indicated in red and black

Fig 64: Scale plan of proposed Rose Street Entrance

Fig 65: Location Diagram

Fig 66: Section C-C

Fig 67: Section B-B

Fig 68: Section A-A North

Fig 69: Section A-A South

Fig 70: Photo of existing Rose St entrance

Fig 71: View of proposed Rose St entrance

Fig 72: Scale plan of proposed McCombs Square

Fig 73: Location Diagram

Fig 74: Section F-F

Fig 75: Section E-E

Fig 76: Section G-G

Fig 77: Section D-D

Fig 78: Photo of existing carpark area - site of proposed McCombs Square

Fig 79: View looking south along new pathway through McCombs square

Fig 80: View West along McCombs Avenue

Fig 81: Elevated view from existing Administration building looking North-West accross McCombs Square

Fig 82: Scale plan of proposed Gym Square

Fig 83: Location diagram

Fig 84: Section H-H

Fig 85: Photo looking south toward existing Gym entrance

Fig 86: Elevated view of proposed Gym square looking south to Gym entrance

Fig 87: Photo of existing junction of A and B blocks - southern facade

Fig 88: View looking North through new opening between A and B blocks through to McCombs Square

Fig 89: Scale plan of proposed Opawhaho Park

Fig 90: Location diagram

Fig 91: Section I-I

Fig 92: Photo looking North-West toward school buildings from existing bridge across creek

Fig 93: View North-West along propsed realigned walkway

Fig 94: View of proposed new bridge and classroom

Fig 95: Elevated view looking North-West across Opawhaho Park

Fig 96: Existing Buildings

Fig 97: View West into Gym square from Opawhaho Park area

Fig 98: Scale plan of Ashgrove Terrace Entrance

Fig 99: Location diagram

Fig 100: Section J-J

Fig 101: Photo of existing neighbouring residential property to be removed

Fig 102: Photo of existing school entrance from Ashgrove Terrace

Fig 103: Section K-K

Fig 104: View from Cashmere Road across proposed footbridge and Ashgrove Terrace entrance

Fig 105: View South from Cracroft Run

Fig 106: View North from Cracroft Run toward existing school buildings

Chapter 1

1.0 Introduction

Schools represent a significant outlay of capital, for both central government, and the communities they serve. They form a critical component to New Zealand's infrastructure, ensuring the education and continued function of society. This thesis is concerned with the location and physical integration of secondary schools within suburban New Zealand.

This research focuses on secondary schools as distinct from primary schools. This distinction is made for two reasons; the first is the older age and maturity level of secondary students, the second is the larger size of high schools – both in terms of student numbers, and land area - compared to primary or intermediate institutions.

Extensive research exists overseas into the capacity of secondary schools to be more integrated with their surrounding environments. Academics such as Roy Strickland propose that the school could become an integral component of the urban environment. Critically, much of this research, concerned with the integration of schools, is focused on integrating them amongst an urban environment. This distinction does not render those findings irrelevant; rather it merely indicates that some translation is needed to ensure its relevance within the suburban context.

Stricklands City of Learning concept (COL) investigates the capacity of existing institutions such as libraries and museums to educate school students. In essence this concept formally acknowledges the cities educational capacity, placing the school within easy access to those facilities. By partially integrating the education of students into the public urban environment Strickland proffers that the students will make a positive contribution the social experience of the urban environment.

Given Stricklands assumption that the school and its students can enhance the urban environment, it

is worth investigating how this could translate to the low density suburban environment.

Suburban New Zealand presents a dramatically different environment to the industrial cities of the Northern United States where Strickland focuses his efforts. This environment differs markedly both in terms of built form and culture. Like most architectural issues, the relationship between secondary schools and their host suburbs has a social dimension. Nevertheless, the research will focus on the physical and spatial aspects of this integration. This is not to disregard this as a social issue; rather it focuses the research on the architects' area of specialist knowledge. Further to this the economics of this proposal lie outside the scope of the research.

The physical integration of suburban high schools does not reflect the symbiotic relationship between school and suburb.

Because of their educational role, and ongoing government funding, schools are one of the few remaining elements which constitute suburban public meeting points, these are sometimes referred to as "third places". Many of the elements which historically facilitated public interaction within the suburbs such as the local bank and post office have disappeared. The school remains an active social node and has the potential to further develop in this role.

Further highlighting the schools latent potential as a place of informal social interaction is its inherent size and existing facilities. Facilities such as sports fields, gymnasias and school halls are already used by the wider community. In many schools, the physical environment is not structured to actively facilitate this positive interaction. School facilities are all too often buried deep within school grounds severing informal relationships between school activities and the public environment.

Research question: the aim of this research is to investigate the physical relationship between high schools and their suburban environment and to assess and whether those physical and functional

connections can be improved.

This thesis consists of five chapters, interspersed with graphic representations and analytical drawings. Chapter two provides a review of literature. The chapter draws together the relevant theoretical texts concerning suburbia and education. The basis for much of this research stems from the findings of chapter three (mapping studies). Positioning the review of literature before this graphic analysis provides the reader with the theoretical framework with which those maps were analysed.

Chapter three investigates sixteen existing suburban high schools. These high schools, located principally in New Zealand's three main centres, provide a graphic analysis of how schools are situated within suburban New Zealand. The graphic analysis of these New Zealand high schools is necessary as there have been no previous studies investigating this area of research. From this study Cashmere High is selected as case study.

Chapter four discusses how the salient deficiencies identified in chapters two and three – lack of permeability, and poor built interface between school and suburb - are addressed in the design case study of Cashmere High. This chapter describes the application of many of the urban design concepts identified in chapter two. The chapter is broken down into discrete sections representing the different aspects of the case study.

Chapter five: Discussion and Conclusion presents the findings from the research. Of most significance this chapter concludes that permeability within the studied suburbs is poor, and that school property contributes to that deficiency. Secondly it concludes that school buildings are disengaged from their surrounding context. Further it finds that these school environments possess many urban qualities. Finally it concludes that school environments can be better integrated into their suburban environment.

Chapter 2

2.0 Introduction

This chapter provides a critical review of existing theories and practices relevant to the discussion of secondary school integration in the suburban environment. As an architectural thesis this research focuses principally on the physical and spatial aspects of this integration, issues central to the discipline of Architecture. To quote Jan Gehl:

“It is possible to design the physical structure to contain areas and facilities that appeal to all the residents or groups of inhabitants. But this is also the limit to what the architects can do with regard to planning for how the social life is to develop” (Gehl, 1987, p 56)

This chapter brings together the literature concerned with suburbia and education, as well as the inherent urban design issues related to this integration. Much of the urban design theory and practices employed in this design investigation are well accepted and commonly understood. As such emphasis is placed on describing the salient issues identified by the mapping studies in chapter three.

The chapter is divided into three sections. Section 2.1 is concerned with suburbia. It is divided into five sub-sections, entitled: Historical Background, Opportunity, Large Suburban Sites, Suburban Preference, and Summary and Conclusion.

Section 2.2 focuses on the school. Similarly to section 2.1 it is broken down into four sub-sections, entitled: Historical Background, Isolated Suburban Schools, An Integrated Future, and Summary Suburban High Schools.

Section 2.3 draws together the findings of sections 2.1 and 2.2 highlighting how the suburban environment is functionally segregated, and socially deficient because of that segregation. It proffers how

many of the ideas of New Urbanism align with the proposal for a more integrated school environment. In tandem to this the ideas of Stricklands City of Learning concept necessitate adaptation in order to reflect the suburban context. Finally it hypothesises that a more integrated school environment can improve both the school environment as well as the immediate suburban environment.

Numerous constraints were applied to the survey of literature. Literature on the suburb was limited to urban design issues specifically. Thus much geographic and social theory was outside the scope of research. Literature on the integrated school was also focused on the physical aspects of that integration. The age of resources varies in importance depending on content. Printed publications were used where possible, however many online sources such as the Urban Design Compendium provide the most up to date resources online. Beyond the limitations outlined the principal feature not investigated in this chapter is the existing integration of suburban secondary schools within New Zealand. This condition is investigated in chapter three but also informs much of the investigations made in this chapter.

2.1.1 The Suburban Condition

Suburbia is today an indispensable component to all New Zealand cities. It is the suburbs, not the inner city which house the majority of our city populations. The 2005 Statistics New Zealand Report: Downtown Dwellers 2005: New Zealand's CBD Residents presents the statistic whereby only 8,607 people lived in inner city multi-unit dwellings in 2001. Such a statistic whilst only representative of a section of urban residents clearly highlights the fact that the vast majority of our city populations do not occupy inner city apartments.

A concise definition of suburbia is fraught with challenges. Models that are commonly recognised as suburban, such as the cul-de-sac are always different according to local circumstance (Ruby & Ruby, 2004). These suburban areas, be they new or old, of limited means, or excessive wealth, are often very repetitive within the bounds of their self reference. It is this variance from a truly universal form that

makes clear definition fraught with problems. A loose definition, yet one that holds true due to its inherently generic form, is that New Zealand suburbia consists principally of individual, stand alone houses. These houses are interspersed with small shopping centres, cafes, Bars, schools, libraries, parks, and other public amenities. Further to this the houses within suburbia do not typically connect, and are set back as if islands within their own property.

As Robert Fishman notes in his introduction to *Sprawl and Suburbia* (Saunders, 2005), suburbia has reached such a point that it is able to offer every 'function' urban environments do. Despite suburbia's capacity to host these traditionally urban functions, the suburb lacks the urban experience itself.

Chapter three's mapping studies clearly demonstrate the physical deficiencies of the suburbs. These studies highlight that the physical integration of suburban high schools is deficient in two key areas. These are the built interface between school and suburb, and the lack of permeability within the suburb.

2.1.2 Historical Background

In his highly regarded essay *Bourgeois Utopias: The Rise and Fall of Suburbia* (Fishman, 1987), Fishman identifies the beginnings of a trend away from the city centre, as originating in the eighteenth century. Centring his argument in London, at the time, as it is today, a hub of world commerce. The English well known for their distinct class system, had essentially all lived in close proximity. There had been no physical separation according to class. Obviously the standard of accommodation differed markedly between rich and poor, but what is important to note is that there was a much greater diversity within any given area than experienced today (Whitehand & Carr, 2001) (Davison, 1995). It is quite remarkable that these early eighteenth century English cities, well known for their extreme inequalities between rich and poor tolerated such social diversity within any given area.

Through the latter half of the eighteenth century, with the increasing importance of London as a global economic hub, those social strata began to blur. Merchants, the business tycoons of their age, grew

in wealth, some even approaching the wealth of the aristocracy. These businessmen, a new form of social elite, were tied to the city core, their business interests requiring proximity to the exchange of information in central London as well as their goods (Fishman, 1987). With this new social class, came the desire to express it physically.

In tandem with these events Fishman cites the rise of the evangelical movement with its desire to place the family at the core of one's life. This movement framed the industrial city as immoral. (Fishman, 1987) Others cite the rise of the Romantic Movement in literature and art which turned its back of the city as the centre of human endeavour, instead turning to the worship of nature (Ferguson, 1994, p25). This vision of an unconstrained natural world contrasted with the "dark and satanic" (Ferguson, 1994, p25) industrial city. This seemingly common rejection of the city masked much variety. As Ferguson states:

"Some rejected the ordered landscapes of the aristocracy but nevertheless hankered after an idealised rural society based on a sense of order, place and social responsibility. Others exalted the individual, unconstrained by irksome social structures, existing in a wild and equally unconstrained natural world." (Ferguson, 1994, p24)

Ferguson goes on to credit this latter idea as having the greatest appeal to the members of the new middle class. "The notion of wild and disordered nature disturbed them, but they believed sincerely in the individual as the basis for social organisation, and even more strongly in the right of individuals to pursue their destiny..." (Ferguson, 1994, p25)

The essential problem for the aspiring middle class was that business life required constant access to the city. This pragmatic reality presented a dilemma for the middle class. Where the aristocracy, who had the means to maintain extensive estates in the countryside, could remain isolated from the profanity of the city, the middle class businessman could not. Suburbia at the fringe of London, or just beyond it provided the best compromise. Access to the city was afforded by a daily commute by private carriage, and in later years tramways and rail afforded rapid access to the central business district. In-

stead of the home serving both domestic and commercial roles it served solely a retreat for the family. Offices, frequently in the form of a townhouse were used to conduct business within the city. To quote Fishman “A new style of life had been established.” (Fishman, 1987, p37) Home life and work life were now separate functions.

Following in this Functionalist concept, early 20th Century Modernism set out to reconfigure the city. At the city scale it set forth the concept of zones; areas segregated by function. It sought to rid the industrial city of its “dark, overpopulated, and unhealthy” (Gehl, 1987, p47) living conditions by isolating buildings from one another and undesirable industrial activities. At the time “it was not recognised that buildings also had great influence on outdoor activities and consequently on a number of social possibilities.” (Gehl, 1987, p48) Importantly, Modernism did not set out to reduce or exclude social interactions.

The dispersion of buildings and city functions assured light and access to clean air but it has also caused “an excessive thinning of people and events.” (Gehl, 1987, p48) Rather than adopting the multi story towers envisaged by Europe’s Modernists (see Fig 1 & 2) (instead adopted by multinational corporations) new suburban development adopted “the bastard child of Frank Lloyd Wright’s Broadacre City (see Fig 3) and Norman Bel Geddes’s Futurama.” (Davis, 2002) These suburban environments lack the communal spaces proposed by Europe’s Modernists. In place of these communal outdoor spaces, individual, private outdoor areas are created for each dwelling. As a result informal, unstructured communal outdoor activities are reduced to a bare minimum. (Gehl, 1987)

2.1.3 Opportunity

Informal outdoor activities and chance meetings are limited in the public suburban environment because of street design, vehicular traffic, and low population densities. (Gehl, 1987) Gehl’s findings on the impoverished public domain of suburbs are important because, as Chapter three shows, New Zealand suburbs profoundly lack the urban qualities which are associated with social activity. These urban

qualities centre on the scale, density (both in terms of built form and population), complexity, and enclosure, all qualities found within these school campuses but typically not in the surrounding environment. (Refer chapter three: Figure Ground Study.)

It is important to note that the argument being made here is not that suburbia lacks social activity rather that that activity is segregated and structured around specific spaces. Ellen Dunham-Jones and June Williamson highlighting this point by stating that they “all have their spaces – just not where they are likely to interact with each other.” (Dunham-Jones, 2009, p60)

Too much emphasis is placed upon efficiency within both the suburban environment. This search for efficiency is far ranging but is clearly evident in numerous features we take for granted. For example the grouping of car parks for the optimum number car parks to vehicle isle, neglects the potential contribution people walking from their car to their destination along a footpath can make. These decentralised car parking models help populate the street and make the street a more interesting place to be in and look at. Further to this the chances for informal social interactions are greatly increased. (Gehl, 1987) What this example serves to prove is that even seemingly mundane activities can make a positive contribution to the public environment.

Fundamental to this problem is the lack of incentive for private entities to foster the suburban public environment. Responsive Environments notes that:

“Because the particular activities defined by the patron get most of the designer’s attention, projects are usually designed rigidly around them by tailoring the pattern of spaces so that the desired pattern of activities can take place as efficiently as possible without interfering with each other.” (Bently, 1985, p56)

Within the inner city, incentive for this interaction does exist, in the form of commercial activities such as retail and cafes. These activities rely on public exposure for business. Within the suburbs however

Fig:1
Le Corbusier; Cité
contemporaine
pour trois millions
d’habitants (1922)
From *Le, Corbusier.
Early Buildings and
Projects, 1912-1923,*
(1982)

this commercial presence is less significant consequently there is a lack of active facades and well defined street edges.

Numerous difficulties inhibit this closer relationship. These include convincing the public that such integration is in fact beneficial. This task is made all the more difficult by the clarity of the functionalist alternative promoted by the Charter of Athens (1933). Rob Krier makes the point that the charter was too easy to use and was commercially successful. He contrasts its functional zoning with that of the medieval town whose functional mix necessitates a certain acceptance of social conflict. (Krier, 2006, p9) To dwell on these difficulties does not allow the proper investigation of suburban high school integration, which is the purpose of this research.

In addition to the public's acceptance of this more integrative approach Andres Duany highlights how engrained this functional approach is within the controlling bureaucratic structures:

"A problem of suburbia is that it is designed by a series of specialists, each with his or her prerogatives. The thoroughfares are given over entirely to engineers; the green areas are designated by environmentalists; the developers only do townhouses or apartment buildings or shopping houses and so on. The so-called planning process is not so much a matter of integration as it is a procedure for allocating where each speciality can apply its principles and preferences. What results is a collection of elements that fails to coalesce into urbanism." (Duany, 2002, p27)

2.1.4 Large Suburban Sites

One of chapter three's salient findings was how high schools form physical barriers to suburban permeability. As a result, permeability and access are key elements of the conceptual framework for the research. If we reconsider the school as a public environment then public connections through the site, linking currently remote areas are possible. Given the large size of these school sites there is typically the physical capacity to host these new connections. Ellen Dunham-Jones and June Williamson make the point in *Retrofitting Suburbia* that large sites "are needed to achieve the critical mass necessary to

Fig:2
Le Corbusier; Cité
contemporaine
pour trois millions
d'habitants (1922)
From *Le Corbusier.
Early Buildings and
Projects, 1912-1923,*
(1982)

induce behavioural change and evolution of the larger transportation, regulatory, and market systems.” (Dunham-Jones, 2009, pviii)

Creating new connections through large sites necessitates a raft of urban design measures and considerations. As Ian Bently notes in *Responsive Environments: A Manual for Designers* “This choice will only be useful if people are aware of it, so it is important to locate new routes as continuations from as many access points as possible outside the site itself, and make sure they can be seen to lead somewhere.” (Bently, 1985p, 14) In addition legibility is of great importance as people need identifiable elements in order to grasp a places layout. Kevin Lynch in *The Image of the City* suggests five key elements are required. (Lynch, 1960) These are:

- Nodes
- Edges
- Paths
- Districts
- And landmarks

Despite the apparent abundance of unbuilt land within the suburbs, most of this is privately owned and is divided into comparatively small titles. The comparatively small size of these land parcels makes large scale interventions to the urban structure difficult. This is not to say that it is impossible to make large scale interventions in the suburban fabric, rather that complicated site agglomeration is typically required.

Given the difficulty of attaining large parcels of suburban land it is not surprising that new residential developments principally occur in the outer regions of the city. New approaches to urban design concerned with the suburbs such as Seaside and Celebration are typically located in Greenfield sites. Because of this these developments, both orthodox and New Urbanist, receive criticism for contributing to sprawl. It is important to note that this is not the intention of New Urbanism rather as Krier

Fig:3
Frank Lloyd Wright,
Broadacre City
From *The Living City*
(1953)

indicates;

“developable land is not available in unlimited quantities, we have to think at the same time about how existing urban structures can be condensed in order to conserve the agrarian reserves and to care for the ecologically valuable regions.” (Krier, 2006, p14)

Many New Urbanist ideas align closely with the intentions of this research. These concepts are:

- Walkability
- Connectivity
- Mixed-use & Diversity
- And Increased Density

Many of the Charters other concepts are still relevant though they tend to be an aside to the focus of this research. These are features such as Green Transportation and Sustainability. (NewUrbanism.org, 2010) The proposal championed by this thesis differs from the main thrust of New Urbanism. Whilst differing somewhat it utilises many of New Urbanisms concepts reinterpreting them and placing the school as a viable civic environment potentially at the heart of other developments.

2.1.5 Suburban Preference

The success of suburbia is clearly evident in its physical expanse. With such success however comes growth pains, (Kiefer, 2004) and some would argue suburbia has become the very thing it sought to escape. To radically revolutionise this condition seems as yet, unlikely. Far too much capital, both public and private has been sunk into suburbia, and buildings are not particularly mobile. In the greater scheme of things it is unclear as to when a turning point will be reached, whereby our cities cease to expand outwards. Irrespective of the timing however history serves to prove that whatever alternative is proposed, it will need to appeal to people’s desire to improve their standard of living.

This apparent preference for ‘more’ is reflected in a study into New Zealand urban form and transportation issues undertaken in 2009, published in Sizing up the City: urban form and transport in New Zea-

land (Howden-Chapman, Stuart, & Chapman, 2010) The respondents, when asked “Would you prefer a larger house and section further out of the city, or a smaller house or apartment in the main town or city nearest you?” 53% responding: “larger house, further out”. Conversely only 23% desired a “smaller house or apartment in the city/main town.” What influences these results, is undoubtedly varied, many of the recipients possibly only having experienced life in the “further out” areas. With this in mind, it is possible that they do not reject the urban experience, rather that they have limited experience of it.

The process of changing these perceptions cannot happen overnight as the perceptions themselves were developed over a long period of time. It does however pose the question as to whether changing the structure of the school environment and promoting it as the core of an existing suburban network can change those perceptions.

2.1.6 Summary of Suburban Condition

This section of research explored the key concepts and theories concerning the suburban environment. It was found that the concept of integrating the school into its suburban setting aligns with many of the ideas of New Urbanist theory. These ideas centre on achieving urban environments with the following qualities:

- Walkability
- Connectivity
- Mixed-use & Diversity
- And Increased Density

It was also found that the suburban environment lacks interaction between its discrete functions. This segregation is evident at numerous scales in the physical as well as social suburban environment. All of the contemporary theories on urban design promote better integrated environments, in a bid to foster positive public social environments. Functionalism did not, for as Jan Gehl notes “it was not recognised that buildings also had great influence on outdoor activities and consequently on a number of

social possibilities.” (Gehl, 1987, p48) That this is so was evidenced in their perspective drawings which teemed with life and activity. (Gehl, 1987)

2.2.1 Schools and suburbia

Section 2.2 introduces the school to this discussion, firstly discussing the school as it is and how it came to be. It then goes on to discuss more recent developments in concerning the integration of schools within their surrounding environments.

The physical integration of schools within the suburban makeup typically does not reflect the symbiotic relationship between the two entities. As Sharon Haar points out in her introduction to *Schools for Cities: Urban Strategies*, schools are subject to demographic changes more than any other civic institution (Sharon. Haar, 2002). Both schools and the suburbs they are located in operate on a supply and demand model. This relationship is subject to both the local and national population changes. It is also affected by increased emphasis placed on education by contemporary society. Reinforcing this sentiment Haar goes on to quote Developer William Levitt as saying: “A school has to be ready when the house is ready. It’s as important as a water main” (cited by Sharon. Haar, 2002, p7)

2.2.2 Historical Background

As discussed in section 2.1.2 the development of eighteenth century suburbs was initially for the very wealthy. The education of these families children would often be undertaken by private tutor (Tanner & Lackney, 2006). Whilst this form of tuition was attainable for the wealthy, it was not an option for those of the middle class.

The development of mass tuition along with developments in rail and other mass transportation facilitated the middle classes move to the suburbs. Within such a family centred environment, it was essential, to maintaining those values (which rejected the city) that the education of its children be located

within the suburbs, rather than the “immoral” city. This symbiotic, or rather this supply and demand relationship between school and suburb did not however determine the school form, or its physical integration within the suburb.

Situated within the suburban environment, and with the ready availability of comparatively cheap quantities of land, 20th century high schools tended to take on campus like forms. The ability to purchase such large swathes of land allowed for the design of schools to be shaped more by their own functional needs than by the specifics of their context. As such prototypes were able to be developed (Sharon Haar, 2002, p81), and applied, the isolation rendering the immediate context effectively a clean slate.

2.2.3 Isolated Suburban Schools

The mapping studies in chapter three highlight the physical isolation present in many of New Zealand's existing high schools. As noted in section 2.2.2 this isolation was facilitated by the large sites these schools occupy. In essence this isolated approach has led to what Andrew Ross terms a form of “unilateralism” (Ross, 2004). To offer a definition, Ross’ description proffers that it is the situation prevalent within suburbia whereby be they individuals or commercial entities are able to operate to a certain degree in isolation of each other. The cul-de-sac subdivision operates as a classic example. The events that occur, or are proposed to occur within that subdivision or development are able to occur independently from events beyond its edge. The same principle applies to suburban schools. (Bingler, Quinn, & Sullivan, 2003)

Such a segregated or “Unilateral” approach tends to reduce the design of schools to a problem of infrastructure (Sharon. Haar, 2002). This functionalist approach sees the school identified as a mono-functional element, no different to a highway whose function is to allow the rapid passage of vehicle. This overly focused approach tending to neglect the potential of the school and its facilities to enrich its surroundings.

Complicating these historic trends, there is also the beginning of a return to a greater mix of home and work life. This made possible by modern technology such as the internet allowing people to effectively work from home. Mirroring this erosion of clearly defined boundaries is the contemporary emphasis placed on continued learning. Historically people generally stayed within their career for their entire working life. Today it is far more common that peoples career paths change during the course of their working life. Given this, re-training is often necessary. This situation brings up the question whereby if adults are to work – as well as live – in the suburb, might they not also continue to study at the local school?

The current separation between formal education and life beyond the school gate tends to conflict with the widely held belief that education is a lifelong process. Sullivan makes the argument that school facilities should also cater for senior citizens as well, citing the looming retirement of the baby boomer generation. In his 2002 report *Catching the Age Wave*, he cites former AARP (American Association of Retired persons) president Joe Perkins as saying, “Schools should be a point of unity not division, between and among generations.”(Sullivan, 2002)

Many factors prevent the integration of formal education with education and life beyond school (both beyond school hours, and after graduating from high school). Situated prominently within this dialogue is the funding of schools. As Sharon Haar points out in her essay *Prototypes and Paratypes*, “the tendency to treat schools as their own category of public investment makes integrative urban approaches rare” (Sharon Haar, 2002, p80) To elaborate, individual schools receive their funding principally through central government, via the ministry of education. This funding is provided for the education of students. Funding is proportionate to enrolled student numbers. Other forms of funding and revenue gathering are available to schools in the form of “school donations” and initiatives such as fundraising. There is little incentive for schools to actively pursue urban engagement that does not directly – and just as importantly, quantifiably – contribute to improved student learning.

2.2.4 An Integrated Future

Extensive debate surrounds the role schools should play within the community. One strand of discussion sees the school as forming a civic space within the community. Many factors support such a stance. One principle contributor is the ongoing presence these schools have within the community. Where elements that previously facilitated communal gathering points have either diminished, or disappeared altogether such as the church, schools typically maintain their position. (Beaumont & Piance, 2002) Two alternate methods for achieving this vision of the schools as the centre of the community are offered in the 2003 report *Schools as Centers of Community: A Citizens Guide for Planning and Design* (Bingler, et al., 2003, p3). The first of these suggests the physical integration of the school within the community. The second method proposed involves the school extending out into the community more effectively making use of existing resources. The second of these proposals is less obviously an architectural proposition, instead more dependent on teacher and curricular criteria. Given this the research focuses on the physical integration of the school campus.

Over the past twenty years Roy Strickland has developed a series of guidelines for the integration of schools within urban environments. Several well documented case studies exist, highlighting how alternative forms of school facilities can be integrated within urban environments previously neglected as unsuitable for education.

These case studies, whilst favouring the return to the inner city, offer a concept that could be applied to the suburban high school. Where, in the inner city case studies, the exchange sees the school reach out to engage with the city. In the suburban setting it is probable that this situation could be reversed. The surrounding community making use of the facilities of the school, such as the library, school hall, swimming pool, and sports fields. Such concepts are nothing new and have in fact been occurring in our suburban high schools for some years now. However it does not appear that schools are set up suitably well to actively encourage this form of engagement.

The 2002 Report *Why Johnny can't walk to school* (Beaumont & Piance, 2002) investigates community centred schools. Sponsored by the National Trust for Historic Preservation the report is biased toward the preservation of historic schools within America. It does however offer valuable insight, in that many of these historic schools serve as anchors for the surrounding neighbourhood. The report positions these typically smaller Historic schools in favourable opposition to the "Behemoth - sized" contemporary schools. Arguing that these smaller facilities offer the safety and security of being where you are known and amongst people who care for you.

Much work has been undertaken regarding the psychological impact of spaces. Children are perceptive to the subtle messages spaces communicate (be they intentional or unintentional). (Eizenberg, 2002; Schneider, 2002) As mark Schneider highlights in the report: *Do School Facilities Affect Academic Outcomes?* (Schneider, 2002) "Attractive, well designed, well-maintained facilities communicate respect for the people and activities housed within them and contribute to a positive school climate, good discipline, and productive learning." And whilst this statement is concerned with the immediate bounds of the classroom and school buildings, it is applicable to the greater perception of the school. Eizenberg makes the point that whilst teachers are attempting to inspire students with knowledge and encouraging students to work together to solve problems the school environments are undermining these lessons.

Peter Jarvis argues in his essay: *Learning to be a person in society: Learning to be me* (Jarvis, 2009), that the emergence of the human essence is a product of both the physical as well as the psychological world in which it inhabits. Essentially we and our children are the products of where and how they are brought up. Whilst this in itself is nothing revolutionary, its physical manifestation in terms of formal education is of critical importance. How students feel about their school and themselves can have a big psychological impact on the students' future attitudes and relationships. The school is where they are first exposed to the world on their own, making this even more critical.

Adding to this argument in favour for the increased interaction between school facilities and the community is the high value placed upon education in today's society. This increased value, both political and economic is representative of the globalised market and knowledge society. (Illeris, 2009) In addition to this view the 2003 report *Schools as Centers of Community: A Citizens Guide for Planning and Design*, the point is made that schools can serve as a "community hub that teaches its occupants about collaboration and the common good." (Bingler, et al., 2003)

Such sentiment is echoed by Strickland outlining his concept of the City of Learning (COL), whereby he describes how "COL is built on the premise that teachers and learners can contribute to community life, and community resources can contribute to learning." (Roy Strickland, 2002) As he then points out, although "educators have articulated an ideal, the actual form of neighbourhoods for learning remains undefined." (Roy. Strickland, 2000, p59). The absence at present of a formal design response facilitates the application of this concept within the suburb.

2.2.5 Summary of Suburban High Schools

This section of research investigated concepts related to the integration of suburban high schools.

As already noted the monofunctional suburban environment lacks viable public spaces for informal social interaction. The school environment – if reconsidered - can provide a valuable backdrop for social activities both public and school related.

Stricklands City of Learning concept focuses principally on the integration of secondary schools into the inner city environment. The concepts intent aligns with that of this research. Given the differences between the urban and suburban environments much translation is necessary.

2.3 Discussion

This chapter identifies that the suburb is deficient in several areas. The first of these is the high level of functional segregation within the suburb. This functional segregation isolates activities and reduces activity within the public environment.

One social problem with school environments is the inconsistent presence of people through the day. During school hours the population density is great, after hours those numbers are significantly reduced. This diurnal cycle reflects that experienced by many Central Business Districts which lack residential and night time activity. This population flux is the direct result of functional segregation. Unlike Central Business Districts which lack residential populations the suburban school environment is immersed in residential activity. The school environments studied in chapter three do not capitalise on this potentially beneficial relationship.

Reconfiguring the interface between school buildings and residential dwellings has the potential to improve both the public street experience as well as allowing the residential activity to have a custodial presence over the school environment. Jan Gehl notes that by tying residential dwellings tightly to public space “The public spaces become part of the residential habitat and are protected against vandalism and crime in the same way that the residences themselves are safeguarded.” (Gehl, 1987, p63)

The second finding is that New Urbanist theory is closely aligned with the concept of more integrated suburban secondary schools. New Urbanism promotes Walkability, greater Connectivity, Mixed-use & Diversity, and Increased Density, all viable responses to the lack of permeability and poor built interface evident in the suburbs studied (see chapter three findings).

Educational concepts such as Stricklands City of Learning are ideologically aligned with the concept of a more integrated suburban high school. Significantly Stricklands writing is concerned with schools in

central city areas. The inner city context varies significantly to that of suburbia. Nevertheless these differences do not rule out the application of COL to the suburban environment rather they highlight the high level of adaptation necessary.

Closer integration would benefit the wider community, facilitating life-long learning, and acknowledging the symbiotic relationship between the school and suburb. Extended use of school facilities warrants greater investment in high quality physical environments. Such high quality environments contribute to improved student performance, as well as contributing to a positive school environment. (Eizenberg, 2002; Schneider, 2002) (Jarvis, 2009)

To improve the integration of high schools within the suburban environment will enhance both the school environment and the suburb.

Chapter 3

3.0 Mapping Studies

Chapter two outlined the relevant ideas and concepts in the discussion of more integrated suburban high schools. This discussion whilst focused principally on the physical aspects is also inherently a social discussion. Much of the contemporary theory is based in the United States, and is concerned with the integration of schools into more urban environments. Those urban environments differ considerably to those of New Zealand suburbia. How high schools are integrated into New Zealand suburbia as a typology is currently uncertain.

To assist the interpretation, and possible adaptation of this material, this chapter aims to investigate the position of New Zealand high Schools within their host suburbs. It then goes on to investigate whether recurring patterns exist, or are appropriate regarding the degree of integration between these schools and the surrounding environment.

This chapter offers an analysis of the physical environment of sixteen suburban high schools. Seven mapping studies were undertaken for each of the sixteen suburban high schools. These studies include; Figure Ground Plans, Zoning, Barriers to school ground access, School grounds in relation to nearby park areas, Topography, Roading, and Public amenities. These high schools are principally located within the three main centres, with the exception of Napier Girls high, and Awatapu College, located in the provincial centres of Napier and Palmerston North respectively.

The methodology for these mapping studies is comparatively straightforward. The mapping studies cover an area of one square kilometre, encompassing the school. The school is positioned at map centre for greater objectivity across the various suburban environments. In addition to this the distance from map centre to edge represents five hundred metres. This distance slightly greater than the four hundred metre walking radius commonly regarded as favourable to walking within urban environ-

ments, but still represents the immediate pedestrian catchment.

From an initial overview of the maps it is abundantly clear that there is an extensive array of street types, block sizes as well as building densities.

These drawings were constructed using the aerial photography afforded by Google Earth. The drawings do not take into account physical features such as fences as they are deemed too small to effectively map at a scale of 1:5000. This is not to undermine the significance of such features as at a human scale these elements are immensely significant in our experience of the street environment.

The studies are discussed in order correlating to the compiled maps. The discussion begins with the Figure ground plans to give an initial understanding of the subject, secondly Zoning, Barriers, Topography, Roding, Public Amenities, Park Areas in relation to school grounds. The discussion of these topics is less rigorously categorised than its graphic counterpoint. This apparent wavering is in fact due to the overlapping points of discussion. The chapters' separation into discrete sections is intended to help align its structure with the graphic analysis.

3.1 Figure Ground studies

One of the great assets of the figure ground drawing is its abstract representation of the built environment. The square kilometre Figure Ground Plan drawings utilised here graphically simplify the suburban environment making individual buildings clearly identifiable. The physical significance of the high school within the suburban environments is made clearly observable. This significance is demonstrable in several features.

The first such feature is the prominent sites enjoyed by several of these schools. Chief among these is Saint Patricks College, Kilbernie Wellington. The school buildings stand apart from other buildings, separated by the neighbouring streets and sports fields. Such a prominent site tends to reinforce the significance of the school as a civic amenity. Converse to this several schools, namely Awatapu College,

Cashmere High, Papatoetoe, and Rongotai College appear as islands isolated by a ring of residential properties. Their street presence is limited and often amounts to a sign and gateway at the driveway entrance. This isolation offers little engagement with the surrounding environment.

Irrespective of the street interface, all of these school campuses offer a density and level of complexity almost urban in nature. The reason for this density undoubtedly lies in the physical requirements of school activities. These numerous activities occur within close proximity to one another due in part to the necessity for students to walk between their variously timetabled classes. This walkability alone represents a desirable urban quality. It seems a pity that beyond the school gate there is a disjuncture between this miniaturised urban environment and the greater suburbia that envelopes it.

The majority of the high schools studied encompass extensive sports fields. These fields are represented as with all open space by the white 'ground' in opposition to the 'figure', or built fabric. The location of these sports fields do not always serve to isolate the school buildings. School buildings are frequently positioned between the street and the field, from one approach at least. These field areas are in general either fully accessible from neighbouring streets, or shut off. This relationship appears dependent on whether the school is an island or integrated more intimately with neighbouring buildings. Christchurch Boys High offers a desirable interrelation between the two. The sports fields are accessible from adjoining streets to the East and West. The school buildings are positioned along the southern boundary of these, mediating between the fields and the residential properties.

3.2 Zoning

These zoning maps were created using information obtained from local district plans. In total this entailed eight council jurisdictions. The information provided by each council was in graphic format and of comparable language and clarity. The information was obtained online in downloadable electronic format. Between the councils there is some differentiation in terms of name classification. For the purposes of comparison these have been standardised as appropriate, facilitating consistent comparison.

As befits a study of suburban high schools, these schools are typically embedded within areas zoned solely for residential use. Exceptions to this are the small areas of local shops present in virtually every one of the school areas studied. Where these shops occur the zoning rules flex to accommodate them. This observation is significant as it highlights the limited extent of the 'public' domain within the predominantly private residential environment. Further, these maps highlight potential inherent within the school as a source of complexity and variety within the surrounding environment i.e. the school often provides the only significant area of non-residential fabric within the locality. Other designated areas are open space. These generally appear well provided for within even the confines of the one square kilometre study area.

In some cases further designations are set aside for amenities such as hospitals and retirement villages.

What these zoning maps demonstrate is an institutionalised level of uniformity. The variety experienced within these areas is limited. Other activities such as the small commercial activities do occur but only in small pockets, and the homogeneity of residential fabric prevails.

3.3 Barriers

These maps were created in conjunction with the figure ground plans utilising the aerial photography available on Google Earth. The age of this photography varies between the five centres studied. The age of these images varies from 2009 for the main centres to the oldest dating from 2005 for the Napier study. Whilst the older photography is less desirable it still affords a comprehensive understanding of the overall makeup of the suburban environment. In addition to possible changes that may have occurred over such time the more recent images are of higher resolution further increasing the accuracy.

Issues of connectivity specifically in regard to access to the high schools are graphically expressed in the maps titled Barriers. The dark grey areas indicate physical barriers such as private property or scrub land. Saint Bede's College Christchurch clearly demonstrates how poor road layout can limit permeability and access to the school. In this example land that is physically positioned within a 500m radius of the school has no direct access to the school within that 500m radius. This poor street network necessitates that people travel significantly further than would be necessary given a better street layout. This increased travelling distance further reduces the likelihood of people travelling by foot, for what would otherwise be short journeys.

Looking beyond access to the school itself, many of these schools become barriers to interconnectivity within the community. Papatoetoe high school in South Auckland for example is located within a street block without any connections between its Northern and Southern edges for a kilometre. As a single large site, these schools provide an opportunity for greater permeability, perhaps even to 'correct' poorly connected street patterns. Further to this, as the school sites are already large significant changes to circulation patterns can be achieved without the need for site agglomeration.

These maps also indicate the principal points of entry to the school grounds. Examples like Awatapu College Palmerston North and Cashmere High Christchurch Christchurch demonstrate that access to the school grounds is typically limited to three points of entry and exit. Furthermore, these entrances are typically not distributed evenly around the perimeter of the site. Whilst this undoubtedly makes monitoring the entry and exit to the grounds of students more manageable it also appears to have the adverse affect of effectively isolating the further reaches of the school grounds.

3.4 Topography

Topographical information on these sites was obtained from the Koordinates website with information supplied in conjunction with Land Information New Zealand. Topographical information is limited to intervals of twenty metres in altitude obviously limiting the detail able to be observed. In a few cases, the

coarseness of the contour information becomes critical. One such example of this occurs at Newlands College. Here, there is a three metre height difference between Bracken Road and the main cluster of school buildings. Despite this limitation, the data is useful in providing an understanding of the schools physical position within the surrounding neighbourhood.

The majority of these schools are situated on flat sites. Several that are not however are subject to access limitations because of it. Two schools significant to this discussion are Newlands College Wellington, and Napier Girls High Napier. Both schools are located on, or adjoining topography that is restrictive in terms of allowing access to the school. These two schools respond in distinct ways to their unique positioning. The grounds of both of these schools are comparatively level or terraced. Napier Girls High is sited prominently on top of Bluff Hill Napier. Newlands College is situated on the Western flank of a valley of Northern aspect. In the latter case, the school grounds are accessed principally from the western boundary adjacent to Bracken road but are significantly lower than street level. The schools eastern boundary backs onto an undeveloped valley of scrub. It is interesting to note that despite this topography the school has an overall layout that is similar to many schools located on flat sites. For comparison note the similarities between Newlands College and Paraparaumu College.

Napier Girls High occupies its hill site somewhat differently. Undoubtedly this is in part due to its continuing 125year ("Napier Girls High School," 2008) occupation of the site. Most notable is the road which passes through the school providing access to the school as well as the neighbouring houses to the east. This area to the east is accessible by only a one other road also adjacent to the school grounds. This access is necessary as the topography of Bluff hill prevents vehicular access from the east.

3.5 Roads

These maps were created using the information provided online by Google Maps. Distinctions between road hierarchies are consistent across the various schools, facilitating consistent comparison.

The square kilometre drawings of road hierarchies make it clear that there are an extensive variety of street layouts present within New Zealand suburbs. These layouts range from the orthogonal gridded streets surrounding Linwood College in Christchurch, to the more varied topographically responsive layout surrounding Napier Girls High. This school, situated upon Bluff Hill, represents an anomaly in terms of its interaction with surrounding roads, in that it has a residentially scaled connecting road severing the school grounds in two. Numerous other schools such as Christchurch Boys High and Epsom Girls' Grammar have roads ending at the school gate which in turn branch off other more significant roads. Other schools are attached along an edge to a locally significant road. Further to this several of these schools, such as Paraparumu College and Newlands College have only one street frontage.

Many of the areas surrounding these schools appear to suffer from poor connectivity. This is possibly best exemplified by Saint Bede's College Christchurch, with its surrounding cul-de-sacs, and dead end roads. An additional observation is the size of the city blocks many of these schools occupy. These blocks are typically very large. Several of these schools are centred in blocks measuring a kilometre in length. Papatoetoe High School located in south Auckland is exemplary of this. Whilst the block is punctured at numerous points along its long edges by side streets, these terminate part way through the block, without connecting through to the other side.

Schools either conform or differ in their orientation to the general street layout. Two examples of this oppositional relationship are Cashmere High and Linwood High. Cashmere High buildings are set at forty-five degrees to the predominant grid, whilst the buildings at Linwood High align with the orthogonal layout. Influencing this it would appear is the relative isolation of the school buildings from the surrounding streets. Cashmere High representing an isolated campus, and in turn allowing for a shift from the orthogonal layout. Linwood high, more rigidly anchored to its eastern boundary, continues the orthogonal layout through its campus layout.

Further examples clearly reinforcing this view are Christchurch Boys High, Epsom Girls' Grammar

Auckland, Saint Patrick's College Wellington, and Shirley Boys High. These schools are most easily identified as continuations of the surrounding street layouts as they are surrounded by readily identifiable gridded street layouts. Exceptions to these observations do exist such as Saint Bede's College Christchurch. This school, whilst separated from the street by sports fields still has buildings aligned to the predominant street grid. This relationship is made possible by the absence of other buildings or objects in the space between.

3.6 Public Amenities

The mapping of these amenities was conducted with the use of aerial photography afforded by Google Earth, in conjunction with the street level views it also affords. Whilst this method leaves room for errors to occur it proves time efficient, and suitably accurate to afford a generalized understanding of these suburban environments.

This study, following the earlier figure ground plan and zoning plan, is the first of three maps concerned with the built form. The study shows places of public interest, including facilities to which the public have access. These facilities include counselling centres, the local grocery store and accommodation as well as other amenities.

Spatially there appear to be two distinct types of amenities present within the suburban areas studied. The first, typically local small businesses such as fish and chip shops are often clustered in small groups of two to three premises. These clusters tend to be located near the intersection of locally significant roads. Second to this are independent amenities such as community centres. For various reasons these facilities are located in isolated positions relative to the other amenities present within the area. They differ from the physical isolation experienced by some schools however as they are frequently in close proximity to neighbouring houses. Many of these facilities are in fact housed in converted dwellings and as such are indistinguishable within the larger pattern of building fabric.

3.7 Park Areas

This mapping study, possibly the simplest element of the study, affords a comparison of the areas of parks and open spaces with the school grounds. What immediately presents itself in these diagrams is the large size of the school grounds in comparison to the neighbouring park areas.

In addition to this it is evident that for many of the studied schools these park like grounds afford areas across which students can travel on their journey to school. As mentioned earlier in the discussion of barriers it is often desirable that the entry and exit of individuals to and from the school grounds can be easily monitored. This may explain why sports fields are continuously fenced where they meet surrounding streets. This is evident in numerous schools such as Christchurch Boys High, Saint Bede's College also in Christchurch, Waitakere College Auckland, and Rongotai College Wellington. All of these schools having sports fields and open grounds which adjoin roads but are in some way fenced off from them.

3.8 Discussion and Conclusion

Despite its limited sample size the graphical analysis outlined in this chapter indicates that there are commonalities between the schools studied. As with any such generalization, there will be exceptions to the rule. Napier Girls High stands as a case in point. This school as outlined earlier has a far more intimate relationship to its surroundings than do the remaining schools. In principal however, these commonalities allow for informative conclusions to be made regarding the physical integration of sub-urban high schools.

Findings from the mapping studies are varied, with some studies proving more informative than expected. The mapping study entitled Barriers to School Ground Access is one such study. This study was intended to highlight – as its name suggests – barriers to school ground access. It proved successful at doing so highlighting that many of these schools suffer from limited points of entry. This feature, whilst

facilitating closer monitoring of student attendance, also tends to isolate large areas of the school grounds.

Additionally this study highlighted the barriers to connectivity inherent within the street network and block pattern occupied by the school. This finding is also supported by the Roding studies which graphically demonstrate the existing circulation networks. What was found was that the school property in many of these schools was in itself a barrier to connectivity within the larger context. The sites occupied by these schools are in many instances detrimental to the permeability of the surrounding street network.

The figure ground analysis highlighted the denser built environment of the school when compared to the suburban surroundings. Additionally these maps demonstrated how these buildings are typically disengaged from the surrounding built environment. This disengagement is manifest in two ways. The first is the physical separation of school buildings from neighbouring buildings; secondly these school buildings frequently have a different orientation from the surrounding buildings. Additionally it was found that many of these schools are located in the centre of large blocks. A result of this is that they have no frontage or presence in the surrounding suburb. Key examples of this are Awatapu College Palmerston North and Cashmere High Christchurch.

Open space alone does not serve to isolate the school buildings from their built surroundings. In many cases the reverse relationship is true. Frequently the school buildings are positioned between the street and field, from one approach at least. This relationship appears dependent on whether the school is an island or integrated more intimately with neighbouring buildings.

Analysis of the council zoning regulations highlighted institutionalised uniformity within these suburban environments. This feature already evident in the figure ground analysis. Small local shops and businesses are sporadically catered for by breaks in the residential zoning. These local shops and busi-

nesses are often clustered in groups of two to three premises. These clusters tend to be located near the intersection of locally significant roads. Spatially this evidence supports Fishmans claim that the key to location within suburbia is access, rather than centrality. (Saunders, 2005, pxii) Further to this, the maps highlight the scarcity of a meaningful public domain. Equally, they demonstrate the latent value of the school environment as a source of variety and complexity.

Two salient features have been identified concerning the integration of suburban high schools. These are street block permeability and the built interface. These two issues are identifiable in a range of analyses, further reinforcing their importance.

Owing to the many similarities observed between the schools studied it is reasonable to hypothesise that a single case study design can be used as an example of how these schools could be better integrated within their environments.

Cashmere High has been selected as the case study school because it is representative of many of the negative features identified. Principally these are; a disengagement with its surroundings, and its location amidst a superblock.

The use of a single hypothetical design will allow for the salient findings from this chapter to be addressed in some detail. From these experimental interventions it will then be possible to extract conclusions as to how these issues could be corrected, if in fact they can.

Figure Ground Plan

Avonside Girls High
Avonside Drive
Christchurch

Fig: 4

Fig: 5

Figure Ground Plan

Fig: 6

Fig: 7

Figure Ground Plan

Cashmere High
Rose Street
Christchurch

Fig: 8

Fig: 9

Figure Ground Plan

Christchurch Boys High
Te Kura Street
Christchurch

Fig: 10

Fig: 11

Figure Ground Plan

Epsom Girls' Grammar
Silver Road
Auckland

Fig: 12

Fig: 13

Figure Ground Plan

Linwood College
Aldwins Road
Christchurch

Fig: 14

Fig: 15

Figure Ground Plan

Fig: 16

Fig: 17

Figure Ground Plan

Fig: 19

Figure Ground Plan

Papatoetoe High
Nicholson Avenue
Auckland

Fig: 20

Fig: 21

Figure Ground Plan

Fig: 23

Figure Ground Plan

Rangitoto College
East Coast Road
Auckland

Fig: 24

Fig: 25

Figure Ground Plan

Fig: 26

Fig: 27

Figure Ground Plan

Saint Bede's College
Main North Road
Christchurch

Fig: 28

Fig: 29

Figure Ground Plan

Fig: 30

Fig: 31

Figure Ground Plan

Shirley Boys High
North Parade
Christchurch

Fig: 32

Fig: 33

Figure Ground Plan

Waitakere College
Rathgar Road
Auckland

Fig: 34

Fig: 35

Cashmere High School

Design Case Study

4.0 Cashmere High – Design Case Study

This chapter expands upon the observations made in chapter three, in specific relation to Cashmere High. It then outlines the ensuing design exploration and experimentation undertaken for Cashmere High. Finally it discusses the success and failures of those investigations.

4.1 Purpose of Design

The purpose of the Cashmere High design case study is to provide an example of the manner in which the two main issues identified in the chapter three can be addressed. The two principal issues are street block permeability and the built interface between school and suburb. As for any design intervention other issues are also addressed, but they do not form the focus of the investigation.

It is proposed that whilst the design interventions made at Cashmere High are site specific, the principals used may be adapted and applied to other similar schools.

Two options existed for the design and experimentation. The first option was for a series of high level design moves to be undertaken across a range of schools. This scenario would see a limited level of detail, with the possibility of overlooking important subtleties. The second option saw the selection and redesign of a single representative school. The second option was selected as it has a greater capacity for detailed exploration. This detailed approach, also encompassing the high level design moves, has a far greater capacity for acknowledging site subtleties. This more detailed approach facilitates a better understanding of the true capacity of the school environment for the suggested interactions.

Cashmere High as identified in the previous chapter is representative of many of the suburban secondary schools studied. It principally suffers from poor street presence as well as being located in the centre of a superblock.

Fig: 36
Map of Cashmere
High School Zone

The school is physically located in south Christchurch, at the junction between the suburbs of Somerfield and Cashmere. Both of these suburbs are well established. They do however differ in character somewhat, not least because the suburb of Cashmere is principally located on the hill. They also differ in terms of affluence, Cashmere being the wealthier of the two suburbs. This factor manifest in the size and quality of its houses.

There is minimal employment opportunity within the immediate environment, with the majority of working residents leaving the area to work. What employment opportunities do exist are principally provided by small service orientated business. There are of course exceptions to this such as Princess Margaret Hospital, and Fresh Choice Supermarket located in Barrington Shopping Centre, but these are not concentrated about a single focal point.

As is typical of all the studied suburbs the predominant building type is stand alone housing. Each of these houses typically stands setback from its boundaries. Despite these building setbacks, required by council zoning regulation, the houses typically conform to a perpendicular relationship to the street. This relationship is more evident in the housing to the north of the school as the level topography makes this more practicable.

Infill housing is also more evident in these northern blocks. This marginally greater density is likely to be due to numerous factors, one of which is their relative proximity to the city centre. What is interesting to note here is that where the house immediately adjacent to the street is aligned to that street, the rear, often more recent dwelling is not confined to that orientation. This relationship is repeated, albeit at a differing scale by the school buildings.

As identified in chapter three, these school buildings possess distinct, almost urban, qualities. They provide a density and variety of building form that differs considerably from the surrounding houses. These buildings are, when viewed as a total cluster, an interpretation of the modernist vision of 'object buildings' in park like grounds. This notion, albeit of limited ideological importance, is most

Fig: 37
Aerial Photo of
Cashmere High and
surrounds

strongly evident in the very isolation of these school buildings from their domestic neighbours. On a larger scale, these school buildings mimic the anomalous alignment of infill dwellings and similarly lack a positive relationship to the street.

The school grounds are located on flat land to the north of the Heathcote River. The grounds are predominantly level, with one level change of significance located to the south at the school creek. The river terrace to the south of this creek is approximately one metre below the level of the main school grounds. This area of land has a different character to it as it is more closely associated with the Heathcote River. Historically this area formed part of the River floodplain, but due to measures downstream it no longer floods. Well established trees and open grass space now differentiate it from the nondescript suburban streets to the north.

The land adjacent to the river is publicly accessible forming a linear park from river source to the estuary at Ferrymead. This linear park is used extensively for recreation. Access from the north is currently limited, with extensive areas of private land limiting permeability (see Fig: 45, p108). The street block occupied by Cashmere High provides an example of this feature. The block measures nearly six hundred metres from west to east, between Fairview and Barrington Streets. To the east it is another four hundred metres until there is access again to the river bank from the north. And to the west, if we ignore the closely spaced, Fairview and Cashmereview Streets, it is another five hundred metres. Increased permeability in circulation routes to the north of the river will increase access to this valuable recreational area.

The area is well provided for in terms of public transportation (see Fig: 43, p104) with an extensive bus network servicing the area. This network is principally focused on commuter travel to the city centre, but is served by the Orbiter bus service which as its name suggests encircles Christchurch city. Four separate Bus services pass nearby the school.

Fig: 38

4km² Figure Ground
Plan Cashmere High
and surrounds

Further to this cycling is a popular method of transportation in the Christchurch region, made in part favourable by the predominance of flat terrain. Ashgrove Terrace, adjacent to the Heathcote River provides an important cycling route for Cashmere High Students travelling from the East.

Fig: 39
Existing Road
Network

4.2 Client and Brief

Cashmere High was established in 1956 with 198 students. That population has since swelled and is now around 1800 making it the second largest school in Christchurch. Given such numbers the school does not want to increase its student role. Having experienced comparatively rapid growth in recent years the school desires to build four new classrooms to more comfortably accommodate these numbers. (Fig: 48 and 49 - school supplied diagrams for proposed developments)

The necessity for this development, combined with the school's poor relationship to its wider context, ensures that Cashmere High offers an ideal case study. Opportunity exists to improve not just the isolated school environment but also the function of the greater area. This approach to suburban enhancement and redevelopment is not as extensive as the complete remodelling of the entire suburban surrounds. However, it is sensitive to the existing environment and activities. Because the school occupies such a large block of land, effective intervention in the urban structure is possible without the difficulties of fragmented ownership or site aggregation. Such sites offer the potential to substantially alter the urban structure in comparatively short time spans in comparison to any of the surrounding residential properties.

This medium to large scale approach is proposed in numerous overseas developments where dilapidated shopping mall sites are redeveloped into mixed use residential and commercial areas. More local example such as the Fort Dorset development in Wellington also make great use of the capacity of larger sites to create more cohesive public environments. Whilst the school site is not dilapidated, it has the physical capacity to accommodate many of the moves made within those developments. The careful and well considered application of certain key moves serving to incrementally enhance both

the school and surrounding environments.

Of critical importance is that any such development be beneficial to the school, and must not detract from the school's core educational role. Given such a delicate environment, any intervention must be applied with a gentle hand. The heavy handed approach is of little benefit, and may in fact be destructive of the very elements critical to the interventions success.

Further to this it is important to acknowledge the limited budget, of both school and local/city council for such development. Given this it is important to have an identifiable and consistent intervention strategy which ensures that modest – possibly incremental – investments have maximum effect. Opportunity does exist for private stakeholders to be involved in various interventions. The inclusion of such private funds needs to be carefully managed, and structured in a mutually beneficial way for the school and developer.

4.3 Assumptions, limitations and qualifications

Two main objectives were identified for the design. These were the improvement of the Pedestrian and vehicular neighbourhood circulation with respect to the area encompassed by Cashmere High. The second objective was the development of positive built interface between school and surroundings.

In order to improve the school's relationship with its surroundings, it is essential to reconfigure the entrances to the site. Additionally areas within the school grounds will need to adjust to facilitate increased pedestrian and vehicular permeability. Failure to do so merely maintains the status quo. A light handed approach has been applied to the redesign of the school. This approach endeavours to maintain as much of the existing built fabric as practically possible. This approach accepts that some areas will be imperfect, but in so doing it also avoids the spaces being overly designed or held to be 'precious' and complete when construction finishes. Instead allowing these spaces to develop and age with time and inhabitation.

Fig: 40

Figure Ground Plan showing location of local amenities such as shops, schools, hospitals, swimming pools, and other amenities

- Living Hills
- Living Outer Residential
- Living Inner City/
Suburban Focal
- School
- Hospital/
Resthome
- Open Space
- Business

4.4 Description of design process and outcome

Three key design decisions were made at the master planning level, in response to the design objectives. The first of these was for the creation of a public pedestrian pathway connecting Rose Street to Ashgrove Terrace and the Heathcote River. The second was the reconfiguration of the existing drive-way into a tertiary level road connecting Rose Street and Barrington Streets. The third major step was the creation of a built edge to this pathway and new public street environment.

For ease of description this section will first address the pathway and circulation issues for the site's Northern regions. Secondly outline the design considerations relating to the built interface adjacent to that pathway, finally going on to outline the design moves at the southern entrance.

4.4.1 Circulation

The positioning of the North South pathway was fraught with programmatic, as well as spatial challenges. As there was no continuous pathway through the site, it seemed most logical to selectively take what routes did exist and connect them together. Further to this it was desirable to connect certain programmatic elements within, and beyond the site. These elements focused principally on the Performing arts centre, School Administration building, the gym and sports field, as well as the "Front" Field with the tennis courts and River area to the south. Conversely a sympathetic approach was adopted for the positioning of this pathway adjacent to existing classroom space, in order to avoid excessive unwanted distraction.

Before the pathway is considered in detail it is necessary to discuss the 'red elements' illustrated in the design drawings. These elements serve two purposes. First, they act as a way-finding device through the site. Second, they indicate areas of higher quality materials and details which are appropriate to public space. As the North-South pathway begins and ends in two areas of quite distinct character, the continuity of this applied element helps to tie the two ends together. The selection of

Fig: 41
Zoning Definitions
as described by
Christchurch City
Council

red, is for this example merely an extension of the graphic language used, and in its own right not important. In addition to exterior application this colour is continued into the interior spaces of selected buildings. These interventions will be discussed later.

In addition to the pedestrian pathway, vehicular access and circulation was given equal consideration. It was decided at a very early stage that the existing driveway linking Barrington Street to Rose Street would be reconfigured to form a tertiary level public street. Several key moves were made to mitigate the perceived adverse affects of public traffic through the site. These principally focused on traffic slowing measures. The first of which is the comparatively narrow lane width measuring six metres. The second feature was the redistribution of the centralised car parking to a decentralised on-street model.

The total onsite provision of car parking spaces has been increased from 93 to 103. This is despite much of the existing car parking areas being either built upon or converted into useable space. These new car parking spaces line either side of the new roadway, with vehicles parked parallel to the curb and flow of traffic. These car parking spaces are divided into two car bays, each bay separated from the next by a street tree. These street trees, with their canopy projecting outwards from the footpath further improve traffic slowing, whilst also enhancing the pedestrian environment. These trees are positioned at 15m intervals, with this measurement remaining constant throughout the roadway, as is recommended good practice.

In addition to the additional car parks provided, there are now two designated bus parking areas. These areas facilitate buses to be parked adjacent to the main vehicle carriageway, picking up students and delivering them to school at a central location. Additionally this location does not require the students to cross McCombs avenue. Currently there is no parking provided for buses within the school grounds. As a result these buses typically park in the driveway adjacent to the field, thus creating an undesirable bottleneck. In addition to this there is currently no paved gathering space, other

Fig: 42
Deprivation Index
Darker areas represent areas less deprived than those paler.

than the driveway, for students to gather or disembark upon. Whilst this is less of an issue in summer months it can become so during the winter, when the field can become muddy.

Fig: 43
Existing Bus Routes

Whilst the introduction of public traffic into the site is in many ways controversial, it has the benefit of improving passive surveillance of adjacent areas, particularly at night and afterhours. Further to this it provides access to the new residential accommodation adjacent to the roadway. (these new buildings will be discussed later)

In addition to this the reconfiguration of this driveway into a streetscape shifts the schools frontage, from mere gateway, to a more defined built edge. Specifically this more formal front is provided by the buildings immediately south of the Top Field. These are the McCombs Performing Arts Centre, the school administration building, as well as the food technologies classrooms.

This new street has footpaths on both sides of the carriageway. The new footpaths appear unremarkable, however there are currently no such pedestrian pathways connecting the school to Rose Street. The Result of which is that the students must walk on the Vehicular Driveway. This lack of pedestrian access currently fails to acknowledge the fact that students enter the school grounds on foot.

The Westernmost footpath neighbouring the Rose street entrance continues on the predominant street grid axis – diverting from the edge of Mc Combs Avenue – until it meets the school Administration building. (see Fig: 42, p142 for Plan) At this point it turns to the South where it passes through the remodelled juncture of A and B blocks (this is discussed later). This area either side of the pathway forms the most formal area to the school. It is bounded on three sides by buildings, with the northern edge defined by McCombs Avenue. Mediating between the two storey school administration building to the East and the Performing Arts Centre to the West are two existing large trees. Historically these trees were pollarded to restrict their spread but they have since developed very large canopies, providing shade in the summer. Beneath these trees are existing lawns. The northernmost lawn has been extended to the north allowing it to more comfortably accommodate the pathway. In addition

Low

Low

to this the lawns northern edge better connects the Performing Arts Centre and the Administration Building.

To facilitate this extension of lawn, and paved area, the smaller existing car parking area has been removed. In their place are more extensive paved pedestrian areas, in combination with the footpath. To reduce the paved areas runoff a filtration garden has been included. This garden is positioned between the footpath and the paved area to the south. In addition to serving this pragmatic role the garden provides learning opportunities for the students within the school grounds.

4.4.2 Built Interface

Currently there is no relationship between the school buildings and the public space beyond the school gate. Given the newly created street through the school grounds, as described earlier, this interface has been altered significantly. The areas of critical importance are those where McCombs Avenue meets Rose and Barrington Streets, in addition to the pedestrian entrance at Ashgrove Terrace. It is these points which define the threshold of public space and school territory. It is therefore at these points that the established conventions need to be broken, if a change in the schools social interface is to occur. In order to achieve this it is proposed that the surrounding public space of Barrington and Rose streets is continued into the site through both the increased width of these entrances, as well as the seamless continuation of asphalt paving into the site. Additionally it is proposed that a new built edge will define the street edge and public environment.

Before discussing the proposed built interface it is important to briefly describe the existing relationship. As is typical of the majority of schools studied, each of the school entrances is neighboured on either side by standalone houses. These dwellings face onto the street, maintaining a polite side relationship to the school entrances. What is important to note here is that they do not positively interact with one another. Neither recognises the potential benefit of the other.

To expand upon this, both the school and residential activity could benefit from a closer interaction

Fig: 44
Site topography
colour variations
represent 20m height
variations

in several key aspects. The first of these is the potential access to school grounds. The extensive park like areas within the school grounds are currently only occupied during school hours, making them available to the wider population after hours extends there use, and increases their return in terms of social interactions. Secondly the school environment beyond the weekday hours of 8am until 3.30pm is in fact a very quiet environment. In terms of the reciprocal relationship the school benefits from the passive surveillance afforded by the residents. This model is merely an extension of the official role the care taker serves. What it serves to do is offer an extension of hours through which the school grounds are in some way occupied. Passively improving personal safety as well as in some respects property security.

In order for this to be realised it is necessary to remove several existing houses. The removal of these houses obviously brings with it the difficulty of land acquisition and the potential for opposition from local residents. What is proposed however is to replace these houses with a moderately more intensive form of residential development: the townhouse. This residential intensification is an already established and accepted pattern within the surrounding areas, and as such is likely to come up against less public opposition than might a radical change of land use.

What is proposed is that the existing relationship whereby residential houses face onto the street is continued around the corner and into the school site, albeit with a more intensive residential model. This shift sees both the residential and school buildings sharing a common street environment. The relationship between the street edge and built form is much more clearly defined in this new streetscape. This edge condition receives different treatment at the Ashgrove Terrace entry when compared to those adjacent to McCombs Avenue, reflecting the different character of those areas. Where the buildings facing onto McCombs Avenue strongly define the street edge, those at the Southern entry are set back slightly from the pedestrian pathway. Further to this the residential activity adjacent to McCombs Avenue is mixed with a small amount of commercial space principally located at the corners of Rose and Barrington Streets with McCombs Avenue. Additional commercial

Fig: 45
Diagram showing
existing North -
South Connections to
Heathcote River

activity is suggested such as a Dentistry practice. Such facilities are of use to both the school and general public and could benefit from such proximity.

Of some importance is the relationship between residential activities and this new street space. Where residential space within New Zealand inner city environments is often above street level relying on commercial activity to occupy the ground floor, such a relationship is not necessarily feasible within the suburban environment. What is proposed instead is an adaptation of another model, more common overseas, where the ground floor is elevated above the footpath. Such a move ensures the residents a level of privacy, in relation to the immediate footpath, but also ensures that that interior activity is not completely isolated from the exterior. Further to this the height difference ensures that there is a hierarchy established, with the residents able provide passive observation over the street.

The townhouses adjacent to the Ashgrove Terrace entry, (see Fig: 98, p 168 for plan) named Cracroft Run after the historic Cracroft sheep farm that once encompassed the area, employ a different approach. Rather than opting for vertical separation the conjoined townhouses are set back in a more leisurely manner from the pedestrian pathway. The sealed pathway is separated from the three storey townhouses by a 4.8m wide stretch of lawn. This lawn has Fastigate (upright growing) *Pyrus Calleriana*, (more commonly known as Manchurian Pear. These trees are deciduous and during spring are covered in white blossom) planted at 7.5m intervals with seating beneath. At the edge of this is placed a 1.2m high wall enclosing a small garden area in front of each ground level residential unit.

In part facilitating this softer edge condition is the Cracroft Runs sites ability to allow vehicular access and parking to the townhouses from the West side of the buildings. This feature removes any potential conflict between vehicular and pedestrian access across school property to the East and ensures the development could be undertaken independently to the school.

Further to this, the more intensive land use is one of the few ways this type of move is likely to be

Fig: 46
Diagram showing
proposed circulation
routes intersecting
superblock

financially economic for a development of this type. The new development also takes advantage of the school driveway as additional frontage, in effect releasing the latent potential value of the site. As these proposed townhouses are located on separate titles immediately adjacent to the school their development could be undertaken by private entities, in close consultation with the school.

This change in interface whilst in some ways very subtle requires a rethink of how buildings are positioned on sites adjoining such institutions. Regardless of the aesthetic preferences any such development must for its successful outcome be mutually beneficial to both school and neighbouring residents. This symbiotic relationship sees the school benefitting from having its grounds passively observed by the residents of these new low rise townhouses overlooking the site. Additionally these residents provide an extended occupation, beyond the hours of typical school activities. This in turn has the positive effect of ensuring that there are greater numbers of people indirectly supervising activities within the site.

Further within the site the placement of the pathway necessitated that it pass through the East West wall created by A and B blocks (see Figs: 87 and 88, p 156 and 157 respectively). These two buildings are both two storey and of reinforced concrete construction. Whilst aesthetically they lack finesse, they serve their job well and have stood the test of time.

At the junction of these two buildings there are two staircases. Between these two staircases are two offices on the ground floor, and a social sciences storage room on the upper floor. The location of these staircases presents the least disruptive area through which to make this intervention. Classroom space is left intact. Further to this the pathway is able to link the administration building to the gymnasium. It is proposed to remove the Western staircase associated with A block, and pass the exterior pathway through this newly created opening. It is desirable that this pathway is open to the sky in order to help it visually read as public space.

Fig: 47
Diagram showing
proposed new building works

Cashmere High School

Proposed Building and Infrastructure Project (2010-2012)

- 1.- New Extended Gymnasium (2010 - Stage 1) (2011-12 - Stage 2)
- 2.- Installation of Data Projectors throughout 45 classrooms (2010-11)
- 3.- Additional computers numbers/access
 - Graphics
 - Art Design
 - Music
 - Languages / PE
 (2010)
- 4.- Fibre cabling "drop off" (street to server) (2010)
- 5.- Four new Classrooms and offices "M Block" (2010-11)
- 6.- New Carpark and Rose street Entrance - Safety + Landscaping (2011)
- 7.- Convert addition science lab - B7 ? (2012)
- 8.- Internal I.T. network cabling throughout school (est. 2012)
- 9.- New additional bookable computer room in S3 (2012-13)
- 10.- New Careers centre on extended Library (2012)
- 11.- Y13 Common room moved from "S Block" to "old" Careers centre (2012-13)

To the right of this passageway the existing storage and office space has been reconfigured to ensure that the ground floor remains as visually open as possible. This feature is desirable as it allows people to see through the building corner. Without such transparency these corners could prove problematic. Additionally after daylight hours this area of glazing will allow interior illumination to spill outside into the pathway space further reducing the ability for people to hide around the building edge.

As the Western stair has been removed this circulation route is replaced by an elevated bridge linking it to the proposed gymnasium extension to the south (see Fig: 76, p144-145). This new building serves several key functions. Principally it provides new entry foyers to the two gyms, as well as an enlarged canteen facility. The canteen has been moved to this location, providing it with a more central location in relation to the distribution of classrooms, as well as an enlarged capacity suited to the increased student numbers. In addition, this position reinforces the canteens role as a social hub for students.

This new building has been sculpted in a manner which makes it subordinate to the open space before it. The buildings form helping to define this exterior space, rather than the building acting as an object in space. This relationship, whilst in opposition to the suburban norm, establishes a precedent for the future treatment of new and renovated school buildings. This built relationship is facilitated by being the most densely built up area within the school.

As with the ground floor of B block, positioned across the square, the facade of the gym and canteen extension is glazed. The ground floor is largely able to be opened up with paired opening doors, thus connecting the interior activity with the exterior. Further reinforcing this connection is the use of the red element within the interior. The use of this element serving as a continuation of the red applied elsewhere along the pathway, signifying the squares inclusion with that space.

Located in the South Eastern corner of this square is the Gym classroom (see Fig 82, p152 plan).

Fig: 48

Diagram supplied by
Cashmere High showing
proposed building
and infrastructure
projects 2010 - 2012

Cashmere High School

Proposed Landscape Plan (2010-2012)

- 1.- Founding pupil quad
(concrete + seating)
- 2.- Senior garden
(Seats, paving +
re-planting)
- 3.- Arts Corners
(Painting, seats between
art rooms)
- 4.- Barrington entrance
(Pou sculptures)
- 5.- Canteen / B-C block
(redesign seating,
plantings, wind shelter)
- 6.- Front Field and H Block
(seating)

Despite this buildings lack of aesthetic appeal there is no justifiable reason to remove it. Of concrete block construction it is materially sound and in good repair. Currently the space to the south between this building and the gym is problematic due to the acute angle created. It is proposed that an additional classroom adjoin the existing classroom to the south. This new classroom will mediate between the pathway and the existing 10m high featureless end wall to the gym.

Fig: 49
Diagram supplied
by Cashmere High
showing proposed
landscape projects
2010 - 2012

Atop the southernmost parapet of this new classroom are placed a series of formed letters spelling Cashmere High (see Fig: 93, p163 image). These letters are backed by a translucent screen of red Perspex once again extending the diversity of the red elements application. Additionally this signifies the threshold of the truly school environment. This is important as this is the least formal of the three entrances.

Beyond a reliance on signage to define this threshold the site is fortunate to have the level change occurring along the northern bank of the school creek. This level change varies but is generally only in the order of 1-1.5m. This level change sees the school buildings on the higher land to the North of the Creek.

Currently placed in the triangle of land defined by the two storey D block classrooms to the north, the Gym to the West and the Creek to the South is the second of the schools cycle parking areas. This facility is in addition to the larger area of cycle stands positioned nearby to the south of the creek. What is proposed is that this second area of cycle stands is removed, and positioned to the north of the school grounds. By doing this the wider spread of cycle commuters are catered for, rather than forcing them to travel right through the site to find a park. Further, by removing these unsightly cycle stands, the area is usable for students as a paved area, leading to an open grassed bank sloping down to the creek.

Two bridges are provided across the creek. These replace existing structures which were either in need of repair or no longer situated in a convenient place. Further to this it was desired that the main

pathway bridge – located in line with the North South pathway - was of the same visual language as that of the proposed bridge across the Heathcote River to the South. This continuation is of some importance as it connects the two bridges, and signifies that the bridge across the school creek is an extension of the public realm.

Fig: 50
Photo of existing
Barrington Street
entrance

The proposed bridge across the Heathcote River serves as an important element in the establishment of the pathway at the southern end of the site. It is important for two reasons. Firstly it establishes an axis that penetrates into the school grounds from public land. Secondly it allows school students a more direct route to Cashmere Road and the Bus services located along that road.

What is important to note about this first point is that by establishing this pathway within an area already understood to be public, and continuing that pathway directly into the reconfigured site, it is hoped that the public will interpret this as a sign that the pathway through the school is an extension of that public realm.

Further to this circulation axis, other key features support this understanding. The First of these is the street lighting adjacent to the pathway. This lighting continues from beyond the sites boundaries, with the pathway right through the site. Positioned at regular intervals, this vertical element establishes a rhythm to the pathway as well as ensuring it is well lit at night. As mentioned earlier the asphalt surface is also continued into the site from the surrounding footpaths. This surface, whilst not as luxurious as some paving treatments ensures that there is no unintentional hierarchy established between school pathway and general footpath. In addition to this it recognises the fiscal limitations of any educational works, and is one of the most economic surfacing materials available.

4.5 Implications for research

The above mentioned design interventions vary in their significance. Of greatest importance are the three high level design moves. The first of these is the integration of a public pedestrian pathway

connecting Rose Street to the Heathcote River. The second is the enlargement of the localised road network into and through the site. Finally, and possibly most radical is the introduction of residential activity adjacent to the entrance corridors leading into the site.

Whilst each of these design interventions is site specific to the Cashmere High case study, the suggested approach is applicable to a wide range of locations. The case study design provides detailed evidence of how this could work. The design evidence indicates that given careful consideration of the relationships between salient elements this integrative concept can work for Cashmere High. Final conclusions are drawn in the following discussion and conclusions chapter.

Fig: 51

Photo of existing Rose
Street entrance

Cashmere High School

Design Case Study Images

Fig: 52
Opposite page:
Aerial view looking
Southward accross
site

This page:
Fig: 53
Aerial view looking
Northward accross
site

Fig: 54
Buildings to be removed.
To successfully re-model the integration of the school grounds it is necessary to remove the buildings indicated (black). Those at the periphery are of particular importance as they are currently understood by residents as gateways rather than street corner buildings

Fig: 55
New Buildings
Where existing houses have been removed new higher density two and three storey townhouses have been built. These face onto the new road helping to define street edge as well as providing passive observation of the street and grounds. Additionally these new dwellings provide the site with a greater population spread through the day

Fig: 56
Existing Carparking
Car parking has been decentralised and moved away from the most formal area in the school grounds.

Fig: 57
New Car parking
Carparking is provided in paired bays along both edges of the new road. This results in a greater number of car parks than currently provided on site. By distributing car parks along the "street," the street becomes populated with people moving to and from their cars

Fig: 58
Circulation
Extension of Road and
Footpath network
into and through
School Grounds in-
creasing permeability
of Superblock

Fig: 59
Trees
The edge to this new
street has been lined
with an avenue of
trees aiding traffic
calming past the
school buildings as
well as improving the
pedestrian environ-
ment and the streets
overall amenity

Fig: 60

Existing Master Plan

Fig: 61

Existing Master Plan

Opposite Page:

Fig: 62

Aerial view looking
Southward across
school site. New
landscaping indicated
in red, new building
indicated in black.

This Page:

Fig: 63

Aerial view looking
Northward across
school site. New
landscaping indicated
in red, new building
indicated in black.

Opposite Page:
Fig 64
Scale plan of pro-
posed Rose Street
Entrance

This Page:
Left:
Fig 65
Location diagram
scale 1 : 10 000

Right
Top:
Fig: 66
Section C-C
Scale: 1:500

Bottom:
Fig:67
Section B-B
Scale: 1:500

Fig: 68
Section A-A
Showing Eastern el-
evation of new town-
house developments
adjacent to McCombs
Avenue
Far left new two story
classroom building
(red)

AA - SOUTH

Fig: 69
Section A-A continued
Showing (right to left)
Eastern elevation
of new two story
classroom building,
existing McCombs
Performing Arts Cen-
tre and adjoining Mc-
Combs Square. Esiting
two story classroom
building rearground
(left)

Opposite Page:

Fig: 70

Photo of existing
school entrance from
Rose Street. Note
absence of pedestrian
footpath

This Page:

Fig: 71

View from Rose Street
to Mc Combs Avenue
with residential and
commercial buildings
lining street edge

Roadway
300mm wide Concrete curb
edge to footpath

Footpath
grove of small growing trees
lower branches removed to
create space beneath dense
canopy

New two storey classroom
block

Vertical Light Column

Seating

McCombs Performing Arts
Centre

Music rehearsal rooms

Entrance to Mc Combs Per-
forming Arts Centre

Reconfigured paved area
adjacent to main Performing
Arts Centre entrance

Vertical Light Column

Existing Music block court-
yard

Existing lawn

North Entrance to A block

Existing grass field

New streetlights at 15m in-
tervals
New avenue of Fastigiate
Pyrus Calleriana
(Manchurian Pear) trees to
street edge

Vehicular drop-off area

Filtration garden for runoff
from paved area

Banner to advertise events
held at school

Precast Concrete paving el-
ements

Existing lawn reshaped and
extended Northwards

Continuation of Asphalt
pathway along desire line
established by footpath ad-
jacent to Mc Combs Avenue

Existing school adminis-tr
ation building

Seating adjacent to lawn

Existing tree
red paint applied to existing
facade detail

Existing alley between
buildings
Street lighting continues ad-
jacent to Red Path

Existing North wingto B
block

Outline of existing cantilever-
ed office above

Reconfigured existing cor-
ridor to B block North wing.
The corridor has been reno-
vated creating a colonade
adjacent to the red path

New exterior pedestrian
connection through A block

Opposite Page:
Fig: 72
Scale plan of
McCombs Square

This Page:
Left:
Fig: 73
Location diagram
Scale 1 : 10 000

Right Top:
Fig: 74
Section F-F
Scale 1:500

Right Bottom:
Fig: 75
Section E-E
Scale 1:500

Fig: 76
Section G - G
Showing Eastern
elevation of new
canteen building
(left) and open space
of McCombs Square
(right)

Fig: 77
Section D-D showing
Western elevation of
existing school admin-
istration building (left)
and renovated ground
floor corridor (right)

Opposite Page:

Fig: 78

Existing Site Photo
View looking South-
ward toward existing
carpark (removed)
and Administration
building

This Page:

Fig: 79

View looking
Southward along
new pathway toward
existing Administra-
tion Building

Opposite Page:

Fig: 80

View Westward along
McCombs Avenue
adjacent to McCombs
Square

This Page:

Fig: 81

Elevated View from
existing Administra-
tion building looking
North-West accross
McCombs Square

Opposite Page:

Fig: 82

Scale plan of

Gym Square

This Page:

Top:

Fig: 83

Location diagram

Scale 1 : 10 000

Bottom:

Fig: 84

Section H-H

Scale: 1:500

Opposite Page:

Fig: 85

Photo looking south toward Gym - currently under renovation
Note building on right is removed in this scheme to facilitate new building (pictured right)

This Page:

Fig: 86

Elevated view of Gym Square looking South.
New Canteen and multiuse spaces define square form and capacity

Opposite Page:

Fig: 87

Photo looking North
to existing junction
of A and B blocks.

Note in redeveloped
scheme much of this
structure is removed
to facilitate a new
connection through
to McCombs Square

This Page:

Fig: 88

View looking North
through new opening
to McCombs Square

Existing lift tower visible from southern approach, as such is has been selected as an identifiable element to aid in the public orientating themselves within the site

Existing concrete constructed classroom

Painted seating element works in tandem with facade treatment to aid the public in orientating through the public area

New classroom adjacent to paved area allowing teaching to be undertaken outside with relative ease

Bridge across creek subtly signifies entry into the areas more clearly identifiable as more school biased

Platforms allowing access down to waters edge

Filtration garden collecting runoff from extensive sealed area

Existing cycle stands retained adjacent to pathway

Existing paving and sports courts retained

Proposed three storey townhouse dwellings define pathway and parkspace edges whilst providing passive observation of the area. These dwellings also benefit from the amenities provided by the remodelled urban school environment

Existing trees

Existing two storey classroom building

New precast concrete paving elements in conjunction with continuous asphalt surfacing

Existing single storey classroom building

Existing secondary cycle stand area resituated on north side of site to serve northern catchment

Existing Conductive Education building

New ramp across creek suitable for cycles and service vehicles

Heathcote River tributary

Grassed edge curved along desire line leading to Eastern area of the school grounds

Grassed park area

School property boundary

New Specimen tree plantings

Existing single family dwelling

Opposite Page:
Fig: 89
Scale plan of
Opawhaho Park

This Page:
Fig: 90
Location diagram
scale 1 : 10 000

Fig: 91
Section I-I
Showing from left to
right Tennis Courts,
new bridge across
creek, new multi-
purpose classroom,
existing gym class-
room (mono pitched
roof), gy entrance
and canteen, existing
classroom block (A
block)

Opposite Page:

Fig: 92

Photo looking North-
West toward school
buildings from exist-
ing bridge accross
creek

This Page:

Fig: 93

View looking North-
West along realigned
pathway

Opposite Page:

Fig: 94

View of new bridge
and multipurpose
classroom

This Page:

Fig: 95

Elevated view look-
ing West across
Opawhaho park

Opposite Page:

Fig: 96

Existing Building elements

This Page:

Fig: 97

View West into
Gym Square from
Opawhaho Park area

Existing location of Tennis Courts and Basketball courts. Facilities made more accessible to public by expanded pathway

Patio spaces mediate between townhouses and pathway

New townhouse development consisting of ten units. Dwellings face onto the new pathway providing passive surveillance

Existing single family dwelling

Single car garaging provided at rear per townhouse unit

Existing Garaging

Vehicular access to townhouses

Grassed Riverbank

Existing established trees with meadow beneath

New large specimen tree

New landscaping to park area

School property boundary

Existing single family dwelling

Grassed area beneath avenue of Fastigiata Pyrus Calleriana

Bench seating adjacent to pathway

New landscaped area adjacent to school entry

School property boundary

Existing single family dwelling

Streetlights at 7.5m intervals continue through site aiding pathway definition

Prominent corner painted to establish sequence of way-finding elements

Existing footpath and street lawn layout along Ashgrove Terrace

Ashgrove Terrace

New Pedestrian bridge across Heathcote River

Existing asphalt pathway through riverside reserve

Streetlightin continued from school site through reserve to Cashmere Road

New pathway connecting to Cashmere Road and Bus stop

Cashmere Road

Opposite Page:
Fig: 98
Scale plan of
proposed Ashgrove
Terrace Entrance

This Page:
Fig: 99
Location diagram
scale 1 : 10 000

Fig: 100
Section J-J
Showing Eastern
elevation of new
townhouses (right),
Heathcote river and
new bridge, and
existing grassed recre-
ational reserve

Opposite Page:

Fig: 101

Neighbouring Residential property to be removed

This Page:

Fig: 102

Existing School entrance from Ashgrove Terrace

Opposite Page:

Fig: 103

Diagrammatic section
through proposed
residential building
showing relationship
between school path-
way and residential
space

This Page:

Fig: 104

view from Cashmere
Road accross new
footbridge into school
grounds

Opposite Page:

Fig: 105

View from Cracroft

Run south toward

Ashgrove Terrace and

Heathcote River

This Page:

Fig: 106

view from Cracroft

Run North towards

school buildings

Chapter 5

5.0 Discussion and Conclusion

This chapter sets out the discussion and conclusion for the preceding body of research. Where each of the preceding chapters has dealt with a discrete aspect of the research, this chapter draws together those findings and conclusions in a holistic response to the research question.

The discussions and conclusions are set within a thematic framework established by the salient findings of preceding chapters. These are grouped under the following headings: Incentive for Integration, Suburban Permeability, and Built Interface. The order in which these elements are discussed reflects the layering of ideas and experimentation which has occurred throughout the duration of the research. Following this discussion the implications of this research are discussed, as well as possible future research topics stemming from this work.

Incentive

Before discussing how the high school might be better integrated into its suburban environment it was prudent to first establish whether that is in fact a desirable objective.

Initial research highlighted bureaucratic barriers to more integrated high schools. These bureaucratic barriers, in essence are indifferent to how integrated the school is, instead they are solely focused – as expected - on serving their own mandate. The first of these bureaucratic barriers is “the tendency to treat schools as their own category of public investment.” (Sharon Haar, 2002, p80) This funding model sees the school funded according to the number of enrolled students. Secondly schools are charged with the education of their students, not the provision of high quality public space.

Whilst these financial and social issues are of great importance to the research’s wider context, they are not fundamentally architectural issues. As such they have been addressed in lesser detail than have

other avenues of research. This is not to diminish their significance; rather it is to maintain this thesis's focus on the physical and spatial integration of suburban high schools. By placing these existing issues, temporarily to the side, the thesis is able to fully investigate, through design, what the suburban high school might be.

The mapping studies discussed in chapter two highlighted several shortcomings within existing schools and their host suburbs. Chief amongst these was the poor permeability within the suburbs studied. In addition to this it was found that the school property serves as a barrier to connectivity in the wider context.

Figure ground studies highlighted how the built environment of schools are disengaged from the surrounding built environment. This disengagement is manifest in two ways. The first is the physical separation of school buildings from neighbouring buildings; secondly these school buildings frequently have a different orientation from the surrounding network of buildings. Significantly there is no economic reason for this disengagement. In addition scale, density, and building type also set the school apart

Analysis of council zoning regulations highlighted the scarcity of meaningful public domain within these suburbs. Equally this analysis demonstrated the latent value of the school environment as a source of variety and complexity. Qualifying this point is the absence of other amenities which have historically served as third places.

The school site, being significantly larger than other existing sites within the area has both the capacity and the potential to correct many of these issues. Additional features such as greater building density and variation in building type also contribute to this potential. Given this physical evidence, (for the moment ignoring functional and economic factors) the school presents itself as a type of urban centre within the surrounding environment. Given this it makes sense for the school to serve as a centring element, from which to focus future investment.

The current isolation of school facilities precludes the potential custodial presence of nearby residents.

Permeability

The street layout to any given area is of great importance as it provides the backbone from which all other elements are in some way attached. The greater the number of streets or circulation routes, in a given area, the more permeable it becomes. The permeability of street layout, and circulation routes, is one of the key elements Jane Jacobs identifies in her Seminal text *The Death and Life of Great Cities* (Jacobs, 1961). In this observational work Jacobs convincingly argues how more permeable street networks contribute to a positive urban environment. The more permeable the environment, combined with other factors such as variety and relief to the street edge favouring walking over other forms of transport.

The mapping studies highlighted that virtually all of the studied high schools were in areas of less than ideal street permeability. Papatoetoe College for example is sited at the southern end of a superblock nearly a kilometre in length.

It was observed in several examples that street layouts favoured movement in certain directions, the street layout immediately to the North of Cashmere High demonstrating this point. Here the streets principally run from East to West for an average of 700m before North South travel is accommodated.

School grounds, and the property on which they are sited, also contribute to the poor interconnectivity of the suburbs they inhabit. The school itself becomes a barrier to this permeability due to its physical size. Evidence for this is visible in both the Roding Maps as well as the mapping study entitled: *Barriers to School Ground Access*. This mapping study, whilst initially intended to highlight the access limitations to school grounds also highlights the potential these school grounds have for improving cross

connections.

Complicating this seemingly straightforward solution are the existing school buildings. These buildings typically form barriers to large scale cross connections such as roads. In addition it is extremely unlikely that the public would approve the removal of classroom space to allow a vehicular roadway through any school.

Road access to the school itself can be placed into two categories. The first sees the school attached along a road edge. The second sees short stretches of roadway terminating at the school gate. Such dead end roads discourage casual interaction with the school grounds and only facilitate direct interaction. Further to this such directness overlooks the potential of passing pedestrians and vehicular traffic to passively monitor activity within the school grounds.

Radical change within the suburban environment is problematic. Numerous issues such as low densities –both population and built form - contribute to this difficulty; however this research serves to prove that high schools can be used to improve permeability within the suburbs.

The use of school property to successfully improve street network permeability is dependent on the following guidelines:

- Ensuring that there is sufficient physical space for new connections
- New circulation routes must form an extension of the existing circulation network
- Routes should be as direct as possible
- Destinations and way-finding measures must be incorporated
- Routes should not be limited to pedestrian
- Circulation routes, where possible should be overlooked by other activities
- Circulation routes should tie together various activities, both within and beyond the school site

- Circulation routes must not interfere with the education of students
- Care must be given to ensure that new circulation routes appear as an extension of public space

Built Interface

The second significant finding was that the existing interface between school and suburb is deficient. This finding is chiefly evident in the mapping studies and was not hinted at by the literature. This is due to the researches focus on the New Zealand context, which whilst similar to overseas examples does have its own unique character and history.

The positions of suburban high schools conform to one of two spatial types. The first type sees the school placed on a prominent site within its environs. The Best example of this - in the study sample - is St Patricks College Evans Bay Wellington. The second category is that of the more isolated, or removed site. The leading example of this being Cashmere High Christchurch. This school is encircled by a wall of private housing, the school itself having no street frontage.

As a result of the second categories isolation access to school amenities such as sports fields is limited. In addition to this it is evident that the School buildings are frequently positioned between the street and the sports fields, from one approach at least. This relationship appears dependent on whether the school is an island (school buildings are positioned amidst a homogenous residential environment), or more integrated with neighbouring buildings.

Irrespective of their surrounding environment these school campuses represent certain urban qualities. The school buildings present a figure ground plan that reads with an urban density and level of building variety. Further in support of these urban qualities, is the walkability inherent within the school environment. At the schools boundaries there is a disjuncture where the environment becomes less permeable and favours vehicular transportation.

Further disjunctures exist in regard to building orientation. The school buildings studied either conform, or differ in their orientation in respect to the street layout. The proximity of school buildings to neighbouring buildings appears to influence this relationship. Where the school buildings are isolated from the surrounding built environment they tend to favour a solar orientation. Cashmere High for example is orientated at 40degrees to the predominant street grid, allowing it perfect north elevations.

The Cashmere High design case study sought to rectify these deficiencies. One of the principal design moves made was to introduce residential accommodation adjacent to the revised school entrances. The introduction of new residential buildings was in response to both the suburban context and the schools limited demand for new development. This move saw these new residential buildings fronting onto the school entrances, profiting from the school environment, as well as offering a positive interface to that environment. This albeit apparently subtle relationship sees a dramatic shift from what is presently a neglected interface between residential and school properties.

The introduction of residential activity, introduces a greater number of people within the immediate area. The presence of new residential units fronting onto all of the schools entrances offers the school an informal custodial presence beyond school hours.

Ultimately the Cashmere High design case study demonstrates that the built interface between school and suburb can be improved. It proves that that development need not be in the form of additional school buildings. Further that development can also occur on properties adjacent to the school entrances, provided adequate consultation with the school occurs. The capacity for positive change is however dependent on several key conditions as identified by the Cashmere High Design case study. These guidelines are as follows:

- Ensuring that there is sufficient space, both within the site and or on adjoining property for new building

- new residential activity should allow passive observation of school entrances
- the school environment should offer an area of high amenity value to the residents
- new residential properties have a positive interface with the school property
- vertical or horizontal separation between residential and school/public areas is required
- ensure the schools front is obvious
- care must be given to acknowledge the existing building context

Implications and future research topics

This body of research whilst focused on the school highlights both the intricacies and difficulties of urban design within the greater suburban environment. Application of the ideas embodied within this research is achievable, given a receptive public and school. The Cashmere High Case study presents a series of five different design moves, as represented by the five zones identified (see case study plans). Each of these design moves can be carried out independently with some benefit. Maximum benefit occurs when all of the suggested interventions are able to work collectively.

The most important of these design interventions concerns the revision of the school entrances. The importance of this element is paramount as it is inherently the first point of interaction.

The cashmere high case study proffers the introduction of new residential units at this point of interaction. This feature represents an existing land use within the area, albeit at a slightly greater density improving the economic feasibility.

Further research is required in four key areas. These are:

- economic feasibility
- process – concerning ownership, development process, resource consents and management
- functional programme of shared amenities and its impact on education
- perceptions of local residents and school community

Conclusion

Given the representative selection process for the case study design it is fair to assume that the findings from the Cashmere High Case study are applicable to other suburban high schools. What this case study serves to prove is that suburban high schools can be better integrated into their host suburb. The integration suggested by the case study design was in specific response to the salient deficiencies identified by the mapping studied analysing existing suburban high schools. The key findings of those analyses were the poor permeability of existing circulation networks, and the deficient physical interface between schools and their host suburb.

Works Cited

Beaumont, C. E., & Piance, E. G. (2002). *Why Johnny Can't Walk to School: Historic Neighbourhood Schools in the Age of Sprawl*. Washington, D.C.: National Trust for Historic Preservation.

Bently, I. (1985). *Responsive Environments: A Manual for Designers*. London: Architectural Press.

Bingler, S., Quinn, L., & Sullivan, K. (2003). *Schools as Centers of Community: A Citizens Guide for Planning and Design*. Washington, D.C.: National Clearinghouse for Educational Facilities.

Davis, R. (2002). Preface. In T. W. Bressi (Ed.), *The Seaside Debates: A Critique of the New Urbanism*. New York, London: Rizzoli International Publications Inc.

Davison, G. (1995). *Australia: First Suburban Nation?* *Journal of Urban History*, 22(40), 40-74.

Duany, A. (2002). *Notes on the Lexicon of the New Urbanism*. In T. W. Bressi (Ed.), *The Seaside Debates: A Critique of the New Urbanism*. New York, London: Rizzoli International Publications Inc.

Dunham-Jones, E. (2009). *Retrofitting suburbia: urban design solutions for redesigning suburbs* / Ellen Dunham-Jones and June Williamson. Hoboken, N.J.: John Wiley & Sons.

Eizenberg, J. (2002). *An Architect's Primer for Community Interaction*. In S. Haar (Ed.), *Schools for Cities: Urban Strategies* (pp. 53-59). Washington, D.C. New York, N.Y.: National Endowment for the Arts ;Distributed by Princeton Architectural Press.

Ferguson, G. (1994). *Building the New Zealand dream*. Palmerston North, N.Z: Dunmore Press with the assistance of the Historical Branch, Dept. of Internal Affairs.

Fishman, R. (1987). *Bourgeois Utopias: The Rise And Fall of Suburbia*. In B. M. Nicolaides & A. Wiese (Eds.), *The Suburban Reader* (pp. 33-39). New York, London: Routledge.

Gehl, J. (1987). *Life Between Buildings: Using Public Space* (J. Koch, Trans.). New York: Van Nostrand Reinhold.

Haar, S. (2002). *Prototypes and Paratypes: Future Studies*. In S. Haar (Ed.), *Schools for Cities: Urban Strategies*. Washington, D.C. New York, N.Y.: National Endowment for the Arts ;Distributed by Princeton Architectural Press.

Haar, S. (Ed.). (2002). *Schools for cities: urban strategies* /National Endowment for the Arts, the Mayors' Institute on City Design; Sharon Haar, editor ; Mark Robbins, series editor. Washington, D.C.: New York, N.Y.: National Endowment for the Arts; Distributed by Princeton Architectural Press.

Howden-Chapman, P., Stuart, K., & Chapman, R. (Eds.). (2010). *Sizing up the City: urban form and transport in New Zealand*. Wellington: Steele Roberts Publishers.

Illeris, K. (Ed.). (2009). *Contemporary Theories of Learning: Learning Theorists... In Their Own Words*. London: new York: Routledge.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House Inc.

Jarvis, P. (2009). *Learning to be a person in society: Learning to be me*. In K. Illeris (Ed.), *Contemporary Theories of Learning: Learning Theorists.. In Their Own Words*. London: New York: Routledge.

Kiefer, M. J. (2004). *Suburbia and Its Discontents: Notes from the Sprawl Debate*. In W. S. Saunders (Ed.), *Sprawl and Suburbia* (pp. 34-43). Minneapolis: University of Minnesota Press.

Krier, R. (2006). *Town spaces: contemporary interpretations in traditional urbanism*: Krier-Kohl -Architects /Rob Krier; introduction by Michael Graves; essays by Hans Ibelings, Philipp Meuser, Harald Bodenschatz; [translation, Fiona Greenwood Fincannon]. Boston, MA: Birkhäuser Publishers for Architecture.

Lynch, K. (1960). *The Image of the City*. Cambridge (Mass): Massachusetts Institute of Technology Press.

Napier Girls High School. (2008). *Napier Girls High School*. Retrieved June 3, 2010, from <http://www.nghs.school.nz/>

NewUrbanism.org. (2010). *Principles of Urbanism*. New Urbanism Retrieved September 3, 2010, from <http://www.newurbanism.org/newurbanism/principles.html>

Ross, A. (2004). *Duct Tape Nation: Land Use, the Fear Factor, and the New Unilateralism* In W. S. Saunders (Ed.), *Sprawl and Suburbia* (pp. 110-121). Minneapolis: University of Minnesota Press.

Ruby, I., & Ruby, A. (2004). *The Challenge of Suburbia*. *Architectural Design*, 74,(No. 4), pp5-8.

Saunders, W. S. (Ed.). (2005). *Sprawl and suburbia*:a Harvard design magazine reader /introduction by Robert Fishman ; William S. Saunders, editor. Minneapolis :: University of Minnesota Press.

Schneider, M. (2002). *Do School Facilities Affect Academic Outcomes?* Washington, D.C.: National Clearinghouse for Educational Facilities.

Strickland, R. (2000). *Learning as a Medium for Placemaking: Neighbourhoods for Learning* (Portfolio). Places, 13(1), 58-65.

Strickland, R. (2002). *The City of Learning: Schools as Agents for Urban Revitalization*. In S. Haar (Ed.), *Schools for Cities: Urban Strategies* (pp. 60-69). Washington, D.C. New York, N.Y.: National Endowment for the Arts ;Distributed by Princeton Architectural Press.

Sullivan, K. (2002). *Catching the Age Wave: Building Schools With Senior Citizens in Mind*. Washington, D.C.: National Clearinghouse for Educational Facilities.

Tanner, C. K., & Lackney, J. A. (2006). *Educational facilities planning :leadership, architecture, and management*. Boston: Allyn and Bacon.

Whitehand, J. W. R., & Carr, C. M. H. (2001). *Twentieth-Century Suburbs: A Morphological Approach*. New York: Routledge.

Further Reading

Smart Schools, Smart Growth: Investing in Education Facilities and Stronger Communities. (2009). Policy Analysis for California Education and the Centre for Cities & Schools.

Alexander, C. (1987). *A New theory of urban design.* New York: Oxford University Press.

Aurigi, A., & De Cindio, F. (2008). *Augmented Urban Spaces: Articulating the Physical and Electronic City.* Aldershot, Hampshire, England; Burlington, VT: Ashgate.

Blank, M. J., Melaville, A., & Shah, B. P. (2003). *Making the Difference: Research and Practice in Community Schools.* Washington, D.C.: Coalition for Community Schools, Institute for Educational Leadership.

Boyd, R. (1963). *The Australian ugliness* /Robin Boyd ; Foreword by John Betjeman. Harmondsworth, Eng.: Penguin.

Boyd, R. (1968). *Australia's home; its origins, builders and occupiers.* Ringwood, Vic.: Penguin Books.

Bressi, T. W. (Ed.). (2002). *The Seaside Debates.* New York, London: Rizzoli International Publications Inc.

Brubaker, W. C., Bordwell, R., & Christopher, G. (1998). *Planning and Designing Schools.* New York: McGraw-Hill.

CABE. (2010). *Ordinary Places:* CABE (Centre for Architecture and the Built Environment).

Calthorpe, P. (2001). *The Regional City: planning for the end of sprawl* /Peter Calthorpe and William Fulton. Washington, D.C.: Island Press.

Cashmere High School. (2010) Retrieved from <http://www.cashmere.school.nz/our-school/school-history.html>

Clapson, M. (2003). *Suburban century: social change and urban growth in England and the United States* /Mark Clapson. Oxford; New York: Berg.

Cowan, R. (2005). *The Dictionary of Urbanism*. Tisbury, Wiltshire: Streetwise Press Limited.

Fishman, R. (1977). *Urban utopias in the twentieth century: Ebenezer Howard, Frank Lloyd Wright, and Le Corbusier* /Robert Fishman. New York: Basic Books.

Frantz, D., & Collins, C. (1999). *Celebration USA: living in Disney's Brave New Town*. New York: Henry Holt & Co.

Gutman, M., & Coninck-Smith, N. d. (Eds.). (2008). *Designing modern childhoods: history, space, and the material culture of children*. New Brunswick, N.J.: Rutgers University Press.

Hackler, D. L. (2006). *Cities in the Technology Economy*. Armonk, N.Y.: M.E. Sharpe.

Hayden, D. (2004). *A Field Guide To Sprawl* (First Edition ed.). New York: W. W. Norton & Company.

Hodgson, T. E. R. (2003). *Proud possessions: architectural style and the old New Zealand house* /Terence Hodgson. Wellington, N.Z.: Bookcase.

Homes and Communities Agency. (2007 - 2009). *Urban Design Compendium*. Retrieved June 20, 2010, from <http://www.urbandesigncompendium.co.uk/>

Howard, E. (1902). *Garden Cities of To-morrow*. In B. M. Nicolaides & A. Wiese (Eds.), *The Suburban Reader* (pp. 166-169). New York, Londonw: Routledge.

Jacobs, A. B. (1993). *Great streets*. Cambridge, Mass. :: MIT Press.

Jacobs, J. (1970). *The Economy of Cities*. New York: Vintage Books.

Knox, P. L. (2008). *Metroburbia, USA*. New Brunswick, NJ :: Rutgers University Press.

Land Information New Zealand. Retrieved April 15, 2010, from <http://koordinates.com/maps/linz>

Lang, P. (1997). *The Occulted Suburb*. In P. Lang & T. Miller (Eds.), *Suburban Discipline*. New York: Princeton Architectural Press.

Lang, P., & Miller, T. (Eds.). (1997). *Suburban discipline*. New York: Princeton Architectural Press.

Le Corbusier. (1982). *Early buildings and projects, 1912-1923*. New York: Paris: Garland Pub.; Fondation Le Corbusier.

Low, S. (2003). *Behind the Gates*. New York: Routledge.

Mattingly, P. H. (1997). *The Suburban Canon Over Time*. In P. Lang & T. Miller (Eds.), *Suburban Discipline*. New York: Princeton Architectural Press.

McKoy, D. L., Bierbaum, A. H., & Vincent, J. M. (2009). *The Mechanics of City-School Initiatives: Transforming Neighborhoods of Distress & Despair into Neighborhoods of Choice & Promise Centre for Cities & Schools*, University of California, Berkeley.

Miles, M., Borden, I., & Hall, T. (Eds.). (2000). *The city cultures reader*. London; New York: Routledge.
Ministry of Education New Zealand. (2008). *Total Investment in Education*: Ministry of Education New Zealand.

Moffat, D. (2002). *Designing a city of Learning Paterson, New Jersey*. *Places*, 15(1), 30-33.

Muthesius, S. (2000). *The postwar university: utopianist campus and college* /Stefan Muthesius. New Haven; London: Yale University Press.

Necyba, T., McEwan, P., & Older-Aguila, D. (2005). *The Impact of Family & Community Resources on Student Outcomes: An Assessment of the International Literature with Implications for New Zealand*: Contract Research by Stanford University for New Zealand Ministry of Education.
NewUrbanism.org. (2010). *Principles of Urbanism. New Urbanism* Retrieved 3/12/2010, 2010, from <http://www.newurbanism.org/newurbanism/principles.html>

Nicolaides, B. M., & Wiese, A. (Eds.). (2006). *The Suburb Reader*. New York: Routledge, Taylor Francis Group.

Pearson, C. A. (2003). *Bernard Tschumi creates an academic village in suburban Miami for the FIU School of Architecture*. *Architectural Record*, 191(October), 102-107.

Porcari, L., & Zellner, P. (1997). *The Luck Country: Myth, Image, and the Australian Suburb*. In P. Lang & T. Miller (Eds.), *Suburban Discipline*. New York: Princeton Architectural Press.

Preval, N., Chapman, R., & Howden-Chapman, P. (2010). *For Whom the city? Housing and locational preferences in New Zealand*. In P. Howden-Chapman, K. Stuart & R. Chapman (Eds.), *Sizing up the City: urban form and transport in New Zealand* (pp. 34-51). Wellington: Steele Roberts Publishers.

Rothblatt, D. N., & Garr, D. J. (1986). *Suburbia An International Assessment*. Beckenham, Kent: Croom Helm Ltd.

Saunders, W. S. (Ed.). (2006). *Urban planning today: a Harvard design magazine reader* Minneapolis University of Minnesota Press.

Schneider, M. (2002). *Do School Facilities Affect Academic Outcomes?* Washington, D.C.: National Clearinghouse for Educational Facilities.

Schneider, T., Walker, H., & Sprague, j. (2000). *Safe School Design A handbook for Educational leaders: Applying the Principles of Crime Prevention Through Environmental Design*. Eugene, Oregon: ERIC Clearinghouse on Educational Management, University of Oregon.

Segal, R., & Verbakel, E. (2008). *Urbanism Without Density*. *Architectural Design*, 78(1), 6-11.

Statistics New Zealand. (2005). *Downtown Dwellers 2005: New Zealand's CBD Residents*: Statistics New Zealand.

Strategy and System Performance, M. o. E. (2008). *State of Education in New Zealand: 2008*: New Zealand Ministry of Education.

Strickland, R., & Riesman, J. (2005). *Place-Making as an Expression of Teaching and Learning: The Hill-top, Washington, D.C. (Research and Debate)*. *Places*, 15(3), 50-55.

Sullivan, K. (2002). *Catching the Age Wave: Building Schools With Senior Citizens in Mind*. Washington, D.C.: National Clearinghouse for Educational Facilities.

Tanner, C. K., & Lackney, J. A. (2006). *Educational facilities planning: leadership, architecture, and management*. Boston Allyn and Bacon.

Teaford, J., C. (1997). *PostSuburbia: Government and Politics in the Edge Cities*. In B. M. Nicolaides & A. Wiese (Eds.), *The Suburb Reader* (pp. 153-161). New York, London: Routledge.

Teyssot, G. (1999). *Il prato americano: lo spettacolo del pastorale suburbano. The American lawn: The spectacle of Suburban Pastoralism*. Lotus International, 101, 92-115.

Toomath, W. (1996). *Built in New Zealand: the houses we live in* /William Toomath. Auckland, N.Z.: HarperCollins.

Trancik, R. (1986). *Finding Lost Space Theories of Urban Design*. New York: Van Nostrand Reinhold Company Ltd.

Vincent, I. J. (2009). *Street Appeal. Landscape Architecture New Zealand*, Summer(04), pp. 72-75.

Weiner, S. S. (1996). *If They Build It, They Will Come (The Mayor's Institute on City Design)*. Places, 10(2), 12-19.

Wells, H. G. (1914). *Anticipations of the reaction of mechanical and scientific progress upon human life and thought* /H.G. Wells. London :: Chapman & Hall.

Whitehand, J. W. R., & Carr, C. M. H. (2001). *Twentieth-Century Suburbs: A Morphological Approach*. New York: Routledge.

Wright, F. L. (1958). *The living city*. New York: Horizon Press.