THE EFFECTS OF LAND USE, TRANSPORTATION INFRASTRUCTURE AND HOUSING AFFORDABILITY ON GROWTH MANAGEMENT IN THE GVRD: A STUDY OF HOUSEHOLD TRAVEL BEHAVIOUR AND LOCATION DECISIONS

by

MARK B. ALLISON

B.Sc., University of Windsor, 1980
M.Sc., University of Waterloo, 1982

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

in

THE FACULTY OF GRADUATE STUDIES

(School of Community and Regional Planning)

We accept this thesis as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

August 1997

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Department of Graduate Studies
The University of British Columbia
Vancouver, Canada

Date 19 October 1997

School of Community and Regional Planning
Abstract

A great deal of planning literature in the last decade has been devoted to growth management and the concept of land use and transportation interactions. "New" approaches to planning, such as Transit Oriented Development (TOD) and Neo-Traditional Neighbourhood Design, are products of this evaluation of current development practices. The influence of housing affordability and accessibility, although intuitively related to the growth management problems of urban sprawl and automobile dependence, has often been overlooked. The purpose of this research is to bridge important gaps in our understanding of how residential land use and transportation infrastructure investments are shaping unsustainable growth and travel patterns in the GVRD, which is the main problem being addressed. The research objectives related to this problem are the correlation of observed trends in growth, housing and travel indicators, the determination of the importance of price and accessibility factors in household location decisions, and the analysis of the role that land use and transportation decisions have played in influencing housing costs and accessibility.

To provide a context for understanding the scope of the problem and the relationships between the research results and proposed recommendations, the applicable literature, theory, and policies in the areas of growth management, land use, transportation and housing are given. Supporting research results include: a survey of senior stakeholders in the region on land use, transportation and housing issues; a synthesis of significant socioeconomic, growth, transportation and housing data; a summary of surveys outlining preferences for residential location and housing type; and an analysis of Place of Work data crosstabulated against Place of Residence and socioeconomic variables. The results show a strong dependency between location decisions and the cost and accessibility of housing, particularly for the critical group of younger households with children.

Policy recommendations, based on the research and covering land use, transportation, housing, governance and education, are proposed to address the main sustainability problems studied. The recommendations focus on promoting affordable, higher density communities, with a choice of transportation modes, as an attractive alternative to lower density, automobile-dependent suburbs.
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Acknowledgments

This work is dedicated to the hundreds of citizen advocates across Canada who are working on land use and transportation issues to promote social equity, environmental protection, and fiscal responsibility. In particular, I would like to thank past and present colleagues in NGOs such as Environmentalists Plan Transportation (EPT) and Transportation Alternatives in Toronto, Citizens for Safe Cycling and the Transportation Environment Action Plan (TEAP) in Ottawa, Better Environmentally Sound Transportation (BEST) and Cycling BC in Vancouver, Transport 2000 Ontario and Transport 2000 Canada.

There is little doubt that our society would be worse off today without such citizen advocacy groups. A glance at any American city, characterized by empty cores gutted by freeways, is a memorial to the effectiveness of public involvement in Canada. Many initiatives now considered to be mainstream by professionals, such as bicycle facilities and neighbourhood traffic calming, originated from unpaid advocacy groups pushing a new agenda. Tragedies such as the Cassiar Connector freeway project and Knight Street truck route in Vancouver, or the urban sprawl common throughout the Fraser Valley, are reminders of what can happen when government and economic interests are too strong or the citizen watchdogs are too weak or unorganized.

The encouragement and support of Dr. Tom Hutton, made an important contribution to the work. Useful feedback was also received from Dr. Mark Roseland of Simon Fraser University, Dr. Nancy Knight and Ralph Perkins of the GVRD, as well as the many who responded to requests for information and opinions on land use, transportation and housing issues. Special thanks go to Hugh Kellas and the GVRD Strategic Planning Department for providing much of the data used in this work and funding for the essential census data compiled by Statistics Canada’s Ted Brown.

Finally, I would like to extend my warmest thanks to Joell Vanderwagen, a long-time mentor and friend, who introduced me to the key roles that citizen advocacy and the planning process had to play in the promotion of a sustainable and equitable society.
Prologue

Early in the writing of this thesis, a lingering cold led to musings on the possibility that the bubonic plague was again rearing its ugly head. The thought then occurred that there were a lot of similarities between the plague and the scourge of urban sprawl. This scourge, inflamed by a growing psychological and physical dependence on the automobile, afflicts most major metropolitan areas around the world. A brief historical review of the plague may therefore be a suitable, if sobering, introduction to the thesis.

"The Bubonic Plague"¹

The plague is one of the most devastating diseases that has ever afflicted mankind. It is a highly contagious fever caused by the bacillus Yersinia pestis, which is carried by fleas that infest rats. The plague, commonly called bubonic plague or the Black Death, has been known since ancient times, but the best documented instance was its deadly appearance in Europe in 1347. It raged throughout all of Europe, killing at least one-fourth of the population—probably 25 million people. Without understanding how it was spread, people had no defense against the disease.

In general, the population of Europe did not recover to its size before the plague until the 16th century, and some towns never recovered. The immediate results of the plague—a general collapse of economies, a breakdown of class relationships, and a halt to wartime hostilities—forced a massive restructuring of society. It has had a lasting impact on art, literature, and religious thought.

Millions of people around the world have also been killed and wounded, directly or indirectly, by the automobile. Over 500 deaths and almost 50,000 injuries result from car crashes every year in B.C. alone.² There is also no doubt that our economic and cultural systems have succumbed to the automobile and that we have been forced to completely restructure North American society.

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¹ Excerpts from Compton's Interactive Encyclopedia, SoftKey Multimedia, 1996.
and most of our communities to accommodate its needs. It could easily be argued that the need to protect access to the cheap petroleum sources required by an automobile-based economy and culture has been a major factor behind several large-scale armed conflicts this century, such the Suez Canal conflict (1956-57) and the Persian Gulf War (1991).

We drive our children to school, ostensibly for their own safety. We allow the brown chemical soup that hangs above us to burn our eyes and afflict those with respiratory ailments. We watch our forests and pastoral farmland succumb to strip development and dysfunctional suburbs. We regret having less time to spend with families and friends as we commute further and work longer hours to pay for our cars and housing. We feel our blood pressure rise as we sit in traffic. Our architects now design houses around large garage entrances. We lament the loss of a sense of community and the feeling that we no longer know our neighbours. We complain bitterly about paying the increasingly high insurance premiums needed to repair or scrap the human and automotive bodies that have fallen victim to the traumatic events that we prefer to call “accidents” instead of crashes or collisions.

How is it possible that, given all of these overwhelming indicators, the opinion polls still show that the greatest concerns of residents living in the Lower Mainland of B.C., the priorities that we insist our decision makers take action on, consistently include relief from traffic congestion and parking shortages? Like the plague, it seems that our society as a whole doesn’t realize that the causes of the affliction are all around us. Once society recognizes their significance and accepts the need to change, remedies may be as easy to implement as the sanitary sewer systems that have made the bubonic plague little more than an unpleasant historical anecdote.

The pages that follow will attempt to demonstrate how a study of our two most basic needs, shelter and access to necessities, can be used as a powerful mechanism to explore the magnitude and implications of the problems of urban sprawl and automobile dependence. Transportation, land use and housing policy directions can then be applied which, with sufficient political will and public awareness and support, could lead towards long-term solutions to these problems.
1. Introduction

1.1 Overview

To loosely paraphrase Jane Jacobs, "This thesis is an attack on current urban planning in metropolitan regions." The negative effects of the urban sprawl and automobile dependence common throughout Canada and the U.S. in terms of social, environmental, and economic sustainability are well documented and the serious consequences are clear. Nevertheless, remarkably little has changed since Jacobs wrote the chapter with the tell-tale title of "Erosion of cities or attrition of automobiles" in her 1961 classic The Life and Death of Great American Cities. Her descriptions of the sprawling automotive wastelands that Detroit and Los Angeles had become are as applicable today as they were 35 years ago. Greater Vancouver is increasingly compared with L.A.

Official policies on growth management appear to address the need for compact, complete communities oriented around walking, cycling, transit and goods movement. Observed trends, such as the increasingly distant location of new low-density development or the high level of per capita car use, indicate that this is not actually the case. An analysis of the policy instruments in place to support growth management policies show that these are having little effect and in some cases may be exacerbating the situation.

The attitude of "we’ll keep doing things the way we’ve always done them" seems to permeate the working culture of the current generation of planners and engineers at the municipal, regional and provincial levels. Municipalities complain of growing traffic and pollution, but little effort has been made by either the suburban municipalities, which act as bedroom communities, or the urban municipalities, which serve as employment centres, to address the issues that are at the heart of the problem: a lack of affordable housing, a better balance of jobs and housing within the region,

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and the need for much higher overall densities. Tax payers view progressive planning initiatives by governments as an attempt to increase their tax burden or impose undesired changes on them.

These factors have combined to create a powerful inertia to change among politicians, civil servants, and the public. Ways must be found to overcome this inertia before new planning principles and engineering standards, those which promote sustainable urban forms, will be accepted by society and implemented.

This thesis is intended to challenge and influence the attitudes of professionals, decision makers, and the general public towards land use, transportation and particularly housing. The goal of the thesis is to contribute to creating a metropolitan region that is designed and built as a higher-density, people-oriented form instead of a lower-density, automobile-oriented form. The underlying hypothesis is that numerous government policies at all levels are effectively driving people to drive in order to access employment, amenities and, above all, affordable, family-oriented housing. These policies are often justified in the name of preserving personal freedom or, in the currently conservative fiscal climate, avoiding the appearance of providing subsidies for the alternatives. Nevertheless, enormous personal and public resources have been, and continue to be, expended to adapt our lifestyles and our neighbourhoods, cities, and metropolitan regions to accommodate a need for cars that we have created ourselves.

The thesis will examine the available choice of housing types, locations, and costs, as well as the transportation modes that are available to move people between their chosen homes and their other activity centres, such as work, shopping, education, and recreation. A focal point of the research is the cost of ground-oriented family housing suitable for first-time buyers and its location with respect to the location of employment centres in the Greater Vancouver Regional District (GVRD). Socioeconomic factors will be examined to determine how these factors influence the lifestyle decisions of newer middle-class families, who form the basis for the perpetuation of low-density, car-dependent communities. It will be argued that, by not offering newly forming households an attractive alternative to the suburban lifestyle through sustainability-
based land use and transportation planning, we are creating a region that not only has an enormous ecological footprint but lowers the quality of life for its residents as well.\textsuperscript{4}

The thesis will be an examination of fundamental relationships between land use and transportation infrastructure as applied to housing decisions in a metropolitan context. Many planners, engineers, decision makers and members of the general public should intuitively recognize the existence of these relationships. Given the magnitude of the subject area, only primary indicators will be synthesized into a cohesive picture and an investigation of all possible indicators will not be attempted. These relationships will be translated into effective housing policy and policy instrument recommendations which address the interdependent issues of urban sprawl and growth management. An effective governance structure and a program of public education, which raises awareness of the issues and proposed solutions to a high level, will be outlined as integral components of a comprehensive strategy.

\begin{quote}
"Regional and local governments should have housing as a centrepiece of their policy."
\end{quote}

\begin{flushright}
...Regional Planner
\end{flushright}

1.2 Problem Statement

Land use patterns in the GVRD have resulted in prohibitively high housing prices near many of the region’s major employment concentrations, particularly for the ground-oriented housing preferred by many new family households. This situation has created increasingly distant, low-density suburbs and exurbs which provide more affordable housing, but are inherently automobile-dependent. Households wishing to own ground-oriented housing appear to have little choice other than long-distance commuting, and large expenditures in personal and public transportation infrastructure have been made to accommodate trends towards increased travel.

Effective, ascertainable policies and policy instruments at the municipal, regional, and provincial levels are not in place to provide sufficient affordable housing near employment centres in order to counter urban sprawl and unsustainable travel patterns. It is highly unlikely that the GVRD can achieve its goal of creating complete, walking, cycling, and transit-oriented communities within a compact metropolitan region in the absence of such policies and policy instruments.

1.3 Research Questions

The following questions will be addressed by this thesis research:

• What are the trends in land use density and mix, jobs/housing balance, housing markets and transportation infrastructure that relate to GVRD housing affordability and travel patterns?

• How important is the lack of suitable, affordable family-oriented housing close to jobs and amenities in household location decisions? In particular, what are the locational and travel influences of the critical “barometer” group of younger households with children seeking to own ground-oriented housing, and how do these differ from the average household?

• Is the “push-pull” theory of land use and transportation modeling, i.e., integrating the “push” effect of high housing prices near employment concentrations and the “pull” effect of low housing prices in distant suburban areas, a more reasonable basis for strategic planning than the simple gravity model, which discounts the importance of housing prices on travel patterns?

• In the context of the available literature, current provincial and regional growth management policies and the research findings, which new or existing policies and policy instruments have the greatest potential to promote affordable housing and a sustainable transportation system to support the goal of creating a compact metropolitan region in the GVRD?
1.4 Study Area Definition

Before beginning, it is worthwhile to define the temporal and geographic study area and terms used to represent components of the study area. The study area includes most of what is known as the Lower Mainland of British Columbia (B.C.), primarily municipalities within the Greater Vancouver Regional District (GVRD) which had either more than 5,000 residents or more than 5,000 jobs in 1991. References will also be made to municipalities in the neighbouring Fraser Valley Regional District (FVRD), which is increasingly becoming an integral part of the GVRD’s “commutershed.” Regional Districts in B.C. are collections of municipalities and unincorporated areas which have limited jurisdiction over matters such as planning and shared infrastructure. For readers less familiar with B.C. or the GVRD, the following context map, including locations of places referred to later in the text, will be of use.

Source: Base map from MapInfo Corporation, overlays by author.

Figure 1 - Study Area Context Map
Three major subregions will be referred to: the Regional Core, Suburbs, and Exurbs. The “Regional Core” is defined in this thesis as the central, higher-density GVRD municipalities which contain most of the major employment centres within the region, including Burnaby, New Westminster, North Vancouver City, Richmond, and Vancouver. The “Suburbs” are defined as the so-called “bedroom” communities surrounding the regional core, which may have major employment centres, but exhibit a severe imbalance between the number of employed residents and the number of employment opportunities available locally. Inner Suburbs and Outer Suburbs of Vancouver will also be referred to. “Inner Suburbs” include Burnaby, New Westminster, the North Shore municipalities and Richmond, while the “Outer Suburbs” include all other GVRD municipalities. “Exurbs” are defined here as those municipalities which are far from the regional core, either by physical distance or access time, and export significant numbers of workers into the suburbs and regional core. Exurbs often have a distinctive economic base underlying a “bedroom” function, usually agriculture. “Subareas” are collections of municipalities with common characteristics and clear geographic boundaries that are often used by the GVRD and some other agencies for data reporting purposes.

For clarity of data representation, the municipality is the smallest geographical unit considered, which can result in the combination of urban and rural characteristics in the aggregated data. Delta, Langley District, Richmond and Surrey are examples of this urban/rural mixture. For historical reasons, the name “Langley Township” is often used for “Langley District” or the “District of Langley.” Richmond in particular should be viewed as a special case. Northwest Richmond acts as part of the regional core, West-central Richmond is a classic suburb and eastern Richmond is clearly rural. Several municipalities have been amalgamated since the 1991 census, notably Abbotsford and Matsqui, and the GVRD has grown since then to become the equivalent of the 1991 Vancouver Census Metropolitan Area (CMA) with the addition of Langley City, Langley District, Maple Ridge and Pitt Meadows. A City in British Columbia is a municipality with more than 5,000 residents and higher overall density, while a District has more than 5,000 residents with an area greater than 800 hectares and a population density less than 5/hectare.
Figure 2 - Definition of Subregions

Figure 3 - Definition of Subareas
In addition to the subareas shown, various reports often refer to the “Burrard Peninsula,” which includes Vancouver, Burnaby, New Westminster and UBC’s University Endowment Lands (UEL), while “South Fraser” consists of the South Region and the Langley.

Source: Base map from Statistics Canada, overlays by author.

Figure 4 - Municipalities within the Study Area

1.5 Thesis Structure

This section will describe how the various parts of the thesis address the defined research problem and research objectives.

An overview of growth management, the relationships between land use and transportation, location theory and the land economics of affordable housing is the starting point. These sections combine a literature review of applicable planning work with an introduction to the theoretical concepts involved to provide a framework for understanding the nature of the problem.
The content and effectiveness of current growth management, transportation and land use and housing policies and policy instruments, taken primarily from “Cascadian” jurisdictions (B.C., Washington, and Oregon) will be then be surveyed. De facto policies, based on observed trends, will be given first in each of these sections, followed by the official policies. An emphasis will be placed on the policy climate that influences low-density urban sprawl and automobile dependency in the Lower Mainland of B.C.

Research findings are then presented, which consist of a number of interrelated components:

- A survey of key informants on their attitudes towards land use, transportation and housing affordability issues to set the context for observed trends in these areas;
- A consolidation of growth trends in terms of population and employment;
- A consolidation of transportation trends, including aggregate travel behaviour and a review of the types and impacts of recent infrastructure investments;
- A consolidation and analysis of key housing trends, including the number of starts, types and locations of units being built, and the cost of owning and renting in strategically important locations of the Vancouver CMA;
- A review of available opinion surveys of the stated and revealed preferences of potential home buyers, in particular first-time home buyers;
- Market analyses of the two opposing choices in housing types and locations facing first-time home buyers for comparison;
- An analysis of the relationships between Place of Work and Place of Residence data for various municipalities as a function of selected household socioeconomic variables;
- The compilation of income profiles for individuals according to their Place of Residence and Place of Work and comparison of these against the identified travel patterns and the cost of housing to determine the relative strength of push-pull factors.

A discussion of the research findings will then summarize key relationships and how these impact growth management goals, combined with conclusions.
In the final section, policies and policy instruments will be recommended which contain mechanisms for promoting sustainable land use, alternative transportation modes and affordable housing in support of the GVRD's growth management goals.

**How to Read This Thesis**

The length of this thesis is intended neither to impress nor intimidate the reader, rather to present all of the necessary facts, figures and background information in forms needed to support the analysis and conclusions made. These forms include photos, maps, graphs, tables, equations, lists, quotes, footnotes and text. Considerable effort has been put into formatting the tables and figures in ways that facilitate the comparison of data and the identification of important features.

As the work is intended to be accessible for both practitioners and the reasonably informed and interested layperson, a summary is usually presented in general terms either at the start of a section, directly before or after where more detailed data or findings are presented, and at the end of longer sections. Readers have the option of examining a section or data in more detail or proceeding. The approach chosen for selecting the background information presented was to provide all necessary and applicable data while referring the reader to more comprehensive works for details on specific subjects. Readers who feel they have a high level of expertise in one or more areas of the available literature, theories or existing policies, may wish to skip these sections.

Information which is more technical, or which complements the research but is not essential for following the findings and conclusions, is enclosed in grey boxes such as the one that you are now reading. A glossary of terms is included at the end of the thesis to provide convenient access to terms and acronyms used throughout the document. Acronyms are usually defined once in the text, after their first usage. Several appendices provide more detailed information that would be useful to many readers, but potentially disruptive if left in the main body of text.
1.6 Research Methodology

Given the enormous volume of readily-accessible background information that was available for the preparation of overview sections, this research methodology section will concentrate on describing the analytical techniques and special considerations that were applied in the preparation of “Research Findings” sections.

1.6.1 Analytical Techniques

An exhaustive study of the locational and travel behaviour of all classes of household and housing types would have been far beyond the scope of a masters thesis. On the other hand, a study of carefully chosen “barometer” groups and areas allows locational decisions and travel habits to be studied on a micro scale (individuals and households) and related to cumulative impacts on land use and transportation at the macro scale (municipalities, subareas, subregions and regions). The study will therefore provide aggregated information for the baseline case of all residents and a framework for the closer investigation of subgroups found to be of interest. The presentation of every possible growth, economic and housing indicator would also likely obscure the main influences being exerted on selected barometer groups and the most important impacts of their behaviour on growth management goals. As a result, indicators are presented only where they can be related to the research questions and readily correlated with other indicators.

As this research has a significant regional focus, there is a heavy dependence on secondary data sources, usually census or survey data collected by large organizations with different mandates and a wide variety of data definitions and collection methods. As a result, not all indicators of interest are available for all time periods and geographic borders. Although the data contains a few “gaps” in socioeconomic indicators, the independent collection of a complete set of primary data would be impossible to produce in a timely or cost effective manner. Cross-checks of the
available secondary data sources were made wherever possible to extract consistent conclusions. This “triangulation” approach is discussed later in this section.\(^5\)

For readers with an interest in analytical techniques, these are now described. Certain techniques will be expanded on, where necessary, in conjunction with the presentation of findings.

**Key Informant Interviews**

A number of key informants in the areas of growth management and housing were interviewed informally during the initial phases of the research to establish:

- That the problems identified were indeed significant and that a clear research gap existed;
- Which data sources were readily available and which needed to be collected or modified;
- The identities of appropriate individuals and agencies to contact for further information.

All questions were open-ended, and were intended to provide a broad overview of the range of attitudes that might be expected from practicing professionals. Areas which appeared to have the greatest importance and diversity of opinion were incorporated into a survey of key-informants.

**Key Informant Surveys**

As a result of the preliminary key informant interviews, personal experience and a review of the literature, it was noted that there was a significant diversity of opinion on the issues within the professional community as to the importance of the issues being researched and the appropriate direction for policy. While this was originally not a focus of the research, an understanding of the attitudes of key government staff and decision makers on the issues being studied was considered to be essential. The survey proved to be a valuable complement to the research results by providing practical insights, background information and a guide to the acceptability of the final policy recommendations presented.

Respondents were identified through earlier research into the issues and the recommendations of key informants. The responses are intended to identify the importance that the respondents assigned to the issues and the factors which were considered most likely to influence policy. The responses were summarized, but not coded for statistical analysis due to the limited sample size (18). The intent was to identify the “opposing camps” of the issues and gain insight into local and regional influences that do not appear in the global literature. Notable quotes appear in boxes throughout the thesis where applicable to provide the reader with a taste of the opinions held by practicing professionals.

Focus groups were suggested as an alternative to the use of surveys. As the criteria for effective focus groups require that homogeneity and anonymity are preferred, discussion should be directed and debate should not be encouraged. It was decided that it would be difficult, given the senior level and highly diverse nature of the respondents, to assemble 8-10 such people in a room for 90 minutes and to keep the group from slipping into a heated debate over the issues.

Growth, Transportation and Housing Trend Analysis

Available data, generally from regional and federal government sources, was organized using computer databases and text tables for presentation in a number of ways, primarily with GIS maps, line graphs, bar charts, and tables. The goal of this analysis was to consolidate available trend information, present the most important information as it affects growth management, transportation infrastructure and housing affordability, and organize it in a way that removed the clutter of unrelated data and facilitated comparison. Readers should be able to confirm the premise of the problem statement by this point.

Household and Buyer Surveys

Existing survey data was available in either report or computer readable format. Raw data for the GVRD GOMD telephone study and developer surveys was available for crosstabulations and
detailed analyses of the attitudes and preferences of different types of household, which provided valuable insights. Data and results available only as printed reports were of significantly lower value, as report authors tended to present only the information that was requested by the commissioners of the report, as opposed to future researchers with other research questions. Where possible, applicable results from published results are analyzed and presented.

Direct evidence on the housing preferences of younger, moderate-income, family households currently working in locations with high housing prices was needed to validate data from secondary sources. As a result, market analyses of two “barometer” communities were conducted:

- A standard market analysis of the Kitsilano neighbourhood on Vancouver’s expensive West Side, where low-rise condominium housing currently predominates new starts;
- A household survey of a recently-completed, entry-level subdivision of detached houses (Clover Valley Station in Surrey). The subdivision selected was a classic “bedroom community,” isolated from employment and commercial centres. It has received a large number of awards for being a model “neo-traditional” community, considered by many planners as an appropriate direction for higher-density, ground-oriented housing in the GVRD.

Clover Valley Station marketing data was offered by the developer of the subdivision. It was decided that the time and expense of a specific survey was not justified, and that any missing information could be derived or inferred from the available data, which proved to be true. The data was then imported into SPSS statistical analysis software to generate buyer profiles for different types of household using crosstabulation techniques.

*Numerical Analysis of Census Place of Work Data*

The highlight of the research findings is the analysis of the special crosstabulation of 1991 Census Place of Work data against Place of Residence, individual, and household variables. This data, with over 800,000 elements, was provided by Statistics Canada in Excel spreadsheet software
format. Through Excel advanced filtering mechanisms and the “Visual Basic” programming language routines, important differences in the locational patterns of different types of individuals and households could be identified. Income profiles of employed residents in Place of Residence municipalities and employees in Place of Work municipalities were also derived from this data.

**GIS Representation of Data**

A Geographic Information System (GIS) provides a powerful way to visualize spatial correlations in data and identify “hot spots” using thematic maps and map overlays, making it an excellent tool for the investigation of urban sprawl and growth management. GIS maps and map overlays which support the presented background information and findings were therefore generated and appear throughout the thesis. MapInfo was chosen as the GIS system, since suitable base maps for the study area were available and an inexpensive academic version was available for graduate student research. The basic steps needed to create the system included:

- **Identify and modify GIS base map.** The GVRD created a digital map of municipalities and unincorporated “electoral areas,” such as UBC. Additional layers were created to add labels for municipality names, subareas, local area maps and the location of major transportation infrastructure investments. All maps are oriented with true North at the top of the page.

- **Gather census, housing, travel data.** The data parameters which were considered to have a potential impact on the policy areas studied were collected. The primary data sources for the GIS database were:
  - 1992 GVRD Travel Survey (Trip distances, vehicle ownership, mode splits, etc.);
  - 1991 100% and 20% census data for BC, published by municipality;
  - 1996 GVRD Key Facts, historical trend data used to validate other sources;
  - 1996 CMHC Rental and Housing Surveys, to determine rents and current price trends;

- **Construct database and import to GIS.** A database was constructed using an Excel spreadsheet with 42 data fields for each of the 25 municipalities that existed in the Lower Mainland in 1991. Jurisdictions appearing on the base map layer were combined with
parameters from the Excel database through the MapInfo “Join” operation using the name of the municipality the database “key,” or reference variable. Smaller jurisdictions with statistically insignificant populations were removed.

- **Determine correlations.** The MapInfo “Shade by Value” thematic map allows many relationships to be quickly determined and visualized. A knowledge of the problem domain to guide the scope of the queries was important, as the number of possible permutations and combinations of the various data fields is enormous.

- **Display using graphical overlays.** Once correlations of interest had been determined, overlays were generated with class ranges that were considered to reflect the importance of the field values for government action. A greyscale, where black represented one extreme and white the other, was generally employed for simple maps. An example of an overlay is “Overlay a cross-hatch pattern of those areas where the average house price is less than four times the average GVRD household income on a map shaded by average distance to work.”

### 1.6.2 Special Considerations

As this thesis is “data intensive” and has a relatively large policy and geographic scope, this section will outline a number of considerations that academic readers may wish to keep in mind when reviewing the presented results:

- Ecological Fallacy;
- Survey Bias;
- Data Validity;
- Use of Data Triangulation;
- Making Inferences on the General Population.
Ecological Fallacy

Ecological Fallacy is the potential error of drawing conclusions on individuals or classes of individuals within a sample based on the characteristics of the entire sample. It is particularly important when aggregate data, such as the breakdown of incomes and work trips used frequently in this work, is applied to the behaviour of individual households, such as location decisions and travel habits. A similar related problem from the field of Geographic Information Systems (GIS) is the Modifiable Areal Unit Problem (MAUP) which relates to potential errors arising from the choice of geographic boundaries used for data collection. A good example is the use of municipal boundaries or subregions for the aggregation of most data used in this research. While housing prices are generally considered to be high in the City of Vancouver, these would be even more dramatic if the data was broken down into the east and west sides of the city. Similarly, the housing preferences of individual households can vary strongly within a municipality depending on factors such as income, age and tenure.

There is also a certain amount of "noise," or interdependence of variables and cyclical fluctuations in the data. The number of housing starts may be closely related to the growth in population, but the influence of decreasing household sizes and economic uncertainty can distort this relationship. Many housing and transportation choices are a simple matter of personal taste or the effectiveness of marketing approaches, which are very hard to categorize. The varying mandates of data collecting agencies, combined with financial restrictions which limit the scope of data collection and sample sizes, are contributing factors. A simple lack of interest in these issues by the major data collection agencies, i.e., the federal and provincial governments, is a significant factor in the lack of complete data. Where possible, data which is incomplete, or subject to more than one interpretation, will be identified in the analysis.

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Survey Bias

Household surveys used, such as the GVRD’s GOMD telephone survey and those carried out by the developer in the Clover Valley Station subdivision, depend highly on the willingness of participants to provide responses, the design of the survey and the quality of the interviewer. The marketing representatives who conducted the interviews managed to survey most households in the subdivision, but did not push respondents to answer all questions and there are gaps in the survey data as a result. In a mailed survey, there would have been the risk that the profile of respondents would not have been the same as that of all households. Buyers with more time to spare, such as retirees, may have been more willing to provide more complete answers than busy young parents. Similarly, the key informant surveys seem to have been answered in greater depth by those with more time available (academics and mid-level government staff) than those working in management position. The profile of survey respondents in all cases was reviewed to confirm that a balanced and representative response was in fact received.

Data Validity

A number of key informants approached for background information expressed concerns that the census and travel data used, although the best available (1991 and 1992 vintage respectively), had already reached their “best-before” dates. Nevertheless, ensuring that most of the data used for comparison purposes covered the same relative time periods allowed for consistent interpretation. Initial 1996 census data, recently released, has confirmed 1991 population trends. Essential data sources were examined to confirm that data definitions and collection methods were appropriate.

For example, the Place of Residence versus Place of Work matrices from 1991 census data were essential components of the secondary data that was analyzed. Careful review of the 1991 census variable definitions and discussions with Statistics Canada analysts indicated that the coding of responses for the place of work sometimes required interpretation from data coders which may

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have introduced some variations into the results. The data is nevertheless the most complete source of individual locational behaviour available, if only for two types of activity (live and work). The 1996 census data added travel mode as another variable. One hopes that more questions on travel behaviour and household lifestyles will be added to the census in the future.

Sample sizes used for several regional surveys were also a major concern. In the case of the GOMD survey, some crosstabulations to identify trends within households with varying housing types, locations, and income classes will not be statistically significant. The survey of Clover Valley Station residents, who live together in houses of the same type and cost, would be more significant, but might not be applicable to residents of other neighbourhoods. Rather than excluding potentially significant results which involved small sample sizes, the actual data has been provided to allow readers to make their own judgments on statistical validity.

Use of Data Triangulation

Throughout the literature and in reference books, authors have made direct or indirect references to “triangulation,” or the need to verify results by cross-checking information from one data source with others. Another common term for this technique is “multiple methods.” This research approach relies heavily on using various data sources to “zero in” on the factors that influence the subject of interest in the study, in this case households and their locational influences. In addition to using different data sources for comparison, existing data sources were examined to identify information that could reinforce or refute the results. The integration of qualitative data, such as surveys using open-ended questions, combined with quantitative data, such as census data, helped to “plug the gaps.”

For example, most respondents in key informant interviews said that they intuitively knew that young households were moving out to the suburbs to find affordable housing, but could not

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8 Ibid. A good introduction was found in Chapter 13, Multiple Methods, “Triangulation,” pp. 360-362.
10 Ibid., p. 60.
quantify how important the trend was. In the GVRD telephone survey on Ground-oriented Medium Density housing, factors such as “neighbourhood” and “schools” at first appear to be more important to most households than price in the locational decisions of residents. Examined more closely, price was much more important to younger households and closeness to work was indeed less important. Cross tabulations were performed where possible on available raw data to extract these subtle differences and provide independent confirmation of trends. “Macro” and “micro” level conclusions could generally be derived from the qualitative and quantitative data.  

Making Inferences on the General Population

A search of the applicable literature produced a number of examples of the need to avoid generalized inferences from transportation and land use data. For example, research by Robert Cervero of the University of California (Berkeley) in the Bay Area of California indicated that there was the expected strong correlation between housing prices and long distance commuting. On closer examination, the direction of the commuting flow was found to be exactly the opposite to what is experienced in the GVRD. In the Bay Area, high housing prices in the suburbs are cited as the reason that many lower income employees in office parks are forced to commute back to the affordable, but crime-ridden, inner-city communities in Oakland. In the GVRD, of course, high housing prices in the Burrard Peninsula force many employees to commute from cheaper housing in the suburbs. It is important that general principles not be rigidly applied to case studies involving limited study areas or sample groups.

11 Ibid., p. 61.
2. Review of Applicable Literature, Theory and Policies

2.1 Growth Management in Cascadia

A number of urban areas in Oregon, Washington and British Columbia have been experiencing tremendous growth throughout the last few decades.\(^{13}\) While most people think first of the GVRD as the primary high growth region in B.C., Nanaimo, the Okanagan and the Victoria area have also been experiencing high growth rates.\(^{14}\) Regional districts and municipalities in B.C., until recently, have had few requirements to address growth management or to coordinate Official Community Plans (OCPs) with neighbouring municipalities. This has led to widespread cases of disjointed development, urban sprawl, and increased costs for infrastructure and community services in support of development.\(^{15}\) In an attempt to rectify this situation, the B.C. government legislated statutory changes in the 1995 Growth Strategies Statutes Amendments Act, often referred to as the Growth Strategies Act (GSA). Most of these changes were directed at the Municipal Act, requiring regional districts and municipalities to implement Regional Growth Strategies and Regional Context Statements.\(^{16}\)

2.1.1 Historical Overview

Throughout the recent literature on growth management in North America, authors refer to the legislation passed by the state of Oregon in 1973 as the landmark legislation to follow.\(^{17}\) Not only were these initiatives passed a full decade before those of any other U.S. jurisdiction, they are still used as a model for later legislation and are considered to be the most progressive and complete in North America.\(^{18}\) It is worth noting the historical context of this legislation. Oregon has a long

\(^{13}\) See, for example, 1996 Census Population Statistics.

\(^{14}\) Province of British Columbia, Ministry of Municipal Affairs Growth Strategies for the 1990s and Beyond (September 1994): p. 3.

\(^{15}\) Ibid.

\(^{16}\) Province of British Columbia Growth Strategies Statutes Amendments Act (Bill 11), 1995.

\(^{17}\) State of Oregon Land Conservation and Development Act (Senate Bill 100), 1973.

history of land stewardship. Late in the last century, for example, the governor ordered that a wide strip along Oregon’s entire coast outside of existing town sites to be preserved in perpetuity for use by the general public.

The state’s population doubled between 1950 and the early 1990s, a rate roughly double that of the U.S. as a whole. Many of the newcomers were Californians escaping from areas spoiled by rapid, uncontrolled development.19 Much of the growth was occurring in the Willamette Valley south of Portland, a valued rural escape for the metropolis and the state’s most fertile agricultural area.20 Predating the legislation were decisions by the Oregon Supreme Court which recognized the precedence of comprehensive plans over local land use regulations.21 The “1000 Friends of Oregon,” a citizen watchdog group formed to monitor the legislation, is often given credit for maintaining the strength and enforcement of the state law.22 British Columbia’s Agricultural Land Reserve (ALR) legislation also originated in this period, for many of the same reasons but with a greatly reduced scope.

The basic principles of the Oregon model are simple. The state defined a series of ascertainable growth management goals, such as affordable housing, shoreline protection and the preservation of farm land. Every city and county was required to prepare a plan consistent with these goals, as evaluated by a Land Conservation and Development Commission (LCDC). Well defined Urban Growth Boundaries (UGBs) were established, outside of which only controlled natural resource uses such as agriculture and renewable forestry were permitted. To offset the danger of increased urban housing prices due to a scarcity of available land, higher zoning densities were mandated. Oregon’s legislation is highly distinctive in that:

- Clear and detailed guidelines are presented for the interpretation of each of the nineteen goals;

19 Ibid. Chapter 4, “Growth Management in Oregon”, by Deborah A. Howe.
20 Ibid.
References are made to specific geographic areas considered to be of statewide importance;
- An independent review commission examines the plans of subordinate jurisdictions for
  conformance with the statewide goals.

As advanced as the Oregon legislation may seem, especially when compared with that of other
jurisdictions, top-down growth management has nevertheless come under attack from property
rights activists and the development industry. Questions in a recent growth management survey
prepared by Metro Portland’s planning staff provide an indication that commitment to the UGB
may be waning. The response which supports the gradual slippage of the UGB and placing
apartments and townhouses only in specific areas seems to be the desired answer, being the only
choice that does not have an “even if that means...” condition attached:

1. “The urban growth boundary should be held in place to preserve all of the land outside, even
   if that means increasing densities with more apartments and new houses on smaller lots.

2. The urban growth boundary is too tight and should be expanded to allow new houses to be
   built on the larger lots available five to ten years ago, even if that means that we have to
   develop significant amounts of land outside the UGB in the next 20 years.

3. The urban growth boundary should expand slightly and we should continue to encourage
   apartments and townhouses in specific areas with slightly smaller average housing lot sizes
   than we have now.”

The State of Washington, which has a significantly denser freeway network and greater urban
sprawl than Oregon, did not pass Growth Management Act (GMA) until 1990. While some of
the concepts of Oregon’s legislation are present, the UGBs defined are less stringent, allowing
considerable room for business-as-usual style development for the foreseeable future, particularly
in the Puget Sound area. It is interesting to note that two of Washington’s fourteen goals are
aimed more at protecting the rights of individuals than preventing urban sprawl:

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• "Property Rights - Protect property from arbitrary or confiscatory actions;"
• Permits - Permits should be issued in a timely manner.”

Washington’s commitment to Growth Management is suspect. While the common call to reduce automobile dependence is present, the GMA states openly that alternative transportation modes should not be stressed outside of denser urban areas. A recent status report on the success of the GMA used a picture of a big box retailer in a small town to show how growth management was promoting business. Another picture from the same report shows a busy street, with a narrow sidewalk on only one side and an enormous parking lot on the other, as an example of a “walkable town centre.” A large part of the $4 billion Puget Sound Ten-Year Transit System Plan is allocated to commuter rail, an expanded HOV network and only a token LRT line while the improved local bus service needed to support higher density communities is overlooked.

The 1992 Georgia Basin Initiative, a project of the British Columbia Round Table on the Environment and the Economy, sought to open a cross-border dialogue on sustainability issues and growth management. The Georgia Basin is roughly defined by the watersheds of the Strait of Georgia, Puget Sound, and the Strait of Juan de Fuca. The initiative resulted from a recognition that there were many social, environmental and economic values shared by the Province of British Columbia and the State of Washington that were being threatened by rapid growth rates. Many of the initiative’s recommendations dealt with regional planning, compact community development and alternative transportation, and included:

- Strongly encouraging urban containment, residential intensification and compact community development;
- Developing provincial guidelines for urban settlement in the basin, building on experiences in B.C., Ontario, Washington and Oregon, which:

• Focus urban development within existing communities;
• Provide for a range of housing (including affordable housing), community services and employment opportunities;
• Minimize single occupancy vehicle use and encourage walking, cycling and the use of public transit.

• Demonstrating leadership in transportation planning and management by:
  • Supporting TDM measures and user pay principles without inflicting undue hardship;
  • Shifting subsidies from private motor vehicles to encourage public transport;
  • Supporting the development and redevelopment of communities to reduce the need for vehicle transportation.

• Recommending new models of governance which would integrate, at the regional level, comprehensive land use and transportation planning;
• Executing a multi-faceted public education programs which increases awareness of the pressures that are imminently threatening sustainability and the quality of life in the basin, along with the need for coordinated action.

The initiative has unfortunately been disbanded although some of its mandate has been absorbed by the Ministry of Municipal Affairs and Housing’s Growth Management Office.

2.1.2 Overview of B.C.’s Growth Management Legislation

Five years behind Washington and 22 years behind Oregon, B.C.’s GSA made statutory updates to the provinces Municipal Act which specify:

• The intent and content of a Regional Growth Strategy;
• The process for the development and ratification of a strategy;
• The requirement for a region’s member municipalities to address a strategy in their OCPs.
The focus of a strategy is to address a wide variety of the environmental and livability problems associated with uncontrolled urban development in the province. For example, strategies “should work towards” avoiding urban sprawl, preserving and creating open spaces for parks and recreation, reducing automobile use, promoting green modes of transportation, reducing pollution, and providing affordable housing.27

The plans to be developed must provide a 20 year strategy for the implementation of matters which are under the jurisdiction of a regional district. They should address the mechanisms by which a region will provide for projected needs in the areas of housing, transportation, economic development, parks, and regional services such as water and sewage.28

The process is initiated by a simple resolution of a regional district’s governing body, a board of directors appointed from elected municipal officials. There is a requirement for extensive consultation with those “who the board considers will be affected,” which includes the public, local governments (municipalities or other regional districts), first nations, and agencies of the provincial and federal governments.29 Several sections in the GSA detail how agreement on the plans is to be achieved, along with a complex arbitration procedure to be followed in the case of disagreements.30 The province, adjoining regional districts, and member municipalities must all be given the opportunity to review a plan before it is adopted by a regional board.

Once a plan is adopted, there are several provisions in the GSA which outline the mechanisms by which the goals of the plan are to be implemented. The primary mechanism is the requirement that the OCPs of member municipalities include a Regional Context Statement which specifically states how the OCP supports the regional strategy and how the OCP will be made consistent with the strategy “over time.”31 This time period is not specified. In theory, as municipal bylaws such as zoning must conform to a municipality’s OCP, the goals of the growth strategy will eventually

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27 Province of British Columbia Growth Strategies Statutes Amendments Act (Bill 11), 1995: Section 942.11.
28 Ibid. Section 942.12.
29 Ibid. Section 942.17.
31 Ibid. Section 942.28.
be respected. The Act requires that an intergovernmental advisory committee be established to advise local governments on the strategy and to facilitate the coordination of provincial and local government activities. Local governments may enter into agreements for the coordination of activities relating to the implementation of a Regional Growth Strategy with other levels of governments and government agencies. Further details of the GSA will be presented in the sections on policy.

2.1.3 Initial Experience with B.C.’s GSA

The Livable Region Strategy (LRS) was adopted in the fall of 1995 by the board of the GVRD as the regional district’s official growth management plan. Although the strategy had been developed before the GSA came into effect, it was subsequently accepted by the provincial cabinet as a Regional Growth Strategy. Challenges to the strategy’s policies appeared almost immediately at the local and provincial levels.

The District of Langley 1995 Growth Management Plan recommended a growth rate of 3%, concentrated in designated areas. The actual rate of growth is 4-5% and the LRS set a target of only 1.5% for the district, citing a growing local jobs/housing imbalance as the reason for this limit. The new district council, which is strongly supported by the development industry and large property owners, dismissed their moderate district manager and director of planning immediately after being elected in November 1996 and rejected the District’s growth management plan and the LRS in April 1997. New policies call for an end to phased development in semi-rural areas and support for dispersed growth throughout the district.

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32 An apparent loophole in the Act is that provisions contained in a Regional Growth Strategy only apply to communities that an OCP, which is not obligatory under section 944. In this case, under the added Section 942.33, the Minister of Urban Affairs may order a community to prepare an OCP within a defined time frame.
33 Province of British Columbia, Growth Strategies Statutes Amendments Act (Bill 11), 1995: Section 942.29.
34 Ibid. Section 942.3.
The City of Richmond rejected provisions in the original LRS which limited growth in the municipality out of concerns for flooding as a result of earthquakes damaging protective dikes.\textsuperscript{36} The city threatened to “opt out” of the plan under GSA section 942.15, which states that a strategy may be adopted without a specific provision “on the basis that it is not binding on the jurisdiction of a local government that has refused to accept it,” if the provision is “not essential to the Regional Growth Strategy.”\textsuperscript{37}

In the Regional District of Nanaimo, the 1997 PIBC award winning “Plan Nanaimo” applied the UGB concept to define a strip roughly twice as wide as the currently developed urban envelope.\textsuperscript{38} Most of the regional district’s 80 km of coast is allocated to residential use under the plan, either as “rural residential” or urban areas. The plan makes only one reference to affordable housing, citing support for reducing actual construction costs as the mechanism to be employed.

The province has indicated that, notwithstanding the intent of the Growth Strategies Act, it still has the final say in many regional matters, particularly in transportation. For example, the province has announced the construction of additional lanes to provide High-Occupancy Vehicle (HOV) capability on highways in the GVRD and has set the minimum occupancy of these lanes at two or more. This contradicts the GVRD’s policy of converting existing lanes for HOV use wherever possible and requiring a minimum occupancy of three or more, in order to avoid the encouragement of Single Occupancy Vehicles (SOVs) by reducing overall congestion.\textsuperscript{39}

The GSA requires a high degree of cooperation, consensus, and conciliation. Unlike Oregon’s legislation, explicit compliance to the goals of the Act is not mandatory and there is no quasi-judicial body to provide an impartial review. No UGBs or density targets are provided by the province. Interpretation of the GSA is left to local regional districts and municipalities, which

\textsuperscript{36} Harold Munro “Richmond considers separation from the GVRD,” \textit{Vancouver Sun}, 28 October 1995.
\textsuperscript{37} Hugh Kellas of the GVRD Strategic Planning department has indicated that the provisions of the Act may be difficult to enforce, and that the primary motivation for implementation will continue to be moral-suation.
\textsuperscript{38} Development Services, Regional District of Nanaimo \textit{Growth Management Plan for the Regional District of Nanaimo} (January 1997). The City of Surrey, a municipality synonymous with sprawl, subsequently won a national planning award for its new OCP. Such awards call into question the practice of rewarding plans without the need to demonstrate a reasonable track record of adhering to the plans.
\textsuperscript{39} Peter Boothroyd “Premier’s incantation is so much black magic”, \textit{Vancouver Sun}, 14 September 1995.
often have considerably different views on the importance of, and acceptable approaches to, growth management. In the absence of public pressure to compel compliance local governments, the examples cited above indicate that the GSA may not be promoting the intended goals of the legislation.\textsuperscript{40} 

A fundamental difference between legislation in B.C. and that in Oregon and Washington is that there are currently no guidelines whatsoever for the interpretation of B.C.’s growth management goals, although the GSA makes a provision for these. The “matters” that Regional Growth Strategies “should work towards” are presented simply as a bulleted list in point form. The potential for inappropriate or inadequate responses to provincial goals is obvious and substantial, given that provincial approval of Regional Growth Strategies is not required. There are no implementation guidelines in the LRS to guide OCP Regional Context Statements in important matters such as transportation and housing, which has led to a great deal of frustration and expense in the development of new plans.\textsuperscript{41} 

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image.png}
\caption{New residential and “big-box” retail development in rural Abbotsford.}
\end{figure}

\textsuperscript{40} Alan Artibise “Our new regional plan needs a plan - to police planners and politicians,” \textit{Vancouver Sun}, 09 November 1995.

\textsuperscript{41} The OCP for the unincorporated area that includes the UBC campus required a significant rewrite after the GVRD board rejected the draft OCP. Among other reasons for rejection, the board called for much higher levels of affordable housing and rental housing than existed in any other GVRD municipality at the time.
2.2 Land Use and Transportation

2.2.1 Overview

While the question of the strength of land use and transportation interaction is often debated, the fact that there is a clear, symbiotic relationship will be assumed to be a fact in this thesis. This section presents examples of these interactions and reviews the social, environmental and economic impacts of past and present land use and transportation patterns. Some of the major land use and transportation planning tools used in various jurisdictions to shape the interactions and mitigate the impacts will then be identified. Finally, a discussion of the critical elements of land use density and mix that dictate many transportation and housing directions will be discussed.

From the earliest towns and cities that sprung up along ancient trade routes to the early history of Vancouver’s streetcar-driven development, transportation has manifested itself as a predominant factor in the ultimate shape of cities. Vancouver would perhaps not exist at all in its current form if the Canadian Pacific Railway (CPR) had not chosen it as the company’s western terminus, with the line being completed in 1885. As Vancouver was being established as western Canada’s major western seaport, Port Townsend and Seattle in the State of Washington competed for supremacy as the major seaport in the U.S. Northwest. Seattle was ultimately chosen as a railway terminus and has become a major metropolis while Port Townsend remains a quaint coastal town with well preserved architecture from the 1800s. Historically, the chronology of urban development patterns has depended strongly on both the health of the local economy and the transportation technology available at any given time to transcend distances.

42 A 1993 SCARP thesis was devoted entirely to an authoritative literature review of land use and transportation interaction with applications to the GVRD. See Tony Parker Land Use and Automobile Dependence (UBC SCARP Masters Thesis, 1993). An earlier thesis looked at the impacts of two major transportation projects on the goals of the newly-emerging Livable Region Strategy. See Reginald Paul Faubert Coordination of Transportation and Land Use Planning: A Case Study of Greater Vancouver (UBC SCARP Masters Thesis, 1990). The conclusions of both studies are similar, noting that the causes of sprawl and automobile dependence are well documented, as is what works to promote effective land use and transportation. Both studies also conclude that the reluctance of decision makers, practicing professionals and the general public to make changes is pervasive.
In the bid-rent theories of land economics discussed later, the utility to businesses and individuals of accessibility to markets and goods has always been a major component of land values, for obvious reasons. Textbooks on urban economics usually devote large sections to the effects of transportation on the locational decisions of businesses and households.43

A case can be made for the proposition that, while transportation once clearly led in most major developments, the age of the automobile has now led to low-density, distributed development patterns. Of particular relevance in this thesis is the question of whether, given the increased mobility that automobiles provide, transportation still leads development or development now leads transportation in suburban areas. Discounting the important and growing influence of home-based businesses and telecommuting, the important questions to study are:

- How important are transportation infrastructure investments in suburban municipalities in shaping rapidly growing metropolitan areas?
- How much of this infrastructure exists to provide access “after the fact” to developments locating away from employment centres and established transportation infrastructure?

Low-density suburban development and the automobile, as de facto standards in land use and transportation at the fringes of metropolitan regions, have exerted a strong influence on land uses in the rural and semi-rural parts of the region, which amounts to transportation access leading development. Resulting speculation and land-use conflicts have been shown to discourage agriculture near urban areas.44 Small developments in rural areas have had the effect of stalling necessary maintenance of farm infrastructure, as land owners wait for urban development to bring windfall profits for their properties.45 “Hobby farms” in the South and North Fraser subareas of the GVRD are excellent examples of this trend. These rural residential properties, zoned as five acre parcels, have proliferated in municipalities such as Langley District as wealthier urbanites

43 See, for example, Edwin S. Mills and Bruce W. Hamilton Urban Economics (Harper Collins, 1989).
sought to escape to more pastoral settings. A wave of rezonings to low-density housing along the
district’s semi-rural north-western border had sent the clear signal that urbanization was on the
way.\textsuperscript{46} The Langley Leadership Team (LLT) came to power in the district in 1996 with the
strong support of developers and large property owners who sought similar rezoning along the
south-western border, which has poor transportation access. Subsequently, in May 1997,
Surrey’s engineering department initiated a study of providing a private toll road to service
leading to this area, in clear contradiction to the GVRD’s Transport 2021 plan.

In the \textit{Geography of Nowhere},\textsuperscript{47} James Kunstler’s descriptions of suburban development patterns
provide strong evidence that automobile mobility is changing land use patterns in many ways,
often creating a vicious circle. For example, requirements for large amounts of parking in most
new developments, combined with low levels of pedestrian amenities, has made shopping and
working in suburban areas very convenient. This draws businesses away from the established
urban cores or runs them out of business completely, making suburban shopping increasingly the
only viable shopping option for most. Wide right-of-ways (ROWs) in suburban areas allow for
future road widenings. As traffic levels and distances between amenities increase, few people
wish to travel by foot or bike. With little need to accommodate pedestrians or cyclists, land use
becomes increasingly automobile-oriented on the urban fringe.

In Robert Cervero’s seminal work on suburban centres in the U.S. and in other works on housing
market analysis, land use and transportation equations can be skewed by several factors specific to
the American context. Inner city crime, racial segregation, poverty and the presence of a federally
funded freeway system which overlays most major metropolitan areas are most often cited.\textsuperscript{48}
These factors are certainly present in the Canadian context, but do not feature as prominently in
the literature. Another set of factors may be more applicable in the Canadian context. For
instance, the impacts of growing concentrations of households of Chinese origin in Richmond and

\textsuperscript{46} During analysis of Place of Work data for this thesis, a surprisingly large subgroup of households earning more
than $80,000 had moved to Surrey and Langley District in the five years before 1991.
\textsuperscript{47} James Howard Kunstler \textit{The Geography of Nowhere} (New York: Simon and Schuster, 1993).
\textsuperscript{48} See, for example, Henry O. Pollakowski \textit{Urban Housing Markets and Residential Location} (Lexington,
Massachusetts: Lexington Books, 1982) or G. Thomas Kingsley and Margery Austin Turner (eds.) \textit{Housing
households of South Asian origin in Surrey on regional travel patterns would certainly merit further research.

The land use shaping effects of freeways and major road projects in metropolitan areas cannot be understated. While the seeds had been sown earlier in the century, innumerable examples of low-density suburban communities sprung up around the United States after the Interstate Freeway system was constructed. A recent road map of Metro Toronto shows that the 401 expressway, intended in 1961 to be a four lane bypass highway on the rural outskirts of the city, is now a 16 lane expressway that lies almost exactly at the mid-point of urban development in the Greater Toronto Area (GTA). Not afraid of repeating enormous past mistakes, the province recently fast-tracked the completion of the 407 expressway through productive farmland just north of Toronto as another “bypass” solution. Support for public transit was cut at the same time in a close parallel to decisions currently being made in B.C.

On a recent visit to the GTA, the 401 corridor was already lined with “Commercial building for lease” signs and the 407 corridor was lined with “Commercial land for sale” signs, a remarkable indication of the speed at which market forces react to changes in the cost and accessibility of a cheaper supply of developable land.

49 James Howard Kunstler The Geography of Nowhere (New York: Simon and Schuster, 1993) p. 107 - “(The 1956 Interstate Highway Act...) called for 41,000 miles of new expressways, with the federal government picking up 90 percent of the tab and the states 10 percent. The bill also subsidized the improvement (read, widening) of innumerable ordinary local roads to facilitate further urban sprawl.”

50 Ontario ordered the Toronto Transit Commission (TTC) in 1996 to increase fare-box revenue from 70% of all costs, a level far above that of any other North American jurisdiction, to 75%, resulting in serious service cuts.

51 On the same visit, strip residential development on rural roads up to thirty kilometers from the urban fringe, with three and four garage houses becoming the standard for new developments.
2.2.2 Impacts and Costs

Many sections could be filled with details of the impacts of transportation and land use patterns on communities. The list of the impacts of transportation infrastructure is lengthy and the monetized costs can be enormous. These costs are generally borne by people other than drivers and land owners:\textsuperscript{52}

"As a rule, the environmental impacts (of transportation) fall on parties other than the provider and consumer of transportation services. Consequently, the impacts are also called externalities, and their costs are termed external costs. When environmental externalities benefit third parties they are desirable, but, with a few negligible exceptions, external impacts of transportation on the environment are negative."

Similarly, the negative impacts of land use are borne by people other that land owners:\textsuperscript{53}

"Land use changes caused by transportation create a wealth of benefits, but they impose environmental and social liabilities at the same time. In general, the benefits tend to be captured by transportation users and land owners, while society as a whole bears many of the costs. A good example of a land use change which provides benefits to the user but imposes environmental and other external costs on society is urban sprawl."

A review of some of the social, environmental, and economic impacts of urban transportation and land use in metropolitan areas with high housing costs is useful.

\textsuperscript{52} Peter Bein, Chris Johnstone and Todd Litman Monetization of Environmental Impacts of Roads (Planning Services Branch, British Columbia Ministry of Transportation and Highways, 1995) Executive Summary.
\textsuperscript{53} Ibid. Chapter 4, Environmental Impacts.
Negative social impacts of automobile dependence and urban sprawl include:\(^5^4\)

- Longer commuting distances and increased traffic congestion;
- Longer distances from home to services such as child care and medical centres;
- Less green space or less accessibility to available green space;
- Pollution-linked health problems;
- Reduced affordability of housing in desired locations;
- Stress on the provision of fire and police services due to increased distances;
- Reduced sense of community, loss of neighbourhood character and cohesion.

An example of one of the more subtle and increasingly costly impacts has been noise. In Vancouver, noise levels are doubling in intensity every six years, and the major cause of this increase has been due to the growth of motorized vehicle traffic.\(^5^5\) Besides lowering property values and reducing the quality of life for people not sitting inside the vehicles, increases in traffic noise have led to increases in hearing impairments, nervous tension and sleep disorders.

The social impacts of land use-induced losses in housing affordability are central to this thesis. Nationally, home ownership rates for the lowest two income quintiles have substantially eroded in the decade between 1980 and 1990.\(^5^6\) The percentage of renters in the Vancouver CMA who can afford a starter home is the lowest in Canada, after Victoria.\(^5^7\) This rate is even lower for those aged between 20 and 40. Home ownership in the lowest income quintile dropped dramatically from 1/2 to 1/4 of these households in the decade between 1980 and 1990. Under federal regulations adopted in 1992, 250,000 households purchased CMHC insured homes with only a 5% down payment and 270,000 individuals have withdrawn $2.5 billion from RRSPs for down

payments on new homes. The willingness to accept larger monthly interest payments and lower RRSP savings in order to own a home, combined with an increasing number of low-income renters, is a concern for the long-term social stability of society. In the former case, a growing segment of society will be less able to make contributions to their pension plans, and will depend more on home equity for retirement security. In the latter case, a major segment of society may not be able to build up equity in a home for retirement security at a time when the number of younger taxpayers available to provide them with financial assistance will be at a minimum.  

The presumed need to live in distant suburbs to attain ground-oriented housing, in addition to demanding an inordinate amount of commuting time, has created the general requirement for more than one car. According to the BC Automobile Association (BCAA), the average annual cost for operating a mid-sized car is approximately $6,000. This is equivalent to a $500 monthly expenditure, which would be the same as the payment on a $60,000 mortgage at an interest rate of 8% amortized over a 20 year period. The GVRD estimates that taxpayers subsidize each car on the road by over $2,600. This adds up to over $2.75 billion dollars per year in subsidies for GVRD car owners from general revenues. This sum is equal to the Insurance Corporation of B.C.’s (ICBC) annual budget and is greater than the combined annual budgets of the BC Ministry of Transportation and Highways (MoTH), BC Transit and the GVRD.

If the results of the GVRD study on Ground-Oriented, Medium-Density (GOMD) housing described later are valid, common knowledge of the financial impact of automobile ownership could inspire many households to choose a townhouse in the Burrard Peninsula over a detached house in the Fraser Valley. This assumes, of course, that adequate zoned land was available for such housing and that transit would be made available to remove the perceived need for at least one automobile per household. Unfortunately, in the current political and social climate, both of these assumptions are tenuous at best. If households owned one less car and lived closer to employment, there would be considerable time savings realized through shorter commutes. This

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58 According to demographic forecasts in David Baxter Homes in Metropolitan Vancouver’s Future: Housing Demand by Structure Type, 1996 to 2021 (August 1996): p. 8, the number of additional people in under-45 age groups will be at an absolute minimum in the year 2010, at which time three times as many people in the 45+ age groups will be added to the Vancouver CMA.
would reduce stress levels and increase the time available for family and community activities in addition to increasing the money available for other discretionary items.

**Environmental**

The environmental impact of urban development in the Fraser Valley has been pervasive. As much as 70% of wetlands in the lower Fraser Valley have already been lost to urban development.  

A short list of negative environmental impacts of urban sprawl includes:

- Loss of productive agricultural and forest land;
- Degradation of natural habitat with loss of plant and animal species;
- Increased energy consumption;
- Poor water quality and quantity due to the inability of water treatment and provision systems to keep up with the pace of development;
- Poor air quality due to excessive reliance on motor vehicles.

Individual low-density developments, such as residential subdivisions and “business parks,” when considered alone, do not require much incremental transportation infrastructure compared to the overall system capacity. The cumulative impact on the environment of low-density developments at the urban fringe can be overwhelming and lead to demands for road improvements such as has occurred in the Northeast Sector, i.e., development leading transportation. This lack of consideration for the cumulative effects of development is evident in the B.C. Environmental Assessment Act (BCEAA). While requiring that an Environmental Impact Assessment (EIA) be made on all LRT projects longer than 8 kilometres and highway projects longer than 20 kilometers, the BCEAA requires no EIA for the hundreds of kilometers of residential and arterial

streets that will be constructed in the next decade to service new developments. There is no requirement for an EIA of residential, commercial or any other non-industrial development, regardless of the size of the land area involved or the projected number of people who will need to access the development. This is in stark contrast to Washington State's GMA legislation, which requires a complete Environmental Impact Statement (EIS) of a wide range of urban development factors, including Land Use, Transportation and Housing. The EIS for the City of Seattle's master plan runs to several hundred pages. The existence of such an EIS does not guarantee that unsustainable elements of development will be avoided, as most planners familiar with Seattle could testify, but at least ensures that some of the "big picture" impacts of land use and transportation are considered at some point in the planning process.

Economic

The costs of providing infrastructure to service new low-density development has been a major motivation for pursuing growth management in Cascadia.

As early as the 1970s, even the real estate industry realized that the costs of low-density, automobile-dependent suburban development placed inordinate financial burdens on individuals and governments, particularly at the local level, stating that these are:

"...the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption and many types of personal costs. This cost difference is particularly significant for that proportion of total costs which is likely to be borne by local governments."

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62 City of Seattle, Planning Department Towards a Sustainable Seattle: Final Environmental Impact Statement for the City of Seattle's Comprehensive Plan (March 1994).
The time involved in commuting to affordable housing has been identified as a growing cause of worker stress and loss of productivity. Congestion delays caused by increasing volumes of commuter traffic is also causing hundreds of millions of dollars in losses to Lower Mainland businesses, which results in job losses and a decrease in the region’s competitiveness. Congestion losses to business in the Greater Toronto Area (GTA) were estimated in 1991 to exceed one billion dollars per year. A value of the order of half a billion dollars, or $250/year for every resident, might therefore be a reasonable estimate for Metropolitan Vancouver, given that, while smaller, Greater Vancouver has much lower transit ridership and a less developed road network than exists in the GTA.

2.2.3 Land Use Tools

The transportation tools discussed in the next section influence how many trips people make and which mode they choose. While these tools are important, they have the appearance of “add-ons” which mitigate the problems caused by a failure of provincial, regional and municipal planning agencies to implement effective land use policies and coordinate these with transportation planning. This section reviews land use initiatives that have been used to avoid the need to apply such mitigation measures in metropolitan regions.

A list of land use measures compiled by Berkeley’s Robert Cervero to reduce sprawl and travel requirements in suburban areas is comprehensive and can broken down into several broad policy areas as summarized below:

- Regional government responses:
  - Tax base sharing. In Minneapolis-St. Paul, over one-quarter of the region’s tax base is shared. Sharing the metropolitan tax base reduces the temptation for one

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66 Based on Robert Cervero America’s Urban Centres: The Land Use-Transportation Link (Boston: Unwin Hyman, 1989): Chapter 8, “Linking land use and transportation, Overview of research findings.”
municipality to make land use decisions which improve the local tax base while imposing negative impacts on other municipalities in the region.

- **Fair-share housing requirements.** New Jersey and Oregon have implemented affordable housing quotas on municipalities to provide more opportunities for affordable housing near workplaces.

- Municipal regulatory responses:
  - **Traditional zoning.** Old-fashioned zoning to increase densities and allow a mix of uses provides the basic requirements for the provision of lower land costs and provide a range of services and employment opportunities close to where people live, reducing the need to travel.
  - **Performance standard zoning.** In the usual variant, mixed uses are promoted, provided that these uses do not cause a nuisance to other uses according to a set of pre-defined criteria. Cervero has extended this to include vehicular traffic as a nuisance which should be included in the criteria. Similar to legislated TDM measures, these criteria include minimum targets for walk/bike/transit modes and maximum number of trips by other modes. This approach has been used in Toronto, Bellevue (Washington) and Fort Collins (Colorado).
  - **Inclusionary zoning.** One way of looking at this type of zoning is the removal of existing regulatory barriers to mixed use and a variety of housing types. Another approach is to prevent exclusionary practices through an independent, third party review of zoning practices. Oregon’s LCDC reviews all community plans and rejects those that are considered to be exclusionary.
  - **Conditional or incentive zoning.** Density bonuses or the relaxation of some regulations can be granted to developers who make their projects more pedestrian, bicycle or transit friendly, who promote mixed use, or who implement TDM programs for their clients.
  - **Density bonuses.** Density has been identified as perhaps the single most important requirement for the viability of alternative transportation and the availability of affordable housing. An entire section on density and mixed land use considerations appears later.
• **Density transfer and zoning swaps.** These paper tricks allow developers to take density from one site and transfer it to another to provide a higher density nodes which are more supportive of mixed uses and alternative transportation modes. Vancouver uses this tool, particularly for heritage preservation.

• **Increased awareness of site design factors.** Often overlooked is how the physical layout of a development supports objectives such as alternative transportation and affordable, higher-density housing. This can range from the street layout, the location of services, the orientation of buildings and the exposure to sunlight. A significant component of site design is the accessibility of the site by walking, cycling and transit.

• **Promotion of parking reductions.** The supply of parking, although a TDM measure in some ways, is also a land use issue. An excess of parking increases the cost of developments and reduces the appeal of alternative modes. One study showed that the likelihood of workers choosing transit over driving is much more related to the cost and supply of parking than higher transit service levels or lower transit fares.  

Moore and Thorsnes, in an American Planning Association (APA) report, recommend a less regulatory, more economic approach to influence land use patterns. Their suggested tools are summarized below:

• **Pricing commercial externalities.** Similar to performance standards, businesses could be taxed not only on the value of their property, but also on community impacts such as increased client traffic, truck deliveries and visual encroachment. Such a concept would promote smaller businesses which support complete communities and strongly discourage the proliferation of big-box retailers such as Costco and the Home Depot.

• **Pricing neighbourhood externalities.** Neighbourhoods and municipalities which resist development that supports complete, compact communities, such as local businesses, infill

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68 Terry Moore and Paul Thorsnes *The Transportation and Land Use Connection* (American Planning Association, Planning Advisory Service Report Number 448/449, 1994) p. 60, in discounting non-economic approaches to alternative land use state simply “Zoning is a blunt regulatory instrument relative to pricing.”
housing, or rental apartments, would be assessed a “homogeneity” tax by the municipality or regional government. This tax attempts to reflect how low-density or single-use design in a community forces people to travel, which impacts other neighbourhoods. This measure could also be viewed as a financial penalty on exclusionary zoning practices. Such taxes would likely have to be assessed according to property values in order to have the maximum effect, as neighbourhoods with higher property values seem to be the most resistant to land use changes.

- **Removing public service subsidies.** The practice of subsidizing extensions of water and sewers supports lower density development, while user-pay systems encourage compactness. Development Cost Charges (DCCs) attempt to implement user-pay principles in the GVRD, although the equity of the various charge schedules is not always clear. Initiating “growth must pay for growth” policies sometimes amounts to asking new home owners to pay twice for their services, as they are required to pay for the full cost of their own services while also helping to pay off services used by the community’s long-term residents.

2.2.4 Transportation Tools

This section looks at how engineering professionals have typically address the transportation problems that are often induced by land-use practices. Needless to say, planning professional must simultaneously mitigate land use problems that are induced by transportation practices. The literature overflows with examples of concrete projects and trip reduction programs aimed alternatively at reducing congestion by adding vehicle capacity or reducing the number and length of trips by Single Occupancy Vehicles (SOV).

Both supply-side and demand-side approaches appear to stem from a systematic application of Social Cost Benefit Analysis (SCBA). In SCBA, costs such as land acquisition, construction and environmental degradation are balanced against the benefits, which are usually the initial time savings for drivers and presumed environmental improvements from reduced congestion. Long-term congestion and induced congestion effects are externalized. The “Social” aspect of the analysis looks at general, non-monetized people factors such as neighbourhoods traffic impacts.
Solutions offered by transportation planners and engineers range from brute-force expansion of capacity through building new roads, widening existing roads and adding turn bays to more elegant solutions such as adding High Occupancy Vehicle (HOV) lanes, computerized Intelligent Transportation Systems (ITS) and commuter rail. These solutions are usually supported by demand forecasts generated by computer models, which discount the push-pull effects of housing prices on trip generation and travel distances. In spite of some remarkable successes that have been observed in maintaining traffic speeds,\(^69\) adding capacity is increasingly seen as a solution with diminishing returns.\(^70\) Appendix A contains a more detailed overview of transportation planning methods currently in use.

While it would be refreshing to say that support for “let’s build our way out of it” approach had finally been put to rest, recent examples prove otherwise. A study of the Puget Sound region in the State of Washington has shown that average automobile occupancy has decreased on several freeways since Seattle’s massive HOV program was constructed.\(^71\) Both B.C.’s South Coast Transportation Systems Plan of 1995 and Central Puget Sound Regional Transit Authority’s Ten Year Regional Transit System Plan of 1996 rely heavily on supply-side solutions to congestion problems, such as new HOV lanes, Intelligent Transportation Systems (ITS) and commuter rail.

Transportation Demand Management (TDM) programs, on the other hand, can be thought of as “demand-side” initiatives which keep people from making unnecessary car trips, thereby reducing the need for additional road infrastructure in the first place. There are strong analogies to the

\(^69\) In Roland L Mitchelson and James S. Fisher “Long Distance Commuting and Income Changes in the Towns of Upstate New York,” *Economic Geography*, Vol. 63, No. 1, 1987: pp. 48-65, it is noted that, while the average commuting time in New York state remained at 23 minutes between 1960 and 1980, the average commuting distance increased from 8 kilometers to almost 20 kilometers. Higher incomes, tax incentives, and highway investments are cited as the causes of the increased distances. The City of Vancouver has managed to maintain a peak-period travel time of 25 minutes between the CBD and Richmond since the 1960s.

\(^70\) Terry Moore and Paul Thorsnes *The Transportation and Land Use Connection* (American Planning Association, Planning Advisory Service Report Number 448/449, 1994) p. 3, states the situation bluntly: “The obvious solution, more highway capacity, has reached a point of greatly diminished marginal returns in developed metropolitan areas. Not only are cities running out of space for new lanes, but the continued addition of highway capacity may be paving the way to a larger, less-treatable gridlock.”

electrical energy sector, which has arguably been more proactive and aggressive in applying the conservation approach. Energy conservation has been prompted in large part by campaigns from environmental movements fighting nuclear plants and hydro dams. Although the journey to work now accounts for less than a quarter of all trips, most trip reduction programs, such as the obligatory employer-based programs in California and Washington, focus only the work trip. Voluntary programs, such as the GVRD's "Go Green" programs, are based on "moral-suasion."

In a summary report from the U.S., seven distinct TDM strategies were identified:

- **Region-wide rideshare agencies.** Voluntary programs to match drivers and passengers.
- **Developer requirements.** Conditions in a development permit which limit the amount of traffic that a project can generate. This is similar to applying zoning-style performance standards to transportation access at a site.
- **Transportation fees.** Payment required from developers to fund alternative modes.
- **Incentive ordinances (by-laws).** Reduced parking requirements in exchange for payment-in-lieu or provision of measures to promote access to the development by alternative modes.
- **Transportation Management Organizations (TMOs).** These are groups of employers and developers who form a non-profit organization to reduce traffic and support alternative modes. Participant benefit from reduced parking needs and local congestion. The Cambie Corridor Consortium is a good example of such a group now operating in Vancouver.
- **Employer rideshare legislation.** Local requirements for employers to reduce SOV trips.
- **Comprehensive TDM legislation.** Regionally administered requirements for major employers to implement and monitor SOV reduction programs, often linked with financial penalties for failure to achieve assigned targets.

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72 In GVRD Overview of TDM Research (November 1995): p. 17, 3/4 of all trips are not work related and are made in off-peak hours. Distance to work is nevertheless a heavily weighted factor in transportation and location decisions. This could be due to the psychological impact of rush-hour traffic, or a lack of awareness by households as to how much time they spend traveling to non-work destinations.

73 Carolyn P. Flynn and Lawrence Jesse Glazer, "Ten Cities' Strategies for Transportation Demand Management," Transportation Research Record 1212, pp. 11-23.
Of these strategies, regional ridesharing and developer requirements appear to be the most effective, TMOs and transportation fees have had some success, and the other strategies have had mixed success. Most U.S. strategies are aimed at “carrot” approaches to controlling SOV use and avoid “stick” measures such as parking charges, gas taxes, tolls and road pricing, which form a large part of the GVRD’s proposed TDM strategy. Simulations using the GVRD EMME/2 transportation modeling program indicates that with a “dramatic” application of a package of carrots and sticks, such as the provision of widespread bus priority and the tripling of parking charges, are seen to have much greater impact than the sum of individual measures applied in isolation. This theoretical result of combining strong measures has been validated by empirical studies, notably in Singapore where transportation and land use is highly coordinated, particularly in the provision of higher density housing near transportation infrastructure. While supporting the combined package approach, the GVRD is nevertheless leaning towards delaying the implementation of sticks until the carrots have been implemented. It is important to note that the results of GVRD computer simulations of the complete package of proposed TDM measures, which showed a much more significant shift in modal split than any individual measure, effectively applies all of the measures together and not in a phased-in manner.

TDM measures which reduce demand for SOV travel by reallocating existing road space for bike, bus or HOV lanes are rarely mentioned in the North American literature. The “take-a-lane” approach is common in Europe, perhaps due to the narrower ROWs which preclude street

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77 GVRD/MOTH A Medium-range Transportation Plan for Greater Vancouver, (Transport 2021 Report, October 1993): pp. 30-32. Section 2.4, Staging Approach for Demand Management, calls for all carrots to be applied before any sticks are used.
78 e.g., U.S. Transportation Research Board National Cooperative Highway Research Program Synthesis 185: Preferential Lane Treatments for High-Occupancy Vehicles: A Synthesis of Highway Practice (Washington: National Academy Press, 1993). In the single paragraph devoted to non-engineering aspects of traffic problems, the report states “Federal, state or provincial, and regional policies to promote clean air and reduce pollution represents another reason why HOV facilities are pursued. Concerns for energy and its efficient use have motivated enhanced HOV lane consideration, including take-a-lane approaches. During 1991 for example, converting an existing mixed-flow lane to HOV use was seriously considered in Seattle, northern New Jersey, and California.” No lanes were actually taken from general purpose traffic for HOV use.
widening. Both the GVRD’s Transport 2021 and Vancouver’s CityPlan support this reallocation approach to TDM in principle. In practice, system capacity has been increased to accommodate alternative modes to the SOV.\(^79\)

The need for regional coordination of land use and transportation, as well as the application of TDM carrots and sticks, has been raised by several authors. In terms of temporal coordination, the phased approach appears to be chosen all too often for expedience, such as availability of funding sources.\(^80\) Fear of public backlash to rapid or sweeping changes is likely a factor.

More straightforward programs, such as making automobile costs more closely related to distances travelled or reallocating currently externalized costs of automobiles from drivers and applying these funds to alternative modes, have received remarkably little attention in the transportation engineering literature or support from decision makers. Economists and environmentalists have taken the lead in examining the substantial externalized costs of road infrastructure, the subsidization of driving and the potential for road transportation investments to exacerbate traffic and congestion.\(^81\) This polarization of thought indicates the need for an expanded dialogue between engineers, land use planners, economists, environmentalists and policy analysts at all levels.

2.2.5 Jobs/Housing Balance

All other things being equal, if the number of employed residents in a community matched the number of jobs, and the skills profile of the residents matched what was required by the

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\(^80\) Strategic Planning Department, GVRD “Transportation Governance and Funding Workshop Notes,” May 1997, confirms that while road projects are usually funded from general revenues, major transit projects are usually debt-financed. The report also notes that transit funding in particular “has often been reverse-engineered to fit the available funds rather than being based on substantive principles.”

employers, there would presumably be less need to travel routinely outside of a community for common activities. This would also reduce the need for applying stop-gap solutions to keep traffic moving and accommodate development pressures. As will be seen later in the section on land economics and factors influencing housing location, such a balance is far from the case in most metropolitan regions, and some would say that achieving even a rough balance is not a realistic goal. Nevertheless, a goal of working towards a balance of jobs and housing on a subarea basis could create a more positive planning mindset than the attitude of “there’s not much we can do, people are going to do whatever they want.” A reasonable balance of jobs and housing at the local level, combined with minimal rates of in- and out-commuting, is a necessary, if not sufficient, condition for creating complete communities.

The terms “local,” “community” and “complete,” although widely used by planners, are often used in different ways. The glossary of terms used by the American Society of Planning Officials defines none of these terms. The BC Municipal Act, GSA and GVRD Livable Region Strategy also avoid any clear, ascertainable definitions. A formal definition of “community” is “A locality inhabited by a group of people who share a government and often have a common cultural or historical heritage.” The most applicable formal definition of “local” is “Pertaining to a city, town or small district rather than an entire state or country, e.g. local transportation.” To overcome this lack of precision, the terms local and community in this thesis refer to areas roughly the size of the subareas defined earlier. These are areas large enough, if properly designed, to provide large amounts of housing and employment and yet compact enough to be conveniently accessed by walking, cycling or transit. The Northeast Sector, Richmond, Burnaby/New Westminster or the City of Vancouver would be examples of such “local” areas or “communities.” The corollary term “complete” will mean providing a wide range of jobs, services, amenities, affordable housing and alternative transportation opportunities that satisfy most of the routine needs of local residents, most of the time.

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82 See research findings section on key informant survey.
83 Webster’s Dictionary s.v. “community.”
84 Ibid. s.v. “local.”
Robert Cervero has also written extensively on the effects of imbalances between jobs and housing on transportation patterns. He concludes that imbalances in suburban areas have been driven primarily by ad hoc market forces and municipalities that make decisions with little regard for regional consequences. Even in the presence of regional plans developed through consensus, such as the LRS, municipalities often disagree with their designated roles and find subtle or overt ways to subvert the process.

An example of such subversion was the District of Langley informing the GVRD in 1995 that it intended to allow growth at a 3% annual rate, “provided that Langley can achieve a balance between labour force and employment at this growth rate.” The District claimed that this rate was consistent with the LRS, although the GVRD had limited growth in the District at 1.5% to prevent residential sprawl. The District’s report stated that the GVRD should be notified that this growth was supported by the public, presumably based on the strength of a 1995 survey in which 80% agreed with the statement: “Langley is part of the larger metropolitan region and should accept its fair share of new residential growth.” 83% of respondents in the same survey had also indicated that they wanted no growth or slow growth in response to the question: “The District has been growing at 4% to 5% each year for the last 20 years. What growth option is best for Langley’s future?” Municipalities appear to understand the importance of seeking a balance of jobs and housing, but are often undeterred from their chosen course of action when there is little likelihood of this happening, such as is being observed in the GVRD’s outer suburbs and exurbs.

Cervero describes five economic and demographic forces that exert strong influences on where jobs and housing are located:

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86 Ibid. p. 48.
• **Fiscal Zoning.** Municipalities seek out, or at least tolerate, commercial and industrial uses for land due to the higher tax revenue generating potential of these activities. The Vancouver CBD is an example of this. High tax revenues from businesses help to cross-subsidize property taxes in the lower density residential areas of a city. Agglomeration economies such as the CBD may be important for the overall economic health of the region, but the impacts of commuting should be mitigated by providing a range of suitable housing for employees near these employment concentrations.

• **Growth Restrictions.** This is often synonymous with exclusionary zoning. Simple restrictions on density, resulting in high land costs, can effectively preclude most new housing initiatives.

• **Worker Earnings/Household Cost Mismatches.** In this interesting example of the differences between American and Canadian land use patterns mentioned earlier, Cervero uses the example of how suburban homes are generally more expensive than inner city properties, forcing lower paid workers in low density suburban commercial parks to commute into the city for cheaper housing. While the GVRD exhibits some of these trends, such as lower paid high-tech and service employees working in Richmond commuting to abundant apartments in the Burrard peninsula, the trend in ground-oriented housing is decidedly in the opposite direction.

• **Two Wage-Earner Households.** With the continued trend towards working couples, there is a tendency to locate the household residence somewhere between the two workplaces.  

• **Job Turnover.** Employees are changing jobs more frequently, leading to a higher probability that at least one wage-earner will be employed in a municipality other than the Place of Residence municipality. A number of causes are identified, such as the growing trend towards short-term contract work and decreasing long-term loyalty between employers and employees.

Moore and Thorsnes claim in their APA report that most commutes to work, even in places like Los Angeles, take less than 30 minutes, indicating that most people actually do live relatively close to their work. Comprehensive studies done in Toronto and Vancouver appear to

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89 Pat Bell “Family income study shows that we’re not any further ahead.” *Vancouver Sun*, 23 August 1997, reports that in spite of a huge influx of two-income households, there has been a nearly complete stagnation of housing comes over the last twenty years.


contradict this conclusion. The average one-way commuting time in the GTA was approaching
one hour in 1991 and the average work trip in the Vancouver CMA was over 15 km in 1992,
equivalent to the distance from Vancouver’s CBD to New Westminster’s downtown. Few would
call this amount of time or distance “living close to work.” Even if this amount of travel was
considered to be low, such travel distances are a good indication that an inordinate amount of
street and highway capacity has been made available to maintain speeds and minimize congestion
in the absence of appropriate land use decisions.

Although not always well publicized, the cities of Toronto and Vancouver have officially
embraced the important link between additional housing close to employment and reduced trip
generation.\textsuperscript{93} In a seminal planning article with an unusually solid empirical foundation, Greg
Stewart, supervisor of transportation policy and research in the City of Toronto planning
department and David Nowlan, a professor of economics at the University of Toronto, made the
discovery in 1991 that an average of 1.2 downtown workers were living in every new downtown
housing unit.\textsuperscript{94} The transportation implication was that, while 85,000 new downtown jobs were
created in the 1975-1989 period, only 50,000 new peak-hour trips were generated. The facts
speak for themselves in Vancouver as well. Almost 60% of West End residents work in the
downtown peninsula and 70% of peak-hour trips made by these workers are by foot, bike, or
transit, a vastly higher percentage than for the region the region as a whole.

The Moore and Thorsnes again took an economic approach, arguing that if people really wanted
to live close to their work, this would be reflected through market mechanisms by bidding up the
prices of housing available near employment. This is, of course, exactly what is being observed in
places like Toronto and Vancouver, metropolitan areas featuring livable cores, and constitutes the
main impetus for this thesis. Housing prices in New York City and San Francisco, two of the few

\textsuperscript{92} GVRD, Strategic Planning Department 1992 Greater Vancouver Travel Survey: Report 3, Travel and
\textsuperscript{93} City of Toronto, Planning and Development Department CityPlan ‘91 Report: Transportation and the Land-Use
Toronto’s approach to focus housing near the downtown.
\textsuperscript{94} David M. Nowlan and Greg Stewart, “Downtown Population Growth and Commuting Trips: Recent Experience
remaining livable metropolitan cores in the U.S., are very high. Nevertheless, Moore and Thorsnes suggest that the mobility provided by the automobile makes most people trade-off proximity to work for proximity to shopping, recreation and friends. Indeed, many prominent authorities on the subject of land use and urban design continue to insist that neither sprawl nor automobile use are significant problems, given the right technology.95

"Oddly, it seems easier to grasp the real costs of sprawl than to understand the benefits of intensification, which is simply the reverse of sprawl."

...Nowlan and Stewart

2.2.6 Density and Land Use Mix

Two recent studies of west coast metropolitan areas, with many similarities to Vancouver, have provided strong empirical evidence in support of the importance of land use density and mix on how, and how often, people travel for different trip purposes. The common theme was that the land use factors of density and mix of land uses exert a strong influence on the overall demand for transportation, modal splits and infrastructure investments. By definition, these higher densities, mixes of use, and reduced travel needs create more compact metropolitan regions with reduced automobile dependence, making the research results of particular interest to this thesis. Suburban residential subdivisions obviously display extremely low density and a lower mix of uses. An examination of the strength of these two factors is important for the understanding of the land use, transportation and housing dynamics that are required to achieve a compact metropolitan region with complete communities.

95 In Moshe Safdie The City After The Automobile: An Architect’s Vision (Stoddart, 1997), the internationally acclaimed architect promotes a vision of perpetuating North American’s low-density cities, but with a fleet of Le Corbusier’s automated electric vehicles replacing private automobiles. In Amory B. Lovins and L. Hunter Lovins, “Reinventing the Wheels,” The Atlantic Monthly, January 1995, the popular alternative-energy expert embarked upon a campaign to promote “hypercars,” low-weight personal vehicles fueled by small gas-electric hybrid engines, as the solution to pollution and urban congestion.
Kenworthy and Newman, in their classic 1989 work *Cities and Automobile Dependence: An International Sourcebook*, showed a clear exponentially decreasing relationship between per capita gasoline consumption and higher urban densities in 32 metropolitan areas around the world.\(^6\) The data is powerful enough to demonstrate convincingly that, regardless where and urban centre is located and in spite of Le Corbusier’s dreams of stacked urban freeways, traffic congestion and livability factors at higher densities eventually lead to the need for alternatives to the automobile. What is less clear is how often the transition is instigated by the increasing economic viability of alternative modes and how often congestion and pollution problems force metropolitan decision makers to provide alternatives. BC Transit has also noted strong relationships between increased density and increased transit use, both for increased employment density and population density.\(^7\) Data plots show Vancouver in a class of its own at the top end of the scale for density and transit usage with South Fraser subarea municipalities at the bottom end. Density was also identified by almost every respondent to the land use, transportation and housing survey conducted for this thesis as the most important factor in promoting alternative transportation and affordable housing.

The two areas investigated in the studies, the Bay Area of California and the Puget Sound area of Washington, share many similarities with the GVRD. All three are large, relatively modern metropolitan areas that have a dense core with a high proportion of jobs and housing surrounded by a low density suburban fringe. The Bay Area has around 5 million people, while Puget Sound and the GVRD have around 2 million people each. Geographic constraints in all three places, such as water bodies and steep elevations, exert a strong influence over growth patterns. As a result, the provision of transportation infrastructure can be expensive and housing prices are high in the metropolitan cores, particularly for ground-oriented family housing in established neighbourhoods.

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\(^7\) BC Transit *Transit and Land Use Planning* (1994): p. 6, as derived from the GVRD 1992 Travel Survey.
A significant difference between the three study areas is the relatively low cost of operating automobiles in the American centres in addition to the existence of an extensive, federally-funded, freeway system. The freeway system may also be responsible for a higher level of suburban employment in the U.S. Transit ridership is much higher in the GVRD, and mortgage payments are not deductible from taxable income in Canada as they are in the U.S.

In a 1994 University of Washington doctoral dissertation by Lawrence Frank, extensive analyses were carried out to correlate the effects of density on travel distance and modal choice in the Puget Sound area. It was shown that higher density in both primarily residential areas and primarily employment areas is conducive to shorter trip distances and increases in the modal shares of walking, cycling, and public transit. Perhaps the most important conclusion of the analysis is that a critical density appeared to be necessary before a noticeable transition started from automobile predominance to the increased use of alternative modes. The critical employment density for a shift from the SOV mode for work trips appeared at 20 to 30 jobs/acre and the critical residential population density for decreased SOV travel appears at about 10 residents/acre, although this point is less sharply defined. Higher density at both ends of a trip was understandably identified as a major contributor to lower automobile ownership and use.

A mix of uses within the higher density locations was also seen to contribute to trip reduction. For housing, a mix of land uses such as grocery stores, professional services and restaurants reduced travel outside of the immediate neighbourhood. For workplaces, a mix of business and employee services such as dry cleaners and print shops reduced the need for regional travel. Frank concludes that a balance of jobs and housing does in fact reduce trip distance and travel times considerably. Of some interest is that, while the results were “controlled” for the effects of non-land use variables such as age, income and household type, housing factors such as price were not considered to have an impact on results. This would appear to be a dramatic oversight.

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98 Lawrence D. Frank  An Analysis of Relationships Between Urban Form (Density, Mix, and Jobs:Housing Balance) and Travel Behaviour (Mode Choice, Trip Generation, and Travel Time) (Washington State DOT & USDOT, July 1994).
given that basic urban land economics makes clear the importance of these two factors in locational decisions, i.e., the economic incentives to live in one place and work or shop in another.

In a 1996 University of California at Berkeley masters thesis by Kara Kockelman, several dimensions of “accessibility” are added to Franks’ basic density and mix indicators. Access to “Opportunity Sites” (destinations) was seen to be one of the most important “Amenities” or “Disamenities” that influence where people locate in the Bay Area. An interesting result of the study was that access to wide range of opportunity sites, including those that would be rarely visited, had a much higher importance for potential home owners than might be expected. This observation lends support to the hypothesis that people need to feel that they are able to conveniently access a high proportion of possible trip destinations by alternatives to the automobile if they are to accept less automobile-dependent residential locations and lifestyles.

The distribution of housing prices was again not considered to be an important factor.

Other research papers by Kockelman have examined the influences of housing prices on travel behaviour in the Bay Area. Housing prices are described as a proxy for all of the usual amenities associated with a home, such as floor space and neighbourhood, with accessibility to opportunity sites seen as just another amenity. One interesting result concerned the added utility of a home being located where only one car was considered necessary instead of two. The difference in monthly mortgage payments for a home in an area where only one car was considered necessary was found to be considerably less than the monthly cost of owning an extra car. This indicates that the full monetary value of reducing car ownership may not be understood by many households. While these studies confirmed house price as a primary indicator of the desirability of a location in terms of accessibility in the Bay Area, many of the correlations are considered to be weak. Income is considered in the transportation mode decisions of households, but not in their location decisions, and then only as an average for the aggregated population.

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99 Kara Kockelman, Travel Behaviour as a Function of Accessibility, Land Use Mixing, and Land Use Balance: Evidence from the San Francisco Bay Area (University of California, Department of City and Regional Planning Masters Thesis, 1996)
100 Kara Kockelman, “The Value of Travel Savings As Reflected in Housing Prices” and “Housing Price as a Function of Accessibility,” University of California, Department of City and Regional Planning Term Papers, 1995.
such, the studies did not look at the subtle differences that may exist between the behaviour of different types of household.

Kockelman makes the intuitively obvious, but nevertheless important, observation that the value of land is highly correlated to accessibility considerations. Land outside of metropolitan commutersheds, which has no recreational or agricultural value, generally sells for a small fraction of what urban land sells for. Accessibility considerations contributing to price fluctuations within urban areas are complex and discussed further in the section on land economics.

**Density and Land Use Mix - Theory and Numbers**

While many readers will be familiar with the importance of density and land use mix in community design and growth management, it is not always easy to see exactly how different housing forms consume land, or how all of the land use “mix factors” can be assembled to identify where a balance or imbalance is present. The following example seeks to provide clarification.

**Density**

Consider a conventional subdivision built with 30’ by 90’ lots with 30’ ROW and no lane versus a 50’ by 150’ with 45’ ROW and 20’ lane. The former housing unit has a physical footprint of 3150 sq ft and the latter 9000 sq ft, a ratio of almost 1:3. As these subdivisions extend out from activity centres and the source of services such as sewers, water, hydro and gas, then the best-case cost of providing infrastructure for these subdivisions would also vary by a factor of 1:3, depending on the mix of lot sizes and street widths.

A comparison between entry level homes targeted for middle classes in Mexican and Canada or the U.S. demonstrates the vast differences in density mindsets of North Americans. Typical new Mexican subdivisions, dominated by two story townhouses, have an average FSR of 1.0 and

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101 Measurements and layouts compiled during field work by the author at several locations in Mexico City, in several cities around Guanajuato State, Mexico and in Surrey, B.C. during January 1997.
a usable floorspace of approximately 1200 sq ft without basements. The smallest two story house in the award winning Clover Valley Station subdivision near Vancouver, which features small lots and neo-traditional design, has 2400 sq ft of usable floor space and an FSR of 0.5 with a full basement. By simple calculation, the Mexican subdivision is four times as dense, without considering street widths. While Mexican residential streets were 20' to 24' wide with no back lanes, streets in Clover Valley Station range from 33' to 40' wide with an additional 22' wide rear lane. Another simple calculation shows that while street space in the Mexican subdivision accounts for 1/6 of the land available, at least 1/3 of the Canadian subdivision is dedicated to asphalt. Considering these extreme differences in density, perhaps it's not really surprising that Mexico City's 20 million residents are able to live in an area approximately the same area as Greater Vancouver's two million residents, with only a marginally higher total number of cars.

Typical New Townhouse Subdivision in Mexico

Legend: S = Sidewalk, CY = Courtyard, TH = Townhouse
Some of the differences in densities and design can be attributed to cultural factors, but it is important to note that Mexicans of all income classes live quite close to one another, and this "culture" of compactness is ultimately what North Americans living north of the Rio Grande will have to re-learn if growth management is to have a reasonable chance of success.

Unfortunately, services provided within automobile-oriented subdivisions are just the tip of the iceberg. The narrower street that was appropriate for the subdivision must expand to a four lane arterial to collect all the cars from the subdivisions and then six lane arterials or freeways as major activity centres are approached. At most times of the day the streets of the subdivisions remain quiet, although damage from the elements, such as frost action, continues through the years.

Similarly, services such as water and electricity need additional facilities such as repeaters and pumps to get their products to users as the distance increases. BC Hydro notes that the denser development called for in the GVRD Livable Region Strategy will delay the need for a number of substations in the Fraser Valley that would be needed otherwise if current development trends
were to continue.\textsuperscript{102} The Hydro report also notes that a duplex requires one-quarter of the "linear infrastructure" (e.g., power lines, sewer lines, etc.) of a detached house and that a rowhouse uses only one-third of the heating energy of a detached house.\textsuperscript{103} BC Transit has concluded that it cannot economically support feeder routes in the low density suburbs due to the large distances involved.\textsuperscript{104} Nevertheless, political decisions in the 1980s to provide minimal transit service levels in most GVRD suburban areas has drained capacity on main routes in urban areas, leading to severe overcrowding and a loss of potential ridership on the urban routes.

The wide distribution of activity centres in suburbs requires more capacity for access roads and large expanses of parking at the centres which lie empty much of the day. This further expands the radius of the metropolis. The distance that heavy delivery trucks must travel to distribute goods also increased. As the damage done to pavement surfaces by trucks is orders of magnitude higher than that of a car, arterial street maintenance costs escalate quickly.

On the macro level, if development is allowed to proceed at low density, infrastructure costs across the region will climb rapidly, and individual taxpayers will face higher costs in property taxes, transportation costs, and travel time.

\textit{Land Use Mix}

Land use "mix" is a measure of the actual number and variety of land uses in a subarea, which can be compared to the number and variety needed for a complete community. Several mathematical definitions of "mix" were found in the literature, none of which claimed to be true representations of the real world, and for which only limited empirical confirmation was offered. The concept is nevertheless well understood by organizations with specific mandates. Most cities have a recipe book which specify the amount of public amenity ingredients that it feels is necessary for complete neighbourhoods: Vancouver, for example, has set 2.75 acres of park per 1000 people, 2.29 sq ft.

\textsuperscript{102} BC Hydro \textit{Bringing Electricity to the Livable Region} (1994): pp. 52-53.
\textsuperscript{103} Ibid, p. 47.
\textsuperscript{104} BC Transit \textit{Transit and Land Use Planning} (1994): p. 10, shows that the average suburban residential density of 4-6 units/acre supports only hourly service during the daytime and that this service will be much more heavily subsidized than urban service.
of community centre per person and one elementary school per 200 children as minimum city-wide standards. Developers and retail chains have well-established rules of thumb as to how many people are required in a neighbourhood, community or regional market area to support different types of sales or service outlets. A consolidation of the principle elements that would be involved in creating an analytical numerical model of land use mixes is presented here.

There are a number of ratios corresponding to activity centres that people need to access which need to be “balanced” locally to reduce the need to travel. The term “local,” as defined above, is important. In a metropolitan region, there is generally a built-in “balance” of uses since most common services, amenities, etc. needed within the region would be assumed to exist within the region. Examples of how activity centre balance ratios could be defined which measure the local balance, or mix, of land uses include:

\[ E_i = \frac{(\text{Employment available in income class } i)_{\text{subarea}}}{(\text{Employed residents in income class } i)_{\text{subarea}}} \]

...there should be a balance of jobs and housing, as represented by the number of employed residents, in each income class within a community. For the reasons indicated earlier, this can never be achieved perfectly, but should fall within a range, 0.8 to 1.2 being reasonable.

\[ H_i = \frac{(\text{Number of suitable housing units affordable to income class } i)_{\text{subarea}}}{(\text{Employment available in income class } i)_{\text{subarea}}} \]

...there should be a stock of suitable housing available locally which matches the income profile of those working within a community.
P = Personal Services and Recreation Ratio =

\[
\frac{\text{Number of Personal Services and Recreation}}{\text{Population}}_{\text{subarea}} - \frac{\text{Number of Personal Services and Recreation}}{\text{Population}}_{\text{region}}
\]

...there should be sufficient services to supply most needs of local residents and workers within a community.

B = Business Services Ratio =

\[
\frac{\text{Number of Business Services}}{\text{Employment}}_{\text{subarea}} - \frac{\text{Number of Business Services}}{\text{Employment}}_{\text{region}}
\]

...there should be sufficient services to supply most business needs of local employers within a community.

Some services are clearly more “local” than others. A Vancouver apartment dweller should not have to travel to a big-box retailer in Richmond for a jug of milk and a major financial firm in Vancouver’s CBD should not have to travel to a neighbourhood drug store to buy stationary in small quantities. Every neighbourhood may not need an appliance store, but there should be a hardware store nearby where a washer can be bought to fix a leaky tap. These “micro” and “macro” relationships would need to be further refined in a complete model. The important concept is that most commonly needed services, amenities, etc., should be available locally at an appropriate scale.

To determine whether or not a subarea has the healthy mix of uses needed for a complete community, the ratio for each factors could be weighted according to its demonstrated importance to growth management and averaged in an equation of the form...
IF = Imbalance Factor =

\[
(W_E \cdot (\sum_{i=1}^n (1 - E_i) \cdot \frac{N_{i, elf}}{N_{elf}})) + (W_H \cdot (\sum_{i=1}^n (1 - H_i) \cdot \frac{N_{i, elf}}{N_{elf}})) + (W_P \cdot |1 - P|) + (W_B \cdot |1 - B|)
\]

where:

- \(W_E, W_H, W_P, W_B\) are weighting factors related the importance of the ratio to growth management objectives.
- \(|1 - R|\) is the absolute, or positive, value of one minus ratio \(R\).
- \(N_{i, elf}\) is the number in the region's employed labour force in income class \(i\).
- \(N_{elf}\) is the size of region's employed labour force.
- \(n\) is the number of defined income classes in the subarea.

Taking the absolute value ensures that all differences from one are counted as contributions to the IF and that positive and negative values don't cancel each other. In a perfect world, all ratios should ideally be closely balanced and have a value near one, resulting in an IF closer to zero. A subarea would then have a balance of all the land uses identified as needed in a complete community. Subareas with IF significantly greater than zero would have a serious imbalance in one or more of the defined land use parameters, and policies could be applied to address these.

On the macro level, if the IF indicates that significant imbalances in land uses in a subarea exist, people will need to travel to other subareas to access the employment, housing, personal services and recreation that they need. The results section will indirectly examine two of these ratios, the (im)balance of the numbers of workers and residents in various income classes in selected parts of the region.

### 2.2.7 Summary

The preceding sections have presented an overview of the current thinking in the area of land use and transportation interaction. Numerous interrelated factors were presented to explain what
planning and engineering professionals consider to be the underlying causes of urban sprawl and automobile dependence. A survey of existing policy instruments suggested which responses have gained acceptance in different jurisdictions.

What became clear in the preparation of these land use and transportation sections was that the nature of urban sprawl and automobile dependence problems, their costs to individuals and society, and workable solutions are well understood. Stated succinctly, the most realistic and proven solutions to these problems are higher densities with mixed land uses and a substantial reallocations of funding from automobile infrastructure to alternative transportation modes. The number of individuals and organizations who have both an understanding of the overall situation and the ability to push an alternative agenda in the face of strong professional and public resistance appears to be quite limited. This is particularly true given the myriad of competing entities in metropolitan areas, with various geographic and jurisdictional mandates, that make effective land use and transportation coordination a daunting task.

The only approach in North America which seems to have effectively promoted such coordination has been the comprehensive “top-down” approach to planning at the state or provincial level, such as the Oregon model described earlier in the section on growth management. The success of the top-down approach in Oregon seems to result from a commitment by most stakeholders to ensure that land use, transportation and housing should all act as means to the end of more livable communities and long-term sustainability. Many of the other state and provincial approaches appear hesitant and reactionary in comparison, i.e., how to deal with the short-term growth problems as conveniently as possible.

A number of respondents to the key informant survey were adamantly opposed to any kind of intervention by higher levels of government, perhaps reflecting a current suspicion of big government throughout North America. Many presuppose that, while little practical action has actually taken place, local solutions to regional problems are preferable to provincially imposed solutions. The fact remains that neighbourhoods and municipalities stubbornly resist land use and transportation changes, such as higher density in established neighbourhoods or lower parking
standards, and this ultimately leads to a lower quality of life for all residents in a region. Pro-
development councils in the GVRD are now challenging even the generalized land use and
transportation goals of the LRS, perhaps out of fear that they may someday be enforced.

The Oregon model uses two deceptively simple mechanisms to overcome these problems,
problems driven by land economics and the protection of perceived self-interests, while
maintaining a high level of community support. Firstly, the statewide goals were developed in
direct consultation with the state’s citizens, establishing a strong, overarching mandate and
bypassing the rhetoric of potentially parochial individual, neighbourhood, and municipal interests.
Secondly, the interpretation of the guidelines developed to achieve the goals is overseen by an
independent review board, again ensuring that common goals are not misinterpreted by local
officials.\textsuperscript{105} Not only does the state require effective citizen involvement in all planning processes,
it provided startup grants at the time the original legislation was passed to create a strong citizen
watchdog group, the 1000 Friends of Oregon, as the keeper of the vision.\textsuperscript{106} The 1000 Friends of
Oregon have recently championed the “Land Use, Transportation, Air Quality (LUTRAQ)
Connection” reports, which formed the basis for canceling new freeway development in the
Portland area and promoting new Transit Oriented Development.\textsuperscript{107}

\textsuperscript{105} State of Oregon, Department of Land Conservation and Development Oregon’s Statewide Planning Goals and
\textsuperscript{106} State of Oregon, Citizen Involvement Advisory Committee How To Put The People In Planning (July 1992).
\textsuperscript{107} 1000 Friends of Oregon The Land Use, Transportation, Air Quality (LUTRAQ) Connection (Volumes I-IV,
2.3 Land Economics, Housing and Location Choice

2.3.1 History and Overview

A historical perspective is a good way to start an overview of what influences housing costs and where people live in relation to their jobs and other needs. The field of land economics, originally applied to agricultural land, is well developed. Early writings assumed that only two factors affected the price of land: fertility and distance to markets. The price or rent paid for farm land was related simply to the possible yield and market value of the crops grown, less the cost of getting the harvest to market. In agrarian societies, the value of urban land was less important, as it accounted for only a small part of the total land mass available and far fewer people lived in larger towns or cities. Early in this century, with the exodus from rural to urban areas beginning to grow, theories of urban land economics began to be formulated, with the value of commercial property being the primary interest. The location of commercial land in terms of proximity to supplies, amenities and markets was still a main focus of the theory. Links to transportation were seen to be the overriding factor in location decisions. The concept of “friction,” or the difficulty in getting from one place to another, became a cornerstone of all theories and is still the term used to describe travel time in transportation models such as the GVRD’s EMME/2 model. When the economics of residential land emerged in the 1920s, the emphasis on transportation continued, but had broadened to include access to activity centres other than work, such as shopping and recreation. By the early 1960s, many of today’s theories on residential land values and location preferences had been established, based on the total utility of a range of property characteristics to an potential buyer or renter.


\[110\] Writers from Robert M. Haig, “Towards an Understanding of the Metropolis,” Quarterly Journal of Economics, Vol. 40, May 1926, and Richard U. Radcliffe Urban Land Economics (New York: McGraw-Hill, 1949) indicated that convenience in terms of accessibility to amenities is the primary component of residential rents. It is interesting to note that the terms “accessibility” and “activity centres,” have enjoyed a recent revival in the literature as “new” planning paradigms, paralleling “neo-traditional” design.

A legacy of this later work was the incorporation of neighbourhood factors, such as crime, prestige and appearance, and the value of commuting time to individuals, into the models.

A GVRD report on housing influences from the 1970s contains many statements that could easily be mistaken for statements from a 1990s report.\textsuperscript{112} Large increases in housing starts were then being seen in the Northeast Sector and South Fraser subareas, due to the large amount of relatively cheap land available in these locations. Concerns were expressed over the displacement of low income housing due to redevelopment, the fact that housing prices were growing faster than incomes, particularly for younger families, and the tendency for new housing to be located in places without public transit. The last concern merits clarification. "Without public transit" in the 1973 context meant no transit of any kind was available in most suburban GVRD municipalities. Growing up in an automobile-oriented culture without transit may still be shaping the opinions of suburban decision makers today. Although the cost of providing development services to new subdivisions was raised as a concern, it is significant to note that the impact of housing locations on transportation needs, environmental quality or the then newly established ALR land was not mentioned. Two quotes from the report, although they may appear to be statements of the obvious, indicate the timelessness of land economics issues as applied to housing:

1. "For those families entering the single family dwelling market for the first time, rising house prices are a considerable encumbrance. Those families are forced to pay today’s prices for single family accommodation and may pay two or three times as much as their neighbour. The effect of rising house prices is distributed inequitably throughout the population; those who own a house benefit from the increase in house prices, and those who wish to purchase their first house are penalized."\textsuperscript{113}

\textsuperscript{112}GVRD The Housing Issue (May 1973).
\textsuperscript{113}Ibid. p. 17.
2. "We like to think that we choose the environment in which we locate our homes and families. In respect to the tightness of the market and the limits to housing unit choice, how much real choice do we really have in this regard?"\footnote{114}

Land, the most important single component of housing prices in the GVRD, is not treated as other commodities by government regulations. The old adage "they ain't making any more land," with ecologically important exceptions such as marsh and tidal basin reclamation, summarizes the argument for special treatment in the case of land. If a pure supply and demand system applied to land capital, it has long been argued that land rents would eventually consume the value of all other goods and services produced by the economy for the sole benefit of a few land owners.\footnote{115} More recently, it has been observed that land price increases have effectively offset some of the wealth and leisure time gains anticipated earlier this century as a result of increasing productivity, as more work time is required to pay for housing and more commute time is required to access work.\footnote{116} Governments in peacetime generally do not control what a company can produce with its capital resources, provided that the product and the production method is legal. If there is a market for a commodity, chances are good that someone will exploit the opportunity. Land use zoning has the effect of limiting what the market would normally do with land capital to maximize profits. Needless to say, some land uses, such as apartment buildings that block sunlight or factories that create noxious odours, may constitute a nuisance situation, but these torts could theoretically be remedied in the courts. Many zoning restrictions currently being applied reflect personal interests and community attitudes more than market economics. The consequences of restrictive zoning practices are clear. A 1990 report prepared for the GVRD warned:\footnote{117}

"The declining supply (of zoned and serviced land) will likely result in:

\footnote{114} Ibid. p. 28.  
\footnote{115} David Ricardo Principles of Political Economy and Taxation (1821) and George Henry Progress and Poverty (1879) quoted in Edwin S. Mills and Bruce W. Hamilton Urban Economics (Harper Collins Publishers, 1989).  
\footnote{117} Coriolis Consulting Corporation for the GVRD Evaluation of Greater Vancouver’s Land Supply (May 1990).
• Higher prices for existing and new single family homes;
• More rapid single family residential development in municipalities such as Langley and Maple Ridge and the Fraser Valley;
• Increased pressure to develop ALR lands, particularly in municipalities such as Delta and Richmond."

Arguments surrounding the equity of various land distribution mechanisms will be left to later discussion and the more complex mathematics that have been developed to support the theories will be reduced to simpler forms. It should be noted that the theories are rarely accompanied by supportive empirical data. The following sections will focus on the more tangible determinants of land values, primarily residential land in metropolitan regions, and mathematical models which represent tradeoffs between these factors.

"Lifestyle choices are the most critical factor (in housing). Economics appears to drive undesirable consumptive practices."

...Real Estate Representative

2.3.2 Bid-Rent Theory

Much of what has come to be known as urban land economics could be described as quantified common sense. All businesses want to find a location that will make them the most money, all households want to live in places where they can enjoy the highest possible quality of life within the constraints of their income and other competing uses for this income. The quantification of the common sense variables that go into decisions on which price to charge or pay for a property falls into the field known as bid-rent theory. The term “rent” is used as a basis for calculations, as owning or renting a property equate to the monthly cost of amortizing a total cost over a relatively long time period.
Decisions on where to locate almost always involve tradeoffs between competing factors. Price, for example, is rarely considered as the only factor, or even the major factor. The cheapest commercial lease rates might reflect a location with low sales volumes while the cheapest residential land price may end up being swamp land in Florida. The relative value of these factors to a business or household is called the “utility” of the factor. The procedure of assigning weights to these factors to determine the optimal combination of tradeoffs is called “maximizing utility.”

The utility based model predicts that, just as transportation mode choice is based on factors such as convenience, time and money, locational choices of businesses and households are influenced by factors such as accessibility (“location, location, location”), amenities, price and operating costs. The model can be applied on an aggregate basis to determine the probable prices of properties in a location or on a disaggregate basis to determine the probability than an individual household with given characteristics will locate in a given area. This thesis is primarily concerned with the disaggregated, or “micro,” choices that individual households make in response to options in the housing market, which combine to create the aggregate, or “macro,” situation.

Once the utility of various locations have been estimated, the expected value of a property can be determined. Conversely, the likelihood that a household or business with certain features will locate in an area can be calculated using a probability function. It is here that the “push-pull” factors that are missing in most transportation models can be found. Those factors that increase the utility of a site are positive while those that decrease it are negative. Price is the most obvious component, with high prices driving households from locations near workplaces and low prices drawing them to others. Transportation models generally only consider travel time and costs.118

The Mathematics of Housing Utility and Locational Probability

The following two steps can be applied to mathematically represent a household’s location decision in terms of measurable parameters:

118 Appendix A contains an overview of transportation planning methods.
1. Determine the utility of all significant factors at a given housing location. A basic example of the utility of housing, $U^h$, for a given household with income $\ell$ and number of members $m$ can be represented crudely as:

$$U^h = a_0^h + a_1^h(t_{\ell}^h + t_{\ell}^h) + a_2^h t_{\ell}^h + a_3^h(s^h/m) + a_4^h(c^h/t) + \text{etc.}$$

where:
- $t_{\ell}^h$ is the average travel time to access employment by the $t$ workers living in the household,
- $t_{\ell}^h$ is the average travel time to access amenities such as shopping and recreation,
- $s^h$ is the size of a house, which could easily be expanded to include variables such as number of bedrooms against the number of children,
- $m$ is the number of household members,
- $c^h$ is the monthly cost of housing being considered, which should include all relevant costs, such as the mortgage payment, taxes and maintenance,
- $\ell$ is the average income of the household. Here, as income increases, the importance of the cost of the housing to the household decreases,
- $\text{etc.}$ are all of the other factors left out of this simple model.

$a_0^h$, $a_1^h$, $a_2^h$, etc., are proportionality constants, which can be thought of as weighting factors reflecting the relative importance of a factor to a household. $a_0^h$ represents all of the hard to measure intangibles involved in the decision, i.e., the non-monetary and non-temporal utility of the real and perceived benefits of a potential choice of housing. Examples of these intangibles include safety, neighbourhood "feel," density, prestige and community amenities such as parks, schools and community centres. In practice, this constant could be difficult to determine empirically.

2. Determine the probability that a household with specific characteristics and a primary Place of Work (POW) will choose one type of housing and Place of Residence (POR) over all of the
available possibilities, given the relative utility of each choice, based on a “Multinomial Logit Model.” This probability can be expressed as:

\[
P_{\text{type,household}}^{\text{POR,POW}} = \frac{e^{-U_{\text{type,household}}^{\text{POR,POW}}}}{\sum_{i,j} e^{-U_{\text{i,POW}}^{\text{POR,POW}}}}
\]

Where

- \(U\) is the Utility of housing type and Place of Residence (POW) to a specific household with a given Place of Work (POW),
- \(\text{type}\) represents a housing type with a defined set of characteristics, i.e., apartment, townhouse or detached house, new or old, etc.,
- \(\text{household}\) represents a household with a defined set of characteristics, such as income, number of workers, number of children, etc.,
- \(i\) represents the different housing type choices,
- \(j\) represents the different Place of Residence choices.

A probabilistic model reflects the fact that not all households, even those with very similar characteristics, will necessarily make the same housing choices. As a result, there would be a statistical distribution around the most probable choice. There is an analogy to the field of traffic engineering. Route determination for drivers would appear on the surface to be a simple matter of finding the quickest route from A to B. Empirical evidence, expressed in Dial’s Algorithm, shows that there is a significant variation of the actual routes that people take between two points when there are options available. While the majority of drivers take the fastest route, substantial numbers of drivers often prefer a variety of secondary routes.

---

As complex as this model may appear, it is still clearly a simplification of reality. For example, the model assumes all relationships to be linear, which is usually not the case, particularly over a wide range of household types and locational factors. Some factors which might appear to be obvious, such as travel time to work, seem to have little statistical significance for some income groups. Others, such as travel costs, appear to be highly inelastic for higher income groups. The value of \( a_0 \) is a proxy for all the variables that are either unknown or cannot be measured objectively, making it subject to suspicion. How does one measure a bias towards living in East Vancouver versus West Vancouver? Another difficulty with the model is the collection of relevant data to identify statistically significant relationships. As mentioned earlier in the methodology section, many data sources come from different agencies with different mandates, study areas, definitions and collection times, making correlation difficult.

Nevertheless, the model serves to indicate how various factors can influence the decisions of consumers and, if properly calibrated, could be used to indicate the potential impacts of policy decisions on the locational decisions of households.

2.3.3 Decision Tree Model

A decision tree, commonly used in applications such as business and engineering, seeks to mimic the flow of logic that many decision makers follow without going into the mathematical detail that a deterministic probability-based model attempts.

It assumes that decisions are made in a linear fashion using "bundles" of parameters. Parameters of greatest importance to the decision maker are dealt with first, and less important factors later.

---

Table 1 - Decision Tree Using a Housing “Bundle”

<table>
<thead>
<tr>
<th>a) Tenure</th>
<th>b) Location</th>
<th>c) Type</th>
<th>d) Cost</th>
<th>e) Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned</td>
<td>Vancouver</td>
<td>Apartment</td>
<td>&lt;$150,000</td>
<td>800 sq.ft.</td>
</tr>
<tr>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td>Rented</td>
<td>Inner Suburbs</td>
<td>Townhouse</td>
<td>&lt;300,000</td>
<td>800-1200 sq.ft.</td>
</tr>
<tr>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td>Outer Suburbs</td>
<td>House</td>
<td></td>
<td>&lt;$450,000</td>
<td>&gt;1200 sq.ft.</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exurbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this example, the household would first decide whether or not it wanted to own. Those wishing to buy would identify preferred locations within the region and then decide on a type of housing. The decision maker would then make trade-offs between the cost and size of the unit. One hypothesis of this thesis is that most young family households actually decide on Tenure, Type (Ground-Oriented versus non-Ground Oriented), Cost and Size together, then make tradeoffs between Type (Detached House versus Townhouse) and location.

2.3.4 PITTS

In discussions with Dr. Ann McAfee, Director of City Plans for the City of Vancouver, suggests that a simple, five-step hybrid of decision trees and bid-rent theory replicates how locational decision are made by most GVRD households, the “PITTS” model.\(^\text{122}\)

- Principle - The asking price of a house;
- Interest - Market rates and trend versus income and employment outlook;
- Taxes - DCCs, Sales taxes, land transfer taxes, and property taxes;

\(^{122}\) Personal communication (January 1996).
• Transportation - Ease of access to activity centres;
• Services - Neighbourhood amenities and personal services.

Crime and intangibles such as prestige do not appear in this classification explicitly, but could be considered as “disamenities” under “neighbourhood amenities.”

“\[quote\text{The media tends to report negative stories which contribute to a public perception that has painted the picture of transit and cities as crime-filled. This is a powerful motivator for persons to leave for the suburbs.}\text{\textendquote}\]

..Director of Planning

2.3.5 Factors Affecting the Cost of Housing

First and foremost, as discussed earlier, the availability of zoned and serviced land is the most variable factor in the land component of housing costs, and often the most important in urban areas. A 1990 study, based on the OCPs that existed at that time and an analysis of the potential for servicing, indicates that the limited supply of serviced, zoned land for single family lots, combined with an abundance of land available for multi-family units, may have unduly influenced housing prices and led to the dominance of apartment units observed in the early 1990s.\textsuperscript{123}

Table 2 - Supply of Land and Absorption Rates (1990)

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Short-term Capacity</th>
<th>Long-term Capacity</th>
<th>Annual Absorption Rate</th>
<th>Supply (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family Lot</td>
<td>45,100</td>
<td>59,530</td>
<td>7,250</td>
<td>14</td>
</tr>
<tr>
<td>Multi-family Units</td>
<td>181,760</td>
<td>25,600</td>
<td>8,950</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Coriolis Consulting Corporation for the GVRD

\textsuperscript{123} Coriolis Consulting Corporation for the GVRD \textit{Evaluation of Greater Vancouver’s Land Supply} (May 1990).
It should be noted that about half of the short-term single family lot capacity was in Surrey, Langley District and Maple Ridge, while an alarming two-thirds of the long-term capacity was in concentrated in only two exurbs: Langley District and Maple Ridge. Vancouver, Burnaby and New Westminster had negligible remaining capacity for single family lots. Surrey and Vancouver accounted for over half of the available short-term capacity for multi-family units, which is almost seven times the available long-term capacity.

A “pro-forma” or “residual” financial analysis, is commonly used in the real estate industry to determine the economic feasibility of a development project or the likely selling price for a property. Assuming a competitive housing market, the market value of housing units fall out of this analysis, along with the costs involved and probable profit margins. This section will identify the main factors which contribute to the final cost of producing a housing unit. A numerical example of a financial analysis for a typical multifamily housing project on Vancouver’s West Side will then be presented which provides realistic current values for the various costs.

**Zoning and Density**

The crucial factor in the financial analysis is the Floor Space Ratio (FSR), the ratio of livable floor space in a building to the surface area of the lot, particularly in urban areas. This value is usually exclusive of parking, which is generally below grade in multifamily buildings in areas of high land value and at-grade where land prices are lower. Site layout, along with setbacks, height restrictions and other zoning requirements, may influence the number of “Square Feet Buildable” (SFB) calculation often used by developers, but FSR is usually the initial determinant of how much space in housing units is ultimately available for sale in a project.

Permitted uses for a site are also an important part of the zoning component. Restrictions on uses, such as commercial activities and secondary suites, influence the value of a property. In particular, units in mixed commercial/residential buildings are often less expensive than equivalent units in purely residential buildings.
Land costs

Land costs are based on factors such as the utility of a building site, as described above in bid-rent theory, the FSR and permitted uses. Within a given geographic area, the utility is often the same in terms of access to activity centres, neighbourhood amenities and other livability factors such as crime levels. This latter factor can be extremely important in major U.S. cities to the point where the relative value of land in suburban and urban areas can be the mirror image of similar locations in Canadian cities. Site specific influences such as high traffic levels and the presence of large parking lots, while potentially advantageous for commercial property, can act to lower residential property values substantially.

Homes in the Clover Valley Station subdivision in Surrey, to be examined later, have an average cost of around $100/SFB, whereas new condominium apartments on the West Side of Vancouver are currently selling from $260/SFB to $290/SFB. These costs are inclusive of any exterior space, which varies from a yard in the case of Clover Valley Station to a balcony, patio or no exterior space at all in the case of condominium units. Construction costs are clearly a relatively small proportion of the cost of development in an expensive city such as Vancouver.

Regional Land Price Variations

It is possible to construct a “contour map” of land prices per square foot for different types of land use in the region, where lines represent constant price. The “gradient” of the contour map indicates how quickly prices fall off, and the “peaks” represent the most expensive, and presumably desirable, places to live. The example below, for commercial property, shows that higher prices are generally concentrated near Vancouver’s CBD and drop off relatively quickly.

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124 Based on recent market analyses by author, described later.
125 From Graeme Wynn and Timothy Oke (eds.) Vancouver and its Region (Vancouver: UBC Press, 1992): p. 225, Figure 19, GVRD: Land Cost Gradients (in thousands of dollars per acre). Price data was measured at contour intersections with a straight line along the most gradual price gradient (between Vancouver CBD and North Delta) and converted to $/sq.ft and km units. Remarkably little data of this type is readily available, although it could be “reversed engineered” from a residual analysis of residential properties in different parts of the region.
The curve resembles a bell curve for a normal distribution, which displays the characteristics of exponentially decreasing land values, as is common in urban areas. The general form of this type of distribution can be represented as

$$\text{Price}_{\text{Distance}} = \text{Price}_{\text{max}} \times e^{-\text{Distance}^2/(2 \cdot \text{Sigma}^2)}$$

Where,
- $\text{Price}_{\text{Distance}}$ is the price per square foot buildable at a given distance from a central point (taken here as the CBD),
- $\text{Price}_{\text{max}}$ is the maximum price per square foot buildable,
- $\text{Distance}$ is the distance from the location of the maximum price,
- $\text{Sigma}$ is a distance on each side of the central point from which the area under the curve is approximately $2/3$ of the total area. In this case, it can be thought of conceptually as a measure of the spread of land prices as distance increases. If the distance is short, land prices are highly peaked and fall off rapidly further out from the CBD. If the distance is far, land prices are relatively flat and developing further from the CBD is less attractive.
Using a value of 12.5 km for \( \Sigma \), which represents the distance from Vancouver’s CBD to the Fraser River, provides a reasonable first approximation of the actual price distribution in the following figure.

![Land Price Distribution Model (Sigma=12.5 km)](image)

**Figure 7 - Normal Land Price Distribution Curve**

The plus and minus signs for distance scales are used here to represent two radial directions from Vancouver’s CBD. A value of 25 km for \( \Sigma \), which is approximately the distance from the CBD to the western border of Langley District, would represent the achievement of a more balanced distribution of land prices, particularly in regional core municipalities. If a constant total value for all land in the region is assumed, the maximum price of land would decrease from approximately $100/sq ft to near $60/sq ft. This would make the price of land in the regional core substantially lower while making the price of land in the outer suburbs moderately higher.
It could be said that this distribution would better reflect the value to a suburb of being part of a metropolitan region with superior infrastructure and economic opportunities. Overlooking such massive benefits may have led the mayor of Surrey to claim recently that regional land use and transportation planning has stifled development in his municipality. The fact that Surrey in its current form would likely not exist without the presence of Vancouver’s economic engine and provincially-financed transportation infrastructure was clearly discounted.

While the model presented was simplified somewhat, it again demonstrates the power of having analytical tools to monitor the prevailing land economic “micro-climates” within the region that drive residential development and housing prices. A better understanding of these trends would allow more proactive intervention in support of growth management.

*Construction Costs and DCCs*

The cost of construction can vary greatly, depending on the site, the type of construction, and the quality. Sites with poor drainage, concrete structures and high-quality finishes can add anywhere from $10/SFB to $50/SFB to the cost of housing. $55/SFB to $90/SFB is the normal range,
exclusive of parking facilities. These costs are usually broken down into “hard” costs and “soft” costs, reflecting items such as materials and labour or items such as management and fees.

Where the cost of most infrastructure for new developments was once paid for from general revenues, the current practice is to allocate these costs “up-front” to developers who then pass them on to new home owners. These are known as Development Cost Charges (DCCs) and have two components in the GVRD: the municipal DCCs which apply to amenities such as schools, libraries, and parks, and regional DCCs which cover services such as water and sewers. Total DCCs range from $10,000 to $15,000 and are generally charged by the unit or according to the unit type and size. If charged by the unit, a smaller apartment may face an additional cost of up to $20/SFB. It is interesting to note that the proposed City of Vancouver rate structure for new regional sewer DCCs charges a townhouse almost the same as a detached house and an apartment of any type or size would pay 2/3 of the DCC that a detached house would.\(^{126}\)

**Development and Building Standards**

Alternative Development Standards (ADS) are increasingly becoming examined as a way of bringing down the cost of housing. The most prominent standard is the amount of space required for road and lane right of ways, and consequently the amount of land that is available for housing within a property. Excessive minimum setbacks from streets will also limit the amount of land that is available for housing. Traditional Right Of Ways (ROW) can range up to 66’ (20m) or more for residential streets. Ratios of 30% or more of urban land dedicated to streets and lanes are not unusual in many municipalities. A reduction to 20% to 25% could result in a 10% to 15% reduction in land costs. The role of land savings of this magnitude was confirmed in a 1992 CMHC report.\(^{127}\) The District of North Vancouver has proposed a new regional standard as low as 13m and the City of Portland, Oregon has created “skinny” street standards in predominantly residential areas with only one travel lane and parking on one side of the street only.

\(^{126}\) City of Vancouver, Standing Committee on City Services and Budgets, “Regional Development Cost Charges,” Administrative Report, 12 September 1996.

\(^{127}\) IBI Group for CMHC, Canadian Homebuilders Association and the University of Western Ontario Achieving Infrastructure Efficiency (Ottawa: CMHC, 1992): p. 20.
The current practice of using separate space in utility trenches for water, sewer, electrical and gas under the street ROW requires extra land. The importance of integrating infrastructure for services could result in life cycle savings of over $10,000, according to CMHC.128

Another set of standards applies to building practices. In the City of Vancouver, for example, the additional cost of providing compulsory minimum levels of parking and sprinkler fire extinguisher systems adds $20,000-30,000 per built unit. For smaller units, these two requirements alone could add up to $30/SFB to the total cost of a unit.

A Financial Analysis for a Residential Development Project

The following analysis will provide a current example of how the costs of a residential project are reflected in the final price of a new unit offered to potential buyers. An understanding of the magnitude of the cost components will provide a context for some of the policy recommendations made later. The example applies to a recent mixed retail and apartment condominium project in the Kitsilano neighbourhood of Vancouver. This type of development being strongly promoted by Vancouver’s planning department as a favoured solution to complete communities and more affordable housing.129 The analytical principles used would apply to any residential project, whether apartment or ground-oriented. A profile of the types of buyers in this neighbourhood will be presented in the results section for comparison against the profile of buyers in new suburban subdivisions.

The site chosen for analysis is on West 4th Avenue in Vancouver, is zoned C2, and lies along a stretch of major arterial street which is undergoing an extensive development phase, in spite of

129 Condominium market data from MacDonald Realtors, Greystone Properties Limited, United Pacific Management Corporation, Intergulf Development Corporation (Kitsilano), Bonaventure Projects, Real Estate Board of Greater Vancouver, CMHC December 1996 New Housing Report. Local land value estimates from Prospero International Realty. Zoning and building requirements from City of Vancouver, “Zoning and Development By-law, C-2 District Schedule” and “Parking By-law No. 6059.” Construction estimates from Ledcor Industries, a prominent Vancouver construction firm.
increasingly heavy traffic volumes. The total lot size is approximately 8000 sq ft with a total FSR of 3.00. Some of the more important C2 zoning conditions to consider include:

- A maximum FSR of 2.5 can be applied for residential purposes.
- A height restriction of 43 feet exists, which could be relaxed due to the grade of the land.
- The first storey of the building to a depth of 10.7 metres, exclusive of entrances, must be used for non-residential purposes.
- A minimum requirement for one off-street parking stall is required for every 753 sq ft of gross floor area and a maximum of 2.2 stalls per unit.

The FSR is exclusive of:

- Parking stalls built at or below grade,
- Open balconies and decks to a maximum of 8% of residential floor area,
- Patios and roof gardens,
- Residential storage space above grade up to 40 sq ft per unit,
- Amenity areas such as day care, recreation facilities, and meeting rooms to a maximum of 10% of the total building floor area.

The bottom line, or the price of land per square foot marketable, would be much lower in a suburban area. The price of land per square foot marketable for condominiums in Kitsilano ($90-100/SFB) turns out to be comparable to the total price per square foot of a detached house and lot on the outskirts of Surrey.
### Site:

<table>
<thead>
<tr>
<th>Area</th>
<th>8330 sq.ft.</th>
</tr>
</thead>
</table>

### Residential/Commercial/Combined

<table>
<thead>
<tr>
<th>FSR</th>
<th>2.5</th>
<th>0.5</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross floor area</td>
<td>20825</td>
<td>4165</td>
<td>24990 sq.ft.</td>
</tr>
<tr>
<td>Marketable area ratio</td>
<td>85%</td>
<td>85%</td>
<td></td>
</tr>
<tr>
<td>Net marketable floor area</td>
<td>17701</td>
<td>3540</td>
<td>21242 sq.ft.</td>
</tr>
<tr>
<td>Parking stalls</td>
<td>36</td>
<td>0</td>
<td>36</td>
</tr>
</tbody>
</table>

### Revenue:

<table>
<thead>
<tr>
<th>Price</th>
<th>$250</th>
<th>$300</th>
<th>per sq.ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing/Commission</td>
<td>5.00%</td>
<td>5.00%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sales</th>
<th>$4,425,313</th>
<th>$1,062,075</th>
<th>$5,487,388</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing</td>
<td>-$221,266</td>
<td>-$53,104</td>
<td>-$274,369</td>
</tr>
<tr>
<td>Net Revenue</td>
<td>$4,204,047</td>
<td>$1,008,971</td>
<td>$5,213,018</td>
</tr>
</tbody>
</table>

### Costs:

<table>
<thead>
<tr>
<th>Annual interest rate</th>
<th>6.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term of loan</td>
<td>1 Years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hard costs (unit)</th>
<th>$75</th>
<th>65</th>
<th>per sq.ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking cost</td>
<td>$35</td>
<td>N/A</td>
<td>per sq.ft.</td>
</tr>
<tr>
<td>Parking space size</td>
<td>350</td>
<td>N/A</td>
<td>sq.ft.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soft costs (ratio)</th>
<th>20%</th>
<th>20%</th>
<th>of Hard Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit allowance</td>
<td>15%</td>
<td>15%</td>
<td>of Gross Costs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hard costs</th>
<th>$1,327,594</th>
<th>$230,116</th>
<th>$1,557,710</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft costs</td>
<td>$265,519</td>
<td>$46,023</td>
<td>$311,542</td>
</tr>
<tr>
<td>Parking costs</td>
<td>$441,000</td>
<td>$0</td>
<td>$441,000</td>
</tr>
<tr>
<td>Financing</td>
<td>$122,047</td>
<td>$16,568</td>
<td>$138,615</td>
</tr>
<tr>
<td>Profit</td>
<td>$630,607</td>
<td>$151,346</td>
<td>$781,953</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total costs (less land)</th>
<th>$3,230,820</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Residual available for land</th>
<th>$1,982,198</th>
</tr>
</thead>
</table>

| Price of land per square foot marketable | $93 |

Figure 9 - Financial Analysis of a Current Development Project
2.3.6 Location of Employment

Factors affecting the location of employment, while not the primary focus of the thesis, is nevertheless closely related to the location of housing and the demand for transportation infrastructure. If employment in the region was locating in greater numbers sufficiently close to affordable housing, there would be little need for a thesis which investigates mechanisms for providing affordable housing closer to employment.

Earlier models of land economics focused theory on a dense CBD at or near a transportation and goods distribution node. The CBD was surrounded by commercial and residential areas. Vancouver was certainly no exception to this historical model. The city nucleated around the transportation nodes of the port and the terminus of the transcontinental railway. Most people walked to work or took an early, horse-drawn version of a trolley. The horses were replaced near the turn of the century by electric streetcars, and housing patterns changed as “streetcar suburbs” along the radial arms of the streetcar network were formed. Most people still lived within walking distance of the streetcar, and their work destinations were to the CBD or the commercial districts that lined the streetcar routes. Goods were mostly moved by horse drawn wagons and congestion could be a significant problem, as many old photographs of major downtown areas throughout North America show.

With the advent of motorized goods movement in North America, business patterns changed dramatically. No longer tied to locations close to the CBD or rail lines, many businesses chose locations that traded off land prices with accessibility for customers and workers. Until after the Second World War, worker mobility was quite limited, as private automobiles were not common. Starting in the 1950s, accessibility problems for customers and workers were effectively removed

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as barriers to the location of business, and the current paradigm of business location theory began. The effects have been dramatic, particularly in the U.S. where many CBDs have been dismantled and reverted to dysfunctional inner cities surrounded by suburban business parks.

During the 1980s, metropolitan planners began experimenting with the concept of promoting regional town centres around a central regional core in order to promote distributed growth and provide employment closer to residential areas. Metro Toronto and the GVRD were notable supporters of the concept, which contributed greatly to the urban form currently observed in these two regions.\textsuperscript{132} Vancouver’s CBD as late as 1981 has been described as “classic pole model of an agglomeration economy,” as confirmed by a survey of companies that showed 71% of corporate respondents citing “Proximity to Business Contacts” as the main reason for locating in the CBD while “Labour Force Accessibility” was important to only 33% of the respondents.\textsuperscript{133} Suburban corporate centres were seen to be more viable in the U.S. due to the existence of an extensive, federally-funded freeway system in that country.

The demographics of the Vancouver workplace in the early 1980s is worth noting, with highly-paid executives and management personnel being almost exclusively men while lowly-paid support staff were predominantly women. A 1985 study of the location decisions of two CBD head offices, BC Hydro’s decision to remain in the CBD and BC Tel’s decision to move to Burnaby, shows that one of the greatest social benefits of BC Tel’s move was to cut employee travel time by over 1/3, and by over 2/5 for the support staff, who found it difficult to afford living near the CBD.\textsuperscript{134} Employee surveys of the two companies, performed several years after the BC Tel move, showed that BC Hydro’s employee residences were distributed throughout the region while BC Tel’s employees were concentrated in the area immediately surrounding the new head office. The same survey showed that employee satisfaction with the workplace was most


directly related to commuting time, with BC Hydro employees who lived in the West End and walked to work showing the greatest satisfaction with their workplace location. It should be noted that Burnaby’s housing prices were much lower in the early 1980s and the observed results of the relocation might have been substantially different if it had been made in 1996.

A 1995 study in the San Francisco Bay Area concluded that the majority of factors most influential in the locational decisions of larger employers were not dependent on market forces, but were shaped by public policy: including housing costs, land costs, travel times and operating costs.135 “Pull” factors were considered to be generally more important than “push” factors. Of 17 possible push-pull factors, the top pull factors that drew businesses to new locations were:

- Cost and suitability of land and space;
- Availability of professional and skilled labour;
- Image/prestige of location;
- Transportation/commuting time;
- Local attitudes towards business.

Unfortunately, transportation and commuting time were not disaggregated in the study, so it is not clear whether respondents were mostly concerned about the time that their workers needed to get to work or the business cost of moving goods.136 It could be implied from the concern over availability of labour that establishing in a location that was more accessible for available professional and skilled labour was an important factor. The most important “push” factors driving businesses from their current locations were:

- Cost and suitability of land and space;
- Local attitudes towards business;

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136 In. Thomas Hutton The Transformation of Canada’s Pacific Metropolis: A Study of Vancouver (Montreal: Institute for Research on Public Policy, 1997): Chapter 5, “Structural Change and the Post-Industrial City-Region: Implications of the Vancouver Experience,” indicates that post-industrial cities are increasingly competing with each other to attract highly skilled workers with amenities and a high quality of life.
• Housing costs;
• Transportation/commuting time.

The most important common factor is, not surprisingly, the cost and suitability of land and space, an element over which local governments have ultimate control. Transportation/commuting time and local attitudes towards business are also common factors. Of particular note is that housing costs are a significant “push” factor, which could again be linked to concerns over the availability of labour. The City of San Francisco has housing prices of the same order of magnitude as those in the City of Vancouver, with an average detached house price of $316,073 (U.S.) and a median price of $294,800 in 1990. One of the major concerns of U.S. businesses locating in suburban business parks is the shortage of lower-income labour due to difficulties in accessing these locations by those without cars who are forced by economic reasons to live in inner-city areas.

Comprehensive empirical data on the distribution of various types of employment, and the income profile of employees working within municipalities, is limited. Most census data which includes personal and household information is focused on the “night time population,” i.e., where people reside not where they work. There is little recent information, other than qualitative observations, of the trends in GVRD employer locations or of the factors that influence their decisions. A 1995 GVRD publication on the subject provided an estimate of employment distribution by Standard Industrial Classification (SIC) code, based on extrapolating responses received from a survey of employers in the region. It would be very interesting to correlate this information with various indicators to determine empirically what influenced the location of these employers. Perhaps the most simple proxy to measure the attractiveness of an area to business, the ratio of available employment to employed residents presented later in the section on growth trends, shows that the residential location of the region’s labour pool is irrelevant to the majority of GVRD employers.

138 G. Thomas Kingsley and Margery Austin Turner Housing Markets and Residential Mobility Washington: The Urban Institute Press, 1993) contains a number of essays about this problem. “Antipoverty Strategy Where the Rubber Meets the Road: Transporting Workers to Jobs,” by Mark Alan Hughes, discusses the problems which many American employers encounter in attracting lower-income workers to the suburbs.
139 GVRD, Strategic Planning Department Estimation of the 1994 Spatial Distribution of Employment in Greater Vancouver: Methodology and Results (July 1995).
2.3.7 Summary

Households and businesses, either consciously or unconsciously, are constantly making tradeoffs in their location decisions in order to maximize the utility of a property or unit. Neighbourhood, costs, and proximity to amenities are three of the most common factors considered. These tradeoffs are reflected in the price that developers are willing to pay for land at any given location and the distance that workers are willing to travel to access employment, services and other needs. Most employers do not appear be basing their location decisions primarily on either the absolute cost of a location or the residential location of the region's workforce.

The price and supply of housing units is dictated predominantly by the cost of land, which is strongly influenced by market demand and the supply of appropriately zoned and serviced land. In Vancouver, the price of land is very high near employment concentrations and drops off gradually towards residential suburbs. The land price gradient can be mapped by calculating probable land prices using a residual analysis. Development and regulatory costs, including DCCs and building standards, can contribute significantly to the final cost of new housing units.

A considerable number of publications feature complex mathematical models of bid-rent theories. Nevertheless, surprisingly little empirical work appears to have been carried out to determine the many subtle interrelationships present or the strength of the various determinants involved in locational decisions. Housing prices vary highly according to local and regional conditions and directly influence household location decisions, which then influence travel habits.

"If you improve a piece of highway, you almost always get a short-term reduction in congestion, but you also get a long-term increase in traffic volume and in congestion, because people take into account and reevaluate their location decisions with respect to their place of work and their place of residence."

...Stephen Putnam, Professor of City and RegionalPlanning and Director, Urban Simulation Laboratory, University of Pennsylvania

2.4 Growth Management Policies

2.4.1 De Facto Policies

Since 1973, the Agricultural Land Reserve has borne the brunt of the responsibility for growth management in the Lower Mainland. The ALR was followed in 1994 by the Forest Land Reserve (FLR), which is playing an increasingly significant role in limiting urban sprawl, particularly in the North Shore subarea and on the southeast coast of Vancouver Island. While it has been said that the ALR was intended primarily as a measure to protect farms, the entity that farms were being protected from was primarily urban sprawl. Hence the roles of the ALR and an Oregon-style Urban Growth Boundary (UGB) can be thought of as similar. Unfortunately, the ALR does not include the many low-density, semi-rural throughout the region in critical growth areas such as Surrey, Langley, District, Pitt Meadows and Maple Ridge. Large inventories of cheap land for residential construction are available in all of these places as a result, providing "footholds" for further development in the Fraser Valley.

Although the integrity of the ALR has remained essentially intact since 1973, development pressures have increasingly infringed on farming activities at the edges. In addition to attempts to use the ALR for such dubious purposes such as golf courses and greenhouses, there have been requests to withdraw land considered as "non-prime" for low-density development, which have largely been denied. The Promontory subdivision and proposed Ryder Lake projects in the District of Chilliwack are good examples of where the Ministry of Agriculture has recommended release of ALR land to protect prime Fraser Valley "bottom" farmland.

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141 Agricultural Land Commission (ALC) Vice Chair Julie Glover, speaking at the UBC School of Community and Regional Planning in March, 1997.
142 Province of British Columbia, Agricultural Land Commission ALC Annual Report: April 1, 1995-March 31 1996 (1996): p. 10, indicates that while the overall amount of land in the ALR has remained constant, 11,500 acres of prime farmland has been removed and replaced predominantly with farmland classified as second class.
143 From discussions in March, 1996, with Bill Weismueller, Chilliwack District, Ministry of Agriculture, recorded in Mark Allison, Jennifer Keesmaat, Edward Kozak "Growth Management in the District of Chilliwack," UBC School of Community and Regional Planning, Project Report, April 1996.
The anti-planning legacy of the Social Credit government in the 1980s is still felt,\textsuperscript{144} when the planning role of regional districts was eliminated and the Municipal Act was modified to replace planning guidelines with a new sections under the title of “Management of Development.”\textsuperscript{145} Many municipal planning departments in B.C. continue to use the name “Development Services.”

As will be discussed in the sections on transportation and land use policy, the province often appears to fuel low-density growth on the fringe of the region by financing transportation infrastructure projects which support suburban lifestyles and long-distance commuting.

2.4.2 Official Policies

The 1995 Growth Strategies Statutes Amendment Act (GSA) sought to establish regional growth management strategies and ensure conformity between regional and local policies to promote development that is “socially, economically and environmentally healthy and that makes efficient use of public facilities and services, land and other resources.”\textsuperscript{146} The statute officially restored the strategic planning function of regional districts, which had been removed during the early 1980s by the provincial government. The GVRD, acting unofficially with the consensus of its member municipalities, initiated the “Creating Our Future” regional planning exercise in the 1980s which eventually led to the Livable Region Strategy (LRS), the province’s first Regional Growth Strategy. The GSA outlines the following land use, housing and transportation concerns that should be addressed in a Regional Growth Strategy:\textsuperscript{147}

- “\textit{Avoiding urban sprawl and ensuring that development takes place where adequate facilities exist or can be provided in a timely, economic and efficient manner;}"
- “\textit{Settlement patterns that minimize the use of automobiles and encourage walking, bicycling, and the efficient use of public transit;}"

\textsuperscript{144} Strategic Planning Department, GVRD \textit{The History, Status and Prospects of Regional Planning in Greater Vancouver} (July 1994): p. 4.
\textsuperscript{145} Province of British Columbia, Municipal Act, Part 19.
\textsuperscript{146} GSA Section 942.11(1).
\textsuperscript{147} GSA Section 942.11(2).
• The efficient movement of goods and people while making effective use of transportation and utility corridors;
• Protecting environmentally sensitive areas;
• Maintaining the integrity of a secure and productive resource base, including the agricultural and forest land reserves;
• Reducing and preventing air, land and water pollution;
• Adequate, affordable, and appropriate housing;
• Adequate inventories of suitable land and resources for future settlement;
• Protecting the quality and quantity of ground water and surface water;
• Settlement patterns that minimize the risks associated with natural hazards;
• Preserving, creating, and linking urban and rural open space including parks and recreation areas;
• Planning for energy supplies and promoting efficient use, conservation and alternative forms of energy."

The first three items presented deal directly with urban sprawl and transportation issues, while many of the remaining items deal directly or indirectly with these issues as well as “settlement patterns” and housing.

The GSA mandates a broad consultative process and strongly supports a consensus based approach to conflict resolution.148 Once approved by member municipalities and adopted by the board of a regional district, the GSA requires that the Official Community Plans (OCPs) of municipalities within a regional district include a Regional Context Statement which aligns their policies with the Regional Growth Strategy. The process for adoption and implementation of a strategy is highly consensual, with complex arbitration procedures, which has been cited as a potential flaw of the legislation.149 In general, all neighbouring municipalities and the board of the

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148 GSA additions to the Municipal Act Sections 942.2 through 942.24 deal with the dispute resolution mechanism.
149 Artibise, Alan (Professor, School of Community and Regional Planning, UBC) “Our new regional plan needs a plan - to police planners & politicians”, Vancouver Sun, 09 November 1995

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regional district must approve of a municipality’s Regional Context Statement before it may come into effect. The GVRD board has set a deadline of February 1998 for the preparation of Regional Context Statements consistent with the LRS.

The Municipal Act, through wording describing the OCP as “a general statement of the broad objectives” of a community, invites municipalities to avoid the statement of clear, ascertainable goals. The GSA reinforces this lack of clear direction by stating that Regional Growth Strategies “should work towards” sustainable settlement patterns and that OCPs need only “be made consistent over time” with Regional Growth Strategies. Courts in BC have taken the stand that zoning bylaws must clearly contradict an OCP before they can be quashed, which in practice means that overly general OCPs may not ensure that community and regional growth management goals will be honoured. Municipalities and regional districts that produce Regional Growth Strategies and Regional Context Statements that are not clear or ascertainable make it difficult for their neighbours to counter the negative effects of poor settlement patterns in a timely manner.

Although the following example, a short excerpt from Oregon’s Statewide Planning Goal 10 Guidelines (Housing), relates to a subject area covered in the later section on housing policies, it demonstrates the level of the specificity that is lacking in B.C.’s GSA.

“Provide for the housing needs of the state. Buildable lands for residential use shall be inventoried and plans shall encourage the availability of adequate numbers of housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density.”

In contrast, B.C.’s GSA states simply that “adequate, affordable, and appropriate housing” as “a matter that should be dealt with” in Regional Growth Strategies. Oregon’s LCDC provided an

150 B.C. Municipal Act, Section 945.
151 See, for example, Rogers versus Saanich, BC Municipal and Planning Law Reports, Volume 22.
152 State of Oregon, Department of Land Conservation and Development Oregon’s Statewide Planning Goals and Guidelines, 1995 Edition (1995). The LCDC has the power to revise these goals and guidelines. Eight new goals have been added since Senate Bill 100 took effect in 1973.
expanded clarification of the statewide planning goal on housing to require that each community within a region consider the broader housing needs of the region to arrive at a fair allocation of housing types (i.e., single family versus multifamily housing). Based on this LCDC clarification, Portland’s Metropolitan Housing Rule then required local plans to:

- "Provide adequate land zoned for needed housing types;
- Ensure that land within the Metropolitan Portland (Metro) urban growth boundary may accommodate the region's projected population growth;
- Provide greater certainty to the development process; and
- Reduce housing costs."

The Housing Rule also requires that at least half of all new residential construction in Metro Portland be multi-family housing and specifies minimum housing densities. The LCDC ensures that the letter as well as the spirit of the law are observed by regional and local governments in their plans. The result of this more ascertainable and quantifiable approach to the goals of growth management has been dramatically increased the number of multi-family units, increased affordability and the achievement of density targets.153

As will be seen in the section on housing policies, B.C. has given municipalities a number of tools in the Municipal Act for the provision of more affordable housing, such as density bonusing and density transfer, but these powers are entirely discretionary and have not been widely applied.

“There is an awareness of the need to manage “growth” but only the power to manage development is actually exercised. Growth itself is almost unmanageable.”

...Urban Policy Analyst

Under the GSA, the GVRD can ensure that member municipalities include a Regional Context Statement in their OCPs which conform to the LRS. The legislation is in its infancy and the mechanics of such coordination and arbitration can lead to compromises.

The OCP prepared in 1996 for UBC’s unincorporated University Endowment Lands (UEL) was the first test case for reviewing a Regional Context Statement’s conformance to the GVRD’s LRS. The OCP called for a large proportion of high-end market condominiums to be built near the City of Vancouver’s western boundary with a fairly traditional transportation plan. The city, which holds a large number of seats on the regional district board, feared increased traffic levels and was strongly opposed to the OCP. The GVRD board subsequently rejected the OCP, setting much higher requirements for providing affordable housing geared to people working and studying on campus (50%) and mandating a comprehensive transportation plan to reduce current traffic levels. While this show of resolve by the regional board was commendable, it is not clear that the OCPs of more powerful municipalities in the region will be treated in a similar manner. In particular, it will be of considerable interest to see if the City of Vancouver, with the nation’s highest real estate costs for a major city, and a large surplus of jobs over housing, will include targets for sufficient suitable and affordable housing to accommodate a high percentage of those employed in the city in its Regional Context Statement.

In the GSA, the province specifically rejected the concept of an arms-length provincial planning review body such as the Ontario Municipal Board (OMB) or Oregon’s Land Conservation and Development Commission (LCDC) to ensure that a Regional Growth Strategies and Regional Context Statements follow the spirit of the GSA. Dispute resolution is focussed on resolving disagreements between municipalities within a regional district, not in ensuring conformance with provincial goals. Theoretically, if the Minister of Municipal Affairs and Housing ordered the directors of a regional district experiencing runaway growth to prepare a Regional Growth Strategy, and the board approved a strategy that said “nothing is required,” the minister would be

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unable to intervene. The GSA would first need to be amended or policy guidelines regarding the strategy development process or content would need to be mandated, as the GSA currently allows. Such policy guidelines are generally not enforceable, whereas regulations would be. In any event, no policy guidelines are currently written.

It is also worth noting that, although regional districts and their member municipalities must abide by the terms of a Regional Growth Strategy, the province itself is not bound to respect it. The GSA does provide for the formation of an intergovernmental advisory committee to coordinate the actions of local and provincial governments in the area of growth management, but the advisory committee was given no statutory powers.\textsuperscript{156} A relevant example of unilateral provincial action came in September 1996 when MoTH declared that the minimum occupancy of vehicles using newly opened HOV lanes on the Barnet-Hastings “People Mover” project would be set at two, contrary to the GVRD policy requiring three or more occupants.\textsuperscript{157} Automobile traffic on this corridor increased 50\% within one year of operation as a result of the increased capacity.\textsuperscript{158} Similarly, the province has invested over $200 million dollars in the “West Coast Express” commuter rail project to the North Fraser Valley bedroom communities of Pitt Meadows, Maple Ridge and Mission in 1995, infrastructure which had been criticized by the GVRD.\textsuperscript{159}

\textsuperscript{156} GSA, Sections 942.29 “Intergovernmental advisory committees” and 942.3 “Implementation agreements.”
\textsuperscript{157} GVRD/MoTH Transport 2021: Medium Range Plan for Greater Vancouver (October 1993): pp. 45-47.
\textsuperscript{158} Glenn Bohn “Barnet Highway traffic climbs, but moves faster,” \textit{Vancouver Sun}, 31 March 1997.
\textsuperscript{159} Ibid. pp. 55-57.
2.5 Land Use and Transportation Policies

Transportation and land use policies at many levels of government impact the Lower Mainland and exert a strong influence on urban form, the locational decisions of households and the choice in transportation mode made by individuals. The level of coordination between the various levels of government, and indeed within levels of government, has historically ranged between minimal and low, although there have been recent signs of increased cooperation.

2.5.1 De Facto Policies

A review of the land use and transportation decisions that have been made in B.C. results in two clear observations:

- A form of laissez-faire economics, operating within a myriad of restrictive building regulations and zoning bylaws, is the basis for municipal land use policies;
- Private automobiles and commercial airlines, supported by highly subsidized infrastructure, are the basis for transportation policies.

The survey of key stakeholders was unanimous in citing high land prices as a result of low density zoning as the major cause of the high housing prices leading to urban sprawl. Nevertheless, there is a near-universal resistance to increased density from members of the community, regardless of the municipality. Municipalities with a surplus of businesses and high density apartments are reluctant to alter these land use patterns, in part due to their contributions to cross-subsidizing property taxes in Single Family Detached home (SFD) areas. Vancouver is a notable example where high density multi-family development is restricted primarily to the dense downtown core,

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160 The GVRD and the Province signed an agreement in May 1997 to undertake a review of transportation funding and governance.
released industrial lands and major arterial streets. Meanwhile, 30% of the population lives in the 70% of the city reserved for SFDs and enjoys low property taxes.\footnote{From 1997 municipal property tax reports, Vancouver, with an exceptionally high level of services, is in the middle range of GVRD municipalities for absolute property taxes, but has by far the lowest rate if based on assessed value.}

Although almost every official policy refers vaguely to the need for a “mix” of land uses and housing types, municipal planners can be reluctant to cooperate when attempts are made to implement new uses.\footnote{Frances Bula “Developer to quit future projects in city, blaming over-regulation,” \textit{Vancouver Sun}, 31 July 1997.} A glance at a regional zoning map shows that land uses are highly segregated between commercial and residential uses and that potential locations for mixed use development are limited.\footnote{GVRD Strategic Planning Department \textit{Greater Vancouver Land Use Map} (1996) and \textit{Greater Vancouver Economic Development Opportunities Map} (1995) provide an excellent overview of zoning and land use patterns throughout the region.} Affordable housing is generally equated with social housing, and there are no serious initiatives in the region aimed at providing a continuum of housing types and prices that provide reasonable housing options for people working within the community.

Concerning transportation, in an estimate generally considered to be conservative, the GVRD estimates that every automobile on the road, with an average occupancy of only 1.12, was subsidized by over $2600 in 1993. If transit passengers were subsidized at this level, the government would be paying each passenger approximately $600 per year instead of requiring the equivalent of $600 per year for monthly transit passes. Provincial government policy is to keep insurance rates low, in part by having part-time “recreation” drivers cross-subsidize full-time commuting drivers.\footnote{Glenn Bohn “$300-million loss anticipated this year, ICBC reports,” \textit{Vancouver Sun}, 21 March 1997.} Most municipal zoning bylaws require that ample minimum parking levels for most foreseeable occasions is available at all destinations.

Although most policies stress that walking, cycling, and transit are to be given priority over private automobiles, transportation budgets overwhelmingly support the provision of street capacity for general purpose traffic. Design standards for streets and buildings, such as street widths and parking requirements, continue to focus on the automobile. Pedestrians are forbidden
from crossing at dozens of high-traffic intersections throughout the City of Vancouver. Off-peak transit service and transit outside of major destinations is limited and only a minority of bus stops are equipped with a bench or shelter. As an automobile is required in many parts of the region for trips other than the commute to work, and the fixed costs of driving are much larger than the operating costs, few are inspired to incur the expense of both car ownership and transit fares.

"Affordable housing is an extremely important issue. One of the biggest obstacles that I face in encouraging the use of more sustainable transportation modes has to do with the argument that people feel they "must" move to the distant suburbs in order to find affordable housing."

...TDM Specialist

2.5.2 Federal Policies

The U.S., through support for the interstate highway system and legislation such as the Integrated Surface Transportation Efficiency Act (ISTEA, pronounced "ice tea"), has a direct role in transportation in urban areas. The deduction of mortgage interest from income for tax purposes in the U.S. can be seen as a massive subsidy to promote suburban home ownership. In contrast, Canadian federal policies are rarely seen as having an impact on land use or transportation. Nevertheless, federal tax regulations and policies that support the air and road modes while gradually eliminating support for the rail mode have had several significant impacts on local land use and transportation.

Firstly, long-distance travel has become increasingly more convenient by combining car and airplane trips than by combining public transit and bus or rail trips. While air navigation services have until quite recently been provided for nominal fees, passenger rail service and subsidies have been systematically eliminated.\footnote{Recently privatized, the air navigation company "NavCan" will receive the new, taxpayer financed Canadian Automated Air Traffic Control System (CAATS) for a small payment.} Many airports and railway stations have been relocated to places where cheaper land was available, regardless of accessibility considerations. The choices
of Mirabel and Pickering as second airport sites for Montréal and Toronto are perhaps the most spectacular and costly examples to date. As the federal government provided no support for rapid transit to these sites, including Vancouver, many are poorly served by public transit and have become almost entirely automobile dependent.\textsuperscript{166} International bus and train passengers face considerable delays at the border due to thorough customs inspections, and the frequency of service to most secondary destinations from airports or train stations is minimal.\textsuperscript{167}

Secondly, the trucking industry, through strong lobbying, has succeeded in achieving a massive expansion of the road network while only paying a fraction of the taxes required to repair the damage that trucks inflict on the roads.\textsuperscript{168} Due to the heavy subsidies that the trucking industry receives, and the federal requirement that railways pay the full cost of government provided services, transport companies have increasingly shifted their shipments from rail to road. As there are few practical ways to force trucks and cars to use separate facilities, the additional capacity needed to support efficient goods movement by truck has been made available for cars as well.

The onslaught of additional trucks in urban areas has caused a dramatic decrease in the quality of life in many residential neighbourhoods. Major truck routes in Vancouver, such as the Knight Street/Clark Drive corridor and Hastings Street, have become highly undesirable places to live. Rental vacancies in the East Hastings area are four times of those in other parts of the city and rents are only two thirds of the city-wide average.\textsuperscript{169}

Thirdly, federal taxation policies contribute to low-density land use and automobile dependence. Employers can deduct the cost of providing free parking to their employees and customers, while

\textsuperscript{166} See Vancouver International Airport Authority 1995-2015 Draft Master Plan (July 1995): Chapter 9, Ground Transportation. With 4,100 parking spots currently available, Vancouver’s new airport facilities will include 3600 additional parking spots and no new transit facilities. The only public transit access to the airport currently is the #100 bus which runs at 30 minute intervals in peak periods.

\textsuperscript{167} There is currently one train per day between Seattle and Vancouver. The train departs Vancouver in the early evening, reaching Seattle after 2300. The return train leaves Seattle at 0700. Travel time is approximately five hours, compared to two hours by car and 45 minutes by airplane. Passengers arriving in Vancouver can stand for up to an hour in a lineup at Canada Customs with their luggage.


the provision of transit passes or credits to employees for walking and cycling are considered to be taxable benefits. Public transit and support for alternative transportation modes were excluded from eligibility in the shared-cost infrastructure programs initiated after the 1993 federal election, while spending on roads and sewers was encouraged. The effect of federal policies are subtle, but can strongly influence the levelness of the land use and transportation “playing fields.”

2.5.3 Provincial Policies

The B.C. Transportation Finance Authority (BCTFA), as the primary funding agency for major transportation projects in the province, coordinated two major transportation programs with far reaching implications on the Lower Mainland since 1995, “Going Places” and BC Transit’s Ten-Year Development Plan. These are transportation policies with a high land use content.

**Going Places: Transportation for British Columbians**

The “Going Places” document embodies the BC government’s current policy on transportation. The role of transportation in the province is stated as:

- Provide people with access to goods, services, jobs, and recreation;
- Maintain the competitiveness of industries;
- Promote economic growth;
- Shape growth patterns and land use;
- Improve air quality and the overall quality of life.

Note that land use, livability and environmental concerns all appear after mobility and economic concerns, perhaps reflecting the fact that a large number of constituencies in the province are far

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170 B.C. Premier Glen Clark negotiated the first exception to the program’s scope in April 1997, to allow federal funds to be used for planning work on the future Broadway-Lougheed LRT line.

171 Province of British Columbia, Transportation Finance Authority *Going Places: Transportation for British Columbians* (September 1995).
removed from major urban centres and are relatively unconcerned about issues such as sprawl, congestion, pollution and housing affordability. A number of elements in the policy relate specifically to transportation in the Lower Mainland. Some of which have already been introduced. Specifically, the policy calls for:

- Initiation of commuter rail in the Fraser Valley;
- The creation of an HOV network through construction of additional lanes;
- Expansion of BC Transit service (see next section), including the construction of an LRT line following the Broadway/Lougheed corridor from Vancouver to Port Coquitlam;
- The relief of congestion on inter-regional routes;
- A limited bicycle infrastructure program, with costs shared 50/50 with municipalities;
- Coordination of land use with transportation infrastructure,\(^{172}\)
- New road capacity for movement of people and goods.

Many of these initiatives reflect those contained in the regional Transport 2021 plans discussed later. Coordination with land use is again near the bottom of the list. There are some notable differences from the region’s policies that have important impacts on growth management:

- The Broadway - Lougheed corridor is to be the initial LRT corridor constructed instead of the New Westminster - Coquitlam corridor. This decision will substantially delay the introduction of rapid transit needed to shape growth patterns in the fast-growing Northeast Sector;
- Commuter rail from the Vancouver CBD to Mission was fast-tracked, with no stops provided in the regional core, at an initial capital cost of $180 million. The Livable Region Strategy sought minimal growth in the North Fraser subarea. Only 6000 regular passengers are accommodated, each of the five trains makes a single, two-hour return trip per day and the service reported an operating loss of over $30 million in 1996-97, the first year of operation;

\(^{172}\) Blair Redlin, President and CEO of the TFA, in an address to UBC School of Community and Regional Planning students in the Transportation Planning course on 28 November 1995, stated that there would be no LRT development until municipalities along proposed corridors adopt zoning bylaws compatible with the Growth Strategies Act, as embodied in the GVRD’s Livable Region Strategy.
• Emphasis on improving road system performance, reducing congestion, and expanding capacity over the discouragement of automobile use through financial "sticks." No new tolls, taxes or plans to tie insurance premiums to distances traveled have been announced;
• Pollution concerns are addressed primarily by stricter emission controls on new vehicles,\textsuperscript{173} as opposed to aggressively promoting shifts to alternative modes;
• Construction of additional roadway capacity for HOV lanes on major regional routes instead of re-allocating of existing roadway capacity;\textsuperscript{174}
• Addition of new HOV lanes to proceed before RapidBus service available to regional centres.

\begin{quote}
"What do we do with sterile, land gobbling single family house subdivisions in Maple Ridge, Mission, Langley and Abbotsford? We put in West Coast Express and HOV lanes along the 401 that all of us as taxpayers must finance in order to subsidize the unsustainable, which ironically, will now actually encourage more of the same - since more people will now see it as feasible to live out there and work in the City."\textsuperscript{...Government MLA}
\end{quote}

The policy does reaffirm the commitment to coordinated land use through cooperation with local governments, but neither the details of the mechanisms to be used to achieve this goal, nor a timeline to have these mechanisms in place, have been provided.

\textit{BC Transit 10 Year Development Plan}

BC Transit's development plan was developed in conjunction with Going Places to provide more detailed information on transit's future role. Improved transit is cited throughout official policy documents as the priority alternative transportation mode and has been identified as the only mode that can realistically support desired land use patterns and to challenge the automobile in the short- and medium-term time frame.\textsuperscript{175} The LRT component has the most important long-term

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\textsuperscript{173} California-style emission controls were announced in December 1995 by Moe Sihota, BC Environment Minister.
\textsuperscript{174} GVRD/MoTH Transport 2021: A Long-range Transportation Plan for Greater Vancouver (September 1993): "High-occupancy vehicle (HOV) and bus priorities," p. 33.
\textsuperscript{175} Assistant City Engineer Peter Judd, the head of Vancouver's Transportation Planning Project, responded to a city councillor's request during hearings on the plan from a Vancouver to outline all of the alternatives to reduce car use stated: "There is simply no alternative to better transit service."
\end{flushright}
role to play in the shaping of regional land use, and has resulted in two major background reports. The plan has three main goals:

- Increase the number and proportion of people who use public transit;
- Shape urban growth and help reduce sprawl;
- Ensure people are well served by transit, especially those who do not drive.

The plan stresses that future success is dependent on improvements to the road infrastructure for transit vehicles and the provision of new LRT lines within ten years. It is expected that bus priority measures such as HOV lanes on major arterials and queue jumper lanes at major bottlenecks such as bridgeheads will be constructed, which is consistent with Going Places and the GVRD’s Transport 2021 plans. Simple technological improvements, such as bus activated traffic signals and improved schedule and route information services, are also to be provided, although details are not available. The simplest measure of all, legislated priority for buses merging back into traffic after picking up passengers, used in many jurisdictions for over a decade, is described as an “innovative measure.”

While overall ridership appears to have stabilized at 130 million (+/- 5 million) revenue passengers, it has not kept pace with population growth, with per capita rider ridership decreasing 12% in the period between 1986-1991. It is difficult to identify a single factor, although car ownership, significantly decreased overall urban density, and a reduction in provincial transit subsidies have contributed to the decline. The Ten-Year Development Plan forecasts an increase of over five million revenue passengers during each year of the plan, which is slightly above the rate of increase in the overall population. It should be noted that the addition of new

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178 BC Transit In Transit: A Ten-Year Development Plan (Fall 1995).
179 Vancouver’s Transportation Plan, approved in May 1997, made the assertion that there were no additional locations in the city that would benefit from bus-only lanes for at least the next six years.
road capacity for HOVs on several major congested commuter routes and reduced air pollution concerns due to tighter emission controls may have a significant impact on the ability of BC transit to attract new riders before new LRT routes are in service well into the next century.\textsuperscript{182}

\textit{Multiple Account Evaluation of Provincial Transportation Investments}

The BCTFA has established three basic principles that should applied when policy is formulated:\textsuperscript{183}

- Make better use of existing facilities and manage demand better in order to reduce the need for new facilities;
- Be more strategic in the investments made in transportation infrastructure to ensure that the high priority projects are undertaken in the most effective way;
- Be more innovative in the way facilities and services are provided in order to reduce costs to users and taxpayers.

The BCTFA has required all major new transportation projects undergo a evaluation according to the province’s Multiple Account Evaluation Guidelines, presumably with these three principles in mind.\textsuperscript{184} MoTH staff have confided that this requirement has often been deferred until after a final decision on a project was already made. The guidelines are intended to ensure that non-monetary factors, the “accounts,” are considered equally in the decision-making process. As stated earlier, the method previously employed was a modified cost-benefit analysis, which considered the major benefit to be time savings for drivers and the major non-monetary cost to be social equity. The guidelines are intended to provide a framework to aid governments in the systematic identification and evaluation of the social, environmental and economic impacts of alternative courses of action. Examples of “accounts” used for evaluation for the LRT system included: \textsuperscript{185}

\begin{flushright}
\textsuperscript{182} Glenn Bohn, “Tough low-emission standards unveiled for new cars”, Vancouver Sun, 08 December 1995.
\textsuperscript{183} Province of British Columbia, Transportation Finance Authority 94/95 Annual Report (1995).
\textsuperscript{185} Province of British Columbia, Crown Corporations Secretariat Multiple Account Evaluation of Rapid Transit Options in Greater Vancouver (May 1995).
\end{flushright}
• **Financial.** Net Present Value of costs and revenues using an 8% discount rate.

• **Customer service.** Ridership increases and time savings.

• **Environment.** Air pollution and other benefits from reduced car use.

• **Urban development.** Contributions to regional land use goals.

Some of the criteria developed to evaluate these accounts appear to be highly qualitative and subjective. In particular, the “urban development” account used to justify LRT on the Broadway-Lougheed corridor over alternatives such as RapidBus on the Richmond corridor, seems to be little more than a guesstimate. Nevertheless, as experience with the guidelines increases within various government ministries, and policy analysts become more familiar with the environment and urban development accounts, better land use and transportation coordination may result.

2.5.4 Regional Policies

As indicated previously, Regional Growth Strategies should address transportation related issues such as the avoidance of urban sprawl, encouragement of walking and cycling, promotion of land use patterns that minimize the need for automobile use, economic development, efficient movement of goods and people, provision of affordable housing, and energy conservation. The LRS has several basic high level goals, all of which are directed at containing urban sprawl:

• **Protect the green zone.** There is a strong desire to preserve the Agricultural Land Reserve (ALR) and to protect existing natural areas and park land.

• **Build complete communities.** Provide mixed land-use to provide work, living, shopping, and recreation possibilities within a community.

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186 Ibid. p. 15. RapidBus, for example was given a “0% probability” of generating adequate development, although this technology is the basis of the transit system in Ottawa, Ontario and was used to create the highly compact form of Curitiba, Brasil. Curitiba has the same population as Vancouver and has been often been cited as one of the best examples in the world of compact, transit oriented development. See Jonas Rabinovitch and Josef Leitman “Urban Planning in Curitiba,” *Scientific American*, March 1996: pp. 46-53.
• Achieve a compact metropolitan region. Develop a network of regional town centres instead of a single metropolitan core.

• Increase transportation choice. Reduce the dependence on the private automobile by increasing opportunities to walk, cycle, or take transit.

Transportation and land use are seen as key factors for the achievement of these policies. The land use and transportation goals and objectives of the GVRD and MoTH for the Lower Mainland, which influenced the development of Transport 2021 and the LRS, were based on the principles of Creating Our Future, including:¹⁸⁷

• Livability. Minimize the impact of transport on the quality of life;

• Economic Development. Ensure that transportation systems support and promote desirable regional social and economic development;

• Land Development Interaction. Ensure that transportation systems are compatible with, and promote, regional development plans;

• Social Equity. Ensure the equitable distribution of transportation services and costs.

The LRS specifically calls for significant changes in the projected population and the numbers of jobs in several key subareas. Transportation infrastructure and zoning are seen as the major policy levers. For example, Surrey and the Northeast Sector are expected to increase their population growth rate and dramatically increase their job rate. The South Region and the Langley’s are expected to decrease their population growth rate and increase their job rate. While the urgency of these two factors is underlined, there is unfortunately no indication as to how land is to be released for affordable housing closer to employment or how employers are to be enticed to create jobs into the outer suburban areas.

LRS studies were careful to state that the relationships between transportation infrastructure and land use shaping effects are not fully understood. Nevertheless, the necessity of coordinating land use and transportation emerges throughout GVRD planning documents. The reports recommend that transportation investments should be prioritized in favour of those projects most likely to result in desired land use patterns, in particular those that will create a compact urban form, although there is little elaboration of which methods should be applied to determine this.

Transport 2021 was a jointly funded project between the GVRD and MOTH. The project’s mandate was to recommend a comprehensive series of transportation plans for the GVRD in support of the LRS. All of the GVRD’s member municipalities had direct input into the development of transportation policies. The results of the project were the Interim Improvements Plan (to 1995), the Medium-range Plan (to 2006), and the Long-range Plan (to 2021). All the plans seek a modest increase in the modal share of transit, while increasing occupancy rates of the automobile and decreasing the need to travel through strategic investments.

*Transport 2021 Interim Improvements*

Items in the short term plan were intended to fill the gap until the medium-range plan provisions came into effect. The criteria for selected improvements were:

- No negative impact on long range land use goals;
- Consistency with modal priority goals, i.e., transit, HOV, and then mixed use;
- Enhance system safety, reliability, and continuity.

It would appear that the emphasis of these interim construction projects was on the “continuity” criteria. The financial expenditures on increased road capacity in the last two years will almost

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188 There does seem to be an enormous body of knowledge, however. A simple search of the UBC library catalogue for the keywords “transportation” and “land use” results in 81 references, most directly related to the land use shaping effects of transportation.
certainly fuel residential growth in the Fraser Valley and reduce the ability of providing alternative modes to compete, particularly transit. Selected construction projects included widening of the Mary Hill Bypass in Coquitlam and the Barnet Highway in Burnaby and Port Moody, adding counterflow lanes on the Pitt River Bridge connecting the North Fraser subarea to the regional core and the removal of the last controlled intersection on the Trans Canada highway between Hope and Horseshoe Bay in North Vancouver.190

**Transport 2021 Medium-range Plan**

Due to the considerable uncertainties in forecasting long-range system requirements over a thirty year time period,191 particularly with available transportation models, the medium-range plan appears to be the focus of the Transport 2021 study. The base year for comparison was 1991, and the plan is oriented to the period 1995-2006. As the medium-range plan covers most components of the long-range plan, the major common elements of both plans are outlined here:

- **Growth Management Using Transport to Shape Growth:**
  - Make transportation investments which encourage inner suburbs;
  - Coordinate land use and transportation. One should not lead the other;
  - Withhold capital investments until appropriate local land use policies are in effect;
  - Expand the mechanism of partnership agreements between levels of government.

- **Transportation Demand Management.** The report stresses the importance of public education before the implementation of any measure seen to be a “stick”, e.g., taxes and tolls. Preferred TDM measures include:
  - Promote telecommuting;
  - Establish employer programs to reduce work trips by automobile;
  - Give transit priority in traffic;
  - Increase parking fees;

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• Increase fuel taxes;
• Introduce toll on bridges.

**Improved transit:**
• Basic transit improvements;
• Provide transit priority at approaches to water crossings;
• Provide transit priority measures on roadways;
• Provide Intermediate Capacity Transit Systems (ICTS, or LRT);\(^\text{192}\)

**HOV network development.** The report calls for the provision of HOV lanes, not necessarily the construction of new lanes. Alternatives suggested include the conversion of existing lanes or preferential access to some highways by HOVs.

**Improved mixed use roadways.** The report emphasizes that improvements are needed to accommodate the movement of people and goods, but recognizes that some unspecified mechanism is needed to deter long haul commuting along these routes.

The report recognizes the financial difficulty of implementing all recommended LRT corridors simultaneously. One significant factor is the debt remaining from the SkyTrain system.\(^\text{193}\) As a result, it is accepted that implementation of system components will be phased in, which was shown in the theory section of land use and transportation interaction to be of limited value.

The report also recognizes that there are conflicting objectives that must be weighed. If transport efficiency was the priority, the report recommends that the Richmond-Vancouver corridor proceed first. If land use shaping was the priority, the New Westminster-Coquitlam corridor was recommended. If funding for two routes was available, it was recommended that both the Richmond - Vancouver and New Westminster-Coquitlam LRT be constructed.

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\(^{192}\) LRT can be a segregated ROW, at-grade (on-street), or Automated (ALRT) service with a capacity up to 10,000 passengers per hour.

Commuter rail is mentioned, but not considered to be a priority component. The plan notes that transit already has a high share of the modal split along the Vancouver - Mission corridor, that it does not promote intensified land use along the route, and that it is relatively costly for the limited function it provides. The major advantages seen were support from the public and a relatively short lead time, which has proven to be the case since the service started in November 1995, less than a year after the decision to proceed with the project was announced.

*Transport 2021 Long-range Plan*

The long-range plan appears to be a minor extension of the medium-range plan. Elements introduced in the medium-range plan are elaborated, such as the full implementation of TDM measures, HOV lanes, LRT corridors, and mixed, higher-density land uses. One TDM measure that is stressed is the need to send clearer price signals to users. A “pay-as-you-drive” insurance system is cited as a specific recommendation.

The plan also elaborates on the promotion of walking and cycling. These also received consideration in an associated technical report with parallel policy recommendations. The report provides examples of bicycle modal shares in North American and European cities far higher than those in Vancouver, and notes that there is considerable potential for increasing the catchment area of transit by the provision of bicycle parking at transit stations. The policy

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195 David Smith “Mission train service puts developers on fast track”, *Vancouver Sun*, 09 December 1995. Article describes a residential building boom in Maple Ridge and Mission, and how several Vancouver businesses, including city hall, are considering shuttle buses for train users.
198 In a 1991 brief to the Toronto Transit Commission, the Toronto City Cycling committee demonstrated that 90% of the residents of the city were within a ten minute bike ride of a subway station. After years of lobbying TTC staff, the Commission passed a resolution to immediately install of bicycle parking at all stations.
recommendation related to cyclists and pedestrians was that new and re-developed urban activity centres should be designed to provide nearby housing and safe routes for walking and cycling.

2.5.5 Municipal Policies

At the receiving end of the many higher level policies is local land use and street networks, two jurisdictions which are predominantly under municipal control. It would be difficult to concisely summarize the land use and transportation policies of more than twenty municipalities in the GVRD. As a proxy, the transportation and land use policies at two geographic and philosophical extremes will be compared, the City of Vancouver and Langley District.

Table 3 - Comparison of Vancouver and Langley District

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Vancouver</th>
<th>Langley District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>Medium to High</td>
<td>Low</td>
</tr>
<tr>
<td>Housing prices</td>
<td>Very high</td>
<td>Low to Medium</td>
</tr>
<tr>
<td>Population</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Buildable Land</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Employment</td>
<td>Surplus of Jobs</td>
<td>Deficiency of Jobs</td>
</tr>
<tr>
<td>Form</td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>Employment base</td>
<td>Services, Transportation</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Transit Use</td>
<td>Medium</td>
<td>Very low</td>
</tr>
<tr>
<td>Auto ownership</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Growth Rate</td>
<td>Low to Medium</td>
<td>Very high</td>
</tr>
</tbody>
</table>

Source: Author's observations.

Vancouver’s high level policy document is CityPlan and Langley’s policies are embodied in its Growth Management Plan, both dating from 1995.
Vancouver

In CityPlan, the city reaffirms its intention to remain the region’s major employment centre while at the same time protecting the predominantly single family nature of the city’s residential neighbourhoods from unwanted development.

The primary policy direction related to a jobs-housing balance is “encourage continued job growth at a rate that helps balance the number of jobs in the city with the number of workers who live here.” Theoretically, this should mean a drastic reduction in the number of new businesses allowed, since 50% more people now come to work in Vancouver than there are workers who live in the city. CityPlan actually calls for a significant increase in the total number of jobs, which would appear to invalidate the goal of balancing jobs and housing. The emphasis is on white collar jobs and, with the exception of port activities, new industry is primarily focussed on activities which are “city-serving.” It is interesting to note that the plan’s authors seemed unaware that the city still had significant numbers of residents who were not in white collar or service sector jobs.

CityPlan promotes the concept of higher-density, mixed-use neighbourhood centres, which appear to be quite linear and focussed along major arterial streets. Many of the city’s residential areas currently have no commercial areas nearby, which inhibits walking or cycling for basic goods and services while promoting car use. The “carrot” to entice neighbourhoods to accept this concept is the ability for current residents, both children becoming adults and workers entering retirement, to stay in their neighbourhoods throughout the life-cycle. Paradoxically, this is to be accomplished without imposing on the SFD character of existing neighbourhoods. The plan also supports the city’s responsibility to absorb “a portion” of the region’s projected growth.

199 Planning Department, City of Vancouver CityPlan: Directions for Vancouver (1995).
200 Ibid. p. 30.
201 Ibid. p. 31, “Many blue collar workers still live in the city and CityPlan seeks to maintain a range of employment opportunities for all workers.”
202 Ibid. p. 13 “New housing in neighbourhood centres best meets the changing needs of current residents while preserving most of the city’s single-family neighbourhoods.”
Relative wording such as "more," "less," and "some" figures highly in the policies intended to promote a mix of housing types, instead of absolute wording such as "adequate."  

- "Subsidized housing will provide homes for some low and moderate income individuals and families;"  
- Private developers will be encouraged or required to provide some less costly market housing;"  
- Regulating demolitions and strata conversion to preserve some rental housing;"  
- Allowing secondary suites to provide more affordable homes in some areas."

The policy falls far short of a commitment to provide a range of affordable housing types based on the incomes of those working in the city. In a sense, the city has guaranteed that the polarization of income classes and housing types while commuter traffic, particularly in the south and east sides of the city, will continue to grow. A "luck of the draw" approach seems to apply to affordable housing, whereby a limited amount of social housing will be made available to whoever is needy enough or fortunate enough to find it. The long lineups to view rental apartments in many parts of the city at the start of each month would indicate that those being able to find suitable, affordable rental accommodation may be in the minority.

Although Vancouver's land use and transportation policies are considered by many to be progressive, many shortcomings are evident when they are compared to every day decisions by council and staff. Practically no ground-oriented or cooperative housing has been built in the city since the 1980s while the number of new condominium apartments in the city outpaced all other regional housing starts combined.  

Pedestrians are increasingly forbidden from crossing at major intersections, presumably for their own safety, instead of providing better crossing facilities and enforcement. Council abandoned a bike lane to the downtown core 1996 after only one week as a result of public and media pressure, although initial traffic delays disappeared after several days and significant numbers of new cyclists were observed. The vast majority of the city's bus

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203 Ibid. p. 22.  
204 See later research findings section on housing trends.
stops do not have even a basic shelter to protect passengers against the elements, presumably due to budget shortages, while millions of dollars are spent each year for street widening, computerized traffic signals and left turn bays.

District of Langley

Many of Langley District’s land use and transportation policies could be used to write a textbook on cutting edge sustainable urban design for the 1990s.\textsuperscript{205}

- *A community should include a well-planned mix of land uses to provide a full range of housing types, employment, educational and recreational opportunities and the range of goods and services that people need for daily living;*
- *A community should include a mix of housing types, including a variety of housing densities, tenures and prices to meet the needs of all members of the community;*
- *A community should be designed around a central node, with the highest density of commercial and residential development in the centre to encourage walking and transit use;*
- *Each community and neighbourhood should be designed to be efficient and convenient for a variety of transportation modes;*
- *A community should provide a balance between jobs and housing;*
- *A community should be well-linked to other communities and to larger centres in the region by transit and walking and cycling links."

Unfortunately, the most fleeting visit to the District of Langley indicates that the last thing in anyone’s mind at the moment is to produce a mixed-use community with a balance of jobs and housing, a variety of housing types or an urban form based on any transportation mode other than the private automobile. Single family houses, strip commercial development and isolated public amenities continue to be the rule. Traffic on Highway One leading to the regional core from Langley’s residential communities is now bumper to bumper for many kilometers on every

\textsuperscript{205} District of Langley, Growth and Planning Commission Growth Management: Conclusions and Recommendations (November 1995).
working day. The most recent and flagrant contradiction to the district’s growth management policies came in May 1997, when the District council announced that it no longer supported the principle of phased development to promote complete communities, and will start to allow development anywhere outside of properties within the Agricultural Land Reserve.

2.5.6 Summary

Current land use and transportation policies affecting the Lower Mainland have a remarkably consistent veneer. It often seems that municipal, state/province or national land use policies could be picked up randomly from a library shelf for any jurisdiction in North America and the policy statements would be practically identical. In an interesting parallel to being Politically Correct, governments in the 1990s seem to feel a strong need to appear Planning Correct, at least in policy documents. Their common policies could be fairly paraphrased in the single statement “we will work towards providing a higher-density mix of land uses in complete, compact communities with jobs, affordable housing and transportation alternatives available for all local residents.” Beneath the surface, a long legacy of market economics, professional planning attitudes and established engineering practices is embedded in restrictive zoning bylaws, outdated building codes and a dogmatic adherence to long-established administrative procedures. These act to reinforce the status quo and prevent innovative land uses, alternative development standards or human-scaled transportation modes from being implemented.

In closing, it should be noted there has been a number of attempts to coordinate land use and transportation planning in the GVRD, particularly near stations along the SkyTrain ALRT route. Burnaby’s Metrotown is often cited as the best example in the region. Higher density zoning, the proximity to a pleasant parkland, access to Metrotown or Patterson SkyTrain stations and a mix of jobs and housing have drawn a great deal of development to this location. Unfortunately, with 10,000 free parking spaces available to visitors, the area around the Metrotown complex forms one of the region’s most formidable barriers to pedestrians and cyclists with only 15% of users arriving by transit. Three of Surrey’s four SkyTrain stations are surrounded by large expanses of
at-grade parking lots which service nearby malls and shopping centres. It would appear that planners, engineers and decision makers at the provincial, regional and municipal levels still have a steep learning curve ahead of them before being sufficiently fluent in the concepts of effective land use and transportation coordination.

"The automobile enjoys huge subsidies and governments continue to make decisions around development without the full knowledge of the costs that the automobile has on society as a whole."

...Transit Planner
2.6 Housing Policies

Although Canadian housing policy this century could never be described as stable, it could currently be described as being in a complete state of flux. The federal government is negotiating with the provinces to hand over jurisdiction for most housing programs. As an example of the results of this instability, housing cooperatives established under section 96 of the federal National Housing Act (NHA) are finding that the Canadian Mortgage and Housing Corporation (CMHC), eager to off-load responsibility for housing cooperatives, is reluctant to provide financing for necessary repairs and renovations. At the municipal level, funding to construct non-market housing in the City of Vancouver has been essentially eliminated during the last two council terms. "Bonusing" schemes, where density increases and the relaxation of requirements are exchanged for social housing and community amenities in new projects, are increasingly being relied upon as a primary policy tool.

Numerous policies and programs under a myriad of agencies and departments impact housing in some way. For example, the provision of transportation infrastructure by the province, including SkyTrain, commuter rail, and freeways, could be thought of as a housing subsidy for those who commute to far-away jobs from cheaper housing. The identification of these highly interrelated policies could easily fill another thesis. As a result, the following sections will focus only on the major housing policies and policy instruments related to the provision of affordable housing by the various levels of government. Housing policy, as it affects neighbourhoods and communities in the GVRD, is a juxtaposition of federal, provincial, regional district, and municipal government policies and programs. The policy instruments at the local level have the most direct impact on housing and can vary widely between neighbouring municipalities.206

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206 For more detailed information on recent developments in local housing policy in B.C., see Hayley S. Britton Decentralization and Local Innovation: The Role of British Columbia's Municipalities in Affordable Housing Policies (UBC School of Community and Regional Planning, Masters Thesis, 1995) or Hayley S. Britton Decentralization and Municipal Housing Policy in British Columbia (UBC Centre for Human Settlements, Policy Issues and Planning Responses Working Paper P18, January 1996), which is a shorter summary of the key points contained in the thesis.
2.6.1 De Facto Policies

It could be argued that there is no overall housing policy in effect at the moment. To be more accurate, there is no comprehensive set of policies that attempts to provide sufficient amounts of affordable, suitable housing in forms that promote sustainability. Those policies that do exist could be classified as: token financial incentives, removal of some existing regulatory barriers, or off-loading of the cost of providing new affordable housing units progressively from the federal level onto buyers of other new units.

Financial incentives include:

- Federal policies allowing pension funds to be used for down payments and decreasing down payments to 5%. These may have stimulated the construction industry, but did so by depleting individual pension savings and encouraging larger monthly mortgage payments by households.
- Provincial policies of removing the property transfer tax for first-time homeowners and large homeowners grants. Ironically, with fewer young households being able to own their homes, the homeowner grant is increasingly acting as a subsidy from general revenues paid by all provincial taxpayers to a dimishing proportion of long-time homeowners.
- The City of Vancouver policy of requiring developers to provide 20% of space in major new projects for non-market, primarily social, housing units. Intended to provide “free land” for affordable housing, usually in the form of airspace parcels, the physical construction of the units is dependent on dwindling funding from the provincial government. This has resulted in negligible amounts of new affordable housing for the “core-needy,” while the policy has not been extended to assist other lower-income groups with affordable housing.

Regulatory barriers include:

- Exclusionary zoning such as low FSRs, limitations on permitted uses, and height restrictions;
- Costly building codes such as sprinkler systems and excessive minimum parking standards;
• Requirement that new developments to pay up front the full costs of both infrastructure and community services. These had been provided without cost in earlier developments and were usually paid for by municipal bonds financed through general revenues.

The lack of a political agenda for a housing policy backed by adequate funding and effective programs means that the de facto policy is to allow the price of housing to be governed by local resistance to development and basic supply-and-demand principles. This lack of political will to take direct action has been reflected in official statements. Exclusionary zoning practices in established municipalities serving as employment centres hampers the achievement of regional housing policy through limiting essential density increases. In this environment, land economics dictates that new affordable housing will be located in cheaper, low-density outer suburban municipalities with development-friendly councils. This statement is not intended to be an indictment of the development industry. Developers, as in any other business, seek to maximize their profits within a set of established rules, which they will obviously try to influence in their favour. The rules are ultimately defined by government policy, which is theoretically guided by the need to promote the greater public interest, which is not always in the interest of a particular sector of the economy or all individuals.

Outside of a considerable federal support for the comprehensive monitoring of housing indicators, particularly for new housing market, housing strategy in Canada is a patchwork of disjointed initiatives with little coordination. As the following table shows, de facto housing policy is being shaped indirectly by a number of policies developed by various mandates.

\[207\] For example, CMHC Habitat II - The Canadian National Report (1996), Introduction, states “Canada will stress the importance of the private marketplace in meeting the housing needs of most people. A key role of government is to implement measures to influence and facilitate the effective operation of the market.” The Province of BC has a similar hands-off approach, stating in Province of British Columbia, Ministry of Municipal Affairs, Recreation and Housing Affordable Housing Builds Strong Communities (1993) that “The intent (of provincial housing policies) is to allow each community to respond, in its own way, reflecting local conditions and points of view.” This latter statement would appear to legitimize NIMBY attitudes and exclusionary zoning practices.

\[208\] Chairs of CMHC are often prominent bankers and developers, which may explain the agency’s historical interest in collecting new housing data. While this data was previously made available to the development industry at no charge, CMHC is moving quickly to a cost-recovery, subscriber-based system for market reports.
### Table 4 - Examples of Indirect Housing Policies

<table>
<thead>
<tr>
<th>Level</th>
<th>Department</th>
<th>Program</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>Public Works</td>
<td>Infrastructure</td>
<td>Incentives to build new roads, sewers, water lines.</td>
</tr>
<tr>
<td></td>
<td>National Revenue</td>
<td>RRSP mortgage withdrawal exemption, CMHC insurance with 5% down payment.</td>
<td>Encourages high ratio mortgages with increased exposure to interest rate fluctuations.</td>
</tr>
<tr>
<td>Provincial</td>
<td>MoTH</td>
<td>Going Places (HOV lanes, commuter rail)</td>
<td>Provides subsidized access to cheap land in outer suburbs for residential sites.</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>BC Environmental Assessment Act</td>
<td>Excludes major urban developments and streets from impact analysis.</td>
</tr>
<tr>
<td>Regional</td>
<td>Development Services</td>
<td>Flat Rate DCCs</td>
<td>Increases attractiveness of large lots.</td>
</tr>
<tr>
<td></td>
<td>Strategic Planning</td>
<td>Livable Region Strategy</td>
<td>Growth earmarked for areas with severe jobs:housing imbalances and poor access.</td>
</tr>
<tr>
<td>Municipal</td>
<td>Planning</td>
<td>Land use zoning, permitted uses</td>
<td>Exclusionary zoning puts single family housing out of reach of most households in central locations.</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>Parking standards, building codes</td>
<td>Stringent sprinkler system requirements in new buildings and mandatory parking adds thousands of dollars to housing prices.</td>
</tr>
</tbody>
</table>
Official housing policy statements at the local level, as were required in OCPs by Bill 20 (1992), are liberally sprinkled with enigmatic expressions such as “provide a choice,” “ensure a balance,” and “establish a mix” followed by the expression “of housing opportunities.” These expressions appear to be carefully crafted to avoid the need to establish ascertainable criteria against which housing objectives could be evaluated, leading to the laissez-faire environment discussed earlier. An example of an ascertainable criteria would be: “a stock of housing shall be maintained which satisfies the needs of households whose primary income earner is employed locally, in terms of size, amenities, access, and affordability.” Few planning departments in North America would dare to propose such a change to their community plan at the current time.

2.6.2 Federal Policies

Canada has been a major player in United Nations housing initiatives and sponsored the first UN Conference on Human Settlements in 1976 (Habitat I). At the Habitat II conference held in Istanbul during June 1996, Canada reaffirmed that decent housing was a basic human right as opposed to simply a marketable commodity.209

While not directly a federal jurisdiction under the Canadian constitution, the federal government has acquired varying degrees of responsibility for housing during this century. The Halifax Harbour explosion during the First World War has been cited as the stimulus for federal involvement in housing programs.210 At the request of the provinces and the general public, the federal government created a program under the auspices of the War Measures Act to provide some replacement housing for that which was destroyed by the blast. Although only a modest contribution, it was the foothold for increased federal involvement in housing.

209 CMHC Habitat II - The Canadian National Report (1996): Introduction. The two themes of the Canadian policy framework are “sustainable human settlements development in an urbanizing world and adequate shelter for all.”

This initial step was followed by the Dominion Housing Act (1937) and the first National Housing Act (1938) which created CMHC's predecessor, the Central Mortgage Bank. The legislation also defined programs to support federal policy of using new construction as a stimulus for the stagnant national economy. The National Housing Act (NHA) was updated in 1944 to prepare for housing returning veterans and in 1949 a landmark agreement was reached between the federal and provincial governments to share the cost of joint housing programs 75%:25%. The 1954 version of the NHA has set the tone for subsequent federal housing policy, with the CMHC becoming the crown corporation responsible for insuring mortgages and supporting national housing policies.

Throughout the 1960s and early 1970s, with the construction of single family detached homes decreasing, CMHC became more involved in funding for urban renewal projects, social housing, and non-profit groups such as housing cooperatives. The creation of the Minister of State for Urban Affairs (MSUA) in 1971 clearly demonstrated the federal government's interest in municipalities. MSUA was dissolved in 1978, due in part to provincial concerns that the federal government had over-stepped its constitutional authority. In the late 1970s and 1980s, federal policy moved towards using fiscal incentives such as tax breaks for Multiple Unit Residential Buildings (MURBs) which intended to address shortages in the supply of rental units in urban areas and the Registered Home Ownership Savings Plan (RHOSP) tax deduction to encourage first-time home owners to save money for an initial down payment. Most federal financial incentives have been eliminated, with the exceptions of revenue neutral measures such as reducing the minimum down payment on insured mortgages to 5% and allowing RRSP contributions to be borrowed as a down payment on a first home. Since 1993, CMHC has withdrawn from all non-profit housing programs whose costs were previously shared with provincial governments, although it still maintains a role in mortgage insurance and provides considerable research support for the building industry and local governments.
2.6.3 Provincial Policies

"In the view of the commission, there is no question that the greatly varying cost of land is the most significant factor affecting the creation and price of housing. The one thing that the province could do to affect the price of housing is to ensure a plentiful supply of land."

...Report of the Provincial Commission on Housing Options (1992)

The BC provincial government has delegated most jurisdiction over local issues to municipalities, entities created under the Municipal Act. Although not formally expressed, the underlying provincial policy since the early 1990s has been to off-load jurisdiction for affordable and social housing as well, albeit without commensurate funding. Provincial infrastructure grants to municipalities have recently been reduced and attempts have been made to transfer responsibility for a number of provincial highways in urban areas to municipalities. This financial support may not appear to be directly related to housing policy. Nevertheless, the growing requirement for suburban municipalities to pay a larger share of the full costs of infrastructure internalizes onto municipalities development costs that were previously externalized. This could lead to increased reluctance to approve remote subdivisions that burden municipal infrastructure resources.

A provincial commission undertook a major review of housing policy in the early 1990s, citing many of the arguments for the need for change that are presented in this thesis, including the social impacts on families and low-income individuals, the environmental impacts of continued sprawl and the economic impacts of high land prices on the construction industry. The limited powers of the Municipal Act before the 1990s have been identified as a barrier to the provision of affordable housing by municipalities. The commission’s categorical conclusion was that the price of land, due to regulatory restrictions at the municipal level, was the main cause of high housing prices in the province’s metropolitan areas. Many of the review’s recommendations that applied to affordable family housing were implemented in the form of Municipal Act amendments.

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which granted new land use powers and required OCP changes in the form of Bill 20 (1992), Bill 57 (1993), and Bill 31 (1994).

Under these provisions, the Minister of Municipal Affairs and Housing can impel a municipality to determine projected population and housing needs in its OCP and to state how these needs will be accommodated. The essential definition of “needs” was not provided, i.e., which needs are to be accommodated: those of the region, those of existing residents, or those of households who would like to become residents? To the author’s knowledge, no municipality has ever been required by the Minister of Municipal Affairs and Housing or the Inspector of Municipalities to justify any of its housing projections or its policies to accommodate anticipated housing needs. Zoning bylaws created by a municipality, such as those which change density or permitted uses, must conform to the general policies of any existing OCP. This ensures that provincial housing policies will eventually be implemented mechanism, at least in theory, in the same way that bylaws conforming to OCP Regional Context Statements are intended to implement the province’s other growth management policies.

Bill 20 (1992) requires that OCPs include “housing policies of the local government respecting affordable housing, and special needs housing.” Bill 57 (1993) authorizes a municipality to enter into negotiations with developers to grant density bonuses and other favourable zoning changes in exchange for the provision of affordable housing and other amenities needed by the community. Bill 31 (1994) allows municipalities greater powers to protect the stock of rental housing through protecting existing rental buildings from demolition and permitting the enactment of bylaws to establish minimum maintenance standards on these buildings. The City of Vancouver has similar jurisdiction through the city’s enabling legislation, the Vancouver Charter.

After several years of experience with these initiatives, the province issued a five point strategy for Affordable Housing in 1996, three of which are directly related to home ownership:213

213 BC Ministry of Municipal Affairs and Housing British Columbia’s Strategy for Affordable Housing (April 1996).
• **Build Partnerships to Broaden Participation.** This appears to be simply an information gathering and distribution exercise. The focus is on telling stakeholders, other than the province, what they can do to help make housing more affordable.

• **Reduce Land Costs.** The cornerstones of this initiative are to allow public land to be made available at below market value for housing and to enable municipalities to negotiate with developers to exchange density for affordable housing and community amenities.

• **Increase Affordable Ownership.** This is a collection of minor initiatives, such as streamlining administrative procedures, reviewing development standards and providing limited financial assistance for first-time buyers.

The strategy sends the clear message to housing stakeholders that the province intends to play only the role of facilitator, leaving ultimate responsibility for the implementation of affordable housing policies in the hands of regional districts, municipalities and market forces.

2.6.4 Regional Policies

The GSA enables the development of Regional Growth Strategies that will provide housing for projected future populations in a sustainable manner. It is stipulated that this housing should be “adequate, affordable, and appropriate.” Besides establishing voluntary targets for population and employment, the LRS’s specific housing policies call for the GVRD Board to:

“**Seek, through partnerships:**

• *A better balance in jobs and labour force location throughout the region;*

• *A diversity of housing types, tenures, and costs, in each part of the region in balance with job distribution;*

• *The identification of further opportunities for the location of ground-oriented housing;*

• *Achievement of adequate population and employment densities in centres and transportation corridors to support planned transit services.*”
While the GSA and LRS establish high level growth management goals, general, high-level statements such as these demonstrate the urgent need in B.C. for a set of clear, ascertainable growth management guidelines and fixed targets to guide the development and evaluation of OCP Regional Context Statements. An independent, arms-length review board, such as Oregon’s LCDC, would help to interpret and ensure uniform application of these guidelines.

2.6.5 Municipal Policies

As in the Transportation and Land Use Policy section, housing policies for the regional extremes of the City of Vancouver and the District of Langley will be compared as a proxy for the range of municipal housing policies in the GVRD.

City of Vancouver

Under the Neighbourhood Housing Variety section of CityPlan, the general direction is to “increase neighbourhood housing variety throughout the city, especially in neighbourhood centres.” Specific directions related to housing affordability include:

- “Continue to provide new housing near downtown jobs and ensure this housing is suitable for different ages and incomes;
- Add more housing to single-family neighbourhoods in new forms.”

Under the Addressing Housing Costs section of CityPlan, the general direction is to:

“increase the supply of subsidized and lower cost housing throughout the city through the use of senior government programs, private sector incentives, and City regulations and subsidies.”
Specific directions related to affordability include:

- "Maintain or increase the ratio of subsidized housing to market housing as the city grows;
- Use incentives to encourage the private sector to provide lower cost housing, or require a percentage of new units to be more affordable;
- Support actions to increase the housing supply, helping to minimize price increases due to scarcity."

It should be noted briefly that a large variety of policy instruments are being used at the local level to promote affordable housing around the country. These programs take advantage of municipal jurisdiction in areas such as general land use policy, regulation (zoning and standards), joint partnerships, land banks, financing, taxation, and information distribution. Specific regional examples from the City of Vancouver include the release of portions of the city's land bank resources for housing cooperatives, the expansion of areas currently zoned as single-family to two-family or multi-family zones to reduce land costs, and the "20% Rule" inspired by Bill 57 (1993). From reviewing these initiatives, it becomes clear that the wheel has been reinvented many times, sometimes in neighbouring municipalities, which cannot be very efficient.

Under Vancouver's 20% Rule, a minimum of 20% of the units in major new projects requiring rezoning must be designated for non-profit (core-need) housing, half of which must be designated for families. Vancouver's city council reserves the right to substitute other affordable housing types and target groups for specific sites with respect to housing need, neighbourhood mix, amenities, and services. If necessary, Vancouver will consider "pay-in-lieu" for the site to be used to support non-market housing in other locations, which allows the developer to build market value units in the place of the non-market units and return a share of the additional profits to the city. The policy has not yet been applied to affordable housing for other than core-needy income

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215 City of Vancouver, Housing Department The State of Social Housing in Vancouver (Vancouver, 1993).
groups, which has led to an income polarization in recently completed projects, which reflects the growing income polarization being observed on a city-wide basis.

**Percent Change in Population by Income Category (1981-1991)**

<table>
<thead>
<tr>
<th>Household Income</th>
<th>CMA</th>
<th>Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td>under $10,000</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>$10,000-$19,999</td>
<td>40.0%</td>
<td>60.0%</td>
</tr>
<tr>
<td>$20,000-$29,999</td>
<td>80.0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>$30,000-$39,999</td>
<td>80.0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>$40,000-$49,999</td>
<td>80.0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>$50,000-$59,999</td>
<td>80.0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>$60,000-$69,999</td>
<td>80.0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>over $70,000</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Lower and Upper Classes are becoming polarized, especially in Vancouver.

Vancouver's Middle Class is disappearing!

Source: Statistics Canada

Figure 10 - Income Class Polarization in Vancouver and the CMA

The 1991 Central Area Plan is more direct than CityPlan concerning the importance of housing in meeting overall land use goals, the relationship between land use, transportation and housing and the appropriate policy direction for housing.216

"Objective: Increase the amount of housing and create new neighbourhoods for a range of households, to add people and activity and to reduce the need to commute from outside the central area.

**Significance:** ...Housing plays a transportation role. Providing more opportunities to live close to the region’s largest employment concentration means fewer demands for major transportation facilities to take people to work from homes in the suburbs.”

The Central Area Plan, although progressive in many ways, does indicate that the transportation role of housing is subservient to a less commendable, NIMBY-serving, objective: to relieve the development pressures that are “threatening existing stable neighbourhoods.”

**District of Langley**

The District’s 1995 policy on housing is as generic as one could possibly imagine:  

“Includef a mix of housing types, including a variety of housing densities (single family detached lots of various sizes, townhouses, apartments), a variety of tenures (fee simple, strata title, rental) and mixed forms such as secondary rental suites in houses to provide a wide variety and price of units to meet the needs of all members of the community.”

The only other significant references to housing in the growth management policy is in the context of the need to keep development costs low through flexible design standards and to base developments around community centres and elementary school catchment areas. This last point is of interest in this research in that it implicitly assumes that new development will be focused on family households with young children, as opposed to a wide range of ages. On the contrary, Vancouver’s policies seems to make no special provision for children in new housing and appears to be focused on couples, families with older children, and seniors.

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217 Growth and Planning Commission, District of Langley Growth Management: Conclusions and Recommendations (November 1995)
2.6.6 Summary

Housing policies at the federal and provincial levels have become increasingly irrelevant, due to a lack of real funding and an unwillingness to get involved in local land use decisions. Affordable housing is generally considered to mean social housing. Housing “assistance” for the middle class has been interpreted as relaxing conditions on access to personal pension savings for down payments and mortgage insurance for high ratio mortgages at the federal level combined with “homeowner grants” at the provincial level. Regional and municipal policies for affordable housing, primarily in the form of social housing, depend on small and dwindling funding from higher levels of government. Generic statements of principles (i.e., provide a mix of housing types with a variety of costs and tenures, etc.) form the basis for municipal policies with few hard numbers for targets and few comprehensive programs to back up policy statements.

The impacts of these housing policies, or lack thereof, on emerging family households seeking affordable housing in the GVRD will now be examined empirically.

"Governments should intervene less, in the sense of giving people more flexibility to use land at greater densities."

...Housing Analyst
2.7 Summary of Applicable Literature, Theory and Policies

The preceding sections on applicable literature, theory and policies have brought together the most applicable elements of planning practices related to the effects of land use, transportation and housing on the achievement of regional growth management. The many close interactions between these policy areas were highlighted.

Approaches to growth management in Cascadia were compared to demonstrate the significant gap between Oregon's top-down approach and B.C.'s concensual, bottom-up approach. All approaches recognize a relationship between growth management, affordable housing and the effective coordination of land use and transportation. Oregon has set ascertainable growth management goals and maintains an independent, quasi-judicial body to ensure the implementation of state goals at lower levels of government. In stark contrast, B.C. defines broad, general policy areas that should be addressed and exercises no control over growth management approaches agreed to at lower levels of government. Initial experience with the GVRD's Livable Region Strategy, the first Regional Growth Strategy under B.C.'s Growth Strategies Act, indicates that the GVRD's member municipalities have publicly endorsed a common regional approach while many privately intend to continue a business-as-usual policy, stressing local objectives first.

Land Use and Transportation impacts, tools and coordination were discussed in detail, primarily to demonstrate that current planning practices cannot continue if regional growth management goals are to be achieved and that there is a well-documented history of both effective and ineffective planning tools available. The common element in all successful approaches to growth management has been highly coordinated land use and transportation planning, combined with much higher densities and land use mixes than currently exist in most parts of the GVRD.

Researchers in Washington State have shown that the use of alternative transportation modes is highly dependent on land use density and mix, while researchers in Oregon State have shown that housing affordability has been effectively maintained by the specification of minimum densities.
The influence of land economics and location theory was then presented to illustrate how the marketplace for residential and commercial development does not usually take official growth management policy pronouncements into consideration when decisions are being made. The utility of a location in terms of accessibility to workplaces, customers and amenities, in addition to price and other economic determinants, dictate the supply and demand parameters for most private sector location decisions. Land prices, the most variable element of housing costs, are indeed heavily influenced by public policy, notably through restrictions on land use density and mix, controls over building standards, and the provision of transportation infrastructure. These public policies have been dominated by local land use decisions designed to minimize neighbourhood resistance to intensification and provincial transportation decisions designed historically to accommodate long-distance commuting.

Existing policies could be classified as de facto policies, or what is seen to be happening on the ground, and official policies, or what is the stated to be the preferred course of action.

Official growth management policies call for regional districts and their member municipalities to address a wide range of issues to promote social, environmental and economic sustainability. De facto policies avoid the definition of clear and ascertainable objectives and criteria to support well-intended high-level goals, which has resulted primarily in parenthood statements with few enforcement mechanisms.

Official land use policies and transportation policies could be concisely summarized as “promote complete, compact communities which discourage car use and promote walking, cycling and transit.” With few exceptions, the de facto land use policy is to segregate high- and low-density uses locally and regionally in order to protect existing single family detached home districts from intensification. Only outer-suburban municipalities offer affordable and attractive ground-oriented housing as a result, perpetuating long-distance commuting by younger, family households. Token funding has been made available to promote walking and cycling, while transit funding has been cut and hundreds of millions of dollars continue to be poured each year into projects that increase road capacity and assist long-distance suburban commuting.
Officially, suitable, affordable housing is seen to be a basic right for all citizens by all levels of government. The de facto policy is that it is left to the marketplace to seek out opportunities in municipalities which do not practice exclusionary zoning, generally found in reclaimed, marginal land in urban areas for high-density development and at the outer edges of the region for low-density development. The development industry attempts to provide the most affordable housing possible given the limited availability of zoned and serviced land, and costly building standards, such as wide Right of Ways and minimum parking standards. Federal and provincial governments have effectively abandoned their roles in housing, although reluctant municipalities have been provided with a reasonable toolkit of legislated powers to make housing more affordable. These tools include old-fashioned control over density and use, as well as the ability to negotiate density increases in exchange for community amenities and affordable housing units.

The following research findings sections provide empirical answers to the research questions posed earlier. In so doing, they also provide validation for the stated de facto policies, point out where observed trends vary from those outlined in official policies, and identify barriers and opportunities exist for bringing the de facto policies and trends back in line with official policies.
3. Research Findings

3.1 Survey on Land Use, Housing, and Transportation Issues

3.1.1 Survey Description

In order to acquire an understanding of the prevailing attitudes towards the issues of land use, affordable housing, and transportation infrastructure raised earlier in the research questions, key informants consisting of senior representatives from government and the private sector were surveyed. Attempts were also made to obtain a cross-section of NGO views, but representatives of these groups generally did not feel comfortable with their level of knowledge on these issues. Respondents were encouraged to answer with “No Opinion” or “Not Applicable” if they did not have an established opinion or the necessary background knowledge in a specific subject area. Although given the option, most respondents did not request that their identity be withheld. Out of respect for those who requested anonymity and those who responded as individuals and not as representatives of their respective organizations, all responses presented here will be unattributed.

Survey Questions

1. How much importance do you assign to the following issues for their impact on growth management in the GVRD (e.g., urban sprawl and long distance commuting)? Why?

a. Providing affordable, ground-oriented housing near employment centres

b. Balancing the number of jobs and employed residents in each GVRD subarea (i.e., North Shore, Northeast Sector, Burrard Peninsula, Fraser Valley South, etc.)

c. Achieving land use density targets that support walking, cycling, and transit
2. What is your definition of "affordable" housing? Do you feel that governments should be responsible for the provision of affordable housing?

3. What barriers are there to the construction of more affordable ground-oriented, higher-density family housing near regional employment centres, such as the Burrard Peninsula?

4. Which of the policy instruments currently available to planners and decision makers for the creation of affordable housing are most effective? Have they been fully exploited?

5. Should governments intervene more aggressively in housing and land use policy? If so, which level(s) of government should act and which programs should be implemented?

6. In general, which policy should governments follow: transportation investments should lead development, or development should lead transportation investments? Why?

7. It has been claimed that some types of transportation infrastructure can act as a hidden subsidy in certain real estate markets. For example, the U.S. Interstate freeway system has been identified as a major factor in providing easy access to cheaper suburban land in metropolitan areas for businesses and homeowners. Do you feel that there are examples of such hidden subsidies in BC? If so, which are the most significant and how could these be made more equitable?

8. How aware are decision makers and the general public of the significance of and need for growth management? Of the influence that personal lifestyle choices and public realm decisions such as transportation mode preferences or housing location/mix have on growth management efforts? Which mechanisms would be best for increasing awareness?

A summary of responses for each question is included below. The complete set of responses, with any remarks that could identify individual respondents removed, is included as Appendix B.
3.1.2 Summary of Key Informant Responses

Two-thirds of the 24 key informants asked to provide their expertise responded to the survey request. Responses were received from authorities at the municipal, regional and provincial levels of government as well as from academia, the private consulting field and the real estate and development industries. Their responses are summarized below.

1a. The provision of affordable, ground-oriented housing near employment centres was considered by a large majority by respondents to be of high importance. The general feeling was that if there was a good mix of housing of various types and cost distributed throughout the region, households could move easily to the location which provided the best balance between their travel needs and other considerations. An associated theme was that the current distribution of affordable, ground-oriented housing often places severe limitations on where households with average incomes are able to locate. The important problem of how affordable housing would be distributed in practice to those working nearby, assuming that significant amounts of affordable housing could be provided near employment centres, was raised by several respondents.

1b. The importance of having a jobs/housing balance in each subarea of the region received mixed reviews. While most agreed that the principle was laudable, a number of respondents felt that such a balance would be difficult, if not impossible, to achieve. Reasons cited included lifestyles, the growing need for two-income earners in households and the increasing mobility of workers. As one respondent put it, “its much easier to change your job than where you live.” The need for a balance of housing types and affordability which matches the income profile of those living in the a subarea, as opposed to a simple numerical balance, was also raised.

1c. The achievement of higher density targets that support walking, cycling, and transit received uniformly strong support. The viability of the transit alternative as opposed to the automobile, the achievement of complete, compact communities and the possibility of realizing significant savings
in the costs of infrastructure, were cited most often by respondents as the reasons why the importance of higher density in the region should be stressed.

2. One of the more interesting results of the survey was that the majority of respondents assumed that the term “affordable housing” meant social housing for the core-needy. There was general support for government intervention in this particular area of affordable housing. Of the few who interpreted the term “affordable” more globally to be inclusive of households with a wide range of incomes, only one respondent held a strong belief that affordable housing was a basic value that governments should actively be involved in.

3. In spite of the ambiguous responses to the “affordable housing” question, there were very clear and uniform responses identifying the barriers to “more affordable,” ground-oriented housing. These were best described in one respondent’s concise answer: “High land cost. Neighbourhood resistance. Inflexible zoning.” High DCC’s were also mentioned by several respondents.

The NIMBY syndrome appears to be at the heart of the issue for respondents from all backgrounds. The answer given above could reasonably be expanded to: “High land cost results from the lack of land zoned for higher density and mixed uses which results from neighbourhood resistance.” Another prevailing attitude was that the established majority, presuming that it is entitled to lower density housing, feels that finding affordable housing is the problem of the non-established minority. Moreover, the established majority feels that the non-established minority should pay up front for the cost of the required infrastructure and amenities for new developments that were previously shared by the entire community.

4. With respect to the tools available to planners to make housing more affordable, the use of density bonusing, the release of public land at below-market prices to non-profit groups and basic zoning were routinely identified. Respondents were unanimous in their belief that these tools were not being fully exploited. Zoning in particular was often mentioned as the single most effective tool, given that land prices are overwhelmingly the largest barrier to affordable housing in the region. Zoning was also cited as the most difficult tool to use due to potentially strong
public resistance. The notion of area-wide zoning was mentioned, whereby higher density and mixed uses would be prescribed over wider areas of the region to avoid localized resistance.

5. The question of the appropriateness of government intervention provided quite a variety of responses. On one side were the non-interventionists, who argued that over-involvement of governments in land use controls had started the problems of low density housing and segregated land uses in the first place. This camp suggested that the worst thing that could happen for affordable housing would be for the government to take too much interest in the issue. On the other side were the facilitators, who supported a government-led enabling strategy to overcome identified barriers to affordable housing, such as:

- Provide information and training for cost-effective development and building standards;
- Mediate the often counter-productive competition for growth between regional municipalities;
- Legislate statutory tools which allow municipalities to effectively provide affordable housing;
- Promote a climate in society where the average citizen understands and supports the need for more affordable housing and compact communities throughout the region.

A consensus was reached that municipal governments should become more proactive in providing sufficient amounts of suitably zoned land for construction and that senior governments should again be more generous in financing housing for low-income households.

6. The choice between transportation leading development or development leading transportation was not intended to present respondents with a “chicken and egg” enigma to solve, but to probe their awareness of the interaction between these two factors. It was, as one respondent guessed, a trick question. It was nevertheless interesting to receive several responses stating that either “Transportation should lead” or “Development should lead” followed only by words to the effect of “for obvious reasons.” A majority of respondents, while usually showing some preference, did indicate that the two factors should be coordinated, or proceed in “staggered parallels” as one respondent put it. In addition to responses indicating that the two factors were independent, the
lack of understanding by some professionals was raised by an experienced strategic planner: “I am still concerned that the land use-transit connection is very fragile and needs constant nurturing.”

The most interesting responses on this question were from two knowledgeable persons working at a high level within the provincial government. One, involved with MoTH, cited commuter rail and HOV lanes as excellent examples of the appropriate transportation investments needed to shape desirable growth patterns. The other, involved with the Ministry of Municipal Affairs and Housing, stated that commuter rail and HOV lanes were good examples of unsustainable and costly solutions that would reinforce the tendency towards urban sprawl by subsidizing long-distance commuting.

7. The potentially contentious question of hidden subsidies and equity resulted in the greatest diversity of responses. Most respondents felt that transportation infrastructure investments did, to a greater or lesser degree, subsidize housing. Examples cited included the West Coast Express, bridges and tunnels with no tolls, freeway expansions, low automobile operating costs and artificially low property taxes in some municipalities. One respondent from the private sector stated that developers are subsidizing most transportation infrastructure. Several thought provoking comments were provided which seem to challenge the conventional wisdom:

- “We have little understanding of the true costs of sprawl, which makes it hard to determine who should pay and what amount they should pay;
- The de facto acceptance of urban sprawl and automobile dependence by individuals and governments may be an unfortunate, but nevertheless valid, confirmation that society values the ownership of ground-oriented, detached housing highly and is willing to provide subsidies;
- The use of general revenue to pay for transportation infrastructure should be considered to be a subsidy not only for suburban home owners, but also for home owners in urban areas closer to job concentrations, as this relieves the pressure on them to accept more density.”
8. The final question, concerning the awareness of decision makers and the public of the need for growth management and the influence of personal decisions on growth management, also provided a wide divergence of opinion. Responses were spread evenly between the public being “not very aware at all” to decision makers being “very aware.” Several stated that public awareness was at the level of “there’s a lot of growth happening, I don’t like it much, but I guess we’re going to have to do something about it, as long as it’s not me.” Others indicated that awareness of the issues and personal lifestyle implications is quite a recent phenomenon, but one which is growing rapidly. A few respondents made the disturbing observation that many decision makers are not nearly as aware of the underlying causes of the problems as they think they are, which is leading to inappropriate actions.

Options for the education of decision makers and the general public included public forums, op-ed pieces in major print media, and involvement in community planning processes. Surprisingly, only one respondent proposed using the potential of the school system to increase awareness of the issues of land use, housing and transportation. Another suggested that if more councils had the courage to make progressive zoning changes, the public hearing process could be used to educate the public on why such changes were necessary to meet objectives.

Two respondents made very convincing cases in favour of the need to address what could be called “densi-phobia,” through public education, to counter fears of higher density. Crime, lack of privacy and the paving over of greenspace top the list of these fears. Poor development standards in some GOMD housing projects may have justified the latter two fears. These respondents stated that good examples of higher density should be highlighted and development/building standards strengthened to achieve livable, high-quality, medium-density housing.\(^{218}\)

“There’s a lot of growth happening, I don’t like it much, but I guess we’re going to have to do something about it, as long as it’s not me.”

...Growth management official’s view on the public’s attitude to change

\(^{218}\) See, for example, GVRD, Strategic Planning Department, Housing Task Group Examples of Ground-Oriented, Medium Density Projects in Greater Vancouver (July 1996), funded by the GVRD and the Real Estate Foundation.
3.2 Population and Job Growth Trends

The heart of the LRS is the concept of directing new jobs and population into a Growth Concentration Area. According to the LRS, the types of growth trends and targets that are needed to achieve the strategy's goals include:

Table 5 - Numerical Targets for Growth Management

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Target Share of Growth (%)</th>
<th>Share of Growth Trend (%)</th>
<th>Excess or Shortfall of Growth (%)</th>
<th>Target Job Growth (to nearest 50 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Region/Langley</td>
<td>8</td>
<td>29</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>South Fraser Valley</td>
<td>3</td>
<td>10</td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>Vancouver</td>
<td>9</td>
<td>13</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Richmond</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>North Shore</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>North Fraser Valley</td>
<td>6</td>
<td>7</td>
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<td>150</td>
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<td>North East Sector</td>
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<td>10</td>
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<td>300</td>
</tr>
<tr>
<td>Burnaby/New Westminster</td>
<td>16</td>
<td>4</td>
<td>-13</td>
<td>100</td>
</tr>
<tr>
<td>North Surrey/North Delta</td>
<td>30</td>
<td>12</td>
<td>-18</td>
<td>450</td>
</tr>
</tbody>
</table>


It is important to note that, while the growth trends in may not be reflecting the targets of the LRS in the Burrard Peninsula, Surrey or the Northeast Sector, Surrey and the Northeast Sector are experiencing the region's most significant long-term growth, but only in terms of population:
Growth (%, 1981-1991)
- 57.2 to 73.5 (3)
- 45.4 to 56.2 (3)
- 36.1 to 45.4 (3)
- 20.4 to 36.1 (3)
- 18.0 to 20.4 (1)
- 16.8 to 18.0 (4)
- 10.8 to 16.8 (3)


Figure 11 - Population Growth (1981-1991)

Growth (%, 1991-1996)
- 27 to 50.0 (1)
- 21.3 to 21.5 (1)
- 17.6 to 21.3 (4)
- 16.0 to 17.6 (4)
- 12.8 to 16.0 (4)
- 7.2 to 12.8 (3)
- 5.4 to 7.2 (3)


Figure 12 - Population Growth in the Study Area (1991-1996)
The second map confirms that the general patterns of the 1981-1991 trends are continuing unabated, with the focus of growth shifting closer to the geographic centre of the Fraser Valley during the 1991-1996 time period. The only significant regional change was the UEL, where the UBC Real Estate Corporation has been creating a new residential community. The highly localized growth in the UEL, shown as black, makes the strong growth in other municipalities appear slightly weaker than the 1981-1991 period.

It should be noted that these data were accumulated before the effects of recently-completed large-scale investments in transportation infrastructure in the Northeast Sector have become evident, such as the Barnet-Hastings HOV lanes, commuter rail, Mary Hill Bypass widening, and Pitt River Bridge counterflow lanes. These are discussed further in the next section. While the rate of population growth in suburban areas is strong, the essential complementary growth rates in employment are far from meeting the targets. In many cases, the rate of growth in employment is not keeping pace with the rate of growth in the residential population. In other words, the jobs/housing imbalance in many of the outer suburbs and exurbs is worsening, perpetuating and accentuating their roles as the “bedroom communities” for employment centres in the regional core. Further, the highest growth rates are being experienced in the central and eastern Fraser Valley where the impact on the ALR is greatest.

It is worth noting that Richmond has not only consistently high growth rates, but also has the region’s highest ratio of jobs to employed residents. This observation is due in large part to the fact that the Vancouver International Airport, a major regional employment centre, is situated in the northwest corner of city. The airport provides over 15,000 permanent jobs, equivalent to one job for every ten persons living in the city.\(^{219}\) In fact, large numbers of workers commute in and out of the city, which reflects the high housing prices in the municipality.

The ratio of jobs (Employment, EMP) to employed residents (Employed Labour Force, ELF), a proxy for housing units, paints a clear picture of the imbalances of jobs and housing in the region:

![EMP to ELF Ratio](image)

Source: GVRD EMME/2 Transportation Model Database

Figure 13 - Ratios of Employment to Employed Residents (1991)

The trend is also important. In the bar chart below, wherever the grey bar (change in employed residents) exceeds the black bar (change in employment) and the white bar (EMP/ELF ratio) is less than 0.8, the jobs/housing imbalance was significant and worsening in 1991.

West Vancouver, Port Moody, Coquitlam, Surrey and Pitt Meadows/Maple Ridge fall into this category. West Vancouver also had the dubious honour of being the only GVRD municipality to register an absolute decrease in the number of available jobs. The relative size of a municipality should also be considered as a factor in identifying the importance of a jobs/housing imbalance. The villages of Anmore and Belcarra have similarly bad jobs/housing imbalances, but amount to 0.1% of the region’s population and do not have a major regional impact. An analysis of trends in the regional balance of jobs and housing and the required direction appears in a table below.

1.20
1.00
0.80
0.40
0.20

Emp/Elf (1991)

An Emp/Elf ratio between 0.8 and 1.2 is reasonable, a value of 1.0 being ideal.

Source: GVRD EMME/2 database.

Figure 14 - Trends in Employment/Employed Resident Ratios

Table 6 - Analysis of Trends in Jobs/Housing Balance (1981-1991)

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
<td>Gradual growth</td>
</tr>
<tr>
<td>↑↑</td>
<td>Moderate growth</td>
</tr>
<tr>
<td>↑↑↑</td>
<td>Strong growth</td>
</tr>
<tr>
<td>➞</td>
<td>Little or no growth</td>
</tr>
<tr>
<td>↓</td>
<td>Negative growth</td>
</tr>
<tr>
<td>○</td>
<td>Emp/Elf &lt; 0.80</td>
</tr>
<tr>
<td>•</td>
<td>0.8 &lt; Emp/Elf &lt; 1.20</td>
</tr>
<tr>
<td>●</td>
<td>Emp/Elf &gt; 1.20</td>
</tr>
<tr>
<td>Municipality Groupings</td>
<td>ΔEmp</td>
</tr>
<tr>
<td>------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Burnaby</td>
<td>↑</td>
</tr>
<tr>
<td>Coquitlam</td>
<td>↑↑</td>
</tr>
<tr>
<td>Delta</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>Langley</td>
<td>↑↑↑↑</td>
</tr>
<tr>
<td>Maple Ridge, Pitt Meadows</td>
<td>↑</td>
</tr>
<tr>
<td>New Westminster</td>
<td>⇒</td>
</tr>
<tr>
<td>North Vancouver City</td>
<td>⇒</td>
</tr>
<tr>
<td>North Vancouver Dist.</td>
<td>↑</td>
</tr>
<tr>
<td>Port Coquitlam</td>
<td>↑↑↑</td>
</tr>
<tr>
<td>Port Moody</td>
<td>↑</td>
</tr>
<tr>
<td>Richmond</td>
<td>↑↑↑</td>
</tr>
<tr>
<td>Surrey</td>
<td>↑↑↑</td>
</tr>
<tr>
<td>Vancouver/UEL</td>
<td>⇒</td>
</tr>
<tr>
<td>West Vancouver</td>
<td>↓</td>
</tr>
<tr>
<td>White Rock</td>
<td>↑↑↑</td>
</tr>
<tr>
<td>Vancouver CMA</td>
<td>↑</td>
</tr>
</tbody>
</table>

Source: Author's estimation based on 1991 census data.
3.3 Transportation Trends

The results presented in this section will be a collection of miscellaneous and occasionally conflicting observations, which reflects the state of transportation data collection in the region.

MoTH abandoned using accidents/Vehicle Kilometers Travelled (VKT) statistics in 1994 due to the difficulty in collecting accurate distance data. BC Transit planners insist that there is excess capacity remaining on main routes in Vancouver during peak periods where simple observation shows that successive buses are full to capacity with standees every day and “pass-bys” are a common occurrence. While the 1985 GVRD Travel Survey interviewed over 25,000 households and the 1992 GVRD Travel Survey interviewed over 15,000 households, the 1994 Travel Diary study approached only 1500 households. A wide range of broad conclusions on regional travel trends was derived from this small sample, in spite of the high probability of statistical error. For example, the 1994 survey claimed a -0.9% decrease in the 24 hour modal share for car drivers in the critical Northeast Sector between 1985 and 1994, but the error range for this value is given as +/- 3.6%. Initial data from MoTH has shown that vehicle traffic on the Barnet-Hastings “People” Mover corridor through the Northeast Sector has increased almost 50% since the original two-lane Barnet Highway was doubled to four lanes in 1996, while transit ridership has decreased.

The EMME/2 transportation model, used heavily by MoTH, the GVRD and municipalities, depends on “K” factors, which are correction factors needed to make the model’s results match what is actually observed by traffic counts. Standard traffic counting instruments such as air tubes are also fallible. The Vancouver’s engineering department was unable to provide accurate numbers for cars and cyclists during a 1996 bike lane experiment, due to instrument failures.

---

220 A “pass-by” is when a bus driver judges that a vehicle has reached a safe capacity with standees and refuses to pick up further passengers. Bus routes leading to UBC, the region’s second largest transit destination, has the highest rate of pass-bys in the system.

221 The Travel Surveys were a set of random telephone interviews in which questions about travel habits were asked, while the Travel Diary was a log book sent randomly to households, who were then asked to record their trips over a one week period and return for analysis. The two research methods involve different sets of systematic errors, indicating that their results should be compared with some caution.
Even in the case of extremely large, concrete infrastructure elements, such as bridges and freeways, MoTH statistical technicians, when approached for historical data from the last twenty years, admitted that they had never compiled a list of the province's major transportation projects. The list eventually had to be pieced together from a set of press releases, partial lists appearing in older publications and the recollections of long-time MoTH engineers.

These comments are not intended to belittle the technical capabilities of traffic engineers, who have limited time and financial resources to make sense out of an enormously complex system. Over five million trips are made on an average day within the GVRD to hundreds of thousands of destinations on tens of thousands of lane-kilometers. They are intended only to suggest that, in spite of the claims of its practitioners, the field of transportation planning is far from being a precise science and is often based on a critical lack of both complete data and a connection to socioeconomic factors. The reader is therefore encouraged to focus primarily on broad trends that are being observed in travel patterns, as opposed to the details.

"When it comes to accurate information on transportation trends to assist in decision making, we're really flying blind here..."

..Regional Transportation Planner

---

222 In Walter Stewart The Paper Juggernaut (Toronto: McClelland and Stewart, 1979) it is demonstrated that data estimation problems are not limited to transportation engineers working on road traffic problems. The ill-fated Pickering Airport project in Ontario during the 1970s, which expropriated 35,000 acres of prime farmland, displaced hundreds of people and cost taxpayers almost half a billion dollars before cancellation, was based on year 2000 traffic projections that soared during the analysis phase from 25 million/year to almost 200 million/year. The planners overlooked the obvious implication that the estimate used would require every man, woman and child projected to be living in Metropolitan Toronto to fly about once every week.
3.3.1 Personal Travel Trends

As the table below indicates, while the Vancouver CMA has been growing quickly, the number of commuting autos in the 1985-1992 time period was growing at a rate 50% faster than the growth in population. The growth in the number of trips made by car drivers was over 100% faster than the growth in population while the average auto occupancy was falling. At the same time, trip distances grew and trip speeds decreased. Overall, the share of trips by the dominant car mode grew another 4% in the morning peak period from 1985-1992 while the share of other modes decreased, transit by 12% and cycling by over a third. It is worth noting that the majority of the decreases in transit use and cycling were for school trips, with a corresponding increase in the number of automobile passengers for school trips. This implies that a much larger share of children are now being driven to school. The 1994 survey confirmed the trend and suggesting that it reflected concerns over safety on the streets. The share for walking remained constant.

Table 7 - Changes in Travel Indicators (1985-1992)

<table>
<thead>
<tr>
<th>Transportation Characteristic</th>
<th>% Change (1985-1992)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>+21</td>
</tr>
<tr>
<td>Commuting autos</td>
<td>+32</td>
</tr>
<tr>
<td>Trips by auto drivers</td>
<td>+48</td>
</tr>
<tr>
<td>Trips by transit</td>
<td>+23</td>
</tr>
<tr>
<td>Total trips</td>
<td>+38</td>
</tr>
<tr>
<td>Trips per person</td>
<td>+14</td>
</tr>
<tr>
<td>Auto modal share</td>
<td>+4</td>
</tr>
<tr>
<td>Transit modal share</td>
<td>-12</td>
</tr>
<tr>
<td>Trip distance</td>
<td>+12</td>
</tr>
<tr>
<td>Trip time</td>
<td>+20</td>
</tr>
</tbody>
</table>

Source: GVRD 1992 Greater Vancouver Travel Survey
An enigma in observed growth patterns is that, if the regional population density is growing, transit ridership should theoretically be increasing at a higher rate. While regional density was increasing, the densities where many new households were choosing to live was decreasing. Many new suburban housing subdivisions are low-density “greenfield” developments, i.e., where no housing existed before. As the Vancouver Regional Transit Commission (VRTC) requires basic levels of service in these areas, the level of transit service available across the region has been effectively decreasing. Recall also that a critical density is required to improve transit viability. Further, in many denser urban areas, notably in Vancouver, transit ridership has reached the system’s capacity during peak periods, which has inhibited increased usage and reduced the utility of transit as an incentive to choose a smaller, more expensive housing alternative in Vancouver over a larger, less expensive suburban choice.

The 1994 GVRD Travel Diary Survey was intended to fill in some of the data gaps found in the 1992 survey. Trip diaries record each trip taken by members of responding households during a week-long period. The 1994 survey suggests that transit’s morning peak period ridership losses observed in the 1992 survey have been recuperated, but notes that increases in overall ridership have been limited to the regional core in off-peak periods. A significant decrease in SOV travel is reported between 1985 and 1994 at times other than the morning peak period examined in the 1992 survey (-7.3% over a 24 hour period). In spite of a reduced walk/bike mode share in both the morning and evening peak periods, gains were observed in transit ridership (+25.4%) and the walk/bike modes (+17.6%) over a 24 hour period. The number of cars per household and the number of cars per capita decreased significantly, from 1.75/household to 1.54/household and from 0.67/capita to 0.58/capita. Half of these decreases in car ownership took place after the 1992 survey, when 1.63/household and 0.62/capita were reported.223

While these latest results are cause for optimism, they should be approached with some caution. Regionally, the growth in automobiles registered for work purposes matched the population.

223 GVRD Strategic Planning Department 1992 GVRD Travel Survey, Report 3: Travel and Demographic Characteristics p. 8.
growth very closely, and the rates of increased automobile ownership vary dramatically across the region.\textsuperscript{224} Vancouver actually witnessed a negative growth in the total number of registered and insured vehicles in the five years between 1991 and 1996, in spite of a 12\% population growth, while Coquitlam, Langley, and Surrey registered 29\%, 24\%, and 30\% increases respectively in this time period. Of special note for this thesis is that the number of vehicles insured for driving to work increased at nearly double the rate of all insured vehicles.

The relative values used primarily the 1994 survey report, i.e., increases and decreases given as percentages, overshadow major increases in traffic levels and the report provides little insight as to why such major trend changes might have occurred. It is difficult to explain, for example, why the number of people walking and cycling in the off-peak afternoon period would almost double throughout the region in only nine years while the number of people walking and cycling to work was apparently decreasing. The lack of absolute numbers for changes in the number of trips per capita and the total number of trips per day prompted the author to do some forensic calculations. Based on raw data from the 1985 and 1994 studies,\textsuperscript{225} the absolute number of car trips in the region had increased from 2,925,000 motorized trips per day, i.e., car or transit trips, to 4,325,000 motorized trips per day. This represents an increase of 50\% in a nine year period. When the automobile modal splits reported in the 1994 report are applied, it is seen that there has been an enormous increase of over 800,000 automobile trips per day in the region in less than ten years.

In other words, while the region's population was growing at an annually compounded rate of approximately 2.50\%, the total number of car trips grew at an annually compounded rate of approximately 3.75\%, or 50\% faster. This rate coincidentally mirrors the rate at which car ownership is exceeding the rate of population growth in the 1992 survey. Needless to say, such rates of increase would be completely unsustainable in the long term and are completely incompatible with government policies at every level to reduce car use and promote alternatives. Transport 2021's targets for transportation, are informative:

\textsuperscript{224} GVRD Strategic Planning Department \textit{Greater Vancouver Key Facts} (July 1996): pp. 42, 65, 66.

\textsuperscript{225} GVRD Development Services \textit{1985 Metropolitan Origin-Destination Survey}. 

150
Table 8 - Transport 2021 Transportation Targets (AM Peak Hour Period)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trips:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All modes</td>
<td>390,000</td>
<td>560,000</td>
<td>700,000</td>
</tr>
<tr>
<td>Car drivers</td>
<td>230,000</td>
<td>300,000</td>
<td>370,000</td>
</tr>
<tr>
<td>Car passengers</td>
<td>60,000</td>
<td>100,000</td>
<td>120,000</td>
</tr>
<tr>
<td>Transit riders</td>
<td>50,000</td>
<td>100,000</td>
<td>130,000</td>
</tr>
<tr>
<td>Pedestrian/Cyclists</td>
<td>50,000</td>
<td>60,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Transit Modal Shares:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To downtown peninsula</td>
<td>37%</td>
<td>45%</td>
<td>49%</td>
</tr>
<tr>
<td>To regional town centres</td>
<td>13%</td>
<td>23%</td>
<td>30%</td>
</tr>
<tr>
<td>To all destinations</td>
<td>13%</td>
<td>17%</td>
<td>19%</td>
</tr>
<tr>
<td>Automobile Occupancies:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To downtown peninsula</td>
<td>1.29</td>
<td>1.35</td>
<td>1.37</td>
</tr>
<tr>
<td>To regional town centres</td>
<td>1.24</td>
<td>1.30</td>
<td>1.32</td>
</tr>
<tr>
<td>To all destinations</td>
<td>1.28</td>
<td>1.35</td>
<td>1.33</td>
</tr>
<tr>
<td>Transit Service Levels:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of rapid transit routes</td>
<td>23 km</td>
<td>83 km</td>
<td>99 km</td>
</tr>
<tr>
<td>Population &lt; 400m from bus</td>
<td>87%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Population &lt; 1km from rapid transit</td>
<td>8%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Other Indicators:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total vehicle distance*</td>
<td>11.1 Gkm</td>
<td>13.4 Gkm</td>
<td>16.6 Gkm</td>
</tr>
<tr>
<td>Average car speed</td>
<td>38 kph</td>
<td>40 kph</td>
<td>37 kph</td>
</tr>
<tr>
<td>Average truck speed</td>
<td>53 kph</td>
<td>53 kph</td>
<td>49 kph</td>
</tr>
</tbody>
</table>

The targets suffer from many of the same limitations as the 1992 travel survey in that the focus is on morning peak hour trips, which now account for less than an eighth of all trips on weekdays. A 38% increase in automobile-based trips over 15 years in the peak hour is to be aimed for, which represents an annually compound growth rate of 1.83%. The observed annual growth rate of approximately 3.75% over a 24 hour period is a factor of two higher than the target growth rate, indicating that a major reversal of current trends will be required to achieve even these relatively large absoluted increases in automobile-based trips.

It is worth noting that while the target for transit-based trips is an increase of nearly 30%, the target increase in walk/bike trips is only 20%, implying that a large share of transit’s increased ridership is expected to come from people who would otherwise be walking or cycling. A similar oversight almost occurred in the City of Vancouver’s Draft Transportation Plan in 1996, where a net decrease in the total walk/bike modal share was initially proposed to achieve a higher transit share. These targets concede that complete, compact communities are not expected to yield many increases in people walking or cycling in the near future. It is also worth noting that the target for average driving speeds calls for a slight improvement of speeds. Given that time savings are now the predominant factor which makes most people choose the automobile over transit, it is hard to see how drivers would be lured away from their cars into buses to meet transit trip targets.

A number of recent regional planning documents have identified the growth in “suburb to suburb” trips to be the most pressing transportation problem within the region. Recall that the GVRD defines a suburb as any GVRD municipality outside of Vancouver. Workplaces in employment rich municipalities such as Burnaby, New Westminster, and Richmond would therefore be counted as an inter-suburban trip if the employees did not have a place of residence in either these municipalities or Vancouver. This point of view discounts the fact that almost half of all worker report both a place of residence and a place of work within the regional core and that seven out of every ten workplaces are located within the regional core, as the following table shows:

---

Table 9 - Inter-regional Workplace Share

<table>
<thead>
<tr>
<th>Workplace &gt; Residence V</th>
<th>Regional Core</th>
<th>Suburbs</th>
<th>Exurbs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Core</td>
<td>47.34%</td>
<td>4.37%</td>
<td>0.34%</td>
<td>52.05%</td>
</tr>
<tr>
<td>Suburbs</td>
<td>20.02%</td>
<td>18.36%</td>
<td>1.29%</td>
<td>39.66%</td>
</tr>
<tr>
<td>Exurbs</td>
<td>2.24%</td>
<td>2.34%</td>
<td>3.72%</td>
<td>8.29%</td>
</tr>
<tr>
<td>Total</td>
<td>69.59%</td>
<td>25.07%</td>
<td>5.34%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: Statistics Canada, 1991 Census Place of Work data, aggregations by author.

What seems to have attracted the most attention from GVRD planners is the fact that “inter-suburban” trips have been growing at twice the rate of Suburb-Vancouver and Vancouver-Suburb trips, which is a valid concern. Two factors in the gradual reduction of the City of Vancouver’s share of regional employment are road congestion and higher land prices. These factors have led many new and existing businesses to locate in North Richmond and Central Burnaby, in part to locate closer to their employees. Improved transportation access for employees was an important consideration in BC Tel’s decision to move its head office from Vancouver’s CBD to Burnaby.227

Closer analysis of the subarea data contained in the following table shows that, of the 18% of workplace/residence combinations shown above as “suburb to suburb,” most are to and from locations within the same subarea, i.e. Langley to Langley or South Region to South Region. This was defined earlier as “local” travel, which is a highly desirable situation. Cross-commuting between suburbs in different subareas, such as Pitt Meadows and Langley or Delta and Coquitlam, is seen to be negligible. There were also very few workplaces in other suburbs or exurbs reported by residents of the regional core.

Table 10 - Suburban Versus Regional Workplaces

<table>
<thead>
<tr>
<th>Workplace &gt; Residence V</th>
<th>Vancouver</th>
<th>Burnaby, New West</th>
<th>Richmond</th>
<th>Regional Core</th>
<th>North Shore</th>
<th>Northeast Sector</th>
<th>South Region</th>
<th>Suburbs</th>
<th>Maple Ridge, Pitt Meadows</th>
<th>Langley</th>
<th>Exurbs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>23.05%</td>
<td>2.67%</td>
<td>2.48%</td>
<td>28.19%</td>
<td>0.95%</td>
<td>0.34%</td>
<td>0.85%</td>
<td>2.14%</td>
<td>0.03%</td>
<td>0.10%</td>
<td>0.13%</td>
<td>30.46%</td>
</tr>
<tr>
<td>Burnaby, New West</td>
<td>5.31%</td>
<td>5.24%</td>
<td>0.79%</td>
<td>11.34%</td>
<td>0.46%</td>
<td>0.54%</td>
<td>0.74%</td>
<td>1.74%</td>
<td>0.05%</td>
<td>0.12%</td>
<td>0.17%</td>
<td>13.25%</td>
</tr>
<tr>
<td>Richmond</td>
<td>3.01%</td>
<td>0.48%</td>
<td>4.32%</td>
<td>7.81%</td>
<td>0.08%</td>
<td>0.06%</td>
<td>0.35%</td>
<td>0.49%</td>
<td>0.01%</td>
<td>0.03%</td>
<td>0.04%</td>
<td>8.34%</td>
</tr>
<tr>
<td>Regional Core</td>
<td>31.36%</td>
<td>8.39%</td>
<td>7.58%</td>
<td><strong>47.34%</strong></td>
<td>1.49%</td>
<td>0.95%</td>
<td>1.94%</td>
<td><strong>4.37%</strong></td>
<td>0.09%</td>
<td>0.25%</td>
<td><strong>0.34%</strong></td>
<td>52.05%</td>
</tr>
<tr>
<td>North Shore</td>
<td>4.05%</td>
<td>0.81%</td>
<td>0.29%</td>
<td>5.15%</td>
<td>4.31%</td>
<td>0.10%</td>
<td>0.15%</td>
<td>4.57%</td>
<td>0.02%</td>
<td>0.02%</td>
<td>0.04%</td>
<td>9.76%</td>
</tr>
<tr>
<td>Northeast Sector</td>
<td>2.36%</td>
<td>2.58%</td>
<td>0.30%</td>
<td>5.24%</td>
<td>0.26%</td>
<td>2.83%</td>
<td>0.51%</td>
<td>3.60%</td>
<td>0.16%</td>
<td>0.13%</td>
<td>0.29%</td>
<td>9.14%</td>
</tr>
<tr>
<td>South Region</td>
<td>4.22%</td>
<td>2.82%</td>
<td>2.58%</td>
<td>9.63%</td>
<td>0.27%</td>
<td>0.53%</td>
<td>9.39%</td>
<td>10.19%</td>
<td>0.06%</td>
<td>0.89%</td>
<td>0.95%</td>
<td>20.77%</td>
</tr>
<tr>
<td>Suburbs</td>
<td>10.63%</td>
<td>6.21%</td>
<td>3.18%</td>
<td><strong>20.02%</strong></td>
<td>4.84%</td>
<td>3.46%</td>
<td>10.05%</td>
<td><strong>18.36%</strong></td>
<td>0.24%</td>
<td>1.04%</td>
<td><strong>1.29%</strong></td>
<td>39.86%</td>
</tr>
<tr>
<td>Maple Ridge, Pitt Meadows</td>
<td>0.46%</td>
<td>0.53%</td>
<td>0.08%</td>
<td>1.08%</td>
<td>0.06%</td>
<td>0.70%</td>
<td>0.17%</td>
<td>0.93%</td>
<td>1.43%</td>
<td>0.07%</td>
<td>1.50%</td>
<td>3.50%</td>
</tr>
<tr>
<td>Langley</td>
<td>0.48%</td>
<td>0.45%</td>
<td>0.23%</td>
<td>1.17%</td>
<td>0.06%</td>
<td>0.15%</td>
<td>1.20%</td>
<td>1.41%</td>
<td>0.04%</td>
<td>2.18%</td>
<td>2.21%</td>
<td>4.79%</td>
</tr>
<tr>
<td>Exurbs</td>
<td>0.94%</td>
<td>0.99%</td>
<td>0.31%</td>
<td><strong>2.24%</strong></td>
<td>0.11%</td>
<td>0.86%</td>
<td>1.37%</td>
<td><strong>2.34%</strong></td>
<td>1.47%</td>
<td>2.25%</td>
<td><strong>3.72%</strong></td>
<td>8.29%</td>
</tr>
<tr>
<td>Totals</td>
<td>42.93%</td>
<td>15.59%</td>
<td>11.08%</td>
<td>69.59%</td>
<td>6.45%</td>
<td>5.27%</td>
<td>13.35%</td>
<td>25.07%</td>
<td>1.80%</td>
<td>3.54%</td>
<td>5.34%</td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

Notes: 70% of trips are still within or to the regional core. Trips between suburbs outside the regional core are negligible.

Source: Statistics Canada, 1991 Census Place of Work data, aggregations by author.
Stressing the importance of a growing "inter-suburban" travel trend problem focuses attention on suburban travel and masks the fact that the region already has a reasonably compact, transit-supportive core that could serve as an excellent base for future intensification. Of concern to the goal of sustainable land use planning is that an undue emphasis on this one problem may have been used to justify major transportation infrastructure investments that have clearly worsened the situation. Infrastructure examples include the Richmond Connector and Alex Fraser Bridge which connect Richmond and Vancouver to North Delta and Surrey or the numerous projects that have improved access between the Fraser North and the Northeast Sector subareas.

If Burnaby, New Westminster, North Richmond, North Vancouver City and Vancouver had been defined as a Growth Concentration Area twenty five years ago, when the ALR was defined and Oregon created a UGB around Portland, or even ten years ago before these transportation investments had been made, today’s sprawl could have been reduced dramatically. Such a concentration would have promoted accelerated Transit Oriented Development within the region and reduced the priority given to improving access to outer suburbs. Portland’s UGB is accompanied by minimum density regulations, to protect housing affordability, a concept which is lacking in the GVRD’s Growth Concentration Area definition.

Enormous resources have been invested into providing transit services from inner and outer suburbs to employment centres in the regional core. While transit’s modal share for work trips to the CBD dropped during the late 1980s and early 1990s for users living in the Burrard Peninsula and the inner suburbs, large increases were being experienced for users living in the outer suburbs. Overall transit ridership levels are still extremely low in the outer suburbs, indicating that such investments have been little more than a subsidy to long-distance commuters at the expense of the rest of the transit system.

229 According to the 1996 City of Vancouver Transportation Plan “Choices” document, Vancouver composes 6% of the VRTC service area, but provides 53% of the system’s ridership with only 30% of the system’s buses. The remaining 70% are allocated to low-density suburban routes.
3.3.2 Transportation Infrastructure Investments

GISs overlays indicate that many recent infrastructure projects have coincided with the appearance of unmistakeable symptoms of urban sprawl: automobile-dependent suburban travel, low density subdivisions, and long distance commuting to workplaces. The following overlays indicate that much of the major new infrastructure constructed in the last 20 years has served to provide easier access to municipalities with severe surpluses of housing over jobs and long commuting distances. Much of the emphasis before the 1990s was directed at the North Shore and South Region. More recently, the Northeast Sector and North Fraser municipalities have been targeted for large increases in mostly residential development and traffic growth.

Source: GVRD 1992 Travel Survey, MoTH, overlays by author.

Figure 15 - Transportation Infrastructure and Employment Concentrations
In the following table, the municipalities in the left column are characterized by long commuting distances, severe imbalances of employed residents to employment, and high growth rates. The transportation infrastructure in the right column was added in the last twenty years or is currently being proposed and has the potential to contribute to low-density sprawl.

**Table 11 - Shaping Suburban Growth with Transportation Infrastructure (1976-1996)**

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbotsford, Chilliwack</td>
<td>Widening Trans-Canada for HOV Lanes</td>
</tr>
<tr>
<td></td>
<td>Proposed Port Mann Bridge Widening</td>
</tr>
<tr>
<td>Coquitlam, Port Coquitlam, Port Moody</td>
<td>Barnett-Hastings People Mover</td>
</tr>
<tr>
<td></td>
<td>Mary Hill Bypass Widening</td>
</tr>
<tr>
<td></td>
<td>West Coast Express</td>
</tr>
<tr>
<td></td>
<td>Proposed Broadway/Lougheed LRT</td>
</tr>
<tr>
<td>North Surrey, Langley</td>
<td>Highway 91 (Richmond Freeway)</td>
</tr>
<tr>
<td></td>
<td>Alex Fraser Bridge</td>
</tr>
<tr>
<td></td>
<td>SkyTrain Extension</td>
</tr>
</tbody>
</table>

Source: GVRD 1992 Travel Survey, MoTH, overlays by author.
Added to these provincially funded projects are many complementary local projects. These include the construction of new arterial and local streets, the widening of existing streets to add more lanes or turn bays and the elimination of on-street parking. The importance of their cumulative impacts should not be underestimated, in terms of financial cost, quality of life and the facilitation of automobile travel. An example is the Knight Street truck route in Vancouver. Over $12 million has been spent since 1990 solely for the purpose of acquiring the ROW needed to construct new left turn bays which are facilitating annual traffic increases of up to 5%. This sum, exclusive of actual construction costs, would have been sufficient to complete the city’s bike route network and provide shelters at all transit stops in the city. Schools, businesses, and numerous homes have had their frontages and playgrounds sacrificed. In one location, an entire apartment complex was demolished to widen the street. As the picture below shows, the vast majority of vehicles using the truck route are automobiles.

![Truncated homes along Knight Street in Vancouver.](image-url)
These investments provide examples of a “cause and effect” relationship between accessibility and travel behaviour and can be attributed to allowing policy to be developed primarily from an engineering point of view. Using methods developed during the massive expansions of the freeway system during the 1950s and 1960s, most of today’s senior transportation engineers were trained to predict future traffic demands and to recommend supply solutions that will most efficiently accommodate this demand. It has only recently been shown that this approach, far from alleviating projected congestion, encourages a latent demand for travel.

Figure 17 - How Transportation Planning Generates Traffic

Appropriate land use decision appear to lag behind transportation decisions in this environment. With cheap land made accessible by such heavily subsidized transportation infrastructure, land use economics dictates that developers can offer buyers affordable housing in low-density ground-oriented housing and realize a high return on investment. Another way of stating this is that, as will be shown later, households starting out in the Lower Mainland real estate market are being

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231 The subtitle of Richard Arnott and Kenneth Small, “The Economics of Traffic Congestion,” American Scientist, Vol. 82, September-October 1994: pp. 446 - 455 is “Rush-hour driving strategies that maximize an individual driver’s convenience may contribute to overall congestion.”
presented with the following choices for the same price: a small, two bedroom condo with balcony in Vancouver or a large, detached house with full basement in Surrey.

As a result of this unbalanced choice, a strong residential foothold has become established in primarily rural areas that were once inaccessible due to natural barriers. The Northeast Sector and the Fraser South subareas are the clearest examples, but the Central and Eastern Fraser Valley do not appear to be far behind. Decisive action now to focus new development within existing communities appears to be the only way to prevent condemning the remainder of the Fraser Valley to a primary role as a bedroom for Burrard Peninsula workers.

"If we continue to plan land development and transportation independently, trying to build our way out of congestion - without taking into account the indirect relocation effects that a new highway induces - this policy will produce far more congestion for far more people over much larger areas, and it won't have fixed anything."\(^{232}\)

...Stephen Putnam, Professor of City and Regional Planning and Director, Urban Simulation Laboratory, University of Pennsylvania

3.4 Housing Type and Location Trends

A plot of yearly housing starts within the Vancouver CMA shows that there have been strong, cyclical fluctuations over the last twenty years.

![Vancouver CMA Housing Starts](image)

Source: GVRD Development Services, statistical analysis by author.

Figure 18 - Housing Starts in the CMA (1975-1995)

The dotted lines on the plot represent linear and exponential best fit curves for the data, or what would have happened if the housing starts had increased monotonically. The Vancouver CMA experienced a 2% annually compounded population growth rate during this period, i.e., an exponential growth curve might be expected. Nevertheless, linear growth fits the housing data better than exponential growth, according to the $R^2$ value, a common statistical measure which determines how well data is correlated to a given curve fit. $R^2$ values near one indicate perfect correlation and values closer to zero indicate lower correlation. The $R^2$ value for the linear fit is 0.269 and the $R^2$ value for the exponential fit is 0.237, indicating how erratic CMA housing starts have been.
3.4.1 Demographic and Socioeconomic Influences

Fluctuations in the number of housing starts are less surprising when the yearly fluctuations in population growth is considered, as opposed to the total population growth.

Besides population growth, a number of other socioeconomic factors should also be considered when analyzing housing starts. The trends and potential influences of some of these factors are:

Table 12 - Factors Influencing Housing Trends

<table>
<thead>
<tr>
<th>Socioeconomic Factor</th>
<th>Current Trend</th>
<th>Potential Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>Population increasing, aging</td>
<td>Potential for exclusionary SFD zoning, equity wealth = high income.</td>
</tr>
<tr>
<td>Household size</td>
<td>Low, decreasing, more singles living alone</td>
<td>Number of new units, mix of units.</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>High, stable, very high for younger age groups</td>
<td>Economic uncertainty, decision to buy instead of renting.</td>
</tr>
</tbody>
</table>
Household income | Average income stagnant, gap increasing between lower and upper incomes | Ability to afford a home, need to form larger “economic” families to own.
---|---|---
House price | High, increasing, highly location-dependent | Market value of housing may exceed ability to pay. Discussed in next section.
Mortgage rate | Low, stable | Payments determine ability to pay.

*Source: BC Statistics, CMHC, observations by author.*

![BC Household Demographic Trends](image)

*Source: Statistics Canada.*

**Figure 20 - Household Demographic Trends (1971-1991)**

![BC Per Capita Income (1986 Dollars)](image)

*Source: Statistics Canada*

**Figure 21 - Income and Unemployment Trends (1976-1995)**
Perhaps the most important factors that do not emerge from the data is that, while unemployment, inflation and household incomes are stable, unemployment and incomes are not distributed equally among age groups. In particular, as was noted earlier, unemployment is much higher than average for the under-35 age group and the real personal and household incomes of this group are well below average incomes and are decreasing.\textsuperscript{233} Vancouver demographer David Baxter has based his GVRD housing demand projections for the 1996-2021 time period primarily on historical trends and what younger families have traditionally preferred with less emphasis placed on these crucial factors.\textsuperscript{234} This led to a conclusion that ground-oriented units would dominate apartment units by almost a 2:1 factor in any likely growth scenario.\textsuperscript{235} As will be seen below, apartments have composed half of all starts since 1990, which better reflects the likely future costs of ground-oriented housing and the current ability of younger households to pay.

\section*{Sources: BC Statistics, Statistics Canada}

\textbf{Figure 22 - Mortgage Rate and Inflation Trends (1976-1995)}

\textsuperscript{233} Statistics Canada Canadian Economic Observer: Historical Statistical Supplement 1994/95 (Ottawa: Queen’s Printer, 1995): Tables 8, 9. Real incomes for full-time workers the under-45 age groups has dropped between 10% and 20% between 1990 and 1995 while they rose 5% to 10% for workers in the 45+ age groups. The gap between full-time and part-time workers has quickly widened, which is resulting in many full-time employees working longer hours while unemployment and underemployment is increasing.

\textsuperscript{234} David Baxter Homes in Metropolitan Vancouver’s Future: Housing Demand by Structure Type, 1996 to 2021 (Urban Futures Institute, August 1996).

\textsuperscript{235} Ibid. p. 35.
3.4.2 Housing Starts and Types

Given the underlying long-term statistical trends which result in market fluctuations, comparisons between municipalities and different types of housing can be problematic and subtle changes in housing preferences can be difficult to detect. To help overcome this difficulty, the data for the rest of this section has been normalized, or "smoothed," to offset short-term fluctuations in the total number of CMA housing starts and better reflect the best fit curve shown above.

**Determination of the Normalization Factor**

Normalized Housing Starts (NHS) for a given year, type and location is defined as

$$\text{NHS}(\text{Year}, \text{Type}, \text{Location}) = \frac{\text{HS}_{\text{observed}}(\text{Year}, \text{Type}, \text{Location})}{\text{NF}(\text{Year})},$$

where housing starts observed for a given year, type and location, $\text{HS}_{\text{observed}}$ is from CMHC actual housing start data, and the normalization factor for the year (NF) is

$$\text{NF}(\text{Year}) = 1 + \frac{(\text{HS}_{\text{CMA,observed}}(\text{Year}) - \text{HS}_{\text{CMA,expected}}(\text{Year}))}{\text{HS}_{\text{CMA,expected}}(\text{Year})},$$

and the expected CMA housing starts are:

$$\text{HS}_{\text{CMA,expected}}(\text{Year}) = 294,088 \times \text{Year} - 568,285,$$

where the numerical values for slope and intercepted are taken from a least-squares linear curve fitting algorithm performed on the housing data.

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236 Housing start data for each municipality and the CMA by year compiled by Development Services Department of the GVRD, other groupings by housing type, municipality, subarea done by the author.
For example, if the observed number of housing starts in the CMA was 25% above the expected number for that year, then the normalized number of housing starts used for comparison purposes would be divided by 1.25:

\[
NHS(\text{Year, Type, Location}) = \frac{(\text{Year, Type, Location})}{1.25}
\]

The resulting numbers of normalized CMA housing starts are:

\begin{figure}
\centering
\includegraphics[width=\textwidth]{normalized_housing_starts.png}
\caption{Normalized Total CMA Housing Starts}
\end{figure}

*Source: GVRD Development Services.*

**Figure 23 - Normalized Total CMA Housing Starts**
The relative distribution of housing types within these housing starts is:

![CMA Housing Starts Composition](image_url)

Source: GVRD Development Services.

**Figure 24 - Composition of CMA Housing Starts**

The type composition of these housing starts contains important information. Apartments can be seen to be absorbing most of the overall increase in housing units in the last five years with a mirror reflection of decreases in the share of detached houses. The relative proportion of duplexes and townhouses has remained remarkably flat over the twenty year period, with the exception of a period after the severe recession in the early 1980s when townhouses enjoyed temporary popularity at the expense of detached houses. This observation points out that no discussion of housing starts can be made in the absence of the prevailing state of the economy.

The locational distribution of housing starts for different types throughout the region is also important to identify, as is shown on the following two pages.
Figure 25: Share of CMA Housing Starts by Municipality

Source: GVRD Development Services.
CMA Housing Start Share (w/o Vancouver/Surrey)

Source: GVRD Development Services.

Figure 26 - Share of CMA Housing Starts (Vancouver, Surrey excluded)

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These plots show that, while Vancouver and Surrey have maintained the lion’s share of new housing starts over the last two decades, Vancouver’s share is the greatest and is experiencing strong growth while Surrey’s share is dropping rapidly. Outside of Surrey and Vancouver, the share of housing starts in Burnaby and Richmond have gradually declined while the share in the Northeast Sector and the Langleys have gradually increased.

The other variable of interest is the percentage composition of the three “barometer” housing types in each municipality. The housing start plots on the following pages show apartment, townhouse and detached house starts for municipalities in the Vancouver CMA with more than 10,000 residents and various groupings of municipalities. The influence of the state of the regional economic factors introduced earlier should again be kept in mind when interpreting the data. In the years following the recession of the early 1980s, in addition to a decrease in the absolute number of housing starts, there is a period of increased apartment and townhouse starts and a corresponding decrease in the number of detached house starts.

Apartment starts in Vancouver continue to overwhelm those in other municipalities, indicating that there is a strong ongoing demand for housing in spite of the high costs involved for relatively small units. There is a growing trend towards a larger share of apartment starts in the inner suburbs, complementing rapid price increases for ground-oriented housing in these municipalities. Although difficult to quantify, there is a distinct “trickle-down” effect in evidence. As housing prices increase near employment centres, there is a shift not only in the location of new housing but also the type of new housing. Households that once chose detached houses are now deciding between townhouses and apartments. Similarly, as will be seen in the final research findings section, households that once worked in Vancouver, and lived in Richmond or Burnaby, are now moving to the Northeast Sector and South Fraser subareas. Residents of these outer suburbs are increasingly moving to exurbs as far away as Chilliwack.

The number of apartment and detached house starts for Vancouver is somewhat skewed for a number of reasons. For apartments, the construction of new rental apartments, dramatically reduced across the Burrard Peninsula, has practically ended in the City of Vancouver.
Condominium apartments are increasingly seen as investment vehicles and are consequently playing a increasing role in the city’s new rental stock.\textsuperscript{237} For detached houses in Vancouver, the vast majority of new starts represent the demolition and reconstruction of existing detached homes, and therefore do not add to the region’s housing stock.\textsuperscript{238}

Although stable on the regional scale, the trends in townhouse starts at the local level could best be described as chaotic, with few discernible trends being observed in any one municipality or subarea. The most discernible feature of the plot was the temporary gain in townhouse starts in the early 1980s at the expense of detached houses. This shows the potential for shifts between the two housing types, given the right set of parameters. The only recent sign of hope is that, in spite of decreases in other subareas, there has been a very modest increase in the number of townhouse starts in the Burrard Peninsula. Given the low numbers, significant numbers of these starts may be from the demolition and reconstruction of existing ground-oriented housing.

Surrey dominated in detached house starts until recently, but these starts are now being distributed over a much wider range of municipalities. Surrey’s relatively high DCCs, property taxes and growing accessibility problems could be an underlying cause of this decline, which supports several of the arguments presented earlier in the sections on transportation and location theory. The only GVRD locations where absolute increases are being seen in detached housing starts are the Northeast Sector and North Fraser subareas. This coincides with large-scale transportation infrastructure investments taking place in these subareas. The South Fraser subarea dominated detached housing starts in the late 1980s and early 1990s after the completion of the Alex Fraser Bridge and SkyTrain extension to the south shore of the Fraser River.

Of concern to supporters of GOMD housing is the symbiotic relationship between detached houses and apartments, increases and decreases in one type is mirrored by decreases and increases in the other. Townhouses do not seem to have gained favour as a potential compromise solution.

\textsuperscript{237} Cameron Gray, of the City of Vancouver Housing Office, estimated in March 1996 that over half of all new condominium units in the city are being bought by investors and subsequently rented. Anne Roberts, marketing manager for the 1200-unit CityGate condominium complex in Vancouver, confirmed this estimate in her project.\textsuperscript{238} City of Vancouver Building and Permits Department, 1996 Demolition Permits statistics.
Source: GVRD Development Services, aggregations by author.

Figure 27 - Location of CMA Apartment Starts (1975-1995)
CMA Townhouse Starts by Area

Source: GVRD Development Services, aggregations by author.

Figure 28 - Location of CMA Townhouse Starts (1975-1995)
Figure 29 - Location of CMA Detached House Starts (1975-1995)

Source: GVRD Development Services, aggregations by author.
Although not the primary focus of this research, the housing location picture would not be complete without a few words on quality and design in housing. The building standards in apartment and townhouse developments in B.C. could best be described as lax. It is estimated that up to one-third of low-rise condominiums built in Vancouver during the 1980s have required major repairs due to water penetration problems. The average townhouse project could be described as a parking lot that had prefabricated townhouses, fronted by a wall of garages, dropped onto it using an overhead crane. It is easy to hypothesize that purely economic considerations may have forced many households to opt for these housing types. There would then be a danger that, should transportation access to development-friendly Fraser Valley municipalities be further improved, a flood of latent demand for detached houses may be released.

![Typical Townhouse Development in Coquitlam](image)

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239 GVRD Strategic Planning Department, Housing Task Group *Examples of Ground-Oriented, Medium Density Housing Projects* (July 1996), reviews a large set of GOMD projects. While there encouraging examples of well-designed townhouses, i.e., showing that developers do indeed have the ability to construct them, the majority fit into the stereotype described above.
Comparing the distribution of housing starts within different types of municipalities is useful for an understanding of the absolute numbers of housing units and types involved. A radial cross section along the axis of SkyTrain (Vancouver, Burnaby, New Westminster, Surrey and extrapolated to Langley) has been compiled here for analysis:

**Housing Start Units (1975-1996)**

**Vancouver Housing Starts**

**Vancouver Starts Composition**

**Burnaby Housing Starts**

**Burnaby Housing Starts Composition**

**New Westminster Housing Starts**

**New Westminster Starts Composition**

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Source: GVRD Development Services.

Figure 30 - Comparison of Housing Starts and Composition in Various Municipalities

Approaching “build out” for ground-oriented housing due to zoning limitations, Vancouver has concentrated primarily on the construction of apartment condominiums. As noted, demolition and reconstruction plays a dominant role in maintaining the number of detached house starts. The most important observation is that, for all intents and purposes, there is no new ground-oriented medium-density housing being constructed in Vancouver. Potential buyers desiring this type of housing would either have to belong to the highest income classes or move outside of the city.

Burnaby shows many of the characteristics common of Vancouver’s inner suburbs, with a mixture of apartments and ground-oriented housing. Many of the apartment units are concentrated along the Broadway-Lougheed Highway corridor and near high-density SkyTrain stations such as Patterson and Metrotown.
Historically, New Westminster shares with Vancouver the distinction of being an established, higher density urban centre. It is perhaps not surprising that the compositions of housing starts are so similar. Two SkyTrain stations in the core of the compact city and new developments of apartment condominiums around the waterfront market have continued this compact tradition. It is worth noting that New Westminster demonstrates a number of qualities that make it the region's most balanced municipalities: medium-density, a good mix of affordable housing types including rentals, excellent local amenities, and a near perfect balance of jobs and housing.

Surrey, until the mid-1990s, has been the location of choice for ground-oriented housing in the region. After 1990, the year that SkyTrain crossed the Fraser River into Surrey, higher density apartment units began to locate around SkyTrain stations in larger numbers. A low-density mindset, manifested by strip commercial development, wide arterial streets and shopping malls, hampers more compact development patterns in other locations. Surrey's mayor recently announced plans to abandon the LRS assumption of a single, compact town centre and proceed with a network of five town centres scattered throughout the city. Such a dispersal would hamper attempts to restrict Fraser Valley sprawl for the foreseeable future.

At the outskirts of the CMA, ground-oriented housing has predominated in District of Langley, as in most outer suburbs and exurbs, for the last two decades. There has been a moderate shift from detached houses to townhouses over the last five years and the number of apartment units has become a non-negligible component of total housing starts. It should be noted that, in spite of relatively low land values, the regional share of total starts in both Surrey and District of Langley have started to diminish after peaking in the early 1990s. While a number of factors may be involved, daily traffic reports of traffic backups extending ten kilometres back from the Port Mann Bridge over the Fraser River to the 200th Street Interchange on the western edge of District of Langley would certainly deter many potential developers and buyers. As will be noted later in the section on Place of Work and Place of Residence analysis, traffic bottlenecks appear to have a powerful influence on household locational decisions.
3.4.3 Supply of Rental Housing

The distribution of rental apartment units throughout the region is highly irregular. With the notable exception of White Rock, negligible stocks of market initiated rental apartments exist outside of the regional core. The number of apartment units per 1000 population in Vancouver may at first appear low, given that 60% of residents are renters, but this number does not include social housing units and does not include rented condominium units. It is estimated that between 25% and 40% of all condominium units are rented to non-owners and, as noted earlier, this figure raises to as high as 50% in newer buildings.

Source: CMHC Vancouver CMA Rental Report, October 1995

Figure 31 - CMA Private Rental Stock versus Population
One non-negligible factor in the imbalance between ground-oriented and apartment units in outer suburbs and exurbs is the fact that the "affordability gap" between rents and mortgage payments is much lower due to lower housing prices, making apartment construction uneconomic in many cases. As will be seen in the next section, while rents may be $100 to $200 cheaper for similar units in the outer suburbs, mortgage payments may be as much as $1000 cheaper.

It could be said that the absence of a healthy stock of rental accommodation is a clear sign that a community does not intend to provide for all housing needs and prefers to cater primarily to homeowners. Students, low wage earners, those with disabilities, young households and senior citizens, for example, have a greater need for affordable rental accommodation. In the absence of a reasonable rental housing stock to accommodate a wide range of households throughout all phases of the lifecycle, it is hard to imagine that a municipality can achieve the mix of affordable housing options needed to promote a balance of jobs and housing.
3.5 Housing Cost Trends

This section will examine four main indicators of housing prices that can exert an influence on the locational choice of newly forming households:

- **New Construction Prices.** New housing prices are closely related to the instantaneous land economics in the areas where growth is occurring in new housing starts. Accessibility also appears to be an important component of the economic utility of new housing to buyers.

- **Multiple Listing Service (MLS) Prices.** MLS prices provide an aggregated average value of all housing units of a given type, both new and resale, that are available on the market. They are generally considerably lower than new housing prices.

- **Mortgage Interest Rates.** Mortgage rates dictate the initial financial burden that households face when purchasing a home, although prices sometimes increase to counter rate decreases.

- **Apartment Rents.** Apartment rents indicate the financial attractiveness of the alternative to home ownership. Two bedroom apartment prices are used as examples in this section, as these are the largest rental unit commonly available in the GVRD and the most likely apartment alternative for newly forming families.

As with most other socioeconomic information available for this work, each data collection agency has a distinct mandate, set of study areas and housing type definitions. CMHC maintains new house prices by municipality and rental information by subareas. The Greater Vancouver Real Estate Board (GVREB) maintains MLS prices for detached houses, attached houses (duplexes and townhouses), and apartments northeast of Surrey and the Pitt River. The Fraser Valley Real Estate Board (FVREB) maintains MLS prices for detached houses in the central and southwestern parts of the Fraser Valley, combining townhouses and apartments into a single condominium category. MLS reporting boundaries are often similar, but not identical, to municipal boundaries.
3.5.1 Housing Prices

The section on development costs provided a summary of current land acquisition and
construction costs for new units, using an example of apartment condominiums in Vancouver as a
numerical example. From this analysis, it was seen that land acquisition costs in Vancouver (~$95
to $100/SFB) is comparable to the final sales price of a detached house with a lot in the outer
suburbs. This section will not break down the land, construction and other cost components of
final prices. Implicit in final sales prices are differences in land prices, which are the most variable,
and often the largest, component of housing prices in the region.

It is important to note that most MLS detached house sales in the region over the last five years
have been resales (90%), while the proportion of MLS apartment sales that were resales have
dropped steadily from 80% (+/− 5%) in 1991 to 65% (+/− 5%) in 1996, reflecting the large
increase in the share of new housing starts now held by apartments. The GVREB and FVREB
reported listings for 22,576 detached houses and 17,682 condominium units in 1996, which is
roughly twice the CMA total of 15,000-20,000 new housing units produced annually in the 1991-
1996 period. Discounting units which may have been sold more than once in the same year, these
figures indicate that potential home buyers have a reasonable selection of resale homes available
to them in addition to new homes.

Housing price comparisons will focus on the period from 1991-1996, for several reasons. The
size and type of housing has changed dramatically over the 20 year period used in the previous
section, making price comparisons between similar units difficult. The 1991-1996 period also
experienced the most rapid inflation in housing prices in recent times, which had little connection
to the general rate of inflation, while many other socioeconomic factors remained stable, such as
household income, inflation and unemployment. This has created a five year “window” where the
“all things being equal” can be said to apply roughly to household location decisions, with the
important exceptions of housing prices and accessibility.
As can be seen, with the exception of West Vancouver, prices for apartments are not only less divergent across the region, prices have remained reasonably stable over the last five years. In a number of cases, the average price has actually dropped. Needless to say, the price does not always reflect value, as the size of units, amenities and the price/SFB will vary considerably according to location.
Average new townhouse prices are roughly 30% higher than those of apartment units, but have experienced greater price increases over the last five years. This reflects the fact that they are ground-oriented and may therefore have experienced a greater competition for available land than apartments, for which there was a larger supply of zoned land available. Price increases observed in regional core communities were moderately larger than those outside of the regional core.
The distinguishing characteristic of new detached house prices as compared to prices for new apartments and townhouses, besides being at least twice as high, is the dramatic dependance of the price on location. The average price increase for detached houses in the most expensive areas from 1991 to 1996 is comparable to the sales price of detached houses in the least expensive areas. The locations of the most expensive homes are again usually near the major regional employment centres, with the exception of New Westminster. The problems of data aggregation are apparent here. New Westminster has relatively small lot sizes, established services and a large stock of older detached homes, which contribute to maintaining the cost of housing relatively low. New Westminster, outside of newer areas served by SkyTrain, has accessibility problems to other regional centres which could also be contributing to these lower prices.

Source: CHMC.

Figure 34 - CMA New Detached House Prices (1991-1995)
The prices of MLS apartment units in the Greater Vancouver market are more stable and less location dependent than those of new units, while the prices are considerably lower than those of new units. This may be related in part to the quality issue raised earlier. Stucco-exterior units constructed in the 1980s have developed a reputation for having building envelope problems which required major structural repairs, which would certainly act to depress prices.
These prices, which represent both duplexes and townhouses, are characterized by a high level of stability. This would confirm the fears of many buyers that these types of unit have a lower resale value than detached houses, which would limit their investment potential. The price stability also reflects the possibility that the units are not being viewed as an attractive housing option.
Generalizations are difficult to make on these prices, as apartments, duplexes and townhouses have been combined for reporting purposes. The prices, outside of fashionable White Rock, seem lower than their GVREB counterparts and have again been quite stable, which would raise concerns among buyers that these units had limited investment potential.

As with the prices of all apartment, duplex and townhouse units studied, the lack of increased equity being observed belies claims that these housing types are "starter units" which will eventually lead to an upgrade to a "higher" form of accommodation. As the prices of detached houses in desirable areas are initially much higher than for other housing types and locations, and are increasing much more rapidly, any household not able now to buy the more expensive housing is falling progressively further behind in its ability to afford it.
The large price increases and variations by location are similar to those seen in new house prices. New prices are generally 30% to 40% higher than the MLS prices, which are mostly resales. This raises an interesting question. Since younger, moderate-income families are often the buyers of new housing, how important is the house size “inflation” factor? If the newer and generally larger homes are intrinsically more important to the current generation than to previous generations, this would add an extra dimension to the problem of urban sprawl. The causes for this would be a useful area for further study.

Source: GVREB, FVREB.

Figure 38 - MLS Detached House Prices (1991-1996)
3.5.2 Mortgage Interest Rates

In addition to land value and construction costs, the mortgage rate is the other factor most often associated with the affordability of market housing units. As the following plot shows, the monthly cost of carrying a mortgage has varied dramatically with the prevailing interest rate. The interest rate, as well as the variability of the interest rate, exerts an influence on potential buyers. The interest rate determines how high initial monthly payments will be, but the variability influences consumer confidence in their decisions to make long-term major purchases. As housing prices are governed to some extent by supply and demand principles, decreases in mortgage rates are often accompanied by price increases, based on the ability of buyers to pay.

Source: Rates from BC Statistics, calculations by author.

Figure 39 - Cost of Mortgages
3.5.3 Rental Prices

This section will briefly review rents in market units. While most households living in non-market units are not candidates for buying market housing units, approximately a quarter of Vancouver households could theoretically afford their home, and increases in ownership comes mostly from this source. Two basic variables are of interest, the average rent and the supply of rental units in relation to the number of residents in different municipalities.


Figure 40 - Average Two Bedroom Apartment Rents
While the percentage spread in rents across the region is not as great as those in detached house prices, the locations of high housing prices and high rents are practically identical. Of greater concern is the distribution of rental units, as was seen in the last section. There is a disparity in the distribution of rental units throughout the region, with no apparent relationship between rents and supply. With the exception of West Vancouver and White Rock, there are negligible amounts of market rental units available outside of Richmond and the Burrard peninsula.

A major factor involved in the decision to rent or to own a home is the mortgage payment that would be comparable to rent under prevailing interest rates. The following plot shows the cost of housing that could be accommodated at various rent levels with different down payments, interest rates, and amortization periods. Taxes and condominium fees are not included.

![Graph showing mortgage equivalent to rent](image)

*Source: Calculations by author.*

**Figure 41 - Mortgage Equivalents to Rents Without Taxes or Utilities**

The “Affordability Threshold” has been chosen to be the four times the 1991 average household income in the Vancouver CMA, a rule-of-thumb generally accepted in most countries to be the
maximum that a household can afford for an average detached house. By this definition, we see that there are very few renters who are soon likely to be in a position to afford to own. This is confirmed by CMHC, which found a large increase in the number of renters in the lowest two income quintiles in the period between 1978 to 1990. Significantly more people in these income classes and significantly more youth are now renting than twenty years ago. This is more pronounced in Vancouver market with the nation’s highest housing prices.

To close this section, a final graphic image of the price differences across the Lower Mainland should remind the reader of the magnitude of the housing policy challenges that lie ahead if the imbalance in regional housing prices is to be addressed.

Figure 42 - MLS Prices for Vancouver and Fraser Valley SFDs

Source: GVREB, FVREB.

In Province of British Columbia, Ministry of Municipal Affairs, Recreation and Housing. The Report of the Royal Commission on Housing Options: New Directions on Affordability (1992), the definition of affordable was “principal, interest and taxes should not require more than 30% of the household gross annual income with a 10% down payment.” The threshold is approximately the same if this definition is applied, but with a 25% down payment and no taxes or utilities. Using a 10% down payment and including taxes and utilities would drive the equivalent price of the rents even lower, increasing the affordability “gap.” In CMHC The State of Canada’s Housing (1992) adds utilities in their definition and adds the important provisos that the housing should also be “adequate” (have basic amenities) and suitable (not overcrowded).

3.6 Buyer and Location Preferences

It is interesting to note that in a major survey of home buyers in 1996, the size of lot and quality of construction were considerably less important to new home buyers in Vancouver than in other major metropolitan areas in Canada. The survey also showed that price and proximity to schools were the most important qualities sought after, considered twice as important as proximity to work and proximity to public transit or transportation arteries. It should be noted that the sample size for the Vancouver component of the survey is relatively small (400) and is aggregated over the entire metropolitan area for all types of household. The study only briefly mentions the most obvious motivators for first time home buyers at a national level, such as "Tired of paying rent" and "Wanted a place of my own." No indications were provided of the importance of trade-offs between various housing qualities in the various housing sub-markets by this important group of home buyers. The only two groups that were considered to be of interest were new home buyers and resale home buyers.

Analyses of other studies which provide greater insight into buyer and locational preferences in the GVRD housing market are given in the following sections.

3.6.1 Choices of Residential Location Survey

This basic survey, performed in conjunction with the GVRD 1992 travel survey, provides some subtle indications about the nature of aggregate household locational decisions.

The survey respondents, one representative from each household surveyed, were asked to give their top five reasons for the household choosing its present residential location. After an initial review to identify major groupings of responses, six major themes were defined:

---

• **Neighbourhood/social.** Community character and amenities, proximity to friends and family.
• **Housing prices/rents.** Affordability, investment quality.
• **House/site features.** House/lot size, views, layout, design, quality.
• **Work/college proximity.**
• **Transportation advantages.** Transit, bus, train, freeway and bridge access.
• **Regional character.** Waterfront, scenery, weather, rural lifestyle.

Neighbourhood/social scored twice as high as the next closest theme, being selected by over 40% of surveyed households. What is interesting is that this theme was equally important in each GVRD subregion, defined as Vancouver, Inner Suburbs and Outer Suburbs. There is a noticeable variation across the region for each of the other themes. This may be an indication that households feel an attachment to their chosen neighbourhood, regardless of where it is located.

Housing prices/rents was the next most important theme, selected by approximately a fifth of respondents, followed by house site/features at one sixth. Work/college proximity and transport advantages were both themes selected by an eighth of respondents as while only a small number chose the regional character theme.

Crosstabulations provide some insights into household socioeconomic differences present in locational decisions:

• Housing price/rents and house/site features were more important themes for respondents in outer suburbs while work/college proximity and transport advantages were less important;
• Housing price/rents and house/site features were moderately more important themes for respondents in ground-oriented households while work/college proximity and transport advantages were less important themes;
Households that had lived longer in a residential location claimed that neighbourhood/social
factors were more important themes to them and work/college proximity was a less important
theme. This may have been more of an indication as to how they felt about their residential
location after living there for a while than how they felt when they made their original decision.

Work/college proximity was a much less important theme to households with two workers.

The general profile that emerges from these results is that newer households living in ground-
oriented units, particularly those with only one worker, are more willing to make the trade-off
between lower housing prices and reduced proximity to work. Once a household has remained in
a location for a period of time and has several children, the neighbourhood becomes a more
important factor. Greater disaggregation of variable data ranges (age, household composition,
etc.) and additional crosstabulations would be needed to validate these implied relationships.
Suitable data from the survey for further analysis was not readily available from the GVRD.

3.6.2 GVRD GOMD Telephone Survey

A large number of questions were asked in this survey covered subjects as diverse as current
living arrangements, family composition, housing type preferences, features sought after in new
housing, commuting trends, and attitudes towards density. While a great deal of interpretation
seems to have been applied to the results by the consulting firm which carried out the survey in
arriving at their conclusions, crosstabulations on the raw data allowed a number of results of
interest to be derived.

The three main questions determined to be of considerable interest for this thesis were:

- How satisfied are you with your current housing?
- What would be your first choice of housing type if the price were not a problem?
- Given a choice between the following types of housing with a price of $230,000, which would
  you choose...
• A smaller, full-featured townhouse in the Burrard Peninsula with a 35 minute commute to the downtown?
• A larger, full-featured detached house in the Fraser Valley with a one hour and 15 minute commute to the downtown?

The responses to these questions were crosstabulated by the following variables:

• Current housing type and tenure;
• Current tenure and subregion;
• Income and age group.

Before presenting the results of these crosstabulations, it is useful to provide a profile of the respondents, which provides a cross-section of household situations across the region. A reasonable effort was made to make the sample as representative as possible within the constraint that an equal number of apartment, attached house, and detached house households were required. A wide range of ages, incomes, tenures, household compositions, housing types and municipalities is found in the sample of 606. As the following two tables show, the younger and lower income respondents tended to be renting apartments, while older, higher income groups tended to own ground-oriented housing. Recall that the degree of home ownership for younger age groups and lower income groups has strongly decreased over the last two decades.
Table 13- GOMD Survey Income, Age and Housing Type of Respondents

Household Income * Age Group * House Type Now Crosstabulation

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Age Group</th>
<th>House Type Now</th>
<th>Detached House</th>
<th>Townhouse/Duplex</th>
<th>Apartment</th>
<th>Total</th>
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<tr>
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Source: GVRD 1996 GOMD Telephone Survey, crosstabulations by author.
Table 14 - GOMD Survey Income, Age and Tenure Type of Respondents

Household Income * Age Group * Tenure Crosstabulation

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<tr>
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<tr>
<td>Age</td>
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<td></td>
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<tr>
<td>under 35</td>
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</tr>
<tr>
<td>Group</td>
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<tr>
<td>under 35</td>
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<td>27</td>
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<td>35 to 54</td>
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<td>139</td>
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</tr>
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</table>

Source: GVRD 1996 GOMD Telephone Survey, crosstabulations by author.
The following table shows that owners of ground-oriented housing were much more satisfied with their housing than renters of ground-oriented housing, but the owners of apartment condominium units were much less satisfied than owners of ground-oriented housing. While the level of dissatisfaction of apartment renters was understandably higher, there was not a significant difference in the satisfaction level between renters and owners of apartment-style units. This lack of satisfaction may be linked to design and quality issues introduced earlier or may be an indication that growing households require more space, as the Angus Reid survey found. This observation has an important potential impact on the long-term success of growth management. If condominium owners are finding that they are not much more satisfied with their housing situation than they were when renting, there may be a latent demand building for more ground-oriented housing and hence growing political pressure to accommodate this demand.

Table 15 - GOMD Survey Level of Satisfaction with Current Housing

<table>
<thead>
<tr>
<th>Counts</th>
<th>Satisfaction Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Type Now</td>
<td>Very Dissatisfied</td>
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<td>Detached House</td>
<td>Rent</td>
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<tr>
<td>Own</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Townhouse/Duplex</td>
<td>Rent</td>
</tr>
<tr>
<td>Own</td>
<td></td>
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<tr>
<td>Total</td>
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<tr>
<td>Apartment</td>
<td>Rent</td>
</tr>
<tr>
<td>Own</td>
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</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

Source: GVRD 1996 GOMD Telephone Survey, crosstabsulations by author.

Although it may seem obvious, the study found that if price were no object, households of all types would prefer a large, single family detached house. The following tables show that the preference for detached houses transcends age, income, tenure, or subarea of residence.

244 Vancouver respondents who were resale home buyers were three times more likely to mention "large lot" as something they were looking for in a home (15%) than first-time buyers (5%).
Table 16 - GOMD Survey First Housing Choice by Income and Age

Household Income * Age Group * First Housing Choice Crosstabulation

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Age Group</th>
<th>First choice for housing</th>
<th>Wouldn't choose</th>
<th>Total</th>
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<td>Townhouse: 8</td>
<td>Apartment: 6</td>
</tr>
<tr>
<td></td>
<td>35 to 54</td>
<td>House: 38</td>
<td>Townhouse: 7</td>
<td>Apartment: 3</td>
</tr>
<tr>
<td></td>
<td>55 or older</td>
<td>House: 20</td>
<td>Townhouse: 14</td>
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<td></td>
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<td>Townhouse: 29</td>
<td>Apartment: 13</td>
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<tr>
<td>$40,000-69,999</td>
<td>under 35</td>
<td>House: 62</td>
<td>Townhouse: 2</td>
<td>Apartment: 3</td>
</tr>
<tr>
<td></td>
<td>35 to 54</td>
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<td>House: 15</td>
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<td></td>
<td>Total</td>
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<td>under 35</td>
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<td></td>
<td>Total</td>
<td>House: 107</td>
<td>Townhouse: 20</td>
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<td>House: 19</td>
<td>Townhouse: 2</td>
<td>Apartment: 2</td>
</tr>
<tr>
<td></td>
<td>35 to 54</td>
<td>House: 50</td>
<td>Townhouse: 8</td>
<td>Apartment: 2</td>
</tr>
<tr>
<td></td>
<td>55 or older</td>
<td>House: 32</td>
<td>Townhouse: 7</td>
<td>Apartment: 1</td>
</tr>
<tr>
<td></td>
<td>Not Given</td>
<td>House: 6</td>
<td>Townhouse: 1</td>
<td>Apartment: 1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>House: 107</td>
<td>Townhouse: 17</td>
<td>Apartment: 5</td>
</tr>
</tbody>
</table>

Source: GVRD 1996 GOMD Telephone Survey, crosstabulations by author.

Table 17 - GOMD Survey First Housing Choice by Subregion and Tenure

Tenure * Subregion * First Housing Choice Crosstabulation

<table>
<thead>
<tr>
<th>Tenure</th>
<th>Subregion</th>
<th>Vancouver/UEL</th>
<th>House</th>
<th>Townhouse</th>
<th>Apartment</th>
<th>Wouldn't choose</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent</td>
<td>Subregion</td>
<td>Vancouver/UEL</td>
<td>House</td>
<td>Townhouse</td>
<td>Apartment</td>
<td>Wouldn't choose</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Inner Suburbs</td>
<td>43</td>
<td>9</td>
<td>8</td>
<td>1</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outer Suburbs</td>
<td>35</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>79</td>
<td>12</td>
<td>8</td>
<td>3</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>157</td>
<td>27</td>
<td>18</td>
<td>9</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>Own</td>
<td>Subregion</td>
<td>Vancouver/UEL</td>
<td>House</td>
<td>Townhouse</td>
<td>Apartment</td>
<td>Wouldn't choose</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Inner Suburbs</td>
<td>30</td>
<td>14</td>
<td>5</td>
<td>4</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outer Suburbs</td>
<td>73</td>
<td>17</td>
<td>6</td>
<td>14</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>188</td>
<td>29</td>
<td>6</td>
<td>6</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>291</td>
<td>60</td>
<td>17</td>
<td>24</td>
<td>392</td>
<td></td>
</tr>
</tbody>
</table>

Source: Data from GVRD 1996 GOMD Telephone Survey, crosstabulations by author.
The important differences between the household groupings occur when they are given a choice between two hypothetical options: a smaller townhouse in the Burrard Peninsula requiring only a short commute to work and a larger detached house with yard in the Fraser Valley requiring a long commute to work.

Table 18 - GOMD Survey Preferences by Subregion, Current Housing Type and Tenure

Subregion * House Type Now * Tenure * Preferred GO Housing Crosstabulation

<table>
<thead>
<tr>
<th>Subregion</th>
<th>House Type Now</th>
<th>Tenure</th>
<th>Rent</th>
<th>Own</th>
<th>No preference</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver/UEL</td>
<td>Detached House</td>
<td>Rent</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Townhouse/Duplex</td>
<td>Rent</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Own</td>
<td>1</td>
<td>24</td>
<td>1</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2</td>
<td>31</td>
<td>3</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Apartment</td>
<td>Rent</td>
<td>9</td>
<td>35</td>
<td>3</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Own</td>
<td>2</td>
<td>15</td>
<td>3</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>11</td>
<td>50</td>
<td>6</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Inner Suburbs</td>
<td>Detached House</td>
<td>Rent</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own</td>
<td>15</td>
<td>27</td>
<td>9</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>16</td>
<td>30</td>
<td>10</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Townhouse/Duplex</td>
<td>Rent</td>
<td>2</td>
<td>12</td>
<td>3</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Own</td>
<td>3</td>
<td>27</td>
<td>4</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5</td>
<td>39</td>
<td>7</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Apartment</td>
<td>Rent</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Own</td>
<td>2</td>
<td>18</td>
<td>5</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9</td>
<td>33</td>
<td>9</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Outer Suburbs</td>
<td>Detached House</td>
<td>Rent</td>
<td>20</td>
<td>7</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own</td>
<td>79</td>
<td>18</td>
<td>12</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>99</td>
<td>25</td>
<td>13</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>Townhouse/Duplex</td>
<td>Rent</td>
<td>18</td>
<td>14</td>
<td>1</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Own</td>
<td>31</td>
<td>37</td>
<td>12</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49</td>
<td>51</td>
<td>13</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>Apartment</td>
<td>Rent</td>
<td>23</td>
<td>15</td>
<td>3</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Own</td>
<td>12</td>
<td>20</td>
<td>8</td>
<td>40</td>
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<tr>
<td></td>
<td>Total</td>
<td>35</td>
<td>35</td>
<td>11</td>
<td>81</td>
<td></td>
</tr>
</tbody>
</table>

*Source: GVRD 1996 GOMD Telephone Survey, crosstabulations by author.*
Table 19 - GOMD Survey Preferences by Subregion, Income and Age

Subregion * Household Income * Age Group * Preferred GO Housing Crosstabulation

<table>
<thead>
<tr>
<th>Counts</th>
<th>Household Income</th>
<th>Preferred GO Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fraser Valley house</td>
</tr>
<tr>
<td>Vancouver/UEL &lt; $40,000</td>
<td>Age under 35</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7</td>
</tr>
<tr>
<td>$40,000-69,999</td>
<td>Age under 35</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3</td>
</tr>
<tr>
<td>&gt; $70,000</td>
<td>Age under 35</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23</td>
</tr>
<tr>
<td>Not Given</td>
<td>Age under 35</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Not Given</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4</td>
</tr>
<tr>
<td>Inner Suburbs &lt; $40,000</td>
<td>Age under 35</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10</td>
</tr>
<tr>
<td>$40,000-69,999</td>
<td>Age under 35</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Not Given</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8</td>
</tr>
<tr>
<td>&gt; $70,000</td>
<td>Age under 35</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3</td>
</tr>
<tr>
<td>Not Given</td>
<td>Age under 35</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Not Given</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9</td>
</tr>
<tr>
<td>Outer Suburbs &lt; $40,000</td>
<td>Age under 35</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>40</td>
</tr>
<tr>
<td>$40,000-69,999</td>
<td>Age under 35</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
</tr>
<tr>
<td>&gt; $70,000</td>
<td>Age under 35</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Not Given</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>34</td>
</tr>
<tr>
<td>Not Given</td>
<td>Age under 35</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Age 35 to 54</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Age 55 or older</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Not Given</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: GVRD 1996 GOMD Telephone Survey, crosstabulations by author.
Of particular note is that those living in the regional core municipalities would overwhelmingly prefer a townhouse in the Burrard Peninsula, regardless of their current housing type and tenure, age or income. This indicates that urbanites in the GVRD do not find their living situation to be as bad as many suburbanites may suppose. Higher income households in particular would choose the townhouse, confirming again that lower income households consider commuting time to be a necessary tradeoff to achieve better housing. Those already living in townhouses or duplexes in Vancouver or the inner suburbs are the strongest supporters of the townhouse option, suggesting that the benefits of the option may not be apparent to many potential buyers. Reasons stated for preferring the townhouse were tied to improved access to work, the downtown, and amenities.

Suburban households, particularly those already living in detached houses, appear to be strongly set in their ways, preferring the detached house in the Fraser Valley. The reasons stated by those preferring the house option were strongly tied to the family-oriented environment in detached home subdivisions and city problems such as noise and crime. Less important reasons included space and privacy advantages.

The survey also studied the willingness of households to accept the concept of higher density living, in response to the problems associated with NIMBYism identified earlier. Unfortunately, as the following figure shows, those survey respondents living in detached houses are far more reluctant to accept higher density forms of housing than those respondents living in townhouses and apartments. Households living in detached houses still represent the large majority of households in the region. This finding does not bode well for future attempts at intensification to provide households with a non-hypothetical option between the townhouse close to employment or the house at the regional fringe. The solution to the dilemma that emerges is the application of an incremental/iterative approach: 1. Promote some duplexing and small townhouse complexes, against which there is less opposition, in SFD neighbourhoods across the region; 2. Once more residents are living in higher density duplexes and smaller townhouse complexes, introduce more duplexes and small townhouse complexes along with larger townhouse complexes.

245 Boutilier and Associates for the GVRD and the Real Estate Foundation Report on Telephone Survey of GVRD Residents on Attitudes Towards Ground-Oriented, Medium-Density Housing (July 1996). p. 34.
Several approaches to intensification in SFD neighbourhoods, those which would be more acceptable to nearby households, were identified in a 1985 Vancouver planning study.\textsuperscript{246} These include intensification which concentrates redevelopment around already heterogeneous neighbourhoods, changes existing derelict and incompatible uses or adds new community amenities. Infill housing which is clearly family-oriented is also much more acceptable to existing residents. The study found that residents living immediately adjacent to redevelopment projects expressed the most dissatisfaction over the long-term, while other residents living quite close to the projects usually reported experiencing little or no effects.

A final observation of the study worth mentioning is that, among the telephone survey respondents, the overall preference between the Burrard Peninsula townhouse and the Fraser Valley house was highly price elastic. As the following figure shows, a $50,000 difference in price, coincidentally the mortgage equivalent of maintaining the extra vehicle associated with suburban living, would make households choose the townhouse by a ratio of 2:1.

\textsuperscript{246} Planning Department, City of Vancouver  New neighbours: How Vancouver's single-family residents feel about higher density housing (1986): p. 14, "Lessons."
The challenges for effective growth management that the survey raises are clear, but a number of opportunities are present as well. Households are amenable to townhouse living under the right circumstances, particularly those households already living in higher density housing types within the regional core. If mechanisms can be found to provide ground-oriented, medium-density housing near the regional core at or below the cost of detached houses in the Fraser Valley, an important opportunity to counter the flight of middle class households to the suburbs exists. Clearly, efforts by the GVRD to entice significant numbers of dedicated suburbanites back into the regional core would provide minimal results, even if the tenuous assumption was made that GVRD board members from suburban communities would entertain such an effort. Keeping households already living in the urban core from leaving, through mitigating the causes of neighbourhood resistance to higher density more aggressively and providing more attractive ground-oriented ownership alternatives, does appear to be a highly feasible approach.
3.6.3 A Market Profile of Vancouver’s Kitsilano Neighbourhood

The increasingly costly Kitsilano neighbourhood of Vancouver, considered as recently as the early 1980s to be a highly affordable area, will be used to provide a barometer of buyer preferences in the Vancouver market, the region’s largest employment centre. The neighbourhood was chosen for being an excellent example of the complete community that the GVRD would like to promote. The neighbourhood has medium-density, a mix of housing types and tenures, a wide variety of shopping opportunities, excellent community amenities, frequent transit service and easy access to a large number of employment locations.

As was reported above in the section on housing starts, low-rise and high-rise apartment condominiums dominate Vancouver’s new housing market and Vancouver dominates GVRD housing starts. Households which prefer the ownership of other forms of housing are highly unlikely to locate in the city as a result. This section will examine the changing socioeconomic characteristics of neighbourhood residents and provide an analysis of how the housing market influences, and has been influenced by, these changes.

Source: Base map from Statistics Canada, overlays by author.

Figure 45 - Overview of Kitsilano Neighbourhood
Age Demographics

Table 20- Age Trends in Kitsilano

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>All</td>
<td>30270</td>
<td>100.00%</td>
<td>34530</td>
</tr>
<tr>
<td>0-9</td>
<td>1735</td>
<td>5.73%</td>
<td>2025</td>
</tr>
<tr>
<td>10-19</td>
<td>2190</td>
<td>7.23%</td>
<td>1785</td>
</tr>
<tr>
<td>20-29</td>
<td>9655</td>
<td>31.90%</td>
<td>9855</td>
</tr>
<tr>
<td>30-39</td>
<td>6755</td>
<td>22.32%</td>
<td>8800</td>
</tr>
<tr>
<td>40-49</td>
<td>2490</td>
<td>8.23%</td>
<td>5160</td>
</tr>
<tr>
<td>50-59</td>
<td>2500</td>
<td>8.26%</td>
<td>2360</td>
</tr>
<tr>
<td>60+</td>
<td>4950</td>
<td>16.35%</td>
<td>4145</td>
</tr>
</tbody>
</table>

Source: Statistics Canada.

The largest increases in population are occurring in the 30-49 age group, which confirms the observations of marketing representatives for various recent projects. While the number of young children (0-4 years) is increasing moderately, there is a clear trend away from households with children from 10 years up to university age. Part of this is likely due to the aging of the population as a whole, but the net leakage of young couples with school age children to other areas of the Lower Mainland is clearly a major contributing factor. In general, younger adults and senior citizens are also leaving the neighbourhood in large numbers, making the population increasingly homogeneous.
### Income Demographics

#### Table 21 - Income Trends in Kitsilano

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>All</td>
<td>16615</td>
<td>100.00%</td>
<td>18865</td>
</tr>
<tr>
<td>&lt; $10,000</td>
<td>1915</td>
<td>11.53%</td>
<td>1585</td>
</tr>
<tr>
<td>$10,000 - $19,999</td>
<td>2830</td>
<td>17.03%</td>
<td>2760</td>
</tr>
<tr>
<td>$20,000 - $29,999</td>
<td>3065</td>
<td>18.45%</td>
<td>3045</td>
</tr>
<tr>
<td>$30,000 - $39,999</td>
<td>2860</td>
<td>17.21%</td>
<td>2745</td>
</tr>
<tr>
<td>$40,000 - $49,999</td>
<td>1920</td>
<td>11.56%</td>
<td>2315</td>
</tr>
<tr>
<td>$50,000 - $59,999</td>
<td>1270</td>
<td>7.64%</td>
<td>1590</td>
</tr>
<tr>
<td>$60,000 - $69,999</td>
<td>870</td>
<td>5.24%</td>
<td>1370</td>
</tr>
<tr>
<td>&gt; $70,000</td>
<td>1885</td>
<td>11.35%</td>
<td>3445</td>
</tr>
</tbody>
</table>

*Source: Statistics Canada.*

Households in Kitsilano are becoming increasingly more wealthy, particularly in the higher income classes earning above $60,000 per year. There was also moderate growth in the number of households earning from $40,000 to $60,000. This observation is possibly due to the rezoning of a large area from RS-1 (SFD) to RT-8 (Duplex) in the 1980s, resulting in a large, temporary increase in the availability of affordable rental housing. This trend may have changed during the last census period, as average rents for two bedroom apartments in the Kitsilano neighbourhood currently exceed $1000/month.\(^{247}\)

---

Table 22 - New Housing Market in Kitsilano

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Det. House</th>
<th>Att. House</th>
<th>Hi-Rise</th>
<th>Low-Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starts</td>
<td>2</td>
<td>29</td>
<td>0</td>
<td>194</td>
</tr>
<tr>
<td>Completions</td>
<td>1</td>
<td>39</td>
<td>45</td>
<td>206</td>
</tr>
<tr>
<td>Absorptions (1996)</td>
<td>3</td>
<td>27</td>
<td>31</td>
<td>248</td>
</tr>
<tr>
<td>Under Construction (December 1996)</td>
<td>3</td>
<td>20</td>
<td>0</td>
<td>174</td>
</tr>
<tr>
<td>Inventory (December 1996)</td>
<td>1</td>
<td>13</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Absorption Rate (1996)</td>
<td>75%</td>
<td>75%</td>
<td>69%</td>
<td>96%</td>
</tr>
</tbody>
</table>


Low-rise condominiums are the dominant new housing type in the area, in large part due to zoning restrictions, and will be the unit type associated with the buyer profiles given below. As was noted above in the section on Land Economics, Housing and Location Choices, the price per square foot of these projects currently ranges between $260/sq.ft. and $290/sq.ft., which is three times the cost per square foot of an entry level detached house in the Fraser Valley. Unit prices range from $130,000 for a studio or small one bedroom unit up to $280,000 for a larger two bedroom with den unit or distinguishing amenity such as a view or a sundeck. Most units fall in the $180,000 to $240,000 price range.

Unit Type, Size and Features

There is some variation between projects on the mix of unit types offered, but units are generally well under 900 sq.ft. Some projects stress two bedroom and two bedroom with den units, while most provide a balance of one bedroom, one bedroom with den, and two bedroom units. The distinction between one bedroom with den units and two bedroom units is often quite subtle, but
usually a “den” is unsuitable as a regular bedroom due to size or geometry. A few projects include a limited number of larger two and three bedroom penthouse units. An increasing number of projects now also offer “city homes,” a variation of stacked townhouses, which are gaining acceptance throughout the city. These units are usually two-level, ground-oriented units with private entrances and gardens beneath units on upper floors.

One bedroom units range from 500 sq.ft. to 650 sq.ft., one bedroom and den from 600 sq.ft. to 750 sq.ft., two bedroom units from 800 to 850 sq.ft., and two bedroom and den from 850 sq.ft. to 950 sq.ft. A limited number of three bedroom and townhouse style units of 1000 sq.ft. or more are offered. There is considerable variability in the amount of outside space offered from zero up to several hundred sq.ft. of patio or deck. Surprisingly, there is no clear relationship between the existence or size of outside space and the price of units, although view and orientation to sunlight and streets makes a considerable difference in unit prices and absorption rates. Buyers have indicated a preference for having access to some form of private outside space.

Most projects stress gourmet kitchens and designer bathrooms with features such as halogen track lighting, ceramic tiles, stainless steel sinks and large tubs. Cheaper stucco exteriors are still the norm, although they have often been subject to water penetration and there is a trend towards the use of more brick and cedar shingles. These exteriors lend more of an air of tradition and permanence to the buildings. Interior finishes vary considerably, particularly in the quality of flooring materials. High quality countertops and cupboards appear to be standard, as are natural gas fireplaces and a complete package of appliances, including fridge, stove, dishwasher, washer and dryer. All projects have security systems installed or pre-wired and gated underground parking. A quickly growing trend is the provision of high speed Internet connections. Large, walk-in closets attached to the master bedroom is a common feature, often with access to an ensuite bathroom or the main bathroom through a second entrance. An in-suite storage area is included in about two-thirds of the units.
Profiles of Condominium Buyers

The profile of the buyers in these projects closely matches the 1991 demographic profile of new residents to Kitsilano: singles or couples in their late-twenties to early forties, mostly in their mid-thirties. Most buyers are first-time buyers, although there is a less significant number of seniors and single parents. Very few couples with children appear to be attracted to this area at the current time. The split between the ratio of singles and couples seems to vary significantly from project to project, with some marketing agents claiming up to 80% singles and others suggesting a 50/50 mix. Advertising for most projects appears to be focussed directly at couples in their late twenties and early thirties. While there are a number of off-shore buyers, the large majority of buyers are first-time buyers from the Vancouver area who work in Vancouver.

Couples and singles appear to be equally interested in two bedroom units, and most buyers are interested in some form of additional room to use as a den, office, or guest room. The increase in young children indicates that the extra room may also be serving as a nursery in some cases. This could be a sign that these households would like to prolong their stay in the city as long as possible before seeking other housing options.

Summary

The Kitsilano neighbourhood, an excellent example of a complete community, is witnessing a growing homogeneity in the makeup of new households. Higher income, childless, professional singles and couples in their mid-thirties now dominate the new housing market, which consists primarily of two bedroom low-rise condominium units in the $180,000 to $240,000 price range with 800 sq.ft., +/- 100 sq.ft. of space. As with the rest of Vancouver, growth in the number of low and middle income households is stagnating while there is strong growth in the number of higher income households, i.e., the lower-middle class is leaving the city.

Based on interviews in March/April 1997 with sales agents representing MacDonald Realtors, Greystone Properties Limited, United Pacific Management Corporation, Intergulf Development Corporation (Kitsilano) and Bonaventure Projects.
3.6.4 A Market Profile of Surrey’s Clover Valley Station Subdivision

On the eastern side of the region, a study of households buying single family detached homes in a subdivision located far from regional employment centres is useful for comparison with the behaviour observed in a complete community close to employment centres, such as Kitsilano.

The factors that make the Clover Valley Station subdivision an interesting and appropriate case study of a suburban subdivision are:

- “Neo-traditional” design of houses is being promoted as a possible model for GOMD housing, being street-oriented and built on small lots;
- In spite of the attractive design and high quality of the homes, prices are considered to be entry-level for the single family detached housing market;
- The subdivision is automobile-dependent, with no transit routes passing near and poor access to shopping and services. Potential buyers would realize that the area would be difficult to service effectively by transit, with only 7-8 units to the acre.
- The location is at the outside edge of the Growth Concentration Area defined by the GVRD and is close to areas designated by the council of Langley District for rapid residential development, contrary to the wishes of the GVRD’s LRS;
- The project has been extremely popular and has received numerous awards, enjoying one of the highest absorption rates for detached houses in the regions, at approximately 20/month;
- The developer has maintained records on buyers which form a useful basis for statistical analysis, lacking only in household income and travel mode data.
Average House Price ($)

- 457,000 to 647,000 (1)
- 270,000 to 457,000 (3)
- 212,000 to 270,000 (2)
- 191,000 to 212,000 (4)
- 156,000 to 191,000 (3)
- 127,000 to 156,000 (3)

Source: Base map from Statistics Canada, overlays by author.

Figure 46 - Location of Clover Valley Station Subdivision

Unit Type, Size, Cost and Features

The subdivision consists entirely of single family detached houses in a curvilinear street pattern with wide streets in addition to back lanes. Most lot sizes fall in the range of 3000 sq.ft. to 4200 sq.ft., or lots with dimensions of approximately 30 ft. by 100 ft. to 35 ft. by 120 ft. Most homes are in the $215,000 to $240,000 price range. This is under $100/SFB for units ranging from 1525 sq.ft. to 1875 sq.ft. above grade and 800 sq.ft. below grade. It is worth recalling again that wood-frame condominium units in central Vancouver range between $240 to $290/SFB with underground parking and little or no outdoor space.

The homes are heritage-style, with two-storey, wood-frame construction, an open concept on the ground floor and three or four bedrooms on the second floor. Exteriors feature well thought-out colour patterns with verandahs and bay windows while the quality of interior finishing is high with 9' vaulted ceilings on the ground floor. All units have large kitchens and 2 1/2 baths with
oversized tubs. All utilities in the subdivision are underground and parking is off of rear lanes. It would be fair to say that these homes are a close approximation of every young couple's dream house. All that is missing are white picket fences, which surrounded model homes and are listed in promotional material as an option.

**Household Profile**

Of those home owners whose ages were known, the mean age is 38. The distribution is somewhat skewed due to a number of retirees who have chosen to live in the community, so the median age would be in the early thirties. While there are a number of professionals such as teachers, nurses and accountants listed among the occupations of household members, there is a much higher number of technical, retail and service workers than in the Kitsilano neighbourhood.

*Source: ParkLane Homes, statistical analysis by author.*

**Figure 47 - Age Profile of Buyers in Clover Valley Station**
Of the 60 households that reported on whether or not children were present, zero, one, and two children were each reported in about one-third of the households, with only 5% of the households reporting three children and none reporting more than three children present. The average age of children living at home is approximately seven.

![Average Age of Children in Household](image)

**Source:** ParkLane Homes, statistical analysis by author.

**Figure 48 - Age Profile of Children in Clover Valley Station**

The number of first time buyers and previous owners is roughly equal. It is noteworthy that first-time buyers from Vancouver outnumber previous owners from Vancouver by a 3:1 ratio. The ratio is 2:1 for those moving from Richmond. In contrast, the large majority of buyers from Surrey and Langley, the two municipalities of which the subdivision is roughly the centre point, are previous homeowners.
Table 23 - Comparison of First-time and Previous Buyers in Clover Valley Station

Previous Location for First-time Buyers and Previous Owners

<table>
<thead>
<tr>
<th>CITYFROM</th>
<th>First-time Buyer?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Outside</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>CMA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Burnaby</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Coquitlam</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Delta</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Langley</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Maple Ridge</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>New Westminster</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>North Vancouver</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Port Coquitlam</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Port Moody</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Richmond</td>
<td>49</td>
<td>34</td>
</tr>
<tr>
<td>Surrey</td>
<td>14</td>
<td>41</td>
</tr>
<tr>
<td>Vancouver</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>White Rock</td>
<td>158</td>
<td>147</td>
</tr>
</tbody>
</table>

Source: ParkLane Homes, crosstabulation by author.

A significant proportion of the households are carrying large mortgages. As most of these homes have sold in the range of $225,000 to $240,000, it would appear that the majority were high ratio mortgages, where less than 25% was paid as a down payment.
Although household income information was not collected, it could be assumed that, with an average mortgage of $175,000, and monthly payments ranging from $1,127 at 6% APR (current rates) to $1350 at 8% APR (1995 rates) for a 25 year amortization period, minimum household incomes would need to be in the range of $40,000 to 60,000. Mortgage payments are assumed here to fall in the range of 25 to 40% of the pre-tax monthly income. As it appears from the data that the majority of households have two adults in the workforce and, from a visual inspection at the site, operate an average of two motor vehicles, an additional $5,000 to $10,000 could be added to these minimum incomes to account for the additional costs of vehicle maintenance.

It should be noted that interest rates are currently at 20 year lows, which may have encouraged more first-time and lower income buyers to enter the market. A time-series analysis of buyer trends would be needed to determine how elastic demand for this type of housing would be at various mortgage payment levels. For example, a return to 1990 interest rates would add $15,000 to $20,000 to the minimum income required to carry a typical mortgage of $175,000.
Nevertheless, with mortgage interest rates and household incomes relatively stable, the profile of buyers can be considered to be fairly representative of entry-level households looking for ground-oriented housing in the Vancouver region during the mid-1990s.

*Place of Work*

The table on the following page maps out the previous Place of Residence and the Place of Work of Clover Valley Station residents. Of those homeowners whose workplace within the Vancouver CMA could be identified (118), 60% work within the regional employment centres of Vancouver, Burnaby, New Westminster, and Richmond while only 82 have a workplace in other Vancouver CMA municipalities. The City of Vancouver is the most common workplace, accounting for over one-quarter of all identified workplaces, a number roughly equal to the sum of identified workplaces in both Surrey and the Langley's. This is quite surprising, given that Clover Valley Station lies at approximately the geographic midpoint of Surrey and the Langley's.

This data reinforces the hypothesis that, in spite of significant and growing traffic congestion on the bridges and highways connecting this area with regional employment centres, low housing prices in distant suburbs are pulling households from employment concentration areas. Regional policies which promote a more compact metropolitan region in which communities strive for a balance of jobs, housing, services and recreation opportunities, cannot be achieved if housing prices continue to have such an important influence on family households, which form the large majority of households in the region. Surrey and Langley in particular have had chronic severe deficiencies of jobs with respect to housing, a trend that will continue if the locational decisions exhibited in Clover Valley Station continue.
Table 24 - Work Locations and Previous Residential Locations of Clover Valley Station Residents

CITYFROM * CITYWORK Crosstabulation

<table>
<thead>
<tr>
<th>CITYWORK</th>
<th>Burnaby</th>
<th>Delta</th>
<th>Langley</th>
<th>New Westminster</th>
<th>North Vancouver</th>
<th>Port Coquitlam</th>
<th>Richmond</th>
<th>Surrey</th>
<th>Vancouver</th>
<th>White Rock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITYFROM</td>
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<td></td>
<td></td>
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<td></td>
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</tr>
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<td></td>
<td>19</td>
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<tr>
<td>Coquitlam</td>
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<td></td>
<td>1</td>
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<td></td>
<td></td>
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<td>2</td>
</tr>
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<td>Delta</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td>17</td>
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<td>2</td>
<td>2</td>
<td>5</td>
<td></td>
<td></td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>1</td>
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<td>19</td>
</tr>
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<td>Maple Ridge</td>
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<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
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<td>1</td>
<td>1</td>
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<td>8</td>
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<td>Port Moody</td>
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<td></td>
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<td>2</td>
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<td>2</td>
<td>25</td>
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<td>46</td>
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<tr>
<td>Total</td>
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<td>14</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>26</td>
<td>46</td>
<td>58</td>
<td>4</td>
<td>200</td>
</tr>
</tbody>
</table>

Source: ParkLane Homes, crosstabulation by author.
Summary

Residents of Clover Valley Station come from all parts of the Vancouver CMA. The typical household profiles that emerge are of previous owners from Surrey or Langley and first-time buyers from Richmond, Burnaby, New Westminster and Vancouver, many of whom have children of elementary school age and continue to work in the municipality from which they moved. A disproportionately high number work in Vancouver, 30 km away over increasingly congested water crossings, and other distant workplaces in the regional core. Most residents own more than one vehicle and hold highly leveraged mortgages.

The subdivision, while of high quality and character, is almost completely automobile-dependent and devoid of most community amenities and nearby employment opportunities. The obvious attraction of such housing to a large cross-section of young family households over condominium units within the regional core is a clear warning to regional planners and decision makers. Equally attractive, ground-oriented housing options must be provided closer to employment centres for these households if the Livable Region Strategy is to succeed.
3.7 Place of Residence and Place of Work Analysis

3.7.1 Data Specification for Residence and Workplace Crosstabulations

The identification of major differences in travel trends based on socioeconomic differences provides support for government intervention in the areas of housing, land use and transportation policy to achieve growth management goals. In particular, this information allows an exploration of the “push-pull” effect of housing prices on household location decisions and travel patterns in the GVRD. The FVRD, while not the primary focus of this thesis, was included in order to verify the suspected growth in long distance commuting from the FVRD to destinations in the GVRD. After an examination of data requirements and available information, specifications for a crosstabulated work trip matrix based on 1991 census data were developed with guidance from Ted Brown of Statistics Canada and Ralph Perkins of the GVRD Strategic Planning Department. The data specification and analysis consisted of several stages:

- **Definition of “geographies.”** These are groupings of locations which could be isolated from information contained on census returns. These include municipalities and electoral areas such as UBC/UEL, known as Census Subdivisions (CSDs), “At home” as a workplace geography, and collections of other geographies, such as the GVRD or Lower Mainland.

- **Identification of variables.** These include income and age, from individual and household census databases, each known as data “universe.”

- **Organization of the data into a manageable structure.** Over 3/4 of a million data cells were delivered by StatsCan to account for 26 different geographies in the study area for each of 1,344 possible permutations of the crosstabulation variables, known as “conditions.”

- **Calculation of workplace proportions.** These are the numbers of workplaces for residence geographies for each condition as percentages of the residence geography’s total workplaces.

- **Comparison of proportions with the baseline condition.** This involved subtracting the proportion of workplaces for conditional cases from the proportion for the baseline case.

- **Correlation of these significant differences.** Determine significant differences in the proportions and relate these to socioeconomic variables to identify important influences.
The general form of a Place of Work versus Place of Residence matrix is:

**Table 25 - Work Trip Matrix Format**

<table>
<thead>
<tr>
<th></th>
<th>Work at Home</th>
<th>No Usual POW</th>
<th>Work CSD1</th>
<th>..</th>
<th>Work CSDn</th>
<th>Other Areas</th>
<th>Total</th>
<th>GVRD</th>
<th>FVRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home CSD1</td>
<td>H1</td>
<td>NR1</td>
<td>N11</td>
<td>..</td>
<td>N1n</td>
<td>N1o</td>
<td>N1t</td>
<td>N1g</td>
<td>N1f</td>
</tr>
<tr>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>Home CSDn</td>
<td>Hn</td>
<td>NRn</td>
<td>Nn1</td>
<td>..</td>
<td>Nnn</td>
<td>Nno</td>
<td>Nnt</td>
<td>Nng</td>
<td>Nnf</td>
</tr>
<tr>
<td>Other Area</td>
<td>Ho</td>
<td>NRo</td>
<td>No1</td>
<td>..</td>
<td>Non</td>
<td>Noo</td>
<td>Not</td>
<td>Nog</td>
<td>Nof</td>
</tr>
<tr>
<td>Total</td>
<td>Ht</td>
<td>NRt</td>
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<td>Ntn</td>
<td>Nto</td>
<td>Ntt</td>
<td>Ntg</td>
<td>Ntf</td>
</tr>
<tr>
<td>GVRD</td>
<td>Hgvrd</td>
<td>NRgvrld</td>
<td>Ngvrd1</td>
<td>..</td>
<td>Ngvrdn</td>
<td>Ngvrdo</td>
<td>Ngvrdt</td>
<td>Ngg</td>
<td>Ngf</td>
</tr>
<tr>
<td>FVRD</td>
<td>Hfvrd</td>
<td>NRfvrd</td>
<td>Nfvrd1</td>
<td>..</td>
<td>Nfvrdn</td>
<td>Nfvrd0</td>
<td>Nfvrdt</td>
<td>Nfg</td>
<td>Nff</td>
</tr>
</tbody>
</table>

Nij are the total Places of Work of employed persons living in geography i and working in geography j. The municipal (CSD) geographies had greater than 5000 employment or employed residents and are the same as those shown in the Introduction. The number of those normally working at home, Hj, and those with no regular place of work, NRj, were also included to account for the growing importance of these two workplaces. The “Other Area” geography is those municipalities with less than 5000 residents or jobs, such as Anmore or Belcarra, combined with all unincorporated areas within the GVRD/FVRD other than UBC/UEL.

The number of work trips between these geographies was broken down by crosstabulations on census variables. For example, one row of the matrix would be the number of work trips for
those less than 40 years, with personal income of $20 to $40k, household income of $40 to $60k, living in a married couple with children in an owned residence less than five years. The crosstabulations identified as potentially significant for examining the effects of household composition and income on housing prices and travel patterns, with total number of variable categories in parentheses, are:

Table 26 - Variables for Trip Matrix Crosstabulations

<table>
<thead>
<tr>
<th>Age</th>
<th>Family Situation</th>
<th>Structure Type</th>
<th>Household Tenure</th>
<th>Mobility</th>
<th>Individual Income (6)</th>
<th>Household Income (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40</td>
<td>Couple, NMSD*</td>
<td>Ground-Oriented+</td>
<td>Owned</td>
<td>Moved &lt; 5 Years</td>
<td>&lt; $20,000</td>
<td>&lt; $20,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$20,000-$39,999</td>
<td>$20,000-$39,999</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$40,000-$59,999</td>
<td>$40,000-$59,999</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$60,000-$79,999</td>
<td>$60,000-$79,999</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; $80,000</td>
<td>$80,000-$99,999</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; $100,000</td>
</tr>
</tbody>
</table>

* NMSD = Never Married Sons and Daughters living at home
+ Ground = Detached, semi-detached, duplex, townhouse, and “other single attached”

It was found that the same data, if reorganized properly, could be used to provide consistent individual income distributions for place of workplace and residence CSDs. Surprisingly, income distributions for workplace CSDs was not available through other sources. Having both workplace and residence profiles available allows the comparison of “daytime” and “nighttime” populations and the probable proportion of the “daytime” (working) population in a given
workplace CSD that can afford to also be the “nighttime” (residential) population given the price distribution of housing in the workplace CSD. The form of the income distribution matrix is:

Table 27 - Income Distribution Matrix Format

<table>
<thead>
<tr>
<th>Income</th>
<th>CSD1</th>
<th>CSD2</th>
<th>...</th>
<th>CSDn</th>
<th>GVRD</th>
<th>FVRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; $20,000</td>
<td>N11</td>
<td>N12</td>
<td></td>
<td>N1n</td>
<td>N1gvrd</td>
<td>N1fvrd</td>
</tr>
<tr>
<td>$20,000-$39,999</td>
<td>N21</td>
<td>N22</td>
<td></td>
<td>N2n</td>
<td>N2gvrd</td>
<td>N2fvrd</td>
</tr>
<tr>
<td>$40,000-$59,999</td>
<td>N31</td>
<td>N32</td>
<td></td>
<td>N3n</td>
<td>N3gvrd</td>
<td>N3fvrd</td>
</tr>
<tr>
<td>$60,000-$79,999</td>
<td>N41</td>
<td>N42</td>
<td></td>
<td>N4n</td>
<td>N4gvrd</td>
<td>N4fvrd</td>
</tr>
<tr>
<td>&gt; $80,000</td>
<td>N51</td>
<td>N52</td>
<td></td>
<td>N5n</td>
<td>N5gvrd</td>
<td>N5fvrd</td>
</tr>
</tbody>
</table>

3.7.2 Place of Work and Place of Residence Crosstabulations

Soon after starting the data analysis, the considerable potential for identifying socioeconomic factors which relate to residential and workplace location was confirmed. Unfortunately, the enormous number of permutations and combinations of possible crosstabulations to investigate also became clear.

In order to focus in on significant differences of interest, a data filters were developed. To select only data that was a significant component of the total number Places of Work for a given Place of Residence, and which higher statistical significance, a pre-filter was applied to all data cells. The pre-filter used allowed the removal of all data cells which represented less than 40 residents or a Places of Work for less than 1% of a Place of Residence’s workforce.

The baseline case for comparison is the percentage of all residents who specified a given Place of Work whereas a conditional case is the percentage of those residents satisfying a combination of age, family status, housing type, tenure and income variables conditions, who specified a given
Place of Work. A surprisingly large number of useful observations resulted from a comparison of the baseline case and the “LT40, NMSD, Ground, Owned, Moved” conditional case with various personal and household income variables:

- Workers in the $<$ $20,000 personal income group were much less likely to have a Place of Work outside of the Place of Residence, and even less likely as the worker’s household income increased. In general, the family “breadwinner,” i.e., the worker in a multi-income household with the greatest income, was the household member who had the more distant Place of Work.
- The percentage of workers with “No Usual Place of Work” was much higher in most cases where individual income was in the $<$ $20,000 and $20,000-$39,999 groups;
- The Place of Work was much less likely to be the Place of Residence for workers in the (LT40, NMSD, Ground, Owned, Moved) cases, particularly in the fastest growing suburbs and in the $40,000-$59,999 and $60,000-$79,999 household income groups.
- Workers in the (LT40, NMSD, Ground, Owned, Moved) cases with a Place of Residence in the FVRD were much more likely to have a Place of Work in the GVRD. Those in these cases with Chilliwack as a Place of Residence were significantly more likely to have a Place of Work in a central or western Fraser Valley municipality.
- The results for Delta were difficult to categorize. This could be due to the split nature of this municipality. “North Delta” is clearly an extension of North Surrey, exhibiting the classic characteristics of a fast growing outer suburban bedroom community, while much of Delta is surrounded by ALR land and has a relatively slow rate of growth. This again demonstrates the argument for defining geographies in future studies by census tract collections to group contiguous areas with similar characteristics, e.g., urban, suburban or rural.
- The percentage of all workers in the (LT40, NMSD, Ground, Owned, Moved) cases with a Place of Residence in the outer suburbs and exurbs is approximately twice as high as those with a Place of Residence in the inner suburbs and three to four times higher than those with a Place of Residence in the regional core;

249 Less than 40 years old, never-married sons and daughters living at home, ground-oriented housing, owned, moved to current home within last five years.
• Surrey and Coquitlam are the most important Places of Residence for detailed study. Each has a large net out-migration of workers. 2/5 of Surrey’s total workforce has a Place of Work in Vancouver, Richmond or Burnaby, while 1/2 of Coquitlam’s total workforce had a Place of Work in Burnaby or Vancouver. While this is an important observation, a much more significant finding is that Surrey’s (LT40, NMSD, Ground, Owned, Moved) group is 30% more likely than the total workforce to have Vancouver or Richmond as a Place of Work, while Coquitlam’s is 40% more likely to have Vancouver as a Place of Work.

• A study of differences between the Places of Work for a Place of Residence’s total workforce and the (LT40, NMSD, Ground, Owned, Moved) group confirms the new “migration routes” that transportation infrastructure has provided suburban residents. For Places of Residence in Langley District, Surrey and North Delta, the Alex Fraser Bridge and Highway 91 openings in the mid-1980s have facilitated access to workplaces in Richmond and Vancouver while delays on the Pattullo and Port Mann Bridges made workplaces in Burnaby and New Westminster less attractive. For Places of Residence in Coquitlam, Pitt Meadows and Maple Ridge, the Maryhill Bypass and Highway 7/Highway 7a/Pitt River Bridge widenings in the late 1970s and mid-1980s appear to have facilitated access to workplaces in Burnaby and Vancouver.

Figure 50 - Proportion of Residents in (LT40, NMSD, Ground, Owned, Moved) Case
The GIS overlay shows that, as expected, the areas of highest population growth coincides with the highest percentage of households in the (LT40, NMSD, Ground, Owned, Moved) categories. A complete set of data for the baseline case and the (LT40, NMSD, Ground, Owned, Moved) conditional case for each household income group and geography is contained in the Appendix C.

Due to their significance to growth management, data for Surrey and Coquitlam were then examined in greater detail. For this purpose, a secondary filter was applied to the pre-filtered data to select conditional cases where there were significant differences with the baseline case, as defined by a "setpoint" number of Places of Work. The secondary filter selected was:

\[
(\% \text{ Difference})_{\text{Other Place of Work}} < -\text{Setpoint AND (}\% \text{ Difference})_{\text{Place of Residence}} > +\text{Setpoint} \quad \text{OR} \\
(\% \text{ Difference})_{\text{Place of Residence}} < -\text{Setpoint AND (}\% \text{ Difference})_{\text{Other Place of Work}} > +\text{Setpoint}
\]

In other words, a significant difference from the baseline case for the Place of Residence geography needed to be offset by a significant countering difference in one or more other Places of Work for a conditional case to be selected for detailed inspection. A setpoint of +/- 40% was found to select a manageable set of conditional cases. From this inspection, a final filter was added to extract conditional cases with more than 1000 Total Places of Work for Surrey and 500 for Coquitlam, the value used reflecting the relative populations of the two municipalities.

**Surrey Place of Work Profiles**

Two sets of conditional cases clearly indicated the most prevalent Place of Work differences from the baseline case. The first set consisted of workers of all ages with personal incomes of $60,000-$79,000 and all household incomes, i.e., households with at least one high-income individual. The second set involved workers less than 40 years old with personal and household incomes of $40,000-$59,999, i.e., moderate-income households with a single-income or two small incomes.
Table 28 - Surrey POW Profiles: Homeowners, All Ages, $60,000-$79,999 Personal Income, All Household Incomes, Moved in Last Five Years

<table>
<thead>
<tr>
<th>Age</th>
<th>Family</th>
<th>Structure</th>
<th>Total POW</th>
<th>POW = Richmond, Vancouver</th>
<th>% POW = Richmond, Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>All</td>
<td>All</td>
<td>2405</td>
<td>970</td>
<td>40%</td>
</tr>
<tr>
<td>All</td>
<td>All</td>
<td>Ground</td>
<td>2310</td>
<td>940</td>
<td>41%</td>
</tr>
<tr>
<td>All</td>
<td>NMSD</td>
<td>All</td>
<td>1580</td>
<td>630</td>
<td>40%</td>
</tr>
<tr>
<td>All</td>
<td>NMSD</td>
<td>Ground</td>
<td>1555</td>
<td>615</td>
<td>40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Places of Work</th>
<th>% Difference from Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Richmond</td>
</tr>
<tr>
<td>305</td>
<td>49%</td>
</tr>
<tr>
<td>290</td>
<td>48%</td>
</tr>
<tr>
<td>235</td>
<td>75%</td>
</tr>
<tr>
<td>230</td>
<td>74%</td>
</tr>
</tbody>
</table>

Table 29 - Surrey POW Profiles: Homeowners, All Ages, $40,000-$59,999 Personal Income, $40,000-$59,999 Household Income, Moved in Last Five Years

<table>
<thead>
<tr>
<th>Age</th>
<th>Family</th>
<th>Structure</th>
<th>Total POW</th>
<th>POW = Richmond, Vancouver</th>
<th>% POW = Richmond, Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT 40</td>
<td>All</td>
<td>All</td>
<td>1905</td>
<td>840</td>
<td>44%</td>
</tr>
<tr>
<td>LT 40</td>
<td>All</td>
<td>Ground</td>
<td>1830</td>
<td>815</td>
<td>45%</td>
</tr>
<tr>
<td>LT 40</td>
<td>NMSD</td>
<td>All</td>
<td>1345</td>
<td>630</td>
<td>47%</td>
</tr>
<tr>
<td>LT 40</td>
<td>NMSD</td>
<td>Ground</td>
<td>1325</td>
<td>630</td>
<td>48%</td>
</tr>
</tbody>
</table>
One interpretation of the observations for the higher income household group, besides the improved transportation links mentioned earlier, is that they were ready to trade up to get “more house for the buck,” and were finding it in places like South Surrey, considered to be a desirable neighbourhood. The lower income group clearly represents the entry level market, and Surrey had an ample supply of the region’s cheapest townhouses and detached homes in the 1980s. The small difference observed between the numbers for all housing types and ground-oriented housing shows clearly that ground-oriented housing is the main attraction for these households in Surrey.

The predominance of SFDs in Surrey is likely to change in the 1996 census, as SkyTrain was extended to Surrey City Centre in the early 1990s and promoted a flurry of inexpensive condominium construction near stations, while SFD construction has declined. The housing start data presented earlier reflects this dramatic change in the fortunes of apartments in Surrey since 1991. Neighbouring Langley appears to have picked up the slack in ground-oriented housing while Surrey focussed on taking advantage of a rare transit-oriented transportation infrastructure project which supported higher density, if not high-density, housing. Similar effects should be expected in the coming years along the route of the West Coast Express commuter train.

Coquitlam Place of Work Profiles

The analysis of the situation in Coquitlam is much more complex. This is perhaps due to the transportation infrastructure in the Northeast Sector before 1991 having been implemented over a longer time period than those that facilitated access to North Delta and Surrey in the 1986 to
1989 time period. Surrey’s growth rate was 20% higher than Coquitlam’s in the 1981 to 1991 period and the percentage of Surrey workers in the (LT40, NMSD, Ground, Owned, Moved) group in 1991 was 1/3 larger than that for Coquitlam. It would be interesting to repeat this study with 2001 census data, after the effects of massive provincial transportation infrastructure spending between 1996 and 1997 have a chance to manifest themselves in the Northeast Sector. The 1991 Surrey data results would indicate that Coquitlam’s (LT40, NMSD, Ground, Owned, Moved) will be more prominent group at that time. After final data filtering and inspection, the following significant patterns emerged for Coquitlam:

- Those with a personal income of $60,000-$79,999 were far more likely (60%-80%) to have a workplace in Vancouver than the baseline case, regardless of household income;
- Those with a personal income of $40,000-$59,999 in NMSD groups were moderately more likely (35%-65%) to have a workplace in Vancouver than the baseline case, regardless of household income. Non-NMSD cases in this personal income group were only slightly more likely to have a workplace in Vancouver (~20%).
- Surprisingly large numbers of those earning $40,000-$59,999 had a workplace in North Vancouver City, while many earning $60,000-$79,999 had a workplace in North Vancouver District. It is worth noting that travel times to Vancouver’s CBD and North Vancouver from Coquitlam are similar.
- There were few discernible differences between any conditional case for workplaces in adjoining Burnaby and New Westminster. The western part of Coquitlam may be acting near-seamless extension of eastern Burnaby and New Westminster, again suggesting a need to group geographies using census tracts as opposed to relying solely on municipal boundaries.

Summary of Place of Work Profile Case Studies

In both municipalities, a prominent subgroup of recently moved, ground-oriented households in moderate income groups stand out from the average household. These households are far more likely to have workplaces in municipalities with higher house prices, often across the region. This is particularly true if the households include workers under 40 and have children living at home.
A large number of households had two or more workers, where the non-primary earner is in the < $20,000 personal income group, especially in Coquitlam. Surrey does have a larger number of workers in the lowest income groups than Coquitlam, and Coquitlam has a larger number of in moderate and higher income groups. The locational implications of the push-pull effects of Place of Residence and Place of Work income distributions are presented more fully in the next section.

To conclude the section, two graphical representations of the crux of the research problem are presented. In the first graph, the predominance of workplaces in Richmond and Vancouver over workplaces in Surrey for Surrey residents in the (LT40, NMSD, Ground, Owned, Moved) conditional case is evident. In the second graph, it is equally evident that Vancouver residents in the (LT40, NMSD, Ground, Owned, Moved) conditional case, although lower in numbers for obvious housing cost reasons (8600 versus 15150), are several times more likely to have their workplace in their Place of Residence as Surrey residents.

Source: Statistics Canada, correlations by author.

Figure 51 - Income Distribution and POW for Surrey Residents
3.7.3 Income Distribution by Place of Work and Place of Residence

From the literature, theory, policies and research findings presented so far, three basic elements stand out as conditions for achieving a suitable balance of jobs and housing in GVRD subareas:

- The number of jobs and housing in a subarea;
- The incomes of those living and working in a subarea;
- Suitable housing that matches the income distribution of those working in a subarea.

In other words, the elements of jobs and housing need to be balanced not only for the aggregate case of the entire population in a subarea, but for the entire spectrum of socioeconomic classes. Examining the majority of households, which purchased homes at a time when prices were much lower, could falsely indicate that there are no long-distance commuting or housing affordability
problems in the region. Achieving a balance in the distribution of incomes for Place of Residence and Place of Work groups within a municipality could also be a misleading indicator. Mission and Delta, for example, have income distributions that are closely matched for Place of Residence and Place of Work groups, but nevertheless have large surpluses of employed residents over local employment, as the Mission case shows:

In extreme cases, such as in West Vancouver, there is a significant difference in the income distribution of those residing in the district and those who work there. High housing prices and a lack of non-service employment opportunities has resulted in large numbers of high-income workers being “exported” while those working in the district have low incomes. In the case of the University Endowment Lands, which includes UBC, a small army of workers in all income classes is “imported” each day, although new residential development since 1991 has likely reduced the gap in higher income groups somewhat:

Source: Statistics Canada, data processing by author.

Figure 53 - POW and POR Income - Mission
Other regional employment and income imbalances are more subtle. Again, when viewed as an aggregate sum, the impacts of important subgroups can be lost. For example, Burnaby imports mostly moderate income workers, Richmond imports significant numbers of low to moderate income workers, and Vancouver exports low income workers while importing moderate to high income workers. The outer suburbs, as we have seen, all export large numbers of moderate income workers to regional core municipalities. It is again interesting to note that, in almost every municipality, the lowest income group was much more likely to live and work within the same municipality. This could be an indication that this group does not have a sufficient income to pay for transportation to distant workplaces or that the higher income member of multi-income households are much more likely to travel the longest distance to their workplaces.

When the data is judiciously disaggregated, a much less subtle picture emerges of how income differences correspond to locational decisions. Workers who had moved in the previous five years and were living in homes owned by a household member were fleeing regional core municipalities in large numbers by 1991 and were heading to the suburbs. This trend was particularly evident in the $20,000-$39,999 and $40,000-$59,999 personal income groups.
For all employed residents in Regional Core Municipalities...

For employed homeowners who had moved in the previous five years...

Source: Statistics Canada, data processing by author.

Figure 55 - POW versus POR Personal Incomes - Regional Core
For all employed residents in Outer Suburban Municipalities...

For employed homeowners who had moved in the previous five years...

Source: Statistics Canada, data processing by author.

Figure 56 - POW versus POR Incomes - Suburbs

It is here that we see the push-pull effect of housing prices most clearly. The commuting patterns observed in the previous sections appear strongly related to the push of high housing prices in the regional core and the pull of low housing prices in the outer suburbs.

Several possible implications for policy analysis are evident from these findings:
Major transportation infrastructure projects throughout the Lower Mainland have clearly been a significant factor in driving residential development. Moderate income households in search of affordable housing have flowed along the paths of least resistance from their workplaces to suburban locations with low land prices that were made accessible by this infrastructure. In spite of a long history of clear cause-and-effect relationships, few lessons seem to have been learned by either provincial transportation engineers or those in senior land use decision making positions. Short-term political benefit seems to be heavily weighted in the cost-benefit analyses used to justify the projects and regional impacts seem to have been discounted.

Current transportation models which rely entirely on projected numbers of jobs and households, failing to take into consideration all necessary socioeconomic factors such as demographic, housing price and income trends, have minimal predictive or prescriptive power. Most efforts seem to be focussed on using correction factors to force the models to reflect, more or less, what is actually being measured during physical traffic counts. Traffic demand forecasts generated using these models have been used to justify additional infrastructure projects, which has quickly spurred development and overloaded the design capacity of the projects well before projections.

Since transportation engineers are trained to focus on roads and trust existing methods and technology, and decision makers place a similar trust in the advice of transportation engineers, transportation policy recommendations which encourage driving have become the norm. Few planners have the technical ability to challenge engineering analyses or recommendations. Many planners are acting as willing accomplices in the vicious circle of transportation planning by allowing low-density development in areas poorly served by non-automobile modes and requiring high levels of parking in anticipation of future demand.
4. Summary, Discussion and Conclusions

"Which does society value more - home ownership, obtained through lower land costs, or equity in transportation infrastructure?"

...Residential Developer

There is widespread agreement that some areas in the Greater Vancouver Regional District are among the most desirable places in the world to live. Migration from other parts of Canada and the world have led to significant growth in terms of the population, the economy, and other indicators. Growth problems that have plagued other successful urban centres in North America, such as Los Angeles and Toronto, have become increasingly apparent in the GVRD. As more people have moved to the GVRD to share the potentially high quality of life that the region has to offer, the unsustainable development patterns that have been established to accommodate them have eroded the quality of life that many came to enjoy.

The problems include urban sprawl, traffic congestion, the lack of affordable housing, a loss of sense of community, and the pollution of air, water, and land. BC’s Growth Strategies Statutes Amendment Act and the GVRD’s Livable Region Strategy recognize that serious problems exist, but have responded to them with general policy statements and few ascertainable or enforceable growth targets or guidelines for development. The absence of an independent provincial agency, such as the Agricultural Land Commission (ALC), to ensure the application of effective growth management measures by local governments would appear to be a serious flaw in the legislation. It could also be easily argued that the many provincial transportation projects which facilitate suburban commuting are undermining the stated growth management policies of reducing urban sprawl and automobile dependence. The de facto acceptance of suburban lifestyles by society may have indirectly addressed some of the problems of housing affordability. Nevertheless, the infrastructure programs which support these lifestyles have the undesirable effect of exacerbating the regional problems of car-dependence and urban sprawl by monopolizing the funding that is needed to support and promote viable alternatives.
Little understanding of, or concern for, these problems is shown by many planners and decision makers in the region. In the single month before the completion of this thesis:

- Langley District Council abandoned phased development in semi-rural areas in favour of a laissez-faire development policy;
- Surrey’s mayor declared an end to the policy of a single regional town centre in his municipality and announced that five new centres, scattered throughout the city, would be promoted instead. He also demanded that regional land use and transportation planning functions be eliminated from the regional government’s mandate.
- Abbotsford's Council approved the "neo-traditional" Straiton Neighbourhood for 13,000 residents on remote Sumas Mountain, where there is no reasonable likelihood that new job sources will be available locally for these residents.

Regional core municipalities are not immune from this type of planning myopia. In this same time period, Vancouver’s Council passed a bylaw requiring the construction of a new parkade, at a cost of over $4 million, with 110 parking spaces for a community centre project and 40 parking spaces for a proposed nearby social housing project. The city’s Park Board had strongly objected, seeking to reallocate the funds to make badly needed repairs on the city’s many other aging community centres. The project site is adjacent to the region’s most dense collection of residences, workplaces and amenities, all of which are readily accessible by foot, bike or transit. The community centre itself will cost less than the parkade and the social housing has been placed on indefinite hold, officially due to a lack of available funding for construction. The irony that the money dedicated to the parking facilities would have been more than enough to build the 40 postponed social housing units seems to have escaped city staff and councillors. Vancouver’s Council had also passed a Transportation Plan several months earlier which called for more measures to reduce car use.

This research data presented here has shown a number of relationships between the way that urban form is developing in the GVRD and the resulting effects on the quality of life of residents in the region. In particular, the factors concerning land use density and mix, transportation
infrastructure investments and housing affordability were examined to explore how these factors influenced the residential location decisions of residents that have led to severe growth management problems. The types of housing choices available to newly forming households were also presented: smaller apartment condominium units closer to employment centres or ground-oriented suburban housing requiring much longer commutes.

Low density suburban development, as manifested in single family detached homes, is clearly incompatible with the goals of preventing urban sprawl and reducing automobile dependence. Complete communities oriented around walking, cycling, and transit simply cannot be supported without land use densities and mixes that are much higher than those that exist in the fastest growing GVRD communities. The current focus on workplace-oriented TDM programs and other isolated measures to reduce car use while simultaneously increasing road capacity and withholding necessary funding from the transit alternative has understandably proven to be futile. A focus on the treatment of symptoms, as opposed to addressing underlying causes, has inhibited necessary actions from being taken to reorient land use, transportation and housing to more socially, environmentally and economically sustainable forms. There isn’t enough land or money to cater to the Lower Mainland’s car dependence and resistance to higher density while at the same time providing a first-class transit system and affordable housing for future generations.

*Transit facilities in Seattle and Vancouver.*
The current definition of the GVRD Growth Concentration Area, particularly the inclusion of Surrey, encourages sprawl into the central and eastern parts of the Fraser Valley. Providing easier access to low-density suburbs with growing jobs/housing imbalances and few prospects for major employment gains, such as Surrey, Langley District and Maple Ridge, is draining resources away from higher density, job-rich municipalities in the regional core and is exerting strong growth pressures on the Agricultural Land Reserve. Regionally and provincially funded infrastructure at the region’s extremities continues to act as a massive subsidy to both suburban lifestyles and the residents of established communities who want to avoid increased land use densities or mixes.

The cost of housing to future generations, both to individuals and society, is completely discounted in current de facto housing policies. In desirable metropolitan areas, such as Vancouver, a form of inter-generational real estate pyramid scheme appears to be operating. Future members of the regional core’s workforce are now faced with the prospect of paying a considerable financial, leisure-time or living-space penalty to attain home ownership status. A desire to maintain neighbourhood character and an aversion to densification by long-time homeowners, combined with an engrained expectation of constantly increasing property values, has caused strong community resistance to changing the rezoning of single family detached housing to multi-family housing. SFD zoning is overwhelmingly the greatest land use in the developed areas of all municipalities of the GVRD. In Vancouver, where 70% of the city’s land is restricted to SFD use, the majority of the population rents, but the renters have been shown to be much less likely to vote in municipal elections than SFD homeowners. There appears to be no organized constituency to represent the interests of these renters, who are future homeowners. These households are voting with their feet, or minivans as the case may be, and locating where the market is providing housing that best meets their needs in terms of cost and accessibility.

The first choice in housing type for most households, particularly family households with younger children, is ground-oriented. Detached houses are preferred, although townhouses would be acceptable to most households if they are cheaper, have good transit service, access to amenities, and are close to major employment centres. Municipalities in the regional core have the potential to provide affordable townhouses, but have added tens of thousands of dollars in additional costs
through restricting the land supply and applying stringent development standards on new housing projects. These standards include wide streets, rear laneways, sprinkler systems, and mandatory minimum numbers of parking spaces.

There is a severe shortage of land zoned for ground-oriented, medium-density family housing in the regional core near major employment centres. The lack of suitably-zoned, low-priced land excludes all but the highest income classes from owning ground-oriented housing near most employment concentrations in the region. Most new multi-family housing in the regional core is of the apartment condominium type and is geared to singles and childless couples. Much of this housing is concentrated along major arterial streets with heavy traffic levels and in a limited number of high-density cores. Intervention by levels of government higher than the municipality appears necessary to correct this problem, which amounts to exclusionary zoning practices.

Many GOMD projects in the region have minimal amenities such as green space, sidewalks or playgrounds provided, and are often considered as starter home projects as opposed to mainstream housing. Design standards, where they exist, often support pedestrian hostile complexes far from shopping or transit which are defined by driveways, garages and carports. This development pattern not only diminishes the appeal of townhouses, it increases resistance to higher density residential uses throughout the region.

After a flurry of goodwill gestures in the housing area at the provincial level in the early 1990s, there are few housing policies in place at any level of government that exert a positive influence on the affordability of housing for households other than the core-needy. Provincial funding for social housing was actually slashed by 1/3 in 1996. Many policies at the federal and local levels appear to increase the financial risk or costs of home ownership. De facto housing policy in the Lower Mainland has been defined by restrictive zoning combined with laissez-faire economics that has resulted in unpredictable games of give-and-take between developers and municipalities.

While masked by a number of secondary factors such as multi-income households and the trend towards frequent job changes, there is a strong relationship between household income, housing
prices, accessibility and the choice of residential location. In particular, the difference in housing prices between major employment centres and residential centres offering affordable ground-oriented family housing displays a powerful “push-pull” effect on newly formed family households seeking ground-oriented housing. This relationship is evident in travel and income distribution data as well as both stated preference and revealed preference studies. The locations of affordable, ground-oriented family housing in the Vancouver region are on the fringes of the metropolitan region in automobile-oriented outer suburbs and exurbs. Once drawn to these suburbs, families are unlikely to return to urban areas to live. As a result of this situation, overall household trips and travel distances are high, infrastructure costs are soaring and the travel mode of choice continues to be the automobile.

There is a crisis of governance in the areas of transportation, housing and land use in the Lower Mainland. This is not an isolated situation, and is being experienced by metropolitan areas throughout North America. At the provincial level, senior MoTH staff are still focused on expanding highway capacity while many elected officials view transportation policy simply as a means of controlling votes. At the regional level, the consensus-based approach to growth management seems to result mostly in poor coordination and vague, compromise solutions. Municipalities grudgingly accept politically correct growth management rhetoric and then act independently to support local priorities. These actions can take the form of resisting growth where it is needed or competing to attract growth where it is not needed. The consensus approach used in the GVRD may reconcile the widely differing values and objectives held by urban and suburban municipalities in the short-term but has failed to ensure that the common vision is carried forward at the local level.

Municipalities, lacking in jurisdiction over major transportation decisions, are faced with conflicting community demands for reduced congestion, a high level of personal mobility, neighbourhood traffic calming and convenient parking. At all levels, a web of responsibilities and historical differences between departments make coordinated action extremely difficult. As of 1996, for example, BC Transit, ICBC, BC Ferries, BC Rail, BCTFA, MMAH and MoTH at the provincial level were being administered independently, although ICBC is now under MoTH.
Budgetary and street capacity limitations preclude providing both an automobile-oriented transportation system and an efficient public transportation system. De facto government policy over the last decade has been to provide transportation infrastructure for automobiles that implicitly requires most households to maintain a fleet of two or more automobiles. With few exceptions, such as ALRT extensions and commuter rail projects of questionable value, transit-oriented development has not been given priority. There is a strong argument that, in addition to allowing automobile dependence to reduce the quality of life, savings realized from redirecting funding from affordable housing and alternative transportation modes have been dwarfed by public investments in automobile-related infrastructure and household investments in automobiles.

There is a clear need to develop better “early warning systems,” such as the GVRD’s air pollution monitoring system, to let planners and decision makers know where problem areas are developing (e.g., low-density SFD development, growing jobs-housing imbalances, etc.). Properly alerted, governments might not be required to retroactively commit scarce resources for infrastructure and transportation to accommodate runaway suburbs. Federal, provincial and regional data collection is disjointed and uncoordinated. Fundamental data, such as accurate information on employment distribution and income profiles in workplace CSDs, are not readily available to planners. Once collected, methods such as the GIS overlay scheme demonstrated in this thesis can provide an effective way of presenting data to identify cause-and-effect relationships and priority areas.

Regional planners must pay close attention to the economic “micro-climates” within the region with a view to determining where land economics are forcing the market’s hands and causing violations of growth management policies. Too often, long-range demographic forecasts and housing trends are the focus of policy recommendations without due consideration being given to the local, short-term tactical considerations that drive the development industry. If development “takes hold” in undesirable locations, decision-makers often feel that their hands are tied and that the provision of transportation infrastructure for automobiles is the only expedient solution available to them.
Transportation planners and engineers are generally too busy dealing with short-term “fixes” to accommodate existing traffic problems and development applications to concentrate on long-term solutions. Many senior staff and decision makers suffer from the same lack of awareness of the issues as the general public and subdue initiatives from more junior staff and decision makers. As one senior municipal politician with a background in planning phrased it: “the comprehensive plans are developed over many years, but the real plans are made by councils one Monday night at a time.” This refers to the pressures on part-time mayors and councillors to approve an endless stream of rezoning and development applications at council meetings, which are commonly held on Monday evenings.

There is a lack of fundamental applied research being conducted into the underlying land use and housing causes of urban sprawl and automobile dependence in the Lower Mainland. Research efforts appear to be limited to monitoring the most obvious symptoms of these problems, such as airborne pollutants and traffic congestion, followed by opinion polls and focus groups to determine the most politically acceptable treatments to alleviate these symptoms. Increased support for independent research could make valuable contributions to public awareness and the region’s growth management knowledge base.

Finally, education and awareness programs aimed at influencing lifestyle decisions are negligible, especially when compared to the opposing advertising campaigns of the automotive, petroleum, and real estate industries. Sometimes the message of government initiated publicity campaigns can be counterproductive to growth management, by assuring the public that no action or change in attitudes is required on their part. Strategic infrastructure investments such as commuter rail and high tech solutions such as electric cars, for example, have been promoted by the province in recent years as proof that simple solutions to congestion and pollution problems are within reach. Many professionals in planning and engineering professions, decision makers, and members of the public remain unconvinced that serious growth management problems exist which need to be addressed as a priority. Until these groups accept that the problems exist and are more supportive to change, the Lower Mainland and British Columbia will continue to suffer the growing social, environmental and economic impacts of urban sprawl and automobile dependence.
5. Recommendations

Lists of policy recommendations are too often viewed by decision makers as a grab-bag of independent actions from which they can pick and choose, based on the prevailing political climate and phased-in according to available funding. This often leads to the implementation of ineffective and sometimes contradictory policy instruments. For example, if the actual policy is to promote transit and discourage automobiles, it makes little sense to make major additions to road capacity while freezing transit service levels and delaying new LRT lines for up to ten years. If the actual policy is to promote a compact metropolitan region, it makes little sense to provide commuter rail to exurbs and designate semi-rural areas as part of the Growth Concentration Area while providing no effective carrots or sticks to promote densification in the regional core near employment concentrations. These are unfortunately real-life examples of actions, and inactions, that have impacted the GVRD in the very recent past.

The following recommendations, based on the thesis problem statement, the GVRD context, existing policies and policy instruments, potential policy instruments and the research findings, are designed to move the region towards achieving official growth management, land use, transportation and housing policy objectives. To be effective, they should, as most policy recommendations, be implemented as a complete, coordinated package. In recognition of the prevailing fiscally conservative climate, the recommendations are designed to be no-cost or low-cost solutions and revenue neutral.

5.1 Land Use

Enormous untapped potential for increasing housing affordability and the viability of alternative transportation modes rests with local decision makers in terms of their control over zoning. This power lies at the municipal level, where the need to seek a new political mandate from local voters every three years usually exerts more influence on decisions than esoteric considerations such as long-term regional sustainability. The following land use recommendations seek to
provide local decision makers with a framework that lets them "do the right thing" from a regional point of view while avoiding a potential backlash from local voters.

Recommendation L-1:
To remove some of the zoning barriers which restrict the amount of land available for higher density development near employment centres, regional jurisdiction should be granted for area-wide upzoning of single family detached housing districts. Municipalities could reserve the right to reject the regional zoning of low density land uses and be assessed a growth management levy. This payment-in-lieu of upzoning would be commensurate with the estimated externalized costs of the additional induced urban sprawl, such as increased pollution levels, transportation infrastructure costs and development services.

Recommendation L-2:
To help create a compact metropolitan region and promote intensification in established communities, the GVRD Growth Concentration Area should be redefined to exclude areas south of the Fraser River, east of the Pitt River and north of the Burrard Inlet.

Recommendation L-3:
To encourage small lot development in order to reduce infrastructure costs and promote a compact metropolitan region, charges in the form of a Regional Subdivision Levy should be instituted for ground-oriented housing which increases exponentially with final lot sizes and FSRs after a property is subdivided.

These Regional Subdivision Levies, shared by the region and municipalities for infrastructure, affordable housing and transportation projects, would promote a more compact urban form and discourage the wasteful practice of large lot subdivisions. A proposed standard GOMD small lot of 8m x 25m = 200 m$^2$ with a minimum FSR of 0.6 would form the base for a revenue neutral tax rate, similar to a land transfer tax. Levies on larger lots would increase progressively at a rate of:

Regional Subdivision Levy, $RSL = RSL_{base} \times 10^n \times ((Lot \; Size/200)^{(0.6/FSR)-1})$, where $n > 0$
The value of n would be chosen in such a way as to reflect the exponentially increased costs of large lot development and low FSRs on local and regional infrastructure.

Table 30 - Sample of Graduated Regional Subdivision Levies

<table>
<thead>
<tr>
<th>Lot size (m²)</th>
<th>FSR</th>
<th>Regional Subdivision Levy (ISL_base = $2,000, n = 0.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 (8m x 25m)</td>
<td>0.6</td>
<td>$2,000</td>
</tr>
<tr>
<td>400 (12m x 33.3m)</td>
<td>0.5</td>
<td>$10,025</td>
</tr>
<tr>
<td>600 (16m x 37.5m)</td>
<td>0.4</td>
<td>$112,470</td>
</tr>
</tbody>
</table>

This measure would not preclude larger lot subdivisions, but would promote a level playing field which would make small lot development and higher densities more attractive to purchasers. It would also provide a revenue source to the region to finance growth management initiatives.

Recommendation L-4:
To prevent residential developments which are separate from employment opportunities, the regional board should have the ability to delay major residential subdivisions in municipalities until such local opportunities are projected to exist.

Recommendation L-5:
To reduce the cost of housing, regional development standards should be modified to eliminate minimum parking standards and lot size, reduce setback requirements and significantly reduce minimum street right of ways. Regional Alternative Development Standards (ADS) should be created, by bylaw, which require the sharing of servicing trenches by all utilities and permit narrow, people-friendly streets such as woonerfen.
5.2 Transportation

Alternative urban design is intimately linked with the provision of alternative transportation modes and innovations in transportation must be concurrent with innovations in land use. As has been clearly demonstrated, transportation alternatives are an integral part of land use planning which support attractive and affordable GOMD housing in complete and compact communities.

The role of funding and the allocation of street space among modes is absolutely key to the implementation of viable transportation alternatives. Financial commitments for capital and operating budgets aimed at maintaining existing service levels for general purpose traffic leave little funding to promote viable alternatives. The funding bias in favour of the automobile mode is engrained to the point where simple and inexpensive measures such as transit shelters, bike racks on buses and sidewalks are routinely overlooked or denied while multi-million dollar road expansion projects are routinely approved.

Recommendation T-1:
To effectively counter explosive growth in automobile traffic, to promote a compact metropolitan region, to release a significant pool of capital and to institutionalize the concept of reallocating existing street capacity to alternative modes, there should be an interim regional moratorium on funding for projects which increase road capacity for automobiles. Increased road capacity is defined as any measure that facilitates increased traffic volumes or speeds for a specified mode.

Recommendation T-2:
To support levels of service that provide a reasonable alternative to the private automobile, significantly higher modal targets should be set for walking, cycling and transit throughout the GVRD, with a commensurate reallocation of transportation funding from existing sources, such as general revenue, insurance premiums, and gas taxes.
Recommendation T-3:
To discourage long distance commuting, a package of measures should be applied, such as:
• Insurance rates should be based upon distances travelled;
• Commuter rail service should be discontinued or converted into a regional rail service throughout the Fraser Valley, with fares based on full cost accounting principles;
• Similar to the existing transit fare zone philosophy, peak-period tolls should be initiated into the regional core from other suburban areas;
• HOV lanes should be reverted for use exclusively by transit and commercial vehicles.

Recommendation T-4:
To halt a growing jobs/housing imbalance in the suburban areas of the GVRD, a moratorium should be placed on major transportation infrastructure investments outside of the regional core until viable mechanisms for attracting sufficient jobs to job-deficient suburban areas can be implemented.

Recommendation T-5:
To avoid excessive amounts of scarce capital being absorbed by a limited number of transportation megaprojects, the potential for RapidBus services and transit-priority measures on a dense grid of major streets should be implemented before additional funds are committed to rail-oriented projects along narrow and dispersed corridors. Such a grid would allow a greater proportion of trip origins and destinations to be accessed by transit and reduce the need for households to own additional automobiles.

5.3 Housing

The pendulum towards market-based housing policies has gone too far in the direction of neighbourhood resistance and laissez-faire economics. Political rhetoric calling for market principles to be applied in some areas of development should be re-examined in the light of the enormous restrictions on the land market that zoning restrictions impose. Government action to
establish a housing climate that supports the provision of affordable, family-oriented housing near employment centres is essential. Failure to do so will result in a perpetuation of the negative externalities of exclusionary zoning practices and the “highest and best use” principles of land economics, such as urban sprawl. Reliance on these practices and principles dictates the most two most important factors for affordable housing: urban land prices and permitted uses.

Recommendation H-1:
To provide reasonable opportunities for households to live and work in the same community, the housing component of OCPs should be required to provide a realistic plan for the provision of a stock of suitable and affordable housing which corresponds to the household income profile of the primary income earners employed in the municipality.

Recommendation H-2:
Notwithstanding the need for high quality and safety standards, to reduce the cost of constructing new housing, a comprehensive review of building standards on a province-wide basis should be conducted. In particular, the need for any minimum parking standard or costly sprinkler systems should be reviewed. The “grow-home” concept, where partially finished homes are sold at a discount and finished by the homeowners over time, should be promoted.

Recommendation H-3:
To address the negative connotations that are often associated with GOMD housing, the region should undertake the specification of stringent minimal design standards for multi-family housing and higher density neighbourhoods. These should address those concerns expressed by potential homebuyers, such as appearance, privacy, safety, landscaping and amenities such as playgrounds or schools.
Recommendation H-4:
To encourage the acceptance of higher density housing by the community, OCPs should be required to include a policy of concentrating new amenities such as parks, libraries and community centres in neighbourhoods according to their support for increases in density.

Recommendation H-5:
To promote fiscal fairness and reduce the price of new housing, an independent multiple accounts evaluation of DCCs, and other forms of “grandfathering” development costs, should be undertaken. In particular, the equity of charging all new infrastructure and community amenity costs in new developments, when these costs were previously financed through general revenues, should be examined.

5.4 Governance

“If municipalities had the courage to move forward on zoning changes, the population would become more aware.”

...Provincial Deputy Minister

The current system of regional governance composed of a large number of elected municipal officials, many of whom are interested primarily in local issues, is not conducive to the effective implementation of the regional growth management policy instruments that are indicated. The development goals of the individual municipalities often take precedence over the land use, transportation and housing goals of the region in such an environment. The negative reactions of municipalities which considered that they deserved higher growth allocations in the LRS, such as Richmond, Surrey and Langley District, are now well-documented and speak to the need for a governance structure and policy development mechanisms which are not subject to complete regional consensus. A provincial-level land use commission, modeled after bodies such as the ALC or Oregon’s LCDC, is an essential element of all successful growth management programs.
Recommendation G-1:
To avoid the restrictions imposed by consensus-based decision making, notably the protection of local interests by municipalities at the region's expense, Directors of Regional Districts should be elected independently by the electorate. A mixed system, whereby half of the directors are elected from subareas and half are elected at-large from throughout the region, would provide the necessary balance between local interests and regional interests. A majority vote of each of these groups would be required to pass a regional bylaw.

Recommendation G-2:
The mandate of regional districts should be expanded to include most matters of regional interest, including environmental protection, land use and transportation planning, housing distribution and existing common regional services such as water and sewage.

Recommendation G-3:
To promote coordination within communities with similar characteristics and to provide the common vision and economies of scale required to support effective land use and transportation planning, serious consideration should be given to redefining the boundaries of municipalities within the GVRD to the equivalent of the subareas defined in this thesis.

Recommendation G-4:
To ensure that the higher societal goals of growth management are being implemented, an independent provincial agency should be established to review and approve Regional Growth Strategies and the Regional Context Statements of OCPs. The agency should also have the power to examine the land use decisions of municipalities to ensure that they are in conformance with Regional Context Statements.

Recommendation G-5:
To monitor the full environmental impacts of incremental urban development and to provide a set of clear and ascertainable guidelines for the preparation of regional growth strategies, regulations should be added to the BCEAA and GSA to address these issues.
5.5 Education and Awareness

Public education and the school system are one of the greatest untapped resources for the promotion of societal change. An indication of large gaps in the public’s knowledge comes from a study showing that the majority of people know what transit fares are, but have no idea of how transit or roads are paid for.²⁵⁰ With such examples of limited information and potential misinformation (see accompanying notes below), it is clear how public opinion could become biased against accepting policy changes which promote more sustainable metropolitan regions. These changes include higher land use densities and mixes as well as reductions in car use.

Recommendation E-1:
To make drivers and households more aware of the negative impacts of wasteful land use and unnecessary automobile trips, and to inform them of alternatives to an automobile-based lifestyle, the GVRD, in cooperation with ICBC and the provincial government, should initiate a comprehensive “travel conservation” campaign. This would include public awareness in the print and electronic media and education for professionals and decision makers on sustainable urban designs which promote a reduced need to travel, viable transportation alternatives and affordable housing in compact communities.

Recommendation E-2:
To counter the trend towards increased car use by younger family households generally, and for school trips and after-school activities in particular, the Ministry of Education should implement a compulsory course of study on the urban environment to educate students and their parents on the impacts of inappropriate transportation and land use choices on urban sprawl, the quality of life in neighbourhoods, traffic and pollution.

Recommendation E-3:
To provide information on the roles and responsibilities of each level of government on land use and transportation issues, and to increase awareness on opportunities for public input

in the decision making process, a major public education program should be undertaken in these areas and information on sustainable practices should be distributed to all homes.

Recommendation E-4:
To provide a more level playing field between advertising aimed at promoting automobile-oriented lifestyles and those which are base on alternative modes, government departments and agencies should avoid any advertising which promotes or emphasizes the use of automobiles or automobile-related products and events.

A Final Note on Education

On any day, a reader of a major daily newspaper such as the Vancouver Sun is bombarded with up to a dozen feature-size automobile advertisements. The Friday edition features an entire section devoted to automobiles called “Wheels,” and the Saturday edition features a thick section devoted to real estate called “New Homes.” MoTH ran enormously expensive half- and full-page ads on a regular basis in Vancouver’s daily papers to inform motorists of the progress of repairs being undertaken to the Second Narrows Bridge in the summer of 1996. At the same time, the City of Vancouver limited promotion of an experimental bike lane on a downtown bridge to small warning notices buried deep in weekly community papers. Much of the advertising on prime-time television programs focuses on automobile and petroleum products. It has been estimated that General Motors (GM) spent over $2 billion in 1990 on advertising to influence consumers to buy their product.251

Even buses belonging to BC Transit routinely display large advertisements from automobile manufacturers urging people to buy their cars. An advertisement appearing on buses in 1995 for Mohawk Oil, “Mother Nature’s Gas Station,” featured a long banner with arrows pointing up to passengers with a caption that stated: “Some of our customers take the bus, too!” These ads were arguably less humiliating to transit users than the buses that were painted as large cat food

billboards in 1996; ostensibly to generate revenue to offset government subsidies. No similar campaign to commandeer private automobiles and paint them with automobile, petroleum or cat food advertising has been proposed to offset subsidies for this class of vehicle. Provincial lotteries giving away automobiles in past years have commissioned advertising campaigns that lampooned transit riders and encouraged them to buy tickets for a chance to escape their sorry lot in the bus. Even organizations such as VanCity Credit Union, which prides itself on being environmentally aware and acts as a major benefactor of environmental and alternative transportation causes, saw no conflict of interest in using cars as prizes for promotions as recently as 1996.

To counter this onslaught of promotion of automobile-based lifestyles and negative images of transit-based urban lifestyles, there has been a smattering of GVRD "Go Green" billboards and bumper stickers, cycling advocates wearing "One Less Car" stickers and low-key "Clean Air Day" events during Environment Week each June. Several government publicity campaigns are devoted to convincing the public that programs still in the conceptual stage, such as long-range rapid transit projects and research into Zero Emission Vehicles (ZEVs), will solve current pollution problems. In early 1997, with capital funding freezes in effect and 10% of the bus fleet crippled due to maintenance problems, causing widespread service disruptions, BC Transit found the financial resources to launch a major publicity campaign to congratulate itself for winning a transit industry award for being the best operator in its size category in North America.

Editorials, Letters to the Editor and Op-Ed pieces promoting transit and more sustainable planning have been appearing in some newspapers with increasing regularity, but these can be easy to overlook among automobile advertisements and stories about traffic congestion, announcements of new road improvements, and other letters demanding that funding for bicycle programs be stopped. The Vancouver Sun now dedicates half a page every day to reporting on traffic issues and providing a forum for readers to suggest improvements to the road system. The Sun's op-ed page editor stated without reservation that contributors are approached to write pieces based primarily on their notoriety and ability to sell newspapers with their rhetoric, as opposed to their ability to provide an informed viewpoint.
The BC Ministry of Education, which sets the basic curriculum for primary and secondary education in the province, supports a voluntary approach to environmental education. Some environmental subjects have been included in the curriculum of some schools since the 1970's, and it is possible to introduce environmental education into the curriculum as early as grade seven. Teachers are encouraged, but under no obligation, to incorporate environmental education into related subjects such as biology and social science. At the discretion of individual teachers, based on their experience and interest, environmental topics can be introduced into lesson plans for any subject. In comparison, subjects such as French are introduced by grade four and continue throughout elementary and secondary school programs. Optional courses, offered only in the later years of secondary school, introduce resource management and environmental issues. While there is currently no specific course on sustainability issues, consideration is being given to teaching the subjects of ecosystems, their interactions, and the effect of human activity to all students through compulsory Grade 8-10 science courses. There are no resource materials available or planned to teach the impacts of transportation and urban land use on the environment or the effect of lifestyle decisions on problems such as air pollution and urban sprawl.

Some progress is also being made at the post-secondary level. For example, the University of British Columbia now requires that all civil engineering students register for a one-term course that teaches "the implications of a finite biosphere and the inherent complexities in environmental decision making." The UBC planning school also offers a course called "The Ecological Context of Planning" to teach the impacts of planning on sustainability. Most of the school's curriculum for the community planning option is still based on mainstream planning approaches, perhaps due to a lack of applied local experience with sustainable urban design or concerns over continuing skepticism from within the professional community towards approaches which vary substantially from established norms.

254 Known as an Instructional Resource Package (IRP).
256 The University of British Columbia, 95/96 Calendar: p. 378.
Epilogue

The graduate study and research leading to this thesis were a search for answers as to why professionals, decision makers, and the general public seemed so willing to ignore the obvious problems of urban sprawl and automobile dependence until they reached a breaking point. After all, a cursory examination of the situation in the Lower Mainland would reveal to any interested observer that the problems of traffic, noise, congestion, community degradation, environmental pollution and general livability are enormous and growing. Similarly, a quick investigation would reveal that the underlying problems are low-density development, the accommodation of automobiles to the point of excluding viable alternatives, a lack of cooperation between governments and departments within government, and severe shortages of affordable family housing near jobs and amenities due to zoning restrictions.

At times, the glaring incongruities and inertia to change can be exasperating. A number of former colleagues, both dedicated advocates and progressive professionals, have abandoned their attempts to promote sensible land use and transportation policies over the years. The hypothesis was eventually formed that professionals are reluctant to promote significant changes because these might make their services obsolete or unnecessary, particularly the many traffic engineers and planners who thrive on cumbersome bureaucratic processes. To anyone who has attempted to convince a highways department that a new road was unnecessary or who has waited years to see a development application approved that varied even slightly from established norms, the theory is not at all implausible.

A well-placed contact issued the strong warning when the offer to enter graduate school was extended: “Never forget that the “P” in Planning stands for Politics.” The basic truth of this statement became increasingly clear as the study and research progressed. Politicians increasingly look to see which segments of society are the most influential and tailor their policies to cater to the lifestyles of these main groups. For the last two generations, this comfortable majority has clearly been composed predominantly of middle-class homeowners who drive cars. As is now common knowledge, deficit financing and the spending programs which subsidized homes, built
roads and financed retirement programs have created a massive debt. Perhaps not surprisingly, as this predominant established generation approaches retirement, there has been a strong push to shift taxes to the less-dominant, less-established generation and to cut services to reduce debts while maintaining pensions and those services which support already established lifestyles, such as roads. Support for transportation alternatives and affordable housing for younger households seems to have fallen victim to society’s new priorities.

A valuable insight on the prevailing system of using policy to accommodate short-term interests of the comfortable majority, as opposed to the promotion of constant values and common interests, was gained from John Kenneth Galbraith’s The Culture of Contentment from 1992:

"Individuals and communities that are favoured in their economic, social and political condition attribute social virtue and political durability to that which they themselves enjoy. That attribution, in turn, is made to apply even in the face of commanding evidence to the contrary. The beliefs of the fortunate are brought to serve the cause of continuing contentment, and the economic and political ideas of the time are similarly accommodated. There is an eager political market for that which pleases and reassures."

The problems are clear. The direction required, if not the exact route, is equally clear. New planners seeking to be effective at promoting society’s lasting values, and not just facilitators serving the cause of continuing unsustainable contentment, will need more skills in sociology, psychology and communication than urban design and bylaw preparation. The conventional wisdom in engineering is that putting together a complex system requires only 10% technical skills, but 90% “people” skills, a recognition that even the best solution to a problem will be rejected if it isn’t presented to peers and management in an appealing and convincing manner.

For the good of all members of society, we can only hope that the emerging generation of new planners will have the people skills and technical skills needed to successfully challenge the biases and beliefs of the established stakeholders and replace our current land use, transportation and housing practices with ones that are more socially, environmentally and economically sustainable.
Glossary

The terms listed below are predominantly the generally accepted meanings, although in several cases the meaning will be specific to the usage of the term in this thesis.

Accessibility - The convenience, comfort, and convenience with which a complete set of required trip destinations can be reached from a given location by various transportation modes. Accessibility-based planning focuses on increasing the ability to reach destinations without necessarily adding transportation infrastructure.

Acre - Measure of surface area equal to 43,560 ft.$^2$, $\frac{1}{640}$ mi.$^2$ or 4047 m$^2$.

Activity or Activity Area - Location where employment, residence, services, or recreation takes place.

Agricultural Land Commission (ALC) - Quasi-judicial body appointed by the Province of British Columbia to administer the Agricultural Land Reserve.

Agricultural Land Reserve (ALR) - Created in 1973 by the provincial government, these areas, usually prime farmland, are reserved for use for agricultural production, as overseen by the Agricultural Land Commission.

ALC - See Agricultural Land Commission.

ALR - See Agricultural Land Reserve.

Attached House - Ground-oriented housing unit that shares at least one exterior wall with another housing unit.

BANANA - Acronym for Build Absolutely Nothing Anywhere Near Anything, representing the reluctance of existing residents to accept additional density.

BC Transit - The provincial Crown Corporation with jurisdiction for providing transit service.

Bike Lane - A portion of a street reserved for use by bikes, usually separated from general purpose lanes by a stripe of paint and signage.

Bike Path - A path segregated from motorized traffic for the use of bikes, sometimes shared with pedestrians.

Bike Route - Any combination of signed Bike Paths, Bikeways, Bike Lanes, and other streets which provides cyclists with a suggested route alternative between destinations.

Bikeway - A street specially treated to provide a bicycle-friendly environment.

Cascadia - An geographic area roughly encompassing British Columbia and the U.S. states of Oregon and Washington considered by many to have common social, ecological, and economic characteristics.

CBD - See Central Business District.

CMHC - See Canada Housing and Mortgage Corporation.
Canada Housing and Mortgage Corporation (CMHC) - A federal crown corporation reporting to the Minister of Public Works with a mandate to support federal housing programs, including market and building research, cooperative housing, and mortgage insurance.

CSD - See Census Subdivision.

Census Subdivision (CSD) - Geographic area used for aggregating census data, larger than a census tract and smaller that a Census Division (Regional District in B.C.). Usually a municipality, electoral area or First Nations Reserve.

Central Business District (CBD) - A high density downtown core which is characterized primarily by office space and commercial activities.

CityPlan - General vision and direction document for the City of Vancouver approved by Council in 1995 which is to be used by Council and staff to guide policy decisions, work priorities, and budgets.

Clouds of Change - Report prepared in 1991 by the City of Vancouver Task Force on Atmospheric Change and approved by Council. Recommendations called for substantial reorientation of the transportation system to favour walking, cycling, and transit over automobile use along with changes in land use and zoning policies to reduce the need to travel.

Density Bonus - The practice of exchanging a higher FSR or relaxations from normal zoning requirements in exchange for concessions from a developer. These could include such items as community amenities or social housing units.

Detached House - Housing unit which shares no common wall with another unit.

Duplex - Residential building containing two separate housing units, usually of similar size, where one in not a secondary suite.

EMME/2 - A transportation simulation program based on the gravity model. Developed at McGill University the program is used extensively by the GVRD Strategic Planning Department and MoTH to model traffic flows in the Lower Mainland of B.C.

Employed Residents (Elf) - The number of residents in a jurisdiction who have jobs, or “employed labour force.”

Employment (Emp) - The amount of jobs present in a jurisdiction.

Exclusionary Zoning - The practice of restricting new land uses and densities, usually associated with protecting the interests of existing property owners.

Exurbs - Communities that are separated from the GVRD regional core by a considerable distance but have a significant population which commutes to the GVRD for work. Abbotsford, Chilliwack, and Mission are exurbs of Vancouver. Langley City and Langley Township could be considered as outer suburbs or exurbs.

FSR - See Floor Space Ratio.

Floor Space Ratio (FSR) - The total useable interior floor area within a building, exclusive of parking, divided by the size of the lot. For example, a 20’ by 50’ two-storey house on a 40’ by 100’ lot has an FSR of $2*(20*50)/(40*100) = 0.5$. 

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GCA - See Growth Concentration Area.

GOMD - See Ground-Oriented, Medium-Density Housing.

Gravity Model - Trip generation model used in transportation engineering to predict the flow of traffic between pairs of defined zones based on the relative attractiveness of the zones (e.g., number of jobs and residential units) and the impedance between the zones (e.g., travel time and distance).

Greater Vancouver Regional District (GVRD) - The regional government in the western part of the Fraser Valley which includes over twenty municipalities and includes Vancouver. Regional governments have some jurisdiction over strategic planning and air quality. Decisions are made by a regional board, which consists of a number elected representatives from each municipality and electoral area in the regional district, with the number of board members from each jurisdiction related to its size.

Greenway - A street connected in a network throughout the City which is enhanced to provide a pleasant environment for pedestrians and cycling.

Ground-Oriented, Medium-Density Housing - Housing which, generally speaking, is accessed through an outside door at-grade, as opposed to a hallway, and is not a detached house. There is usually some form of exterior private space, such as a yard or courtyard, associated with the unit. Examples include duplexes and townhouses.

Growth Concentration Area (GCA) - Municipalities designated by the GVRD as areas where future growth should be focussed. Vancouver, Burnaby, New Westminster, North Surrey, the Northeast Sector (Coquitlam, Port Coquitlam, Port Moody), and Richmond are included.

Growth Management Act (GMA) - Short form for the State of Washington’s growth management legislation.


GMA - See Growth Management Act.

GSA - See Growth Strategies Act.

GVRD - See Greater Vancouver Regional District.

Grade or At-Grade - At, or close to, ground level (as opposed to elevated or buried):

ha - See Hectare

Hectare - Measure of surface area equal to 10,000 m$^2$ or approximately 2.471 acres

High Occupancy Vehicle (HOV) - Passenger vehicle with more than a regulatory minimum of occupants, including the driver.

HOV - See High Occupancy Vehicle.

ICBC - See Insurance Corporation of B.C.

Inclusionary Zoning - The practice of promoting new land uses and higher densities in order to provide housing opportunities for a variety of new property owners.
Inner Suburbs - Suburbs which are in close proximity to the regional core. Burnaby, New Westminster, North Vancouver, Richmond, and West Vancouver are inner suburbs of Vancouver.


Land Conservation and Development Commission (LCDC) - Independent, quasi-judicial agency in Oregon charged with supervising the implementation the Statewide Planning Goals.

Land Use Mix - Also known as the “mix.” Variety of types of uses within a defined area. The selection of the size of the area is an important variable in the definition of the mix. A region may have a complete mix of land uses, whereas individual communities within a region may have severe imbalances between employment, residential, and service uses.

LCDC - See Land Conservation and Development Commission.

Light Rapid Transit (LRT) - A transit system, generally at Grade, which runs on dedicated rail which may be on a protected or shared Right of Way. Sometimes called Light Rail Transit.

Livable Region Strategy (LRS) - Approved by the GVRD in October 1995, this high level policy document has been approved by the provincial cabinet as the regional growth strategy under the Growth Strategies Statutes Amendment Act of 1995. The key components of the strategy are: Protect the Green Zone; Build Complete Communities; Achieve a Compact Metropolitan Region; Increase Transportation Choice.

Logit Function - Probability model often used to predict aggregate modal splits between traffic zones based on the utility of the mode, usually expressed in terms of average travel time, waiting time, distance, out-of-pocket cost, and income.

LRS - See Livable Region Strategy.

LRT - See Light Rapid Transit.

Ministry of Transportation and Highways (MoTH) - Provincial ministry with jurisdiction over the road network in the province outside of private and municipal street systems.

Mix - See Land Use Mix.

Modal Split - The number of trips by each mode, usually expressed as a percentage.

Mode - A method of transportation, such as walking, cycling, transit, rail or automobile.

MoTH - See Ministry of Transportation and Highways.

NIMBY - Acronym for Not In My Back Yard, referring to the reluctance of existing residents to accept changes in their neighbourhoods.

NGO - See Non-Governmental Organization.

Non-Governmental Organization (NGO) - A private group not generally affiliated with any government or business groups, usually member supported, which promotes specific issues in the public interest.

Northeast Sector - Designation for the northeast part of the Burrard Peninsula, including Coquitlam, Port Coquitlam, and Port Moody.
OCP - See Official Community Plan.

Off-Peak Period or Off-Peak - Times outside of the Peak Period.

Official Community Plan (OCP) - A general statement of the broad objectives and policies of a local government which a municipality may prepare, as specified in the Municipal Act.

Opportunity or Opportunity Site - A location where necessary or desired activities take place.

Outer Suburb - Suburbs which are significantly separated from the regional core, either by distance, travel time, or physical barriers such as water or steep grades. Coquitlam, Delta, Maple Ridge, Pitt Meadows, Port Moody, Port Coquitlam, Surrey, White Rock are outer suburbs of Vancouver.

Peak Hour - The hour of the day with the highest traffic volume at a given point. Commonly known as “rush hour.”

Peak Period or Peak - Three hour period in the morning and afternoon during which traffic levels are the highest. Also known as the morning or afternoon “rush”. Although traditionally considered to have much higher traffic volumes than at other times of the day and week, Off-Peak volumes at certain times are approaching the peak period.

Pedestrian Priority Area - Segments of streets which are given special treatment to create a pedestrian friendly environment, by measures such as traffic calming and landscaping.

Place of Residence (POR) - Census Subdivision or other defined geography in which a respondent normally resides.

Place of Work (POW) - Census Subdivision or other defined geography in which a respondent normally works.

POR - See Place of Residence.

POW - See Place of Work.

Push-Pull Model - A variation of the Gravity Model, assumes that there is a repulsive force between traffic zones in addition to the traditional attractive force (e.g., high housing prices in the work zone or high crime in a residential zone).

RapidBus - A limited stop bus service along high demand transit routes.

Regional Route - A street which is suited for trips joining regional destinations.

Regional Context Statement - Statements within an OCP which explain how the policies of the municipality conform to a Regional Growth Strategy, as required by the GSA.

Regional Growth Strategy - A comprehensive plan prepared by a regional district which describes policies intended to achieve the growth management goals of the GSA.

Right of Way (ROW) - Statutory right by a government jurisdiction to a strip of land for use as a transportation corridor.

ROW - See Right of Way.

Rowhouse - See Townhouse.
SeaBus - BC Transit ferry service linking Waterfront Station in Vancouver with Lonsdale Quay in North Vancouver.

Single Occupancy Vehicle (SOV) - A vehicle, generally an automobile, in which the only occupant is the driver. Bicycles and motorcycles are not considered to be SOVs.

SkyTrain - Automated LRT running between Waterfront Station in Vancouver and King George Station in Surrey on an elevated, dedicated Right of Way.

Suburb - Normally defined as a low density, predominantly residential, developed area. The GVRD considers all municipalities in the regional district other than the City of Vancouver to be suburbs of Vancouver. For the purposes of this thesis, where a distinction between suburbs is required, the terms Inner Suburbs, Outer Suburbs and Exurbs are used.

Sustainability - Providing for our present needs without interfering with the ability of future generations to provide for their needs. Often confused with “Sustainable Development,” which usually refers to development which has a lower impact than conventional development techniques.

TDM - See Transportation Demand Management.

Townhouse - A ground-oriented, attached house which is part of a linked chain of three or more such units. Access is usually at-grade through a private, exterior entrance, although “stacked” townhouses may involve using stairs to access the unit.

Traffic Calming - The practice of using physical and regulatory techniques to influence traffic movements in neighbourhoods. Objectives of traffic calming vary from improving safety through speed reduction measures such as traffic circles to discouraging traffic from entering an area through diversion measures such as “right-in, right-out” intersections.

Transport 2021 - Based on the Livable Region Strategy, this regional transportation plan for the GVRD was completed in 1993 and prepared jointly by GVRD Strategic Planning Department and MoTH. It consists of three main reports and a series of technical reports. The main reports are the Long-Range Plan (to 2021), the Medium-Range Plan (to 2006), and Interim Highway Improvements (mostly implemented or under construction). These plans were the starting point for the province’s “Going Places” policy and BC Transit’s Ten-Year Development Plan for the Lower Mainland.

Transportation Demand Management (TDM) - Measure to reduce the demand for transportation, normally in relation to trips in SOVs. TDM measures are often referred to in terms of “carrots” and “sticks”. “Carrots” include priority lanes and preferential parking for HOVs while “sticks” would include bridge tolls, gas taxes, and higher parking rates.

Trip - Displacement from one destination to another, such as from home to work or from work to shopping. “Number of trips” is usually specified as person trips or vehicle trips.

Trolley or Trolley Bus - Electric bus powered by high-voltage overhead wires used within the City of Vancouver.

Urban Growth Boundary (UGB) - The maximum extent around an urbanized area within which development is permitted.

UBC - The University of British Columbia.
UEL - The University Endowment Lands, a land trust granted to UBC to provide it with a land base to support the University’s educational objectives.

UGB - See Urban Growth Boundary.

Utility - The ability of an option to satisfy a decision maker’s need, based on quantifiable parameters such as time requirements and cost. For use in calculations, a common dimensional units are used, such as time or money. If money is used, non-dollar values are said to be "monetized."

Vancouver Regional Transit Commission (VRTC) - Decision making body for the VRTS which consists of seven commissioners from municipalities within the VRTS service area. The City of Vancouver has two seats on the commission.

Vancouver Regional Transit System (VRTS) - The division of BC Transit which has jurisdiction for providing transit service in the eastern part of the Fraser Valley.

VRTC - See Vancouver Regional Transit Commission.

VRTS - See Vancouver Regional Transit System.

Whole Route Planning - The concept of analyzing a entire route in terms of its transportation roles and the impacts of these roles on stakeholders such as local residents, transit users, and businesses before making transportation decisions which affect the route.
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Appendix A - A Land Use Planner's Guide to Transportation Planning Methods

Transportation engineers have traditionally employed a "gravity model" to predict the number of trips between defined traffic zones at a given time of day for a specific type of activity. The gravity analogy is that the number of trips between two places (the "force of attraction" between two objects) is proportional to the number of trip makers and destinations in the places (the "masses" of the two objects) and inversely proportional to the difficulty in getting between the two places (the "distance" between the two objects). For a given type of trip, e.g., to work in the morning peak period, the most common application of the model, the model usually takes the form of an equation such as: 257

\[ T_{ij} = \frac{k_{ij} A_{ij}(\text{Jobs, Households})O_iD_j}{I_i(d_{ij})} \]

Where...

- \( T_{ij} \) is the number of trips expected from zone i to zone j,
- \( A_{ij}(\text{Jobs, Households}) \) is the relative attraction between zones in terms of the number of jobs in the employment zone i and households in residential zone j,
- \( O_i \) is the total number of trips that originate in zone i,
- \( D_j \) is the total number of trips with a destination in zone j,
- \( d_{ij} \) is the average distance between the two zones,

257 See, for example, G.M. Lamb, "Introduction to transportation planning" series, Traffic Engineering and Control, January - June 1970, for a detailed overview. An overview of the GVRD implementation of the basic four-step transportation planning algorithm using the gravity model is described in GVRD Strategic Planning Department GVRD EMME/2 Transportation Planning Manual (December 1995).
$I_{ij}(d_{ij})$ is the "impedance" between the zones $i$ and $j$, as represented by factors such as the distance between the two zones. Traditionally, impedance was simply the distance raised to some power between one and two. This is similar to the "inverse square" effect of distance (i.e., $1/d^2$) on the physical force of attraction of gravity.

$k_{ij}$ is euphemistically called a "correction factor" or a "constant of proportionality" by transportation engineers. The value can be different for each pair of traffic zones. It can be thought of as a way of accounting for all of the factors that the model designers could not express mathematically, such as socioeconomic variables and complex road network patterns. They are needed to make the model balance for what is actually observed, at the present time.\(^{258}\)

These trips are then distributed among the various possible paths between the two zones, to predict system performance and identify future overload conditions. Recommendations made by transportation engineers to decision makers for increases of infrastructure capacity in order to satisfy these anticipated demands are often based on these predictions. Until quite recently, the decisions have been justified primarily of the equivalent monetary benefits of the time savings from reduced congestion to businesses the drivers of private automobiles.\(^{259}\)

It has become increasingly evident that, far from satisfying predicted demand, adding more road capacity has had the effect of releasing a latent demand for travel.\(^{260}\) This is implicit in the model

\(^{258}\) Ibid. p. 43. These are known as "superzone to superzone ratio factors" in the GVRD EMME/2 model, whose purpose is to "adjust for differences between observed and modelled inter-regional trip patterns not accounted for by the simple gravity model."

\(^{259}\) These systematic barriers are stated bluntly in: TransVision Consultants for BC Transit and the Province of British Columbia, Crown Corporations Secretariat Transit Priority: Programs That Put People First (October 1994): Executive Summary, p. iv.


Appendix A

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in that when the impedance between two places drops for a mode, more trips will be generated. The latent demand was either served by other modes or did not exist before the infrastructure was available to satisfy it, i.e., people would not have bothered to make the trip if it was too difficult. In the latter case, land which was previously unfeasible for housing due to inaccessibility becomes attractive for development and encourages increased commuting between suburban homes and urban jobs. The philosophy of “build it and they will come” has also been applied often in the past to justify new roads. The results of this engineering methodology can be visualized as:

Result of Applying Transportation Planning Methods Iteratively

Note that, as the process is repeated, the slope of the predicted demand curve will become steeper with each iteration, which is characteristic of exponential growth. This is exactly what is observed in the GVRD, with the number of registered automobiles and trips by automobile both increasing exponentially at a 3.75% annually compounded rate, which is approximately 50% higher than the observed rate of population growth.

Once the number of trips between zones is predicted, or generated as the case may be, the likely modal splits are determined using “Multinomial Logit” probability functions. These equations indirectly use the utility functions, similar to housing utility functions, of the various modes with
monetized time and cost factors. Multiple regression analysis is applied to these factors to determine the exact form of the utility function used. The mathematical representation for the probability of using a mode to travel between two traffic zones is:

\[
P_{i,j}^m = \frac{e^{-U_{i,j}^m}}{\sum_{m=1}^{4} e^{-U_{i,j}^m}}
\]

Where:

- \(U\) is the Utility of the mode as a function of time and cost,
- \(m\) represents the four modes: walking, cycling, transit, auto,
- \(i, j\) are the origin zone \(i\) and the destination zone \(j\),

The utility of a mode can be represented mathematically as:

\[
U^m = a_0^m + a_1^m t_v^m + a_2^m (t_w^m / t_v^m) + a_3^m (c^m / i)
\]

Where:

- \(U^m\) is the Utility of mode \(m = w\) (walk), \(b\) (bike), \(t\) (transit), \(a\) (auto),
- \(t_v^m\) is the total in-vehicle time,
- \(t_w^m\) is the total out-of-vehicle time,
is similar to the trip distance in the Mannheim utility model for modal preference. The factor reflects the impact of waiting time as a function on the total time of the trip. In other words, if waiting time is a small proportion of the total time, the wait will seem significant, whereas long waits for short trips contributes significantly to the impedance of the mode. A reasonable representation of this effect is:

\[ t_{ec} = \frac{1}{1 + (t_w^m/(t_{ec}^m + t_w^m))} \]

\( t_{ec}^m \) is the total trip cost. \( c^1 \) is transit fare, \( c^a = c^{a, \text{parking}} + c^{a, \text{operating}} \), \( c^m = 0 \) for other modes.

\( i \) is the average income of the trip-maker(s). As income increases, the impact of cost on the use of the mode decreases.

\( a_0^m, a_1^m, a_2^m, \) and \( a_3^m \) are proportionality constants, which are from the impedance factor relationships used in the GVRD Emme/2 transportation model and checked using observed modal splits. \( a_0^m \) represents the non-monetary and non-temporal utility of real and perceived benefits of using a mode, which include factors such as safety, convenience, prestige, and other biases. \( a_3^m \) is weighted to make the time related to the cost of travel worth \( 1/3 \) of the equivalent time needed to earn the cost.

The final step in the process, after the number of trips between two places is generated and the probable modal split is determined, is to distribute these trips among the possible alternative routes between the two places. This information can be used to determine areas of likely congestion, which unfortunately often leads to recommendations to provide more capacity.
Wide arterial streets in new developments are designed to accommodate anticipated demand, as opposed to acceptable traffic levels.

The model originated in the 1950s, at a time when families were predominantly nuclear, with one income earner who travelled daily to a fixed workplace. Needless to say, being entirely dependent on changing aggregate socio-economic factors and constant upheavals in living and working patterns, the predictive power of the models developed to date has been limited. Forecasted demands on the transportation system are determined essentially by assuming job and housing growth predictions into the model with a fixed infrastructure network and recalculating the number of peak period trips. This presumes that people will continue to behave in the future as they do today, a tenuous assumption at best. Telecommuting and dramatically increasing numbers of two income families have already rendered many of the model’s assumptions obsolete.

Nevertheless, the concepts of the modelling process have some usefulness as a framework to predict the relative short term effects of various land use and transportation policy instruments and to understand how the use of the model can lead to the traffic problems that it seeks to solve. One of the prime criticisms of the model is the exclusion of increasingly varied individual and household behaviour on travel patterns. This includes disaggregated travel behaviour, the inability to predict 24 hour transportation demands and the lack of socio-economic factors other than travel times and direct costs. These shortcomings prevents to permit a fuller examination of the likely effects of various potential policy instruments on travel patterns.

Appendix A
The "push-pull" model seeks to incorporate some of the more obvious gaps in the representation of socio-economic measures of the simple gravity model. Most importantly, for the purposes of explaining travel behaviour of new households, the differences in house prices between areas of employment and areas of housing need to be explicitly represented. In bid-rent theory, the basic of land economics, the price of land and buildings is directly related to how well the needs of prospective buyers and renters are satisfied. For housing, the factors include safety, education, convenience of services, recreation and the two foci of this thesis: mobility and price.

This brings us back to the access-based planning paradigm. Accessibility is an old planning concept that, like neo-traditional planning, provides a powerful traditional alternative to current transportation planning methods. Whereas transportation engineers have focussed primarily on satisfying projected demands for vehicular capacity, associated with individual mobility, an accessibility planner would seek to find all possible ways to reduce the need for travel in a private vehicle.

Examples of this "soft engineering" approach include methods such as: increasing land use density and mix; promoting work at home and shorter work weeks; improving alternative transportation modes. It would also include the focus of this thesis, achieving a better regional jobs/housing ratio through balancing the incomes of employees in an area with sufficient suitable and affordable housing. The approach is analogous to using energy conservation programs to avoid the need for building unnecessary hydro, thermal, or nuclear electricity plants.


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Appendix A
Appendix B - Key Informant Responses to Land Use, Transportation and Housing Survey

1. How much importance do you assign to the following issues for their impact on growth management in the GVRD (e.g., urban sprawl and long distance commuting)? Why?

a. Providing affordable, ground-oriented housing near employment centres...

High. Quality of life of people - hopefully we are not going back to the company compounds of industrial towns.

High importance.

Very important. Allows growth concentration, reduces infrastructure costs. Ensures green zones can be protected.

High Importance. Affordable ground-oriented housing:

- Will take the form of row or stacked townhouses;
- Reflects the need for higher density development or higher priced land in the vicinity of most employment centres;
- Supports more convenient transit service.

Very Important. Continuing demand for affordable and ground oriented housing (e.g., not single family homes) will continue and grow. Supply is constrained now, need expanded opportunities.

Affordable housing is an extremely important issue. One of the biggest obstacles that I face in encouraging the use of more sustainable transportation modes has to do with the argument that people feel they "must" move to the distant suburbs in order to find affordable housing. Then
they complain about poor quality transit service in these "communities", and use this as an excuse for why they need to drive everywhere. Conventional public transit systems are not capable of providing cost-effective service to these bedroom communities, and I'm not sure that we should even try to serve these areas beyond a marginal level, especially when it comes at the expense of providing greater service to more transit friendly neighborhoods. But, I don't think "ground-oriented" housing is as necessary as a lot of current thinking presupposes it to be. The key is "affordability." I think that it is very possible to have a high quality standard of family living in a non-ground oriented housing unit. It also would be far less wasteful to live in such a unit. We need to change our thinking on this issue, since we are running out of "ground" in a number of neighborhoods that could and should accommodate higher densities.

Important. People should have choices. Many young families move to suburban locations because housing is more affordable. Often young families cannot afford to live in the City or in some of the inner suburbs where employment is concentrated.

On small lots, duplexes in existing single detached areas. I think this will be the solution. (...near employment centres) see footnote in Managing Vancouver’s Growth (LRS, # 28). This will sort itself out.

Relatively high importance: but many housing type choices are far from generic - i.e., ground oriented has many forms as do condos that are stacked.

Considerable importance.

Very important.

High. Supports the GVRD objective of creating a compact metropolitan region. Housing near employment supports this objective.

High importance.

Appendix B
High. Most of our communities now suffer the consequences of the ill-conceived notion that good planning meant keeping land uses separate from one another. Not only has this resulted in sprawl and the commute but in many areas it has also destroyed the vibrant, dynamic organism called “community.” Ground oriented is where people are at who have grown up with the North American dream of the single family house. The bigger issue with housing near employment centres, however, in a democracy, does one ensure that those who live there, work there and vice versa?

Very difficult to achieve. Most of this housing will have to be in apartments - but it can be affordable and close to employment centres.

b. Balancing the number of jobs and employed residents in each GVRD subarea (i.e., North Shore, Northeast Sector, Burrard Peninsula, Fraser Valley South, etc.)...

High, but need to concentrate if transit has a small chance.

High importance.

Important, but very difficult to do. Governments can only provide a climate for job creation and job location.

High Importance. This balance:

- Improves the tax base and reduces the tax burden on residential properties
- Reduces commuting for jobs and air pollution

Important, but with the caution that housing and jobs can only be loosely linked - two income families, the fact that changing your home is harder than changing your job means that most people won’t live near where they work, even if they can.
Less important than affordable housing. I think if we have a larger base of affordable housing units around the region, people will be able to move to be closer to work, school, etc.

Not Very Important. While creating a better balance of jobs/ labour force should in theory allow persons to live closer to where they work, two income families, changing employment structure and personal preferences around lifestyles, may make this a very difficult goal to meet. Los Angeles has a good balance of jobs/ residents in many of its communities, however, has significant sprawl and commute problems.

No reason to believe that this, without small ground oriented housing, will solve anything.

Impossible, perhaps desirable, but municipalities are going to compete for economic growth and jobs first - housing is assumed to follow - consider development cost charges.

Not much, as people choose location for many reasons other than proximity to employment i.e., social issues, lifestyle, affordability, etc.

Not so important.

High. Support the GVRD objective of creating complete communities. Balancing jobs and housing contributes to this objective.

Important.

While we should continue to encourage and promote this where it makes sense, I question its feasibility beyond a certain point. Not a panacea; we should not be viewing the housing/employment relationship in isolation, imposing it in cookie cutter fashion in every region. Ignores the unique biophysical/ecological character from which, ideally, a settlement/employment strategy should emerge for each region. For example, in the Lower Fraser Valley, a rural,

*Appendix B*
agricultural area - yes we need to encourage some employment for those who farm part-time or
engage in other land-based rural activities part-time and for members of their families not involved
in “rural jobs” but goal should not be to create enough employment so that all those ex-urbanites
now commuting to Vancouver could work there. That would only serve to increase the pressure
on the ALR, increase the demand for housing and further transform the rural community, which is
undesirable, in my view.

Very idealistic and difficult to achieve. Richmond has more jobs than workers but commuting
remains high as we export workers to Vancouver and import retail workers.

c. Achieving land use density targets that support walking, cycling, and transit...

If like Vancouver West Side are, but not too high.

High importance.

Important. But even if you have these densities, weaning people from automobiles is a difficult
task. The alternatives have to be safe, convenient and even at that, there has to be some special
event that gets an individual taking that first “non-car” trip.

High Importance: higher density is the key to achieving more complete communities with viable
alternatives to the private automobile.

Important - as with above, it’s creating the choice/the opportunity that counts.

Very important for the vitality of the community and the for ability of the society to provide
infrastructure and services that are economically and environmentally sustainable.

Important. Increasing density is key to making transit more viable (more frequent, direct routes).
This density should be achieved within the Growth Concentration Area. The GVRD’s Livable

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Region Plan does not go far enough to create the densities necessary to bring about more sustainable growth.

Byproduct - specialization of labour force will constantly pull away from “the completely gated complete community” - market will achieve these densities when redevelopment is permitted.

Relatively high priority and it can be done.

Medium importance.

Very important.

High. As per item a. This item also supports the objective of creating a compact metropolitan area.

Important.

Highest priority in already urbanized areas. For several reasons, not only to finance transit (provides critical mass for other infrastructure, services, amenities as well; maximizes efficiency in use of resources, saves agriculture, habitat lands etc.) Need also to use the densifying tool in a proactive, creative way to re-establish or enhance sense of neighbourhood. Then the challenge is to change consumer habits so that more residents choose to walk or bicycle to a local (higher priced) shop than to drive to Wal-Mart or Home Depot to buy a cheaper light bulb.

Yes - this is the only answer to urban sustainability.

2. What is your definition of “affordable” housing? Do you feel that governments should be responsible for the provision of affordable housing?
Don't know. They (governments) should keep out except in rare circumstances.

Housing that is economically accessible within 30% or less of net income. Government should mostly facilitate housing, including some extraction from developers.

I don't have a definition. Governments can encourage affordable housing, but developers are the ones who build it.

Affordable housing is housing that local households can buy or rent within their means. Since it may be uneconomical for the market to provide housing at an affordable price or rent, all levels of government should cooperate in assisting in the provision of affordable housing, especially to the economically disadvantaged groups.

Affordable is a relative term. The core-need definition created by CMHC is probably the most useful for guiding policy. Society should be responsible for guiding affordable housing - government is just its collective will. We need to ensure the market is allowed to produce as much as it can.

Affordable housing is housing that people are free to continue living in even if all sources of personal income were to suddenly cease. I think that some housing cooperatives have come close to achieving the goal of being able to offer affordable housing for most people, if not for everyone. I like the common co-op practice of charging people according to their ability to pay. This is my definition of affordability. In the co-op in which I live, families making well over $100,000 per year live side by side with families existing on social assistance. This housing is affordable to all concerned, since the co-op has a policy that anyone with a household income of less than a certain amount per year is required to pay no more than 25 percent of their gross income for their unit. What higher, or more basic purpose could governments have than to ensure that housing and food needs of all members of society are met? Governments have the resources (obtained from us) available to offer long-term low interest loans, or even grants to assist groups of people build community housing. Private financial institutions will not provide loans to
property-less, income-challenged people. Without such government intervention, people are likely to remain property-less, and even homeless. This is a fundamental government obligation to its citizens.

Very difficult to define. Generally speaking I do not favour government intervention. However in Vancouver the issue is critical to meeting regional growth strategy that Governments must take action.

I don’t have one. No. I think that redistributional policies should not be buried in allocational programs. Greater land use, building code, and density flexibility will ensure better match between incomes/prices.

Shelter available for the lowest 20% of the income earners at a maximum of 40% of the average income.

There are two issues - “affordable housing” and “housing affordability.” There is a role for government in both areas. Regrettably, there will always be some hard to house situations which require government to provide housing. Government has a role in housing affordability by reducing costs to housing, expediting process and ensuring adequate land through appropriate zoning.

Yes, government should. Affordable means affordable by those defined as “in poverty.”

No definition, therefore cannot answer this question. Too big of a topic to handle adequately in a “short” survey question.

Housing in which a wide range of “ordinary British Columbians” or middle to low income people can afford to live in; I consider some essential features of “affordable housing” to be a) flexibility (owned/rented/shared/co-op as well as other innovative and creative arrangements we don’t use yet, b) inclusiveness, in terms of mix of age, income, gender, family status, etc. and c) integration.

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with other residential and other uses. In other words, housing should be built to meet the needs of the population (the whole community). Period.

Less than $200,000. Government needs to subsidize but private sector must build and manage.

3. What barriers are there to the construction more affordable ground-oriented, higher-density family housing near regional employment centres, such as the Burrard Peninsula?

Land price!


High land cost. The current oversupply of apartments in the downtown core. Home ownership involves more than a choice for shelter. A primary consideration for housing consumers is to maximize appreciation potential based on location, quality, and amenities for a given price range.

Existing capital, in the form of existing uses such as SFDs, one storey retail, needs to be replaced which means a loss of capital value - in other words - net gain is reduced, cost increased. Social indifference, the “I’m alright, Jack” & NIMBY syndrome. Short-term perspective dominates over long-term.

One of the largest barriers seems to be the existence of NIMBYs that make it hard for the city to re-zone neighborhoods at higher densities or to allow non-market housing to be built in a neighborhood. City needs to find creative ways of "selling" NIMBY-types on the advantages of allowing density and non-market housing. Also, city needs to create incentives for developers to build rental housing. The main form of housing being added to the market lately is pricey condominiums.

Opposition from existing neighbourhoods to new developments that would feature higher density housing. Opposition to secondary suites. Prevailing attitudes by a large number of people that

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high density housing comes with more crime, will reduce land values, destabilize neighbourhoods, are not for families etc., etc.

Municipal zoning by structure type and occupancy. Minimum lot size. Side yard requirements.

Land prices.

Government represents the greatest barrier, through increasing taxes, charges, etc. and by not ensuring adequate supply of appropriately zoned land.

Zoning changes. GVRD member municipalities are moving too slowly in this area.

#1 High price of land. #2 High DCCs, and other exactions which can only be charged in the price of products. #3 NIMBY resistance to higher levels of density.

Developers' reluctance (can't make their profits so no incentive), existing OCP's and Zoning; lack of local Council leadership in providing carrots and sticks; single family house syndrome; low income housing stigma; neighbourhood reluctance to accept change; lack of "clout" of those who require it; under current private property/speculative/land-as-a-commodity-to-be-bought-and-sold and the highest-and-best-use-is-the-use-that-brings-the-greatest-profit-to-the-owner scenario; there are no funds to build it; system doesn't reflect the philosophy of the last sentence to the previous question.

NIMBY. High cost of land. No federal and only very limited provincial assistance in housing.

4. Which of the policy instruments currently available to planners and decision makers for the creation of affordable housing are most effective? Have they been fully exploited?

Zoning - no. Bill 55 powers - no.

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Zoning for small lot housing and other ground oriented housing.
Density bonusing provisions of the Municipal Act.
Making land available for long term lease at 65%-75% of market value.
These tools are being more effectively used in Surrey.

Loosen zoning to allow higher density rowhouses/townhouses, low-rise apartments. Maintain taxpayer funded social housing programs. If zoning amended to increase densities, ensure windfalls (if any) are to public account. No, they have not been fully exploited.

Rezoning all single detached neighbourhoods to allow any non-standard residential unit development. 25 foot minimum lot size. Ignoring illegal suites. Not fully exploited.

Housing policy if active rather than passive (lip service). No, no, no.

Appropriate zoned lands, implementation of processes that facilitate development and building.

1. Build and fund social housing.
2. Zoning.
3. Provincial and federal co-op housing program.
4. Take advantage of low interest rates.

It depends what you mean by “affordability,” and when the “affordability” is being addressed. This is a very wide open question. Some instruments are being misused in the name of “housing affordability.”

I’m rusty on this one. In my view, the changes to Section 931.1 of the Municipal Act to allow density bonusing, the new Growth Strategies Act plus all the tools local government has always had if they wished to be creative in providing affordable housing, instruments are there.
Bonusing or a cash levy in lieu for market housing to build a percentage of social housing or cash in lieu and let city do it.

5. Should governments intervene more aggressively in housing and land use policy? If so, which level(s) of government should act and which programs should be implemented?

No, again they (governments) usually do not know what they are doing and have little personnel.

Yes - regional and local governments should have housing as a centrepiece of their policy.

Ministry of Municipal Affairs is currently leading a process on development finance review (main focus DCCs). The development industry and local governments work to see if they can agree to changes. If they can, the ministry will facilitate making it happen. This is as aggressive a role as the ministry will take - bringing together the partners and working on partnerships.

All levels of government should act on housing. Senior levels of government should provide funding with zoning support and facilitation from local governments.

Society should intervene - need collective understanding and will. Region needs to be empowered to overcome NTMM (Not in My Municipality). Province needs to continue funding provincial social housing programs, and should provide incentives to municipalities for secondary suites and increased ground-oriented medium-density housing.

This is a trick question, right? Your question seems to be based on the presumption that governments would do the right thing if only we gave them the authority to be more aggressive with the implementation of their policies. I am glad that governments didn't intervene any more aggressively than they did during the Downtown Eastside/Chinatown freeway debate of 25 or 30 years ago or with their concept of how best to "develop" the Grandview Cut as a transportation corridor. Let's hope the City never gets the nerve to try to aggressively intervene any more so than they already do. There seem to be people in the Engineering Department that are biding their

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time, waiting for the right moment to sneak their Grandview Cut Freeway plans back out when nobody is paying attention.

Yes. Provincial government already has a number of housing programs - Affordable Housing First Lands Policy, Non Profit Rental Housing, New Options for Home Ownership and Community Housing Initiatives etc. Local governments still must be convinced of the goals of the livable region and their own self-interest are not mutually exclusive. There needs to be more demonstrable projects that show how ground oriented medium density housing can be attractive and that local governments should consider alternate development standards. Local governments should be encouraged to permit secondary suites even though community groups often oppose.

No. They should intervene less, in the sense of giving people more flexibility to use land at greater densities.

Not intervene. Be clear and consistent. Understand opportunity cost implications of regulation and policy.

Governments are already too aggressive in their involvement in land use policies. Their role should be to set direction, goals, and provide appropriate zoning.

Yes. All levels.

Every intervention increases the total cost of housing and of non-residential development too, i.e., jobs. A housing voucher system is worth considering for social housing.

Yes. It’s absolutely critical that the Feds reenter the field (with real dollars) to fulfill their responsibility because housing is a national issue and should be viewed as a basic right of all Canadians. Provincial role is well positioned as part of Growth Strategies and Homes B.C. programs - important that affordable housing not be seen as separate but as part of the whole question of compact, complete and livable communities; As with many other valuable programs,
Homes B.C. could use more dollars but... The level of government best positioned to deliver affordable housing is the Local. They have the land use mandate. They have all the tools they need in the Municipal Act. They now also have the GVRD Livable Region principles, goals and overall Strategy to support them. They now just have to get to it and do it.

Province or cities - Province has the money and cities control land.

6. In general, which policy should governments follow: transportation investments should lead development, or development should lead transportation investments? Why?

Transport should lead, then these should be a public-private investment to make the things work.

Development should lead transportation investments - you know why!

It will always be both. Transportation investments can shape development and give it a coherence. But there will always be cases of guessing wrong and some transportation investment will have to occur where development has taken hold.

Transportation investments should shape development based on local governments' land use plan. Roads and transit service should be planned ahead of development so that mode of transportation, preferably public transit, will be considered along with housing decisions.

Transportation should lead (though not by much - more staggered parallels than in series). Because it always does. If you can’t get from here to there, there is no there!

Generally favour transportation investment leading development. Transportation investment up-front is needed to significantly change land use. The policy has to be comprehensive - in other words, development must be funneled into transportation corridors. Notwithstanding the success of SkyTrain, I am still concerned that the land use-transit connection is very fragile and needs constant nurturing.

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This is a false dichotomy. All infrastructure extension is part of the existing pattern of
development and facilitates additional development. The Richmond line is as much leading as it is
servicing and North East Sector line is as much servicing as it is leading. The fundamental
approach is that the two must be coordinated, and that both are justified.

Depends on whether the strategy is public/private partnerships or something else. I favour
transportation investments leading and private development of access, amenities as a way of
sharing costs and benefits.

Transportation and land development should be jointly planned so there is orderly growth,
predictable land policies, stable prices.

Transportation investments first.

Transportation investment plus definitive land use plans with density and design targets should
proceed development in order to achieve growth management objectives stated in the Livable
Region Plan.

It depends on the form of transport. Development leads road improvements because development
pays for them. Government “leads” rapid transit, but does not always keep up with development
pressure.

Transportation investments should lead development but only after adequate planning such as has
taken place in the GVRD with the Livable Region Strategy. The whole philosophy and structure
and process of the provincial Growth Strategies Act is, I believe, a very credible, consensus-base
model. It says, a region must have a plan. The province will be there at the table from the
beginning. And when the region has planned, the province will enter into agreements to deliver
infrastructure dollars in response to that plan. this takes us light-years ahead of where we have
ever been in this province in terms of coordinating the jurisdictional responsibilities of the two

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levels of government (along with the regional entity) to ensure transportation and other infrastructure investments enhance community-building goals rather than perpetuate urban sprawl with all its attendant impacts. The opposite approach has created a dilemma that even money can’t solve. What do we do with sterile, land gobbling single family house subdivisions in Maple Ridge, Mission, Langley and Abbotsford? So we put in West Coast Express that all of us as taxpayers must finance in order to subsidize the unsustainable, which ironically, will now actually encourage more of the same - since more people will now see it as feasible to live out there and work in the City. Similarly, with the HOV lanes along the 401. Politically, a government must respond to the demand to do something with the freeway. Personally, if we were really serious about forcing behavioural change, we would allow grid lock to happen (although there are those who make the good argument that moving cars release less pollutants to the air than idling cars). And, as long as Councils keep rezoning to allow these subdivisions, what can the province do?

Transportation should lead development. Buy right of ways for transit cheaper, put in cost levies to recover some transportation costs from increases in land values. This enables us to plan for higher densities with fewer cars.

7. It has been claimed that some types of transportation infrastructure can act as a hidden subsidy in certain real estate markets. For example, the U.S. Interstate freeway system has been identified as a major factor in providing easy access to cheaper suburban land in metropolitan areas for businesses and homeowners. Do you feel that there are examples of such hidden subsidies in BC? If so, which are the most significant and how could these be made more equitable?

Yes - suburban bus service, West Coast Express - why build up CBD Vancouver at expense of region.

Yes - see Transport 2021 Study #11. Bring fair market economics to urban transportation.
SkyTrain and the Alex Fraser Bridge have boosted real estate value in North Delta and Surrey. A Capital Gains Tax on residential properties upon resale would help to recapture a portion of the land value increment attributed to public investment in community infrastructure. However, this would prove to be politically unpopular and would hinder residential mobility. A utility surcharge for transit and a toll for highway crossings could be considered for implementation in phases.

The Oak Street Bridge and the Deas Island Tunnel created Tsawwassen and then Richmond. The Port Mann pushed Surrey into its boom. Tolls should be in place on opening. Capture increase in value on rezoning. As infrastructure moves out, expands region, densities should go up in inner city/inner suburbs. Encourage jobs and housing to move out/expand together. Create town centres early to provide regional sub-foci.

The automobile enjoys huge subsidies and governments continue to make decisions around development without the full knowledge of the costs that automobile has on society as a whole. Similarly other utilities and services (including transit) provide higher subsidies for lower density development. Overall the costs of sprawl development are not well understood.

Again, seems simple to say, but misses a whole bunch of other aspects... for example, the subsidy could be seen as a subsidy to people who did not want growth in their neighbourhood - also need to separate purpose and effect.

The logic of this argument is infinitely regressive. There is no clear position that can be defended.

Yes, and the question needs to be asked if these hidden subsidies need to be made more equitable. Which does society value more - home ownership, obtained through lower land costs or equity in transportation infrastructure?

1. Low property taxes.
2. No speculation tax in B.C.
3. No project related tolls.

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No. Real estate development in fact subsidizes improvements in transportation infrastructure.

Of course our current transportation infrastructure subsidizes both the real estate market (can speculate on cheap rural land then get it rezoned for housing without having to shoulder the full costs to the public of sprawl) and the private automobile (costs of owning and driving a car don’t begin to cover the cost of infrastructure, as several studies have shown). Ways to address: begin the perhaps painful but essential shift to resource-based taxation or “green taxes” as they are commonly known, whereby taxes are increased on the use of resources such as energy, water, fossil fuel, materials, and waste/pollution (i.e.: bad behaviour) and taxes are decreased for socially desirable activities, such as affordable housing, density, transit use, jobs, etc. (i.e., good behaviour). There is a tremendous amount being written on this now. We need to begin using these tools at every level of decision making, on decisions large and small.

(Hidden subsidies are on) Bridges and highways to suburbs, free on-street parking. (Use) Tolling and pay parking.

8. How aware are decision makers and the general public of the significance of and need for growth management? Of the influence that personal lifestyle choices and public realm decisions such as transportation mode preferences or housing location/mix have on growth management efforts? Which mechanisms would be best for increasing awareness?

If planners had all the answers to growth management, this survey would not be needed. The future is not well defined - everyone must take chances and the last thing that they want is for professionals like ourselves telling them what their future will be. Change is our choice at the moment, enjoy it!

Decision makers - very. General public - quite. Schools programs, conferences.
Awareness - generally is on the level of "oh my God, things are changing and I don't like it" rather than a sense that planning can help develop a more desirable/palatable future. Individuals have a general sense of how their lifestyle choices may have an impact, but they will usually figure "what's on more drop in the bucket?". I think Op-ed pieces in the GVRD media are having a tremendous effect on people's awareness of air quality, potential growth, transit issues.

Residents and Council are aware of the need to manage growth. The City recently completed an elaborate citizen involvement program in which the City involved over 20,000 people in creating a 25 year vision for the City and a new Official Community Plan. The vision is a shared community vision with commonly held goals and objectives to guide planning and community development. This process responded to three fundamental challenges: the need to reconcile growth management, transportation, and environmental strategies with regional goals; the need to integrate land use planning and transportation, utilities and fiscal management; and the need to reflect the public's values for the City's future. The planning process with avenues for public involvement would be the best mechanism for increasing public awareness of growth and development issues.

They are very aware, though not necessarily enthusiastic or accepting. Make choices realistic and attractive, e.g., Vancouver's Ridgeway Greenway/Bikeway is explicit statement that non-auto traffic matters. Build incremental projects that illustrate how ground-oriented medium-density can work. But be honest: do not claim growth is the greatest thing since sliced bread - it's not - it has real costs, real changes, along with some benefits. The alternatives - the petrified, crumbling, unaffordable, dying City - is worse.

Decision makers in the Lower Mainland seem to be increasingly aware of the need to manage growth in a much more proactive manner than they did in the past. A general consensus on this issue seems to have arrived and taken firm root relatively quickly, and recently. The public seems to generally understand and support growth management. Recent focus groups and public opinion research shows us that most people in the region are aware that government will increasingly be making decisions with regard to transportation, land use & density that will impact
the general public in ways they probably won't like. The public, for example, seems to be aware
that some type of road pricing system will be introduced in the not-too-distant future.
Surprisingly, our research tells us that most people are ready to have these kinds of "sticks" used
to help wean them from their overdependence on their SOVs. The region's residents have been
told for years, through various public awareness and education programs/events and campaigns
(Go Green, Clean Air Day, CityPlan process, etc.) that they need to take responsibility for their
personal lifestyle choices, and that the "wrong" choices will become more costly in the future.
Therefore, I think public awareness levels are generally fairly high.

Overall the public is poorly informed. Decision makers think they understand, but often they
don't. Very few people understand the significance of the real costs of serving low density
development.

they are aware of the big picture, but cannot find solutions in the everyday decisions that they
make. General public - very little, but it is not their job. (Of the influence of lifestyles...) Very
little!

Lifestyle choices are the most critical factor. Economics appear to drive undesirable consumptive
practices. The problem seems to be "context," not understanding interrelated factors.

I believe there is growing awareness on the part of the general public as to these issues.

Not very aware at all. If municipalities had the courage to move forward on zoning changes,
population would become more aware.

"Growth" and development are not the same. There is awareness of the need to manage
"growth" but only the power to manage development is actually exercised. "Growth" itself is
almost unmanageable. The questions tend to miss the most important questions of all: what are
underlying assumptions of "growth management" and to what extent are these assumptions valid.

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Many people I speak to rarely discuss assumptions, yet by addressing the assumptions, we might gain better insight on much more interesting (and more political) issues like housing affordability, jobs/housing mix, land use/transportation relationships, and so forth. For example, is it fair to assume that people will always be able to live and work in the same locality and require less transportation, when people are changing jobs and occupations so frequently? Further, with two ever-changing income sources required to afford a modest ground-oriented dwelling unit, is it reasonable to limit parking to one place per unit?

With the Georgia Basin Initiative and the Growth Strategies Act dialogues initiated at the provincial level, the extensive time/effort/discussion that went into the GVRD Livable Region Strategy, as well as the myriad of regional and provincial planning processes around transportation and transit over the last decade, I think there is a high degree of awareness of growth management issues amongst decision makers. Recent coverage in the media suggests awareness is also rising in the general public. I think most people understand the problem. What is not as well understood is the magnitude of the changes required for the solutions. While the past five years have seen growing numbers of higher density redevelopment taking place within urbanized neighbourhoods, there are legitimate concerns (i.e., gentrification of the Downtown Eastside) that they may not otherwise meet the tests of overall sustainability. How to increase awareness? Increase opportunities for public dialogue is the only way. Need to prepare for all the reasons people don’t want change, including excuses that blame others as the cause of the problem - whether immigrants, the poor or Hong Kong money, etc. Also need to promote a much better understanding of the huge public and taxpayer costs of single family detached houses and urban sprawl upon local and provincial budgets. Agree somewhat with Alan Artibise who says we are and anti-urban society; i.e., we need to tackle the image that Cities are horrible, dreary, expensive places to live and terrible places to bring up a family and create the alternate picture in people's minds of what safe, affordable, livable medium-density City neighbourhoods can look like.

Decision makers are largely aware in cities. Province less so and feds not at all. Public is not aware, as growth is incremental.

Appendix B
### Place of Work Versus Place of Residence Matrices

#### Abbotsford, DM

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<th>Age</th>
<th>Family Structure</th>
<th>Tenure</th>
<th>Mobility Income</th>
<th>HH Income</th>
<th>Total POW Work at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
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\[(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 10.95%\]

#### Burnaby, DM

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<tr>
<th>Age</th>
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<th>Tenure</th>
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<th>HH Income</th>
<th>Total POW Work at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
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<th>Coquitlam, DM</th>
<th>Delta, DM</th>
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<td>All</td>
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\[(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 4.68%\]

### Appendix C

304
## Place of Work Versus Place of Residence Matrices

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<thead>
<tr>
<th>Surrey, DM</th>
<th>Vancouver, C</th>
<th>FVRD Total</th>
<th>Abbotsford, DM</th>
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<th>Mission, DM</th>
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<td>19%</td>
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<td>3%</td>
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<td>6%</td>
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<tr>
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<td>-6%</td>
<td>30%</td>
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<td>N/A</td>
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<tr>
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</tr>
<tr>
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<td>N/A</td>
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<td>-1%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
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<table>
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<th>Surrey, DM</th>
<th>Vancouver, C</th>
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<td>1255</td>
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<td>7%</td>
<td>17%</td>
<td>-1%</td>
</tr>
<tr>
<td>-3%</td>
<td>17%</td>
<td>9%</td>
<td>4%</td>
</tr>
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<td>10%</td>
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<td>4%</td>
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<td>-5%</td>
<td>8%</td>
</tr>
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<td>3%</td>
<td>6%</td>
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<td>-26%</td>
</tr>
<tr>
<td>-14%</td>
<td>10%</td>
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<td>-3%</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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Appendix C

305
### Place of Work Versus Place of Residence Matrices

**Chilliwack, DM**

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<th>Age</th>
<th>Family Structure</th>
<th>Tenure Mobility</th>
<th>Income</th>
<th>Total POW at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
<th>Langley, DM</th>
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<th>Vancouver, C</th>
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<td>250</td>
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<td>N/A</td>
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<td>69%</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
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<td>All All All All All</td>
<td>All &gt; $100,000</td>
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<td>N/A</td>
<td>-6%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</table>

(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 13.52%

**Coquitlam, DM**

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<th>Tenure Mobility</th>
<th>Income</th>
<th>Total POW at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>Coquitlam, DM</th>
<th>Delta, DM</th>
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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 10.12%

**Appendix C**

306
### Place of Work Versus Place of Residence Matrices

<table>
<thead>
<tr>
<th>FVRD Total</th>
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<th>Chilliwack, DM</th>
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<td>5%</td>
<td>3%</td>
<td>N/A</td>
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<td>6%</td>
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<td>2%</td>
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<td>220%</td>
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<td>N/A</td>
<td>-1%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>-15%</td>
<td>N/A</td>
<td>-14%</td>
<td>N/A</td>
<td>N/A</td>
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<th>Port Moody, C</th>
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<th>Vancouver, C</th>
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<td>1400</td>
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<td>16%</td>
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<td>3%</td>
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Appendix C
### Place of Work Versus Place of Residence Matrices

**Delta, DM**

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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 10.89%

**Langley, C**

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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 10.66%

**Appendix C**

308
## Place of Work Versus Place of Residence Matrices

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**Appendix C**
### Place of Work Versus Place of Residence Matrices

**Langley, DM**

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<th>Total POW Work at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>Coquitlam, DM</th>
<th>Delta, DM</th>
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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 13.90%

**Maple Ridge, DM**

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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 16.91%

**Appendix C**

130
### Place of Work Versus Place of Residence Matrices

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<tr>
<th>Langley, C</th>
<th>Langley, DM</th>
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<th>Surrey, DM</th>
<th>Vancouver, C</th>
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<th>Port Moody, C</th>
<th>Richmond, C</th>
<th>Surrey, DM</th>
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### Place of Work Versus Place of Residence Matrices

**Matsqui, DM**

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\[(LT40, NMSD, Ground, Owned, Moved) (All, All, All, All, All) = 13.51%\]

**Mission, DM**

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<th>Age</th>
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<th>Tenure Mobility</th>
<th>Income</th>
<th>Total POW Work at home</th>
<th>GVRD Total Burnaby, DM Coquitlam, DM</th>
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<td>68%</td>
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\[(LT40, NMSD, Ground, Owned, Moved) (All, All, All, All, All) = 16.37%\]

**Appendix C**
## Place of Work Versus Place of Residence Matrices

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Appendix C
### Place of Work Versus Place of Residence Matrices

**New Westminster, C**  
226

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<th>Tenure</th>
<th>Mobility Income</th>
<th>HH Income</th>
<th>Total POW Work at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>Coquitlam, DM</th>
<th>Delta, DM</th>
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<td>35%</td>
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| LT 40 NMSD Ground Owned Moved All | All | 1215 | 3% | N/A | 2% | 21% | N/A |
| LT 40 NMSD Ground Owned Moved All | All < $20,000 | 15 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $20,000 - $39,999 | 155 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $40,000 - $59,999 | 335 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $60,000 - $79,999 | 425 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $80,000 - $99,999 | 205 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All > $100,000 | 85 | N/A | N/A | N/A | N/A |

(LT40, NMSD, Ground, Owned, Moved)/(All, All, All, All, All) = 5.37%

**North Vancouver, C**  
213

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<th>North Vancouver, C</th>
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| LT 40 NMSD Ground Owned Moved All | All | 755 | 23% | N/A | 2% | 24% | -17% |
| LT 40 NMSD Ground Owned Moved All | All < $20,000 | 10 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $20,000 - $39,999 | 90 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $40,000 - $59,999 | 170 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $60,000 - $79,999 | 170 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All $80,000 - $99,999 | 170 | N/A | N/A | N/A | N/A |
| LT 40 NMSD Ground Owned Moved All | All > $100,000 | 145 | N/A | N/A | 12% | N/A | N/A |

(LT40, NMSD, Ground, Owned, Moved)/(All, All, All, All, All) = 3.55%

**Appendix C**

314
### Place of Work Versus Place of Residence Matrices

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Appendix C
### Place of Work Versus Place of Residence Matrices

**North Vancouver, DM**

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<th>Mobility Income</th>
<th>HH Income</th>
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<th>No usual POW</th>
<th>GVRD Total</th>
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(LT40, NMSD, Ground, Owned, Moved)/(All,All,All,All) = 8.69%

**Pitt Meadows, DM**

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<th>Age</th>
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<th>HH Income</th>
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<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>Coquitlam, DM</th>
<th>Maple Ridge, DM</th>
<th>New Westminster, C</th>
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<td>All</td>
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<td>All</td>
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<td>-1%</td>
<td>15%</td>
<td>N/A</td>
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<td>Ground</td>
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<td>All</td>
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<td>0%</td>
<td>-2%</td>
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<td>-34%</td>
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<td>Ground</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
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<td>38%</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
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<td>Ground</td>
<td>Owned</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>NMSD</td>
<td>Ground</td>
<td>Owned</td>
<td>All &gt; $100,000</td>
<td>35</td>
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<td>N/A</td>
<td>N/A</td>
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</table>

(LT40, NMSD, Ground, Owned, Moved)/(All,All,All,All,All) = 16.25%

**Appendix C**

316
### Place of Work Versus Place of Residence Matrices

<table>
<thead>
<tr>
<th>Richmond, C</th>
<th>Vancouver, C</th>
<th>West Vancouver, DM</th>
<th>Other GVRD</th>
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<td>12%</td>
<td>-2%</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>-22%</td>
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<td>N/A</td>
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<td>-11%</td>
<td>47%</td>
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<td>N/A</td>
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<th>Port Moody, C</th>
<th>Richmond, C</th>
<th>Surrey, DM</th>
<th>Vancouver, C</th>
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<td>565</td>
<td>520</td>
<td>120</td>
<td>165</td>
<td>185</td>
<td>705</td>
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<td>114%</td>
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<td>-12%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
<tr>
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<td>7%</td>
<td>N/A</td>
<td>26%</td>
<td>21%</td>
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<tr>
<td>-18%</td>
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<td>N/A</td>
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*Appendix C* 317
### Place of Work Versus Place of Residence Matrices

**Port Coquitlam, C**

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<th>Family Structure</th>
<th>Tenure</th>
<th>Mobility</th>
<th>Income</th>
<th>HH Income</th>
<th>Total POW</th>
<th>Work at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>Coquitlam, DM</th>
<th>Delta, DM</th>
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<td>N/A</td>
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<td>N/A</td>
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<td>-4%</td>
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<td>N/A</td>
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<td>-8%</td>
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<td>N/A</td>
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time: 15.49%

**Port Moody, C**

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<tr>
<th>Age</th>
<th>Family Structure</th>
<th>Tenure</th>
<th>Mobility</th>
<th>Income</th>
<th>HH Income</th>
<th>Total POW</th>
<th>Work at home</th>
<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>Coquitlam, DM</th>
<th>Maple Ridge, DM</th>
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<td>5%</td>
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<td>135</td>
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time: 10.35%

### Appendix C

318
### Place of Work Versus Place of Residence Matrices

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<th>Vancouver, C</th>
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<th>Port Moody, C</th>
<th>Richmond, C</th>
<th>Surrey, DM</th>
<th>Vancouver, C</th>
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<td>765</td>
<td>265</td>
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<td>25%</td>
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</tr>
<tr>
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*Appendix C*
### Place of Work Versus Place of Residence Matrices

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<td>All</td>
</tr>
<tr>
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<td>All</td>
</tr>
<tr>
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<td>All</td>
</tr>
<tr>
<td>LT 40</td>
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</tr>
<tr>
<td>LT 40</td>
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</tr>
<tr>
<td>LT 40</td>
<td>NMSD</td>
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<tr>
<td>LT 40</td>
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<tr>
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<tr>
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<td>NMSD</td>
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<tr>
<td>LT 40</td>
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</tr>
</tbody>
</table>

\[(LT40, NMSD, Ground, Owned, Moved)(All, All, All, All) = 7.02\%\]

### Surrey, DM | 1140 |
| **Age** | **Family Structure** | **Tenure** | **Mobility Income** | **HH Income** | **Total POW at home** | **No usual POW** | **GVRD Total** | **Burnaby, DM** | **Coquitlam, DM** | **Delta, DM** |
| All | All | All | All | All | All | 114000 | 8670 | 3315 | 99795 | 9720 | 2010 | 6345 |
| All | All | All | All | All | All | $< 20,000 | 7010 | 58% | 18% | -6% | -15% | 33% | -24% |
| All | All | All | All | All | All | $20,000 - $39,999 | 20390 | 19% | 35% | -3% | -12% | -19% | -7% |
| All | All | All | All | All | All | $40,000 - $59,999 | 32675 | -9% | 0% | 1% | 5% | 22% | 2% |
| All | All | All | All | All | All | $60,000 - $79,999 | 27330 | -19% | 0% | 2% | 6% | 7% | 2% |
| All | All | All | All | All | All | $80,000 - $99,999 | 13570 | -23% | -27% | 3% | 15% | -6% | 4% |
| All | All | All | All | All | All | $>< 100,000 | 13030 | 27% | -37% | -1% | -15% | -50% | 9% |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | 15150 | 19% | -22% | 0% | 11% | -1% | 21% |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | $< 20,000 | 445 | 107% | N/A | -6% | 45% | N/A | N/A |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | $20,000 - $39,999 | 2145 | 50% | -14% | -3% | 26% | 85% | 38% |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | $40,000 - $59,999 | 5205 | 21% | -22% | 0% | -4% | -7% | 17% |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | $60,000 - $79,999 | 4275 | -26% | -21% | 3% | 33% | 14% | 39% |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | $80,000 - $99,999 | 1690 | 5% | N/A | 0% | 11% | N/A | -15% |
| LT 40 | NMSD | Ground | Owned | Moved | All | All | $>< 100,000 | 1385 | 99% | N/A | -5% | -28% | N/A | 10% |

\[(LT40, NMSD, Ground, Owned, Moved)(All, All, All, All) = 13.29\%\]

### Appendix C

320
### Place of Work Versus Place of Residence Matrices

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<td>-12%</td>
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<th>White Rock, C</th>
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**Appendix C**

321
## Place of Work Versus Place of Residence Matrices

### Vancouver, C

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<td>All All All All</td>
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<td>All</td>
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<td>All</td>
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<td>-50%</td>
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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 3.60%

### West Vancouver, DM

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<th>No usual POW</th>
<th>GVRD Total</th>
<th>Burnaby, DM</th>
<th>North Vancouver, DM</th>
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<td>All All</td>
<td>All All</td>
<td>All</td>
<td>965</td>
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<td>-4%</td>
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<td>All All</td>
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<td>All</td>
<td>50</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
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<td>All All</td>
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<td>All</td>
<td>13</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
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<td>All All</td>
<td>All All</td>
<td>All</td>
<td>130</td>
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<td>N/A</td>
<td>N/A</td>
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<td>All</td>
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<td>All All</td>
<td>All All</td>
<td>All</td>
<td>140</td>
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<td>All</td>
<td>465</td>
<td>-9%</td>
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(LT40, NMSD, Ground, Owned, Moved)(All,All,All,All,All) = 4.97%

### Appendix C

322
## Place of Work Versus Place of Residence Matrices

<table>
<thead>
<tr>
<th>North Vancouver, DM</th>
<th>Richmond, C</th>
<th>Surrey, DM</th>
<th>Vancouver, C</th>
<th>UEL, SRD</th>
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<td>3%</td>
<td>-15%</td>
</tr>
<tr>
<td>13%</td>
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</tr>
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<td>-11%</td>
<td>3%</td>
<td>13%</td>
<td>0%</td>
<td>-11%</td>
</tr>
<tr>
<td>0%</td>
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<td>13%</td>
<td>-2%</td>
<td>11%</td>
</tr>
<tr>
<td>9%</td>
<td>13%</td>
<td>-8%</td>
<td>-3%</td>
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<td>-37%</td>
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<td>-4%</td>
<td>-3%</td>
<td>23%</td>
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<td>16%</td>
<td>5%</td>
<td>1%</td>
<td>-52%</td>
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<td>6%</td>
<td>N/A</td>
</tr>
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<td>N/A</td>
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<td>93%</td>
<td>-1%</td>
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<tr>
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<tr>
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<td>1%</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td>-30%</td>
<td>N/A</td>
<td>9%</td>
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<table>
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<th>West Vancouver, DM</th>
<th>Other GVRD</th>
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<td>N/A</td>
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<td>39%</td>
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<td>N/A</td>
<td>-3%</td>
<td>-34%</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>-35%</td>
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*Appendix C*
### Place of Work Versus Place of Residence Matrices

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<th>Age</th>
<th>Family Structure</th>
<th>Tenure</th>
<th>Mobility</th>
<th>Income</th>
<th>HH Income</th>
<th>Total POW at home</th>
<th>GVRD Total Burnaby, DM</th>
<th>Delta, DM</th>
<th>Langley, C</th>
<th>Langley, DM</th>
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</table>

\[(LT40, NMSD, Ground, Owned, Moved) \times (All, All, All, All) = 4.73\%\]

---

**Appendix C**

---

324
### Place of Work Versus Place of Residence Matrices

<table>
<thead>
<tr>
<th>New Westminster, C</th>
<th>Richmond, C</th>
<th>Surrey, DM</th>
<th>Vancouver, C</th>
<th>White Rock, C</th>
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*Appendix C*