COMMUNITY LIVING AT YORK STATION: NEW URBANISM PRINCIPLES APPLIED TO STREET DESIGN TO CREATE LIVABLE, SUSTAINABLE COMMUNITIES

by

CAMERON ANDREW SMITH

B.A. UNIVERSITY OF KING'S COLLEGE

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER'S OF LANDSCAPE ARCHITECTURE

IN

THE LANDSCAPE ARCHITECTURE PROGRAMME
FACULTY OF AGRICULTURAL SCIENCES

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

April 1999

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Department of Landscape Architecture

The University of British Columbia
Vancouver, Canada

Date April 27, 1999.

Abstract

The purpose of this thesis is to demonstrate that by using New Urbanist ideas one is able to design streets that will help create livable, sustainable communities, which are a viable alternative to suburban status quo developments. The effects of this type of development on three components of community (ie. social,economic and ecological) are studied. The New Urbanist development model is applied to the design of an historic railway infill site in Fredericton, New Brunswick.

Key Words: back yards, block size, building footprint, building type community centre, commercial heart, density, ecological, economic, five minute walk, front yards, greenway high street, lanes, lot size, neighbourhood, neighbourhood main, New Urbansim, open space, private realm, public linkages, public realm, raised pedestrian walkway, residential mews, social.

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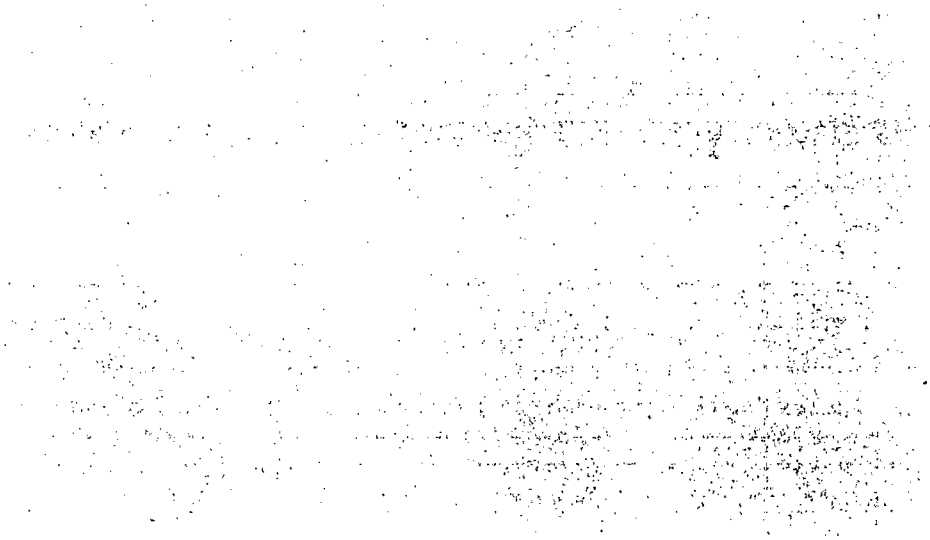
Acknowledgements

I would like to thank my committee, Allan Duncan,Greenway Planner,City of Vancouver, Elspeth Bradbury,Landscape Architect, West Vancouver, and Patrick Condon,Professor of Landscape Architecture,Chair of the committee , for their guidance in my design. I would also like to thank Bill DeGrace and Alex Forbes, both Planners from the City of Fredericton for supplying site information. A final word of thanks to Beverley G.Smith and Elizabeth Smith for excellent photographs of the site.



1.0 Introduction

" What we have is what we are, and what we are is what we have"
Larry Luka[1]

People are seeking new alternatives to the post war suburban sprawl of communities across North America, and revaluating what it means to be a community. Judith Martin a geographer and Sam Warner an urban historian agree that the concept of community "is a set of ideas about the ways in which people relate to one another and the spaces in which they do this."[2]

Suburbia, or 'Conurbation'[3] as Lewis Mumford called it is based on a low density development which is made up of segregated single use land parcels which are commercial,industrial or residential and can often only be accessed by the automobile. Since the turn of the century North Americans have been building communities or restructuring/replacing older communities to fit the needs of automobiles. Many of us have in the words of Howard Kunslter been living "car-centred lives."[4]

One of the new alternative types of developments to come to the forefront is that of 'NewUrbanism' also known in some circles as a 'Neo-Traditional Development (NTD). It is about reinventing the traditional development patterns of communities prior to the world wars that promoted walking to work, recreation, shopping areas and streetscapes that reflected a close-knit neighbourly feel. These were communities that gave a sense of place on a human scale as opposed to that of the suburban model which is built around more a model of technology. The difference between the old and new traditional models is that New urbanism seeks to accommodate modern technology. As the New Urban Congress, states " New urbanism seeks to reintegrate

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1 Joan Nasseur, 'Placing Nature ', Island Press, Washington D.C., p115
2 Ibid., p.115
3 James Howard Kunstler, 'The Geography of Nowhere',Simon and Schuster, New York,1993,p.15
4 Ibid.,p.113.

the components of modern life-housing,workplace,shopping and recreation-into compact, pedestrian ,mixed use neighbourhoods linked by transit and set in a larger regional open space framework."[5]

The purpose of this thesis is to investigate and demonstrate the New Urbanism (N.U.) development model by designing a mix of streetscapes and land uses on an infill site in Fredericton New Brunswick . The primary objective is to show that New Urbanist ideas applied to street design help create livable , sustainable communities.Three components of what makes good community development will be analysed;1) social- the relationships between people and place;2) economic- the cost of the development in terms of outward capital and infrastructure; and 3) ecological - the relationship between people and the environment.

Because of the large scope of this topic emphasis will be placed on N.U. streetscape's typologies and how their use in New Urbanist developments works to strengthen the neighbourhood and ultimately community as a whole.

With New Urbanism as the guide the streetscape will be analysed and discussed on the three given aspects of community with the following objectives of the thesis attached to each. These are as follows:

Social

1) The streetscape will respect the values of what is public, semi-public, and private

2) The site will provide for accessibility to pedestrians, bicyclists, and mechanised transport

3) The site will provide for a diversity of land use that will include residential, commercial, and recreational spaces

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[5] Congress of New Urbanism,http://www.cnu.org/new urbanism.html,p.1

4)Allow for the ability to walk within a five minute time frame from residential areas to public transport nodes, commercial, recreational and school facilities

5)Work to minimise automobile use

6) Ensure street design vocabulary reflects surrounding neighbourhoods

7) Ensure a maximum level of comfort for every season

8)Provide for open space for recreation

Economic

1) Will provide a development that is economically viable such as more affordable housing; reduced long-term (75 year life-cycle costs) ;infrastructure costs; and generate public and private revenue.

Ecology

1) Harmonise streets with the natural systems such as having permeable surfaces to absorb precipitation and filter out pollutants.

2) Reduce automobile 'short trips' of a five to ten minute radius so as to reduce emissions.

3)Provide for green space for bird and animal habitat.

These three groups of objectives provide theoretical guidelines on which to base the design. In this sense, they should be regarded as interrelated and not as separate objectives.

2.0 Method

2.1 Structure

Using the principles of rational and intuitive thought the process of the design thesis follows a linear sequence of scientific analysis and experimentation. The word rational is applied as an adjective and means "of or based on reason"[6] which is one's "intellectual faculty by which conclusions are drawn from premises."[7] The premise in this thesis is that New Urbanism should be considered as a viable alternative model in community development.

The word intuitive stems from the word intuition, a noun , which is described as "an immediate insight or understanding without conscious reasoning."[8] Intuitive thought follows no logical process but acts as an 'interrupter' to rational thought.

Both rational and intuitive thought should not be judged as two opposite forces but as a inter-related course of action. Together they serve to enrich the process of scientific analysis and experimentation.

The framework to which both forms of thought are applied, the scientific model, involves five steps. These are as follows; 1) Hypothesis/Objectives - the statement of intent and an introduction to the proposed project; 2)Research Process- the gathering of data through a literature review and precedent studies that serve to support the objectives; 3) Review - analyse the data collected;4) Discussion and Summary- to discuss the findings of the results ; and5) Conclusion- to pass judgment on whether to accept the hypothesis and to support it through the use of a set of design principles.

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6 Edelia Thompson,'The Oxford Dictionary',Oxford University Press, New York,1992,p.746

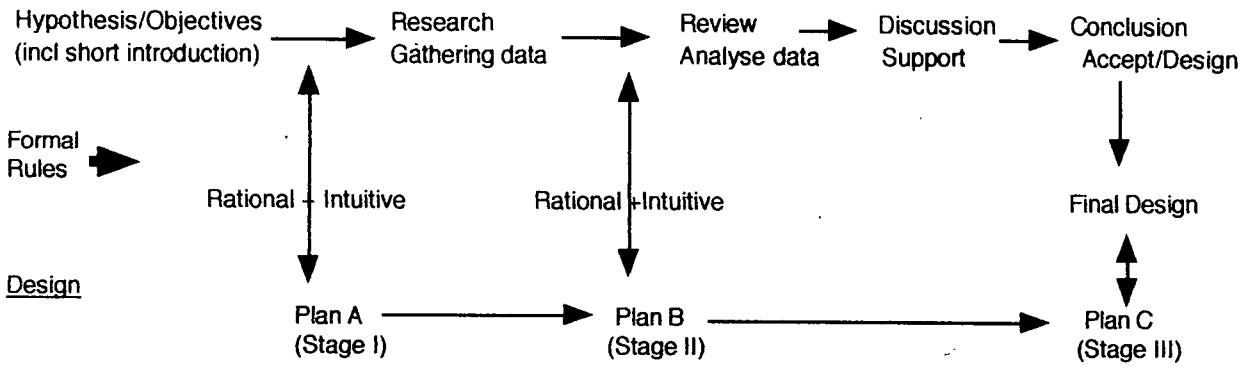
7 Ibid.,p.750

8 Ibid.,p.466

The matrix below shows how the process of the design development will occur.

Linear Sequence

Verification



2.2 Formal Rules

One additional and important step in the process is the establishment and application of 'Formal Rules'. These act as more rigid guidelines as to how the process of analysis and experimentation proceeds. They are listed as follows;

1)The Analysis of the data.

2) Explanation of less than common terminology (eg. streetscape,social infrastructure,) is necessary.

3) The inclusion of precedent studies is foremost in the verification process. These should focus on the social, economic, and ecological aspects of the study.

4) Document all sources where appropriate.

5) The design itself must be self explanatory. Include drawings that reflect the nature of the information being applied (eg.plan view,axonometric,cross sections,perspectives).

The end result of the entire process is to come up with a product that meets the criteria of the formal rules and is able to demonstrate the principles.

2.3 Learning Objectives

What has not been discussed are the 'learning objectives ' or the knowledge that is sought by the study. These although not found on the matrix itself are very much part of each step in the process. They are what the designer seeks to realise in each step, and then, in the conclusion provide a sense of closure to each. The set of learning objectives are as follows:

1) To understand through design analysis the form, function, and connection of the street.

2) To establish a programme that sustains the social, economic, and ecological values of the neighbourhood and community.

3) To analyse and design space within the public/semi-private and private realms to show that a system of public over private values exist.

4) To construct a plan that will demonstrate the inter-connections between the site and existing neighbourhoods.

2.4 Summary

The method used in the design thesis exemplifies a format that works on the premise of integration. The combination of rational and intuitive thought , formal rules and learning objectives make the process an interdisciplinary one as opposed to a multi-disciplinary. It remains though a singular process in the sense that it works on a linear sequence but one that encompasses many different levels. As Alexander notes it is a "single process...one which works at many levels, in many different ways...but still essentially is a single process, in virtue of the fact that it has a single goal:simply the creation of wholeness in the environment." [9] The given method thus gives the designer

[9] Doug Patterson, 'Alexander:A new Theory of Urban Design', University of British Columbia, Vancouver, B.C., 1998, Larc 420

the opportunity to look at the 'bigger picture' as both whole and part at once and design 'to create a wholeness of the environment.'

3.0 Analysis

3.1 Understanding New Urbanism

3.1.1 A Sense of Place

The new communities of the post war era were planned around the idea that technology and mechanisation would give us what we needed and craved: convenience. The automobile exemplifies this very 'convenience' and came to dominate both the land and the people that used it. Martin and Warner note "the automobile dominates the environment of the metropolis;the highway,road, and street networks control the organisation of metropolitan areas." [10] Gone is the sense of place in communities where human scale set the precedent, instead, even in the traditional towns streets are "widened, parking lots added, road lanes made wider and multiplied"[11] and pavement seems to be everywhere. People have overlooked or forgotten human values and reasons for what makes a community.

Charles W. Foster states that what is missing is" people's understanding of the fundamental relationship between people and the land. It is what the Chinese refer to as 'fengshui', the concept of living in harmony with one's environment."[12]

The understanding of place is critical to understanding New Urbanism and its set of values. Foster explains place as "a centre of action and intention unlike space which

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[10] Joan Nasseur,'Placing Nature,p.114

[11] Ibid.,p.114

[12] Charles W. Foster, 'The Environmental Sense of Place',Lincoln Institute of Land Policy, Cambridge Mass.,1995,p.1

is more abstract, it is a centre of meaning constructed by experience."[13] What the New Urbanist might add to this definition is in 'human scale'. To the New Urbanist the idea of place is both about 'living in harmony with one's environment' and as a 'centre of action and intention.'It is about a neighbourhood which can either be one side of a city block or an area that includes five to six blocks. New Urbanists like Christopher Alexander believe place is about neighbourhood and home. People, says Alexander, "need an identifiable spatial unit to belong to."[14] Alexander gives an example of two residents speaking on the merits of neighbourhood. One resident states "I feel its home. There are warm people on this street." Another resident says "the street life doesn't intrude into the home....only happiness comes in from the street. I feel my home extends to the whole block."[15] This is what the New Urbanist seeks 'a centre of activity and intention.' Place and home become synonymous with neighbourhood. As Charles Foster states "home is where here is." [16] In addition, the New Urbanist holds to the premise that all design must be in a human scale and not dominated by any one element be it social,economic, or ecological. Alternatively, New Urbanism seeks to integrate and accommodate these elements to create as Alexander Christofordis states " an environment that is suited to human scale and responsive to contemporary transportation, development, legal, and sustainability issues" [17].

3.1.2 History

Critics have argued that the New Urbanist Movement is just a 'rehash' or reshaping of the traditional community developments and their ideals in prewar America and England. There is some truth in their argument.The movement's foundations did come from late 19th and early 20th century thinking. 'The Garden City Movement' and the 'City Beautiful' developments of the late nineteenth century had a similar goal of

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[13] Ibid.,p.2

[14] Christopher Alexander, p.81

[15] Ibid.,p. 83

[16] Charles Foster,p.2

[17] Alexander Christoforidis, 'The New Urbanism', University of Tennessee, 1995,p.1

associating people with the land. English designer Ebenezer Howard (1851) proposed the "Garden City where the city poor might again live close to nature."[18] In North America planners such as Clarence Stein and Henry Wright "sought to maintain a village"[19] in their designs. Stein's new town of Radburn, New Jersey, in 1927, was laid out in "neighbourhood units"[20] around green spaces, schools and a modified grid system offering different sized land parcels. In addition, Stein worked to "create a rigid separation between automobile and pedestrian traffic by using overpasses and greenways."[21] These examples do show that there is some merit to the contention that New Urbanism's ideals do come from these earlier movements. Andres Duany, of Duany and Plater-Zyberk, one of the chief leaders in New Urbanism says "There is nothing radical about traditional neighbourhood developments. The prototype is right under our noses and its the traditional American town of the early 20th century."[22] What the New Urbanist argues is that it is not about manipulating the traditional town and its ideals but providing a place that reflects community values. As Duany goes on to explain it is about providing for a "small town where children, and the elderly can walk without fear of speeding vehicles... where residents feel they are part of a community not just dwellers in a subdivision."[23] Peter Calthorpe another architect, planner and supporter of the New Urbanist ideals states it is about designing for the "social linkages"[24] He says "the practical must come first: land, energy, and resources should be saved, traffic should be reduced, homes should be more affordable, children and the elderly should have more access, and working people should not be burdened with long commutes."[25] The movement is therefore not about history and the reshaping of traditional towns but is about meeting the social,

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18 Jane Jacobs,'The Death and Life of Great American Cities',Vintage Book New York, 1961,p.16
19 William Fulton, 'The New Urbanism- Hope or Hype,' Lincoln Institute, Cambridge Mass.,1995,p.8
20 Ibid.,p.8
21 Ibid.,p. 8
22 Ottawa Citizen,'Landscape,'Ottawa July 11, 1992,p.4
23 Ibid.,p.4
24 Peter Calthorpe,'The Next American Metropolis, Princeton, Architectural Press, 1993,p.10
25 Ibid.p.10

economic and ecological needs of present day society and recapturing a sense of place in one's community.

3.1.3 Guiding Principles

William Fulton states in his treatise on 'New Urbanism-Hope or Hype' that there are three guiding principles to New Urbanism. These are as follows;

1) Walkable neighbourhoods oriented to the quarter-mile, five-minute walk.

2)Primary orientation to public transit systems , rather than private automobiles.

3) Greater integration of different land uses (such as housing, shops, workplaces, and schools) at the neighbourhood level.[26]

The New Urban Congress has an expanded set of principles to give a more specific guide to how new urbanist development should proceed. Among the more important features are that all development (neighbourhoods and districts) be compact, have clearly defined edges and centres, encourage pedestrian activity rather than automobile use, streets are interconnected, and civic buildings should be given prominent locations.[27] For the purpose of this design thesis a combination of the first three principles(social, economic, and ecological) presented and those mentioned above will be used as a guide.

3.1.4 Application

The New Urbanists stated in their early manifesto the 'Ahwahnee Principles of 1991' that "we can, first, infill existing communities, and second, plan new communities that will more successfully serve the needs of those who live and work within them."[28] In theory this implies that the New Urbanist ideal environment is that already found within existing community borders and only secondly do they consider new communities or new towns as development options. Peter Katz reinforces this notion

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[26] William Fulton, p.5

[27] New Urban Congress,p.2

[28] New Urban Congress,p.1

by stating "The utilisation of existing infrastructure and the best opportunity to preserve our open space will come from infill and redevelopment."[29] This stance on how development should proceed, further substantiates New Urbanism and its willingness to address social,economic, and ecological concerns at the community level . Examples representative of the various applications of New Urbanist developments exist throughout North America. Infill developments such as Communications Hill in San Jose, Brentwood Village in southern California , or the town of Kentlands in Gaithersburg, Maryland, all display typical characteristics of what , according to Peter Katz, makes good town planning. For the purpose of this thesis the study will concentrate on those pertaining to infill development namely the Brentwood Village Development in California. This will be further discussed and analysed in the Precedent Studies.

3.2. Defining Social Infrastructure:

3.2.1 Social Infrastructure

Social infrastructure can be defined as the framework which works to create and bind together a community.It is made up of three parts; a) social- how we as humans live; b) economic- the financial input and out put of the inhabitants; and 3) ecological- the interaction of people with the environment. Each is dependent on one or more of the following three design principles: circulation, programme, and aesthetics.

Circulation is, according to Kevin Lynch in his text 'Site Planning',considered as a system that maybe either integrated or dispersed. For example, roads are integrated;storm drainage systems are usually dispersed.[30] Physical circulation patterns share some general characteristics. Insignificant flows notes Lynch are

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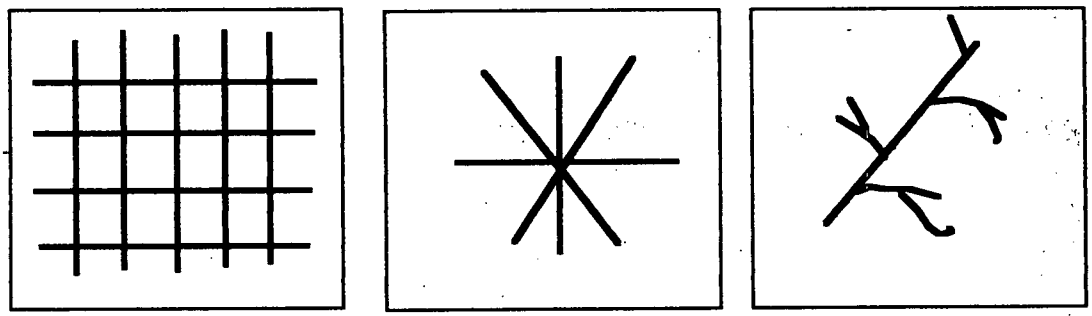
29 Peter Katz,'The New Urbanism, Toward an Architecture of Community, McGraw-Hill, New York, 1994,p.,xiii

30 Kevin Lynch, Site Planning,MIT Press, Cambridge Mass., 1984, p.194

"placed in defined channels, with terminals and interchanges. These channels are organised into networks, which distribute the flows over large areas."[31]

The larger the flow, such as car traffic, the more need for better definition of streets, intersections and types of street design as a means of controlling the flow of street traffic. Examples of 'channel networks' or pattern circulation range from: 1) the grid which works to shift flow to and from, usually over a large area; 2) radial- where channels spread out from the centre; and 3)linear where all origins and destinations are attached.[32] The following illustrate in diagrammatic form the three pattern types;



Grid Radial Linear

New Urbanists favour the grid pattern over the radial and linear forms because of its 'interconnected network' that allows for a continuous flow of traffic be it automobile, pedestrian or bicycle, and, has the ability to be flexible without loosing its interconnectedness. This will be discussed further under street patterning.

Programme, as defined by Michael Laurie, a landscape architect, is "a set of uses with generic form "[33]. It must be used in combination with geometry, which provides the shape and form. For example, a building is merely four walls and a roof until it is given a set of uses such as becoming a home where a person eats and sleeps. It then

31 Ibid.,p.195

32 Ibid.,p.195-6

33 Michael Laurie, An Introduction to Landscape Architecture,Prentice Hall, New Jersey,1996,p.172.

is able to be a programme in the more fuller sense of the word, which the new urban designer sees programme as. Programme and geometry do share some limitations. Site planning acts as " a process of arranging these uses in relation to each other with reference to the constraints and opportunities revealed in regional analyses."[34] Laurie continues saying programme must be " a reflection of user needs and attitudes" [35] and geometry must "provide what is wanted."[36] Often the exact opposite happens. The public who is largely seen as the user is often left with a programme, a shape and form which has no direct correspondence to its need. Programme and geometry should be regarded as an important responsibility of the designer as it is an essential part of the social infrastructure.

The definition of aesthetic in regards to the understanding of the social infrastructure differs from the more public perception of aesthetic which is "of or sensitive to beauty."[37] Instead aesthetic should really be described as 'aesthetic experience.' Marcia Eaton in her essay 'The Beauty that Requires Health' describes it as having "to see (or hear or smell or in some way directly perceive) something for oneself in order to have an aesthetic experience of the feature in question; and if one knows the meaning of the term referring to that feature , then this direct perception is all one needs to verify the presence or absence of that feature."[38] Aesthetic, then, can be assumed to include not only the experience from visual perception, but the experience of all five senses. Hearkening back to social infrastructure, the aesthetic is the sights,smells, noise, feeling (touch), tastes, of what makes up community.

Reviewing the three design principles one can conclude that circulation, programme, and aesthetic effect one or more of the three parts that make up social infrastructure.

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[34] Ibid.,p. 173
[35] ibid.,p.173
[36] Ibid.,p. 173
[37] Oxford Dictionary,p.13.
[38] Placing Nature, p.91

Circulation can be attached to either social or ecological issues, programme to social, economic, and ecological , and, aesthetic to social.

To the New Urbanist it could be argued that circulation, programme, and aesthetic are more than just design principles but act more as a subset of formal rules to be used to direct the design of a community. Without interconnected streets,paths for pedestrians and bicyclists, (circulation), diverse land use (programme), active pedestrian street life and a social centre (aesthetic, programme), the ability for the five minute-walk (circulation and programme), there is no 'New Urbanist Movement. '

Based on this I wil proceed on the assumption that circulation, programme, and aesthetic will act as a subset of formal design rules to social infrastructure as previously defined. These are:

1) Circulation will follow a grid pattern of development

2) Pedestrian and bicycle circulation will work on a flow pattern but not necessarily limited to the grid.

3) Programme will be established according to a diversity of land parcel sizes, building types, and street types.

4) Aesthetics will aid in creating a cohesive community and connecting with the surrounding neighbourhoods by use of similar perceptions.

3.3 Design Typology

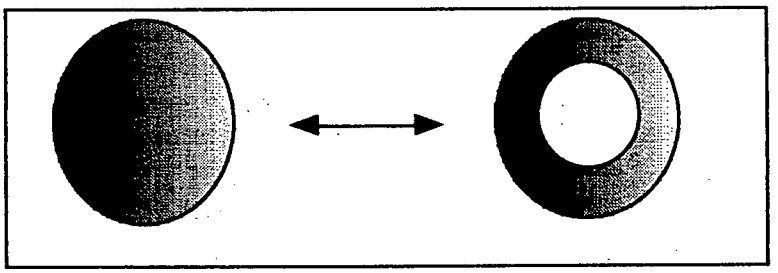
It is defined as a set of built solution types.The idea of 'type' in the landscape comes from the belief of the French Enlightenment Thinkers in the early part of the 19th century. They said 'type' acts as a "general model that essentializes form,function, and meaning all at once[39] ." This is made more creditable by the modern thinker Piaget a French psychologist who discovered 'space schemata', and that "design typologies

[39] Patrick M. Condon, 'A Designed Landscape Space Typology, University of Minnesota, 1988, p.7

presume the existence of a shared language of space and form."[40] Type then can be assumed to have within it both technical meaning and meaning relating to experience of that type. For example a street is both a 'human object' as a thing as well as being a "human object... where... the spirit of a society is realised, transmitted and perceived."[41] Street type encompasses both objective and experiential meaning.

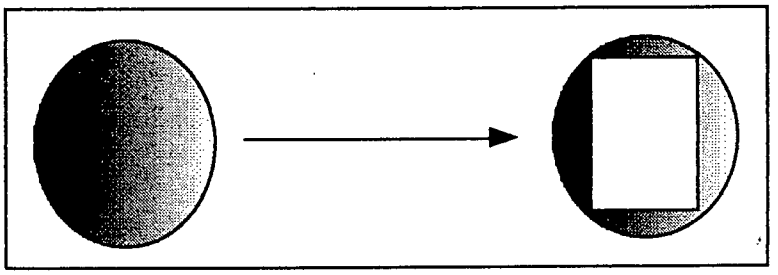
There exist three distinct design type dimensions. These are important as they establish a link between humans and nature and that there is some formal order of the design typologies that must be adhered to. These three dimensions are as follows:

1) natural forest to natural clearing-the birth of landscape types. One is able to perceive a spatial change from dense forest to open space.



Forest Clearing [42]

2) nature to human-where man clears by his own hand a clearing in the forest.



Forest Clearing

3) human to human and or human to nature- where for example the street on one level shares stable ties with nature and as well shares its other side with other humans. In other words your neighbours.

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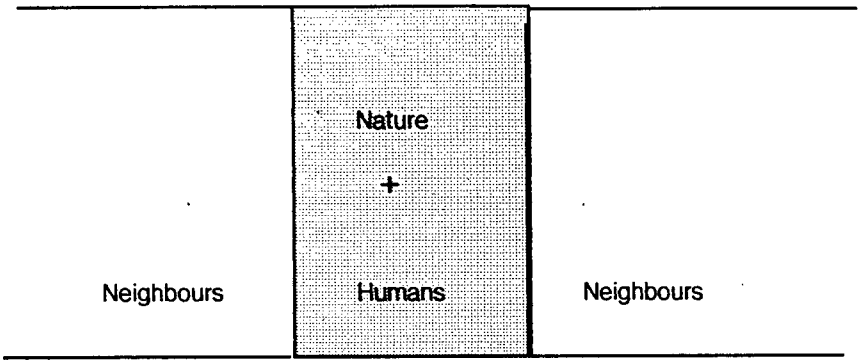
[40] Ibid.,p.7

[41] Ibid.,p.34

[42] Ibid.,p. 33

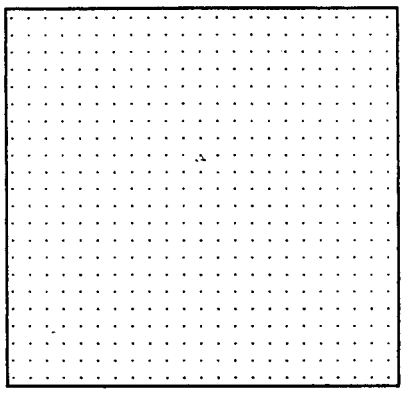


These three dimensions signify that there is order to the development of landscape types. With this realisation one can assume then that landscape types could be used as important "building blocks of spatial experience in humanised landscape."[43] Considering one's design a list of building types emerges that is essential as a framework from which to create a design that will be representative of a built development. These are the bosque, the allee, the front yard, the back yard, and the street.

The Bosque is " to the clearing what the clearing was to the forest."[44] It is trees ordered in a grid like pattern that may provide ' straight timbers for buildings or a place of quiet thought and repose ' or it could be both of pragmatic and spiritual use.

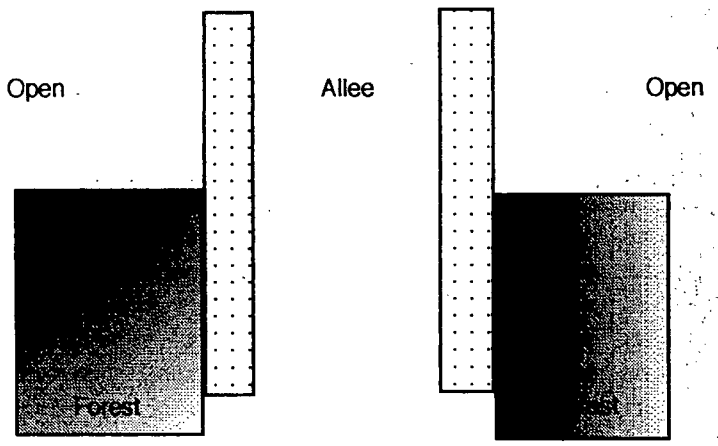
[43] Ibid.,p. 35

[44] Ibid.,p.39



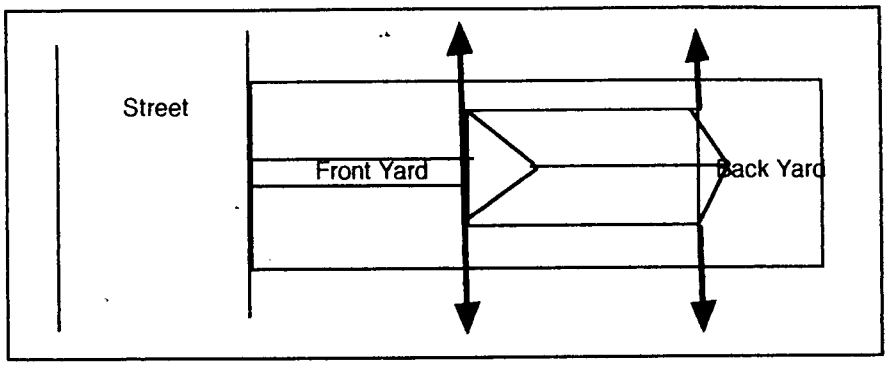
Bosque

The allee is like a 'cut' or 'swath' through the forest allowing for passage through or it can act as a frame in open landscape.[45]



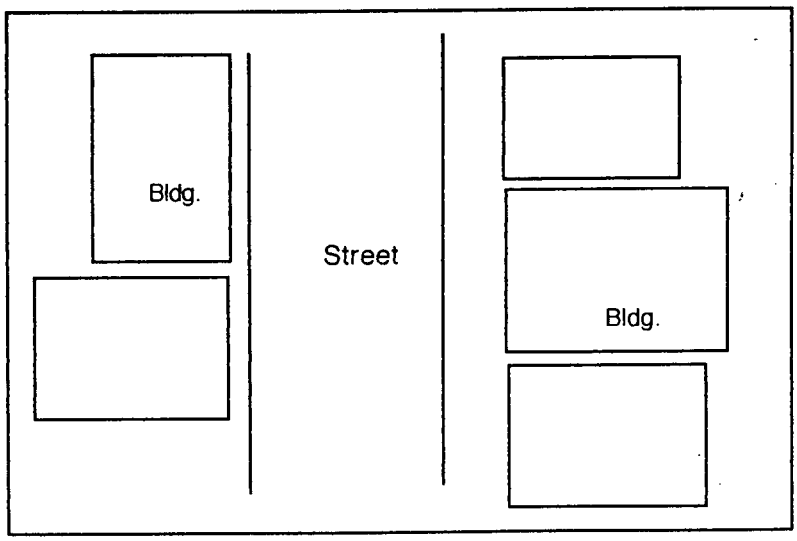
The Front Yard is the landscape space that separates the space of the public Street from the completely private space of the home.[46] The stoop and front porch are part of the front yard but represent degrees of different publicness. The Front Yard is very much about arrival and transition from a place that is very public (the street) to that which is private (the home).

[45] Ibid.,p.39
[46] Ibid.p., 40



The Back Yard acts as link between activities of the home and those of nature.It can be considered as an outdoor living room or recreation room. It may be a planted garden or simply a place to experience the outdoors.

The Street is the space that allows the Front Yard to come into being,as it acts to connect the private and public living realms.[47] It is not dissimilar to the allee except it is carved out of human built form rather than nature. One difference is that the street comes into existence simultaneously when the built form is erected. The experience of the street is dependent on its many different facades, and binding edges (building walls).



[47] Ibid.,p 42

These five design types act as building blocks to establish a framework from which to design a streetscape typology.

3.4 Understanding Urban Spaces

Rob Krier in his classic book 'Urban Space' defines the concept of urban space as "all types of space between buildings in towns and other localities."[48] It is by our abilities of understanding both our knowledge of the geometry of shape and form and aesthetics that we are able to distinguish urban form from external space.[49]
Two design types exemplify urban space; the square, and the street. The square is produced when a group of buildings are located around an open space and act to both enclose and control that space.The agora, the cloister, forum, and courtyard are examples of this type of urban space.

The street develops from the square. It is formed when building space is no longer available and people must expand outward. Streets give the settlement a 'framework' from which to grow, allowing access. Originally streets were planned on a human scale meeting human needs. As Krier notes "The street is unsuitable for the flow of motorised traffic,whilst remaining appropriate to human circulation and activity."[50] The street usually is laid out not as a separate entity but to work as a network.

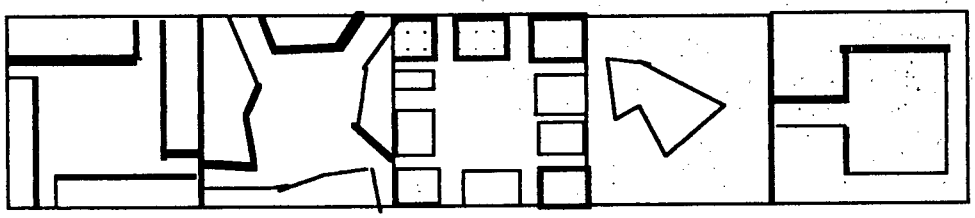
Functions of urban spaces range from public to private. They include going to work, selling commercial wares, recreation and other leisure activities.

The square was originally designed as a communal place. It held markets, civic parades and ceremonial events that today have all but disappeared. The square is very much a place of cultural connection for the whole of the community and offers an opportunity to act as a cultural civic centre. A square as well is a place to recreate and

48 Rob Krier, 'Urban Space',Rizzoli, New York,N.Y., 1979,p.15
49 Ibid.p.,15
50 Ibid.,p.17

a place for leisure activities.

Similarily, the street is as a place of recreation, circulation, and public well-being. Jane Jacobs states "the functions of city streets:to weave webs of public surveillance and thus protect strangers as well as themselves; to grow networks of small-scale, everyday public life and thus of trust and control; and to help assimilate children into reasonably responsible and tolerant city life."[51] The street is divided into two types, the residential and the commercial. Each functions pragmatically to circulate traffic flow. Socially, the residential street acts as well as a place of recreation, to meet your neighbours, to walk, and to enjoy the aesthetic experiences it hopefully will offer. The commercial street offers as well a place to recreate. This may include shopping from outside street vendors, stopping to talk to friends, and to enjoy the sights, sounds and smells of urban city life. The following illustrations show an array of the vast range of urban spaces.



Urban Spaces

3.5 Understanding Streetscape

According to Anton Neesen a city planner, and author of 'Visions For A New American Dream', "Streetscapes create the form and scale of the community and must accommodate the pedestrian and the vehicle."[52] In the traditional town it was about network, form of streets, visual perspective, spatial complexity, mobility and accessibility, ownership, and vocabulary. The New Urbanist as well believes the

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51 Jane Jacobs,'The Death and Life of Great American Cities,Vintage Books, New York,1961,p.119

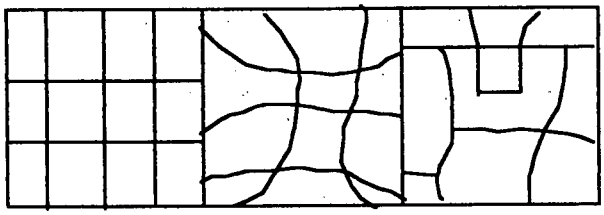
52 Anton Neesen,'Visions for a New American Dream,Chicago, 1994,p.186

streetscape must adopt these measures if the streetscape is to function as a neighbourhood and as a connector to the community, on social, economic, and ecological levels.

3.5.1 Network, Form and Visual Perspective

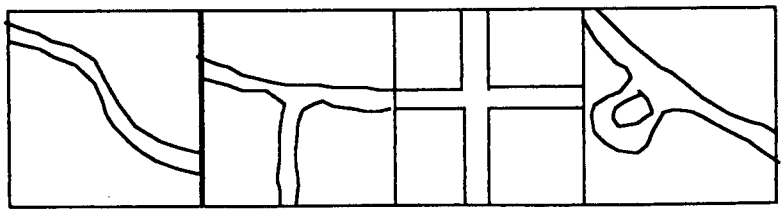
Street network is about connection , circulation and about squeezing and stretching land parcels. The three types of flow as previously mentioned were the grid, radial, and linear patterns.

For the traditionalist and New Urbanist the grid is the pattern of choice. It takes several different forms that continue to allow traffic flow, but, as well give diverse land parcel sizes. The following illustrate three of the most common grid pattern types;



Common Modified Composite

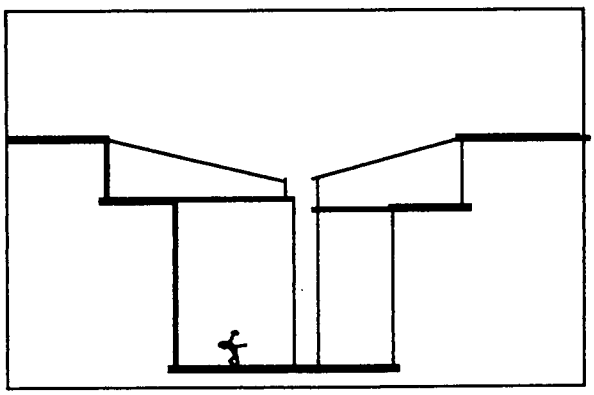
Street network at a more specific level can take different forms. These forms can affect termination of visual perspective, a sense of enclosure, or elongation of a view. Four of the most common types are illustrated below;



Curve The 'T' Crossroads The Common

3.5.2. Spatial Complexity

Streetscape proportions and dimensions are in accordance with 'human scale.' Human scale is "based on the proportions and dimensions of the human body"[53] states Frances Ching. It is not just about what we can touch with out stretched arms and hands but as well what we judge as to be of human scale such as those that are "related to dimensions of our posture, pace, reach, or grasp,"[54] or, those out of human scale such as a large building. The large building is judged as monumental making us feel small in comparison to it. Streetscape proportions and dimensions are thus critical . They have the ability to make humans feel either comfortable or uncomfortable. A street's narrowness gives a feeling of safety while a wide street presents an open and often uneasy feeling. Yet, proportions and dimensions are dependent themselves on certain elements such as hroizontal and vertical boundaries. The horizontal width and vertical height of buildings act to define a street's dimensions and serve to proportion space. Buildings' walls provide horizontal boundaries to the street , and vertical boundaries with their height. These boundaries states Allan Jacobs "communicate clearly where the edges of the street are, that set the street apart, and that keep the eyes on and in the street that make it a safe place."[55] These illustrations show how space can be affected by vertical and horizontal boundaries.

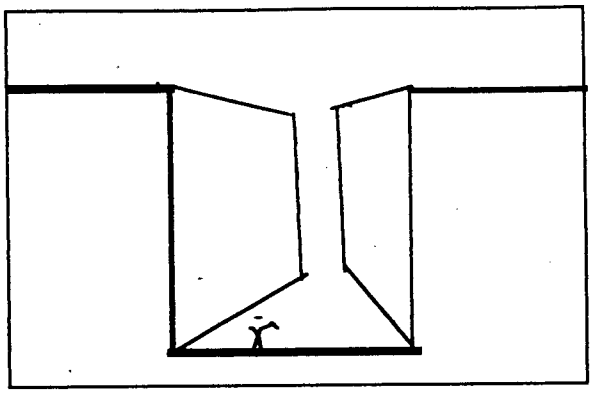


Top floor set back. Reduces the height of the building visible to the eye.

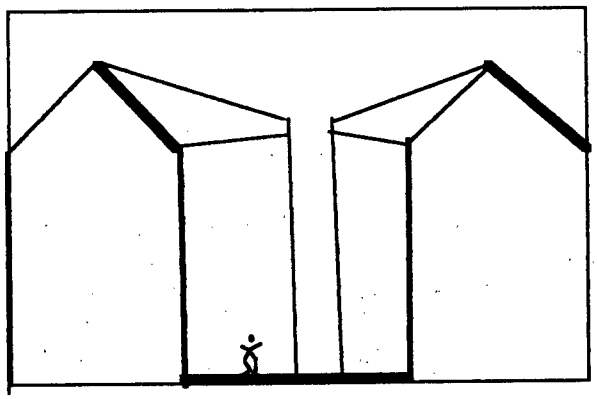
53 Francis Ching, 'Architecture Form, Space , and Order, New York, 1996,p.316

54 Ibid.,p.316

55 Allan Jacobs, 'Great Streets', MIT Press, 1996.,p.277



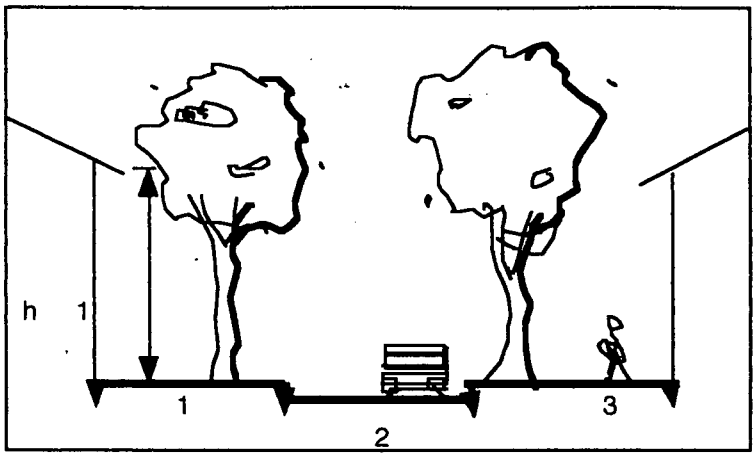
With flat roof



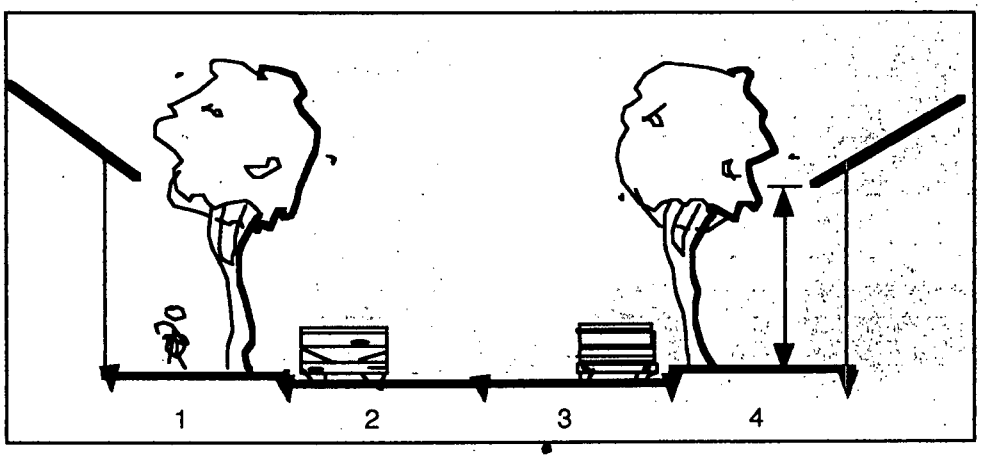
Standard Traditional Section with pitched roof.

Other factors of the streetscape are the width of the street, and, the depth of the front yard to the street. The closer the buildings are to a narrow street the more enclosed the street feels. Similarly, the wider the street and the further the buildings are set back the more open a street feels.

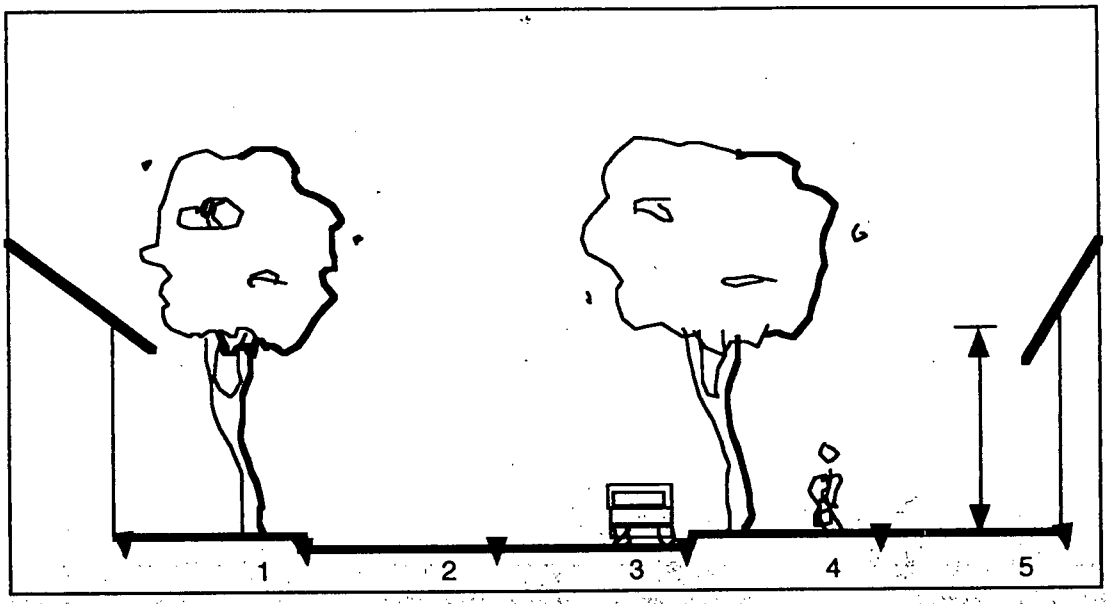
Street plantings of trees work to reduce or widen space. Trees like buildings act to frame space. They are important vertical elements acting t o define space by means of their canopy and form. Trees can give the street a cathedral effect. The following illustrations are some of the more common design types of how a street is effected by street width, front yard depth, and street trees. (Note- the drawings are not to scale)



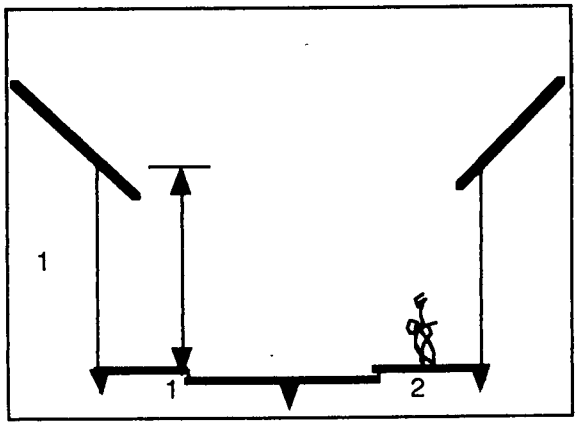
Narrow Street/Short Front Yard
Ratios of 3:1 & 4:1 are acceptable



Wide Street /Short Front Yard
4:1 ratio is acceptable

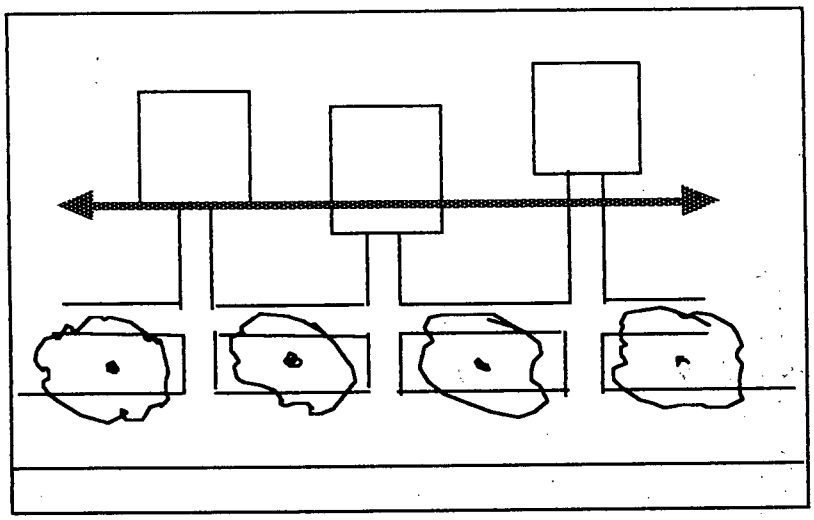


Wide Street/Short and Long Front Yard 1:5 ration becomes less defined. There is no sense of enclosure.



Ratios 1:1 & 1:2 are considered ideal

Another aspect to spatial complexity is the arrangement of buildings on the street. The setback and 'build-to line.' This is the "line which determines where the majority of the primary facades should be located"[56] . Setbacks should vary according to the building and or land parcel's use, and, be proportionate to them. The figure below gives some examples of of setback alignments.



Optimum traditional setbacks are 3.75-4.37m (12'-14')[57]

Proportions and dimensions of a streetscape are dependent on the adjustment of width, depth or height of a building, street, and front yard types . Their spatial arrangements serve to enhance how a street is percieved in human terms and whether it meets human scale standards.

3.5.3 Accessibility and Mobility

A recent study by Hampshire County in Winchester England notes "Accessibilty is the single most important fact that makes for good transport for all users. Mobility is not an end in itself." [58] Although, in considering streetscapes one does recognise that

56 Anton Neesen,p. 200

57 Ibid.,p.200

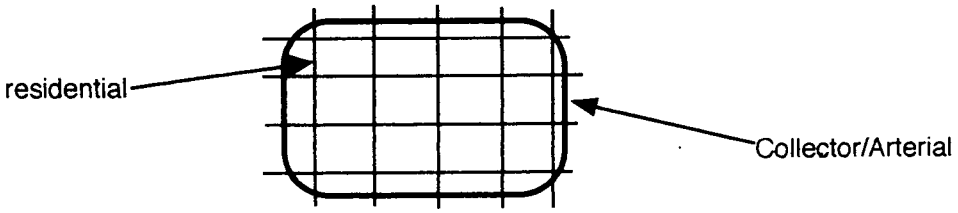
58 'Movement and Access in Residential Hampshire County Council Areas', Winchester, U.K., 1997,p.37

accessibility and mobility go hand in hand if good street design is to be accomplished. The two processes share two common goals, convenience and ease. Convenience is judged on how easy it is to reach chosen destinations;homes,places of work,shops, schools, recreation and leisure facilities.[59]

Mobility and accessibility of automobiles,pedestrians, and bicycles hinge on several important streetscape elements. Streets,alleys, sidewalks,bicycleways and greenways allow for movement from one place to another to access homes, offices, and shops. These four elements are critical to neighbourhood design and connections to the community.

3.5.3.A. Streets

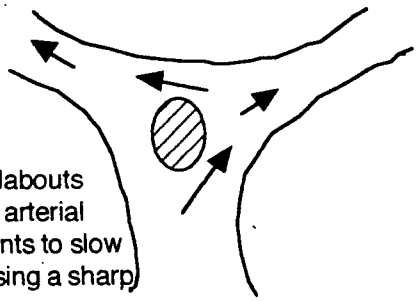
Streets provide accessibility and mobility to move traffic; motorised,pedestrian and cyclists. Good street design works to do so conveniently, with safe relative ease. Street widths function as speed regualtors for automobiles. The more narrow the street the more cautiously a driver proceeds. The wider the street the faster the traffic moves. Residential streets that are 4.8 m width have a maximum design speed of 24km (15mph). Those streets that are known as collector/arterial roads, which serve to take traffic from residential to other points in the community, have a w idth of 5.5m, and a design maximum speed of 32kmph (20mph). [60]



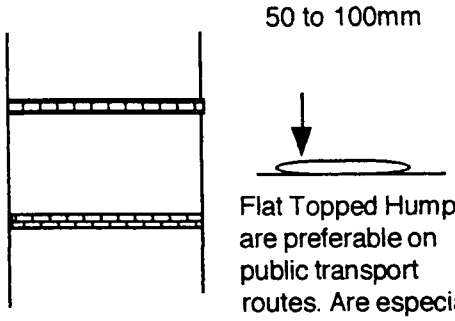
These streets may have been designed to maximise speeds but it has not meant that people will travel at the prescribed levels. City planners and engineers have therefore come up with measures of slowing traffic down often referred to as 'traffic calming'

59 Ibid.,p.37
60 Hamshire County Council, p.16,17

features. The following are a sample of some of these:

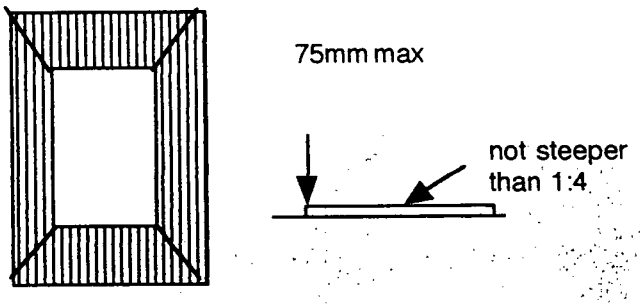


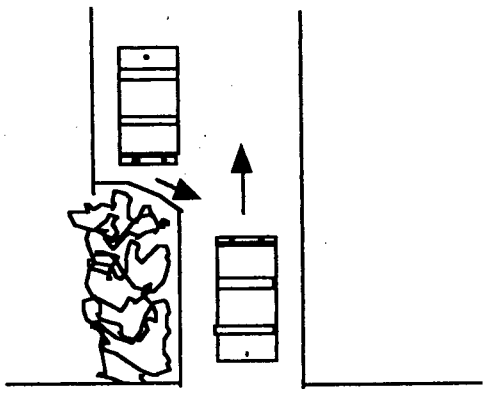
Mini roundabouts are used at arterial access points to slow traffic by using a sharp turn.



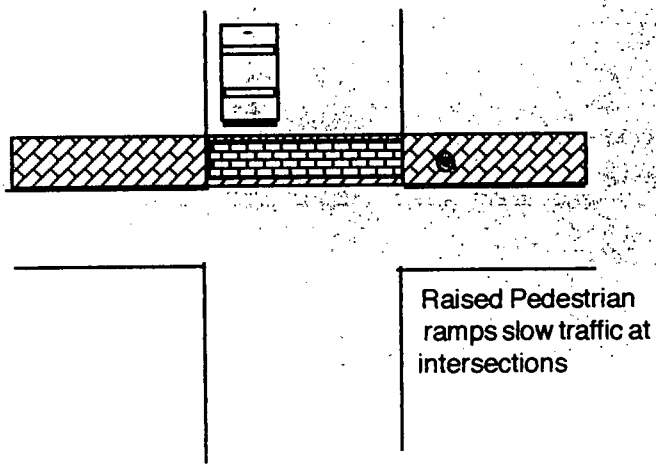
Flat Topped Humps are preferable on public transport routes. Are especially good on residential streets

The Speed Cushion allows emergency and bus transport to get by but slows down other traffic.

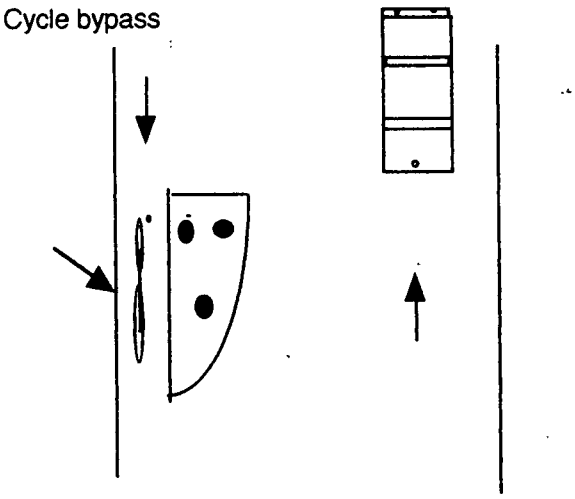




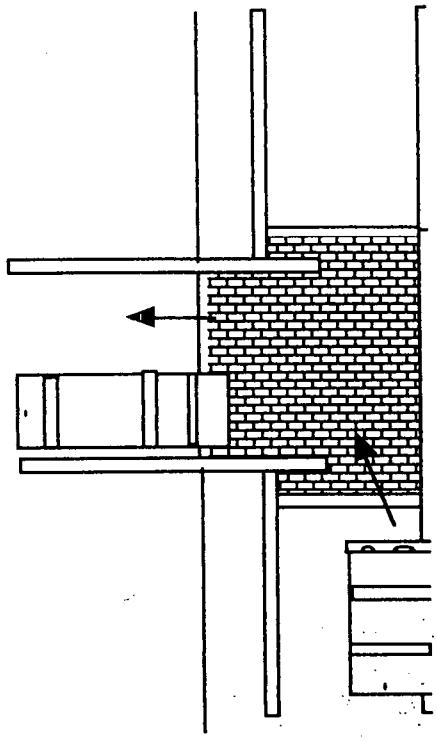
'Pinch Points' are used at a junction as an alternative to road humps.



Raised Pedestrian ramps slow traffic at intersections



Build out used within calmed areas particularly where there is a highlevel of on street parking



Junction tables slow down intersections and crossroads [61].

Street layout, as previously discussed, is about traffic flow; but it should also be considered as providing convenient access to residential and commercial areas. Alan Jacobs notes "Streets with one entry for every 300'(90 meters) are easy to find."[62] Another aspect which is related to this is that by having more streets there is more likelihood for a greater diversity of block size. Jane Jacobs states "blocks must be short; that is , streets and opportunities to turn corners must be frequent."[63] She argues shorter blocks give people more choice on various routes to use to get to their destination. Longer blocks on the other hand provide fewer access streets to choose from and make trips longer. The three diagrams support her theory.

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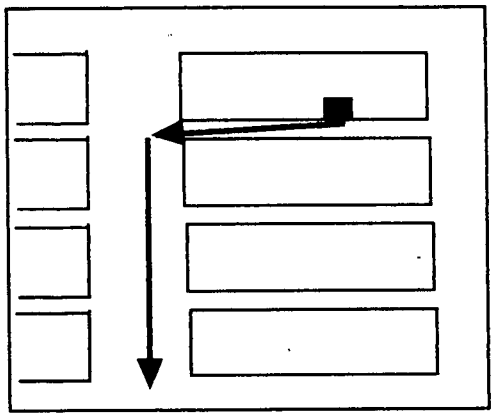
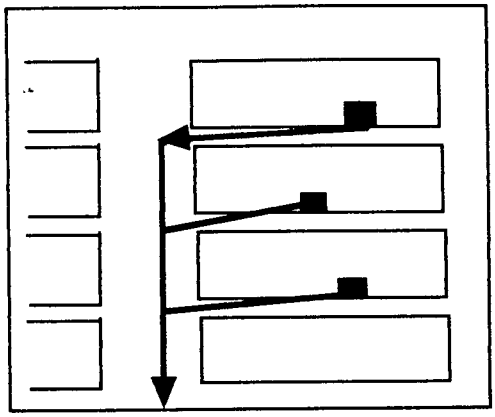
61 Ibid., p.52-60

62 Allan Jacobs, p. 302

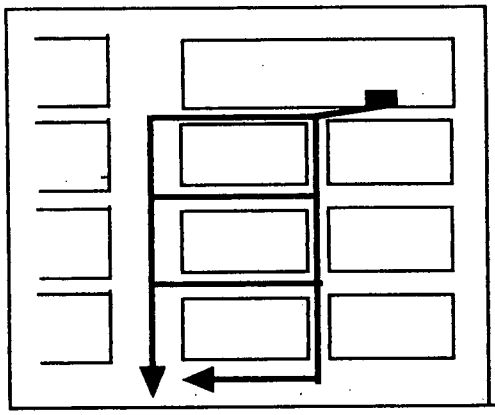
63 Jane Jacobs, p. 178.



One choice/Long route

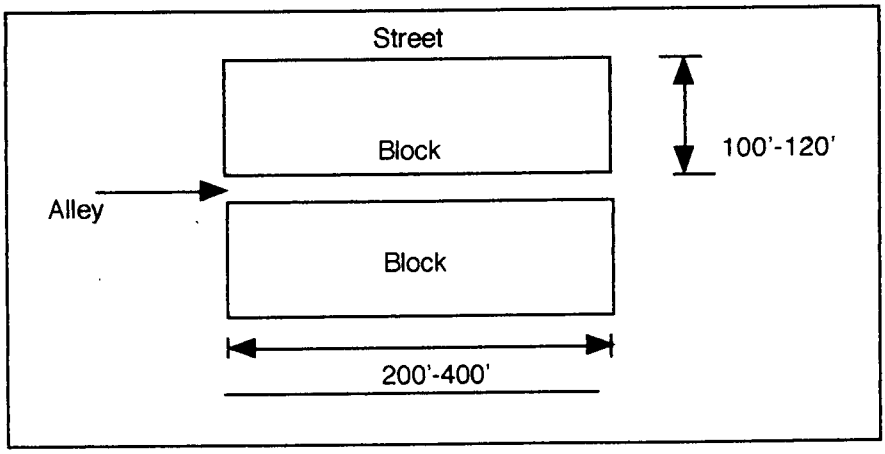


One Choice/ Long Route



Multiple choices/Shorter routes [64]

Anton Neeson recommends block sizes to be from 220' to a maximum of 400' with a depth of 100' to 120' with an alley dividing the block to allow for ease of access to the back side of properties. The most common traditional block is 220' X220 from right of way to right of way line.[65]



[64] Ibid.,p.179,181

[65] Anton Neesen,p. 196

Frequent streets therefore mean more access to a wider diversity of land parcel sizes which in turn offer more diversity at a social level as well. Therefore street accessibility and mobility are linked to the community on both pragmatic and social levels. Jacobs sums it up by saying "frequent streets are effective helping to generate diversity only becase of the way they perform. The means by which they work (attracting mixtures of users along them) and the results they can help accomplish (the growth of diversity are inextricably related. The relationship is reciprocal."[66]

3.5.3.B. Alleys

Alleys are located in the centre of the block and are largely to access properties from the rear, and, as a service entrance for utilities, rubbish pickup, and emergency vehicles. In addition, alley ways increase the number of routes people can take to a given destination.

3.5.3.C. Sidewalks

Sidewalks are about moving people from one place to another. They are about leisure,ease of mobility, ease of accessiability, and comfort. Sidewalks must then be wide enough to accomodate the user. Questions should also be raised as to the purpose of the sidewalk . Is it to be for a commercial area where pedestrain traffic will be heavy, or a residential area where traffic will be light? Is it about rubbing shoulders with your neighbours or with your community.

Table 1 [67] gives the average speeds of pedestrians.

	A	B	C	D
1	Type	mm/min	ft/min	km/hr
2				
3	Averg Adult	78 000	260	4.3
4				
5	Elderly	64 500	215	4
6				
7	Bunching	60 000	200	3.7
8				
9	Up stairs	45 600	152	2.8
10				
11	Down Stairs	33 900	113	2

[66] Jane Jacobs,p.186

[67] Charles W. Harris, Nicholas T. Dines, 'Time Saver Standards',New York,1998,p.340-2

	A	B
1	# of People	Sidewalk Wic
2		
3	1	3'
4		
5	2	5'6"
6		
7	3	7'6"
8		
9	4	9'6"
10		
11	5	11'6"

Table 2[68] gives the Density Maximum according to the Width

	A	B
1	Sidwalk Typ	Dimensions
2		
3	Residential	1.56m
4		
5	Main (Comm)	2.5m min.
6		
7	Shared w Bike	2-3m
8		
9	Occ Emer Use	3m
10		
11	Entr to Schools	3m
12		
13	Headroom	2.6m min
14		
15	H for >= 23m	2.3m min
16		
17	Junct-Sight li	2m X2m

Table 3[69] gives Average Sidewalk Dimensions

Table 1 outlines the distance travelled by various types of pedestrians and gives the average of pedestrian speeds if there are more that two people on a walkway. Table 2 shows the various widths of sidewalks that are needed to accomodate a number of

68 Anton Neesen,p.161

69 Hampshire County Council,p.37

people. Allan Jacobs notes if the number of 17 people per minute per meter width is exceeded then people feel a sense of being crowded and leisurely walking is next to impossible; seven to nine people per minute per meter width is the more recommended figure allowing for people to walk at different paces and not feel crushed; 3 to 4 people, walkways feel that they are never crowded; and at 2 people they seem empty.[70] Table 3 are the reocommeded standards for sidewalks and pathways. What should be taken into consideration is the number of people expected on any given sidewalk and factor this into the equation comfort + mobility= width.

3.5.3 D.Bicycle Ways

One of the best means of travel for short trips to the store, office, recreational facilities, is by bicycle. It does not consume fuel, is healthy, and access is made easy as finding parking is not a problem. Yet it is often overlooked in community planning as an alternative to the automobile.

Table 4[71] outlines average requirement for bicycles.

	A	B
1	Type	Dimensions
2		
3	Flow>200perh	2mwide
4		
5	Peak fl/segr	3m(1.5Ped,1.5
6		
7	Headroom	2.6m min.
8		
9	Gradients	>3%
10		max 5%-100m
11		7% up to 30m
12		
13	Dism Barr	1.2m dist
14		
15	Exit-Road	90 degr
16		
17	Sightline-Jun	20m X 20m

[70] Allan Jacobs, p.273

[71] Hampton County Council,p 39

3.5.3.E Greenways

Greenways are a "comprehensive sytem for both pedestrian and cyclist linking housing, industry, commercial, and areas of play and recreation."[72] They are as it were 'green streets'. Greenways should have pathways 2.5m wide(dependent on site-curves require more space) to accomodate bikers and pedestrians alike, but, have a even amount of rough grass on either side (.25m) so as to accomodate emergency vehicles. Safety barriers should be in place at street intersections for safety.

3.6.1 Ownership

There are three realms of ownership of the streetscape: public, semi-public, and private . Each of these appropriate certain uses and perceptions of the street, sidewalk, lot, building, and alley.

The street, its sidewalks, and boulevards, and all that is found within the standard right of way designation (usually 20m) is considered to be public, open to and shared by all .[73] The public street is where people may park their cars, walk their dog, and 'rub shoulders' with friends and strangers alike.

The front yard is considered as semi-public, a transition zone between the public street and private home. Technically ownership lies with the owner of the building. But there is the perception of shared space. People sit on front porches call out to passersby or to neighbours next door. There is not a sense of complete privacy nor is there the sense that it is completely public..

Another area of semi-public space is the alleyway. Its space is perhaps more semi-private than public. It is where residents' cars are parked, peolple live in apartments

72 Ibid.,p.40

73 Oxford Dictionary, p.724

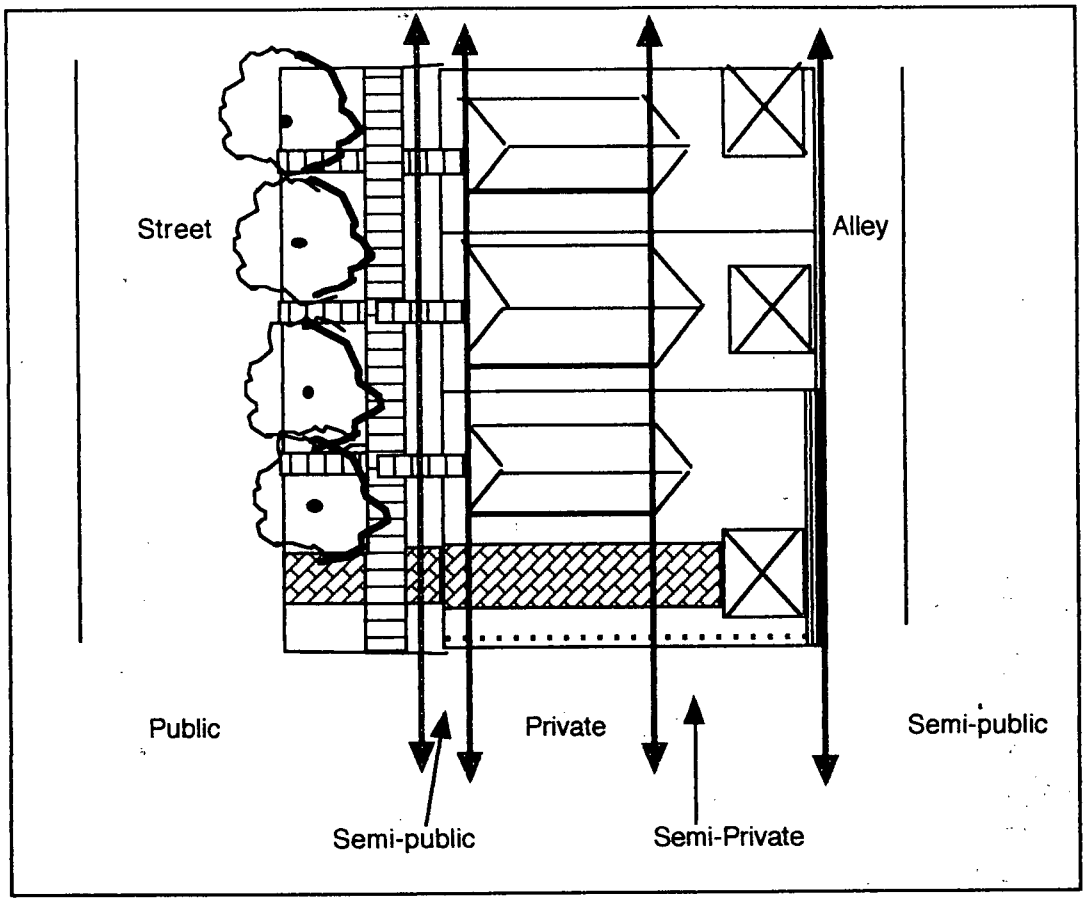
over the garages, rubbish is picked up. Becuase of its more enclosed nature (alleys tend to be 6m in width) and the fact that backyards (which can be considered as semi-private) back onto the alley, there is the perception that this space belongs more to the immediate neighbourhood and not to the public at large.

The home is something different. It is not a house with just four walls and a roof instead it is a space that has been personalised through ritual, myth, and narrative.[74] This is the private realm.

On another level the home works to promote ownership of the street.
People use the home to peer out at the world, onto the street. People's view onto the street acts as a system of 'public surveillance'[75] and in this sense a type of ownership of the street. The home directs eyes onto the street. The closer the viewer is to the street, the clearer and sharper the image of what goes on is . The further away the home is to the street, the less clear the picture of the street becomes.

Semi-private space is the space which is more personalized but is shared either by neighbours looking into a back yard from above (windows) or across (fences and alleysways. The backyard is considered as semi-private.The diagram35 on the next page shows how the three public realms culiminate in making up the streetscape.

[74] Charles Foster,p.2
[75] Jane Jacobs, p.7



3.7.1 Vocabulary

The vocabulary of a streetscape refers to the language of the street. It is what the street conveys to the viewer and user. It is available parking space, lot size, home and garage placement, street plantings and street furniture. Andres Duany says streetecape design is a "search for a unified taxonomy of design language."[76] These features such as lot size or on street parking characterize the street and have the ability to make or destroy a streetscape. Allan Jacobs definition of 'Great Streets' are "those that are markedly superior in character and quality."[77] Jane Jacobs says " Think of a city and what comes to mind. Its street. If a city's streets look interesting the

[76] Andres Duany,'A Common Language of Urban Design,' Places, 11:3,Winter,v.11,p.76

[77] Ibid.,p.3

city looks intersting, if they look dull, the city looks dull."[78] The following elements exemplify key features in the language of a streetscape.

3.7.1.A. Parking

The placement of parking on a street gives the perception that the street is lived on and in. It allows for accessibility to a home, shop, or office. The removal of parking makes the street seem empty and has the effect of speeding up traffic. It was found that drivers proceed much more cautiously if there is parking on the street. Parallel parking buffers the pedstrian on the sidewalk.[79] The removal of residential parking,driveways, and garages from the front of lots makes for a tighter more cohesive primary facade. Lot size inadvertently can be smaller so that greater housing density can occur. Smaller lot sizes reduce house costs so that housing is more affordable to a wider range of incomes and promotes a diversity of people (young,middle, and elderly) in the neighbourhood. Placement of parking at the rear of the property has the effect of increasing activity on the alleyway.

There are a variety of ways to deal with commercial parking. Large vast lots are common, as are parking garages and underground parking both of which remove parking entirely from the street. This is not a bad thing as it allows for buildings to be built close to the street and more accessible to shoppers. Angled parking is also used. It according to Philip Langdon, enables " a larger number of people to park in front of stores they want to visit, an increased buffer zone between pedestrians and cars,and more pleasing proportions to streets that may have become overly broad to begin with."[80] The following table highlights some planning standards for parking.

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[78] Ibid.,p29

[79] Anton Neesen,p.189

[80] Philip Langdon,'A Better Place to Live,'University Of Massachusetts Press,1994,p.222

	A	B
1	Types	Dimensions
2		
3	1-2DwU per lo	1-2sp pU
4		
5	ll pking bays	6m X2m
6		
7	Min aisle width	6m
8		
9	Min gar size	6m X 3m
10		
11	1 bike rack	every 20 cars
12		
13	1 motorcyc sp	every 25 cars

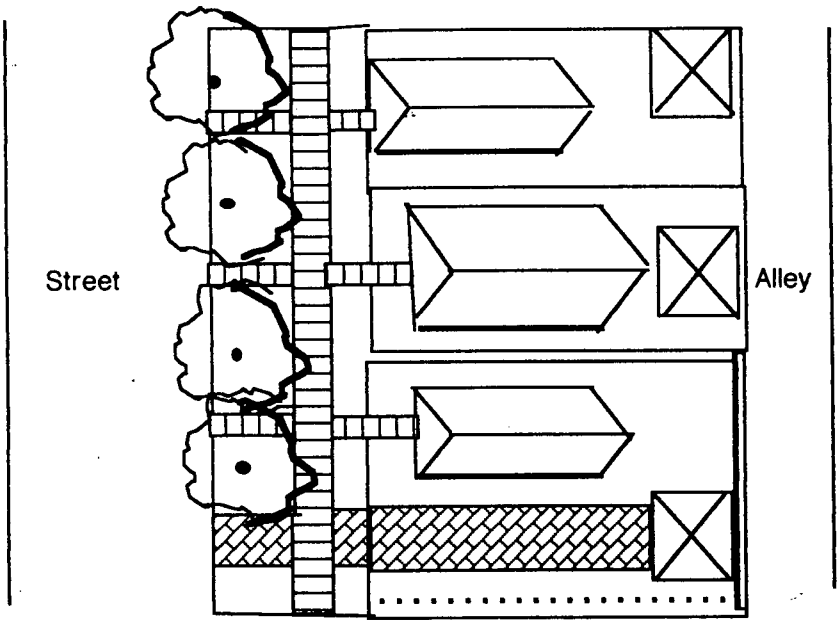
[81]

3.7.1.B Lot Size and Building Foot prints

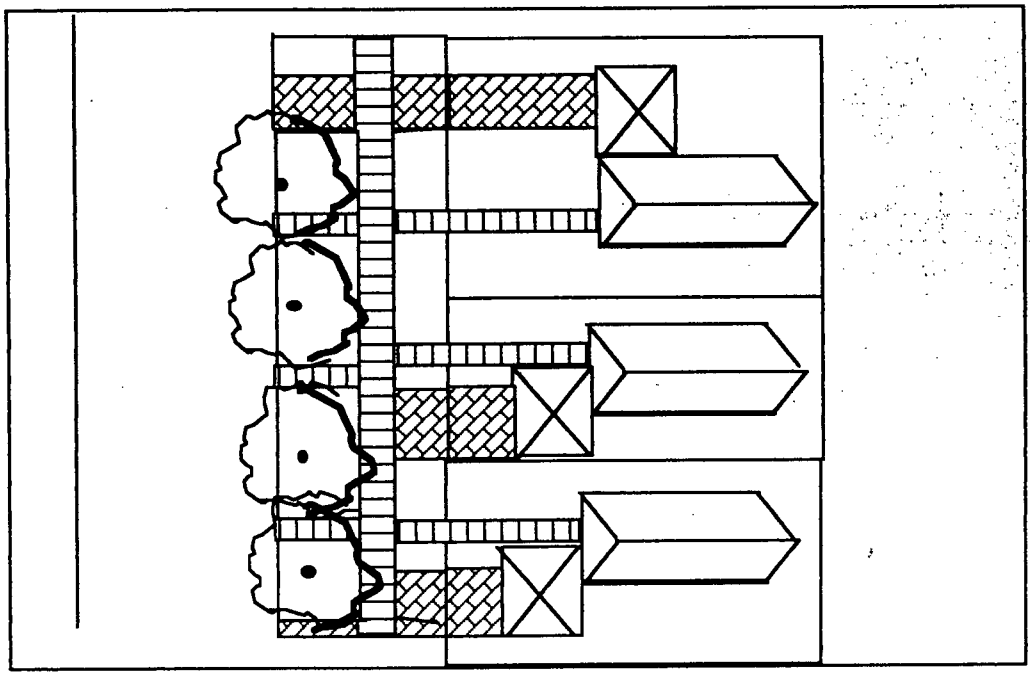
Lot sizes cangreatly influence how a street feels. The larger the lot the more open a space feels.The more narrow the lot, the more compact a street feels. A diversity of lot sizes leads often, as has been mentioned, to a more diverse use.

Footprints of buildings (eg.houses, garages, shops) are dependent on lot size and the desire for open space. By placing houses to the front to the lot the street takes on a close more neighbourly feel. The raising of the first floor of the house so that steps are required to access the front entrance gives the first floor and entrance a more private feel as opposed to being at ground level where people can look right into your living room while walking by. By putting the house back from the street the house becomes more private. Fewer steps are required to 'privatise the front entrance and first floor. The following diagrams illustrate variations of lot size and building footprints.

81 Hampshire County Council,p.68.69



Garages are at the back with access from either street or back alley.
Varied lot sizes, house footprints and placement.
As opposed to driveways and garges on the street side (below)



3.7.1.C Housing Density

Although strictly not design vocabularly it can characterise streets and alleys. More dwelling units per lot gives a sense of closeness to both the street and alley 39 ways.Traditional neighbourhoods are less dense although they may have one,two, or

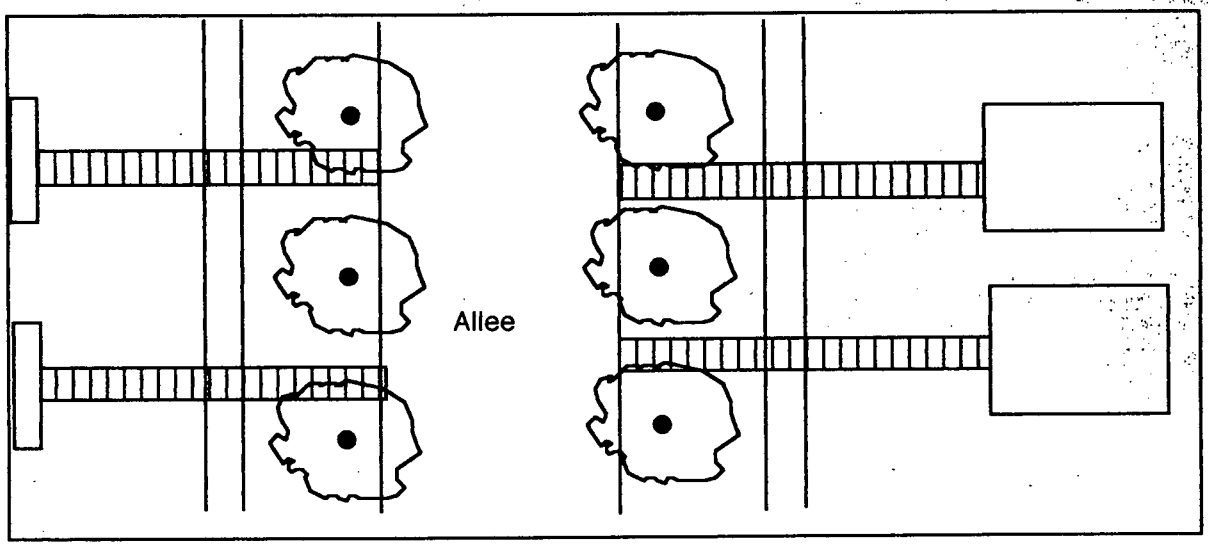
three dwelling units per lot. The house provides living quarters for the owners and possibly tenants . Another dwelling unit may be found over the carriage house and is either rented or an office. The diagram below illustrates how a traditional lot(s) can be orientated.

Allan Jacobs sums up density and how it can affect the character of the neighbourhood stating "density means there are alot of people around. It means that public transit can be supported,it means that small stores within walking distance are likley to survive, and schools are close and community on the whole has a chance at community."[82]

82 Allan Jacobs,p.19

3.7.1.D. Street Planting

Trees and shrub plantings give definition and comfort to a streetscape. Trees help to frame a street, low hedges bordering the sidewalk act to define public space and private spaces. Trees and or shrub plantings can work together to screen parked cars or unsightly rubbish bins.Decidous trees provide shade for hot sun in summer while in winter allow sunlight to penetrate through to the streetscape. Trees and shrubs can reduce wind 25% to 40% in an open field area.People seek out sunny or shady places to sit.[83] Recommended street tree planting intervals are at 5.6m to 9.3m. The closer trees are planted the more dense a street appears to be. Lined on both sides can create an allee effect. Planted in square groups of 4,6,8 or more gives an appearance of a bosque. The example below features an 'allee effect.'



3.7.1.E Street Furniture

Street furniture "compliments the function and form of the street"[84] It can range from street seating,drinking fountains, lights, rubbish bins, and planters. Their placement should enahance convienence and comfort and use of the street in particular the social aspects of street use and street life.

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[83] Ibid.,p.276.

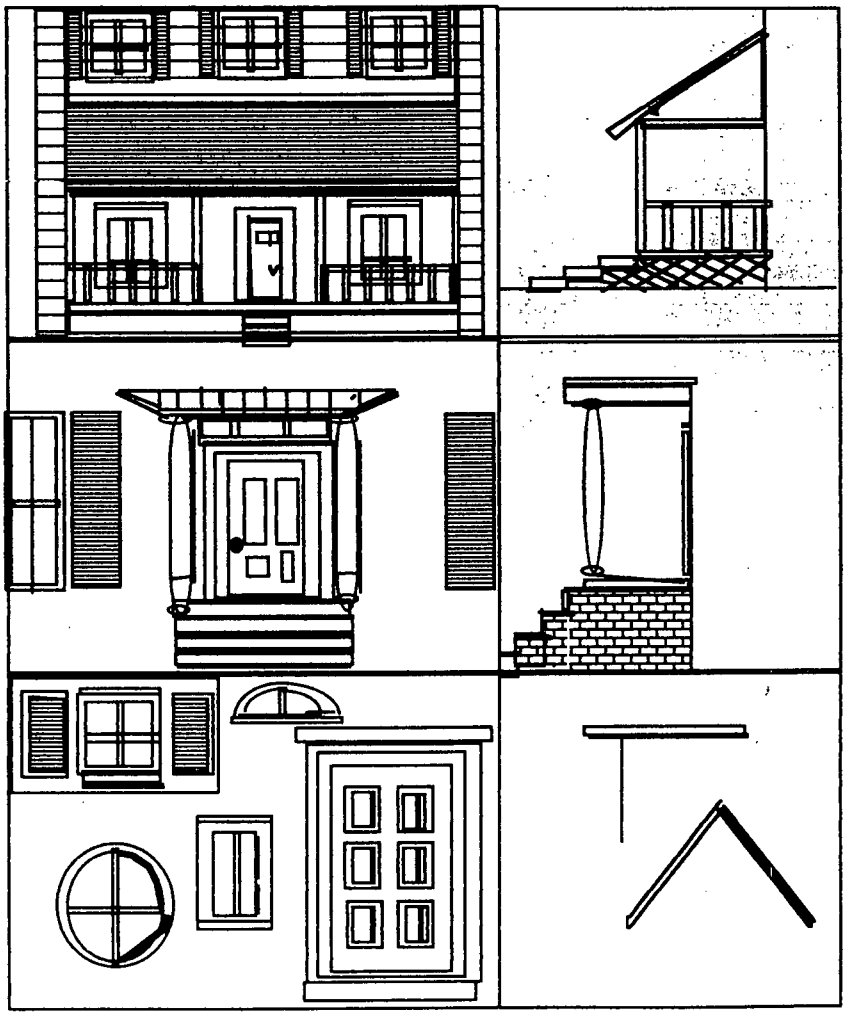
[84] Anton Neesen, p.205

3.7.1. F Buildlings, Walls and Fences

Building facades should work to compliment surrounding neighbourhoods' character. Materials and their patterns on the outside of buildings is important. Below are some sample types how that patterning can take shape.

Buildings' windows, roofs,,entrances,eaves, and trim types can all take different forms and also give the house,neighbourhood, and community a different feel and therefore a differnent experience. Below are some type samples of the more important design features to consider.

Entrances ,Windows and Roof Lines



Walls and fences define a lots border. Depending on the height, the space they divide or enclose, can be semi-public as in the case of the front yard or semi- private such as in the back yard. Fence or wall height in the front yard should be no more than 1m to 1.5m in height.

3.7.1.G Curbing and boulevards

Although strictly not design voacabulary in the true sense of the term, curbing and boulevards do nevertheless set a certain standard and utlimately character.Curbing should only be used where traffic is heavy and in areas that there is alot of erosion such as reasonably steep road banks. Otherwise curbing should be avoided, to allow water draining from the street to runoff into boulevards and percolate naturally. In traditional towns, prior to the post war period, curbing was little used.

Boulevards act as buffers to the street and provide areas for water to naturally percolate, and for trees to be planted. They also serve to give a sense of 'greeness', helping reduce the pavements' breadth. They can vary in size but should be a minimum of 1.5m.

3.7.2 Summary

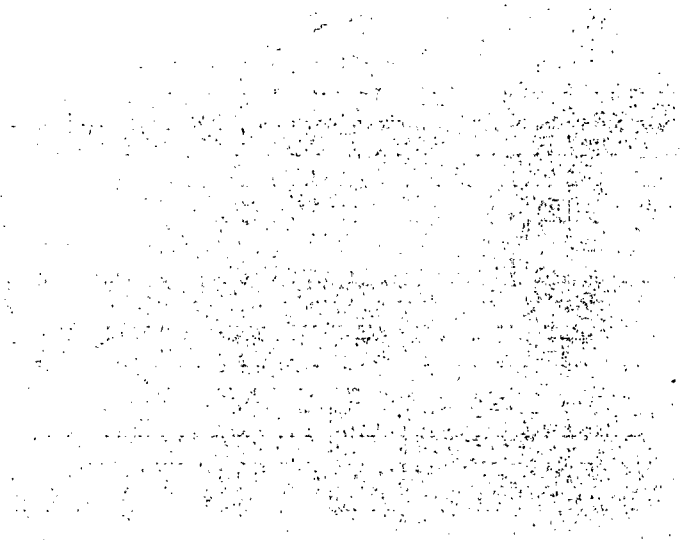
A streetscape is both a combination and the cumulative effects of form ,scale, network, spatial complexities,accessibility,ownership, and vocabulary. If good streetscape design is to be accomplished then careful consideration of each of the factors listed above must be studied and analysed. The key, though, is in the recgnition that each of the factors does not work independently of the other but must be considered as a part of the whole (For example, parking is dependent on street width which in turn is dependent on capacity and or social pressures).

3.8 Summary and Conclusions of Literature Review

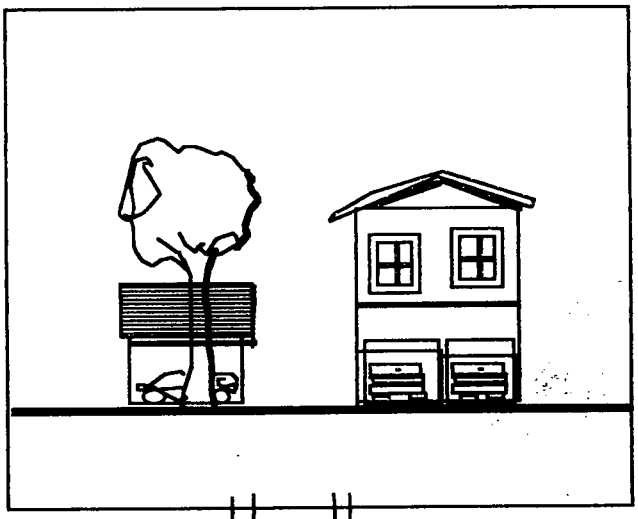
Reviewing the literature five streetscape types emerge that are relevant to understanding the New Urbanist development model. These are: 1) the alley; 2) the narrow residential one-way street, with parking on one side;3) the narrow two-way residential street with parking on one side; 4)the narrow two-way residential street with parking on both sides; and 5) the Main street which is commercial/mixed use with parking on two sides. The five types offer a richness towards building a good neighbourhood. Building setbacks are closer to the street and sidewalk making the front yard less private and more public. Houses are more dense allowing for more opportunity for your neighbour to chat over the fence or from the sidewalk to the porch. The house face is closer to the street giving more eyes to watch and protect those on the sidewalk and neighbourhood. Street parking acts as a buffer between the pedestrian and road. The narrowness helps to slow traffic yet still accommodate it. The smaller front yard allows for more house or back yard space. The alley is a place to park you car, put out the garbage, a place to walk,and for children to play street hockey or basketball. These features all work towards establishing a good streetscape that is more orientated to good community living.

The application of these streetscapes to Fredericton would be a continuation of many of the streetscape features found in the traditional residential and commercial areas. Many of the houses are built close to the sidewalk making for small front yards. Streets allow for a variety of parking such as parking on one side or on both sides. One notable difference though, would be a reduction of asphalt given the five new types are less wide. Although there are no alleys many of the old houses have the carriage houses to the rear of the house. A variety of house types, lot sizes, and land uses (corner stores, with residential over the top) provide a rich mixture of what it is to make both a neighbourhood and a community in Fredericton.

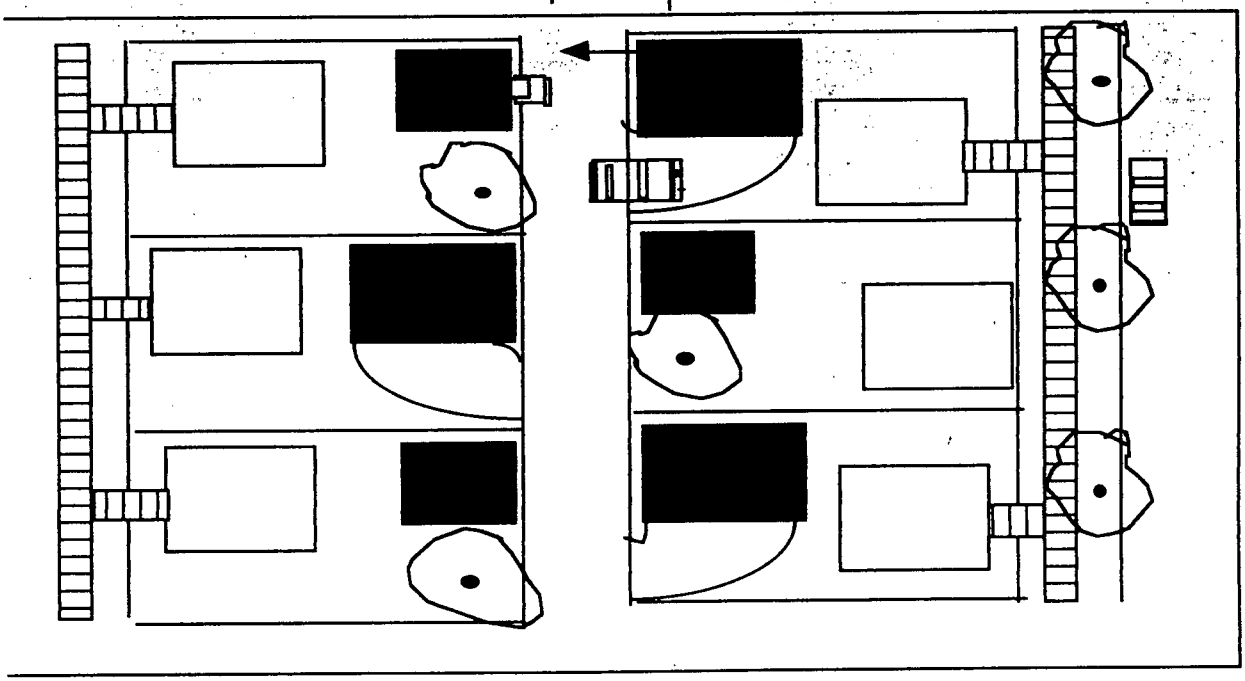
The following is a brief description, a table of recommended design features including dimensions of each and a diagram showing both a plan view and cross section. Lot size is on average 10.0m(w) X 31.2m (l). Building footprints, lot , boulevard, and front yard size dimensioning are again different type examples of size and placement and not necessarily site specific.All water,sewer, gas lines, are along the alley.



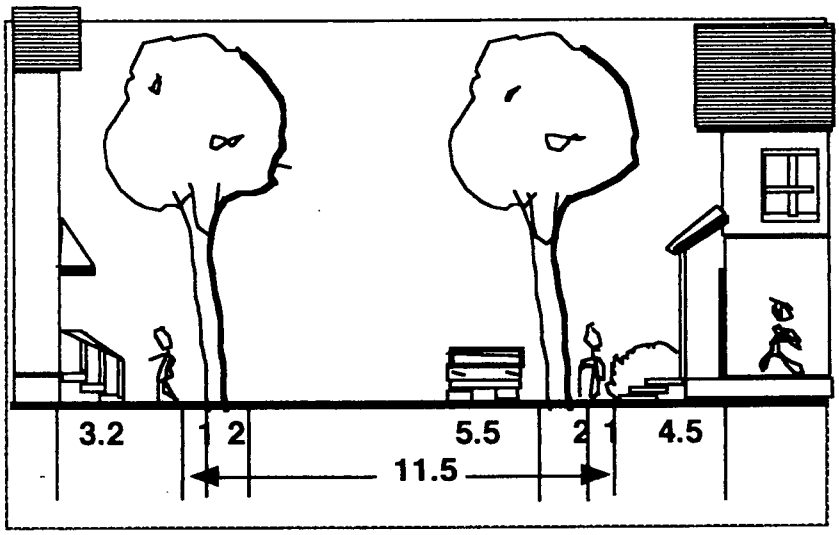
Type 1 Alley can be considered the spine of the block. It provides rear access parking. Garage space for a car and may or may not have additional dwelling unit over the garage. It is where utilities are run and garbage picked. Acts to give an opportunity for a more positive inter-knit streetscape-face.



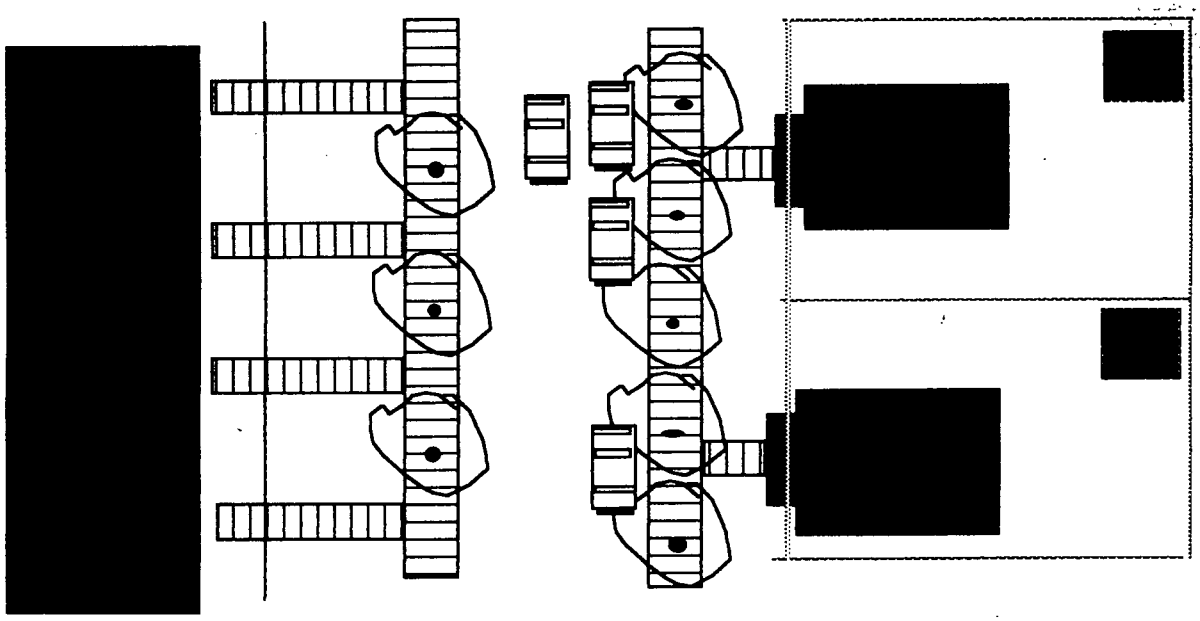
	A
1	Dimensions
2	6.25m wide
3	1m build to line
4	20kmph max
5	
6	Garage
7	1-2 storeys
8	1-2 car sp
9	1 resid/umit
10	or 1 office



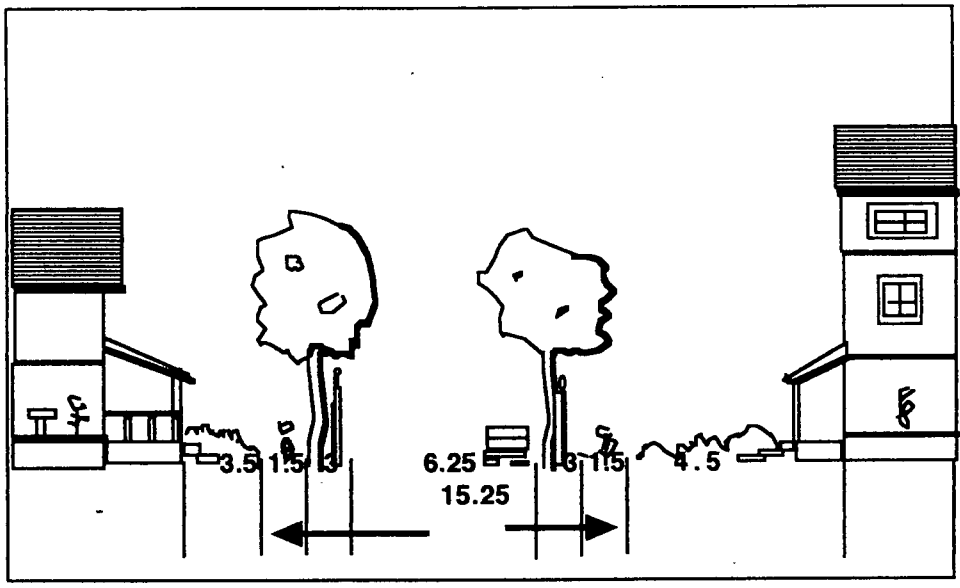
Type 2 Narrow Residential One way Street with parking on one-side. The street has the capacity of a small number of car tips, parking is parallel, and each unit has access via the alley.



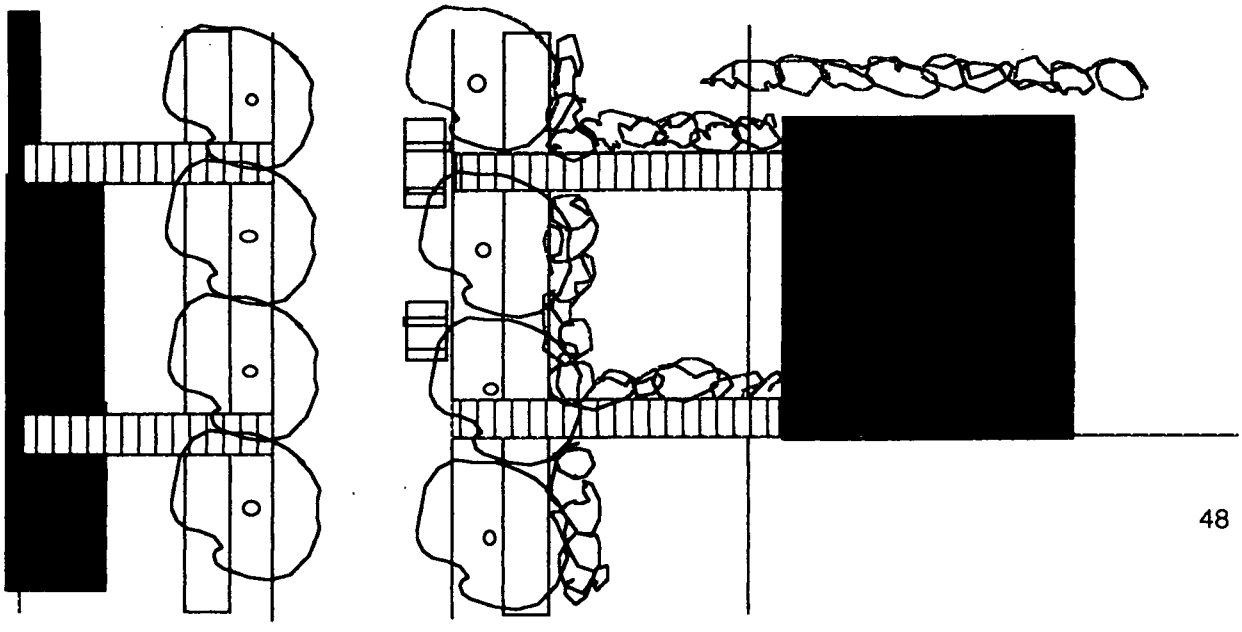
	A
1	Dimensions
2	11.8mROW
3	3.1 to 4.6m-
4	build to line
5	20-25kmph
6	
7	House types
8	2-2.5 storeys
9	FF1-1.5 above
10	sidewalk
11	single family
12	duplex
13	townhouses
14	multifam. with
15	undergr. pking



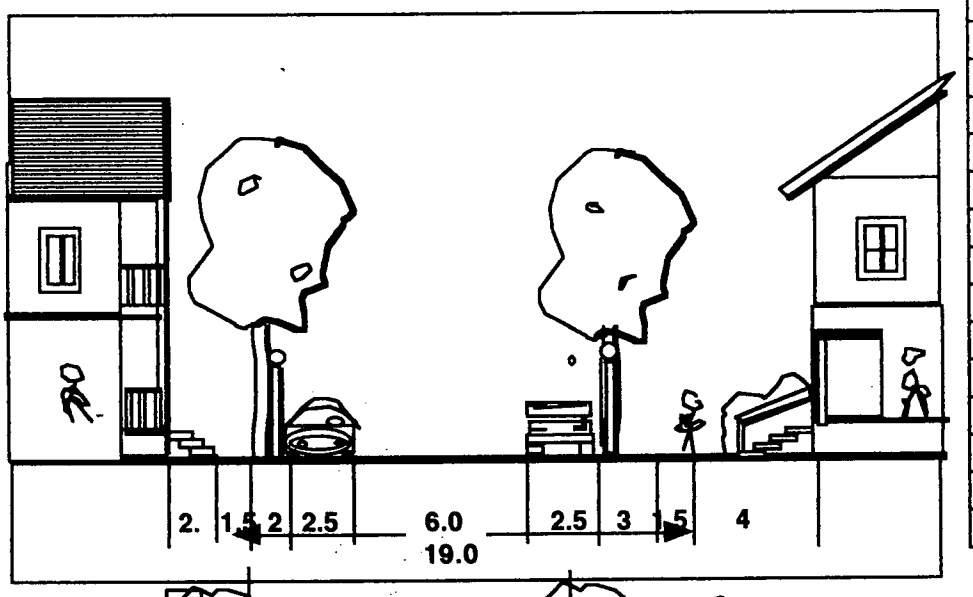
Type 3 Narrow Two-Way Residential Street with parking on one side. The street has the capacity for a small number of car trips,parallel parking on one side,and alley access.Because of the wider street Bicycle riding is 'safe and easy.'



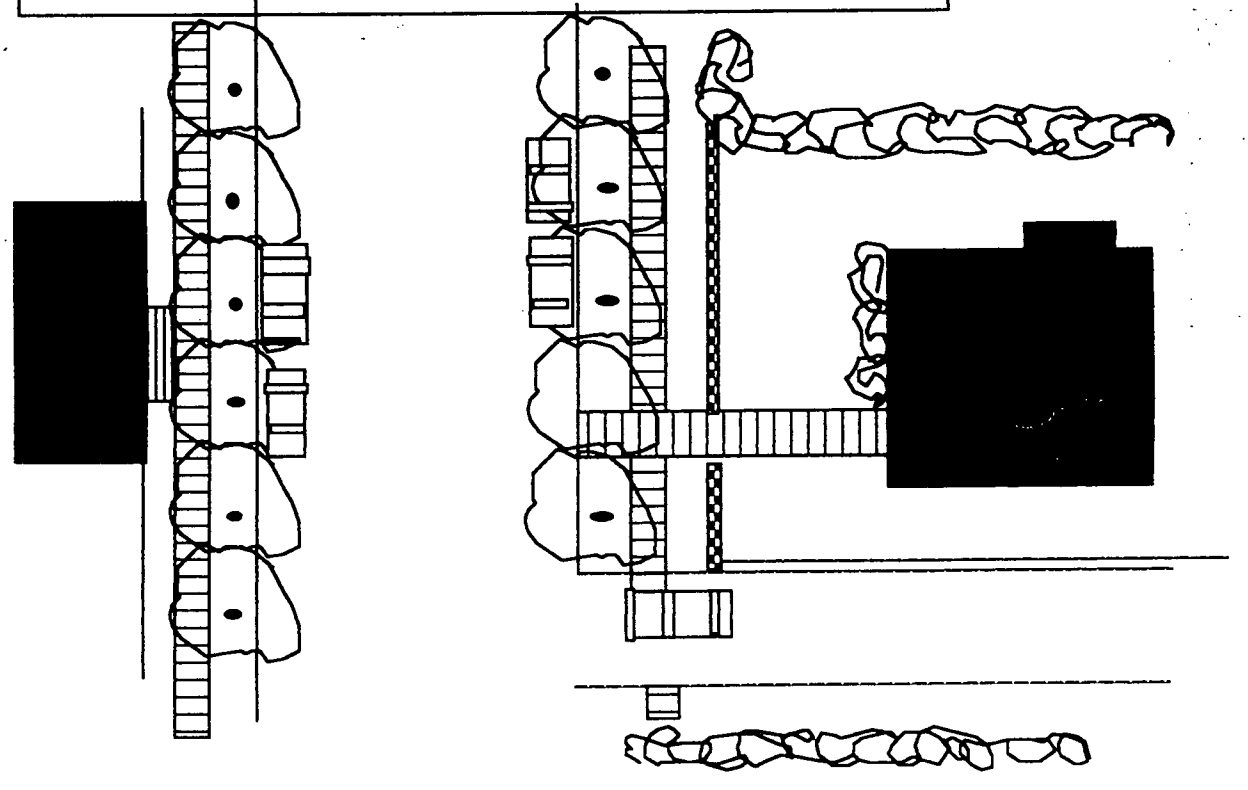
	A
1	Dimensions
2	15.6mROW
3	3.1-4.6mbd-lin
4	20-25kmph
5	Pavement 6.25
6	to 8.4m
7	
8	Buildings
9	2-3 storeys
10	FF 1-1.5 agr
11	duples
12	tonwhouses
13	multifam
14	with undergr pk
15	lg setbacks



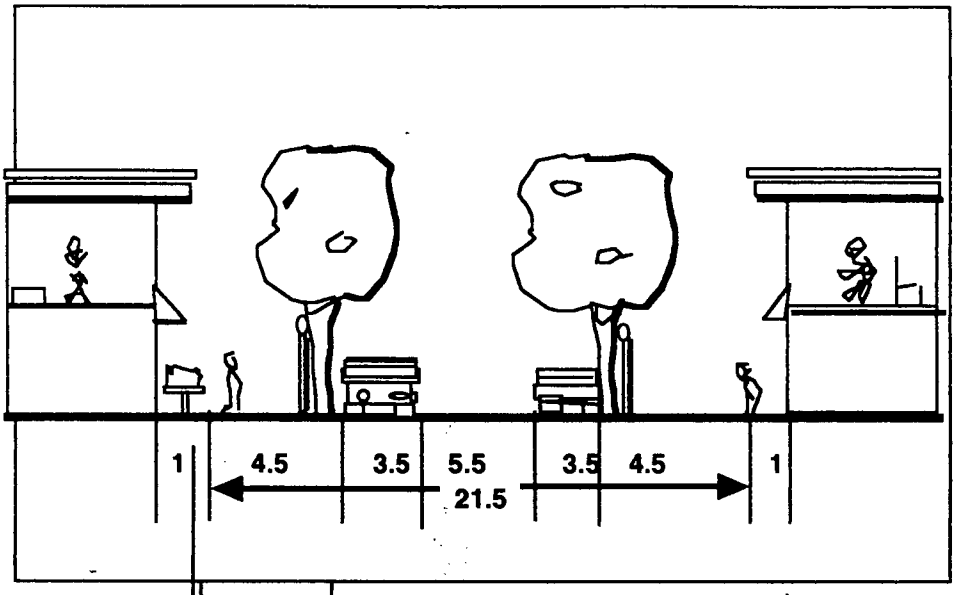
Type 4 The two way residential street withparking on both sides.. Will be able hold a moderate number of cars,parallel parking on both sides of the street,access is from the rear. Bicycle riding is more difficult due to the increased traffic.



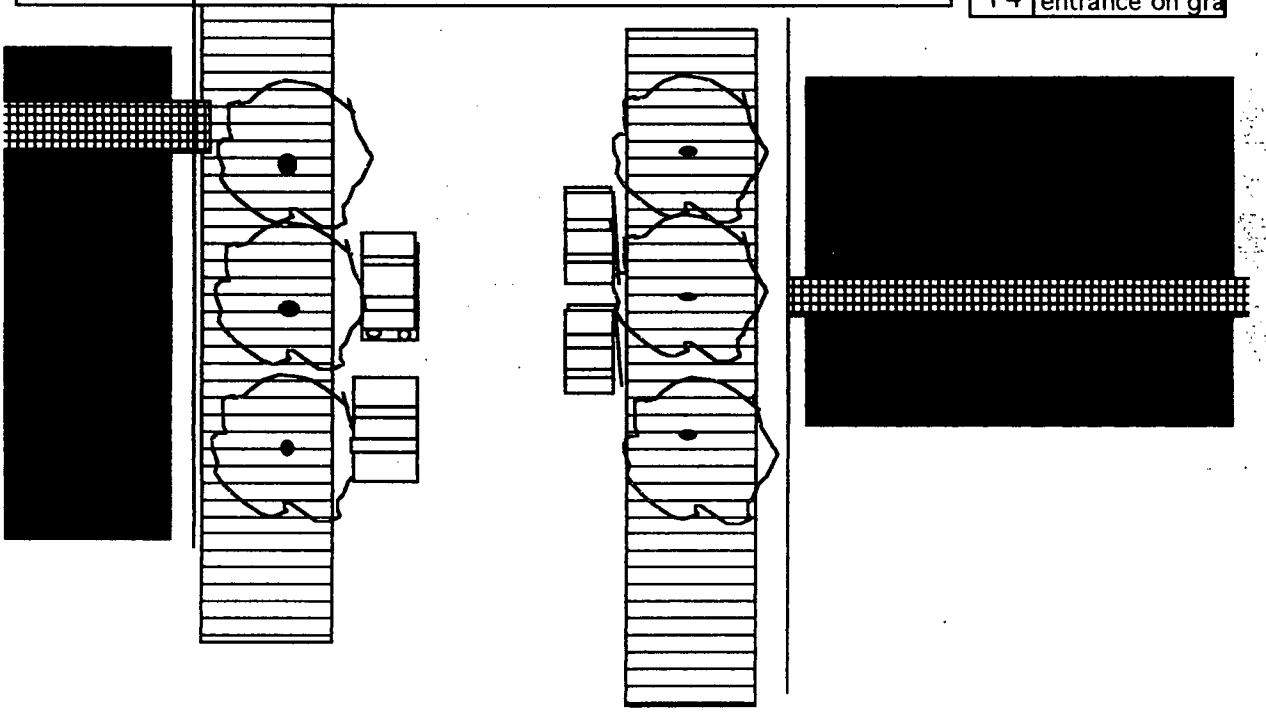
	A
1	Dimensions
2	18.75m
3	4.5m bldg to li
4	35-40kmph
5	9.35-11.25m
6	of pavement
7	
8	Buildings
9	2-3 storeys
10	FF 1m-1.5 agr
11	duplex
12	townhouses
13	Multifam
14	Home Offices



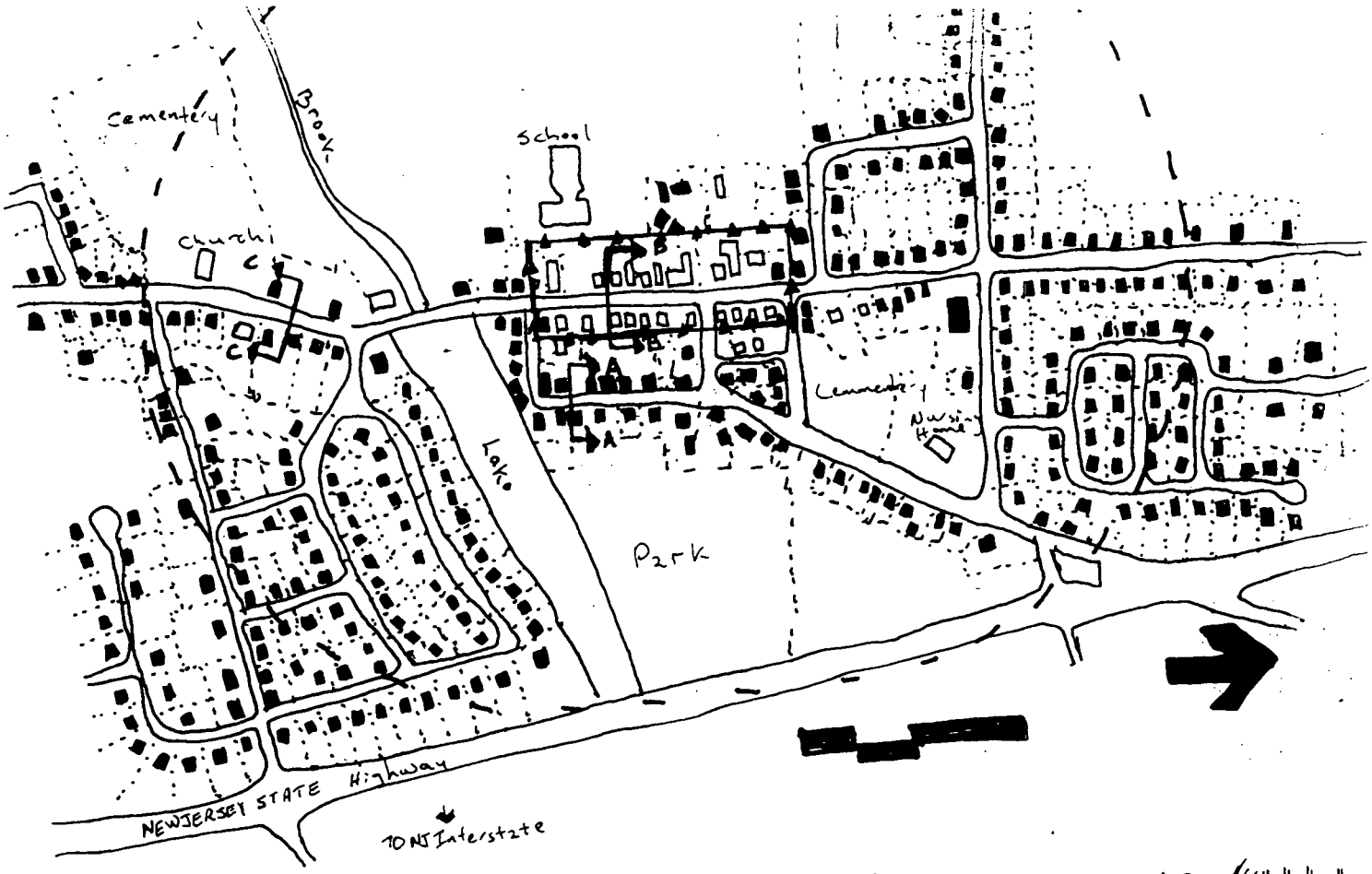
Type 5 Main street-the commercial/mixed use street with parallel parking on two sides . Street is able to hold a moderate number of car trips, parallel and underground parking. Small pathways exist between buildings that lead to alleyways.



	A
1	Dimensions
2	20mROW
3	0-1.2mbdlg -li
4	9.35-11.25m
5	of pavement
6	15m sidew min
7	Building
8	2-3storeys
9	commercial
10	on ground
11	floor
12	residential on
13	upper two floo
14	entrance on gra



PRECEDENT STUDY I
TRADITIONAL COMMUNITIES -CRANBURY NEW JERSEY



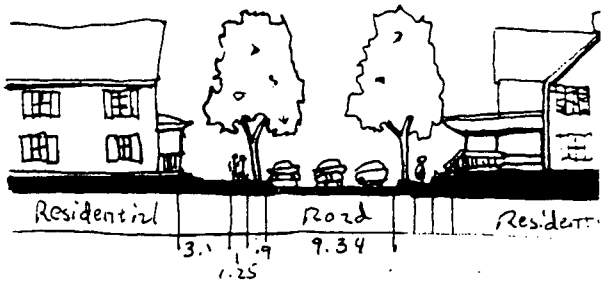
LEGEND

RESIDENTIAL
COMMERCIAL/PUBLIC
MIXED USE
STUDY AREA

1500 FT. from the core

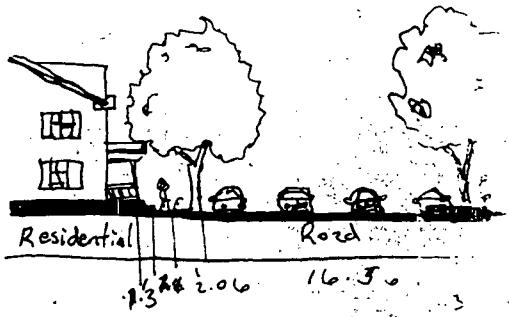
STREET SECTION

Section A-A



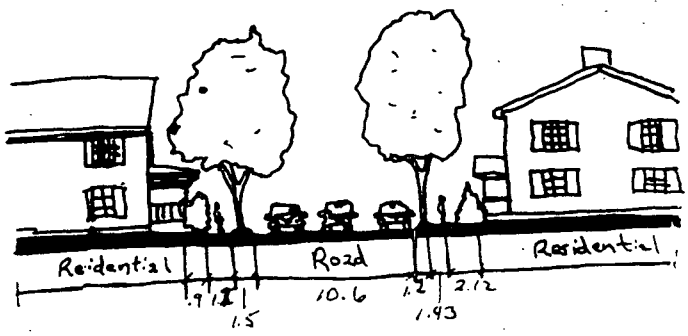
Section A-A'

Section B-B



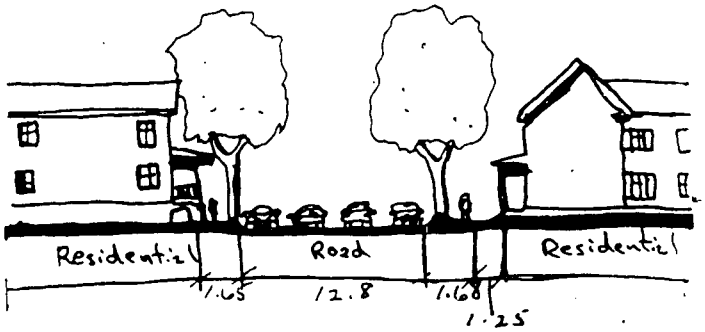
Section B-B'

Section C-C



Section C-C'

Section D-D



Section D-D'

3.9 Precedent Studies

Five precedent studies were chosen to show why a New Urbanist type of development is a viable alternative to other existing patterns. Each study is representative of a community or neighbourhood's streetscape with emphasis on one or a combination of a social,economic, and ecological aspect (s). A short introduction , a table of 'Lessons Learned' and a summary is included with each.

The comparison rating for the tables is based upon what is streetscape, as defined on the opening two pages of this thesis. Ratings are low (poor) , medium (average), and high (good). A fuller more detailed analysis of each study is found in the Appendices 1 through 5.

3.9.1 Precedent Study 1- Social and Economic

The majority of the state of New Jersey's traditional settlement patterns are found in its hamlets, villages, and towns.[1] Each share spatial characteristics that give them a sense of place, and differences that give them a sense of their own identity. Despite urban growth pressures such as new suburban developments, advanced technology, or the even the coming of the automobile, the traditional village core has adapted and been able to maintain a viable community core without sacrificing its original ideals.

The city Cranberry, New Jersey is typical of the traditional development pattern. Residential areas are a five minute walk to commercial and recreational facilities. Streets offer curbside parking, variable street widths, boulevards, and public sidewalks. Front porches signify the development of semi-public space. House types are varied.The streetscape as well is not over designed yet has a neighbourly feel. The particular attention paid to varied streetscapes and their spatial layout in the study allows one insight into what makes a particular street feel the way it does. The addition of parking on one or both sides of the street, the width of the street ,boulevard,

[1] Anton Clarence Nelessen,Visions for a New American Dream, Planners Press, Chicago, 1994,p. 48 53

and setbacks (front and side of house) and if it is tree lined change the way one interprets the street. Coupled with the house type whether it has two or three stories, has a front porch, a slanted roof line, has shutters that match the window size gives that street and ultimately that neighbourhood a definitive identity and sense of place.

Table 1 indicates 4 street types of the town. Each is rated according social aspects which include space type, density, accessibility,land use, comfort levels,and design vocabulary, and , economic viability.The following Tables indicate the results of the comparison rating.

Table 1- Social

	A	B	C	D	E
1	Factor	Maple	Main	South Main	Park
2					
3	Public Space	low	high	medium	medium
4					
5	Semi-Public	high	high	high	high
6					
7	Private	high	high	high	high
8					
9	Semi-Privat	N/A	N/A	N/A/	N/A
10					
11					
12	Density	medium	medium	low	medium
13					
14	Pedes acc	high	high	medium	high
15					
16	Bike Acc	high	high	high	high
17					
18	Car access	high	high	high	high
19					
20	Div. Land U	medium	high	medium	medium
21					
22	Open Space	high	high	high	high
23					
24	Comfort	high	high	high	high
25					
26	Design Vocab	high	high	high	high
27					

Table 2-Economic

	A	B	C	D	E
1	Factors	Maple	Main	South Main	Park
2					
3	Revenue	Medium	High	Medium	Medium
4					
5					
6					
7					
8					
9					

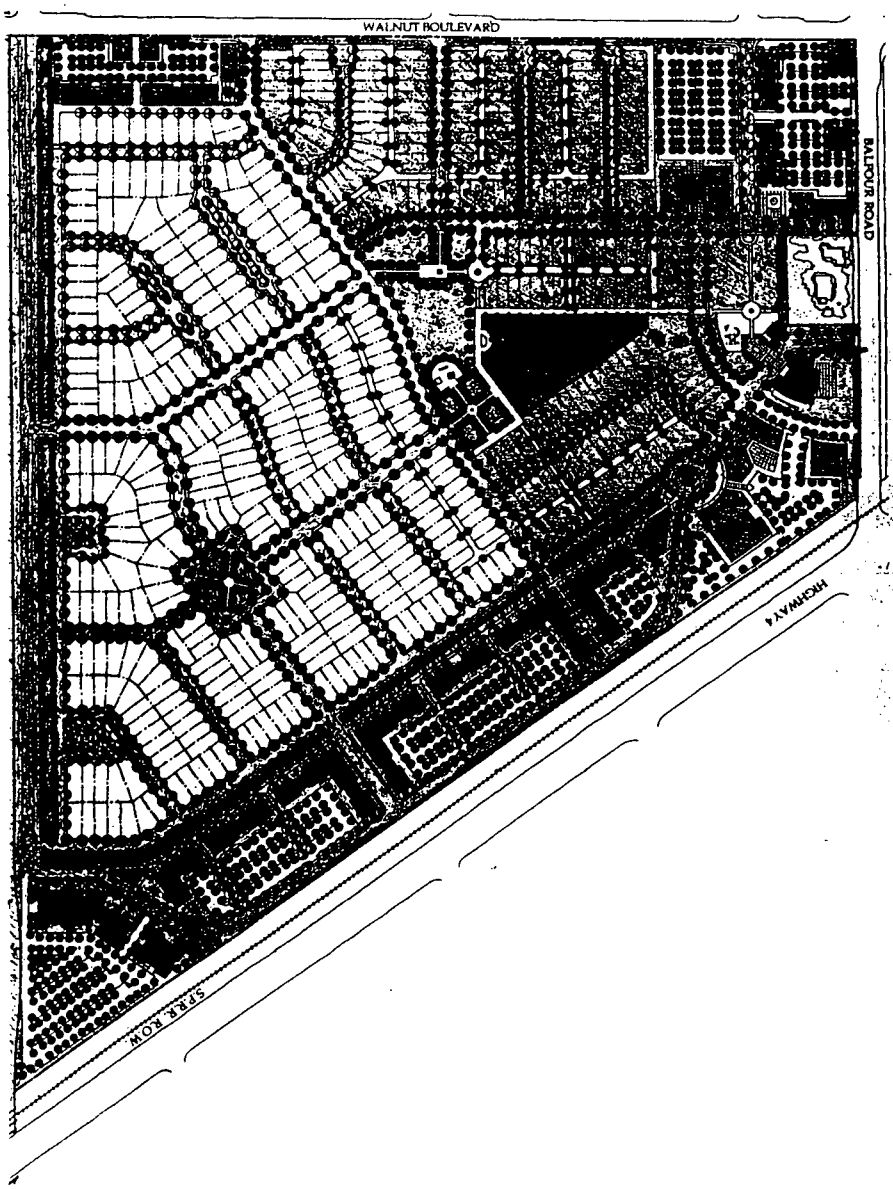
3.9.1. Summary

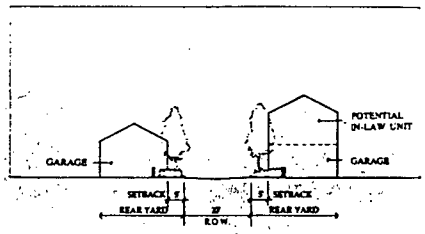
The example of Cranberry, New Jersey, which remains a viable functional and economic place, proves that the traditional development pattern can continue to work and adapt to the ever changing community. Nelessen's argues that by analysing visual and spatial characteristics, one is able to understand the principles that are fundamental and must be included in a development pattern in order to accomplish scale and a sense of place in that community.[2] In realising this one is then able to apply these characteristics to a large scale development such as an infill site or new town.

The results of the tables indicate a high regard for community and neighbourhood living in the traditional town given thesis's definition of what makes for good living (social,economic, and ecological).

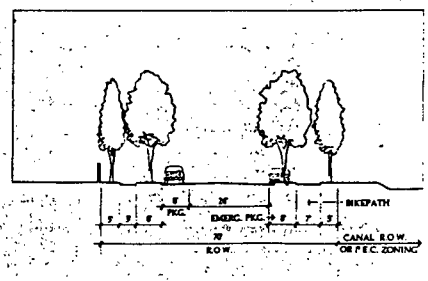
[2] Ibid.,p78

PRECEDENT STUDY II
STREET WIDTHS-SOUTH BRENTWOOD VILLAGE
BRENTWOOD, CALIFORNIA

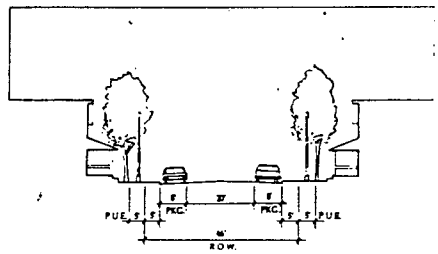




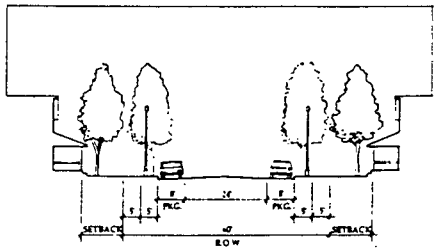
ALLEY



EMPLOYMENT ACCESS STREET



MINOR RESIDENTIAL STREET



MAJOR RESIDENTIAL STREET

A variety of street sections will add diversity and identity to the neighborhood. Small mini-parks are distributed around the neighborhood for easy access.

3.9.2 Precedent Study 2- Social, Economic, and Ecological

Peter Calthorpe's book 'The Next American Metropolis' is about the "ecology of communities referring to the ecological principles of diversity,interdependence,scale, and decentralisation that can play a role in our concept of suburb,city, and region."[3] In essence it is about our perception of human scale pertaining to visual and spatial qualities of what makes a community more livable.The community is where people have a sense of place in their neighbourhood and community. This is achieved by working with design elements such as street widths, building heights,lot sizes, and the placement of transit stops, and of residential, commercial, and civic buildings.

The book highlights some exemplary models of developments in the United States that "seek to restore the best of our oldest traditions of town planning and join them to forms appropriate to our new conditions."[4] South Brentwood Village is one such example. It was selected for inclusion in this thesis because it highlights how traditional urban ideas have been combined with new urban development to produce a new neighbourhood with a sense of place.

The identity of South Brentwood Village is a combination of several factors. The development offers residents the ability to interconnect to residential, commercial, and recreational areas via a system of pedestrian, bicycle pathways and streets. All houses and facilities are walkable. Perhaps most importantly is that streets accomplish not only to connect the neighbourhood but give the community a visual and spatial quality that is representative of many of the more traditional development patterns of the past. The traditional placement of the garage (Carriage House) at the back of the property helps maintain an integrated street facade. While the alley gives access to the garage and is a place to put garbage bins similar to traditional alleys which acted as service lanes. The narrow tree-lined streets coupled with the two

---

3 Peter Calthorpe, The Next American Metropolis,New York, N.Y., 1993,p.9

4 Ibid.,p. 9

storey houses with raised front porches is not dissimilar to many of the more traditional streets. The varying setbacks and street widths offer a diversity of spatial qualities much like the traditional development pattern.

The second precedent study is a post war development plan that was designed as an 'alternative development'. This study encompasses all the parts that make up social infrastructure (social, economic, and ecological) and rated accordingly.. Four Street types are analysed:1) Alley; 2) Employment Access Street (EAS); Minor Residential (MinRS); and Major Residential Street (MajRS).

Table 1 Social

	A	B	C	D	E
1	Factor	Alley	EAS	MinRS	MajRS
2					
3	Public Space	medium	high	medium	high
4					
5	Semi-Public	medium	N/A	medium	high
6					
7	Private	high	N/A	high	high
8					
9	Semi-Privat	N/A	N/A	N/A/	N/A
10					
11					
12	Density	high	high	high	high
13					
14	Pedes acc	high	low	high	high
15					
16	Bike Acc	low	high	low	medium
17					
18	Car access	medium	medium	medium	high
19					
20	Div. Land U	high	high	medium	high
21					
22	Open Space	high	high	high	high
23					
24	Comfort	high	high	high	high
25					
26	Design Vocab	high	high	high	high

Table 2-Economic

	A	B	C	D	E
1	Factors	Alley	EAS	MinRS	MajRS
2					
3	Revenue	high	N/A	Medium	Medium
4					
5	Afford House	high	N/A	High	High
6					
7	Ener Eff	N/A	N/A	N/A	N/A
8					
9	Life cycle	N/A	N/A	N/A	N/A

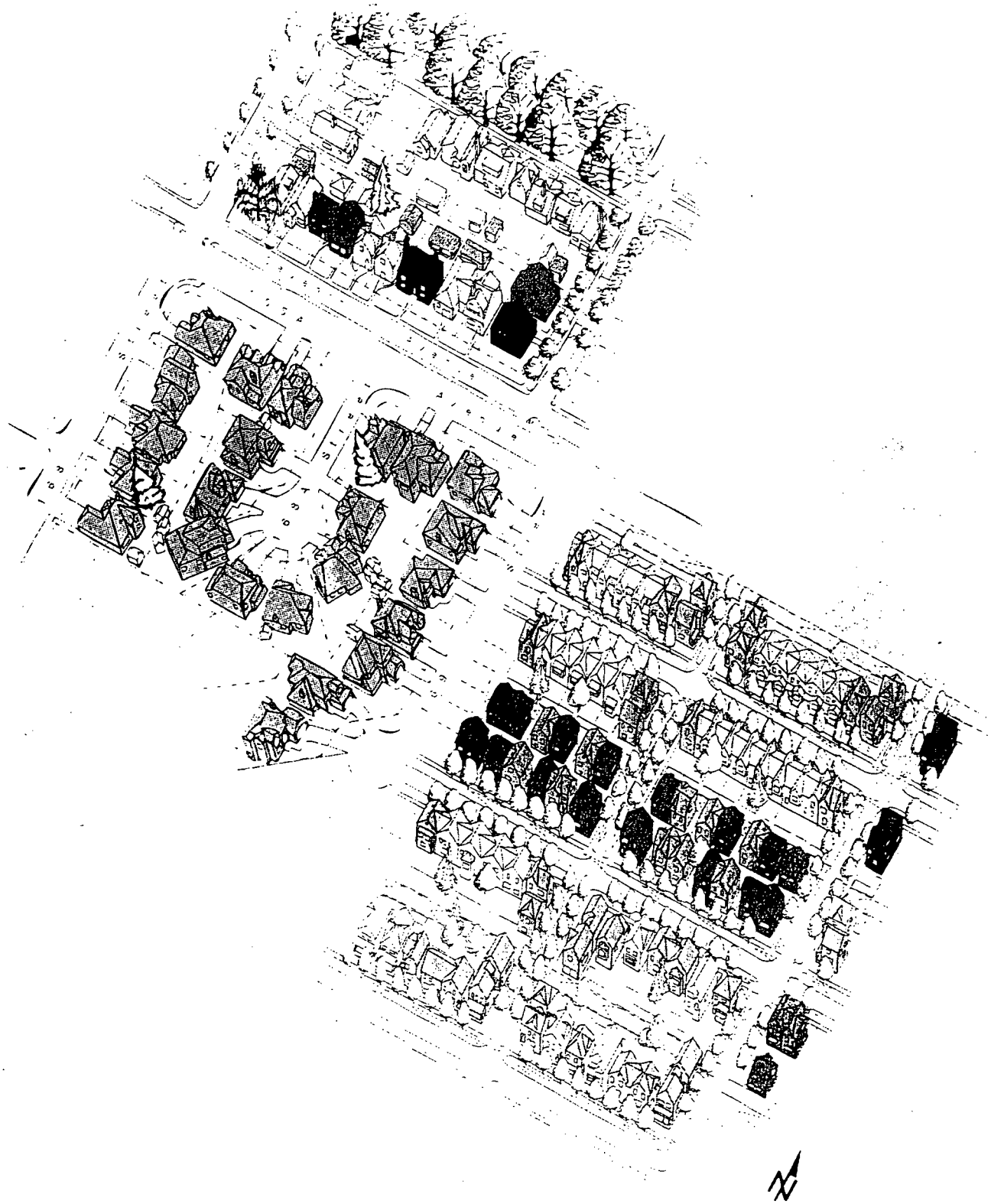
Table 3-Ecological

	A	B	C	D	E
1	Factors	Alley	EAS	MinRS	MajRS
2					
3	Nat Syst	high	medium	low	medium
4					
5	Red Aut	high	N/A	High	High
6					
7	Red Lot	high	N/A	high	high
8					
9	Bird&Anim H	low	medium	low	low

3.9.2. Summary

The results of the three tables,social,economic, and ecological indicate the South Brentwood Development plan is very much a plan that seeks to incorporate many facets of social infrastructure. Its main weakness is that it does not include good habitat for birds and animals.

PRECEDENT STUDY III
A COMPARISON BETWEEN TRADITIONAL, STATUS QUO AND ALTERNATIVE DEVELOPMENTS IN THE GREATER VANCOUVER AREA



3.9.3 Precedent Study 3 -Social, Economic, and Ecological

With the growing interest in alternatives to the conventional suburb development of the postwar period the James Taylor Chair in landscape and Livable Environments held at UBC three 'Designs for Sustainable Urban Landscapes' (all in Greater Vancouver and Langely) beginning in September 1995.

Precedent Study 3 is a comparative analysis between traditional, suburban, and alternative models of community development in the lower mainland of British Columbia. The first two, traditional and suburban are actual sites while the last is a proposed site and plan using the 'alternative sustainable model.' Each of the developments offer all parts of the social infrastructure (social, economic, and ecological) and will be analysed according to the definition as set out in the beginning of this thesis.

Out of this came "practical proposals for making our communities more sustainable, with more efficient use of land and water and more cohesive social environments."[5] This was further refined to seven basic principles of what makes a sustainable community. These are as follows;

1) Five minute walking distance to transit and commercial services

2) Different dwelling types allowed in the same neighbourhood, and even on the same street.

3) Detached dwellings that present a friendly face to the street

4)Car storage and services handled in lanes at the rear of the dwellings

5)Natural drainage systems where storm water is always held on the surface and permitted to seep naturally into the ground

6)An interconnected street system

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5 Patrick Condon, Jacqueline Teed, Jennifer Crawford,'Alternative Development Standards for Sustainable Communities, Fraser Valley Real Estate Board,Surrey,B.C., April 1998, p.1.1

7)Narrower streets with lighter, cheaper, greener, smarter construction.[6]

With the establishment of these proposals' it was decided among a group of individuals to "explore the costs and benefits"[7] in a workshop titled 'Alternative Standards for Sustainable Developments. It was hoped that social and economic benefits would emerge and provide developers and the City of Vancouver real examples of Sustainable developments.

The workshop was divided into two specific areas; 1) Three Alternative Neighbourhood Patterns Compared; and 2) Two Alternative Construction Plans Compared.For the purpose of this precedent study it will be limited to the first, Three Alternative Plans Compared. Particular attention was paid to lot and block size, and the streetscape with emphasis on the social benefits.

Table 2- Economic

	A	B	C	D
1	Factors	Traditional	Suburban	Alternative
2				
3	Revenue	high	low	high
4				
5	Afford House	medium	low	High
6				
7	Ener Eff	N/A	N/A	N/A
8				
9	Life cycle	medium	low	high

6 Ibid.,p.1.1

7 Ibid.,p..1.1

Table 2- Social

	A	B	C	D
1	Factor	Traditional	Suburban	Alternative
2				
3	Public Space	high	high	high
4				
5	Semi-Public	high	high	high
6				
7	Private	high	high	high
8				
9	Semi-Privat	medium	high	medium
10				
11				
12	Density	medium	low	high
13				
14	Pedes acc	high	medium	high
15				
16	Bike Acc	medium	low	high
17				
18	Car access	medium	high	medium
19				
20	Div. Land U	medium	low	high
21				
22	Open Space	medium	low	high
23				
24	Comfort	high	low	high
25				
26	Design Vocab	high	low	high

Table 3 - Ecology

	A	B	C	D
1	Factors	Traditional	Suburban	Alternative
2				
3	Nat Syst	low	low	high
4				
5	Red Aut	high	low	high
6				
7	Red Lot	medium	low	high
8				
9	Bird&Anim H	medium	low	high

3.9.3. Summary

One factor emerges from each development pattern that has guided us in the past, present and has the ability to control our future. That factor is value. The traditional development pattern in Kitsilano reveals a neighbourhood that offers a

variety of human options. One is able to easily walk to a transit stop,recreation facilities and commercial facilities. Residential densities it has been shown must be above 13 dwelling units per acre if commercial business is to survive close by.[8] Kitsilano is either at or above this number. In contrast to this is the suburb of the postwar era, the Status Quo Development Pattern which places a strong value on the automobile and less on neighbourhood. Neighbourhood densities in most suburban communities average between 1 and 5 units per acre therefore not enough to support commercial centres within easy walking distances and so the need for an automobile. The dendritic layout of the street system with cul de sacs promotes further use of the automobile with wide arterials to carry the traffic from the cul de sacs unlike a grid system where traffic is allowed to flow through.

The hypothetical pattern seeks to reunite our value with the traditional neighbourhood form made better, harmonising both traditional with ecological values. Housing densities are increased so that there are more families per acre in the preferred semi-detached homes.[9] The high density supports not only commercial and recreational facilities but transit as well. The reduction of the front yard setback allowing porches to be closer to the street gives a more cohesive community feel. From an ecological standpoint the Ecological Pattern does clean the water[10] through a system of natural swales and greenway stream corridors. The clean water preserves the fish while stream corridors act as greenways for pedestrians and cyclists.

In contrast the study shows that the Status Quo doe not necessarily have more permeability. Instead because of its wide streets, wide roofs, longer driveways a larger part of the land is impermeable than the Ecological Underlay. This pattern has smaller roofs, no need for driveways, permeable lanes and narrower streets.[11]

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8 Ibid.,p.2.25

9 Ibid.,p.2.25

10 Ibid.,p.2.25

11 Ibid.,p.2.25

To be sustainable one needs clean air and clean water. This means less use of the automobile and more natural permeability. The Langely Case Studies offer two scenarios of the future. The first is a community that is based on a high value given to the automobile which will promote its greater use but at a price of more pollution, more roads, less permeability of water, a greater cost on the infrastructure to deal with water runoff and water purity.

The second study is based on a lesser value given to the automobile and a greater value given to the neighbourhood, clean air and clean water. The community is designed to encourage less use of the car by having short walks to commercial centres, have a good system of pedestrian and bike ways, and transit. All streams are preserved helping to clean water.

The overall cost savings to society on a larger scale further the support an alternative sustainable design. The study notes if this pattern became the norm for settling 2 million inhabitants two thirds of lands that would be urbanised could remain as open space,transit would be more efficient and better used saving 35% in fuel consumption, and infrastructure costs would be one third that of like suburban developments so that tax revenues would be able to cover the replacement ,operating and maintenance costs.[12]

The tables indicate support for an alternative development that shares some of the values of the traditional pattern and builds upon them. The alternative sustainable design voices a strong argument for a community that desires neighbourhood qualities such as promoting less use of the automobile and thus cleaner air and by dealing with storm water on site helping to lower infrastructure costs and 'clean' the water.

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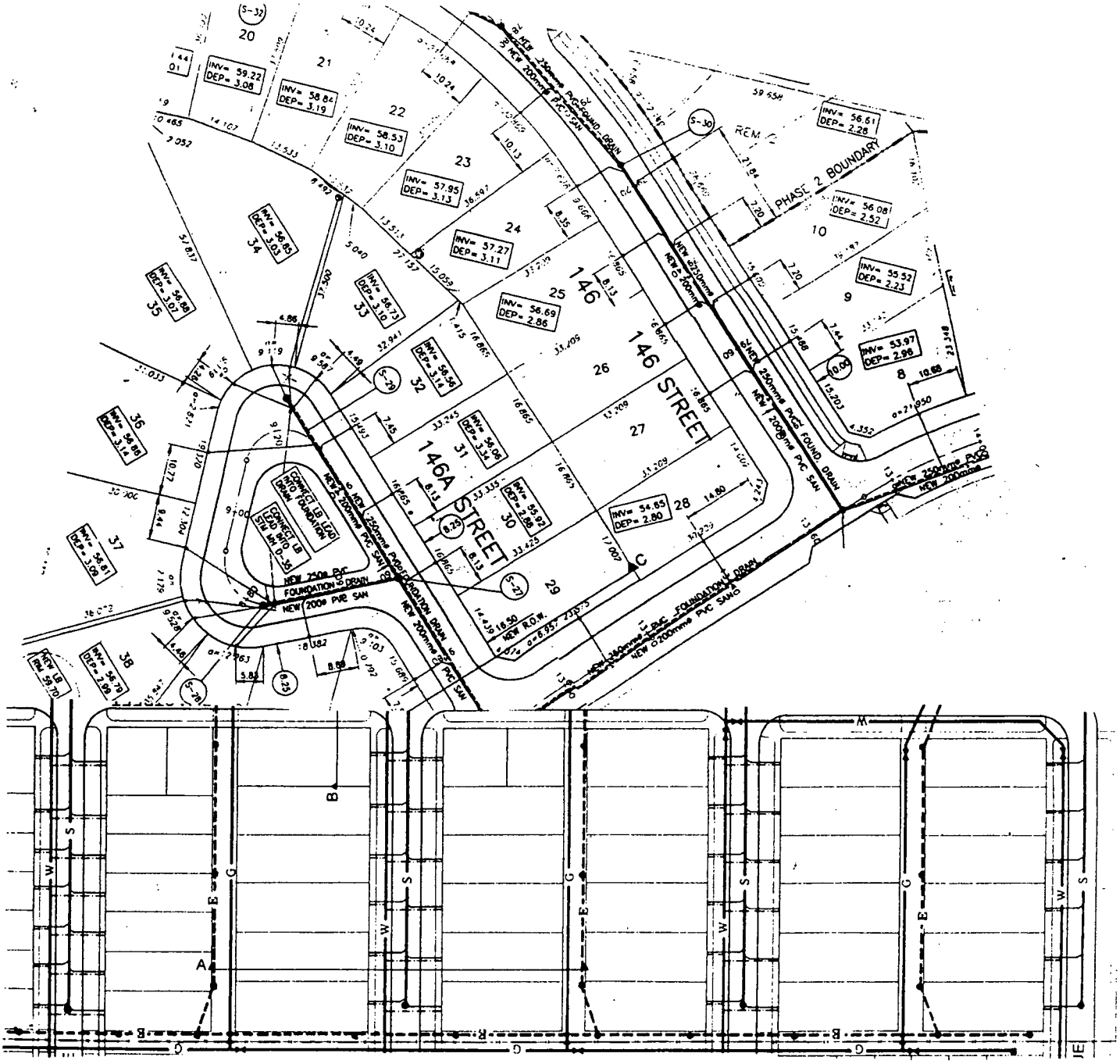
[12] Ibid.p.2.25

PRECEDENT STUDY IV
A COMPARISON OF INFRASTRUCTURE COSTS BETWEEN STATUS QUO AND TRADITIONAL DEVELOPMENTS IN THE OTTAWA-CARLETON REGION



3.9.4 Precedent Study 4 - Economic

The Canadian Mortgage and Housing Corporation and the Regional Municipality of Ottawa Carleton (RMOC) commissioned a study to compare conventional development patterns with alternate developments which use the 'new planning paradigm' more widely known as New Urbanism.

The aim of the study was to compare the " cost effectiveness"[13] between the two developments, conventional and alternate. The conventional pattern is considered to be those developments that are postwar suburban while the alternate developments represent mixed use, compact sites, using the principles of new urbanism.

Analysis of the two are based on two conditions, " life-cycle costs of various linear infrastructure, and , community services."[14] Life cycle costs are made up of first-time emplacement costs, replacement costs, operation and maintenance costs over a seventy-five year time span that is widely considered the limit of a community's infrastructure. In addition, public and private costs are divided into two separate areas.

The overall study is intended to address only infrastructure costs and not "social or environmental implications of either development pattern."[15] The study states that it " simply assesses which plan is more cost effective and why."[16] This precedent study will follow the same guidelines.

Precedent Study 4 compares two examples of community development, suburban and alternate as to their cost effectiveness. This study therefore deals largely with the economic criteria associated with the social infrastructure between the two.

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13 Canada Housing Corporation, 'Conventional and Alternate Development Patterns, Canada, 1997,p.1

14 Ibid.,p1

15 Ibid.,p.1

16 Ibid.,p1

Table 1- Economic

	A	B	C
1	Factors	Suburban	Alternate
2			
3	Revenue	low	high
4			
5	Afford House	low	high
6			
7	Ener Eff	low	high
8			
9	Life cycle	low	high

3.9.4. Summary

The findings of the study conclude that the alternate development over the long term shows a significant saving over that of applying a conventional plan to the same test site. Although the alternate development is initially higher the study reveals that due to densification the infrastructure costs per unit is lower as there are more units per ha that are able to share the replacement, operating and maintenance costs. The study states "savings range from about 29-37% for roads,utilities,service connections,sanitary sewers, water distribution, and stormwater management."[17]

Roads represent the largest saving at $3,054 per unit in the residential alternate plan. They were followed by stormwater management at 41,444 per unit, water distribution at $1,089 per unit, sanitary sewers at $975.00 per unit, sidewalks and street lighting at $289 per unit. It is interesting to find that although the road length in the alternate plan 16% longer it required 32% less road length per unit that the conventional Plan. Rear lanes are though excluded.[18] Roads as well represented the single largest saving in the commercial sector under the alternate plan.

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[17] Ibid.,p35

[18] Ibid.,p.35

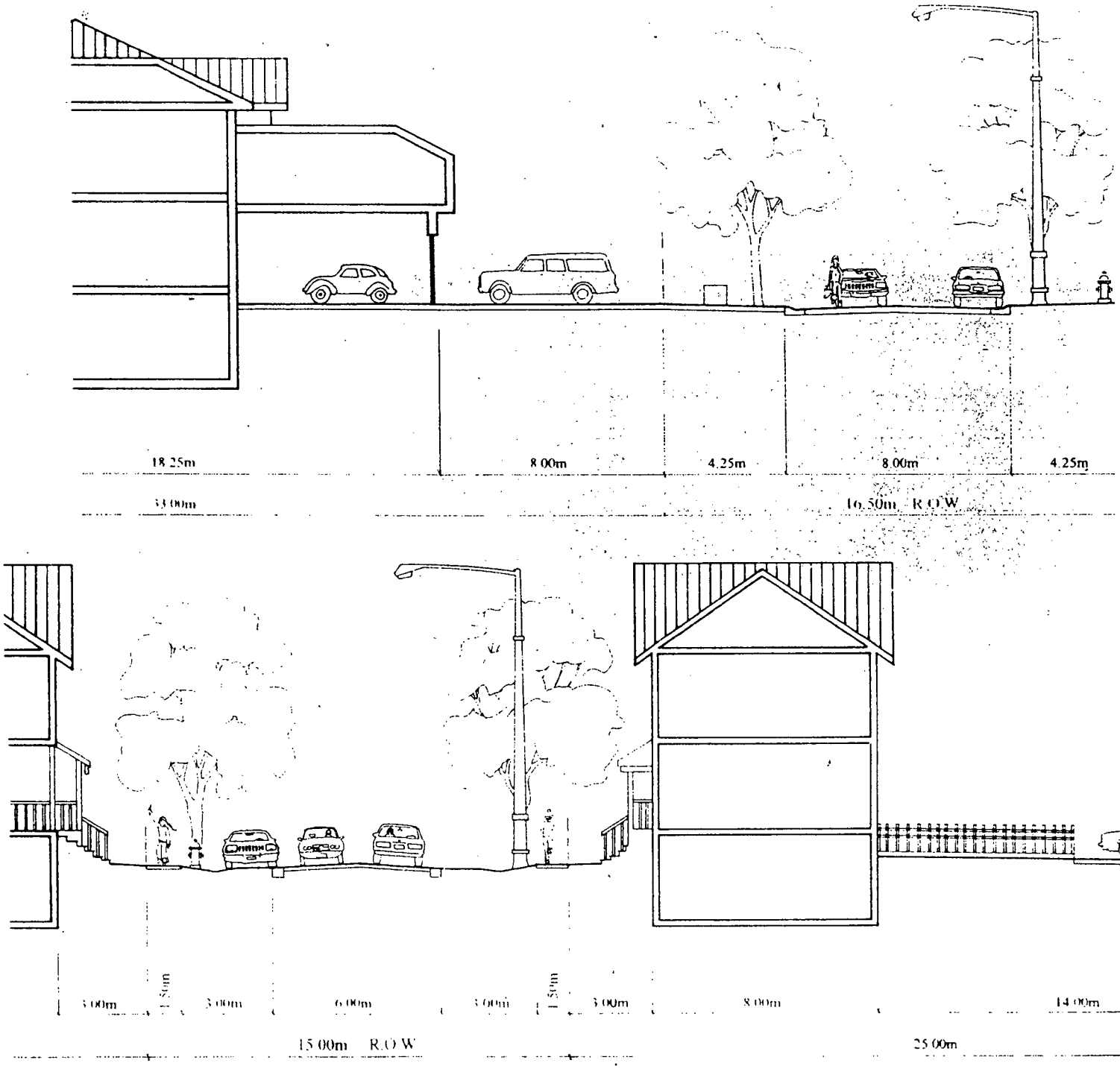
Schools the report notes are the largest cost factor in both plans equalling over half of the total life cycle costs.[19] What would have been interesting to detail was whether municipal taxes over a period of time reflect the savings and if they would be lower in the alternate development as compared to the conventional development.

Overall the findings support the economic viability of an alternate plan based on new urbanist principles over that of a conventional development. The adjustment of certain physical features such as the narrowing of road widths, a smaller lot size, the movement of lot parking to the back of the property are shown as being economically viable without the need for sacrificing livability. The incorporation of a good storm water management and a water distribution further alleviate total infrastructure costs. Furthermore with a densification of housing less pressure is put on other open land for development.

The table does indicate substantial savings to both individual and municipality if an alternative development is adopted as compared with the suburban model. Although, the application of the alternate system as a viable economic alternative to other areas of the country should perhaps have a 'cost of living' factor applied to it. As the study noted operation and maintenance costs may vary from each region. Apart from a dramatic rise in this sector the alternate development is shown in this study to offer a positive option.

[19] Ibid.,p.35

PRECEDENT STUDY V
A CONSUMER SURVEY RATING OF 'SUSTAINABLE ALTERNATIVE DEVELOPMENTS IN CALGARY ALBERTA



3.9.5 Precedent Study 5 - Social, Economic, and Ecological

The project's primary objective was to ask a group of consumers on the merits of sustainable community design and whether they would want to live there.[20] The study defines 'sustainable community' as a set of "performance features: sustainable development, ecological performance, built environment designs and functions (eg. housing, streets, employment opportunities); environmentally -friendly resources consumption (recycling land densities); provision of lands for food production; and capacities in the built environment for succession planning and adaption (housing, business needs)."[21]

Due to the wide coverage of the study this precedent analysis will be limited to Stage 1 'Sustainable Community Design versus the Conventional Suburb' and its implications with particular reference given to the streetscape.

This precedent reviews all parts of the social infrastructure (social,economic, and ecological) with the 'public' a group of citizens who are asked for there negative and positive responses to suburban and alternate development feature. The tables will reflect their responses and opinions.

20 William T. Perks and Andrea Wilton-Clark, Consumer Receptivity to Sustainable Community Design, Canada Mortgage Housing Corporation, April 1996.p.i

21 Ibid.,p.i

Table 1- Social

	A	B	C
1	Factor	Suburban	Alternate
2			
3	Public Space	low	high
4			
5	Semi-Public	medium	high
6			
7	Private	high	high
8			
9	Semi-Privat	medium	high
10			
11			
12	Density	low	high
13			
14	Pedes acc	medium	medium
15			
16	Bike Acc	medium	medium
17			
18	Car access	medium	high
19			
20	Div. Land U	low	high
21			
22	Open Space	medium	high
23			
24	Comfort	low	medium
25			
26	Design Vocab	N/A	N/A

Table 2- Economic

	A	B	C
1	Factors	Suburban	Alternate
2			
3	Revenue	low	high
4			
5	Afford House	low	high
6			
7	Ener Eff	low	high
8			
9	Life cycle	low	high
10			
11			

Table 3- Ecological

	A	B	C
1	Factors	Suburban	Alternate
2			
3	Nat Syst	low	high
4			
5	Red Aut	low	high
6			
7	Red Lot	low	high
8			
9	Bird&Anim H	low	high

3.9.5.B Summary

The following results of the study conclude that given the choice between a sustainable community and a conventional neighbourhood in regards to the areas discussed the range of overall approval for such a community is as follows;

Social

Street dimensioning to calm traffic is an important issue even though it would add $800 to the cost of the house. The preference for a grid with a few cul de sacs over strictly a grid system is a reflection that traffic flow is less important to having one way closed streets. Possibly this is due to the feeling of having streets that act more as private roads than public streets and that cul de sacs provided for safer areas for children.

Pedestrian and Bicycle paths are an option to reducing the need for the automobile. Although the numbers are not strong in their support they are better than 50 + 1%. The non-support may largely due to economic considerations.

The strong support for the option of a having a small front yard and having the additional space in the back yard reflects the respondents willingness to accept semi-public space in order to have more private back yard space.

Neighbourhood Centres are seen by 3 out of 4 respondents[22] as important in the design and an integral part of the neighbourhood and to the community as a whole.

Open spaces as food producing areas are regarded as a negative option within the neighbourhood but should be a considered for some area of the city.

The citizens social wants and desires show that individual and collective preferences are roughly the same. The only major differences are in the areas of having a grid system with a few cul de sacs where neighbours had a lower approval of a completely open system to a plan of having a mix of open and closed streets, and, fact of having public pathways only if those in Edgemont did not have to pay for them.
Generally the social advantages of an alternate development plan met with high approval.

Economic

The strong support of narrowing of street widths to help reduce infrastructure costs indicates that citizens do care about costs outside the realm of their own properties. On the other hand it does hinder some of the more positive measures of incorporation of sustainable design features such as pedestrian-bicycle ways.

22 Ibid.,p.vi)

Overall approval results:

1)Edgemont- 65.8%

2)City- 70%

3)Edgemont and City - 64.3%

The results signify there is reasonable support for a 'sustainable community development at both a social and economic level, and an acceptance of ; 1) working to have a community that has a more broadly based population composition with a range of incomes and types of family;2) different types of housing and lot sizes from single detached houses to multi-attached homes in the neighbourhood; 3) a diversification of land uses such as residential,commercial, educational, open public spaces, street right of ways; and 4) a move towards infrastructure cost savings.

As the tables indicate there is a better than average approval rate for most of the features of the alternative model. The only real surprises were the support of pedestrian and bicycle accessibility as not being a high priority. Although this was largely due to their cost factor as when asked if they would be put in by the city the rating returned to a high level in favour of these pathways.

3.10 Final Summary of Five Precedent Studies

The intention of the precedent studies was to select five that are inherent to alternate development patterns. Each precedent works to support the application of alternate development designs using new urbanist principles and, represents a different aspect of the costs and benefits from a social, economic, or ecological point of view.

The case study of Cranbury, New Jersey serves as an example of the the importance of adapting certain social aspects of traditional urban planning, with particular reference to the streetscape, and to present day developments, without sacrificing present day technologies such as the use of the automobile. Traditional urban plans sought to integrate both human scale and a sense of place. The ability to walk to commercial, recreational or civic facilities, providing neighbourhoods with a diversity of residential streets, house types, lot sizes and land uses all move to give the community cohesiveness and ultimately a sense of place and human scale.

Peter Calthorpe shows one in South Brentwood Village that the use of traditional urban development patterns are possible and have a real application to the present day. Having all residential within a five minute walk of commercial,recreational facilities,narrowing streets, lining a diverse mixture of streets with trees, keeping building heights to two and three stories are all examples of the traditional urban pattern being applied to a present day development. This is in keeping with the principles of maintaining a human scale and a sense of place. The idea of selling the idea economically is not as strongly given excepting that housing will be affordable due to the fact the contractor is the largest residential developer in the Californian region and therefore houses will be offered less expensively.

The third precedent study, 'Alternative Standards for Urban Landscapes', reveals both the social and economic viability as in cost to the human environment

such as in land use, water purity, and air quality, of alternate developments. It is about value and what we as a society consider as sustainable.

The use of a comparative analysis in this study of present day or 'Status Quo' developments with a traditional and a hypothetical example of a traditional ecological underlay pattern highlights the negative and positive aspects of each form of development. The results of the comparative analysis are significant when contrasting the Status Quo with the Traditional Ecological Underlay Pattern. The Status Quo falls far short of our present day idea of what a sustainable neighbourhood should be. It neither has the density to maintain close walkable recreational,commercial, or transit facilities, nor does it have a system of street or pedestrian connections to allow for good traffic flow, and lot sizes are less impermeable, . This is in contrast to the alternate pattern which offers all these things at a higher density (houses per acre), more open space, a diversity of streetscapes, housing with front porches,more permeable surface area, and a more close-knit neighbourly feel. The Alternate system uses many of the traditional pattern features particularly working to create an environment that is human in scale, and, making it better.

The Canadian Mortgage and Housing Corporation's study successfully proves the numeric economic value of applying an alternate development pattern using new urbanist principles. The overall savings of 7.5% compared to the present day conventional development is significant enough to make it viable. The fact that these are infrastructure costs based on a 75 year life cycle further substantiates that such a development will save over a long term period. In addition, although the sturdy did not go into property tax savings, it could be assumed that there would be due to a higher housing density a more even spread of replacement and operational and maintenance costs therefore showing that the 7.5% figure could well be higher. The costs to a developer are seemingly higher but it must be remembered

there are two to three times the number of units per acre and in actual reality the costs on a per capita basis are the same as that of a conventional development as pointed out in the study.

The last precedent study asks what we as citizens wish to see in a neighbourhood. The 'Sustainable Community Design' study done at the University of Calgary shows that what people desire is a community very similar to the 'alternate traditional sustainable development model' based on new urbanist principles. The respondents in the study want streets that are narrower to calm traffic and houses with front porches to offer a more cohesive neighbourly feel.They want to be able to be within walking distance of commercial,civic, and recreational facilities, have neighbourhood centres, and lower infrastructure costs. These factors are what they believe makes a good neighbourhood. Their desire is to have a neighbourhood that is human in scale and offers good social and economic possibilities without sacrificing present day technologies such as the automobile. There do remain some obstacles such as the layout of streets and bike parkways but there is room for compromise on these issues. The five precedent studies together demonstrate support for an alternate sustainable development based on new urbanist principles. By so doing we are able to create from these studies a set of formal rules that will act to guide the design. These are as follows:

1) Five minute walking distance from residential to commercial,recreational, and transit facilities
2) A mix of land uses that include residential,commercial, and recreational facilities
3) Storm water is held on the surface of the ground and is allowed to seep in naturally
4) Different dwelling types are allowed in the neighbourhood and on the same street
5) Car storage and services are in the rear of the dwelling.
6) Dwelling unit parking is allowed only at the rear of the lots.

7) All street parking is for visitors only

8) Interconnected street system

9) Interconnected pedestrian and bikeways

10) Narrower streets with a diversity of ROW allotments that include public sidewalks, light fixtures and trees

11) Houses which are two to three stories in height,have varied types of raised front porches, windows facing the street , sidewalks that meet the street and facades and materials that make for a well knit streetscape.

12) Varied setbacks from 1 to 6m from sidewalk to house

13) Housing densities must be above 13 dwelling units per acre to support neighbourhood centres

14) A neighbourhood that provides housing for a varied mix of people and incomes

3.11 Site Analysis:

3.11.1 Process

The purpose of the site analysis is both to define the attributes of the proposed site and as a means to further explore the project in detail. It is a systematic survey of the nature of the site. Focus is directed on the geophysical, topographical hydrological features, the existing structures (buildings, roads,), utilities (drainage systems, sewage and power lines), the phenomena (light, air, water), human activity (neighbourhoods, history and culture), and the regulations that govern (zoning regulations and by-laws).

The systematic survey begins by analysing the site under the current market . It is the character of the place that is studied. Usually a visit to the site at various times of day/night and weather occurs. Given the logistics of distance of the site a more methodical approach has been taken.

Hard facts have been collected via the internet, library and by direct communication with two Fredericton City Planners, historian,Naturalist, an Atlantic Canada climatologist and a member of the Rails for Trails Coalition. A Base ,a topographical , utilities (storm and water), and zoning maps, a Municipal Plan, and By-Laws of the City of Fredericton have been obtained. Those points that are relevant have been included in the site analysis. In addition constraints, and opportunities have been indicated so as to give a balanced picture .The following eight areas will be analysed:

1) History - from the first aboriginal settlement in the area to present day development. The aim of this section is to give a brief overview of the area in regards to the historical development of the residential town plat.

2) Environment- given how the natural environment effects our ability to live and function, an understanding of these conditions is essential. This will include sun

radiation,wind, precipitation, and temperature.

3) Geophysical - features that have relevance to changing the landscape and building structures. These include soil, topography, and hydrology.

4) Natural- features that include the living such as vegetation, and fauna.

5) Context - where the site is and how it relates to the areas surrounding it at present .

6) Economic Feasibility- how the site is economically viable in both the initial development stages and as a established neighbourhood.

7) Constraints - problems that could occur through development such as dealing with drainage, sewage, the removal of wildlife and bird habitat.

8) Opportunities- that have been laid out in the City of Fredericton's Municipal Plan such as the revitalisation of the downtown commercial centre and the older neighbourhoods through higher density development that is in close proximity to these areas.

3.11.2 History

Fredericton is situated on the banks of the Saint John River in South Western New Brunswick. It 's original settlers were the Maliseet Tribe who had a encampment in the mid 1600's, just past the islands now known as Hart and Savage Island.

It was not until the early 1700's that a more permanent settlement was established. The French saw the area as a strategic point as two other major rivers (the Nashwaak, and Oromocto) flow into the Saint John River here. A fort was built at the mouth of the Nashwaak directly across what was then called Pointe Ste-Anne village(now Fredericton). It is recorded that 89 people within 17 families lived in this area. This population swelled with the exportation of the Acadians, in 1755, from Nova Scotia, some of whom then retreated to this area, hoping for a safe haven from the

British. In 1759, New England raiders came to destroy the village.

Despite the destruction, Acadians continued living here. However with the American War of Independence these remaining few, along with many of the Maliseets, were "driven out"[1] by American raiders from the New England states. Several American families came to live here in the early part of the American War of Independence. The population grew once more with the arrival of the 'New Empire Loyalists' who fled America during the latter half of the war.

The coming of the loyalists meant that Ste-Anne Pointe would change from a small village to a town. This led to the implementation of a more formal plan by the Royal

Military Engineers. A survey taken in 1784 which went as far east as to what is now known as the University Avenue area. This survey was to serve as a basis upon which town would be ordered.

In 1786 a more conclusive survey was made by Dugald Campbell. He took 4.5 acre blocks and divided them into 18 lots, 165' deep, separated by streets 66' wide. Houses were to be "at least 16' by 20' even with the lot line of the street,equidistant from the sides of each lot with all outhouses attached to the rear"[2] (see Map 1). Looking at Map 1 one will notice the widened streets at what are known today as Smythe Street and University Avenue. It is thought these may have been wider to accommodate open-air markets. Map 2, dated 1878, allows the viewer a more comprehensive plan. The major difference is the addition of the rail line which was a spur line off the major line. The end of the spur line was in the middle of the design site (the station was not

[1] Town Plat Technical Report, Historical Section 1.0, Fredericton, New Brunswick,p.1

[2] Ibid.,p.2

built until 1923).

The city north south grid ends at the base of College Hill, although the development since has been extended up the hill maintaining the original grid pattern, as laid out in the 19th century. As noted in the Technical Survey of the Town Plat "residents have lived with a tradition of orderly development within a formalised grid plan for more than two centuries."[3]

The plan of Fredericton differ little from the engineered planned towns of

the day as seen in the Bird's Eye View of Fredericton (Map 3). Fredericton like, many Canadian cities consisted of a mix of houses,churches, industrial and institutional buildings.A distinctive development pattern of land parcel use emerged. Neighbourhoods were largely residential, but within a five to ten minute walk of the town centre; where there existed commercial businesses (ranging from stores selling foodstuffs to lawyer and doctor offices). The town centre as well included provincial and federal government buildings, military barracks, and municipal offices. An industrial area was built on the western outskirts of the city, on what is now the exhibition grounds.Those working in the professions and or government resided largely on the eastern flank of the town centre while those who worked as clerks or in the industry settled in neighbourhoods west of the town centre.

House styles in the 1800's consisted of neoclassical forms.In the late 19th and early 20th centuries the Victorian style was predominant. Modern suburban styles came into vogue from the 1950s to present day.The most dominant style in the old city is the

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[3] Ibid.,p3

Queen Anne style of the 1880's and 1890's. Houses up until the 1950's were primarily made of wood reflecting one of the foremost industries of both the past and present (the lumber industry). Many of the houses have porches attached to the front and back of the houses. These acted in summer as places to sit in the shade and enjoy cool breezes. In winter they acted as protection from the fierce cold winds often having a panel attached on the northwest sides to block the coldest of the winter winds.

The City's prominence stems from the fact that it was made the provincial capital of New Brunswick, at the time of Confederation in 1867, and was granted the first Royal Charter for a University in British North America in 1789. This meant that the social strata of the 1800's was more middle to upper class . As mentioned these people lived in the North-east end of the city and built houses befitting their status. Many of the houses have intricate detailing and are of immense size. Those in the south and west ends of the city are more modest as this area was largely made up of clerks and labourers.

Fredericton's growth through the 1900's has been steady and relatively prosperous. It has not been as affected by the depression and recessionary times since its economic base is founded on the government and university. The government and university expansion periods beginning in the late 1960's and continuing until the early 1990's meant for a larger population base. The grid of the town has continued past the old city whose boundary ended on the north side of the site at Aberdeen Street and up the Regent to Smythe Street hill to Prospect Street. These neighbourhoods reflect a more suburban nature segregating commercial from residential. The town has also experienced several amalgamations so that the boundaries extend

almost 12km in all directions from the original ones of 1786 .

The city, has like many other cities in Canada, experienced a revival in preservation of its historic features. This has led to the creation of a Municipal City Plan that seeks to preserve the city's historic features such as attempting to preserve the initial grid pattern, the arrangement of church, state,divisions of residential lots, and the placement of parks and other open spaces.

3.11.3 Statistical Data- Fredericton-1997

Population:

Fredericton: 46,222

Greater Fredericton: 70,720

Male: 34,715

Female:36,005

Family:

Husband-Wife Families:16,630

Common-law Couples:1,500

One-parent:1,500

Average household income:$44,756

Work force:

Post-secondary training:57%

University degrees:22%

Bilingual:18%

Employment turnover:5% (third lowest in Canada)

Employment:600 new jobs created in 1996.

Unemployment Levels:10% (lowest in New Brunswick)

Official Languages:

English

French

3.11.4 Environment

1) Sun Radiation:a) Global Solar Average median-11.6hrs b) Reflected Solar-3.18hr c)Diffuse Solar-7.201hrs d) Mean Daily All-wave solar-3.887 hours.

2) Winds (10 year average)- Winds in the winter months of January to February are mainly from the west averaging 13km/h with extreme speeds of 64km/h and gusts up to 120km/h. These can be critical as they will add a wind chill factor that can lower the temperature by 20C degrees in relation to time of exposed skin to be frozen. In March to April winds are often heavier out of the NW at an average of 15km/h with extreme speeds of 68km/h with gusts to 103km/h. March is particularly gusty. From May to September winds are largely from the south to southwest bringing warm and often humid air to the Saint John River valley. Winds are much lighter averaging 11 km/h with extreme speeds at 58km/h with gusts up to 83km/h. From October to December the average is again low at 11km/h with extreme speed hour at 64km/h and gusts up to 90km/h.

3)Precipitation (10 year average)- Fredericton has both rainfall and snowfall. Winter December to May sees an average of 29.3cm per month with the greatest amount 67cm falling in January.The average daily rate of snow on a given day will be in the vicinity of 40cm. The months with complete all month long snow

cover are January, February, and March. In addition rain does fall in these months making conditions extremely icy. The average for these six months is 56mm with the heaviest being in May at 90mm, with the average extreme daily fall of rain at 63mm. In the 'summer ' months of June to September an average of 92.7mm falls per month with an extreme daily fall measured at 89.25mm.September is hurricane month and it averages a extreme daily rainfall at 148.6mm. Likewise in the Autumn months of October to November the average rainfall is 92mm with average extreme daily fall at 65mm. Rain tends to Fall steadily over the course of an average six to 8 hour period. Showers are less likely. Snow falls in usually shorter periods of between 4 and 6 hours.

Moisture levels are highest in the months of June to October with humidity at an average of 69.4% per 0600L with the highest being in September at 90%.

4) Temperature- The temperature is coldest in the months of January to March with an average of -6.8C with an extreme low of -33C. For the months of April through

September the average mean temperature is 13.72C with an average extreme high of 35C. The warmest months are June through September. October through December have an average mean temperature of 7C with an average extreme low of -9C Temperatures in the winter can vary dramatically from a low of -40C to a high of +12C within the space of twenty four hours. This freezing and thawing can severely damage plants and make for treacherous street conditions. Late frosts are also hazardous to early shooting plants. Frost is not uncommon the last week of May and the first week of September. Summer temperatures combined with humidity can often make movement a challenge in July and August. The temperature range changes do make seasons distinct.

3.11.5 Geophysical

1) Soil- New Brunswick is at the north end of the Appalachian Mountain Range. These old mountains are more like large hills stretching through the centre of the province and along the Bay of Fundy Coast. Fredericton is surrounded by many of these 'hills'.The old city of Fredericton is on the river plain of the Saint John River where some of the richest agricultural land is found in the whole of Canada. The soil in Fredericton on the plain is a mixture of silt and glacial till. It is of a heterogeneous mixture of material of all grade sizes. It is loose to very compact with a depth of <10'. The underneath stone,bedrock, is largely a red to grey conglomerate of silt stone that includes silic to mafic volcanic flows,tuff and related intrinsic rocks. On the hill sides of Fredericton a thin veneer of glacial till is found above the bedrock.The soils on the plain are basic in nature while those on the hill are generally acidic with deposits of iron.

2) Topography- The river plain area is basically flat. This plain area extends to the base of Dundonald street whereupon the gradient becomes steep. (see Map 4)

3) Hydrology- The main watershed is the Saint John River system. This has been known to flood certain areas of Fredericton (see attached Environmental Assessment Map5). The site itself is not in the floodplain and has never been recorded as to having been flooded.

3.11.6 Natural

1) Vegetation- Much of the original vegetation (old growth) has been all but removed. The area at one time was a mix of deciduous (Acer, Betulus, Fagus, and Quercus) and

coniferous (Abies, Pinus) forests. The last remaining parcels of forested land in the city are found around the perimeter of the University of New Brunswick and in Odell Park.These are secondary growth forests.Some scrub vegetation (Alnus, Malus, Acer rubrum) are found along the river's edge and along where the old streams used to be. Fredericton is known as 'The City of Stately Elms.' Many were planted well over two hundred years ago and with an intensive management programme have weathered the Dutch Elm disease. Although many losses have occurred the City has undertaken to replant the these trees and strengthen the tree canopied streets with other species (Tillia, Acer, and Quercus) . Deciduous trees shade and cool the streets in summer and let light in during the winter months.

2) A wide range of birds including summer migratory species and winter species exist in the Fredericton area.

Other native wildlife species in the Fredericton area include grey squirrels, red squirrels, raccoons, skunks, and ground hogs. These animals are prominent in and around the more wooded areas of Fredericton.

3.11.7 Site Data

1) Context- The site is formally the Canadian Pacific Rail Yard and Station which remains intact along with some of the old rail lines. The rail lines into to Fredericton were abandoned in the late 1980's although freight was shipped until the mid 1990's on the track that ran across the river. This too was closed due to the down turn in rail profits. The land has remained largely in CPR hands although, as much was leased, some areas have run out while others have been bought out. The city was given first

option by the province to buy the land and or entitlements.

The City of Fredericton backed a community drive to keep these links public. There formed a coalition between the City and the community which has become known as the 'Rails for Trails Coalition'. Since their establishment a whole network of trails has been established throughout the city with provincial connections. These have become known as greenways and provide a range of activities from cycling, to walking, to cross-country skiing, and as an area of habitat for flora and fauna throughout the lower city plat. Many connect with other Green Spaces (see attached Ward Map 7).

One of the remaining last rail lines that has yet to be developed is from Regent Street into the rail yard and station area. The rail yard itself has within it, as mentioned, the now abandoned but intact rail station, a grain elevator, and some warehouses. There is as well some existing track still intact.

The site is on the perimeter of the older section of the city (see Map 2). It is framed on the east by Regent Street with a small section on the east side of Regent Street next to McLeod Avenue, and the west side reaches just past York Street. Looking north towards the river (apart from three commercial sites [362,360,362]) is mainly a residential area. This area is made up of a mixture of older homes, apartment buildings,and a Catholic School(327,321). To the south east and west of the site is largely commercial that ranges from light industrial (Hart Shoe Company on York Street, 401),to Government Offices and small private businesses (restored Chestnut Canoe factory, York Street 470,500), other commercial interests include a business complex(,dry cleaner, fast food, Mall Box copying, office space,525,513,519), a gas station (465), fast food (460). There is a small strip of residences

(535,559,567,575,585,) on Beaverbrook Court and a Fire Hall and the City's Park and Tree Yard (520) These latter sites are not included in the site development. (please see Ward Map). All these sites are within a five minute walk of the design site.

The area of the site is as follows: 4 city blocks X 4.5 acres= 18 acres or 8.1 ha

2) Economic Feasibility- The City of Fredericton has slated the site to be a combination of high density residential and commercial land parcels that will serve to revitalise the local neighbourhoods and the downtown core by bringing in new people with a variety of backgrounds and incomes.

3) Zoning By-Laws, Zones and Area of the site The following are a list of specific zoning bylaws that have specific relevance to the site;

- Definition of Mixed Use: Where two or more permitted uses are located in one building or on one lot, and when the regulations applicable to these users are different, and unless otherwise specified, the most restrictive regulations shall be deemed to be in force for that lot or building.

Zoning

Total of Special Study Area= **14.65 hectares** -zoned medium to high density according to Capital City Plan[4] -

Medium density: is established as- consisting of town houses, walk-up apartment buildings not exceeding 3.5 storeys, converted dwellings and other forms of housing where densities generally do not exceed **25 units per acre (62 units per hectare).**

High density: consisting of large apartment buildings or other concentrations

[4] Capital City Municipal Plan , City of Fredericton, December 1991.,p22

of dwelling units where densities generally **exceed 25 units per acre**[5].

Therefore **Total Area is 14.65 hectares X 62 units = 908 units minimum.**

Present Commercial Space is **58,760 sq meters**

Present Zoning

a) Comprehensive Development District Zone (CDD)

Total Area is **8.52 ha**

b) Mixed Use District (MD)

Total Area is **4.378 ha**

c) Automobile Service Station

Total Area is **.375 ha**

d) Highway Commercial Zone

Total area is **.125 ha**

e) Residential 2 (R-2)

Total Area is **.120 ha**

f) Residential 9 (R-9)

Total Area is **.937 ha**

g) Residential 9 A (R-9A)

Total Area is **1.05 ha**

4) The following maps included are: 1) topographical, regional,slope, parks and greenways,lot sizes, present zoning, aerial photograph of the site and surrounding

[5] Ibid.,p.23

area.

5) Constraints- Other possible problems on the site are:

a) if the soil is found to be contaminated because of the industrial use of the site as a rail yard;

b) the economic feasibility of restoring the rail station;

c) the dealing on site of rain water, grey water, and sewage systems;

d) the removal of existing vegetative shrub cover which serves as nesting sites for birds;and

e) the inclusion of a greenway through the site as pressed for by the 'Rails for Trails Coalition.

4) Opportunities - for the site

a) mixed land use;

b) use of solar radiation and air circulation to reduce energy consumption and enhance human living conditions;

c) increase land value;

d) preserve historical features;

e) stormwater management;

f) maintain north south grid street pattern;

g) maintain character of neighbourhood and community;

h) habitat for birds;

3.11.8 Site Analysis Conclusions

The following is a summary of the site's attributes and the possibilities they offer to the

site design;

1)The geophysical features preclude that the site is capable of supporting building structures and is not in danger of flooding; barring contamination the area is ideal due to its flat nature and well drained glacial/silt till.

2) Given the extremes of weather patterning from rain to snow, cold to hot, the design will have to address these swings in weather patterns.

3) Given the amount of rain and snow throughout the course of the year a storm water management system that meets present day standards of sustainability is essential.

4) The amount of sunlight and solar radiation and air flow is significant enough to warrant a design that will utilise these two factors so as to help reduce energy costs.

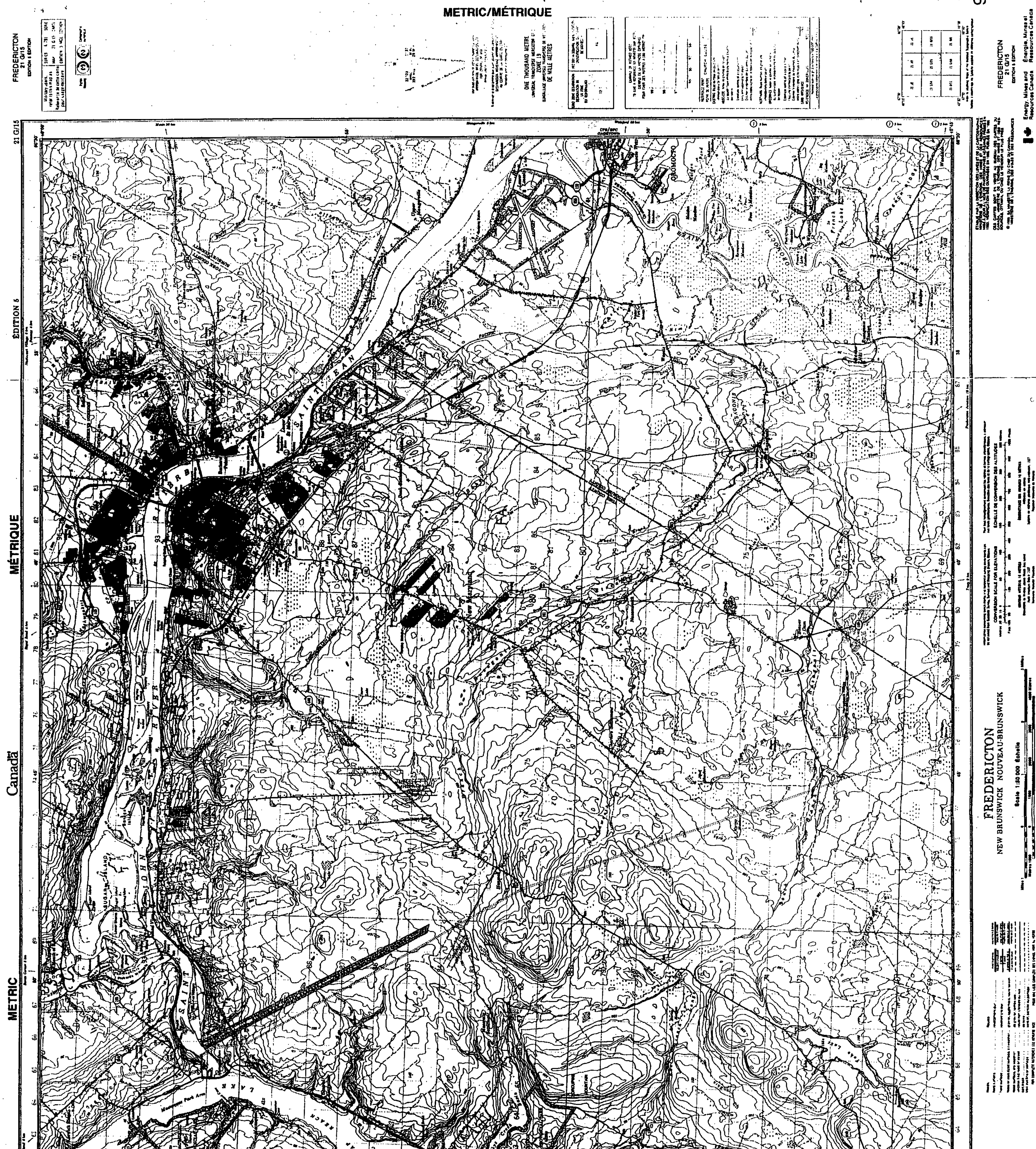
5) Barring contamination , the soil offers a good growing medium for plants and trees which will in turn provide possibilities of habitat for birds, street shading, and integration into the surrounding canopy covers found on the surrounding streets.

6) Given the close proximity to the downtown core and established older neighbourhoods there is a strong potential for the site to be economically feasible. Certain measures such as higher density, and a good programme could enhance this potential even further.

7) Given the historic features found on the site, such as the old rail lines and the station there is the potential for developing the site as a possible tourist destination. This is dependent on a good programme.

8) Given the site is an infill area and is in close proximity to the existing grid there is the potential to attach and continue with the existing north south grid pattern .

9) The neighbourhood surrounding the site offers a wide variety of joint uses from residential to commercial to office space to light industrial. With the site's central location to these and it not being far from the town centre it offers the potential for a neighbourhood that will reflect a mixed use of the land . The challenge is in coming up with a design plan that meets these needs, and which addresses some of the more modern problems such as urban density, circulation, parking, streetscape, and heritage preservation.


METRIC/MÉTRIQUE
FREDERICTON
NEW BRUNSWICK NOUVEAU-BRUNSWICK
21 G/15
EDITION 5
ÉDITION 5
METRIC
MÉTRIQUE
Canada
SAINT JOHN RIVER
Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

Arenas
1. Fredericton Collecum
2. Lady Beaverbrook Arena
3. Nashwaaksis Arena
4. York Arena

City Depots
1. Dundonald Street
2. Regent Street
3. St. Marys Street

Fire Stations
1. Harrison Court
2. Kimble Road
3. MacLaren Avenue
4. Royal Road
5. York Street

Parking Lots & Garages
1. Brunswick Street Parking Garage
2. City Hall Parking Lot
3. Frederic Square Parking Garage
4. TRA Cash & Carry Parking Lot

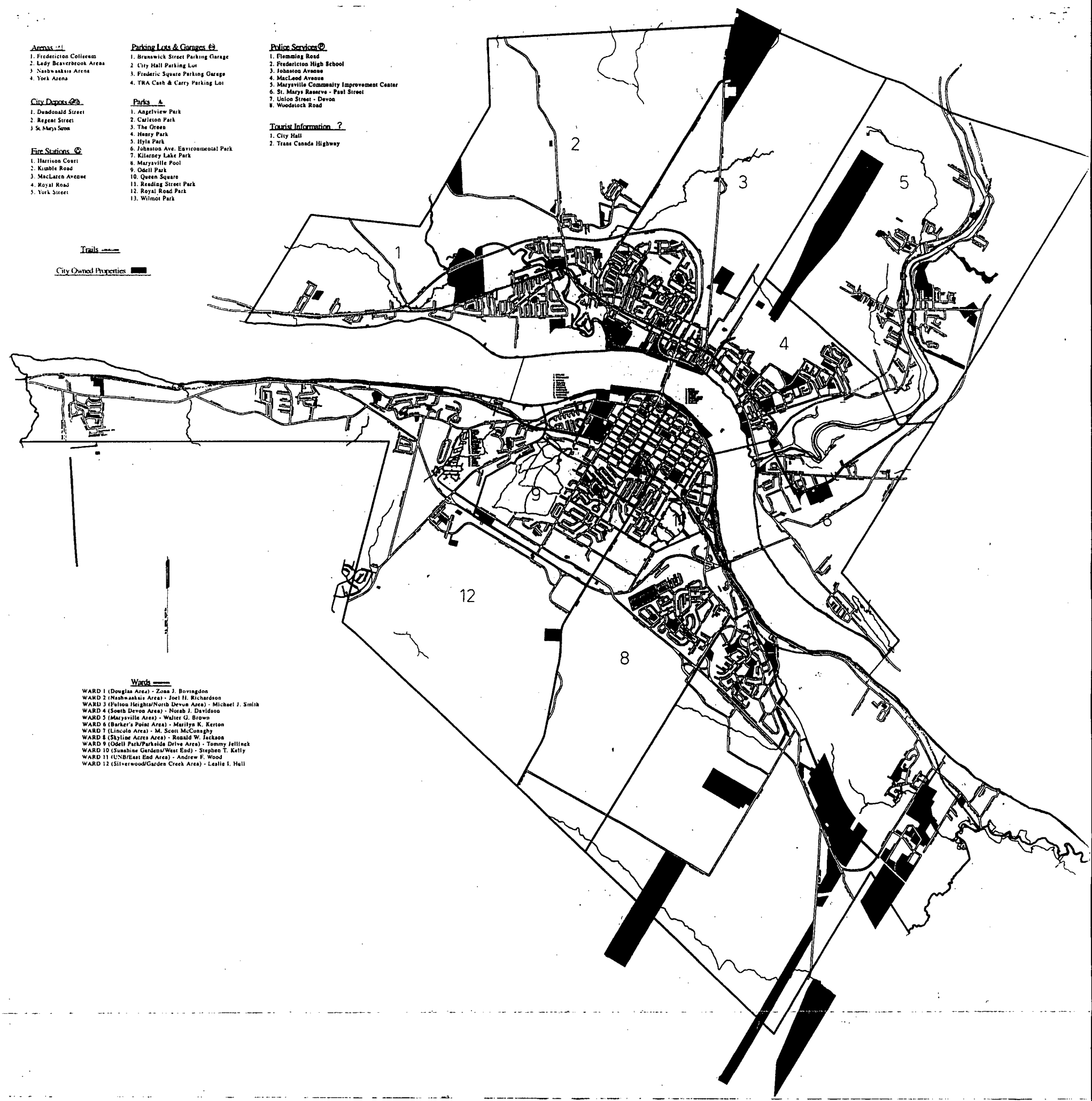
Parks
1. Angelview Park
2. Carleton Park
3. The Green
4. Henry Park
5. Hyla Park
6. Johnston Ave. Environmental Park
7. Killarney Lake Park
8. Maryaville Pool
9. Odell Park
10. Queen Square
11. Reading Street Park
12. Royal Road Park
13. Wilmot Park

Trails

City Owned Properties

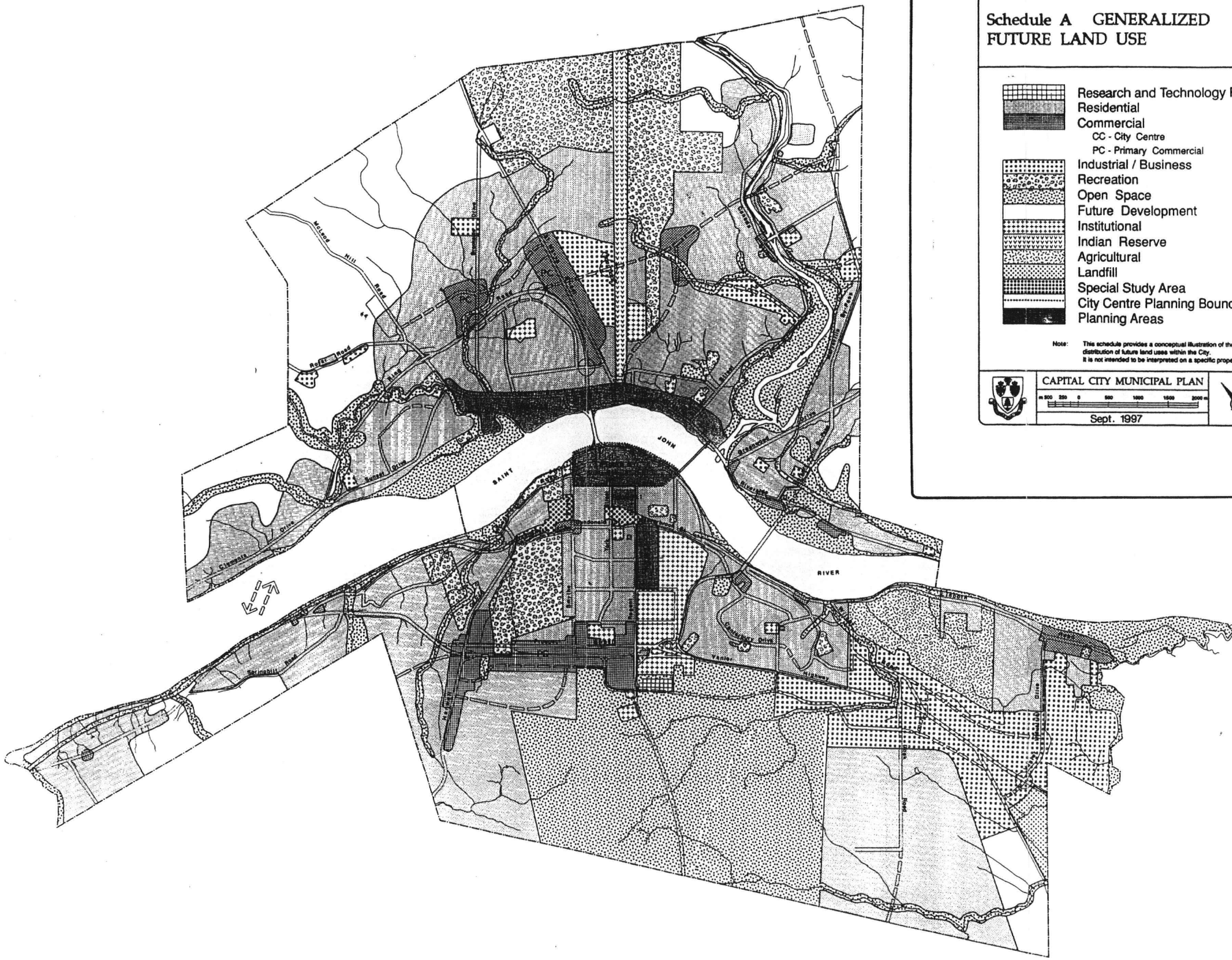
Police Services
1. Flemming Road
2. Fredericton High School
3. Johnston Avenue
4. MacLeod Avenue
5. Maryaville Community Improvement Center
6. St. Marys Reserve - Paul Street
7. Union Street - Devon
8. Woodstock Road

Tourist Information
1. City Hall
2. Trans Canada Highway



Wards

WARD 1 (Douglas Area) - Zona J. Bovingdon
WARD 2 (Nashwaaksis Area) - Joel H. Richardson
WARD 3 (Fulton Heights/North Devon Area) - Michael J. Smith
WARD 4 (South Devon Area) - Norah J. Davidson
WARD 5 (Marysville Area) - Walter G. Brown
WARD 6 (Barker's Point Area) - Marilyn K. Kerton
WARD 7 (Lincoln Area) - M. Scott McConaghy
WARD 8 (Skyline Acres Area) - Ronald W. Jackson
WARD 9 (Odell Park/Parkside Drive Area) - Tommy Jellinek
WARD 10 (Sunshine Gardens/West End) - Stephen T. Kelly
WARD 11 (UNB/East End Area) - Andrew F. Wood
WARD 12 (Silverwood/Garden Creek Area) - Leslie I. Hull



Schedule A GENERALIZED FUTURE LAND USE

- Research and Technology Park
- Residential
- Commercial
  - CC - City Centre
  - PC - Primary Commercial
- Industrial / Business
- Recreation
- Open Space
- Future Development
- Institutional
- Indian Reserve
- Agricultural
- Landfill
- Special Study Area
- City Centre Planning Boundary
- Planning Areas

Note: This schedule provides a conceptual illustration of the distribution of future land uses within the City. It is not intended to be interpreted on a specific property basis.

CAPITAL CITY MUNICIPAL PLAN

Sept. 1997

CITY OF FREDERICTON
ZONING BY-LAW Nº Z-2

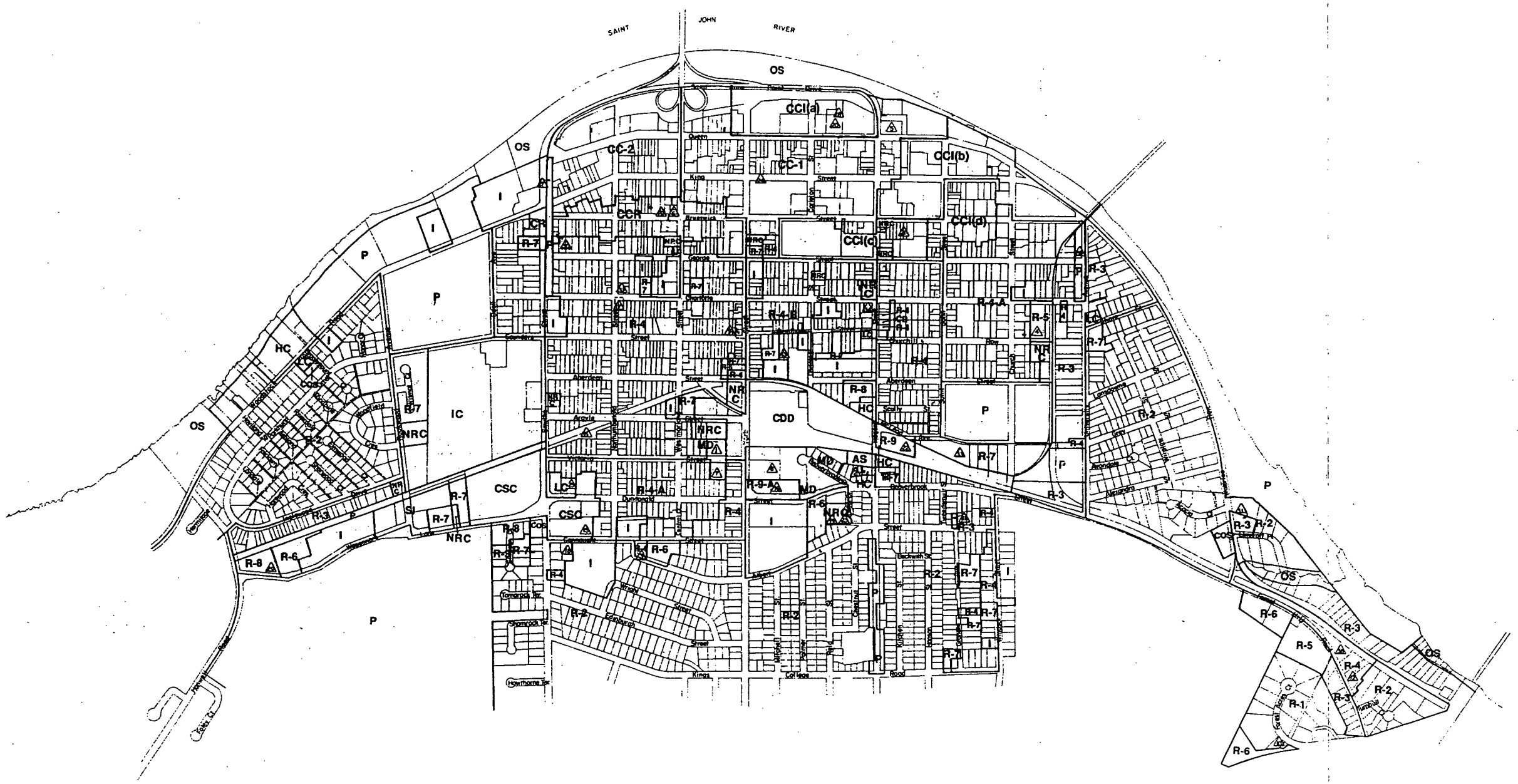
Mayor [signature] Clerk [signature]

Date: March 13, 1995 Scale 1 : 5 000

Revised Date: Approved By: [signature]

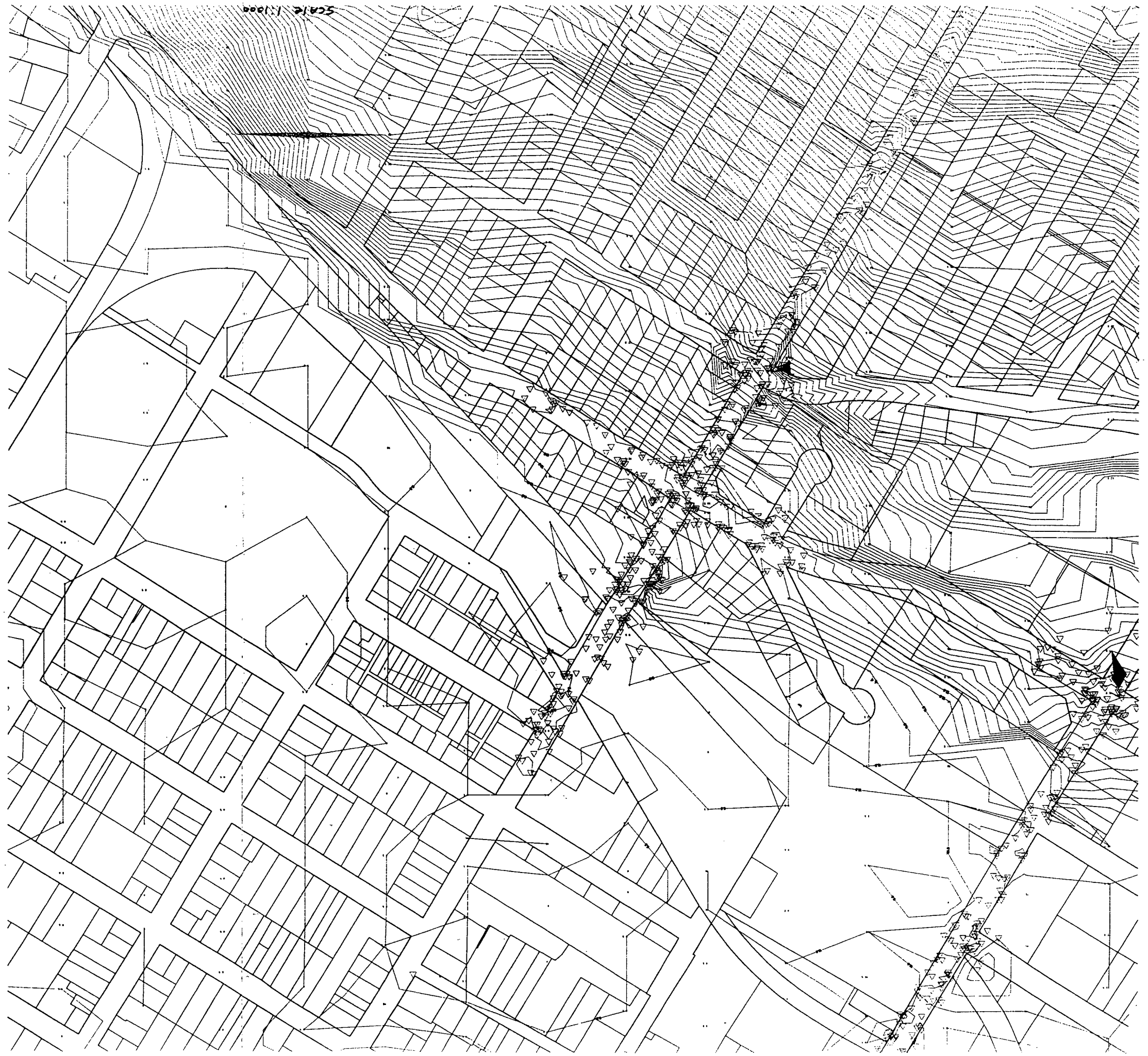
AMENDMENTS

By-Law Nº	Date	Revision Nº
Z-2.3	1995-7-24	1
Z-2.2	1995-11-15	2
Z-2.14	1996-4-22	3
Z-2.37	1996-6-10	4
Z-2.36	1996-7-24	5
Z-2.39	1996-7-26	6
Z-2.44	1996-9-10	7
Z-2.41	1996-9-10	8
Z-2.43	1996-8-26	9
Z-2.46	1996-11-26	10
Z-2.50	1996-11-27	11
Z-2.51	1996-10-15	12
Z-2.52	1996-11-12	13
Z-2.58	1997-1-30	14
Z-2.63	1997-3-13	15
Z-2.64	1997-3-13	16
Z-2.67	1997-5-16	17
Z-2.70	1997-5-8	18
Z-2.73	1997-6-13	19
Z-2.76	1997-6-9	20
Z-2.78	1997-6-13	21
Z-2.65	1997-7-9	22
Z-2.80	1997-9-16	23
Z-2.92	1997-11-17	24
Z-2.116	1998-5-2	25
Z-2.118	1998-5-12	26
Z-2.114	1998-5-12	27
Z-2.120	1998-5-25	28
Z-2.119	1998-5-25	29
Z-2.129	1998-8-12	30
Z-2.130	1998-8-12	31
Z-2.131	1998-8-12	32
Z-2.125	1998-8-26	33
Z-2.133	1998-9-16	34
Z-2.134	1998-9-16	35



SCHEDULE S-3


Churchill
Aberdeen
Carleton Street
Regent Street
Scully Street
McLeod
Avenue
CDD
01479849
75334110
MD
01448604
Office building
Business complex
Parks & Trees
Fire Station
Baseball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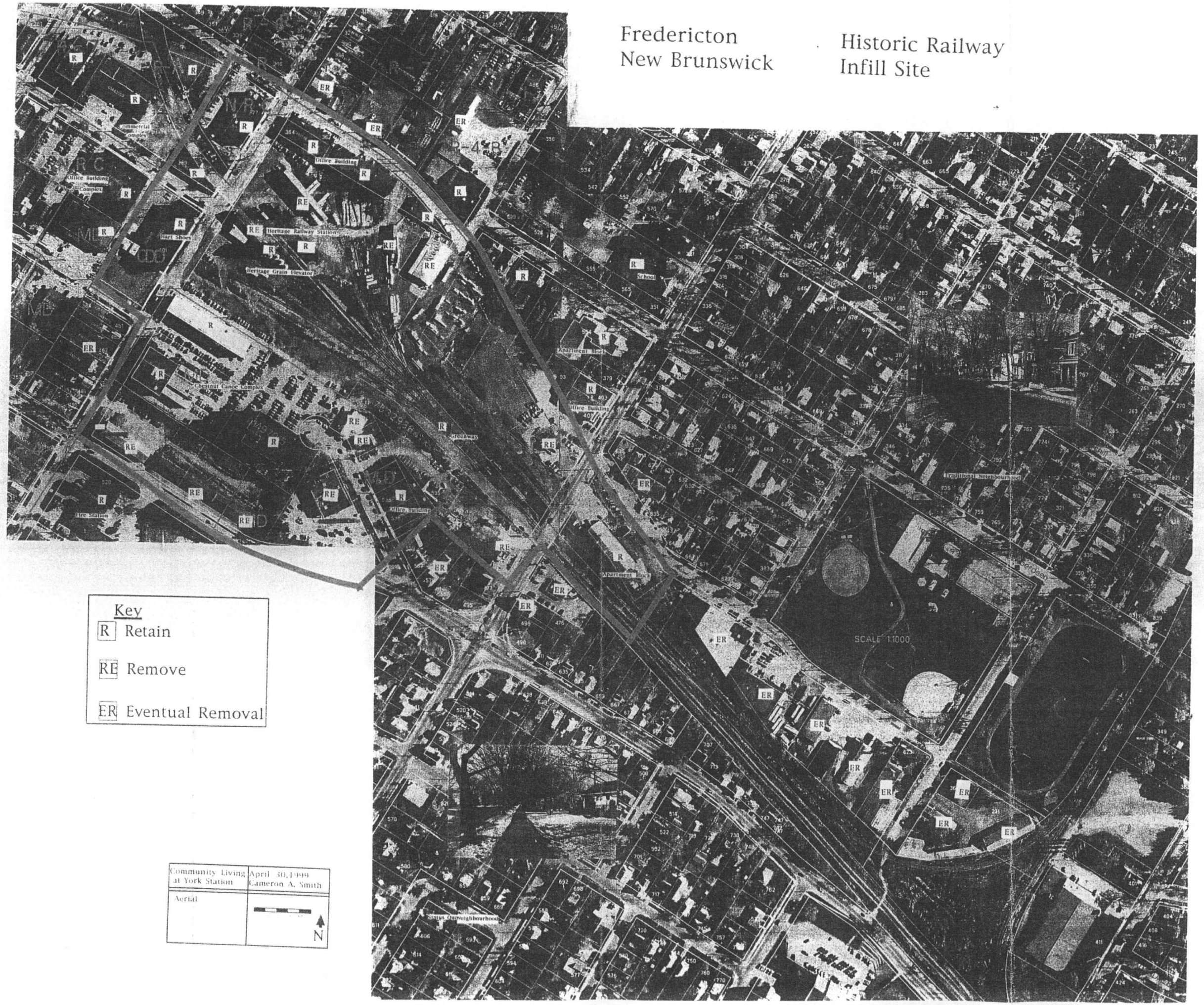
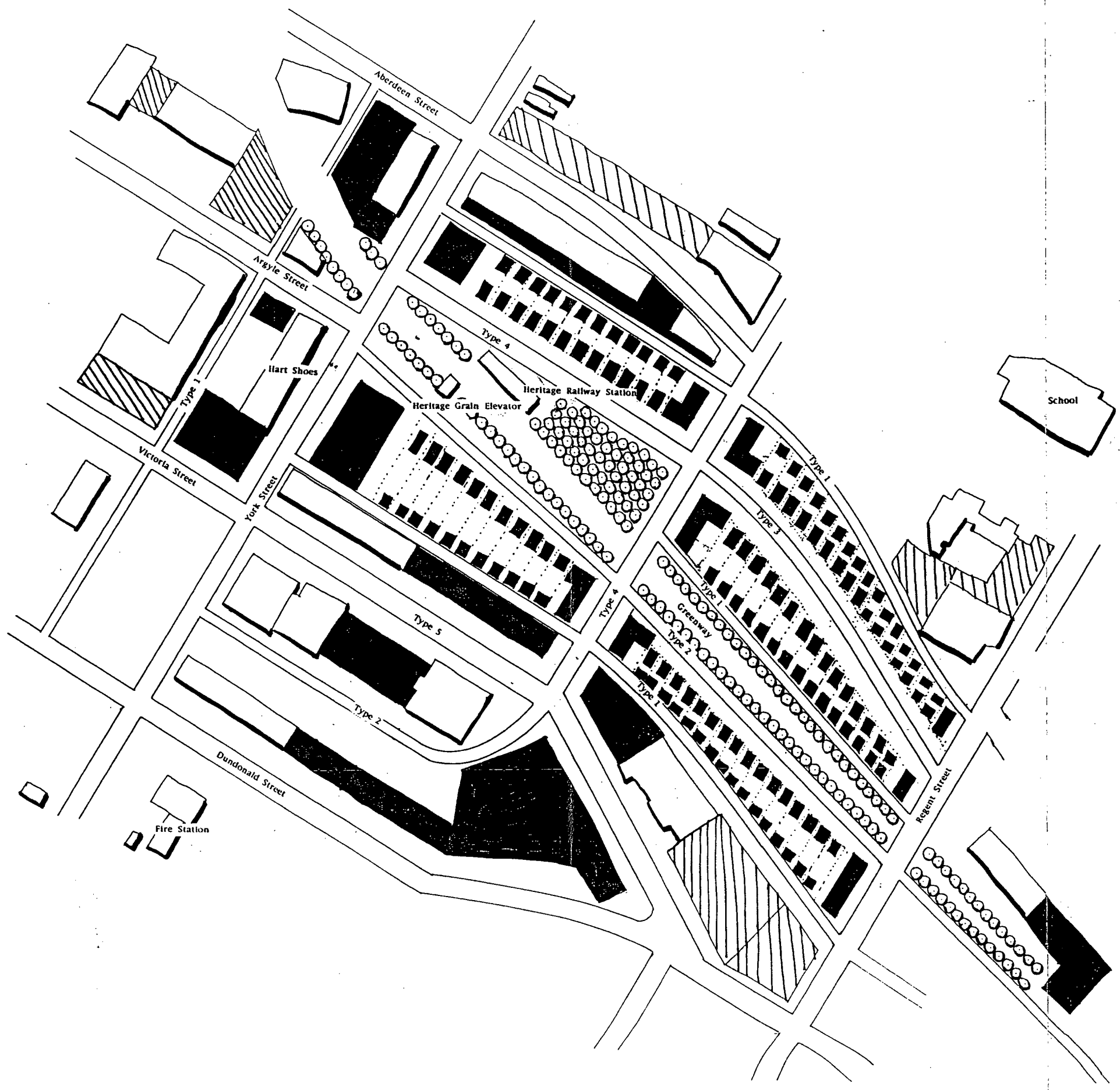
Fredericton
New Brunswick

Historic Railway
Infill Site





Key

- Existing
- Proposed
- Proposed - Outside Study Area

Street Key

Type 1- Back of House,access to garage unit, 6.25m

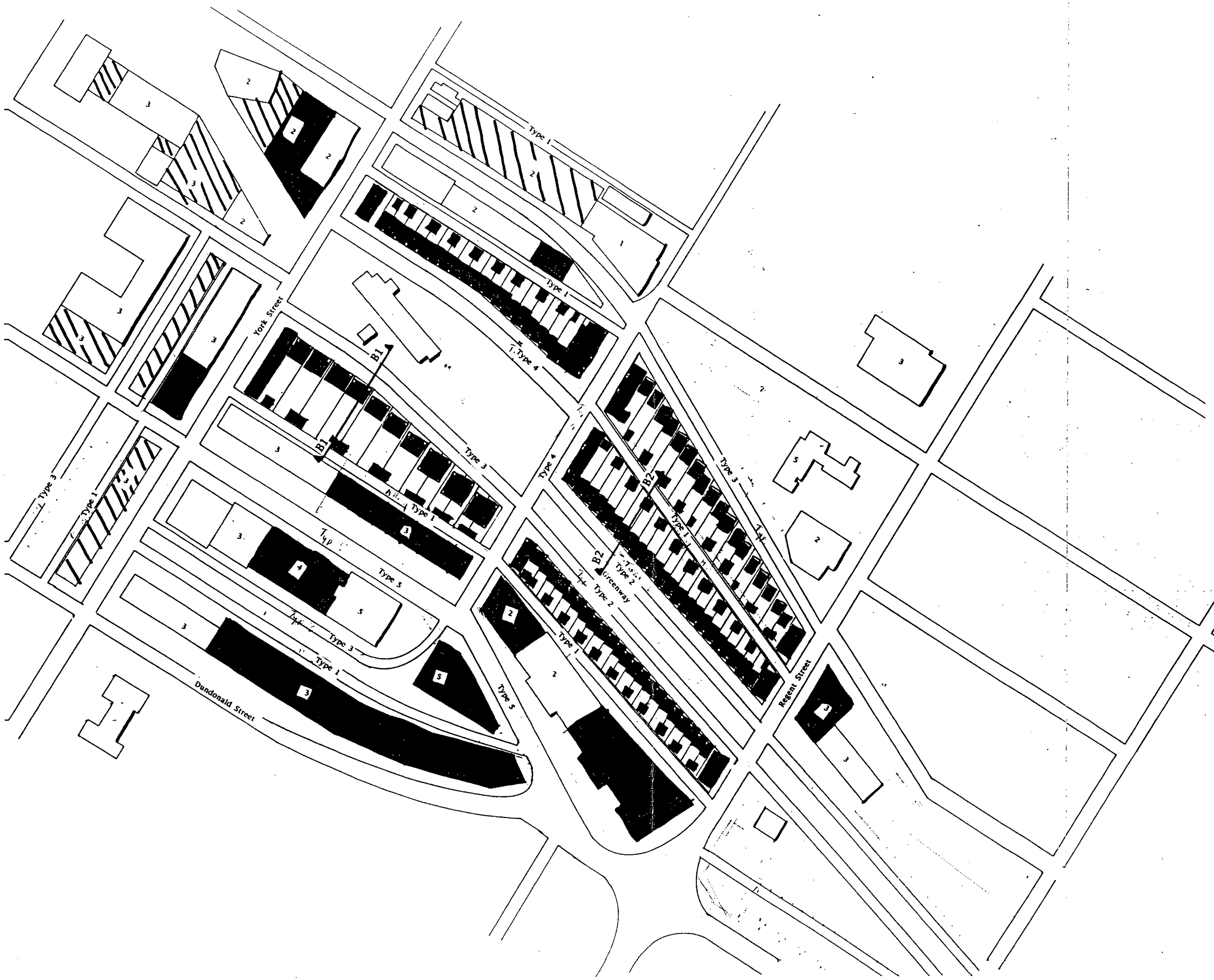
Type 2- One way, parking on one side, 5.5m

Type 3- Two way, parking on one side,6.25m

Type 4- Two way, parking on both sides, 11.5m

Type 5- Two way, commercial parking on both sides 12.5m

Community Living at York Station	April 30,1999 Cameron A. Smith
Plan A	0m 20m 30m 40m 50m N



Key

- Existing
- Proposed
- Proposed - Outside Study Area

Street Key

Type 1- Back of House,access to garage unit, 6.25m

Type 2- One way, parking on one side, 5.5m

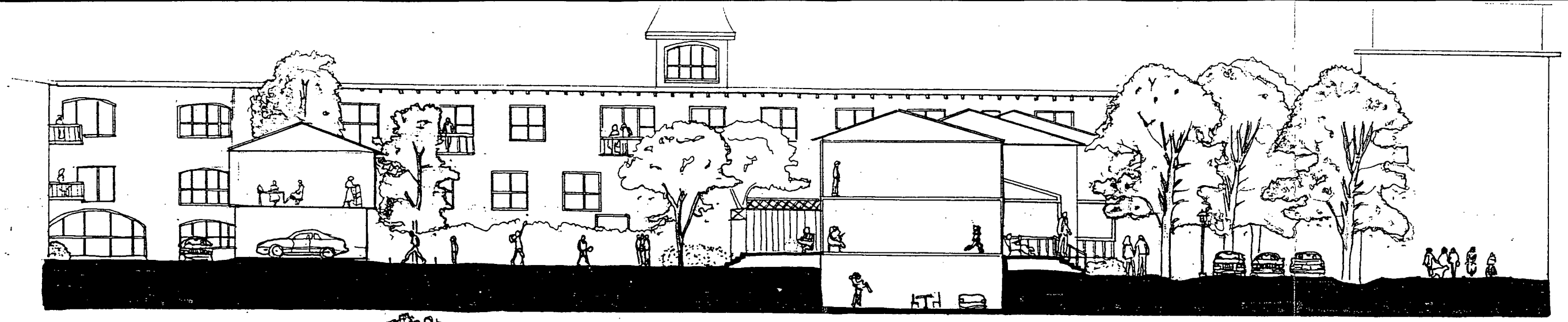
Type 3- Two way, parking on one side,6.25m

Type 4- Two way, parking on both sides, 11.5m

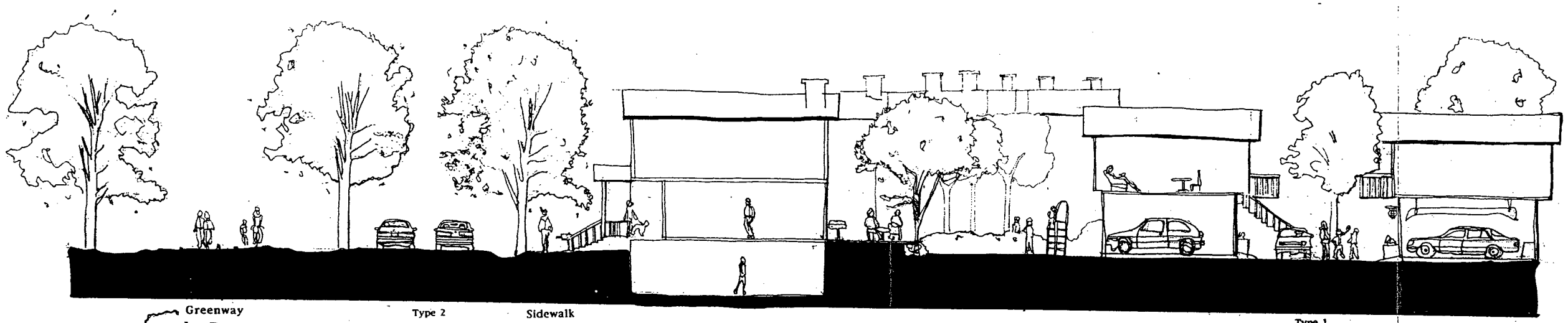
Type 5- Two way, commercial parking on both sides 12.5m

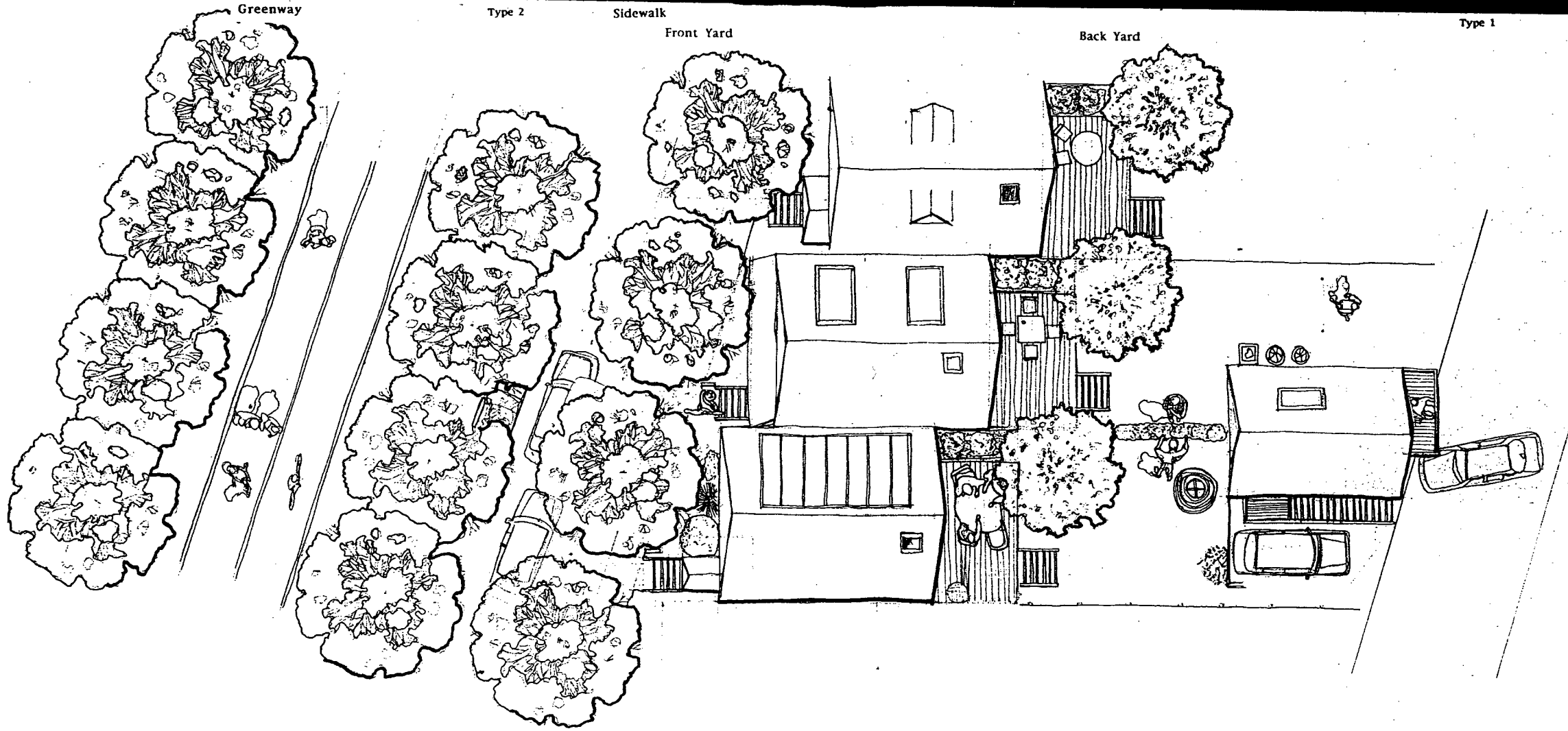
*Numbers Signify Building Stories

Community Living at York Station	April 30,1999 Cameron A. Smith
Plan B	0 10 20 30 40 50 N

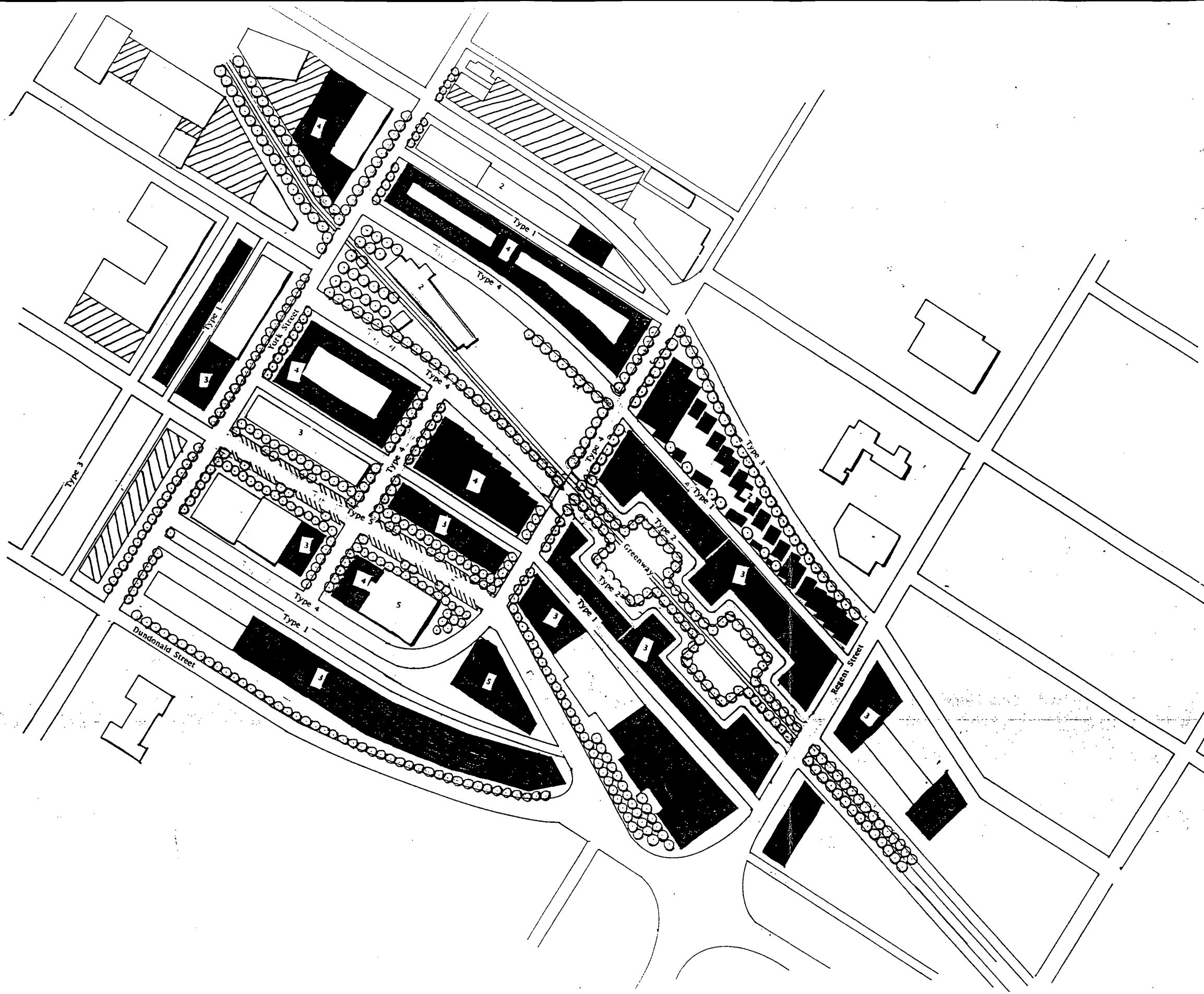


Community Living at York Station	April 30,1999 Cameron A. Smith
Section B1-B1 Plan B	0 1m 2 3 4 6 N





Community Living at York Station	April 30,1999 Cameron A. Smith
Section B2-B2 Plan B	0 1 2 3 4 5 N



Key

- Existing
- Proposed
- Proposed - Outside Study Area

Street Key

Type 1- Back of House,access to garage unit, 6.25m

Type 2- One way, parking on one side, 5.5m

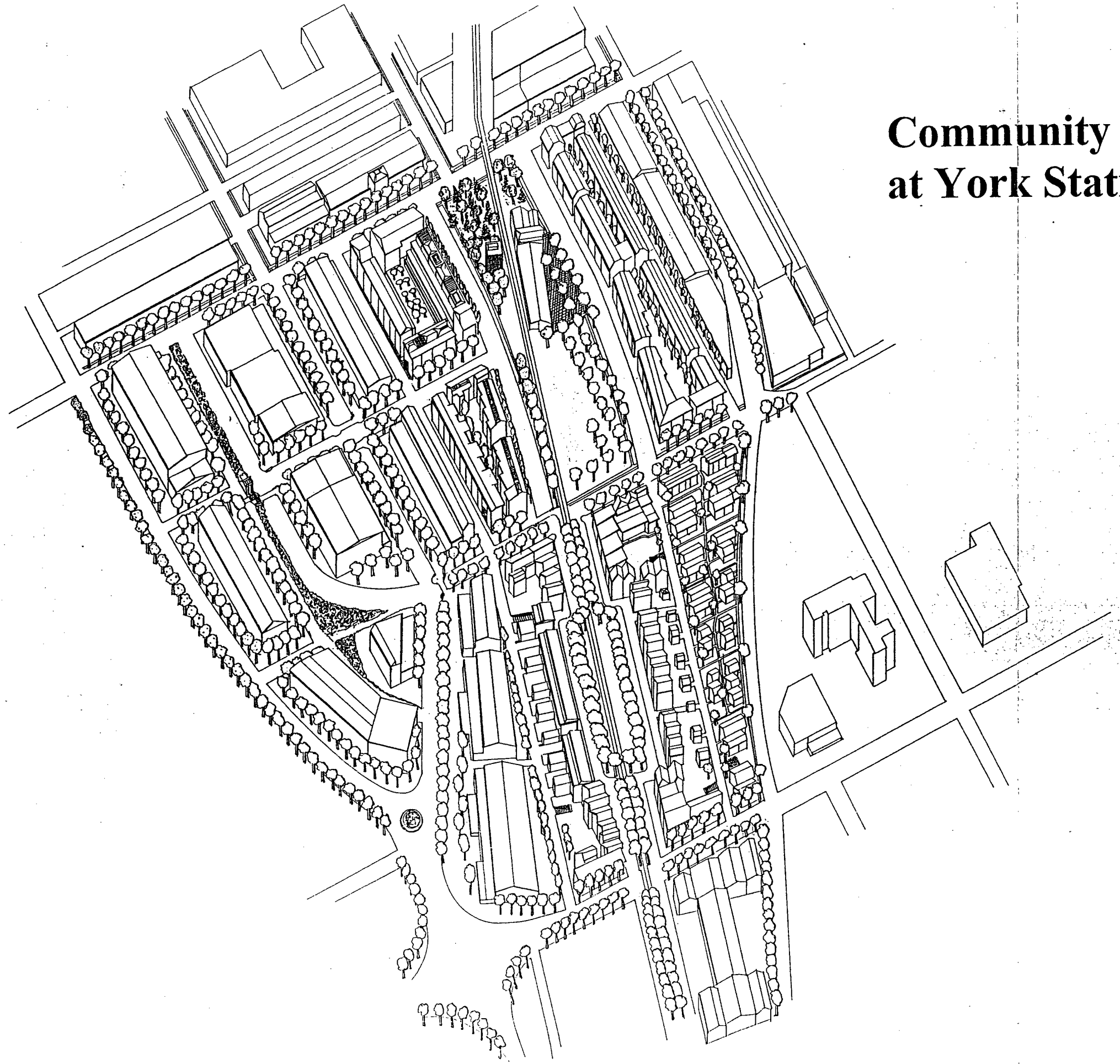
Type 3- Two way, parking on one side,6.25m

Type 4- Two way, parking on both sides, 11.5m

Type 5- Two way, commercial parking on both sides 12.5m

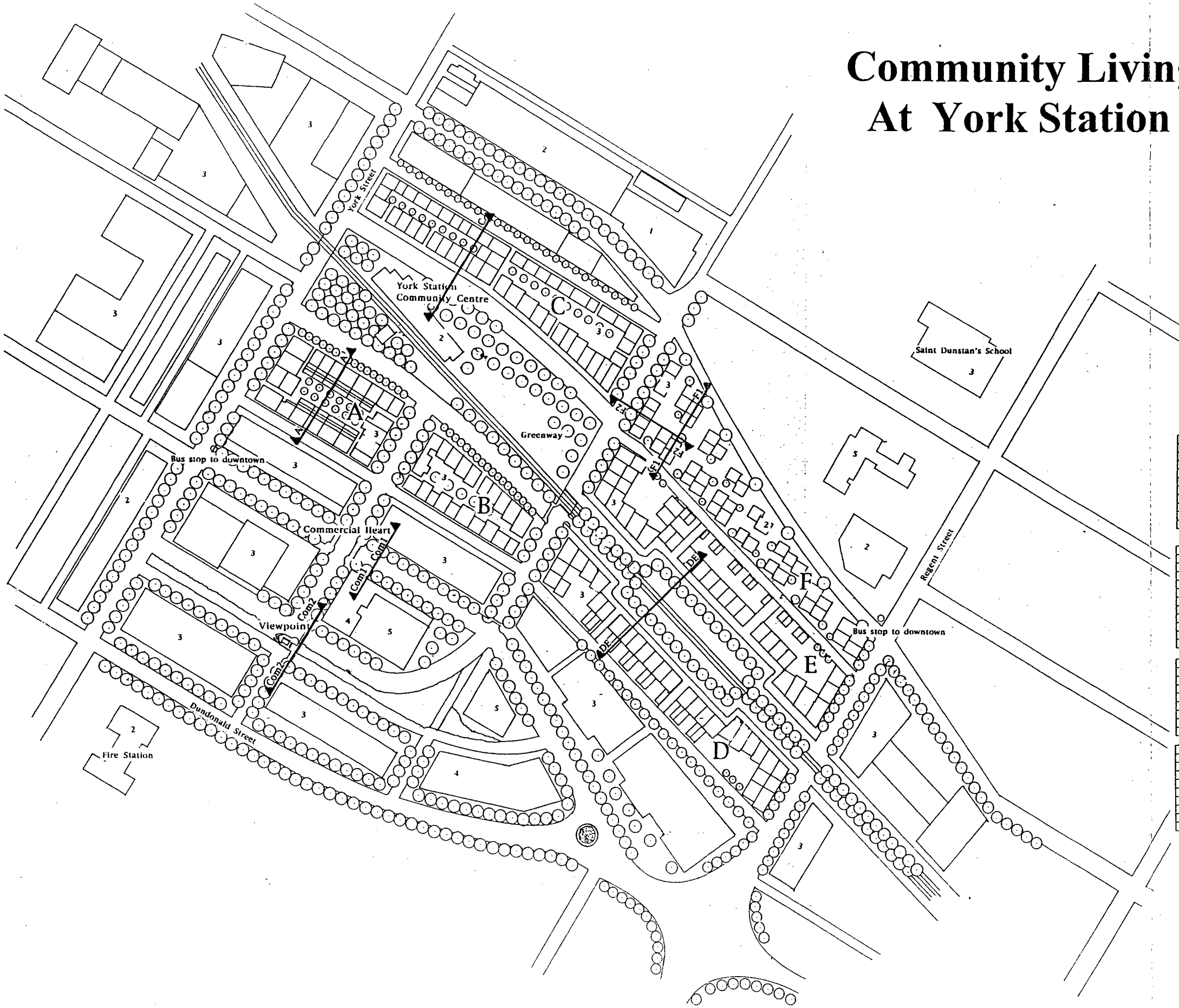
Community Living at York Station	April 30,1999 Cameron A. Smith
Plan C	0 10m 20 30 40 50 N

Community Living at York Station



Community Living at York Station	April 30,1999 Cameron A. Smith
Axonometric with Vegetation	0 10 20 30 40 50 N

Community Living At York Station



Key
- High Density
- Medium High
- Medium
- Low
- Commercial
- Civic

*Numbers Signify Building Stories

	A	B	C	D	E	F	G	H
1	Unit Total	Average Siz	Total Sqft	Commercial sqft approx	Total Site Sqft		GSFR	
2								
3	A-F	9 X 10m	968					
4	606		586608					
5				415040	1579464		1.001585	
6	Apt Blocks	8 X 10m	861					
7	657		565677					
8								
9			Total					
10			1152285					

	A	B	C	D
1	# UPA	#UPHa	#Persons PA(2pu)	#perpHa
2	36	15		
3			72	30
4				
5				
6			Total 2520	
7				
8				
9				
10				
11				

	A	B
1	Traditional Average	
2	(Fredericton)	
3		
4	#UPA	6.6
5		
6	#UpHa	2.75
7		
8		

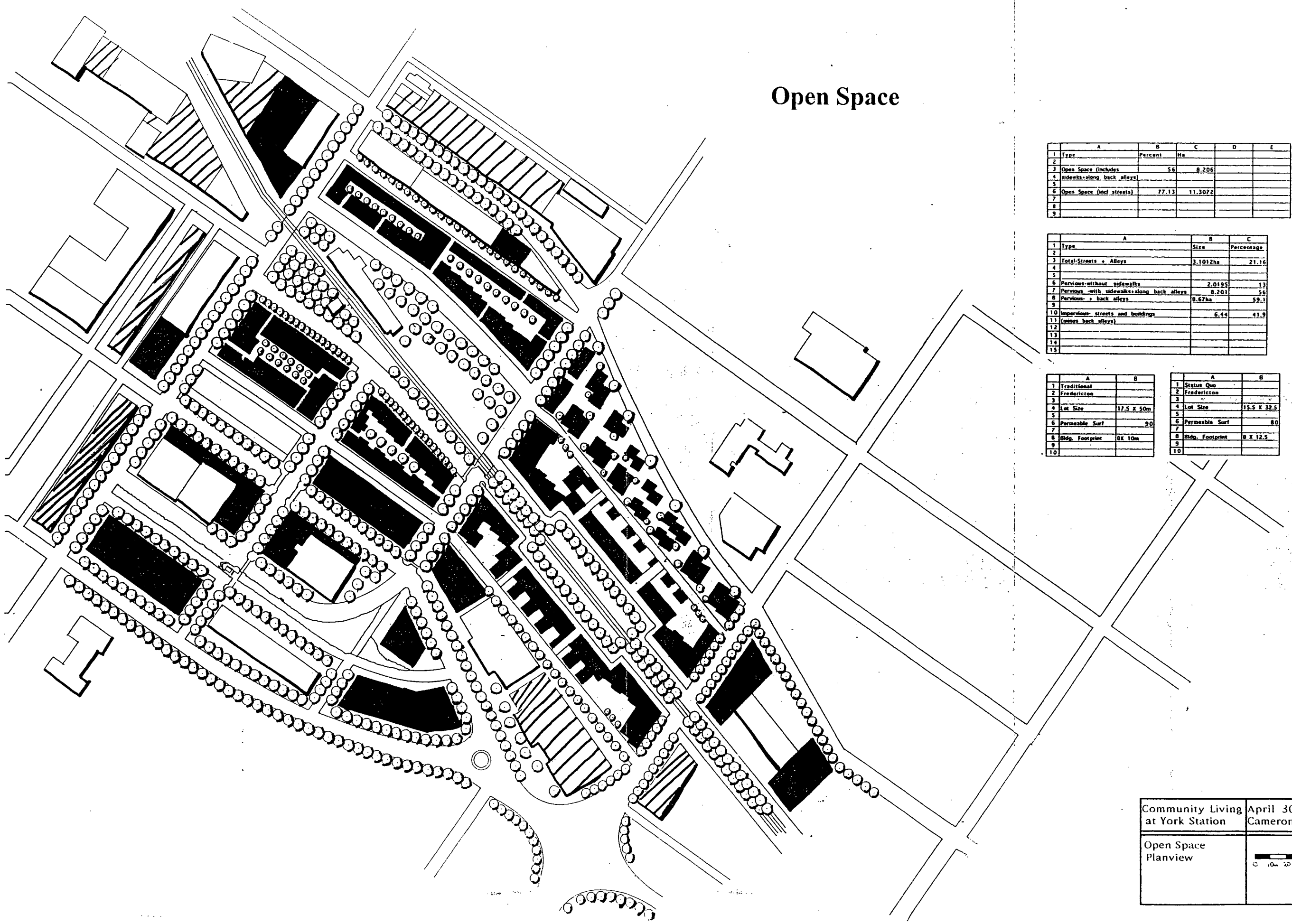
	A	B
1	Status Quo Average	
2	(Fredericton)	
3		
4	#UPA	5
5		
6	#UpHa	2
7		
8		

	A	B
1	Traditional Block	200 X 80
2	Size(F'ton)	
3		
4	Street Comm	12.5m
5	R.O.W.	20m
6	Street Resid	8.5m
7		
8		
9		

	A	B
1	Status Quo Block	300 X 45
2	Size(F'ton)	
3		
4	Street Comm	24.5m
5	R.O.W	20m
6	Street Resid	8.5m
7		
8		
9		

Community Living at York Station	April 30,1999 Cameron A. Smith
Final Design Plan	0 10 20 30 40 50 N

Open Space



	A	B	C	D	E
1	Type	Percent	Ha		
2					
3	Open Space (includes	56	8.206		
4	sidewks+along back alleys)				
5					
6	Open Space (incl streets)	77.13	11.3072		
7					
8					
9					

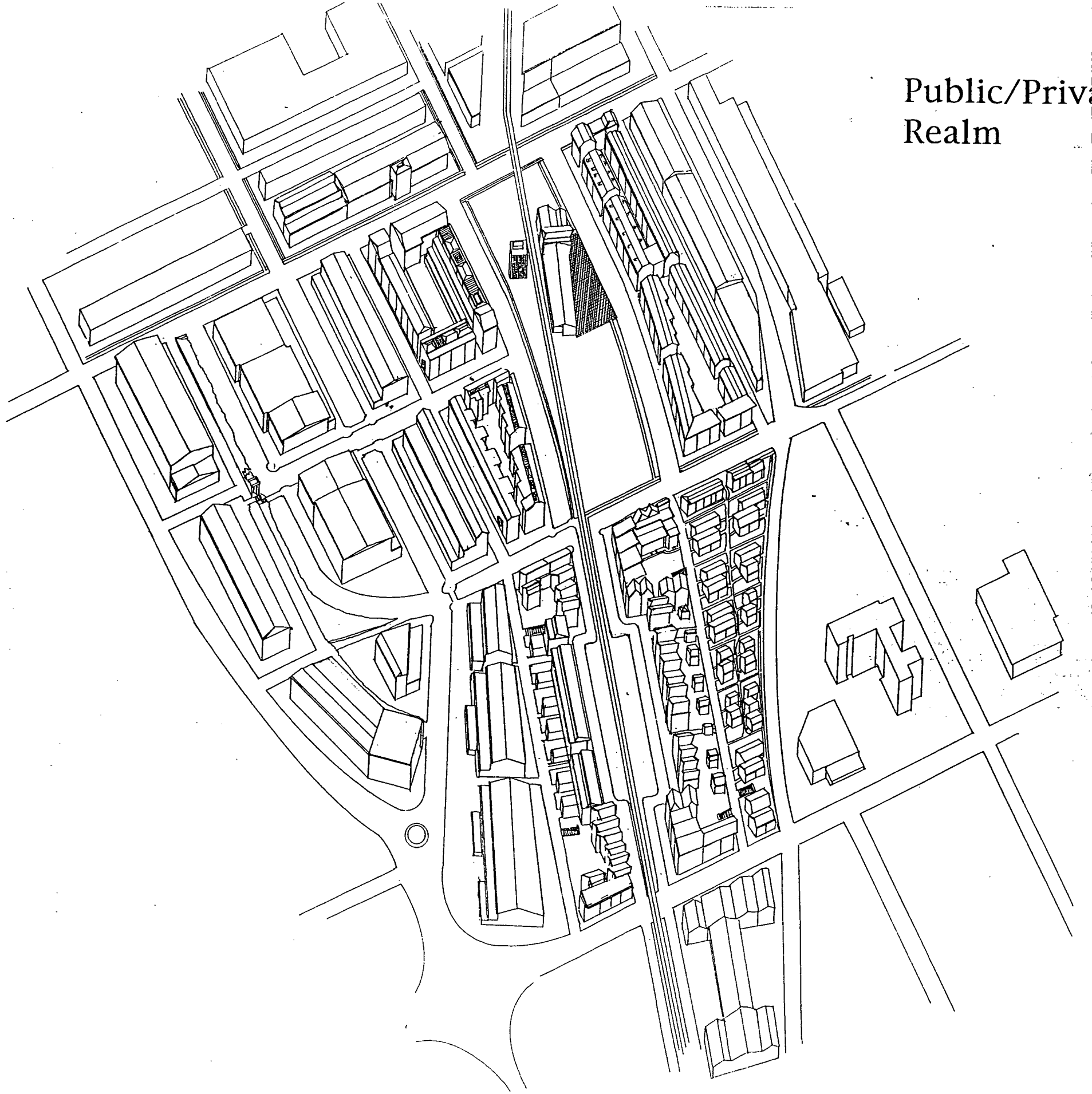
	A	B	C
1	Type	Size	Percentage
2			
3	Total-Streets + Alleys	3.1012ha	21.16
4			
5			
6	Pervious-without sidewalks	2.0195	13
7	Pervious -with sidewalks+along back alleys	8.201	56
8	Pervious- + back alleys	8.67ha	59.1
9			
10	Impervious- streets and buildings	6.44	41.9
11	(minus back alleys)		
12			
13			
14			
15			

	A	B
1	Traditional	
2	Fredericton	
3		
4	Lot Size	17.5 X 50m
5		
6	Permeable Surf	90
7		
8	Bldg. Footprint	8X 10m
9		
10		

	A	B
1	Status Quo	
2	Fredericton	
3		
4	Lot Size	15.5 X 32.5
5		
6	Permeable Surf	80
7		
8	Bldg. Footprint	8 X 12.5
9		
10		

Community Living at York Station	April 30,1999 Cameron A. Smith
Open Space Planview	0 10m 20 30 40 50 N

Public/Private Realm



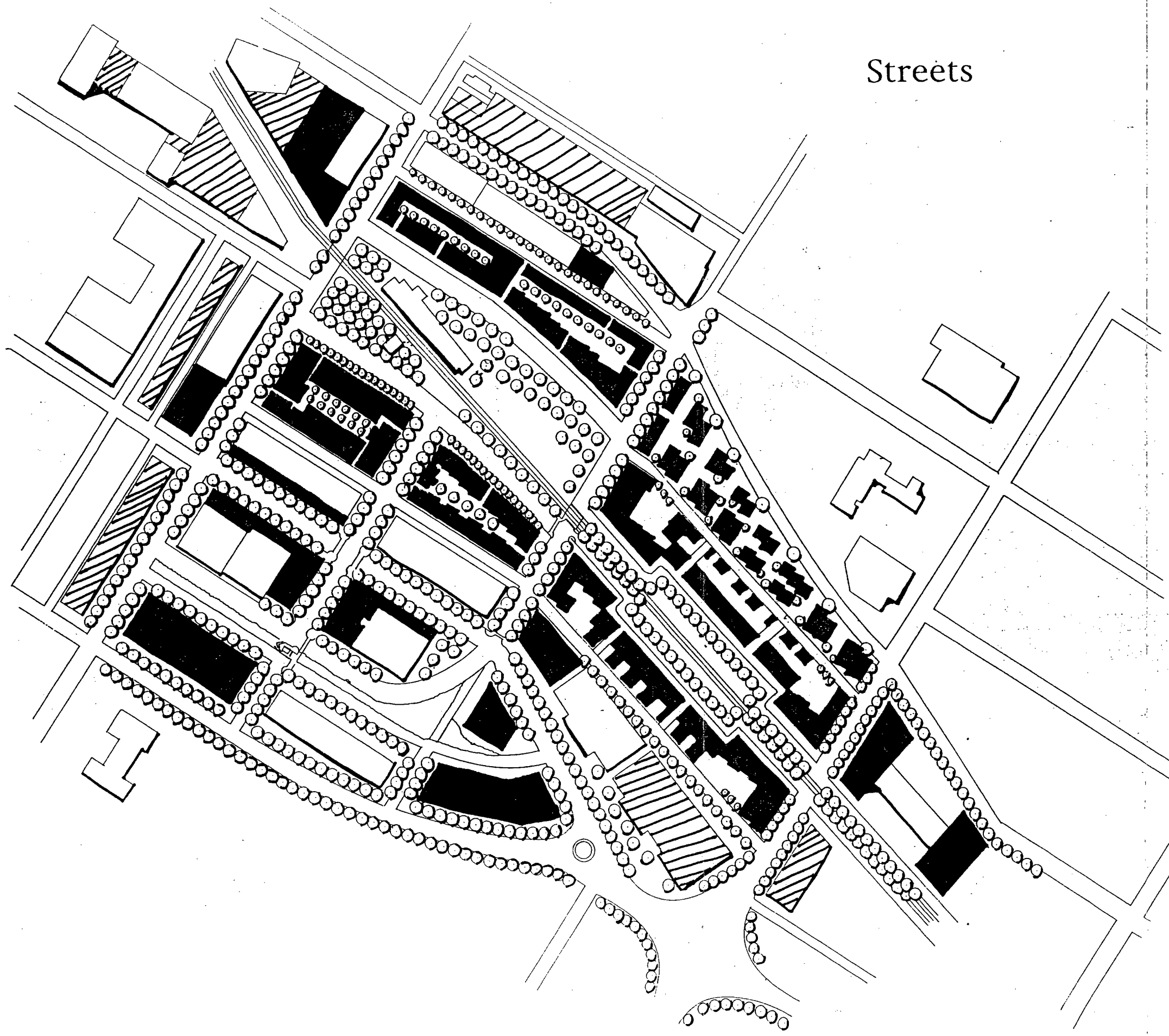
Key

- Public
- Semi-Public
- Private
- Semi-private
- Civic
- Ecological

	A	B
1	Trad. Setback	
2	F'ton	
3		
4	Resid.	8m
5		
6	Commercial	8m
7		
8		
9		
10		

Community Living at York Station	April 30,1999 Cameron A. Smith
Axonometric Public/Private Realm	0 10 20 30 40 50 N

Streets

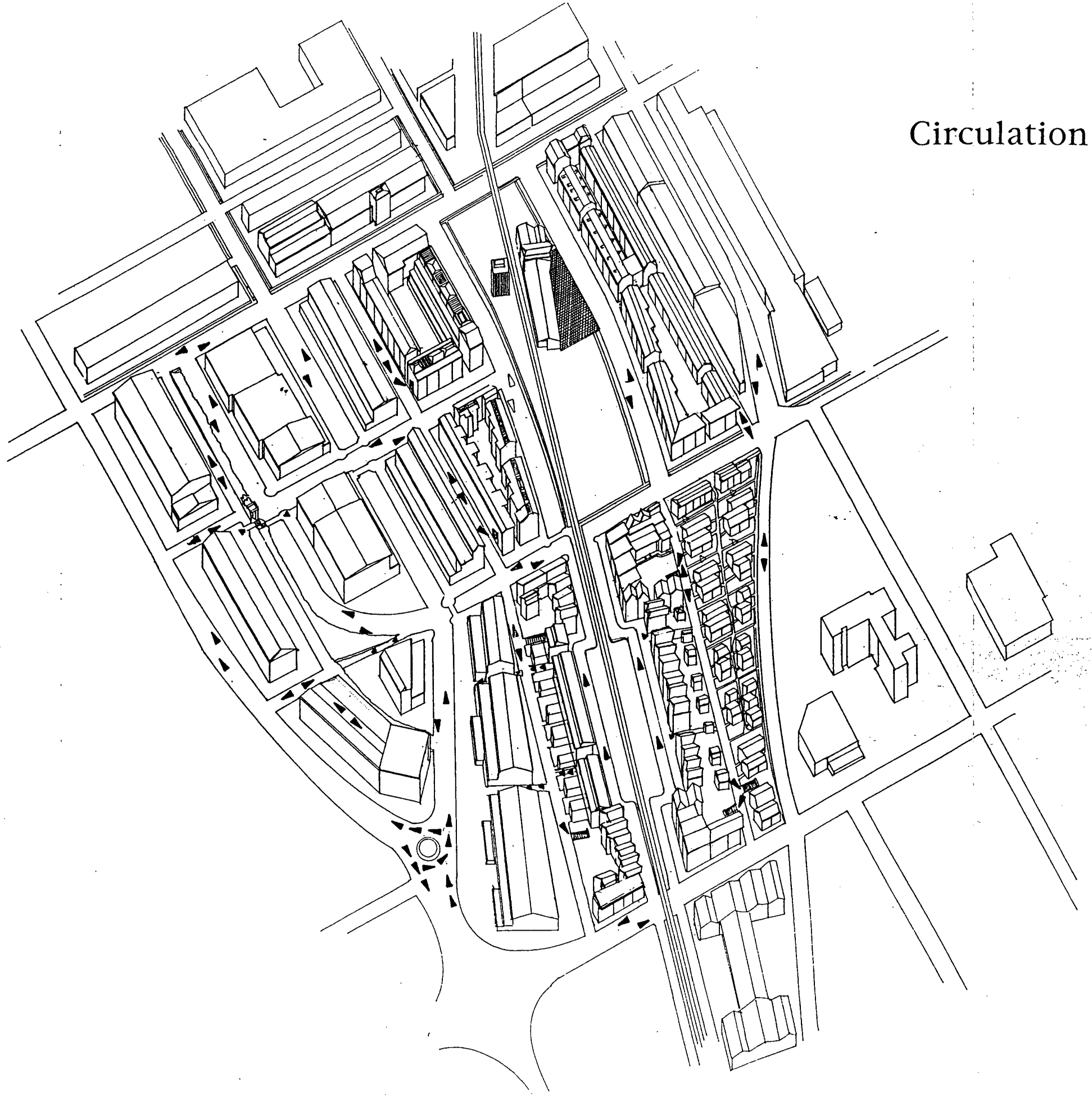


Key

- Type 1-Lane (6.25)
- Type 2-Residential Mews- One Way,Parking on One Side (5.5m)
- Type 3-Residential- Two Way Parking on one side (6.25m)
- Type 4- Neighbourhood Main -Two Way, Parking on both sides (11.5m)
- Type 5- High Street, Two Way,Parking on both sides (12.5m)

Community Living at York Station	April 30,1999 Cameron A. Smith
Streets Planview	0 10m 20 30 40 50 N

Circulation



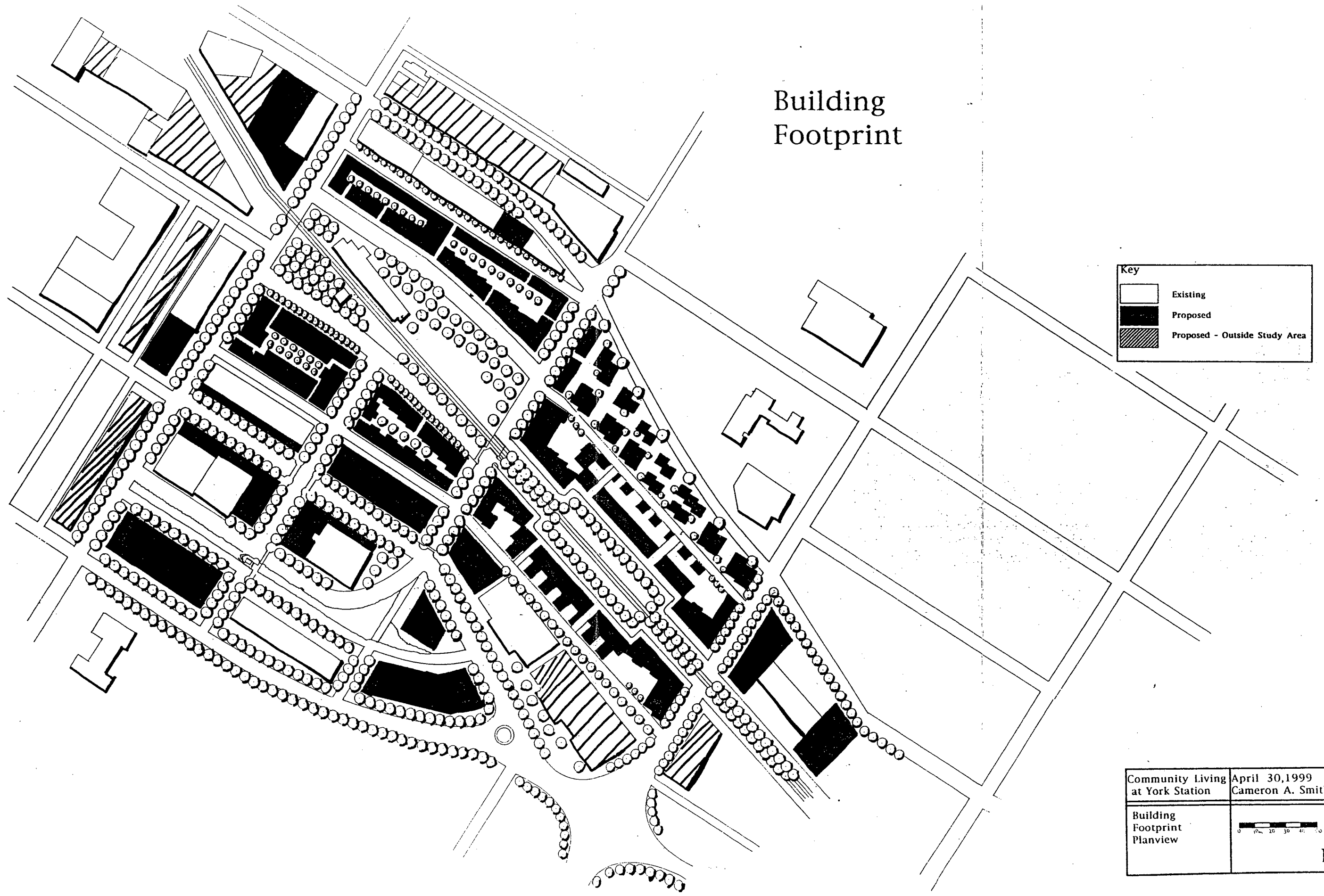
Key
- Automobile
- Bicycle
- Pedestrian

Community Living at York Station	April 30,1999 Cameron A. Smith
Axonometric Circulation	N

Water Flow

Community Living at York Station	April 30,1999 Cameron A. Smith
Water Flow Planview	N

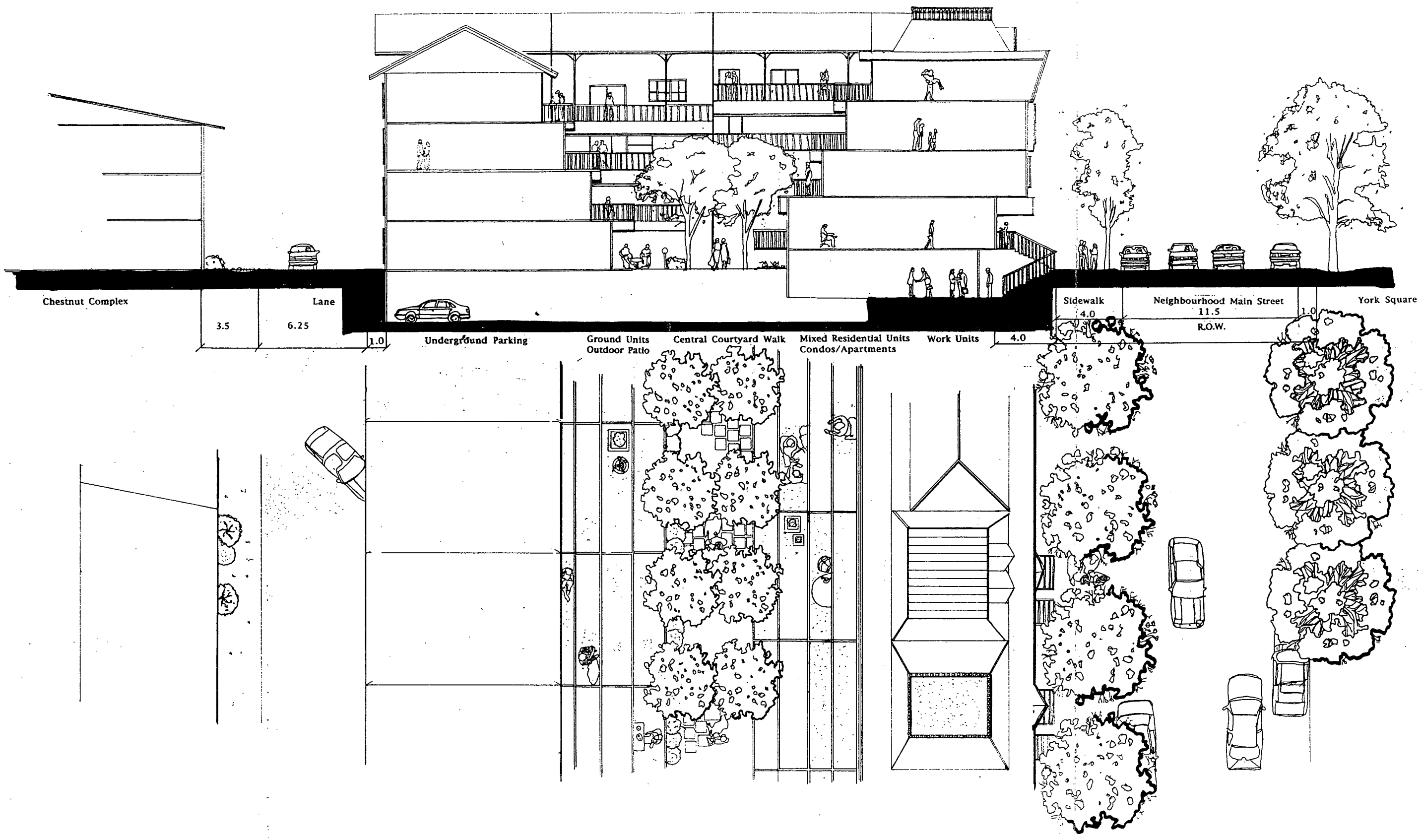
Building Footprint



Community Living at York Station	April 30,1999 Cameron A. Smith
Building Footprint Planview	0 10m 20 30 40 50 N

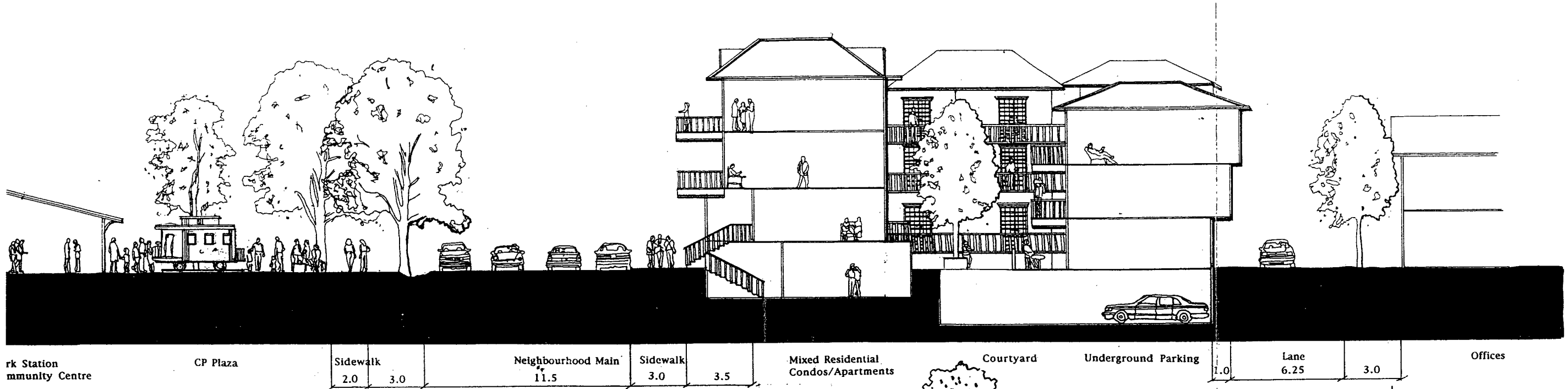
Infill

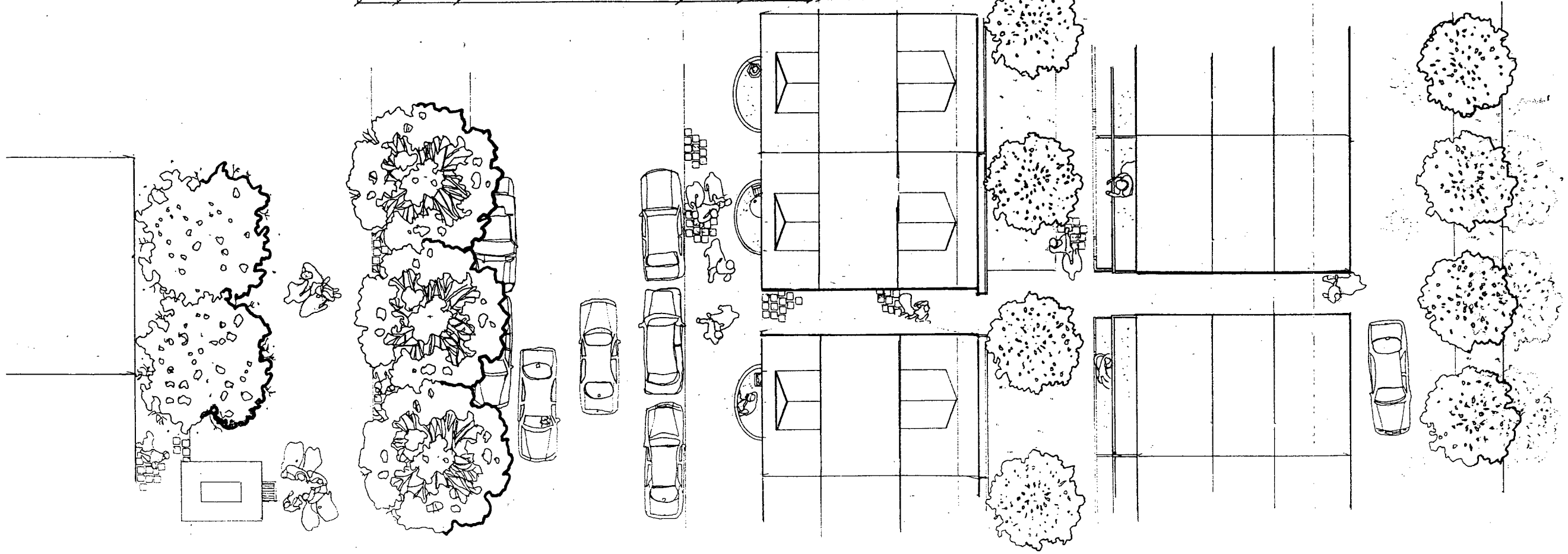
Community Living at York Station	April 30,1999 Cameron A. Smith
Plan View Infill	N



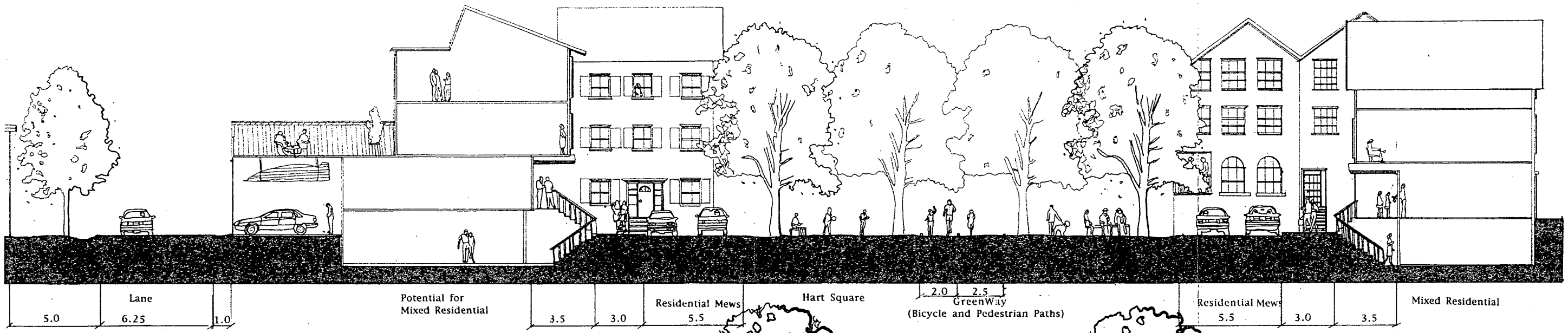
Key
Commercial
Residential

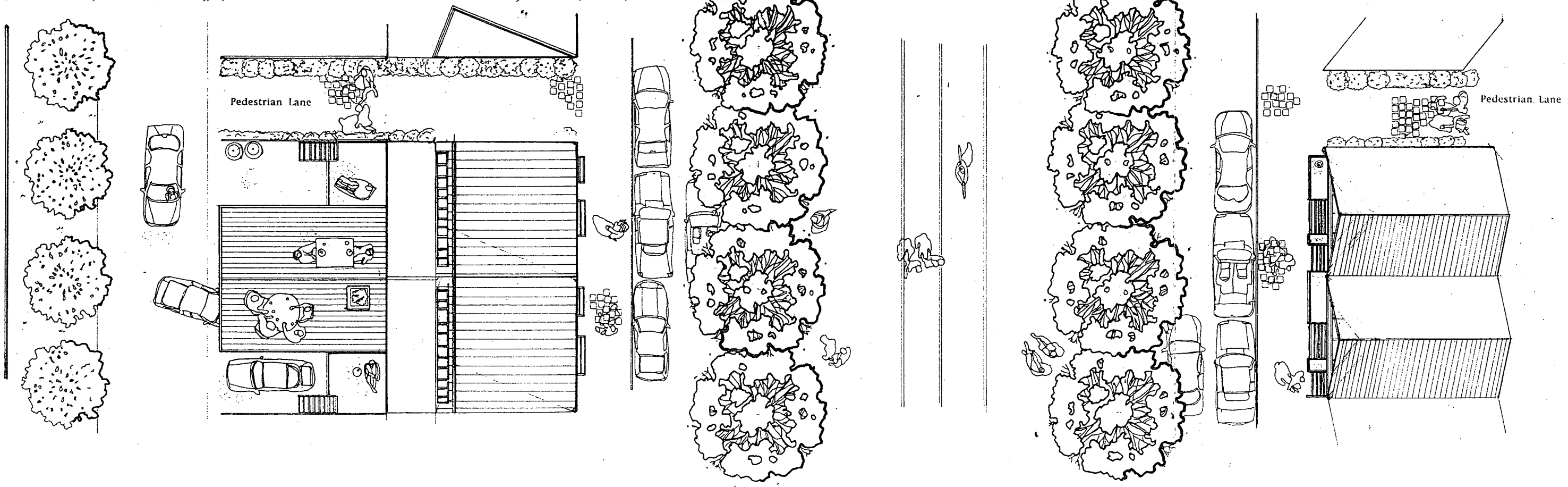
Community Living at York Station	April 30,1999 Cameron A. Smith
Block A Section A-A Plan View	N





Community Living at York Station	April 30,1999 Cameron A. Smith
Block C Section C-C Plan View	0 1 2 3 4 5 N

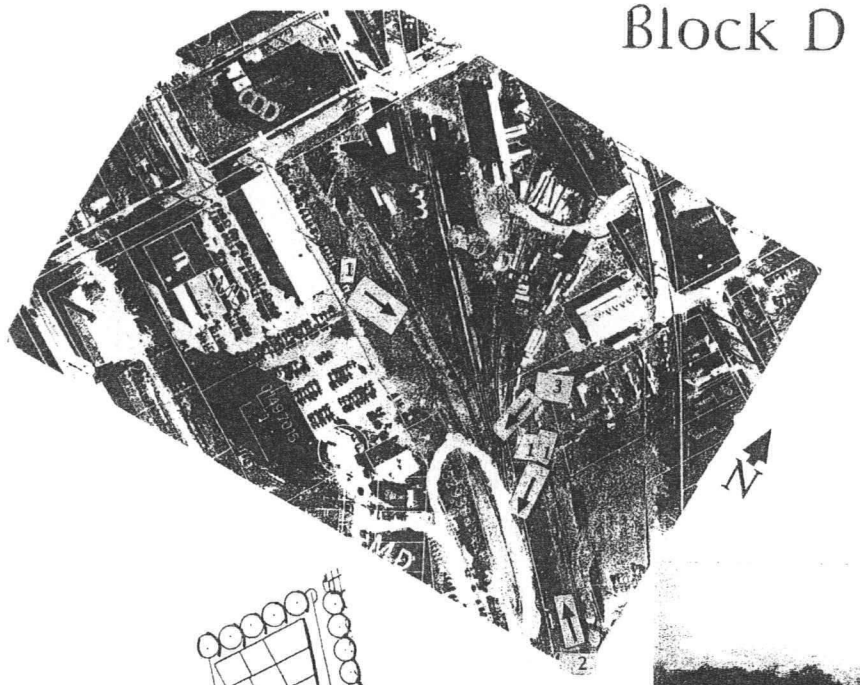


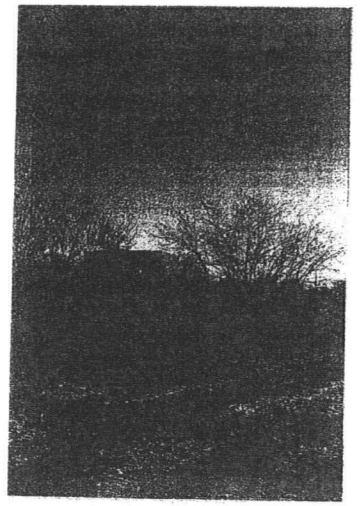


Key
- Ground Unit
- Middle Unit
- Loft

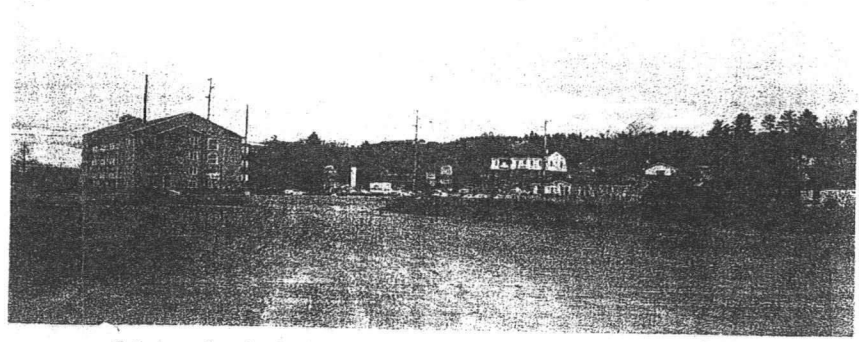
Community Living at York Station	April 30,1999 Cameron A. Smith
Blocks D & E Section DE-DE Plan View	0 1 2 3 4 5 N

Block D





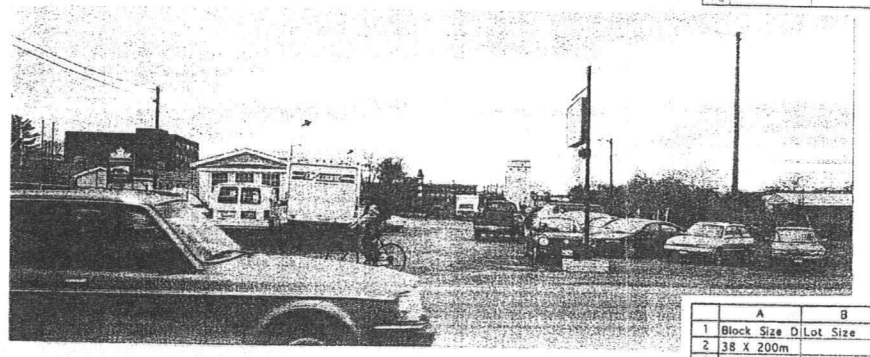
Existing- On Site looking northeast(arrow 1)



Existing- On site-looking east(arrow 1.1.)

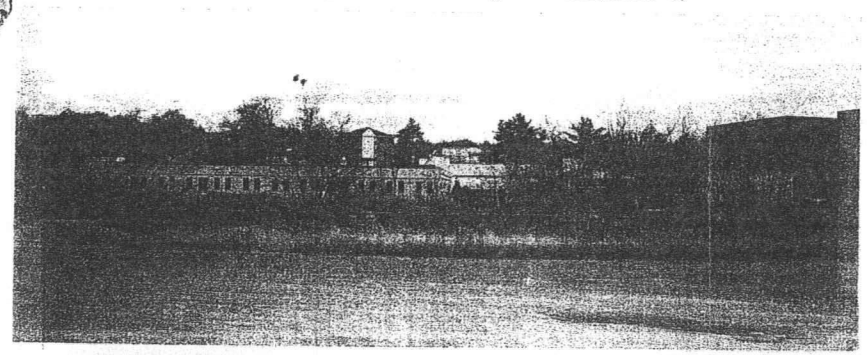
	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Ty
2								
3	D Corners	Basement	8 X 8m	17	Total Cor	Total Cor	17 res	Type 2
4	(Two	1 floor	688sqft		& Row 69	& Row 28	underground	Type 4(W
5	Corners E,W)						34 on street	Type 1/A
6		Main	8X 8m	17				Regent St
7		2 floors	1376sqft					
8								
9		Loft	8 X 8m	17				Pking One
10		1 floor	688sqft					Pking Two
11	*8.0 W 20m			Total 51				
12	incl 3l E							

	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Ty
2								
3	D Row	Basement	7.5 X 10m	13	Total Cor	Total Cor	1 garage	Type 2
4		1 floor	807sqft		& Row 69	& Row 28	1 open	
5							1 on street	Type 1/A
6		Main	7.5X 10m	13				Regent St
7		2 floors	1614sqft					
8								
9		Loft	7.5 X10m	13				Pking One
10		1 floor	807sqft					
11				Total 39				
12								



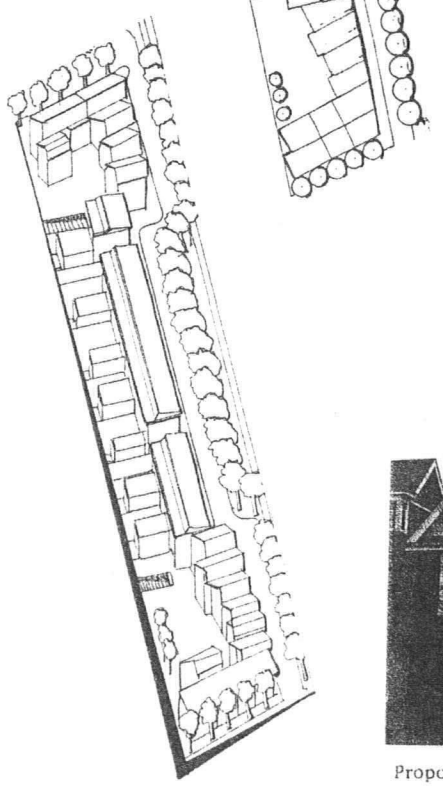
Existing- On site looking west (arrow 2)

	A	B	C	D	E	F
1	Net FSR Res	NET FSR Com	Total NFSR	GSFR Res	GSFR Com	Total GSF
2	1.25		1.25	0.75 (incl/2 square)		0.
3	D					

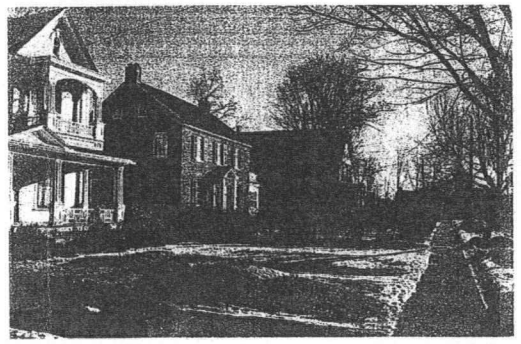


Existing- On site looking south (arrow 3,

	A	B	C	D	E	F
1	Block Size D	Lot Size	% of Perm Surf	Walking to Commercial	W to Comm Centre	W to City C
2	38 X 200m		61(incl side,boul)	5.2 minutes(furth groc	6.6 min	17.8 minute
3				(based on elderly pace	Average-3.3min	Average 8.9
4	30 X 185m		46.6(without)	of 64.5m per min)		
5				Average 2.6 min		
6		7.5 X 21.5m	22.5% row			
7		row			5.5min	14.7 minute
8					Average-2.25 min	Average 7.3
9		2(35 X 35)m	39.6% 2 corners	5.0 min		
10		corner		(based on average		
11				adult of 75m per min)		
12				Average-2.5min		



Traditional Type- Porch and Front Yard (Aberdeen Street, Fredericton,N.B.)



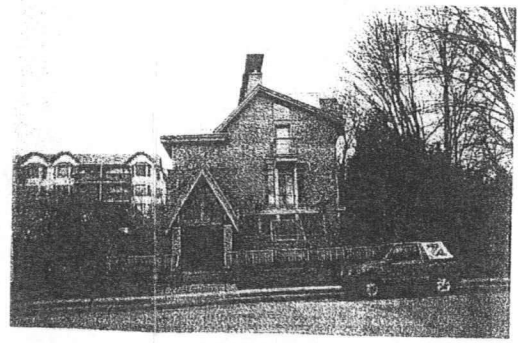
Traditional Type- Setback,Porch and Front Yard (George Street, Fredericton, N.B.)

Traditional Type- Setback (University Avenue, Fredericton,N.B.)

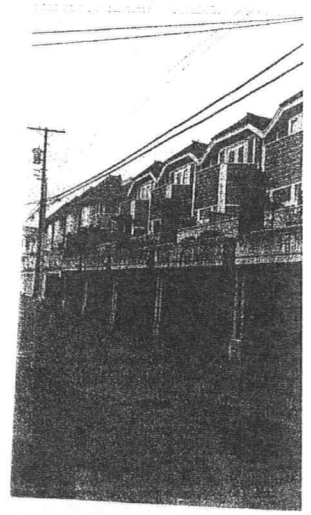
Proposed Type- Garage Entrance,off Lane- Vine Street,Vancouver,B.C.

Proposed Type- Corner Lot (Vine Street, Vancouver B.C.)

Proposed Type- Front Yard, Corner lot- 2313 West 11th and Vine, Vancouver, B.C.

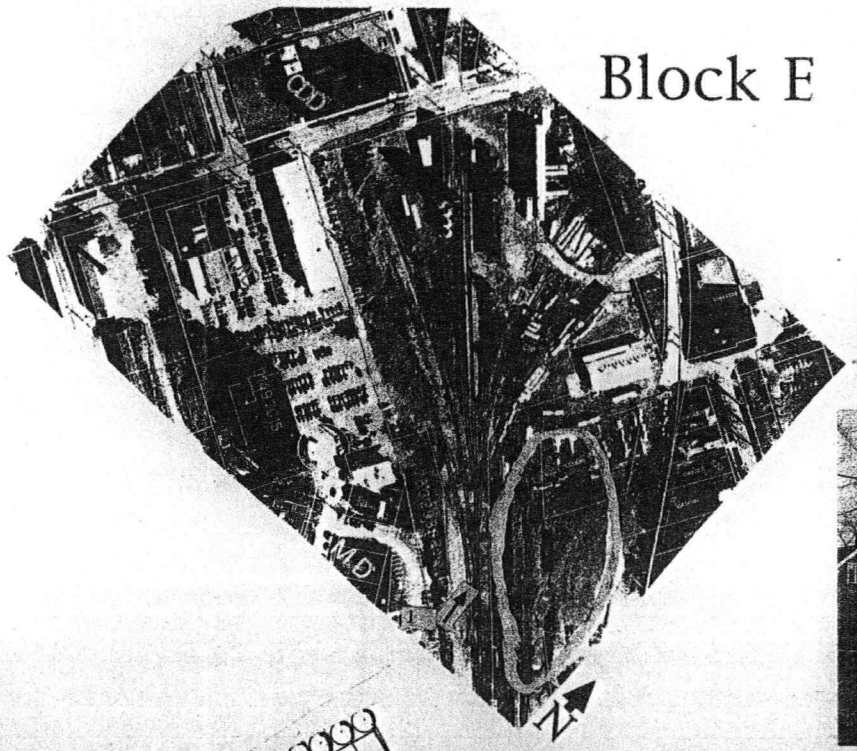


Proposed Type- Row House (328 East 2nd Street,North Vancouver,B.C.)

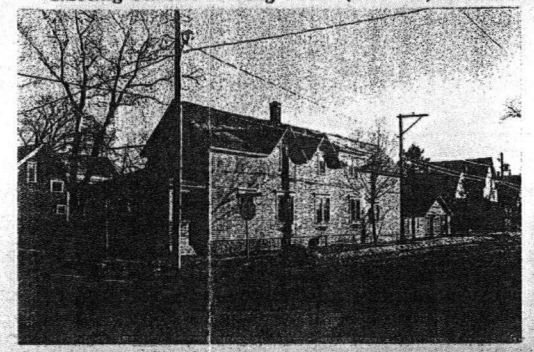


Proposed Type- Garage Unit,Back Yard Space overtop- (233 6th Street, No Vancouver,B.C.)

Block E

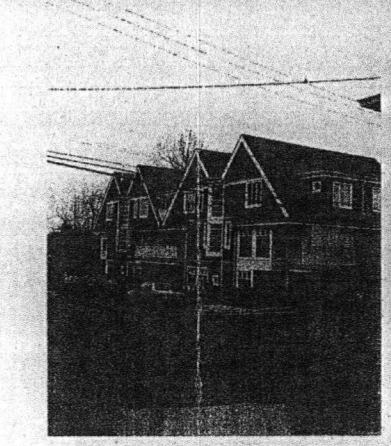


Existing-On Site looking north (arrow 1)

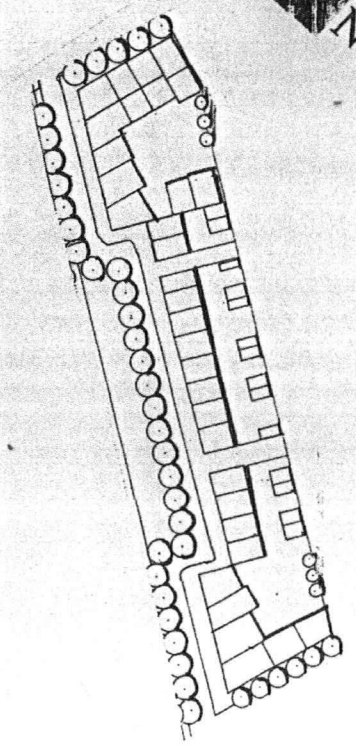


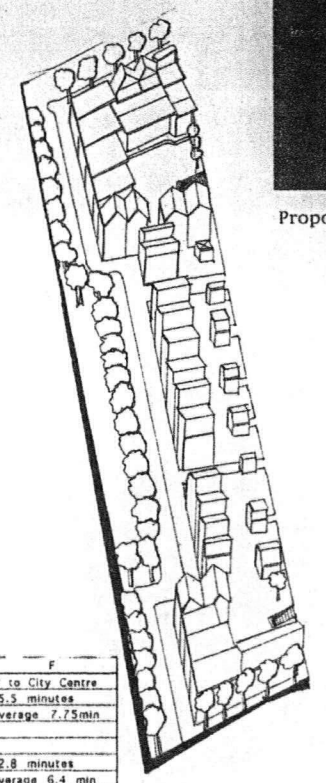
Traditional Type- Setback- (Westmorland and Aberdeen Streets, Fredericton,N.B.)

Proposed Type- Rubbish Area off Lane- Vine Street,Vancouver,B.C.



Proposed Type- Corner Lot (Vine Street,Vancouver,B.C.)





	A	B	G	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	E Row	Basement	7 X 10m	14	Total Cor	Total Cor	1 sp garg	Type 2
4		1 floor	753sqft		& Row 65	& Row 27	1 sp open	
5							1 on street	Type 1/Alle
6		Main	7X 10m	14				
7		2 floors	1506sqft					On Street Pk
8								One Side
9	*R.O.W. 20m	Loft	7 X 10m	14				
10	incl bl D	1 floor	753sqft					
11								
12		1 GarageUnit	8 X9m(775sqft)	5				
13				Total 47				

	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	E Corners	Basement	8 X 10m	19	Total Cor	Total Cor	57 res	Type 2
4	(Two	1 floor	861sqft		& Row 65	& Row 27	underground	Type 4
5	Corners E,W)							Type 1/Alle
6		Main	8X 10m	19				Regent St
7		2 floors	1722sqft					
8								Pking One Si
9		Loft	8 X 10m	19				Pking Two S
10		1 floor	861sqft					
11				Total 57				
12								

	A	B	C	D	E	F
1	Net FSR Res	NET FSR Com	Total NFSR	GSFR Res	GSFR Com	Total GSFR
2	1.58		1.58	1.11 (incl1/2		1.11
3	E			squares)		

	A	B	C	D	E	F
1	Block Size E	Lot Size	% of Perm Surf	Walking to Commercial	W to Comm Centre	W to City Centre
2	45 X 195m		64.6(incl side.boul)	5.4 minutes(furth groc	4.6 min	15.5 minutes
3				(based on elderly pace	Average-2.3min	Average 7.75min
4	35 X 185m		52.1(without)	of 64.5m per min)		
5				Average 2.7 min		
6		7.0 X 25m	41% per lot- row		3.8min	12.8 minutes
7		row			Average-1.9 min	Average 6.4 min
8						
9		2(32.5 X 45	32.3% av 2 corners	4.4 min		
10		corner		(based on average		
11				adult of 75m per min)		
12				Average-2.2min		

Mixed Residential
Ground and Upper Units

1.0

Lane
6.25

2.0

Fourplex Residential

7.0

Mews Walk
2.0

5.5

Underground Parking

4.5

Sidewalk
1.5

3.0

Residential Street
6.25

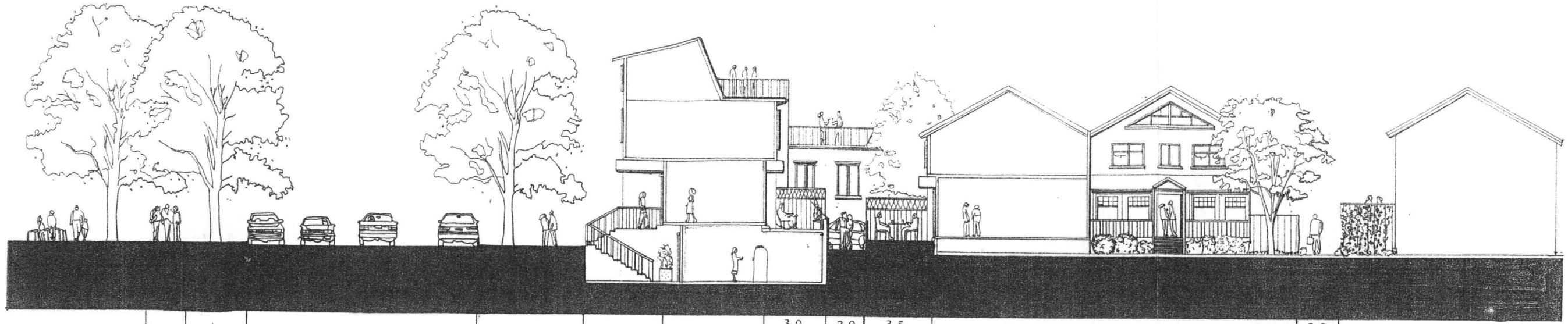
Roof Terrace

Row Houses along
Neighbourhood Main

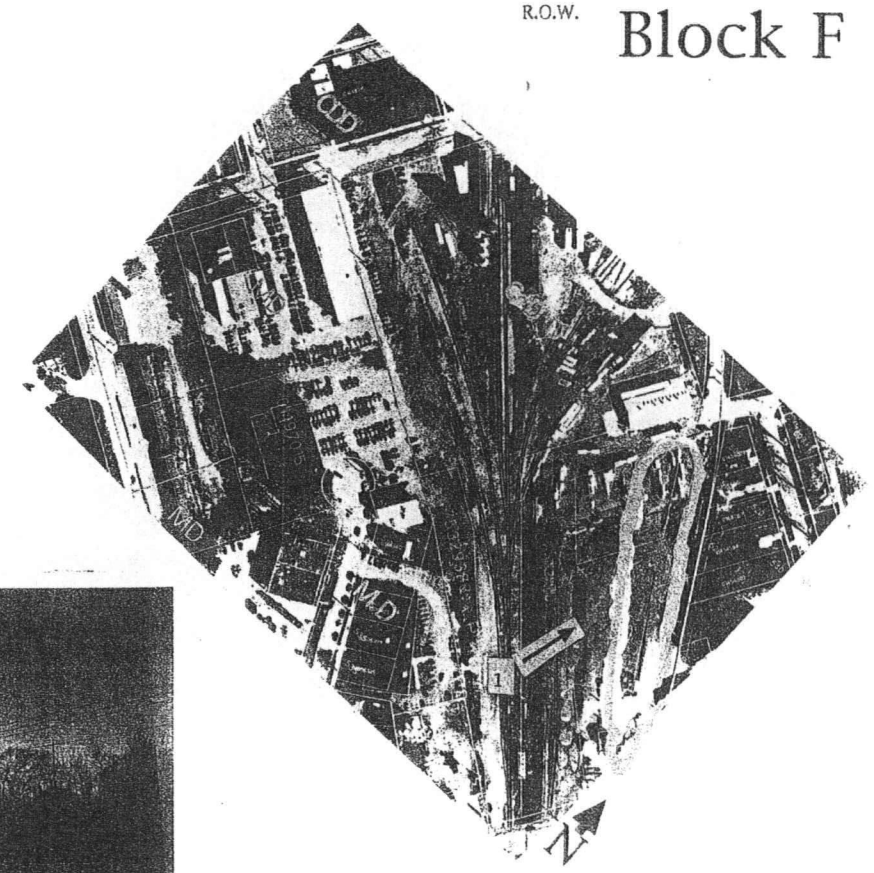
Community Living at York Station	April 30,1999 Cameron A. Smith
Block F Section F1-F1 Plan View	0 1 2 3 4 5 N

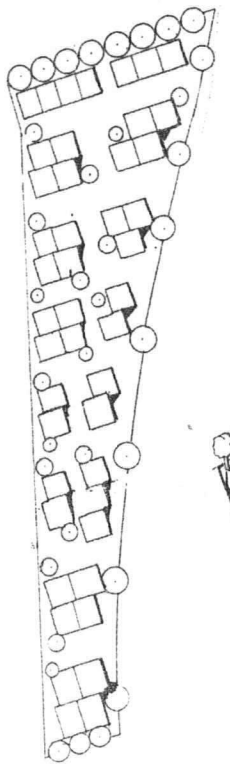
Key

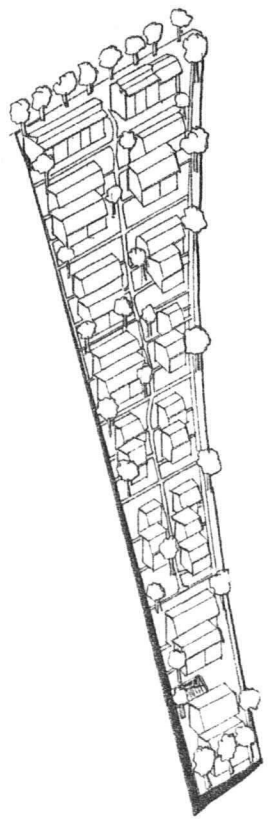
- Ground Unit
- Middle Unit
- Loft Unit

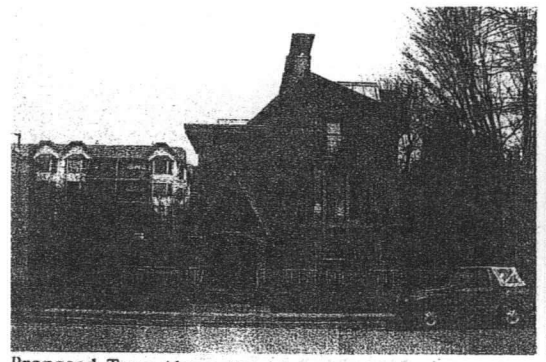


Block F

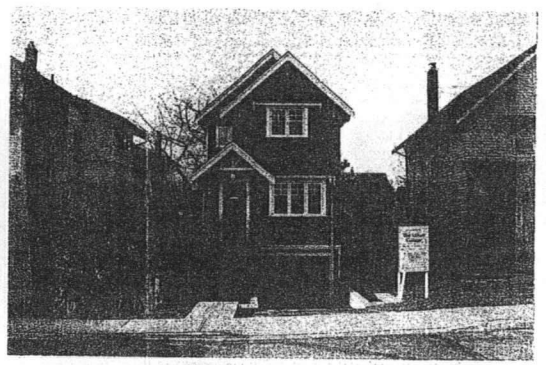




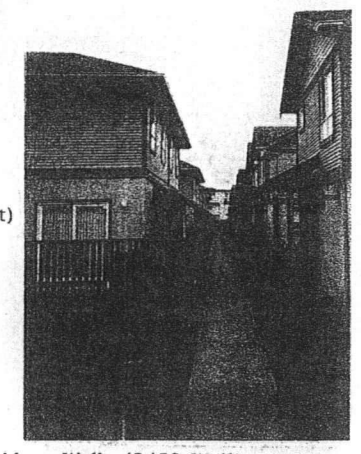




Proposed Type-Along Neighbourhood Main, Rowt, House-(328 East 2nd, North Vancouver, B.C.)



Proposed Type-Urban Cottage-(345 West 19th Street)



Proposed Type-Mews Walk- (3450 Wellington Ave., Vancouver, B.C.)

Existing-On site looking north (arrow 1)

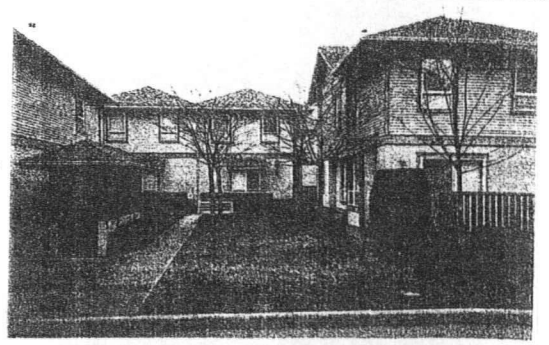
	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	F Mews	Main	7.5 X 7m	34	Total Cor	Total Cor	34 res	Type 3
4		2 floors	1130sqft		& Row 52	& Row 21.8	underground	Type 1 Alley
5								
6								On Street Pk
7	*R.O.W. 20.5							Two Sides
8	incl opp block							
9								
10								
11								
12								

	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	F (E & W	Basement	7 X 7m	11	Total Cor	Total Cor	33 res	Type 3
4	Corners)	1 floor	527sqft		& Row 52	& Row 21.8	underground	Type 4
5								Type 1/Alley
6		Main	7.5 X 7m	11				
7		2 floors	1130sqft					On Street Pk
8								Two Sides
9		Loft	7 X 7.5m	11				
10		1 floor	565sqft					
11				Total 33				
12								

	A	B	C	D	E	F
1	Net FSR Res	NET FSR Com	Total NFSR	GSFR Res	GSFR Com	Total GSFR
2	0.85		0.85	0.55		0.55
3	F					

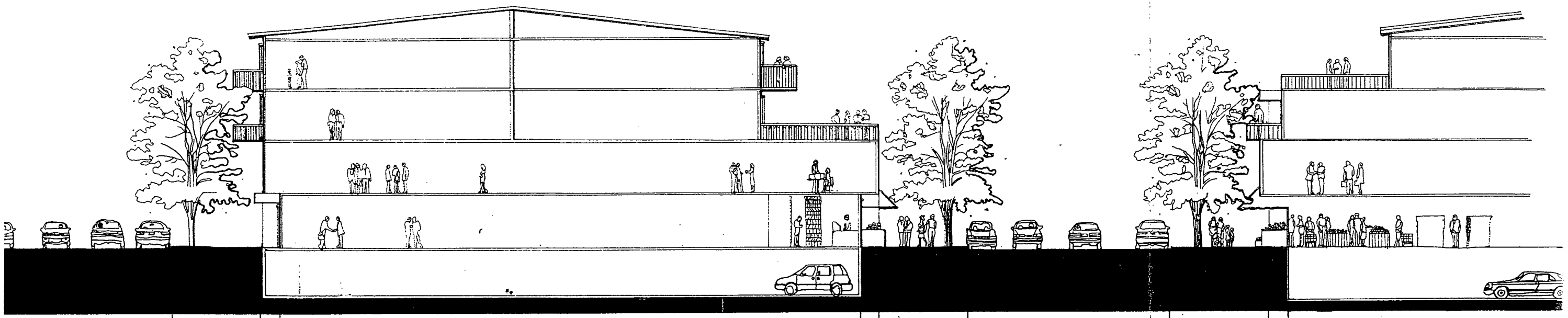
	A	B	C	D	E	F
1	Block Size F	Lot Size	% of Perm Surf	Walking to Commercial	W to Comm Centre	W to City Centre
2	42.5 X 208m		71.6(incl side boul)	5.2 minutes(furth groc	4.65 min	15.5 minutes
3				(based on elderly pace	Average-2.3min	Average 7.75min
4	35 X 195m		63.2(without)	of 64.5m per min)		
5				Average 2.6 min		
6		14 X 12m	70% per lot- row		3.85min	12.8 minutes
7		mews			Average-1.3 min	Average 6.4 min
8						
9		12 X 7m	16.6% av 2 corners	5.0 min		
10		row		(based on average		
11				adult of 75m per min)		
12				Average-2.5min		

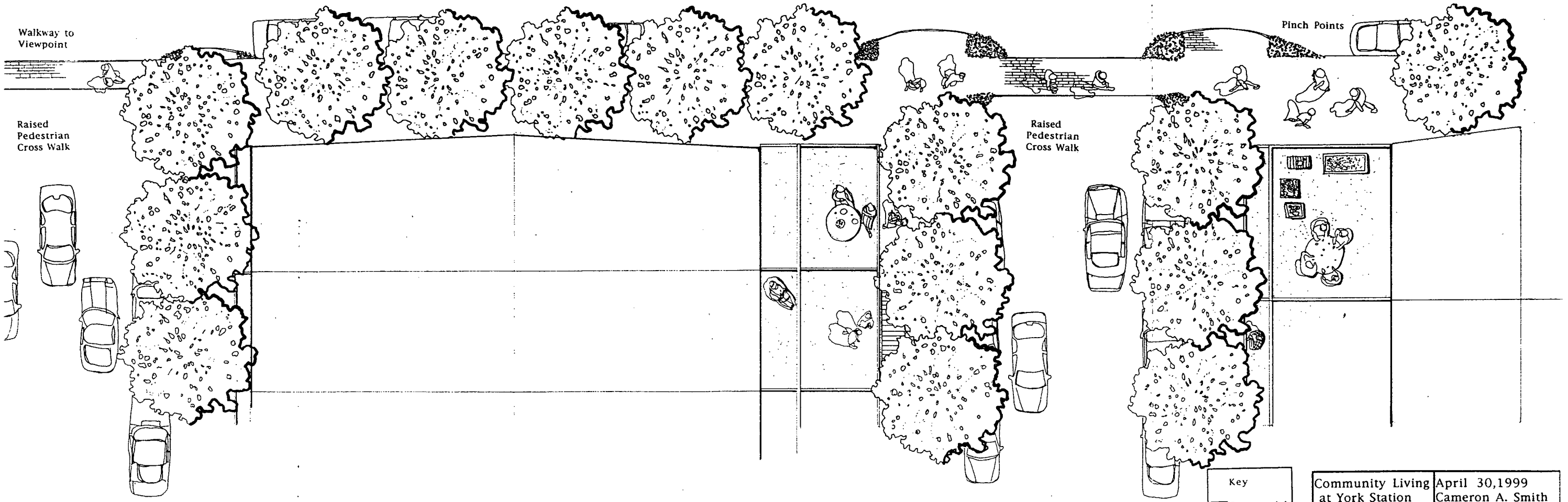
Proposed Type- Back yard Space- (3450 Wellington Ave., Vancouver,B.C.)



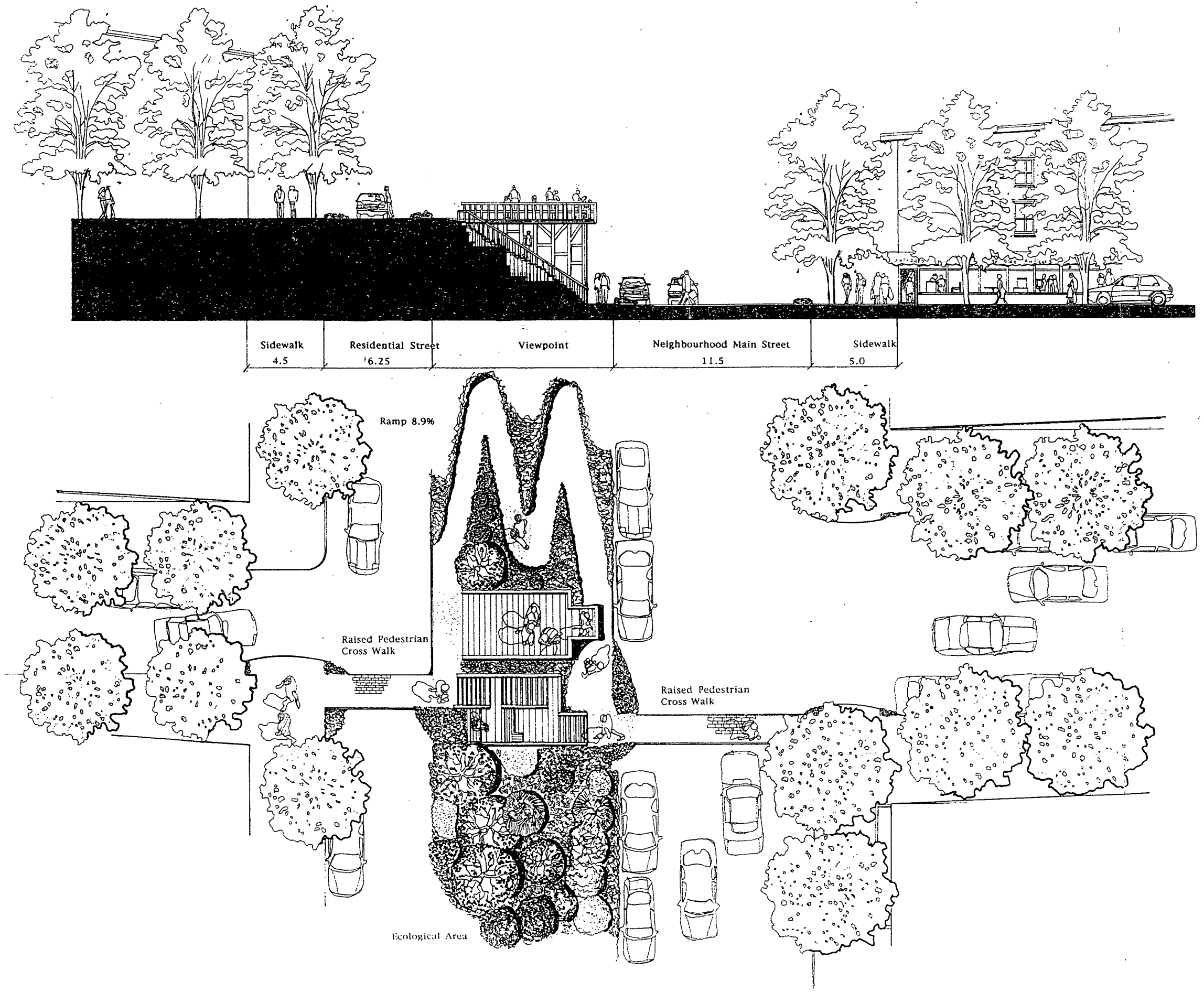
Proposed Type- Underground Parking Entrance (3450 Wellington Ave., Vancouve B.C.)

Community Living at York Station	April 30,1999 Cameron A. Smith
Block F Section F2-F2	0 1 2 3 4 5 N



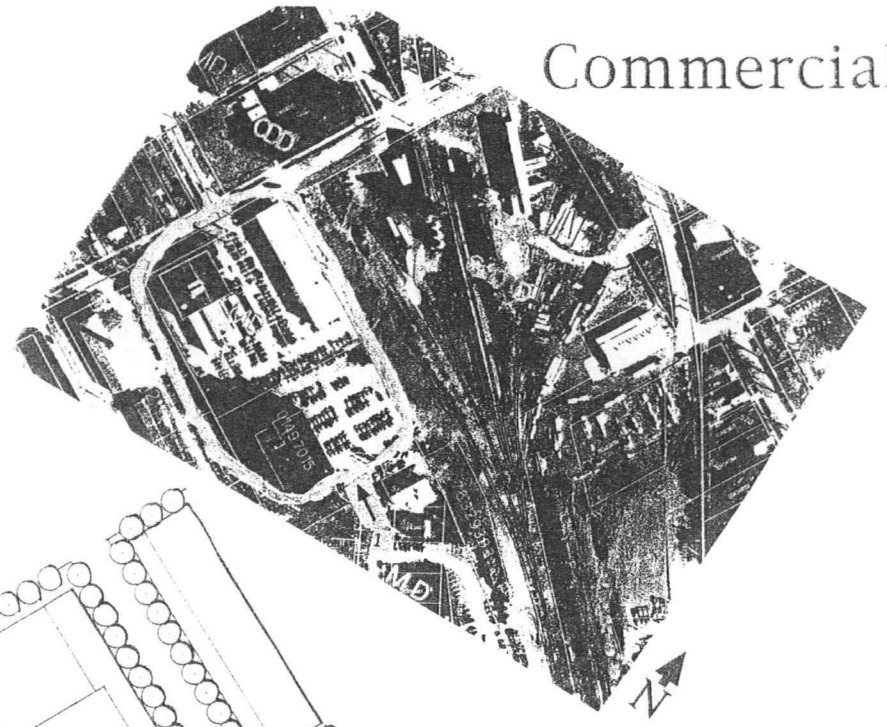


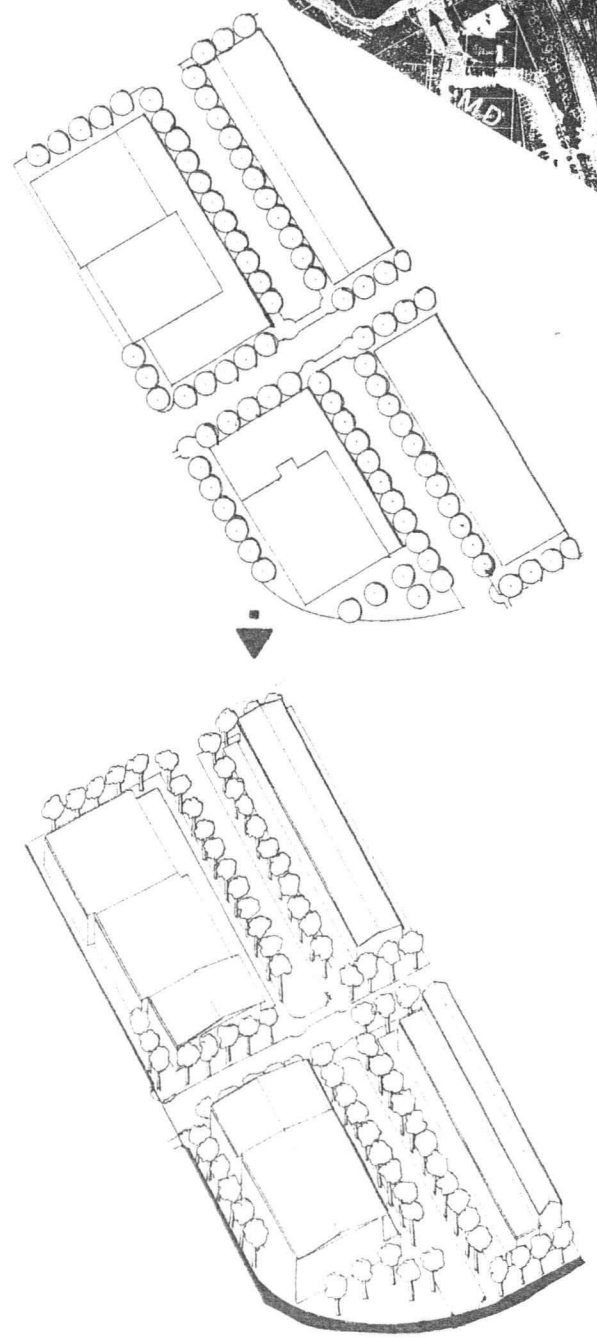
Community Living at York Station	April 30,1999 Cameron A. Smith
Commercial Section 1-1 Planview	0 1m 2 3 4 5 N



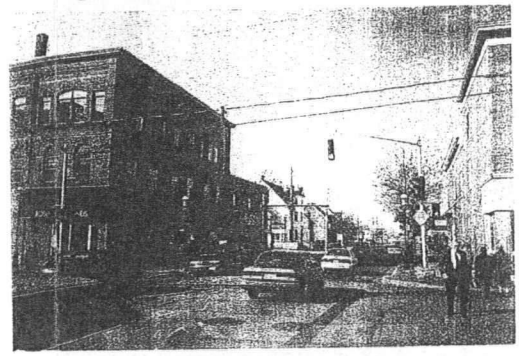
Community Living at York Station	April 30,1999 Cameron A. Smith
Commercial Section 2-2 Planview	N

Commercial

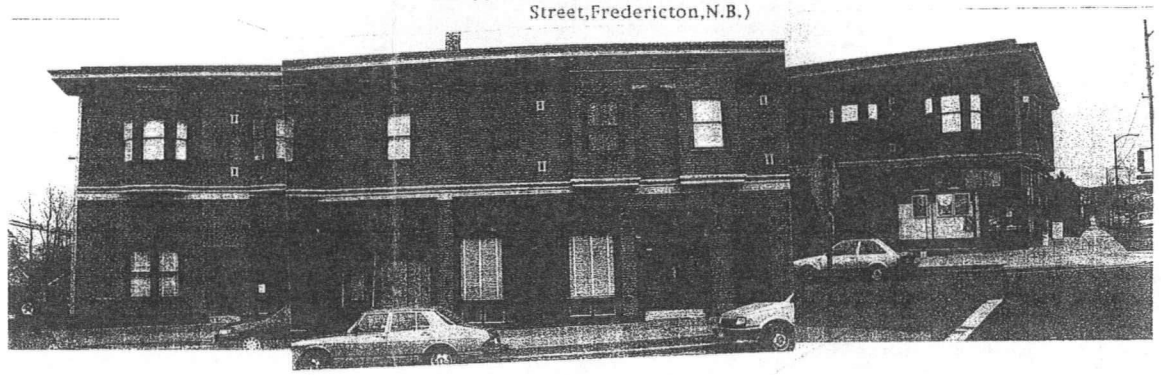




Existing- On site looking west (arrow 1)

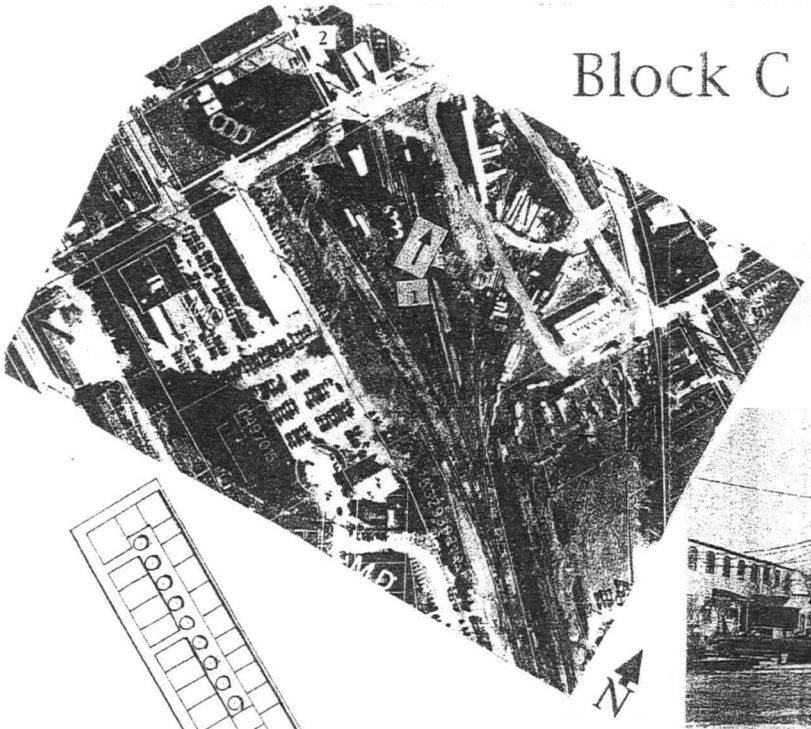


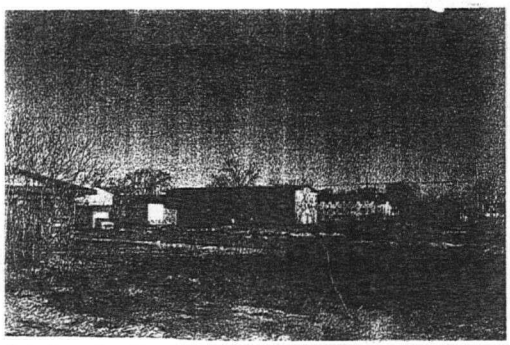
Traditional Type- (Corner of Queen and York Street,Fredericton,N.B.)



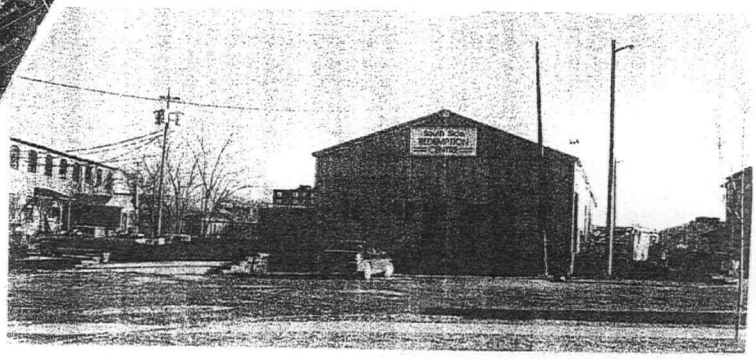
Proposed Type- Three to five stories (Broadway and Vine Vancouver, B.C.)

Block C

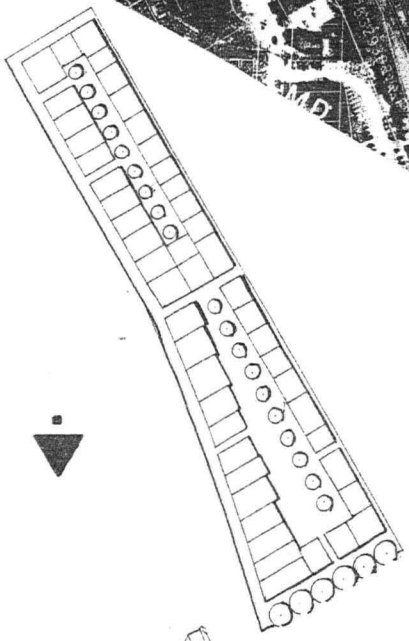


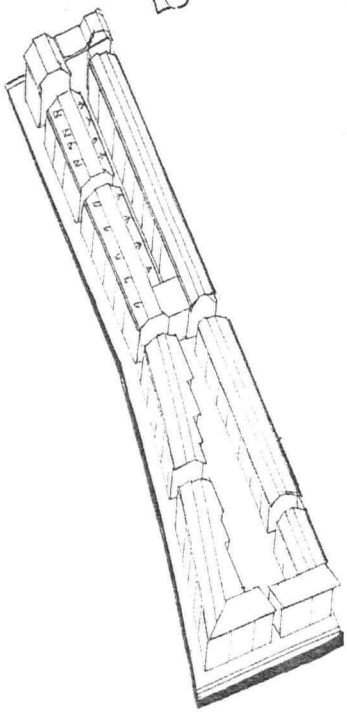


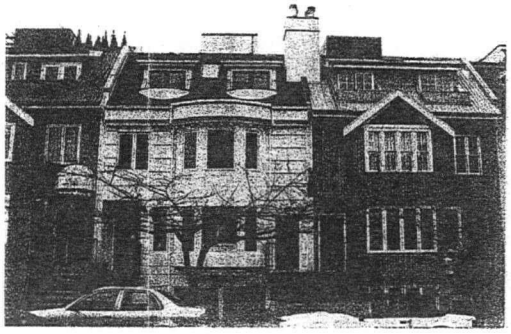
Existing- On Site looking northwest (arrow 1)



Existing- On Site looking east from York Street (arrow 2)







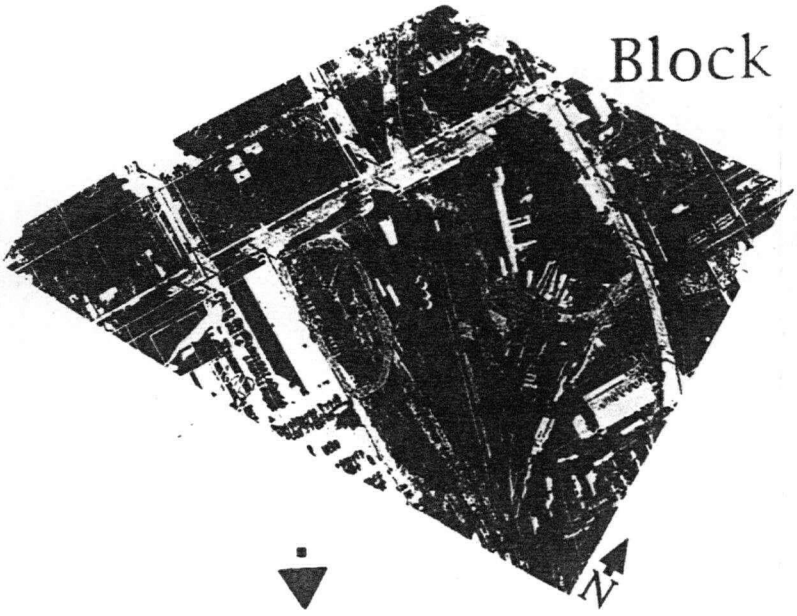
Proposed Type- Residential Row- (1870 West 1st Vancouver, B.C.)

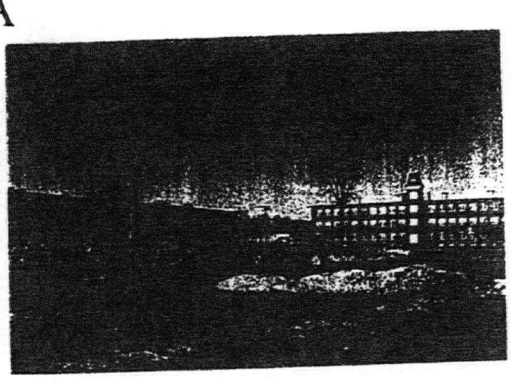
	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	C	Apartment	7 X 10m av	201	188	78	201 res	Type 4
4		1 floor	753sqft				20 visitor	
5							underground	Type 1/Alley
6	R.O.W.30m							York St(W)
7	Incl Blocks A,B							
8								Pking two
9								sides
10								
11								
12								

	A	B	C	D	E	F
1	Net FSR Res	NET FSR Com	Total NFSR	GSFR Res	GSFR Com	Total GSFR
2	2.6		2.6	1.8		1.8
3	C					

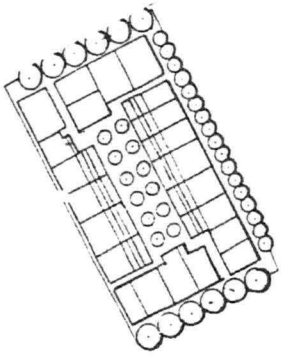
	A	B	C	D	E	F
1	Block Size	Lot Size	% of Perm Surf	Walking to Commercial	W to Comm Centre	W to City Centre
2	40 X 190m		47.5(incl. side,boul)	4.3 minutes(fr groc)	3.1 min	13.9 minutes
3				(based on elderly paco		
4	32.5 X 178m		31.3(without)	of 64.5m per min)		
5						
6				3.71 min	2.5min	11.5 minutes
7				(based on average		
8				adult of 75m per min)		

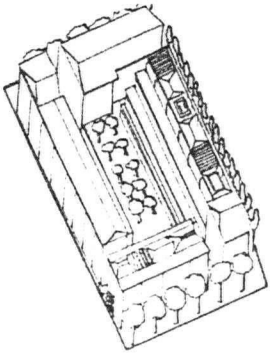
Block A

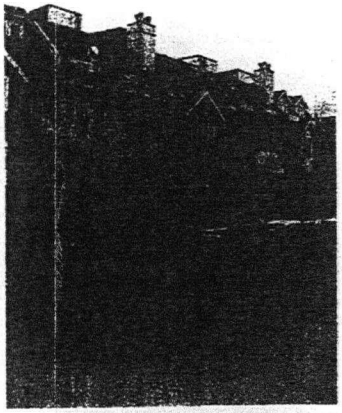


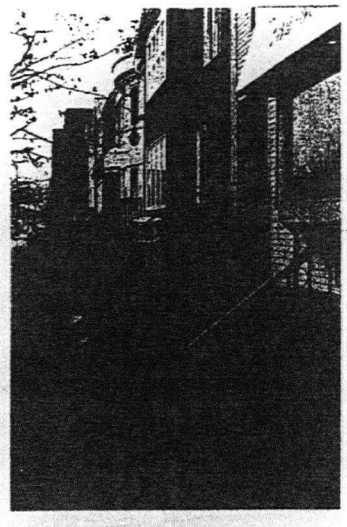


Existing- On site looking southwest (arrow 1)









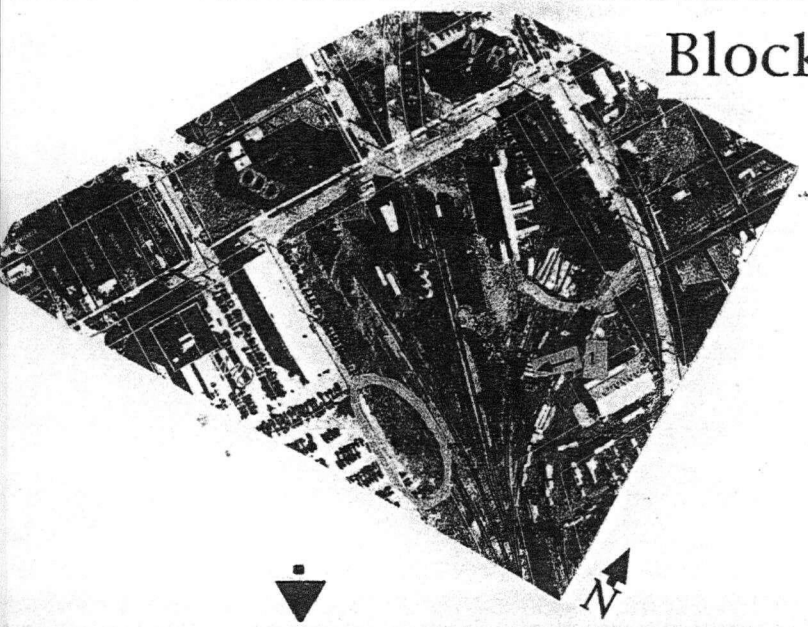
Proposed Type- 'Yorkville' Row House
Commercial/Residential
(1870 West 1st Street,Vancouver,B.C.

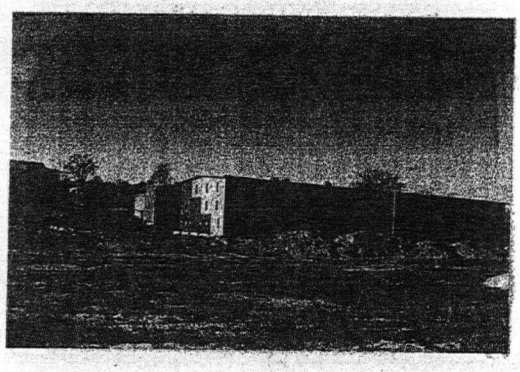
	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	A	Apartment	8 X 10m av	84	165.5	68	84 res	Type 4
4		1 floor	861sqft				30 visitor	
5							underground	Type 1/Alle
6								York St
7								
8	R.O.W. 30m							Pking two
9	incl B C							(sides Typ 4
10								& York)
11								
12								

	A	B	C	D	E	F
1	Net FSR Res	NET FSR Com	Total NFSR	GSFR Res	GSFR Com	Total GSFR
2	1.8	0.43	2.23	1.13	0.27	1.41
3	A					

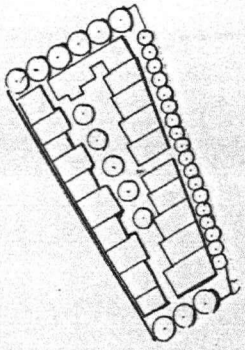
	A	B	C	D	E	F
1	Block Size	A Lot Size	% of Perm Surf	Walking to Commercial	W to Comm Centre	W to City Centre
2	50 x 96m		45.6(incl side boul)	3.1 minutes	1.53 min	10.8 minutes
3	44 x 75m		30.8(without)	(based on elderly pace		
4				of 64.5m per min).		
5						
6				2.5min	1.3min	9.3 min
7				(based on average		
8				adult of 75m per min)		

Block B



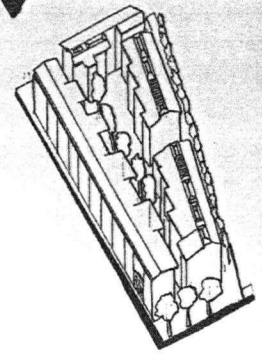


Existing-On site-looking south(arrow 1)



Proposed type- Varied Facades, Yorkville Row House
1870 West 1st Ave.,Vancouver,B.C.

Proposed Type- Varied Back Facades, Yorkville Ro
1870 West 1st Ave.,Vancouver,B



	A	B	C	D	E	F	G	H
1	Block Type	Unit Types	Size of Units	# of Units	# UPA	#UPHa	# Garag Sp	Street Type
2								
3	B	Apartment	8 X 10m av	60	120	50	60 res	Type 4
4		1 floor	861sqft				20 visitor	
5							underground	Type 1/Alle
6	R.O.W. 30m							
7	incl Bl C							
8								Pking two
9								sides Typ 4)
10								
11								
12								

	A	B	C	D	E	F
1	Net FSR Res	NET FSR Com	Total NFSR	GSFR Res	GSFR Com	Total GSFR
2	2.28	0.76	3.04	0.91	0.3	1.22
3	B					

	A	B	C	D	E	F
1	Block Size B	Lot Size	% of Perm Surf	Walking to Commercial	W to Comm Centre	W to City Centre
2	37.5 X 90m		53.5(incl side.boul)	1.3 minutes	3.2 min	13.7 minutes
3				(based on elderly pace		
4	30 X 75m		30.2(without)	of 64.5m per min)		
5						
6				1.08min	2.6min	11.4 minutes
7				(based on average		
8				adult of 75m per min)		

4.0 The Design

4.1.2 Introduction

The design process follows the matrix described in the chapter on method. Plans A to C act as preliminary explorations of the site given the information applied to them. The final design is a culmination of written and preliminary design explorations.

Two levels of thought are applied to the design. The first is the more practical side of how the design will work such as; 1) the physical elements (aspect, topography, slope, climate,); 2) how the edges fit with the surrounding neighbourhoods; 3) the street connections and circulation between existing streets and proposed ones; 4) how building type, block and lot size will fit with the existing character and pattern of the area; and 5) the cultural heritage of the site.

The second level involves a more philosophical approach as to the influences which make a good neighbourhood and ultimately community.The philosophy is based on New Urbanist ideas pertaining to social, economic and ecological aspects. Specific areas are addressed: density,open space, public and private realm, and streets.

The design results from the integration of these two levels of thought. The following is a brief discussion as to how the design evolved and was finalised.

4.2 Discussion

The design began (refer to Plan A, B and C) with looking at the more practical aspects of the site such as: 1) street connection and circulation (which are critical to movement into and throughout the site. An effort to divert traffic from Regent Street is made

as The City of Fredericton does not want any additional traffic on this street), 2) site's historic significance- this is addressed by making the rail station central to the site and part of an open green space. The rail tracks are an important link to the past and present community and offer links to the present system of 'Rails for Trails'. The rail tracks are therefore made into a greenway open to pedestrians and bicyclists that connects with the system already in place.; 3) commercial district - the commercial heart of the site is located at the existing Chestnut Canoe Complex since many of these buildings are already commercial in nature and are easily accessible either on foot (5 minute walk from any part of the site) or by automobile; 4) infill edges- these transcend from a) high density on the southern edge (with existing apartment complexes on both sides of Dundonald Street which are infilled with additional apartment/condos) and to the commercial area- which is surrounded by existing commercial buildings (Chestnut Canoe Complex, Hart Shoes), and on the upper north side by small offices (Mission Limited and Fundy Cable), to b) medium density meeting on the southeast edge suburban status quo housing, and c) low density on the northeast side, meeting traditional housing; 5) aspect and orientation of buildings are addressed to maximise sun in front and back yards, buildings, and on the street itself ; and 6) lot size, building type and use are given consideration as to how people will live. Plan C begins to consider such things as the social and economic implications of how such a site can support both a cultural and commercial heart.

The final plan takes what has been worked and analysed in the previous three plans and refines it. In addition, areas such as public/private realm, open space and pervious surfaces, street nomenclature, building footprint, and water flow, are incorporated.

All components are addressed in accordance to the New Urbanist philosophy given the social, economic, and ecological contexts. Much of the information was arrived at through the process of doing a series of sections (refer to Sections A-A,C-C, DE-DE, F1-F1, F2-F2, Com 1, Com2 and the Table Sheet Associated with them-Block A-F, and Commercial).

4.3 Conclusions

The following is a list outlining the final design outcomes for density, open space, public/private realms, streets, circulation, and water flow .

4.3.1 Density (refer to Density plan, sections)

-transition from high to low density to meet surrounding proposed and existing neighbourhood edges

- overall medium to high density required to support commercial and community centre (York Railway Station); work to revitalise traditional neighbourhoods,downtown commercial core,local churches, St. Dunstan's School, and make for a viable neighbourhood.

- provide for a diverse mixture of building types,lot ,block and building sizes

-provide ability to pay for infrastructure costs (underground placement of utilities along back lanes, street building and maintenance, park maintenance)

-will provide for large, more even municipal tax base

- more eyes on the street make for a more secure neighbourhood

4.3.2 Open Space (refer to Open Space plan, sections)

- provides for a place for recreation for neighbourhood residents, office workers, all within a five minute walk radius from anywhere on the site, and, street parking is available to those who are from other parts of the city

-greenway provides a pedestrian and bicycle link to the larger 'Rails for Trails' Greenway System found throughout the city both for local residents and people from other neighbourhoods

-provides habitat for bird,plant and wildlife particularly in ecological area

- provides natural filtration for precipitation

4.3.3 Public/Private Realm (refer to Public/Private Realm, Sections)

-Community Centre (York Station): acts as cultural and recreational heart to both the local neighbourhood and community at large. Is an important link between the local neighbourhood and surrounding community

Commercial Heart: acts employer, and supplier to local neighbourhood and community at large. It is an important link between the local neighbourhood and outside community.Viewed as an extension or satellite of the downtown core and not as being in direct competition with it

-Streets,Lanes Sidewalks,Parks, Squares, are public linkages to existing streets, neighbourhoods, and neighbours

-Front Yards are semi-public, houses are private, back yards are semi-private

- All housing has outdoor semi-private space (balconies back yards), many of the units have ground access, all house units have front yards with front porches (semi-public space). All ground units have ground access and outdoor (semi-private space).

4.3.4 Streets (refer to Streets Plan, sections)

- Street nomenclature reflects neighbourhood values:

a)Lanes a place to walk, park your car (garage), a safe place to play street hockey;

b) Residential Mews- low traffic volume,slow speeds, safe place for children to cross to 'Hart Square',accessibility, parking;

c) Residential- low traffic volume, low traffic speeds, tree-lined boulevards, accessibility, parking;

d) Neighbourhood Main- able to accommodate higher traffic volume, more parking, provide link to commercial and residential areas, tree-lined boulevards;

e) High Street- able to accommodate high volume of traffic, more parking, room for loading and unloading commercial vehicle, tree-lined boulevards;

f) Greenway- provides for a safe aesthetically pleasant pedestrian and bicycle link;

g) Raised Pedestrian walkways- slow traffic, direct pedestrian crossings, and give a feeling of safe crossing;

4.3.5 Circulation (refer to Circulation Plan)

- provide for a system that connects to the existing grid and is one that allows for a continuous free flow of traffic, pedestrian movement and bicycles both throughout the site;

- all proposed roads,sidewalks, greenways link to existing roadways, sidewalks, and Greenways.

-all pedestrian movement on site is within a five minute walk of either commercial or the community centres and or greenway.

- smaller block sizes offer a multitude of routes

4.3.6 Water Flow (refer to Water Flow Plan)

-all water flow moves away from houses into existing storm water system.

-where possible open space is used as a natural filtration system and absorb storm water.

4.3.7 Building Footprint

-all residential units have southeast, and or south west exposure with over half experiencing sunlight from sunrise to sunset.

-most residential units are sheltered from the winter's Northwest wind flow

- all buildings are situated on flat terrain

-there are a diverse range of lot and block sizes

- there are a diverse range of building sizes

4.4 Recommendations

One of the design's greatest assets that has not been discussed to any great length is that the design need not necessarily be developed all at once but instead can be designed in increments so as to meet market demand. Block A to C might come first or Block F. Public space (Hart Square, York Square, and the Greenway) and public buildings such as the historic York Station should be first set aside and protected at the beginning, as well as street layout and zoning should be implemented so the plan will not loose any of its original goals.

Further to this there is the potential for increasing the site to link with other areas. As seen on the initial opening site map those buildings slated EV (eventual removal) indicate the site could be extended down on the south

side of Queen's Park. Infill could take place in some of the older traditional housing areas. These linkages would strengthen the link between the two areas.

The above list indicates a design that has incorporated many of the New Urbanist ideals socially, economically, and ecologically from the five minute walk, to a diverse range of building types,lots sizes, land users aspect and orientation.The bringing together of all these factors into the design makes for a 'whole environment' that is a livable, sustainable and viable alternative development model.

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Appendices

Appendix 1
Precedent I

Anton Clarence Nelessen, 'Visions for a New American Dream,Planners Press, American Planning Association, Chicago, Illinois, 1994.

Cranbury, New Jersey

The majority of the state of New Jersey's traditional settlement patterns are found in its hamlets, villages, and towns.[1] Each share spatial characteristics that give them a sense of place, and, as well have differences that give them a sense of their own identity. Despite urban growth pressures such as new suburban developments or advanced technology, or the very coming of the automobile the traditional village core has adapted and been able to maintain a viable community core without sacrificing its original ideals.

This precedent study looks at the Case Study of the small town of Cranbury, New Jersey to analyse the traditional development pattern of its streetscape. Particular regard will be paid to street elements such as street widths, boulevards, front yards and land use.

Site Specifics/Analysis

Statistics

Study Area:	92.2ha (230 acres)
Open Space:	44.44ha (110 acres)
Developed:	48.48ha (120 acres)
DU:	265
Gross Density:	3DU/ha (1.2DU/acre)
Net Density:	4.2 to 28.65DUha (1.7 to 11.6DU/acre)

Design Characteristics

Lot Size:	1406.25sqm(4,500 sqft) to 5000 (16,000 sqft)
Lot width:	9.37m (30') to 31.25m (100')
Lot Depth:	39.06m (125') to 78.1m (250')
Setback:	3.75m(12') to 7.81m(25')
Side yard:	0 to 4.6m (15')
Footprint:	250sqm(800sqft) to 468.75sqm (1,500sqft)
Bldg. Height:	2 to 3 stories
Parking:	On-Street and rear yard garages/lots [2]

[1] Anton Clarence Nelessen,Visions for a New American Dream, Planners Press, Chicago, 1994,p. 48
[2] Ibid.,p.556

Cranbury New Jersey is located in Middlesex County, New Jersey, U.S. of A.. It is situated in an agricultural belt that has some low density urban development. It began as a small hamlet in the 17thC next to the Cranbury Brook and the junction of the Philadelphia-New York transportation route which is now Main Street. Its original development centred around that of a mill and inns which serviced the traffic on the transportation route. Later it became a hub fro the surrounding agricultural area.

Presently it has a village status and has grown to include two postwar suburbs. Its character is centred around what is called main street which acts as the commercial heart of the village. It consists of mixed use with a frontage of about 281.25m. Housing and or offices are above stores located at the ground level.

The village edge is within 468.25m (1,500') of the original commercial centre making it within easy walking distance. Development has occurred at either end of the main street that neither resembles the original character and is 781m (2,500') away from the village centre.

Open Spaces include a lake, village park, two cementaries, and a school yard. It is noted that "Cranbury remains a distinct community defined for its open space."[3]

Cranbury is referred to as a 'residential village'[4] but does have civic buildings (school,museum,municipal) located in the centre of the village along with the commercial space. The largest industrial employer is a commercial greenhouse.

Section A-A
Maple Avenue

Section A-A

The street has parking on one side with two way traffic and is bordered with a 15cm curb. The parking acts as a screen from street traffic and acts to slow traffic. The street is narrow so cars must proceed slowly. Trees line both sides giving shade in summer and help to make the street less open and more aesthetically pleasing. Sidewalks line both sides of the street for good pedestrian connections to the neighbourhood and commercial/civic core.

Set backs vary from one side to the other. The right side is closer to the sidewalk giving the street a more close neighbourly feel. The left side although further away is still relatively close due to the narrowness of the street.

A private sidewalk from the house connects the street and public sidewalk. Steps lead up to a raised front porch. The right front porch is larger and able to accommodate several chairs. It is as well slightly higher than the one across the street possibly due to its closer proximity to the public sidewalk. By raising the porch it gives a more private feel.

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[3] Ibid.,p.59

[4] Ibid.,p.59

Houses on either side have usable shutters, like windows,and wooden siding, and peaked roofs giving continuity to the neighbourhood. There are differences such as house colour and the addition of a low open picket fence bordering some properties.

Distances between houses appear to be reasonably large so that one may assume density is low.

Section B-B
Main Street

The Street is residential, has parking on both sides, is two way and is wider than section A-A . Parking on both sides helps to screen street traffic as well as slow it down.The street is bordered by a 15cm curb on either side. Trees line both sides shading the street in summer and helping to alleviate the wideness of the road. The treetops act as a screen to the upper stories of the houses giving some privacy from the street. The boulevard on the left side is wider so that there is a greater definition of space between the street , sidewalk and house which in turn has a shorter setback than on the right side of the street. The wider boulevard acts to give more privacy Sidewalks line both sides of streets for good pedestrian connections to commercial and residential areas.

Setbacks as mentioned are only 1.2m from the sidewalk on the left side of the street while on the right side they are close to double. The front porch of the house on the left is built up to the property line. This again makes the roadway seem less wide and the neighbourhood more close and personal.

House sidewalks connect the street with the public sidewalks and the front porch/door. Houses both have front porches though the front porch on the right is smaller. It possibly is used more as part of the entrance rather than to sit out on.

Houses share the same features as in Section A-A. Houses appear to be much closer together. This gives the neighbourhood a more cohesive denser feel.

Section C-C
South Main Street

The Street is residential, two way, with parking on the right side and is narrower than Section B-B but slightly wider than Section A-A. The street shares many of the same qualities of Section A-A with the following exceptions; 1) Boulevards are reversed in width from one side of the street to the other possibly following the street parking arrangement; 2) Houses are built close to the sidewalk on both sides of the street and are closer together. This makes the street feel closer and increases the density per acre.

Section D-D
Park Place

Section D-D is a residential street, with parking on both sides of the street. It shares many of the same qualities of Section B-B with the following exceptions; 1) The street is narrower; 2) The boulevards next to the street are on the left narrower and on the right slightly wider;3) The public sidewalk is wider and abuts the front porch on the left side of the street while on the right it is narrower and the house is setback; 4) Houses are not as close together. The last two differences make the street feel on one hand less close yet because of the narrower street and parking on both sides the street is less expansive aesthetically so the neighbourhood feels warmer and more cohesive despite the wider spaces between the houses.

Summary

The existence of Cranbury, New Jersey as a still viable functional and economic place proves that the traditional development pattern continues to work and adapt to the ever changing community. Nelessen's argument is by analysing visual and spatial characteristics, one is able to understand the principles that are fundamental and must be included in a development pattern in order to accomplish scale and a sense of place in that community.[5] In realising this one is then able to apply these characteristics to a large scale development such as an infill site or new town.

The study Cranbury, New Jersey is typical of the traditional development pattern. Residential areas are a five minute walk to commercial and recreational facilities. Streets offer curbside parking, variable street widths, boulevards, and public sidewalks. Front porches signify the development of semi-public space. House types are varied.The streetscape as well is not over designed yet has a neighbourly feel.

The particular attention paid to varied steetscapes and their spatial layout in the study allows one insight into what makes a particular street feel the way it does. The addition of parking on one or both sides of the street, the width of the street ,boulevard, and setbacks (front and side of house) and if it is tree lined change the way one interprets the street. Coupled with the house type whether it has two or three stories, has a front porch, a slanted roofline, has shutters that match the window size gives that street and ultimately that neighbourhood a definitive identity and sense of place.

It is the seeking of providing a neighbourhood and or community with a particular sense of place and human scale that will ultimately provide a sustainable community.

5 Ibid.,p78

Appendix II
Precedent Study II

Peter Calthorpe, The Next American Metropolis, Princeton Architectural Press, New York,N.Y., 1993.

Introduction

Peter Calthorpe's book 'The Next American Metropolis' is about the "ecology of communities referring to the ecological principles of diversity,interdependence,scale, and decentralisation that can play a role in our concept of suburb,city, and region."[1] In essence it is about our perception of human scale pertaining to visual and spatial qualities of what makes a community more livable.The community is where people have a sense of place in their neighbourhood and community. This is achieved by working with design elements such as street widths, building heights,lot sizes, and the placement of transit stops, and of residential, commercial, and civic buildings.

The book highlights some exemplary models of developments in the United States that "seek to restore the best of our oldest traditions of town planning and join them to forms appropriate to our new conditions."[2] South Brentwood Village is one such example. It was selected for this precedent study because it highlights how traditional urban ideas have been combined with new urban development to produce a new neighbourhood with a sense of place.

Procedure and Site Specifics

An analysis will focus on what gives South Brentwood Village its identity and its sense of place and if the developments is in any way connected to more traditional forms of pattern development.

South Brentwood Village is located in Brentwood, California. The development is acres (56.56ha) . It is considered to be an easily walkable site with a village green, commercial and civic buildings at its centre which offer employment and shopping. These are surrounded by a residential district mad up of houses with front porches. The density is low to medium but high enough to support the commercial core. The site is bordered on one side by the Southern Pacific Rail and highway making it a good candidate for a transit stop (rail and or bus).

Two distinct features stand out about the community. The first is the site is made up of a strong 30% in commercial development and secondly housing is very affordable due to the developer being one of the biggest home developers in the state of California.[3]

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1 Peter Calthorpe, The Next American Metropolis,New York, N.Y., 1993,p.9

2 Ibid.,p. 9

3 Ibid, p. 154

Analysis of Street System

Streets are interconnected resembling that of a composite grid system. Streets are tree-lined and narrow in width.. In addition a system of paths connect the residential , commercial and recreational areas.

Section A-A
Alley

Dwelling unit parking is at the rear of the residential lot. Garages are either single storey or may be two storey. The latter second storey has the potential of accommodating a second dwelling unit. This helps increase the density to support the inner commercial core of the development, provides a secondary income to the lot owner, and adds a set of eyes to the back alley way to help ensure security and safety in the laneway.

The alley is narrow at 6.25m (20') but offers no parking so access to and from garages are unobstructed at all times. The alleys are tree lined for shade and to lessen the visual bareness. Garages are setback from the alley way to accommodate the trees or shrubbery and to give appropriate room for the turning circle of a car.

Section B-B
Employment Access Street

The street is curbed on either side. Cuts in the right boulevard facilitate extra parking so that traffic flow may move more efficiently although parking is available on the left next to the curb. The street is narrow at 7.5m (24') wide. A bike path,2.18m (7') wide follows the boulevard next to the street on the right side and a pedestrian pathway 1.56m(5') wide is on the left. Both are curbed on either side. Each is the same depth as the road. Trees line both sides. The trees and curbing possibly act to give the bike and pedestrian paths a sense of security. The cars as well are less visible making the pathways more visually pleasant. The large ROW ensures the bike and pedestrian lanes to be part of the public domain.

Section C-C
Minor Residential Street

The street is two way, curbed, with parking on either side.Traffic must proceed slowly because of it narrow its width 6.25m (20') and parking on either side. Sidewalks are curbside with boulevards next to the property line. Boulevards are on private property yet serve both the lot owner and street as they include shade trees and light fixtures. The trees close proximity to the house help as well to act as a privacy screen to the upper stories of the houses. Flat roofed two storey houses line both sides of the street and are set slightly back from the boulevard. Each has a raised (two steps up) front porch which appears to be able to have enough space to accommodate chairs. An upstairs protruding window looks out onto the street adding additional 'eyes' to watch and secure the street.

Section D-D

Major Residential Street

The two way street is curbed with parking on either side though the parking is not indented as in Section B-B. The street is as wide as Section B-B. Narrow tree-lined boulevards with light fixtures follow the street on either side. Sidewalks parallel the boulevards. Houses are setback from the sidewalks but share the same characteristics of Section C-C including having a tree close to the house. This double row of trees gives the street a more close knit feel.

Summary

The identity of South Brentwood Village is a combination of several factors. The development offers residents the ability to interconnect to residential, commercial, and recreational areas via a system of pedestrian, bicycle pathways and streets. All houses and facilities are walkable. Perhaps most importantly is that streets accomplish not only to connect the neighbourhood but give the community a visual and spatial quality that is representative of many of the more traditional development patterns of the past. The traditional placement of the garage (Carriage House) at the back of the property helps maintain an integrated street facade. While the alley gives access to the garage and is a place to put garbage bins similar to traditional alleys which acted as service lanes. The narrow tree-lined streets coupled with the two storey houses with raised front porches is not dissimilar to many of the more traditional streets. The varying setbacks and street widths offer a diversity of spatial qualities much like the traditional development pattern.

The identity of the community is established through its desire to create a development that reflects traditional development patterns and indicates a will to return to a more socially cohesive neighbourhood.

Appendix III
Precedent Study III

Patrick Condon,Jacqueline Teed,Jennifer Crawford,Alternative Development Standards for Sustainable Communities, The Fraser Valley Real Estate Board, April 1998.

Introduction

With the growing interest in alternatives to the conventional suburb development of the postwar period the James Taylor Chair in landscape and Livable Environments held three 'Designs for Sustainable Urban Landscapes' beginning in September 1995. Out of this came "practical proposals for making our communities more sustainable, with more efficient use of land and water and more cohesive social environments."[1] This was further refined to seven basic principles of what makes a sustainable community. These are as follows;

1) Five-minute walking distance to transit and commercial services
2) Different dwelling types allowed in the same neighbourhood, and even on the same street.
3) Detached dwellings that present a friendly face to the street
4)Car storage and services handled in lanes at the rear of the dwellings
5)Natural drainage systems where storm water is always held on the surface and permitted to seep naturally into the ground
6)An interconnected street system
7)Narrower streets with lighter, cheaper, greener, smarter construction.[2]

With the establishment of these proposals' it was decided among a group of individuals to "explore the costs and benefits"[3] in a workshop titled 'Alternative Standards for Sustainable Developments. it was hoped that social and economic benefits would emerge and provide developers and the City real examples of Sustainable developments.

The workshop was divided into two specific areas; 1) Three Alternative Neighbourhood Patterns Compared; and 2) Two Alternative Construction Plans Compared.For the purpose of this precedent study it will be limited to the first, Three Alternative Plans Compared. Particular attention will be paid to lot and block size, and the streetscape with emphasis on the social benefits.

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1 Patrick Condon, Jacqueline Teed, Jennifer Crawford,'Alternative Development Standards for Sustainable Communities, Fraser Valley Real Estate Board,Surrey,B.C., April 1998, p.1.1

2 Ibid.,p.1.1

3 Ibid.,p..1.1

Procedure

The procedure used in the study is a comparative analysis of three distinct neighbourhoods. The first two are real life areas located within the Greater Vancouver Area. The third is a hypothetical neighbourhood. Each represents a specific type of neighbourhood.

The first , the Status Quo Pattern is typical of most postwar developments. The second is the more traditional pattern associated with developments prior to the second world war. The third hypothetical plan is a 'Traditional Pattern with an Ecological Underlay which is described as "taking on the basic arrangement of the Traditional Pattern while preserving and enhancing the natural systems of the site"[4]

Location of the various areas are; 1) 3.0 hectar residential site in Fraser Height's in Surrey, British Columbia for the Status Quo. This area has largely typical single family homes with one dwelling per lot.; 2) 3.0 hectar site in Kitsilano representing the Traditional Pattern. This area contains a wide variety of housing types per block where each lot may contain 1 to 4 dwelling units. 3) Again a similar size was chosen for the Ecological Underlay in as yet an undeveloped parcel of land near 64th Avenue and King George Highway.

A comparative analysis was made looking at "housing density, access to transit and recreation, surface permeability, road right of way geometry and construction, utility line locations, property line locations, and building setbacks."[5]

Lastly application of two different alternative models is applied to two areas of land in the Langely Township. Each is examined according to ecological and urban design consequences and out of this is developed a set of formal rules or guidelines that have the potential of "encouraging more sustainable communities."[6]

Analysis

The following analysis will look at the three development Patterns according to Streetscape, Lot and Block Size.

4 Ibid.,p.2.1

5 Ibid.,p2.1

6 Ibid.,p.2.1

Status Quo	Traditional	Ecological Underlay
Street Form & Hierarchy		
-arterial-collector-residential -cul de sac (see illust) -dendritic layout -part of every trip will be on an arterial	-arranged in a gridiron pattern -block form 180X90m	-modified grid
Density		
-10 dwelling units pha over 1sqkm =1,000 dwelling units=2,500 people psqkm or 2,020 people if open spaces are included	-33 dwelling unitspha over 1sqkm=3,300 dwelling units=8,250 people (assuming 2.5 people per unit.	-47.7 dwelling units pha over 1sqkm=4,767 dw units=11,918 people per sq km
Infrastructure		
-25%=paved road, driveway sidewalk or 229mpdwu -R.O.W. profile see tables below -all driveways are paved -utility system follows road -storm drains are subsurface -utilities follow road and lane.	-24 % =paved road,driveway sidewalk or 5mpdw unit -R.O.W. Profile see tables -20sqm of paved surface -storm drain is subsurface -private walks extend to rear to dwelling unit at the back	-26%=paved road driveways,sidewalks,pk or 51mpdwu R.O.W. see tables -entirely natural -utilities follow road and lane.
Coverage and Permeability		
-46% is permeable surface	-49% is permeable surface	-50% is permeable surf.
Recreation		
- a 10 minute walk to nearest recreational space with 10sqm per dwelling unit	-10 minute walk=14squm per dwelling unit	-10 minute walk=18sqm per dwelling unit
Commercial &Transit Nodes		
-takes 12 minutes at a pace of 1.0km per 10 minutes to reach a bus stop /commercial	-takes 2 minutes to walk to bus stop/commercial	-2,5 minutes to commercial /bus
Multi-Modal		
-no comprehensive alternative pattern to move pedestrians and or bicycles. Must use arterial street ways.[8]	-no comprehensive alternative to move pedestrians or bicycles[7]	-has intra- and inter-access for pedestrians and bicycles[9]

7 Ibid.,p.2.9
8 Ibid.,p.2.3
9 Ibid.,p. 2.15

Langely Case Study

The location of the Langley case study is on a 4600 hectare tract of land in the township of Langley.

The following table charts the present of 'what is' to what it could be using the status quo design and the traditional ecological underlay development.

Langely at Present	**Langley as a Status Quo Devel**	**Langley as a Ecol**
Population -sparse	-low density	-high density
Street Layout -grid	-dendritic -arterial-residential cul de sacs	-grid
House Lots -.8 to 4.0ha in size	-556sqm lots (4.0 units per acre)	-250-280sqm (13.4 upa
Land Use -farm,woodlot, old field[10]	-almost all streams are wiped out	-preserved all streams large open spaces preserved
Potential Scenarios	-expanded urban area covers most if land -pattern of landscape determined by needs of automobile -old quarter mile sections filled with cul de sacs-no provision for traffic carrying capacity and poor bicycle/pedestrian connections lead to overloaded arterial -neighbourhoods lack good access to commercial centres-need automobiles to access -commercial strip malls line arterial with large setbacks for parking lots in front -no commercial nodes -no existing streams/habitats - drainage is underground -open spaces are hard to reach on foot -due to complex street pattern transit cannot be efficiently managed - large setbacks for houses forces buildings from street edge. [12]	-urban area covers much of land -automobile use is red to one half -interconnected grid allowing traffic carrying cap.. while walking and cycling,transit are safe efficient -all homes within walking distance of commercial centres for employment and shopping -all streams preserved + large open spaces -natural drainage system that acts as well as a -greenway for ped.bikes -homes with front porch are set close to street[11]

10 Ibid.,p.2.22
11 Ibid.,p2.2
12 Ibid.,p.2.22

Summary of Studies

One factor emerges from each development pattern that has guided us in the past, present and has the ability to control our future. That factor is value. The traditional development pattern in Kitsilano reveals a neighbourhood that is based on a more human scale that has adapted to the coming of the automobile without sacrificing community values. One is able to easily walk to a transit stop,recreation facilities and commercial facilities. Residential densities it has been shown must be above 13 dwelling units per acre if commercial business is to survive close by.[13] Kitsilano is either at or above this number.

In contrast to this is the suburb of the postwar era, the Status Quo Development Pattern which places a strong value on the automobile and less on neighbourhood. Neighbourhood densities in most suburban communities average between 1 and 5 units per acre therefore not enough to support commercial centres within easy walking distances and so the need for an automobile. The dendritic layout of the street system with cul de sacs promotes further use of the automobile with wide arterials to carry the traffic from the cul de sacs unlike a grid system where traffic is allowed to flow through.

The hypothetical pattern seeks to reunite our value with the traditional neighbourhood form made better, harmonising both traditional with ecological values. Housing densities are increased so that there are more families per acre in the preferred semi-detached homes.[14] The high density supports not only commercial and recreational facilities but transit as well. The reduction of the front yard setback allowing porches to be closer to the street gives a more cohesive community feel. From an ecological standpoint the Ecological Pattern does clean the water[15] through a system of natural swales and greenway stream corridors. The clean water preserves the fish while stream corridors act as greenways for pedestrians and cyclists.

In contrast the study shows that the Status Quo doe not necessarily have more permeability. Instead because of its wide streets, wide roofs, longer driveways a larger part of the land is impermeable than the Ecological Underlay. This pattern has smaller roofs, no need for driveways, permeable lanes and narrower streets.[16]

To be sustainable one needs clean air and clean water. This means less use of the automobile and more natural permeability. The Langely Case Studies offer two scenarios of the future. The first is a community that is based on a high value given to the automobile which will promote its greater use but at a price of more pollution, more roads, less permeability of water, a greater cost on the infrastructure to deal with water runoff and water purity.

The second study is based on a lesser value given to the automobile and a greater value given to the neighbourhood, clean air and clean water. The community is

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13 Ibid.,p.2.25

14 Ibid.,p.2.25

15 Ibid.,p.2.25

16 Ibid.,p.2.25

designed to encourage less use of the car by having short walks to commercial centres, have a good system of pedestrian and bike ways, and transit. All streams are preserved helping to clean water.

The overall cost savings to society on a larger scale further the support an alternative sustainable design. The study notes if this pattern became the norm for settling 2 million inhabitants two thirds of lands that would be urbanised could remain as open space,transit would be more efficient and better used saving 35% in fuel consumption, and infrastructure costs would be one third that of like suburban developments so that tax revenues would be able to cover the replacement ,operating and maintenance costs.[17]

It is clear that 'value' choices will have to be made. The alternative sustainable design voices a strong argument for a community that desires neighbourhood qualities such as promoting less use of the automobile and thus cleaner air and by dealing with storm water on site helping to lower infrastructure costs and 'clean' the water.

[17] Ibid.p.2.25

Appendix IV
Precedent Study IV

Canada Mortgage and Housing Corporation
Conventional and Alternative Development Patterns
Infrastructure Costs

The Canadian Mortgage and Housing Corporation and the Regional Municipality of Ottawa Carleton (RMOC) commissioned a study to compare conventional development patterns with alternate developments which use the 'new planning paradigm' more widely known as New Urbanism.

The aim of the study was to compare the " cost effectiveness"[1] between the two developments, conventional and alternate. The conventional pattern is considered to be those developments that are postwar suburban while the alternate developments represent mixed use, compact sites, using the principles of new urbanism.

Analysis of the two are based on two conditions, " life-cycle costs of various linear infrastructure, and , community services."[2] Life cycle costs are made up of first-time emplacement costs, replacement costs, operation and maintenance costs over a seventy-five year time span that is widely considered the limit of a community's infrastructure. In addition, public and private costs are divided into two separate areas.

The overall study is intended to address only infrastructure costs and not "social or environmental implications of either development pattern."[3] The study states that it " simply assesses which plan is more cost effective and why."[4] This precedent study will follow the same guidelines.

Procedure

The procedure taken in the study is a comparative analysis of the two development patterns, conventional and alternate. To accomplish this certain objectives had to be established which defined the site and how the study was to proceed. These were as follows:

1) a location, the Regional Municipality of Ottawa Carleton (RMOC), was chosen for best exemplifying 'suburban development patterns';

2) an alternative plan founded on the principles of New Urbanism was overlayed on the same land used for the conventional site;

3) statistics (i.e. dwelling units,land use, population, density, road dimensions) of the two developments were compared;

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1 Canada Housing Corporation, 'Conventional and Alternate Development Patterns, Canada, 1997,p.1

2 Ibid.,p1

3 Ibid.,p.1

4 Ibid.,p1

4) a financial model to quantify public and private life-cycle infrastructure costs over a 75-year period was developed;
and
5) the infrastructure costs of each development were then compared.[5]

Analysis

What followed was a site specific analysis that included setting up parameters that would aid in the selection of the test site and direct the study. Within each parameter an inventory was made of what was on the site with respect to what was required to support that specific guideline.

The test site parameters outlined a site that was representative of a conventional suburban area in the RMOC district, large enough to provide sufficient numerical data, have a civic core (schools, recreational facilities) including pubic transportation, mixed use (commercial and retail), be near enough to a major transit way, a local municipal data source, and have a cooperative host partner (i.e. the municipality).

Site specifics-Conventional:

-Barrhaven suburb of the City of Nepean
-planned to have 22,000 dwellings
-population of 66,000
- homogeneity of land uses
-a hierarchy of roads (arterial. collector,local) that have 20m (66') right of way for local streets
- curvilinear road patterns
-a hierarchy of retail facilities (convenience ,neighbourhood, community, regional)
-physical separation of schools and community facilities
-emphasis on the use of the private automobile
-residential is low to medium density of 20-25 units per hectare
-standard lots
-community is young, family orientated and relatively affluent

Standard Lot Building Size and Parking

-single family detached lot frontages 10.7m to 19.8
-Street townhouses 5.3m
-Building height- 7.7.m to 9.2m
-Side Yards-1.2m to 2.4m
- Street -lot depths approximately 30m (100') to 34m(112')
-front yard setbacks of 6.0(19.7')
-back yard setbacks of 9m
-lot coverage 30% to 45%
-parking is in front of the house with room for two cars parked bumper to bumper
-garages are in the front attached and dominate front of house facade and

5 ibid.,p.1

streetscape.[6]

Site Specifics-Alternate

-compact urban designed around a 400m (5 minute) walk
-clearly defined individual neighbourhood that have a central green space that is surrounded by public buildings (school, library, community centres)
-high net residential densities
-finer mix of land uses
-reduced role of car placing emphasis on public transit, walking, and cycling
-open grid
- narrower local right of way reduced from 20m to 17.5m
-residential blocks have rear lanes
- concentrated mixed use near transit nodes
- affordable housing and greater range of housing types
-scaled to human/pedestrian use with a strong commitment to the public realm.[7]

Statistical Comparison of the Plans

Total Area of Both Plans is 337.7ha

Conventional	Alternate
-184.2ha residential= 4,005 dwellings with a pop. of 13,045 land use is 54.4% residential low density residential=44.9% medium density=8.8%	158.2ha of net residential land=6,857 with a pop. of 20,949. land use is 46.9% residential low density residential = 30.5% medium density= 16%
residential density=21.7 units perha frontage=10.7m to 19.8m	residential densities=43.3 upha frontage=6m to 12m overall the alternative plan=71% more dwelling units than the conventional.
commercial land use=6.0ha	commercial land use=15.4 recreation land use= 20% more greater length of roads= 16% more* road surface area= 15% more * *does not include rear lanes. These instead are considered as the equivalent of private driveways.[8]

Summary of Analysis

The study has established three of the five of its original objectives. A location which meets the proposed parameters was chosen, an alternate plan was 'superimposed' onto the test site, and statistics of the two sites were compared. In the latter the overall

6 Ibid.,p.2,3
7 ibid.,p.7,8
8 Ibid.,p.13

summary concluded that the alternate plan used land in a more compact way so that there was more open space available. On the other hand the alternate plan has more housing, roads and ultimately paved surfaces than the conventional development which would lead one to assume that infrastructure costs would be higher.

The study at this juncture establishes a financial model from which to compare infrastructure costs.

Infrastructure Costs

Procedure

The procedure of this study follows the guidelines set in the original study of doing a comparative analysis between the two developments, conventional and alternate. Before proceeding the study defines the word infrastructure and the terminology associated with it such as life cycle, emplacement, replacement, operating and maintenance. These terms are explained as follows:

1) infrastructure includes what is commonly referred to as elements of the public realm such as roads (utilities and service connections),sidewalks, street lighting, sanitary sewers, storm water management, water distribution, transit, fire and police protection, park land, recreation facilities, libraries,works and park depots, garbage collection, hydroelectric service, and school and transportation facilities. [9]

2) Life-cycle costs refer to "the amount of money that would hove to be banked today to pay for the infrastructure and services over a long period of time."[10] In this instance the life cycle is 75 years the time considered " the longest lifespan among the 15 infrastructure components under review"[11] in the community. Certain infrastructure components such as a road which has a lifespan of about 25 years will though have to be replaced earlier. These costs are estimated in 1994 dollars.[12]

3) Emplacement refers to the "first-time capital costs to build the infrastructure. The study assumed a 25 year debenture programme starting in 1994 at a annual debenture rate of 5.5%.

4) Replacement is basically the rebuilding costs of replacing infrastructure at the end of its useful life. The study assumed a 'sinking fund' of "X" years at an annual rate of 4%.[13]

5) Operating and Maintenance are the costs include the fixing, cleaning, staffing, and monitoring necessary to run the infrastructure over the assigned time period of 75

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9 Ibid.,p.18

10 Ibid.,p.18

11 Ibid.p18

12 Ibid.,p.18

13 Ibid.,p18

years.[14]

Calculation of costs were done through spreadsheets that allowed for quick easy access and looked at the financial costs on a per dwelling unit basis. The spreadsheets included an inventory of what each service included in both service operation (staffing) down to physical elements such as the number of meters of road surface, or building space. Costs refer only to those associated with either the conventional or alternate plans and not to other neighbourhoods or the city as a whole.

In the study the emplacement and replacement costs are regarded together as 'capital costs'. These are set according to the quality and service standards of local or regional by-laws. Whereas operating and maintenance costs stand in their own column.

Certain limitations of the financial model were recognised by the study. Operating and maintenance costs are site specific whereas capital costs are roughly the same across Canada. The 75 year cycle is set in 1994 monetary values it does not take into account costs fluctuations, technological advancement, societal value shifts or other such changes.

Comparison of Conventional and Alternate Using the Financial Model

Conventional	Alternate
Overall	
-Total life-cycle cost for 75 year period is period is $500 million -Operating / Maintenance $318.4 million or 64% of the total life cycle -Emplacement $144.6 or 29% of the total life-cycle -Private (developer) costs is 38% or 11% of total life cycle -Replacement costs is $37 million or 7% of total life cycle	Total life cycle cost for 75 year $820.5 million Operation/Maintenance $551 million or 67% of the total Emplacement is 26.4% of the total life cycle Same Replacement costs are about 6.5% of total of life cycle costs -Therefore the alternative plan is about higher.
Per Unit	-Alternate generates 71 %more

[14] Ibid.,p18

	dwellings. Therefore it is actually 7.5% more economical or a life cycle cost savings of $8,947 per unit. 158
-Nonresidential is $689.00 per sq meter	Nonresidential sector is $312 per sq meter or 55% more economical * Lane ways as mentioned earlier are though the responsibility of the owners therefore these costs were not included.
-Emplacement costs per unit is $39,619 in residential sector Commercial is $319 per sq meter *School facilities and school transportation are the single largest cost emplacement coming in at $10,560 in both plans.	Emplacement costs per unit is $29,468.00 in the residential sector Commercial is $96.00 per sq meter
Storm water management is $787 per unit	-Stormwater management at $493 per unit
	Replacement costs per unit is $1,821 per unit less or a savings of 21% in the residential sector Commercial sector it is a savings of $82 per sq meter or a savings of 68%.
$1004 per meter of road	* For both residential and nonresidential roads represent the biggest savings at $1,333 per unit. $989 per meter of road (due to the reduction in pavement width.
Operating/Maintenance per unit is $48,500 over the life cycle	Same

Summary of Life Cycle Costs

The findings of the study conclude that the alternate development over the long term shows a significant saving over that of applying a conventional plan to the same test site. Although the alternate development is initially higher the study reveals that due to densification the infrastructure costs per unit is lower as there are more units per ha that are able to share the replacement, operating and maintenance costs. The study states "savings range from about 29-37% for roads,utilities,service 159

connections,sanitary sewers, water distribution, and stormwater management."[15]

Roads represent the largest saving at $3,054 per unit in the residential alternate plan. They were followed by stormwater management at 41,444 per unit, water distribution at $1,089 per unit, sanitary sewers at $975.00 per unit, sidewalks and street lighting at $289 per unit. It is interesting to find that although the road length in the alternate plan 16% longer it required 32% less road length per unit that the conventional Plan. Rear lanes are though excluded.[16]

Roads as well represented the single largest saving in the commercial sector under the alternate plan.

Schools the report notes are the largest cost factor in both plans equalling over half of the total life cycle costs.[17]

What would have been interesting to detail was whether municipal taxes over a period of time reflect the savings and if they would be lower in the alternate development as compared to the conventional development.

Overall the findings support the economic viability of an alternate plan based on new urbanist principles over that of a conventional development. The adjustment of certain physical features such as the narrowing of road widths, a smaller lot size, the movement of lot parking to the back of the property are shown as being economically viable without the need for sacrificing livability. The incorporation of a good storm water management and a water distribution further alleviate total infrastructure costs. Furthermore with a densification of housing less pressure is put on other open land for development.

The application of the alternate system as a viable economic alternative to other areas of the country should perhaps have a 'cost of living' factor applied to it. As the study noted operation and maintenance costs may vary from each region. Apart from a dramatic rise in this sector the alternate development is shown in this study to offer a positive option.

Essiambre-Phillips-Desjardins Associates Ltd.,Canadian Mortgage and Housing Corporation, Conventional and Alternative Development Patterns,- Phase 1:Infrastructure Costs, Canada, 1997.

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15 Ibid.,p35

16 Ibid.,p.35

17 Ibid.,p.35

Appendix V
Precedent Study V

William T. Perks and Andrea Wilton Clark, Consumer Receptivity to Sustainable Community Design, (CMHC), University of Calgary, April 1996.

Introduction

William T. Perks and Andrea Wilton-Clark in 1994 initiated a study on 'Consumer Receptivity to Sustainable Community Design' with the support of the Canadian Mortgage Housing Corporation.

The project's primary objective was to ask a group of consumers on the merits of sustainable community design and whether they would want to live there.[1] The study defines 'sustainable community' as being made up of "performance features"[2] defined as "sustainable development and ecological performance, in the environmental and artifactual environmental systems deployed ; performance of built environment designs and functions (eg. housing, streets, employment opportunities); environmentally -friendly resources consumption (recycling land densities); provision of lands for food production; and capacities in the built environment for succession planning and adaption (housing, business needs)."[3] This definition presents a comprehensive aspect of what makes up a 'sustainable community.'

Due to the wide coverage of the study this precedent analysis will be limited to Stage 1 'Sustainable Community Design versus the Conventional Suburb' and its implications with particular reference given to the streetscape.

Procedure

The procedure was based on an analysis of the surveyed results.Stage 1 was based on community design that was tested by a group of 62 Calgary householders from Edgemont a suburban community in Calgary. In stage 1 the respondents were given a set of questions based on the alternate community, Edgemont II. They were asked to " signify which performance features they would choose or accept,which they would not favour or accept."[4] The various choices were first given them individually and then in a group.The group had undergone some preliminary briefing of what was expected in a half day urban planning workshop.

Stage 1 is chiefly concerned about the wants and opinions of the householders including actual viewpoints of a 'sustainable development.'

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1 William T. Perks and Andrea Wilton-Clark, Consumer Receptivity to Sustainable Community Design, Canada Mortgage Housing Corporation, April 1996.p.i

2 Ibid.,p.i

3 Ibid.,p.i

4 Ibid.,p.i

The information provided was by means of drawings and computerised images. Results of the 62 householders are tabulated three different ways:
1) Single written answers represents Edgemont the neighbourhood
2) Taken as a collective group represents the City
3) Edgemont + City= Average

The study noted two main limitations. First the small size of the respondents perhaps was not a fair sample of respondents given that the diversity of those in the Edgemont neighbourhood is not representative of many parts of Canada. Secondly the computerised document does not fully compliment the extent of information given on the various design features and therefore is not as complete as it should be.

Stage1- Sustainable Community Design versus the Conventional Suburb'

Site Specifics:

Population

The conventional Edgemont 1 is largely made up of single families with an income of $90,000 per household, whereas the alternate development, Edgemont II would be a mix of singles,elderly, lone-parent families, and non-family households, with the average household income of $58,000.[5]

Housing Types

See Table 1 for housing types and lot sizes

Land Uses

See Table 2[6]

Infrastructure Costs

See Table 3 for Infrastructure Costs[7]

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5 Ibid.,p.iv
6 Ibid.p.,iv
7 Ibid.,p.v

Consumer Receptivity to the Streetscape

Street Width

A short interpretative sketch was given to the respondents of street and roadway design dimensioning highlighting current community streets which are wide with gentle curves with large intersection spaces which encourage faster than normal speeds in residential areas and increase wind speeds making them less comfortable for walking.

Cost evaluation was also included showing that the wider the street the higher the emplacement, replacement and maintenance costs are.

Narrowing street width helps to slow traffic and the following example shows costs are lowered.

A Typical	2 traffic lanes and 2 parking lanes with sidewalk
Street Design	Roadway width is 9.50m (31') **Cost is $1150 per average home property**
Alternative A	2 traffic lanes and 1 parking lane, with sidewalk Road width is 6.60m (22') Change from 'The Typical'--narrower traffic lanes reduced width by one parking lane **Cost is $750 per average home property**
Alternative B	2 traffic lanes and 1 parking lane, with 2 sidewalks Road width is 6.60m (22') Change from the 'Typical'--narrower traffic lanes, reduced width by one parking lane **Cost is $1030 per average home property**
Alternative C	2 traffic lanes,1 parking lane,0 sidewalks Road width is 6.60m (22') Change from the 'Typical'--narrower traffic lanes, reduced width by one parking lane **Cost is $470 per average home property**[8]

Results (average of Edgemont + City)

[8] Ibid.,p.43

75% of the total respondents favour narrower street widths
71% favour traffic calming street designs...even though it would add $800.00 to home purchase (this figure comes from keeping the street to conventional width size).[9]

Front Yard

A short graphic sketch shows that the typical front yard has more than doubled in the post war period. If the front yard is reduced to 3m (10') it has the following advantages;

1) more neighbourly feel
2) smaller property purchase price (up to $4000 reduction)
3) or have the same property but a larger back yard
Yet a smaller front yard still meets the minimum requirements for drive-way parking safety,front door privacy,street parking and snow storage.[10]

Results (Edgemont and City)

Smaller Front yard considering saving $4000 yielded an 81% approval (Edgemont)
80% approval (City)

Smaller Front yard with no saving yielded an 86% approval rate (Edgemont)
80% approval (City) [11]

When asked to consider all three features, reduced street width, calming measures for streets, and a small front yard, the respondents gave a 86% approval rate.

Street System

Information presented states that there are two main types of 'street networks in suburbs; 1) the cul de sacs and P-loops; and 2)the grid system.

Cul de sacs allow fro continuous traffic flow with the exception that carrier or P-loop roads are busier as they must handle traffic that comes from the cul de sacs.

The grid system with short distances between intersections ie shorter blocks helps slow traffic. Edgemont II would be laid out on the traditional grid system.[12]

Results (Edgemont and City)

Grid system with few cul de sacs yielded a 62% approval rate (Edgemont)
78% approval (City)

Grid system only 14% approval (Edgemont)

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9 Ibid.,p.vii
10 Ibid.,p. 45
11 Ibid.,p.45
12 Ibid.,p.50

17% approval (City) [13]

Pedestrian and Bicycle Pathways

Information is given on how to 'reduce dependency on the automobile' by way of providing for exclusive bicycle lanes, linked bicycle-pedestrain pathways, and bicycle storage facilities at key bus stops enabling 'bike to work programmes.'These pathway arrangements though would mean a 5% to 10% rise in property taxes.[14]

Results

52% of the single respondents (Edgemont) favoured the pathways
63% of the collective respondents (City) were favourable [15]

Neighbourhood Centres

The information given defined a neighbourhood centre as a place to work, shop, or provide entertainment.[16] It would It should be within a 5 minute walk minimum and a 15 minute walk maximum. Surrounding this centre would be first high density (townhouses and apartments) followed by single detached dwellings.[17]

Results (Edgemont and City)

Favoured neighbourhood centre arrangement to the present conventional suburb of having no centre 62% approval rate (Edgemont)
80% approval (City) [18]

Open Spaces

Information was given on open spaces being used as garden allotments for the production of food. These could be rented or organised under a community organised farm cooperative system that takes care of food production.[19]

Results (Edgemont and City)
Yes -very positive- 10% approval rate (Edgemont)
48% approval (City)

Yes- but not a specially big factor 80% approval rate (Edgemont)
38% approval rate (City)

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[13] Ibid.,p.51
[14] Ibid.,p51
[15] Ibid.,p.51
[16] Ibid.,p55
[17] Ibid.,p.52
[18] Ibid.,p.53
[19] Ibid.,p.56

Summary of Results

The following results of the study conclude that given the choice between a sustainable community and a conventional neighbourhood in regards to the areas discussed the range of overall approval for such a community is as follows;

Social

Street dimensioning to calm traffic is an important issue even though it would add $800 to the cost of the house. The preference for a grid with a few cul de sacs over strictly a grid system is a reflection that traffic flow is less important to having one way closed streets. Possibly this is due to the feeling of having streets that act more as private roads than public streets.

Pedestrian and Bicycle paths are an option to reducing the need for the automobile. Although the numbers are not strong in their support they are better than 50 + 1%. The non-support may largely due to economic considerations.

The strong support for the option of a having a small front yard and not saving money on the price of the property reveals the respondents desire for a more neighbourly feel over that of economics.

Neighbourhood Centres are seen by 3 out of 4 respondents[20] as important in the design and an integral part of the neighbourhood and to the community as a whole.

Open spaces as food producing areas are regarded as a negative option within the neighbourhood but should be a considered for some area of the city.

The citizens social wants and desires show that individual and collective preferences are roughly the same. The only major differences are in the areas of having a grid system with a few cul de sacs where neighbours had a lower approval of a completely open system to a plan of having a mix of open and closed streets, and, fact of having public pathways only if those in Edgemont did not have to pay for them.
Generally the social advantages of an alternate development plan met with high approval.

Economic

The strong support of narrowing of street widths to help reduce infrastructure costs bears that citizens do care about costs outside the realm of their own properties. On the other hand it does hinder some of the more positive measures of incorporation of sustainable design features such as pedestrian-bicycle ways.

Overall approval results:

1)Edgemont- 65.8%

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[20] Ibid.,p.vi)

2)City- 70%
3)Edgemont and City - 64.3%

The results signify there is reasonable support for a 'sustainable community development at both a social and economic level, and an acceptance of ; 1) working to have a community that has a more broadly based population composition with a range of incomes and types of family;2) different types of housing and lot sizes from single detached houses to muti-attached homes in the neighbourhood; 3) a diversification of land uses such as residential,commercial, educational, open public spaces, street right of ways; and 4) a move towards infrastructure cost savings.

To conclude the social coupled with the economic factors support the building of a 'sustainable designed neighbourhood.'