MOBILITY IN THE LIVABLE CITY: A CASE STUDY OF SKYTRAIN'S IMPACT ON MOBILITY AND LIVABILITY IN VANCOUVER, BC

by

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ABSTRACT

Vancouver has been cited as an exemplar of successful urban planning, and newspaper articles, surveys, Best Of Lists and academic reports would seem to agree. The city has become a brand of "livability" that is packaged and sold as the "Vancouver Model" of urban planning. One of the early outcomes of the city’s livability-centred planning ethos was the construction of an enormously expensive light rail transit line, the SkyTrain, which has subsequently become an icon of the city’s livability. In this project, I investigate the extent to which Vancouver’s substantial investment into automated light rail has facilitated efficient and equitable urban mobility, a key feature of livability. I argue that the broader context of the Vancouver Model built on a flourishing post-industrial economy is shaping the geography of urban mobility just as much as the light rail line itself. I argue that this is related to the suite of changes in Vancouver’s urban form in the past number of years, which have bifurcated into two related but unacknowledged categories: an official face of urbanism comprising the feted forms that have come to be known as "The Vancouver Model"; and an unrecognized side that is part and parcel of the former, involving dramatic re-configurations in rental housing and the social geography of the city-region. I present preliminary evidence that suggests that tensions between the official and unacknowledged sides of Vancouver’s urbanism are shaping the region’s geography of urban mobility to an extent beyond the influence of the city’s transportation planning and heavy investments into automated light rail.
## TABLE OF CONTENTS

Abstract .................................................................................................................. ii  
Table of Contents .................................................................................................. iii  
List of Tables ......................................................................................................... iv  
List of Figures ....................................................................................................... v  
List of Abbreviations ............................................................................................ vi  
Acknowledgements ................................................................................................ vii  

1. INTRODUCTION The Case for a Study of SkyTrain’s Impact on Mobility and Accessibility in Vancouver .......................................................................................................................... 1  
   1.1 Introduction to Vancouver: Accolades and Concerns ........................................ 1  
   1.2 A Brief History of Livability: The SkyTrain in Context .................................... 5  
   1.3 Outline of Research .......................................................................................... 7  

2. LITERATURE REVIEW Transportation and Land Use: Evaluating Accessibility Around Light Rail Transit ......................................................................................................................... 9  
   2.1 Approaches to Gauging Accessibility ................................................................. 9  
   2.2 Land Use and Accessibility ............................................................................. 11  
   2.3 Transportation and Accessibility ..................................................................... 12  
   2.4 Gauging Transportation Iniquity ..................................................................... 13  
   2.5 The Transportation-Housing Connection ....................................................... 16  
   2.6 Conclusion ....................................................................................................... 20  

3. METHODOLOGY ................................................................................................. 22  
   3.1 Overview .......................................................................................................... 22  
   3.2 Methodological Issues ..................................................................................... 22  
   3.3 Case Study Analysis: Benefits and Limitations ............................................... 23  
   3.4 Scale of Analysis ............................................................................................. 25  
   3.5 Context-Based Approach ............................................................................... 27  
   3.6 Quantitative Approach ................................................................................... 28  
      3.6.1 Data .......................................................................................................... 28  
      3.6.2 Variables ................................................................................................ 28  
      3.6.3 Quintiled Analysis: Estimating Spatial Connections between Affordable Housing and Public Transit (SkyTrain) .......................................................... 30  
   3.7 Conclusion ....................................................................................................... 35  

4. DISCUSSION PART I A Trajectory of Change in Vancouver: Feted Urban Forms and (Dis)associated Geographies ........................................................................................................... 36  
   4.1 Shifting Economic Foundations: Vancouver’s Post-Industrial Economy ........ 37  
      4.1.1 Transition to Post-Industrial Economy: A Geography of Inscription ....... 37  
      4.1.2 Social Polarization .................................................................................. 38  
   4.2 Foundations of Urban Change: Myriad Contextual Factors ......................... 39
LIST OF TABLES

Table 3.1  Research Methods on Mobility and Accessibility ........................................... 24
Table 3.2  Scales of Analysis for Analyzing Geographies of Urban Mobilities:
            Selected Examples ......................................................................................... 26
Table 3.3  Variables Collected and Derived from Statistics Canada Census Survey
            Data, 1991 and 2001 .................................................................................... 29
Table 4.1  Percentage of Households (both owner and tenant) spending more than
            50% of household income on shelter .............................................................. 57
Table 4.2  Distribution of Tenant Households by Census Tract ................................. 63
Table 5.1  Housing Characteristics in Census Tracts (CTs) within walking
            distance of the Expo SkyTrain Line in 1991 and 2001 ................................. 76
Table 5.2  Selected Socio-Demographic Characteristics of Census Tracts (CTs)
            within walking distance of an Expo SkyTrain Station .................................. 77
Table 5.3  Average Dwelling Size (Number of Rooms per Dwelling) for Census
            Tracts (CTs) within walking distance of an Expo SkyTrain Station ............... 80
LIST OF FIGURES

Figure 1.1  The Expo SkyTrain Stations in the Greater Vancouver Regional District .............................................. 4
Figure 3.1  Census Tracts within Walking Distance to SkyTrain Stations .............................................................. 32
Figure 4.1  The contextual factors that have shaped urban form and mobility in Vancouver ......................................... 42
Figure 4.2  False Creek North ......................................................................................................................................... 46
Figure 4.3  Coal Harbour ............................................................................................................................................. 47
Figure 4.4  Incidence of Low-Income Households, 1991 ............................................................................................ 55
Figure 4.5  Incidence of Low-Income Households, 2001 ............................................................................................. 56
Figure 4.6  Distribution of Rented Dwellings by Census Tract, 1991 ........................................................................... 61
Figure 4.7  Distribution of Rented Dwellings by Census Tract, 2001 ........................................................................... 62
Figure 4.8  Average Number of Rooms per Dwelling ................................................................................................. 64
Figure 4.9  Secondary Suites in Kitsilano ................................................................................................................... 68
Figure 4.10 Campbell Heights Under Construction .................................................................................................. 71
Figure 4.11 Gloucester Office Park ............................................................................................................................ 72
Figure 4.12 Campbell Heights – For Lease Signs ....................................................................................................... 72
Figure 5.1 Apartment and Condominium complexes next to Joyce-Collingwood Expo SkyTrain station .................. 81
Figure 5.2 Residential towers within 15-20 walking distance from Skytrain stations in Burnaby ............................... 81
Figure 5.3 Census Tracts within Walking Distance to the SkyTrain Line: Census Tracts characterized as Affordable Rent, and Unaffordable Rent (Highest Quintile) .................................................. 85
Figure 5.4 Census Tracts within Walking Distance to the Downtown Core: Census Tracts characterized as Affordable Rent, and Unaffordable Rent (Highest Quintile) .................................................. 87
Figure 5.5 Census Tracts within Walking Distance to Expo SkyTrain stations and the Downtown Core: Census Tracts characterized as Affordable Rent and Unaffordable Rent .............................................. 88
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>BRU</td>
<td>Bus Riders Union</td>
</tr>
<tr>
<td>CT(s)</td>
<td>Census Tract(s)</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GVRD</td>
<td>Greater Vancouver Regional District</td>
</tr>
<tr>
<td>GVTA</td>
<td>Greater Vancouver Transportation Authority</td>
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<tr>
<td>LRSP</td>
<td>Livable Region Strategic Plan</td>
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<tr>
<td>TAZ</td>
<td>Traffic Analysis Zone</td>
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1. INTRODUCTION: Mobility in the Livable City: The Case of SkyTrain’s impact on mobility and livability in Vancouver, BC.

"Vancouver has emerged as the poster child of urbanism in North America. Like the most vivid of dreams, the city is reinventing itself: something curious, perhaps even miraculous is happening here."


"My child and I barely saw each other during the time we relied on public transit. TransLink’s service has severely diminished the quality of our lives”

(Respondent #22, Women In Transit, 2004)

“I wait for a long time [for the bus], then I’m late for work. That causes big problems”

(Respondent #37, Women In Transit, 2004)

1.1 Introduction to Vancouver: Accolades and Concerns

As a city that often tops the lists as one of the world’s most livable, Vancouver is a curious place. The contrast between the quotes above crystallizes the irony: on the one hand, it is ‘miraculous’, and on the other, its infrastructure ‘diminish[es] the quality of our lives’. The second quote, taken from an intensive study by the local Bus Riders Union, is neither emblematic of public transit in the region, nor is it entirely uncharacteristic. Depending on whom you talk to, Vancouver’s public transit system is either one of the best, or one of the worst in North America. These quotes underscore the many layers of contradictions the city has, I believe, come to represent. For example, Vancouver has an award-winning transit system\(^1\) that can simultaneously ‘cause big problems’.

Berelowitz’s praise of Vancouver as ‘miraculous’ is not unique. The ‘Vancouver Achievement’ (Punter, 2003) has been attributed to the incorporation of values of social

\(^1\) Awards include ‘2005 Sustainable Community Award’, 2004 ‘Innovation and Performance Award’ (from The Canadian Urban Transit Association)
equity, pluralism and ‘livability’ in regional land use and transportation plans (Hutton, 2004). Ley (1980), for example, pointed out that, as early as the 1970s, city politicians were basing decisions on ‘quality of life’ and ‘people before property’. In many respects, these early efforts have paid off. The city has come to be lauded as ‘socially sustainable’. Berelowitz promotes Vancouver as the North American exemplar of good urban form. The shape of the city has become known eponymously as ‘Vancouverism’ (Boddy, 2005) or the ‘Vancouver Model’, lending itself to a high ranking on the lists of most livable cities in the world.

It is not enough to simply conclude that those who demand better transit have no grounds for complaint. Berelowitz was correct when he wrote that ‘something curious’ and ‘miraculous’ is happening in Vancouver. Punter (2004), for example, thoroughly describes in reverent terms the ‘achievements [and challenges] of Vancouver’s urban renaissance”. At the same time, a continuing housing affordability crisis, as well as some transportation issues outside the urban core have all become current and pressing concerns. The challenge now is to excavate the implications this style of planning, particularly if Vancouver is presenting itself as the North American exemplar of good urban form.

Focus has recently centred on Vancouver as a living urban experiment on the impacts of globalization (Olds, 2000), post-industrialization (Hutton 2004, Pope 2002), post-modern urban planning (Sandercock, 2005), and contemporary urban design (Punter, 2004, Berelowitz 2004). The impacts of major transportation projects, or of the unique path of changes in Vancouver have not received as much attention. Although accessibility has been addressed through travel surveys with focus on commuting distances and times, this has been without consideration towards either equity or how these current travel data are situated within the broader story of Vancouver’s urban transformation.

\[2\] Vancouverism in this paper is used interchangeably with ‘The Vancouver Model’ and ‘Vancouver Urbanism’
This project begins with the question of how the city’s ‘instant urbanism’ (Berelowitz, 2004) is impacting the intersections of housing and transportation in the city, altering the ability to get around and re-configuring the distribution of transportation benefits and burdens. The research involves a context-based case study of a major public transit project – the Expo SkyTrain Line. Constructed in 1986 to coincide with the World Exposition taking place later in the same year, the Expo SkyTrain Line (ESTL) has come to symbolize ‘good transit’ in the livable city. Cervero (1994), for example, cites the line as being the ‘backbone’ of Vancouver’s transit system. At the same time, rapid light rail in the GVRD has been variously accused of being too costly, of supplanting higher transit priorities (such as bus transit) and also of reinforcing ‘transit racism’ (BRU, 2004). The purpose of this study is three-fold: to examine urban ecological changes associated with the GVRD’s first major rapid transit line, to situate these changes within a regional context, and lastly, to infer from these changes how rapid transit in Vancouver has shaped mobility and access in the region.
Examining housing and demographic changes associated with a permanent route of transit infrastructure provides a means of understanding how the intersections between housing and transportation are changing concomitantly with the rest of the city-region. This interaction is usually investigated through hedonic models for owner-occupied housing that incorporate access or proximity to transit as an input variable. The Expo
Skytrain Line is no exception to this approach (Goldberg 1984, Goldberg 1989, Buzzelli and Olson, work in progress). This project, however, approaches this interaction by focusing on rental housing. The object is not to evaluate the economic value of access conferred to surrounding properties of a major transit line, but rather to examine more generally how a major transit line fits in with and alters mobility and access in the rest of the city-region. The question itself is imbued with the notion of equity, namely, the concern that mobility and access are unevenly and unjustly distributed ‘public goods’.

Thus, this project presents a unique approach to studying land-use and transportation interaction, not only because it begins with rental housing, but also because it is premised on the notion that mobility and access can and should be distributed without unjust disparity. Specifically this project instead is concerned with whether and how rapid transit projects contribute to or mitigate against these disparities. In light of Vancouver’s status as a budding ‘transit metropolis’ (Cervero, 1998), its preference for SkyTrain technology for current and future transit infrastructure³, the city’s Expo Line presents an ideal case study for fleshing out these questions.

This chapter will address the Vancouver context, a brief history of the Expo Line and a description of how this research unfolds.

1.2 A Brief History of Livability in Vancouver: The Expo SkyTrain in Context

There is general consensus that the history of Vancouver’s progressive transit-planning, out of which the Expo Skytrain Line eventually emerged, dates back to the Great Freeway Debate in the late 1960s and early 1970s (Price, 2004, Harcourt, 2005). Concerned with how freeways would impact the downtown core, a group of citizens

³ The Greater Vancouver Regional District (GVRD) is currently expecting to add 2 more Skytrain rapid transit lines in the next 10 years, bringing to the region a total of 4 rapid transit routes. These include: the Expo Line (completed in 1986), the Millennium Line (completed in 2002), the Canada Line (due to be completed in 2009), and the Evergreen Line (due to be completed by 2011).
successfully lobbied for the rejection of freeways in the city. Subsequently, with the downtown core representing the sole employment hub in the region, traffic in the 1970s worsened. Later in the decade, traffic congestion topped lists of civic concerns for the city, outpacing other issues such as crime.

The rejection of freeways in Vancouver was part of a larger social (and political) resistance to the *modus operandi* of city development characteristic of the 1950s and 1960s that was marked by a clear preference for low-density suburban development at the expense of the urban core. Instead, a regional vision with an emphasis on livability was articulated in 1975 in the Livable Region Strategic Plan (LRSP), a publicly-informed document that outlined a 'modest dream' (Lash, 1976) for the region. Emphasizing transportation alternatives, a 'growth concentration area', and a greater spatial balance between jobs and housing, the LRSP crystallized the idea and hope for Vancouver as a livable city. It was a process and a document that had emerged variously from the election of the Team Electors Action Movement in City Hall in 1971, the appointment of Ray Spaxman as director of Planning, as well as civic reactions to and engagement with planning decisions.

It was in this livability-oriented climate in the 1970s that conceptual plans for rapid transit in the region sprang into discussions of routes, financing, technology and logistics. Plans for a transit line connecting the downtown peninsula, east Vancouver, Burnaby, New Westminster (and later, Whalley, Surrey), had been discussed since the inter-urban railway connecting these municipalities had been dismantled in the 1950s. The abandoned transit corridor had been converted into a major roadway. By the 1970s, with downtown Vancouver comprising the only major employment centre in the region, the corridor had come to a near standstill with traffic problems. Of particular note in early regional transportation reports was the emphasis on 'accessibility', which one report had cited from survey data as being a 'top priority for the region's residents' (GVRD Report, 1982, page #?).

In addition to public concerns for the ability to get around, the planning department
had been alarmed with the finding that commuter travel distances and times had been increasing at a greater rate than population growth. Moreover, there was broad recognition that ‘The road system [was] at capacity, the buses [were] full, traffic [was] moving slower, and it [took] longer to travel the same distance than it did a few years ago’ (GVBC, 1982). Under the aegis of the Livable Regions Strategic Plan (LRSP) and enabled by livability-based civic identity, City Hall declared that the 1980s would be ‘the decade of transit’ (GVRD Report, 1982).

These events and discussions in the 1970s shaped the context out of which the decision to build the rapid transit line was made. With 20 years since the opening of the Expo Line, land use and development along the line have had time to respond to Vancouver’s first rapid light rail line. This presents an opportunity to examine not only how development and land use has responded to this particular mode of transit, but also how it intersects with housing in the region to facilitate access and mobility.

1.3 Outline of Research

Chapter 2 outlines the various ways accessibility has been investigated as well as some of the difficulties and challenges of equity-based assessments of transportation projects. This chapter addresses some of the transportation and land-use interaction literature, with particular focus on the literature that address access through both land use and transportation planning strategies. I also outline with supporting evidence the premise that equitable transportation involves both spatial and economic connections to adequate modes of transportation.

In Chapter 3, I explain the methods used in this project, which involves a context-based case study that examines land use – transportation interaction through the lens of rental housing and rapid transit. I also situate this project methodologically with other accessibility studies.

Chapter 4 examines the land use and socio-demographic context surrounding the
Expo Skytrain Line between 1991 and 2001. I argue that this context is comprised of two categories – a set of celebrated changes (between 1991 and 2001) that comprise ‘Vancouverism’, and a less recognized set of changes that include a re-configuration of the rental housing market, a deconcentration of low-income households, and suburbanization of employment opportunities.

Chapter 5 examines more specifically the urban ecological changes associated with the Expo Line between 1991 and 2001 through a look at changes in housing affordability, low-income, rental housing size of dwellings and average rental price. The second half of this chapter explores the implications of rapid transit planning in Vancouver by situating social ecological changes within the (bifurcated) context of the region outlined in Chapter 4.

Chapter 6 lays out the findings of this project as well as some of the limitations of my analysis. I conclude that the Expo Skytrain Line’s contribution to livability – or the connection between affordable housing and affordable and efficient transit infrastructure – is more complex than portrayed in standard economic planning models. On a wider scale, I also conclude that broader forces of urban change are altering the geography of mobility to an extent on par with or exceeding the influence of the Expo Line itself.
2. LITERATURE REVIEW: Transportation and Land Use: Evaluating Accessibility around Light Rail Transit

2.1 Approaches to Gauging Accessibility

At the core of this thesis is the concept of accessibility – the ability to reach desired goods, services, activities and destinations. Access is the ultimate goal of transportation, and implicitly involves both the movement of people (mobility) as well as land uses which determine travel distances. In the past, research tended to focus almost exclusively on mobility. More recently, however, there has been broader recognition that mobility has little value in and of itself, and research has is now steering towards accessibility (Helling, 2005), a concept that recognizes that the ability to reach destinations is at least as if not more important than the travel itself.

A variety of approaches to measuring and gauging access have been employed. These range from qualitative methods such as surveys (c.f. Clark et al 2003) and interviews (c.f. Hanson & Clark, 1995) to quantitative methods such as multi-level modeling, factor analysis (c.f. Christaldi, 2005), GIS and spatial interaction (c.f. Kwan), remote sensing (Wang & Trauth, 2006) and accessibility indices (c.f. Horner 2004). The literature is wide-ranging in scope, and has uncovered myriad factors that contribute to the mobility constraints placed discriminantly and indiscriminantly on segments of the urban population. These include gender relations and employment relations (Hanson & Pratt, 1995, McLafferty & Preston, England 1992), education (Christaldi 2005), socio-economic status (Holtzclaw et al 2002), race (Kain 1968, Cervero, Pucher & Renne 2003), access to a vehicle (Lukas, 2004), age (Barker 2003), individual subjective perceptions (Kwan and Weber, 2003), shape of the city (Buliung and Kanaroglou 2006, Vandersmissen, Villeneuve P, Theriault 2003, Cervero and Wu 1997) and employment status (Sanchez 1999). By influencing commuting distances (and times), these characteristics, in turn, influence social outcomes such as employment (Cervero-Sandoval-Landis 2002) and welfare rates (Blumenberg-Manville, 2004, Ong 2002) differentially across the urban landscape.
From this literature, it appears that many of these individual-level characteristics, in addition to an array of intervening factors, such as political regimes (Grengs, 2004) and local historical contexts (c.f. Siemiatycki, 2005, 2007 forthcoming), tend to confound attempts in land use & transportation planning to produce equitable and efficient transportation infrastructure. Based on their empirical work, Weber and Kwan (2003), for instance, question whether land use and transportation planning even play a role in mediating urban accessibility. Coming to this conclusion, however, runs counter to a body of research that continues to underscore how land use and transportation infrastructure reinforce social exclusion (c.f. Lukas 2004) and influence social outcomes such as unemployment (Hess 2005) and welfare-retention rates (Blumenburg & Ong 2001, Cervero, Ihlandfeldt & Sjoquist 1998.).

Kain's (1968) 'spatial mismatch' hypothesis proposed over 40 years ago implicated land use and associated transportation planning for the perpetuation of inner-city unemployment. Racial and socio-economic relations that reinforced residential segregation, in addition to the decentralizing of employment opportunities, a spatial housing-jobs imbalance, and a lack of transit infrastructure out to suburbanized employment, were deemed to play a synergistic role in creating and reinforcing inner-city unemployment and racialized urban poverty. While the spatial mismatch literature shows mixed evidence (Hess 2005, Clark & Wang 2005, Martin 2003, Preston & McLafferty 1999, Raphael 1997), the research is premised on the notion that urban land use and transportation infrastructure play a role in producing or reinforcing social outcomes. This is distinctly different from more recent geographical work that largely views commuting behaviour more as a social outcome than one of urban (and suburban) forms and infrastructure. In the early 1990s, for example, research on spatial entrapment (Hanson & Pratt 1992) and 'pink collar ghettos' (England 1993) drew attention to the ways in which land use and transportation infrastructure can differentially benefit or hinder different people and that this is based largely on gender-, race- and employment relations. In a similar manner, critics of spatial mismatch theory minimize the impact of urban form and transportation planning.
These present particularly complex considerations for those faced with the task of creating socially equitable cities that mitigate, rather than reinforce, inequitable social outcomes. Urban planning, particularly transportation planning, has a history of blame for inequitable urban mobilities, from the inaccessibility and elitism of Robert Moses’ New York City as Marshall Berman describes it in *All That Is Solid Melts Into Air* (Berman, 1982), to current accusations by several chapters of the Bus Riders Union who invoke civil rights discourses⁴, to the local Boards of Trade who cite traffic congestion as an impediment to economic progress⁵, and finally to current academic research that underscore how inadequate transit access is directly and indirectly responsible for social exclusionary outcomes. Much of contemporary planning theory is imbued with the broad-based value of livability, in which accessibility is often viewed as a key component.

### 2.2. Land Use and Accessibility

Two streams of planning research address the issues of accessibility, mobility and the commuting patterns that result. The first involves the co-location of housing and employment opportunities, epitomized in 1989 in an article in the *Journal of the American Planning Association* by Robert Cervero, as a means of reducing commuting distance and the transportation demands placed on oft-overwhelmed transportation infrastructure networks. Co-location was (and is) viewed as a means of facilitating a more serviceable transit system, as well as lending itself to a more socially equitable transportation network. If you live close to employment opportunities, your commute distance and time will be reduced. This was argued to be beneficial for two reasons: first, a more serviceable transit system provided equitable mobility for those who cannot drive

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⁴ The Los Angeles Bus Riders Union (BRU) and the Vancouver BRU premise their campaign efforts on the idea that “Mobility is a Right”.

due to age, ability, etc., and second, gender differences in commuting patterns could be thus accommodated with shorter commuting distances\(^6\).

Planning theory and practice continues to herald this approach – in Vancouver, the Livable Regions Strategic Plan seeks to balance housing and jobs by emphasizing regional town centres. Planning often falls under the rubric of creating ‘complete communities’, or places where it is possible to live, work and recreate, with many of these efforts falling under the Smart Growth or New Urbanist banners (c.f. Talen 2004).

More recently, there has been recognition that transit-oriented ‘complete neighbourhood’ developments in and of themselves do not reduce travel demands and commuting distances or times (Jarvis, 2005). Rather, urban structure on the scale of the city (or city-region) appears to be much more crucial to improving access and reducing the time-cost gap between car trips and transit trips (Bento et al 2005, Porter et al. 2005, Kawabata & Shen 2006, Ming 2006). This suggests that regionally coordinated land use planning plays a significant role in shaping the geography of urban mobility.

2.3 Transportation and Accessibility

The second stream of research to address mobility and access surrounds the mode of public transit that can best serve an urban population – rail, light rail, buses, etc (c.f. Schipper L, Fulton L 2002). Presently, the bus-rail debate represents a difference of opinion as to the focus or purpose of public transit. Rail advocates argue that rail presents greater opportunity to attract would-be car drivers to transit, thus increasing the demand for and incentive to build transit infrastructure. Bus advocates argue that the focus on rail, for a variety of reasons, diminishes the potential to provide equitable transit service.

\(^6\) Daily commuting distances and times represent only one measure of accessibility offered by mobility. The number of daily non-work trips and the ability to chain-trip represent other indicators of accessibility and mobility. These travel patterns tend to be differentiated by gender roles and relations.
On the rail side, research tends to focus on factors that influence ridership rates such as land use, accessibility, employment, population and percent renters (c.f. Wells et al 2006, Yoh et al 2005, Kuby et al 2004). Underlying this approach to transit project evaluation is an assumption that all passengers are choice riders – those with alternative means of getting around. Captive riders – those without alternative modes of transportation – are not considered separately in transit performance evaluation. Thus, it is a market-based approach to transportation planning and evaluation that, as Grengs (2004) points out, destabilizes transit’s ‘longstanding social purpose of providing mobility for those who cannot drive a car’. Even under a cost-benefit analysis of transportation projects, which presumably addresses equity through finding the maximum benefit for the greatest number of people, the social purpose of providing efficient mobility can be lost (Battiato, 1993).

Related to the debate between bus-advocates and rail-advocates is a body of research surrounding the economic benefits (or consequences) of building various types of transportation infrastructure (c.f. Mikelbank 2005, Banister & Berechman 2004). Economic outcomes of transportation planning carry potential social implications. Rail projects in particular can be associated with significant land use changes and increases in property values related to the hedonic value placed on the accessibility offered by a rail line. Research into the influence of rail investments on hedonic housing prices has a long history (c.f. Alonso 1964; Mills 1967; Muth 1969). More recently, major rapid transit projects have been associated with neo-liberal political climates (Siemiatycki, 2005), which can undermine the social equity component of transportation planning. It is fair to question how such economic and land use changes (either within or outside neo-liberal contexts) alter social geographies and, by extension, the geography of mobility and accessibility.

2.4 Gauging transportation inequity

Injustices precipitated through transportation planning have received varied attention under the spatial mismatch literature, transportation justice literature (c.f.
Bullard 2004), and in the UK, the social exclusion literature (c.f. Lukas 2004). The equity component of rapid transit projects has received little attention, with the exception of Levinson (2002) and Fruin and Sriraj (2005), who propose means of assessing the social equity of transit capital improvements. In the latter study, census tracts were identified as either ‘environmental justice’ neighbourhoods or not, with a subsequent analysis of the benefits and externalities of major transit projects.

Through a broader lens, Grengs (2004) examines the social equity movement in Los Angeles that was catalyzed by unjust allocation of transit resources towards a rail line that served middle-income neighbourhoods (a claim subsequently substantiated by Court of Law in a 1992 class action suit). This study identifies transportation inequities through social resistance movements couched in civil rights discourses. Similarly, Sanchez et al. (2003) provide a good overview of the history of transportation policy in the US in terms of the ways it has disproportionately impacted on minorities and strategies for overcoming transportation iniquities.

Murray and Davis (2001) outline in detail how difficult it is to assess the equity component of specific transportation projects, and transportation planning in general. Part of the issue is the intensive data required to assess accessibility: where people live, where they intend to go, and how they get there. Data issues aside, developing methods for assessing transportation equity can be equally problematic. Part of this relates to the inherent complexity of transportation equity:

“There is no single way to look at [transportation] justice; it would be incredibly difficult and may be even impossible, especially on a macro level, given the resources and time constraints of the agency, academic or professional conducting the study [to cover all angles of environmental justice].” (Fruin & Sriraj, 2005)

Murray and Davis (2001) succinctly explain:

“The lack of methods for evaluating equity issues in the evaluation of transportation projects puts decision makers in a rather compromising position. Costs and benefits may be quantified through consistent and established
evaluation techniques, whereas a subsidy to support unprofitable and underutilized bus services, as an example, is supported only with a narrative on the need to address equity principles as outlined in planning documents.”

To get around this, Talen (1998) proposes using GIS to visualize ‘equity maps’. Three variables are considered in this approach: (1) a location analysis (of the resource in question), (2) socioeconomic data, (3) facility characteristics. Shen (2001) uses GIS to visualize and assess accessibility between job seekers and employment opportunities in Boston, MA. To date, using GIS as a visual analysis tool has not been used in any evaluation of a specific transportation or transit project. While planners may examine the spatial extent of transit service, the level of service along a route is not often considered. In other words, the spatial proximity to a transit stop offers a convenient way of considering access, but it is also inadequate if transit service is infrequent or is unreliable.

Related, mobility standards for transit systems have not been firmly established. The mobility needs and requirements for different residents within the same city-region differ widely, and variously call for well-maintained sidewalks, good street connectivity, frequent transit service, express bus service, late night service, wheelchair and stroller access, etc. Planning for a single transit/transportation system for individuals of varying needs and means is no small challenge.

In addition, the current funding structure for public transit puts it in a position of being subsidized by public money. Under these circumstances, the question of adequate mobility is complicated by running into the question, “When does need entitle the few to make a claim against the collective?” (Robertson, 1998). In transportation planning, basic access is interpreted to mean ability to reach basic necessities such as work, school, the doctor’s office, and ‘some level of recreational and social activity’ (Litman, 2006). These standards are ambiguous enough to lend themselves to interpretations that, given the research outlining transportation injustices and social exclusion, often prove inadequate.
2.5 The Transportation-Housing Connection

Litman (2006) offers four dimensions by which a good transit system will be able to provide adequate mobility:

1. **Affordability** – Whether transportation options have financial costs within the targeted users’ budget.
2. **Availability** – Whether transportation options exist at the location and time users require.
3. **Accessibility** – Whether transportation options accommodate users’ abilities, including people with disabilities and special needs (Universal Design), taking into account the total journey (i.e., door-to-door).
4. **Acceptability** – Whether transportation options are considered suitable to users.

Little research has been done concerning the affordability of transportation, with the exception of the spatial mismatch literature, which acknowledges the explicit mobility differences between individuals with and without access to a car. Transportation costs are currently estimated to consume 17-20% of household income, depending on city land use efficiency (McCann, 2000). Transportation expenditures over 20% of household income is considered to be unaffordable (Litman, 2006).

In fact, these households may be experiencing ‘transportation stress’ – paying for transportation at the expense of other necessities. In a survey of bus riders (BRU, Women in Transit, 2004) one of the respondents explained that the cost of transit is prohibitively high, “I spend $189 on bus passes every month. I could use this money on food, bills. Things are already tight. Transit is a major expense” (Respondent #9). Another interviewee remarked, “…my husband and I had no choice but to buy a car. It’s very expensive, especially with the insurance and the gas. If the bus was [sic] working well, we wouldn’t need to spend so much money on a car.” (Respondent #53). In the latter case, opting for ‘affordable’ housing comes at the expense of either meeting transportation needs, or assuming significantly high household expenses. These examples
underscore the interaction between housing affordability stress and transportation stress, the amalgamation of which lends itself to a geography of 'un-affordability' and inaccessibility.

Access has long been recognized as an important feature of hedonic housing prices (Alonso, 1964; Muth, 1969). Access to adequate transportation in Vancouver is negotiated by household ability to afford living in a more central location of the city, or ability to pay for the cost and operation of a car in areas farther away from the spatial bulk of public transit service. Economically, a central feature of livability is household ability to pay for the combined costs of housing and transportation. Spatially, this represents the connection between the most affordable housing in the region with public transit infrastructure.

With transportation expenses thus constituting the second most costly household expense (after housing), it becomes clear that households can secure adequate mobility in two, non-exclusive ways:

(a) Economically – in which households do not spend more than a combined 50% of household income on both transportation expenses and housing rent

Since 30% of household income is considered the benchmark for affordable housing, and 20% of household income considered affordable for transportation, spending more than 50% of household income on combined housing and transportation expenses can be deemed unaffordable. Although the premium placed on residential properties in the downtown core and nearby neighbourhoods such as Kitsilano can be attributed to scenic views, heritage housing (in Kitsilano), cachet, etc., it means that on a regional level, housing prices in Vancouver broadly reflect von Thunen’s bid-rent curve. One complicating factor of this generalization, and of the estimate that 50% of household expenses constitutes a connection between

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7 By ‘Most affordable housing’, I refer to the housing units themselves and not to the occupier’s ability to pay for the mortgage or rent.
housing and transit, is the different values that different households place on access and other housing characteristics. For example, for middle-income households, the transportation and access offered by locating in the downtown core are not necessarily incorporated into housing decisions (Ley, 1996). For low-income households, however, there is evidence that proximity to the downtown core is highly valued (BRU, 2005) for the more frequent and better connected transit service offered in the central part of the GVRD. If this is the case, then the price of rental housing roughly corresponds to that capitalised value. Consequently, spending 50% of household income on combined transportation and rent expenses for lower-income households approximates whether households have connected economically to adequate transportation.

(b) Spatially – in which a household is located next to (affordable) transit that offers availability, accessibility and acceptability.

Traditionally, spatial access to transit has been measured by proximity to a bus stop, which is arguably a simplistic measure if, for example, bus service only comes once an hour. In Vancouver, bus service ranges widely depending on the route, from service every 3 or 4 minutes to bus service only three or four times a day. In other words, transit service is quite good, but only for a spatially limited area. This is indicated by the relatively high proportion of choice ridership (about 37%) while the overall transit share for the region is relatively low (11%) compared with other Canadian cities. Thus, it is spatial access to frequent transit by which a household can secure its transportation needs.

Recently in Vancouver, TransLink has begun distinguishing its frequently served bus routes from ordinary bus routes, which it defines as, at minimum, service every 15 minutes, 15 hours a day, seven days a week (Masterton, 2006). Whether this

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8 This assumes the ‘market-based’ approach to transit planning, namely, that better transit service leads to higher proportions of passengers choosing transit despite other transportation options.
constitutes frequent and convenient service for the users has not been confirmed, however, it is an important first step to recognizing that bus route service can vary widely. Some service corridors, and the residential locations along them, may be valued for their access to the network of good transit service. The vast majority of frequent bus routes in the GVRD reside on the Burrard peninsula, broadly corresponding with the BRU's assertion that the transit costs and travel times associated with living in the outer parts of the GVRD presents an untenable situation.

Research examining the connection between rental housing and transit lines is scarce. There are number of reasons that might explain this: (a) research on accessibility generally focuses on the journey to work and does not consider housing affordability as a variable component, although housing tenure is addressed in some studies (c.f. Cervero and Landis 1997). (b) it is methodologically difficult to examine these connections. A significant component of accessibility is individual subjective perception (Weber and Kwan, 2003), which may lead to choices that run counter to the premise of *homo economicus*.

Examining rental housing and demographic profiles of households living near rail stations in San Francisco, Cervero (1996) hypothesized finding two groups of households: younger households (without children), and transit dependent households who would value the access. He found that households located within walking distance of the rail line were primarily middle-income earners, young families and households, and employed in office jobs located in downtown San Francisco. Farther away from the stations (about 3-5 miles), Cervero found lower-income and minority households employed in blue-collar work. Additionally, he found that the value of access to the rail line was dependent on the line's end-point destinations. In other words, the rail line in San Francisco does not appear to make equitable connections between lower-income housing and transit. Cervero's project has been the only one to date that investigates economic intersections between rental housing and rail transit.

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9 Chapter 3 addresses methodological issues in more detail.
Interactions between housing and transportation have traditionally focused on housing price and land value impacts and permanent transit routes such as rail lines, highways (Mikelbank 2005, Boarnet and Chalermpong, 2001), or Rapid Bus Routes (BRT) (Rodriguez & Targa 2004). This research is facilitated by the ease of inserting housing prices or land values - variables that directly express the hedonic value of particular locations over others. Murray & Davis (2005) point out the difficulty of evaluating subsidized transit projects because the narratives of need and rights (to mobility) off-set attempts at calculating equity. For similar reasons, housing prices are used to estimate how much transportation accessibility is valued. This approach, however, undermines attempts to evaluate transportation equity for two reasons: (a) it does not consider households who might benefit most from spatial access to good transit given transit’s social purpose of providing mobility to those who cannot drive – i.e. it does not consider low-income renter households who may not have economic access to a car. (b) there is evidence to suggest that, in the GVRD, low-income renter household sensitivity to transit access differs from owner-household residential location preferences.

Focusing on rental housing and housing affordability allows for a more holistic assessment of accessibility, one that recognizes that there is an affordability dimension to access, particularly for lower-income renter households, that is not easily separated from other aspects of access such as land uses and proximity to good transit. An examination of accessibility through the twin lens of rental housing and housing affordability is a step towards assessing how transit planning projects are regionally impacting the ability to reach destinations and for whom these projects benefit and/or disadvantage.

2.5 Conclusion

This chapter broadly outlines the underlying complexity of urban mobility and access and the subsequent difficulty of assessing equitable urban mobility. The dearth of literature on interactions between rental housing and transit, and the geography of mobility/access that such interactions bode, makes it difficult to evaluate how a light rail
line contributes to livability and equitable urban mobility. Even so, such interaction is important to understand for those concerned with planning inclusive cities. Adding to the environmental justice research in the US, and the social exclusion research in the UK, a study of Vancouver presents a Canadian context for the study of transportation (in)equity and sets up a means of critically assessing a city so often held up as an exemplar of good urban and transportation planning.
3. METHODOLOGY

3.1 Overview

The objectives of this project are three-fold: first, to examine the changes in rental housing and socioeconomic profiles of census tracts within walking distance of Expo SkyTrain Line in the Greater Vancouver Regional District (GVRD), second, to incorporate these changes into a broader story of urban change in Vancouver, and third, to examine these specific and broader changes to infer the potential of urban light rail to facilitate inclusive mobility.

To this end, I employed a multi-method approach to bring together a case study of the Expo SkyTrain. Examining first the context surrounding the light rail line, I analyzed some of the regional changes in rental housing and linked them to the broader context of urban change in Vancouver. In the second part of the analysis, I used GIS maps and descriptive statistics to examine more closely housing changes near Expo SkyTrain stations. The following sections detail some of the methodological issues associated with accessibility studies, and how these have been addressed in this project and in other research studies. I also address how this project fits in, methodologically, the current research.

3.2 Methodological Issues

Assessing the ways in which a large-scale transportation project shapes regional geographies of mobility and accessibility is methodologically difficult (Fruin and Sriraj, 2005, Murray & Davis 2001). For reasons outlined in Chapter 2, any study on the geography of access and mobility, including an evaluation of light rail line’s contribution to livability and equitable mobility, will be considerably constrained.

In response to the limits of the nature of accessibility studies, but also, more pertinently, to my own limited resources, time constraints and access to data, this project is a qualitative case-study based on census variables and GIS-derived descriptive statistics woven into the broader context of urban change in Vancouver.
The use of GIS in this project is intended as a visual aid in the assessment of changes near Expo SkyTrain stations and in the GVRD. A similar approach has been used elsewhere (c.f. Shen 2001) and is useful for getting around the difficulty of obtaining data-layers agglomerated in an incompatible manner. Talen (1998), for example, argues that GIS is a powerful tool for ‘equity mapping’.

3.3 Case Study Analysis of Access: Benefits and Limitations

A regional case study analysis of accessibility offers the benefit of unearthing relationships that would be missed with other methodologies. Rather than treating the regional context as a confounding factor that explains why a particular case strays from the norm in access/mobility studies that seek generalizable conclusions, a case study approach places the regional context front and centre in the analysis. Through consideration of land use and transportation interaction, this type of analysis assumes that transportation projects and their associated outcomes influence and are influenced by a broader range of factors.

Table 3.1 outlines the traditional approaches to mapping access and mobility and their respective benefits and limitations. Included in the table is the approach taken in this project: case-study analysis.
<table>
<thead>
<tr>
<th>Method</th>
<th>Data</th>
<th>Questions Addressed</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Statistics      | Traffic Analysis Zones (TAZ), Cross-tabulated Census Data | What social, economic and demographic patterns exist in commuting patterns/behaviour? | * Accurate results  
* Offers compelling results for policy-makers, planners  
* Shows how variables and outcomes relate to one another and how they change over time | * Expensive to acquire data sets  
* Restricted to variables measured in the census or TAZ |
| Interview       | Interview                                 | Why do these commuting patterns exist?  
What accounts for these differences?  
What social relations underpin these patterns? | * Uncovers the qualitative factors that shape the geography of urban mobility  
* Can reveal variables that would be missed using statistical data | * Reveals nothing about the scale or extent of issues surrounding urban access & mobility  
* Doesn’t make a strong case for policy-makers |
| Survey          | Structured Survey                         | What choices do individuals make in terms of their commuting behaviour and residential preferences? | * Often generalizable results  
* Control over questions asked and variables measured | * Expensive and time-consuming  
* Issues in minimum sampling size can undermine accuracy of results |
| Case Study      | An assortment of primary and secondary data | What place-specific and contextual variables might shape the geography of urban mobility?  
How has a particular route of infrastructure shaped livability? | * Draws out regional and place-specific trends that influence livability, accessibility & mobility  
* Provides a richer understanding of how context shapes accessibility  
* Provides results that are highly relevant to local planning  
* Inexpensive, widely available data  
* Transparent methodology easy to replicate, refute | * Ungeneralizable results  
* Relying on broad-based trends and patterns translates into an extensive analysis  
* Less compelling for policymakers |

Table 3.1: Research Methods on Mobility and Accessibility
These methods range from quantitative data-intensive studies to qualitative interview-based research. Each strategy has its benefits and limitations, and addresses different dimensions of accessibility. For example, the quantitative approaches, though offering potentially generalizable conclusions that appeal to policy-makers, require expensive data and may not address some of the underlying relationships and contexts that influence access. Similarly, interviews can reveal variables that would otherwise be missed in surveys or statistical approaches but give no indication of the scale or extent of the relationships they uncover. A case study using primary and secondary data benefits from the use of inexpensive data, but is limited in the insights it can offer to other cases. As a context-based case study, this project provides breadth in the analysis.

3.4 Scale of Analysis

Attempts to map transportation-accessibilities hinge significantly on scale of analysis. Research has demonstrated that intra-household differences, mediated by, for example, gender relations (Blumen, 1994, Hanson and Pratt 1995), education level (Christaldi, 2005) or individual-level differences\(^{10}\) (Weber and Kwan, 2003) considerably influence an individual’s accessibility. Consequently, Weber and Kwan (2003) conclude that land use and transportation planning initiatives are limited by the extent to which they can improve accessibility. Sensitivity to ways in which scale alters the map of ‘accessibility’ is tremendously important for policy considerations and assessments of how transportation infrastructure can affect the ‘livability’ of a region. Different patterns and relationships emerge at different scales of analysis, thus there is not so much an inherently ‘correct’ scale at which to study a geography of urban mobility. Although this project uses GIS for visual assessments, Horner and Murray (2003) warn, “[scale] representation issues are critical in evaluating transit access in the context of planning

\(^{10}\) Weber and Kwan’s (2003) empirical work demonstrate that accessibility cannot be reduced to demographic characteristics. While they do not dispute the importance of demographic factors, their research shows that individual factors (eg. perception and choice) are more influential.
and policy development using GIS.” Even so, each scale lends itself as appropriate depending on both the research question and the policy or planning issues at stake.

Table 2 outlines some of the scales at which geographies of urban mobility have been mapped. Different scales are appropriate for different questions and lend themselves to discovering different types of relationships and trends. Individual or intra-household level studies, for example, examine demographic aspects associated with access and mobility. Larger-scaled studies at the city or regional scale tend to examine origins and destinations, and tend to use quantitative and GIS approaches. In addition to the scales listed in Table 2, accessibility can also be measured or assessed using GIS and a network analysis (c.f. Horner & Murray 2004 for overview).

<table>
<thead>
<tr>
<th>Scale of Analysis</th>
<th>Relationships Gleaned from Analysis</th>
<th>Examples</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-household</td>
<td>Gender relations, Employer relations, Employment Opportunities, Unpaid Household work and commuting patterns</td>
<td>Hanson &amp; Pratt 1995, England 1993, Turner &amp; Niemeier 1997</td>
<td>Interviews, Surveys</td>
</tr>
</tbody>
</table>

Table 3.2: Scales of Analysis for Analyzing Geographies of Urban Mobilities: Selected Examples

As part of the focus of this study is to assess on a regional level how a rapid transit line (among a host of other factors) is altering the map of accessibility, choosing
aggregated census data fits with research that addresses regional level patterns and trends. Although the bulk of research in this area demands specialized data sets, cross-tabulated variables, or intensive survey research, the approach taken in this project is unique because I have combined a particular scale of analysis that often employs sophisticated statistical analyses (and large data sets), with a methodology that is not often used at this scale, with one exception being Cervero’s (1996) study of the Bay Area Rapid Transit line. Accessibility studies at the regional scale often seek generalizable results, and statistical studies lend themselves to such conclusions. For this project, a case study on regional accessibility, less generalizable conclusions are compensated with a richer understanding of how the broader context of urban change can influence outcomes associated a particular transportation project.

3.5 Context-based Approach

Recently, there has been recognition that external factors, such as the urban economic or political context (Siemiatycki, 2005), play a significant role in influencing outcomes associated with transportation projects. Implicit in this ‘context’ are the land uses, origins and destinations between which travel is necessary or desired. For example:

"Asabere and Huffman (1996) point out that while an accessibility variable is often included in urban hedonic studies, the effect is not always as expected, and the changing nature of urban areas makes it reasonable to test for accessibility effects in other ways." (Mikelbank, 2004)

Mikelbank rightly points out that accessibility as a hedonic variable carries a significant contextual component. The economic, political, cultural and policy-related milieus in which large-scale transportation projects are built and subsequently employed may override the price effects catalyzed by the transit investment alone.

Evaluating access based on contextual factors and examining the context of urban change surrounding construction of light rail is part of a regional approach to equity mapping. The variables that ultimately comprise (some of the) determinants of access,
mobility and accessibility are, as would be expected, variable. Examining changes in these determinant variables in a disaggregated manner lends itself to an equity-mapping approach. In Chapter 4, I describe some of the changes in the GVRD between 1991 and 2001.

3.6 Quantitative Approach

This section describes the data, variables and methods used for deriving the descriptive statistics used in the context-based analysis, the GIS maps used for visual analysis, and the GIS analysis.

3.6.1 Data

Aggregated data from Statistics Canada Census Surveys 1991 and 2001 at the census tract level were used for a number of reasons: (1) the spatially nested boundaries of census tracts make it possible to compare data from the same spatial extent across census years, (2) census tracts are the smallest scale at which data between census years can be reliably compared, (3) with a total of 298 in the 1991 census, and 387 in 2001, there is still a large enough population (average population roughly 4000) to identify potential regional trends.

3.6.2 Variables

The following variables (Table 3) were collected from Statistics Canada and mapped using ArcMap 9.0.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable from Statistics Canada</th>
<th>Census Year</th>
<th>Calculations (from ‘Variable Name A, B, C...’)</th>
<th>Derived Variable</th>
<th>Mapped ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Total Economic Families</td>
<td>1991, 2001</td>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>Economic Families Spending 30% or More Income on Rent</td>
<td>1991</td>
<td>[C/G(1991)]*100</td>
<td>Percentage of Renter Households with Unaffordable Housing (1991)</td>
<td>Yes</td>
</tr>
<tr>
<td>D</td>
<td>Economic Families Spending 30-99% Income on Rent</td>
<td>2001</td>
<td>[D/G(2001)]*100</td>
<td>Percentage of Renter Households with Unaffordable Housing (2001)</td>
<td>Yes</td>
</tr>
<tr>
<td>E</td>
<td>Average Number of Bedrooms per Dwelling</td>
<td>2001</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>F</td>
<td>Occupied Private Dwellings</td>
<td>1991, 2001</td>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>G</td>
<td>Rented Dwelling</td>
<td>1991, 2001</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>H</td>
<td>Rented Dwelling</td>
<td>1991, 2001</td>
<td>[H/G]*100</td>
<td>Proportion of Rented Dwellings</td>
<td>Yes</td>
</tr>
<tr>
<td>I</td>
<td>Average Rent</td>
<td>1991, 2001</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>J</td>
<td>Median Family Income</td>
<td>1991, 2001</td>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3.3: Variables Collected and Derived from Statistics Canada Census Survey Data, 1991 and 2001

11 In the 2001 census, the category ‘Economic Families Spending 30% or More Income on Rent’ was divided into two categories: those spending 30-99% income on rent, and those spending 30-100% income on rent. The Census Survey incorporated this difference to distinguish between unaffordable housing situations and temporary unaffordable housing (e.g. student households). The two categories are similar in values, I used the first category for a more conservative measure of housing unaffordability.
Spatial data such as census tract boundaries and municipal boundaries were collected from DMTI Spatial. Skytrain stations were manually geocoded using the CanMap Streetfile roadmap as a guide.

3.6.3 Quintiled Analysis: Estimating Spatial Connections between Affordable Housing and Public Transit (SkyTrain)

'Spatial connection' to mobility is based on Litman’s (2006) description of the various dimensions of good transit/transportation accessibility (see Chapter 2). Tenant households with unaffordable\textsuperscript{12} rent are households who could benefit most from spatial access to good transit. Cervero (1996) uses this assumption in his study of census tract profiles and transit equity around the BART Line. Similarly, Fruin and Sriraj (2005) assess transit equity on the census tract level, and assume that a census tract 'consumes' the use of a rail line if the rail line passes through the census tract.

To estimate how the spatial connections between affordable housing and public transit changed between 1991 and 2001, I used the derived variables 'Proportion of Households spending over 30\% Income on Rent' for 1991, and 'Proportion of Households Spending 30-99\% Income on Rent. These derived variables were mapped and selected according to their spatial proximity to a SkyTrain Expo Station.

The analysis was a 6-step process:

1. Maintaining Spatial Consistency Across Census Years: A ‘Combined’ C.T. Boundary Layer

In order to maintain the spatial extent of analysis across years, a ‘combined’ CT (census tract) boundary layer was created so that census tract boundaries between years

\textsuperscript{12} Unaffordable rent, according to the Canadian Mortgage & Housing Association, is 30\% or more of household income spent on housing.
aligned with each other. This had the effect of enlarging the spatial extent of individual census tracts whose centroids were used to measure distance to a SkyTrain station.

2. Selecting Census Tracts within Walking Distance of a SkyTrain Station

This ‘combined’ census tract layer was used to select tracts in both the 1991 C.T boundary layer and the 2001 C.T boundary layer that are within walking distance of a SkyTrain station. ‘Walking distance’ in transportation studies is conventionally regarded as a 10 minute walk, or in distance terms, approximately 750 m. Once census tracts from this combined C.T layer were selected based on whether centroids were within 750 m of a SkyTrain station, census tracts were then selected from the 1991 and 2001 layers. Centroids, rather than census tract boundaries, were used for this measure as they minimize the effects of irregular shaped census tracts and of census tracts whose corners are close to Expo SkyTrain stations. For 1991, 28 census tracts were designated as spatially connected to a skytrain station, and for 2001, 37 census tracts were selected and designated. Although the number of census tracts changed in the 10-year period, the spatial extent of analysis remained identical across years.

13 Walking distance is often approximated as a half-mile or 750 m (Fruin & Sriraj 2005)
3. Analysis of Census Tracts by Proportion of Unaffordable Housing

A simple quintile analysis was used in order to track spatial changes in relation to a permanent route of public transit infrastructure – the SkyTrain line – of census tracts characterized by a high proportion of unaffordable rent. This analysis is based on the premise that there are both economic and spatial connections between housing and access to adequate transportation (access to urban mobility). Economic connection refers to a household’s ability to secure affordable housing alongside the ability to secure adequate transportation (towards which the average household in the GVRD spends 15% of household income). Spatial connections refer to proximity to good public transit. Economic and pecuniary connections do not represent either/or trade-offs, but rather represent a continuum of costs that households pay towards securing transportation.
Under the assumption that households experiencing housing affordability stress (spending more than 30% of income on rent) would benefit most from spatial access to good public transit (which would significantly lower the proportion of household income that goes towards transportation), this analysis estimates the movement of households experiencing unaffordable housing either towards or away from SkyTrain stations.

Census tracts for each year (1991 and 2001) were ordered according to the proportion of tenant households spending more than 30% income on rent. The top 20% of census tracts with the highest proportions of unaffordable housing were selected: for 1991, this translated into 60 census tracts. For 2001, 77 census tracts comprised a quintile. Census tracts characterized by unaffordable housing were selected by quintiles in order to account for population and census tract changes between 1991 and 2001. The 60 CTs from 1991, and the 77 from 2001 were mapped whereupon a simple overlay analysis was used to select which of these CTs characterized by unaffordable housing were located within walking distance to a SkyTrain station.

4. Designating Census Tracts by Proximity to SkyTrain Stations, the Downtown Core, and the Burrard Peninsula

The layer upon which the overlay analysis was based is comprised of census tracts that were designated as within walking distance to the SkyTrain line, and/or within walking distance to the downtown core or and/or within the Burrard Peninsula. ‘Walking distance to the downtown core’ was designated by census tracts which fell north of Broadway, East of MacDonald Ave and West of Main St. I coded for proximity to the downtown core because of the ‘urban mobility’ that such spatial access affords. With the level of grocery stores, employment opportunities and amenities in the central area, proximity to good public transit is less crucial. Census tract designation decisions in this case were based crudely on where most of the multi-dwelling zoned areas in Vancouver are located. I also coded CTs for whether or not they were located in the Burrard Peninsula.

14 Excluding the Commercial Drive district. A map of Vancouver’s zoning districts can be obtained here: http://vanmappub.vancouver.ca/cwp/vanmappub_gotocomm.cfm?frmCommID=LocalAreas,FAIR
Peninsula. Although the SkyTrain line represents the most reliable, temporally-consistent extent of good public transit, the spatial bulk of bus service is widely viewed as contained within the Burrard Peninsula\textsuperscript{15}. Many neighbourhoods in the outer suburbs do have minimum levels of bus service, however, such service is commonly viewed as an inadequate transportation option. Such service tends to run only on weekdays during rush hour. Neighbourhoods within the Burrard Peninsula also experience poor bus service (South Main Street being a prime example), however, there is a greater frequency of service connected to a broader network of route connections in the Burrard Peninsula. Rapid bus service now serves several major routes in the Burrard Peninsula, however, these were not in service until 2000 and 2001. Thus, between 1991 and 2001, the SkyTrain line represented the best level of transit service, followed by neighbourhoods within the Burrard Peninsula and followed lastly with neighbourhoods in the outlying suburbs and municipalities.

5. Overlay Analysis

The simple overlay analysis in the GIS involved designating census tracts characterized by a high proportion of unaffordable rental housing into one, two or three or none of the following categories:

- Located within walking distance (750 m) to a SkyTrain station
- Located within walking distance to the downtown core
- Located within the Burrard Peninsula

This was done for both 1991 and 2001, with results displayed in a series of bar graphs.

6. Profiling Census Tracts Located Proximal to SkyTrain Stations

Cervero (1996) uses census tract profile analysis in his evaluation of equitable accessibility of the Bay Area Rapid Transit (BART) Line in San Francisco. I used a similar approach in my analysis. Using the selections criteria described in 3.6.3 (b), I

\textsuperscript{15} This point was recently confirmed by preliminary research that TransLink conducted in the Summer 2006 for the development of a ‘Frequent Transit Network’ (Masterton, 2006). When mapped, this network is composed of corridors with minimum transit service every 15 minutes, 15 hours a day, seven days a week, and is located almost exclusively within the Burrard Peninsula.
summarized the variables listed in 3.3 for census tracts located close to SkyTrain stations. I broke the summaries down by municipality and profiled the downtown core separately. I produced these separate profiles by municipality as different municipalities have different land use policies and different strategies to address housing shortages. Moreover, each municipality exists within different economic climates. While it is beyond the scope of this project to uncover how these various contexts, policies and strategies have responded to the SkyTrain line, my purpose for producing these profiles is to provide background information concerning the ways in which neighbourhoods surrounding SkyTrain stations changed between 1991 and 2001 and to provide additional evidence to address whether the SkyTrain line has facilitated livability by connecting housing with transportation.

3.7 Conclusion

The objectives of this project are three-fold: first, to examine the changes in rental housing and socioeconomic profiles of census tracts within walking distance of Expo SkyTrain Line in the Greater Vancouver Regional District (GVRD), second, to incorporate these changes into a broader story of urban change in Vancouver, and third, to examine these specific and broader changes to infer the potential of urban light rail to facilitate inclusive mobility. These questions are addressed through a context-based case study analysis of the Expo SkyTrain Line, involving a mixed-methods approach: Census statistics, GIS analyses, ‘equity mapping’, the use of secondary data, all incorporated into a broader story of how the Expo SkyTrain line and Vancouver have altered the ability to reach endpoint destinations between 1991 and 2001.
4. DISCUSSION PART I: A Trajectory of Change in Vancouver: Feted Urban Forms and Dissociated Geographies

If access and mobility are determined, in part, by where people live, where they intend to go, and how they are (un)able to get there, it becomes clear that the outcomes of a particular transit project are context-contingent. In this chapter, I broadly examine this context for Vancouver and the Expo SkyTrain Line, and propose that it is comprised of two sets of change in urban forms, a celebrated set and an ‘unofficial’ set, both of which have developed within Vancouver’s post-industrial climate.

‘Change’ has become an increasingly prominent theme in Vancouver. As one local booster describes it, the city’s development has been a kind of ‘instant urbanism’ (Berelowitz, 2005). Others have pointed out that the past three decades of unprecedented population and employment growth have catalyzed an ongoing urban transformation of ‘Canada’s Pacific metropolis’ (Hutton, 1998). Many of the transformations and adjustments in the city over the past few decades have been brought about through an array of dynamic factors, all situated within a global economy and post-industrial realities, and most of which have intersected, coincided and conflicted to produce a number of outcomes.

What follows is an extensive overview of these changes, and how they have intersected to produce new forms and new geographies. Common to the changes that I highlight in this chapter is their connection to mobility and (un)livability. Some of these changes are being celebrated; indeed, they are being promulgated as a model of planning in North American cities seeking the Vancouver brand of ‘livability’. Such changes include residential densification of the downtown core, public input into planning process, lack of freeways in the downtown core and an emphasis on public transit. But there have been other changes as well, some of them lesser-known or forgotten, but many of which are simply disconnected from the factors and forces that have catalyzed and facilitated the feted changes in Vancouver’s urban form to take shape. These include: deconcentration of low-income households from the downtown core, suburbanization of
employment opportunities, increased levels of housing precariousness, and re-configurations of the rental housing market leading to a proliferation of secondary (and often illegal) suites as a micro-scale reaction to the larger-scale developments in the core.

Excavating the history of Vancouver's development, however short in light of the city's "instant urbanism", reveals associations and connections between seemingly disparate trajectories of development. This chapter proposes that the changes in urban form often associated with the 'official' model of Vancouverism are integrally linked with what I have called the 'unofficial changes'.

4.1. Shifting Economic Foundations: Vancouver's Post-Industrial Economy

4.1.1. Vancouver's Post-Industrialization: A Geography of Inscription from the Urban Core to the Periphery

As with all cities, the means to build and (re)develop and the economic forces behind those means serve as foundation upon which a city is shaped. The same is true for Vancouver. Central to the city's 'instant urbanism' has been its (relatively) recent economic re-structuring and flourishing post-industrial economy.

The outcomes of economic restructuring and post-industrialization in Canadian

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15 'Unofficial change' is a misnomer: some of these changes, such as the proliferation of secondary suites, have recently been recognized as an important part of Vancouver's development. 'Associated changes' is a more apt description, however, I use 'unofficial' as a reminder that this category is absent from discussions on the 'Vancouver Model' despite being integrally tied to these forms.

16 'Unofficial change' is a misnomer: some of these changes, such as the proliferation of secondary suites, have recently been recognized as an important part of Vancouver's development. 'Associated changes' is a more apt description, however, I use 'unofficial' as a reminder that this category is absent from discussions on the 'Vancouver Model' despite being integrally tied to these forms.
cities have received attention in areas focused on the urban core (Hutton, 2004), in labour market segmentation (Hughes and Lowe, 2001), segregation (Walks & Bourne, 2006), urban form (Olds, 2001), and social polarization (Hamnett, 2004). Essentially, economic restructuring has changed the face of where people are working (and what they're doing in those jobs), where people live and relative socio-economic standing between households. Post-industrialization has enabled the construction of new urban forms, with visible outcomes in the core and indirect outcomes in the cities surrounding. These are all factors that comprise the variables that ultimately direct mobility – how people get around the city and who is able to access what.

Although Vancouver's transition to a post-industrial economy is debated, with some arguing that the local economy was more centrally focused on the primary sector and thus never fully industrialized (Barnes et al 1992, Hutton, 1997), there has been a growing concentration of companies and employment opportunities in the urban core that are related to the 'new economy' (Hutton, 2004). These are economic activities centred around, for example, computer services, new media, design and advertising, and reflect an employment trend towards a tertiary and quaternary based economy. Data from statistics Canada reflect this: Employment in computer systems design services, for example, expanded from 7% in 1991 to 27% in 2001 (Statistics Canada, Labour Statistics Division, Labour Force Survey). At the same time, manufacturing jobs in Vancouver\textsuperscript{17} were halved. Taken together, these statistics have been interpreted as evidence of some degree of post-industrialization (Hutton, 2004).

4.1.2. Social Polarization

Part and parcel of economic restructuring, however, is social polarization (Moulaert, Rodriguez, Swyngedouw, 2003). There has been some evidence that social polarization – a widening disparity of incomes within a city – is associated with both Gateway cities (Sassen, 1991 The Global City) and global cities (Hamnett, 2004). Ley

\textsuperscript{17} In 1991, 9.8% of Vancouver's labour force were employed in manufacturing. By 2001, this had gone down to 4.5% (Source: Statistics Canada Census Surveys, 1991 and 2001)
(2002) points out that gentrification is often a component of social polarization in these places. For Vancouver, a city that has been described variously as a post-industrializing gateway and global city that has been marked by gentrification, evidence supporting the thesis of social polarization is indicative, albeit inconclusive.

In the midst of post-industrialization in the 1990s, for example, there was a dramatic rise in the incidence of low-income households. From 14% in 1991 to 19% in 2001, the proportion of households and individuals that Statistics Canada counts in its tally of those with economic disadvantage within the GVRD grew by 40.6% within the span of a decade. At the same time, British Columbia, of which the Greater Vancouver Regional District comprises a significant proportion of the provincial population, boasted the highest proportion of millionaires in the country (Statistics Canada 1999 Survey of Financial Security, in Kerstetter, 2001).

It should be noted however, that social polarization was not a phenomenon exclusive to the 1990s. There has been evidence of social polarization (and its influence on housing prices) between 1971 and 1986 (Ley et al, 2002). Rather, post-industrialization and social polarization are presented as contexts in which both Vancouver’s celebrated changes (the Vancouver Model) and (dis)associated geographies have developed.

4.2 Foundations of Urban Change: Myriad Contextual Factors

In addition to the role of the city’s economic climate, the suite of changes in Vancouver’s urban forms and social geographies has come about through myriad intersecting contexts. These contexts, outlined in Figure 4.1, are inter-dependent. The historical, economic, political, social, cultural and planning factors have shaped each

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18 Statistics Canada has released recent reports indicating the incidence of low-income has dropped since 2001.

other such that any given change in urban form or geography can be attributed to a
number of interacting and overlapping factors.

Figure 4.1 seeks to demonstrate how these forces interact. For example, economic
restructuring and social polarization have played an important role in re-shaping
Vancouver (Hutton, 2004), but it would be imprudent to neglect that politics, economics,
local decisions (Smith, 2004), local history (Punter, 2004) and local geography
(Berelowitz, 2004, Wynn & Oke 1992) factor into the ways that these two phenomena
have manifested. Similarly, ignoring the interacting influences of cultural and social
contexts with the local planning ethos offers a limited reading of urban changes.

Each contextual factor is linked in a way that carries influence through the
sequence of changes in Vancouver’s urban form to impact on the way that individuals
can move around and access goods, services, activities, etc. For example, one of the
changes in urban form, densification of the downtown core with upscale condos and
luxury apartments, is linked to all of the contexts listed in the upper portions of the chart:

**Historical Context:** Residential densification was made possible by the
rejection of freeways in the urban core

**Political / Economic:** Political desire in the 1970s to increase residential
density in the core; Political decision to extend greater power to the City
Planning Division; Vancouver’s economy generated the means to build
these developments

**Social / Cultural:** Willingness on the part of home-buyers, consumers to
live in the downtown core

**Planning Ethos:** Planners such as Ray Spaxman played a significant role in
the development process of the Livable Region Strategic Plan (LRSP),
which subsequently directed residential growth in the downtown core.

Residential densification is also linked with urban amenities which were (are)
leveraged from large-scale developers. By changing the equation of where individuals
live and work, residential densification of the downtown core, by extension, impacts the overall ability to get around the region and access endpoint destinations within the region.

Nor are the contexts listed in Figure 4.1 exhaustive. For example, a large body of research on immigration in Gateway cities like Vancouver continues to unravel how immigration, urban forms and social geographies interact. To the list in Figure 4.1 might be added key actors, an engaged public, Provincial and Federal government decisions, immigration, and trends in design, mega-events and mega-projects. It is beyond the scope of this project to unearth the interconnections and dynamics between these factors. Rather it is intended to provide contextualization to SkyTrain's contribution to mobility in the GVRD (which is addressed more specifically in Chapter 5).
Figure 4.1 The Contextual Factors that have shaped urban form and mobility in Vancouver

Figure 4.1 The Contextual Factors that have shaped urban form and mobility in Vancouver
4.3 Feted Urban Forms: The Vancouver Model

The celebrated changes in the city are broadly encompassed in ‘The Vancouver Model’. It is a relatively recent term, created and reinforced in large part by civic boosters seeking to both brand Vancouver as a livable city as well as give a name to the style of planning the city evokes (Boddy, 2005, Harcourt, 2005). In planning and development circles, there is often reference to a Vancouver style of planning, but viewing the city as an outcome of a particular set of plans is misleading. As I stated in Section 4.1 and 4.2, Vancouver is the product of a number of intersecting contexts, some of which are related to planning but others of which have been antithetical to planning processes. For example, the lack of freeways flowing into the downtown was largely a result of the efforts of local activists. Thus, when I refer to the ‘Vancouver Model’, I refer to a varied history of events and contexts that go beyond any official or institutionalized planning process. Common to all of these points, however, is that they are repeatedly invoked in discourses surrounding Vancouver’s livability.

Tenets of the Vancouver Model generally include:

a) Residential densification of the downtown core
b) Prioritizing public transit
c) Rejection of freeways in the downtown core
d) Urban amenities (parks, daycares, schools, low-income housing, etc.) leverage from large-scale developers
e) Greater distribution of employment opportunities in the region; specifically, the creation or promotion of employment and commercial hubs within designated


The Vancouver Model, as I have indicated, is an ambiguous term. There is also a distinctive architectural style that is often associated with, or sometimes labeled, the Vancouver Model. In this paper, I have only included aspects that are relevant at the city-scale. As an architectural style, the Vancouver Model refers to the ‘tower and podium’ condominium and apartment complexes: a complex of buildings interspersed with small taller sized buildings, and lower ground-oriented low-rise buildings. This is in contrast to the more traditional style of urban density – large, monolithic buildings which, built and designed under cost restraint, offer little to the surrounding streetscape.
regional town centres.

f) Public participation in planning processes\(^\text{22}\).

One point that I did not include in this list was residential densification, whose role outside the urban core has been ambiguous. On the one hand, there has been overwhelming consensus of the need to increase both housing diversity and the supply of housing stock (see Section 4.3.b. CityPlan). On the other hand, NIMBYism and community resistance to individual housing developments and a lack of agreement as to how this is to come about has largely placed the role of residential densification in limbo\(^\text{23}\). Thus, while residential density in Vancouver is often applauded, there is little sense of the type and location of density that is being talked about.

4.3.1. Residential Densification of the Downtown Core, and Creation of Employment/Commercial Hubs

Residential densification of the downtown core, and the creation of Employment and commercial hubs was an outcome of two strategic planning documents: the Livable Regions Strategic Plan in 1975, and CityPlan in 1995.

The Livable Regions Strategic Plan, first drafted in 1975 and updated in 1994, has contributed to shaping the Vancouver region, and is often cited as providing the guiding principles of Vancouver's livability, and with shaping the city into a model of good planning. The LRSP sought to address pressing concerns within the city: traffic, housing supply, housing affordability, etc. and was developed under a political and cultural climate that was favourable to new approaches and visions of city planning (Punter, 22).

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\(^{22}\) Public participation in planning has received wider attention from academics and planning theorists than from civic boosters.

\(^{23}\) Current Mayer Sullivan recently announced that the city would bring forth a policy of ‘Eco-density’ in order to alleviate housing shortages and support a more sustainable city (Sullivan, 2006).

\(^{24}\) http://www.mayorsamsullivan.ca/ecodensity/index.html (June 19, 2006)
Given that freeways had already been rejected, the LRSP sought to reduce travel demand and commuting distances through a regional distribution of employment and commercial activities. By directing growth to regional town centres (approximately one per municipality) within a designated urban growth boundary, it was felt that the region as a whole would benefit through spatial balance of housing, job opportunities and commercial activities. Achieving this balance involved not only dispersing offices and retail activities out to regional town centres, but it also meant promoting residential development in the downtown core.

Drafted after extensive public consultation, CityPlan (1995) presented a series of priorities and goals for the city in tandem with a vision for the city’s future. CityPlan was quite extensive in scope and highlighted issues in housing, transportation, the environment and health. With respect to urban forms and the shape of Vancouver, CityPlan re-emphasized the LRSP goals of a residential and commercial mix for the downtown core. Additionally, it promoted a jobs-housing balance throughout the city through the creation of neighbourhood centres, smaller scale versions of the regional town centres that the LRSP encouraged.

Both the LRSP and CityPlan facilitated the residential densification of the downtown core. The results can be seen in the numbers: occupied private dwellings in the downtown core increased by 131% between 1991 and 2001, well above the regional average increase of 25%. The population grew by 62% in the same period of time. Figures A and B show residential buildings in the downtown core and corroborate these figures.
Figure 4.2 False Creek North (Above: View from Burrard Bridge; Below: View from the Street). All of the towers shown here are residential, most of which have been built after the 2001 census was taken. (Photo by K. Olson, March 5, 2006)
While the LRSP and CityPlan facilitated this downtown residential development, I emphasize that densification was facilitated additionally as a result of cultural preferences, increasing middle class complexity, and a growing post-industrial economy. Individuals who have fared well in Vancouver's thriving post-industrial economy have added substantial market demand for downtown residential dwellings.

This came about after another group of middle class households, whom Ley (1996) identifies as the 'New Middle Class', created and maintained a housing market demand in the downtown core. The New Middle Class comprises individuals employed largely by the public sector, and thus relatively immune to economic re-structuring. This is a group for whom, Ley argues, identity politics and inscription of meaning are expressed through residential preferences for downtown neighbourhoods. In other words, the 'new middle class' are involved in the first wave of gentrification in Canadian cities. As downtown neighbourhoods ameliorate, a second wave of gentrifiers arrive, comprised of individuals employed in the biotech sector, or IT, or the Entertainment Arts sector, this is a group of individuals who are more aligned with economic restructuring. Their middle class status
is not characterized by identity politics in the same way that it does for the new middle class, rather, they can be more aptly described as the beneficiaries of the city's transition to a post-industrial economy.

This cultural shift in middle class residential preferences has translated into market demands and development responses that fit with the LRSP's goal of increasing residential density in the downtown core. Combined with what Berelowitz describes as 'the cult of the view', the cachet of high density living in the downtown peninsula has shaped the local housing market in a way that partially aligns with the city's vision of development. On the one hand, high-density development in the downtown core align with plans such as the LRSP, CityPlan and the Core Area Plan. But these plans also envisioned a mixed-income downtown core. This is has been achieved to a limited extent, with the city managing to leverage some low-income housing. But the development of mid and lower priced housing has neither reached the proportion the city has been hoping to achieve, nor has the market been able to keep up with the need for affordable housing. This has had the effect of re-configuring the housing market. I will return to this when I discuss 'unofficial changes' in 4.4.a.

4.3.2. Emphasis on Public Transit

The emphasis on public transit arose from citizen intervention in 1967 that ultimately barred the construction of freeways into the downtown core. During the 1970s, traffic in the region worsened, and with the rejection of freeways a fait accompli, prioritizing public transit become part of official planning and policy in 1975 with the LRSP.

But the LRSP provided guidelines only, without specifying any particular transportation projects or plans. Re-organizing land uses so that employment opportunities would be located closer to residential areas was meant to reduce commuting distances and times, and was long-term in scope. Additionally, it was informed not by best practices but by planning theory that suggested that commuting demands on
transportation infrastructure would be reduced as a result of co-located jobs and housing.\footnote{There is evidence that commuting distances and times are not necessarily reduced when housing and employment opportunities are co-located \cite{Jarvis2003}}.

In the meantime, transportation was a growing concern among residents in the GVRD \cite{GVRD1982}. It was out of this context that conceptual plans for a rapid transit line began. Since the downtown core represented the only major employment hub in the region at the time, the route for a rapid transit line was laid out by the early 1970s to connect downtown Vancouver with regional town centres in Burnaby, New Westminster, and Surrey.

By 1982, the GVRD had announced that the \textquote{1980s would be a decade for transit}. At the same time, the city was in the midst of preparing for the World Exposition of 1986, the theme of which was transportation. The technology for the rapid transit line – an elevated, driverless system – was deemed to serve two simultaneous purposes: providing much needed transit service between the downtown core and outer-lying residential neighbourhoods in surrounding municipalities, while also showcasing Vancouver as a modern, transit-oriented – and livable – city.

Since the 1980s, transit and alternative transportation modes have been reemphasized as a priority for the region \cite{Transport2021Report1993}. This has been partially reflected in increases in spending on alternative transportation infrastructure. For example, spending on bicycle infrastructure increased three-fold between 2001 and 2004 \cite{TransLinkAnnualReport2004}. Transit expenditures and ridership over the past five years have increased as well, which suggests both a budgetary and cultural approval that public transit is a priority in the region. Moreover, the densification of the downtown core has meant that public transit competes not with vehicle trips but with other modes of transportation such as walking and biking \cite{Ramsay2004}.\footnote{There is evidence that commuting distances and times are not necessarily reduced when housing and employment opportunities are co-located \cite{Jarvis2003}}.
There are other factors, such as land use and mode of mass transit, that shape the role that public transit takes in a region, and whether or not it is viewed as a priority. Different modes of public transit can lead to vastly different outcomes in terms of ridership, accessibility, economic development, etc.

Public transit, however, is much more ambiguously specified in the LRSP. While TransLink’s 2021 Plan, drafted specifically to align with the goals and visions in the LRSP, states that bus service and rapid bus service are priorities in the transit and transportation infrastructure (Transport 2021, 1993), there has been deviation from this plan. The region has allocated resources towards expensive rail transit, an outcome stemming from a ‘path dependent’ history of events and relationships (see Siemiatycki, 2007, forthcoming, UBC Press, for full description).

Thus, the precise mode of public transit within the Vancouver Model is unclear. The SkyTrain Millennium Line, for example, could be viewed as deviating from the Vancouver Model because of the precedence it has taken over bus service, despite the stated priority of bus and rapid bus service in plans that have specifically aligned with the LRSP. At the same time, the Skytrain line has become an icon of livability in the region.

4.3.3. Urban Amenities (Leveraged from Large-Scale Developers)

Armed with a growing economy and a downtown core filled with ocean and mountain views, planning directors in Vancouver have been able to leverage a number of urban amenities that have added to the attractiveness – and cost – of living downtown. Recently awarded the Order of Canada, retired Director of City Planning, Larry Beasley, has been credited for acquiring for the city: parks, daycares, schools, artsplaces, grocery stores and community centers. These items have added to the urban core in such a way that the wave of downtown gentrification is discernable less and less by identity politics characteristics of the ‘New Middle Class’ (Ley, 1996. See section 4.2.2) than by people simply wanting to live in the area (c.f. O’Connor,2006). This is an important distinction, for it transforms the downtown from a gentrifying vanguard neighbourhood to a
downtown core more widely known as the Vancouver Model. As one of the local architectural critics notes, "Trading density for amenity is the Vancouver Model in a nutshell" (Boddy, 2005).

4.3.4. Public Participation in Planning Processes

Another celebrated dimension to Vancouver's 'stunning success' is the level of public engagement in planning processes (Sandercock, 2005, p.36). Civic engagement in Vancouver today involves both institutionalized and activist paradigms, with the former gaining increasing prominence. Public influence on urban form, however, was particularly dramatic under a civic and activist campaign in the late 1960s during the 'Great Freeway Debate'.

Since the 1960s, the award-winning CityPlan has been the most comprehensive — and extensive — public consultation project to date. Again, it has only been through economic restructuring and social polarization that these changes have been able to unfold. For example, the densification and rapid development of upscale condominium towers and luxury apartments would not have taken place without a clear market demand for high-end dwellings, sustained in part by an expanding middle class alongside market interest in Vancouver. Similarly, the construction of the SkyTrain Expo line, a hugely expensive project which still commands 12% of the annual transit budget\(^2\)\(^6\), was built on the premise of economic development (SkyTrain, Catalyst of Development, 1989) and showcasing the city as a 'global city' worthy of investment. Thus, the unfolding of the Vancouver Model, while certainly tied to other factors such as planning, culture and social relations, is perhaps most deeply intertwined with the city's economic climate. The two have propelled each other in a way that it is difficult to tease apart one from the other. More realistically, the urban forms associated with the Vancouver Model emerged in tandem with economic re-structuring and social polarization.

\(^{26}\) (Translink Annual Report, 2001). This does not include the Millenium Line, which began operation in 2002.
4.4 Associated Changes, (Dis)associated Geographies

The contexts and conditions that allowed the celebrated urban forms in Vancouver to develop are the same as those that have given way to other geographies. These are changes that are dissociated from the Vancouver Model in boosterist rhetoric, but they are part and parcel of the same process, and include:

(a) deconcentration of low-income households from the downtown core
(b) increase in housing precariousness (the proportion of tenant households spending 30% of more of household income on rent)
(c) re-configuration of the rental housing market
(d) proliferation of secondary suites
(e) suburbanization of employment opportunities

4.4.1. Deconcentration of low-income households

In Section 4.2.b. I presented evidence of social polarization in Vancouver and drew attention to the 40.6% rise in the incidence of low-income households. Yet at the same time, the incidence of low-income within any given census tract in 2001 was considerably less than in 1991. For example, the highest incidence of low-income within any given tract in 1991 was 67%, but for 2001, the highest incidence had dropped to 62%.

This is explained through the maps in Figure 4.4, which shows that social polarization had a distinctly spatial dimension, broadly characterized by a deconcentration of low-income households from the core. Figure 4.4 shows the

27 Ross et al (2004) found that concentration and centralization both increased in Vancouver, conclusions which appear to contradict the story told by the maps presented in Figure 4.4. and the statistics that I report at the census tract level. Ross et al (2004) used micro-level raw data, whereas I have presented incidences of low-income at the census tract level data. The difference between the two conclusions about the centralization of low-income households is confounded by a few different factors: the
distribution of the incidence of low-income households in 1991 and 2001. In 1991, there was a highly concentrated area of inner city poverty that by 2001, appears to have lessened. Whereas 6% of low-income households in the GVRD lived in the DTES at the beginning of the 1990s, this proportion had dropped to 3.7% by 2001. But anecdotal and personal observations of the DTES tell a different story: while the statistics tell that the number and proportion of lower-income households in the DTES has declined, there has most certainly been an intensification of the severity of economic precariousness for those in the DTES today (c.f. Smith, 2003, for an in-depth discussion).

Suburbanization of low-income households indirectly aligns with the work of Bourne and Ley (1992) who describe the increasing complexity of Canadian suburbs. Post-industrial economic activity has been associated with de-segregation of lower-income households (Walks and Bourne, 200628), while new economy industries have been shown to lead to mass evictions and displacements (Parker and Pascual, 2001). Similarly, Ley and Tutchener observe,

"The economic niche of the new middle class in professional and managerial positions has been a consistently strong source of local housing demand, reflected for example in gentrification. So too a weaker performance by other segments of the local economy has led to relatively high unemployment, and together with inflating housing and rental costs, has contributed to pressures to leave the city."  
(Ley and Tutchener, 2001, p.206)

This 'pressure to leave the city' could be interpreted as either a pressure to re-locate to the suburbs, or as pressure to move to another city altogether. The pattern of de-concentration that I have found is consistent with research that unearths the economic context for changes in social geography.

While Ross et al (2004) find evidence for increasing segregation and centralization,
their research results are confounded (as are mine) by variables such as scale, increasing density of the urban core, increased incidence of low-income and evidence of micro-scaled social polarization (Smith, 2002). Moreover, deconcentration as a spatial phenomenon can only be inferred from non-cross-tabulated census data.

Additionally, a deconcentration of low-income households should not be interpreted as a negative consequence of the Vancouver Model. There has been some effort on the part of planners to create mixed socio-economic neighbourhoods and housing developments. There has been a considerable push, for instance, to demand 20% non-market housing from large-scale developments. Creating mixed-income neighbourhoods is emblematic of the local planning ethos that was underpinned with values of pluralism and diversity (Hutton, 2004).

Figures 4.4 and 4.5 show the distributional changes in the incidence of low-income between 1991 and 2001.

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29 Ross et al (2004) did not, for example, account for overall economic changes. Thus, what is observed as ‘centralisation’ might be accounted for by the increase in the overall incidence of low-income.
Figure 4.4 Incidence of Low-Income Households, 1991. (Map by K.Olson; Data Source: Statistics Canada; Spatial Data Source: DMTI; Software: ArcMap 9.0)
Figure 4.5 Incidence of Low-Income Households, 2001. (Map by K. Olson; Data Source: Statistics Canada; Spatial Data Source: DMTI; Software: ArcMap 9.0)
4.4.2. Increase in Housing Precariousness

During the 1990s, Vancouver began to suffer under the weight of its own success. The conditions that enabled the market demand for high end and centrally-located housing - the thriving economy, a growing population enabled an ameliorating downtown core - are the same conditions that led to a rise in unaffordable housing. Housing prices (and rental costs) outpaced the rise in household incomes. Tenant households in the GVRD spending over 30% of pre-tax income on housing standard jumped from 33.7% (of all tenant households) in 1991 to 40.2% in 2001.

In light of the increased incidence of low-income and the rise of homelessness (Goldberg et al, 2005), I interpret these figures to suggest an overall increase in the degree of housing insecurity in the region. Hulchanski (2004) reports that among Canadian cities, Vancouver has the highest percentage of households spending over 50% of household income on shelter in 2001.

<table>
<thead>
<tr>
<th>Percentage of households spending &gt; 50% Income on Shelter</th>
<th>Calgary</th>
<th>Toronto</th>
<th>Montreal</th>
<th>Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16%</td>
<td>20%</td>
<td>18.1%</td>
<td>22.3%</td>
</tr>
</tbody>
</table>

Table 4.1 Percentage of Households (both owner and tenant) spending more than 50% of household income on shelter. (Source: Statistics Canada)

There were a number of interacting factors that have contributed to growing housing precariousness in Vancouver – a flourishing economy, an intense period of population growth in the city coupled with speculative home-buying, a reduced emphasis on affordable housing at the federal level through the abolition of programs offered through Canadian Mortgage and Housing Corporation (Hulchanski, 2004), federal level policies that leave affordable housing in the hands of the market, reduction in the number of affordable and non-market housing stock in the downtown and inner suburban core,
and very little de facto coordination between municipal jurisdictions regarding a ‘livable region’\(^{30}\). Not surprisingly, homelessness and a significant shortage of affordable housing became poignant issues in Vancouver in the 1990s. These issues have persisted today – in a recent civic election, a new mayor was elected to Vancouver on a slate promising, among other things, ‘more affordable housing options for low-income families’ (www.samsullivan.ca, November 20, 2005).

Larry Beasley, former director of planning for the City of Vancouver, spoke on the eve of his retirement\(^{31}\) that the market has been wholly unsuccessful in providing affordable housing. The continuing emphasis on condominium development geared towards singles, couples and young families has meant both a reduction in the supply of family rental housing, alongside a spatial re-configuration of where families who have not benefited from Vancouver’s transition to a post-industrial economy might find affordable and suitable accommodation.

4.4.3. Re-configuration of the Rental Housing Market

Aside from obvious explanations of escalating housing costs and growing incidences of low-income, there are a few other factors that help to explain changes in the types, prices and supply of rental market housing that would clearly impact on the proportion and location of households experiencing housing affordability stress.

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\(^{30}\) Although the Greater Vancouver Regional District (GVRD) had been involved in developing the ‘Livable Regions Strategic Plan’ document in 1975 and again in 1996, its political structure has allowed it to do little else than coordinate basic civic infrastructure. For instance, there is no regional plan for equitable access to affordable housing and adequate transportation – it is merely an implied goal of the LRSP. The assumption in the LRSP has been that provision of affordable housing in the core will be sufficient for the region – an assumption that has already been undermined by the current housing crisis, and additionally undermined by the organization of the Bus Riders Union in 2001.

\(^{31}\) February 7, 2006. Panel Discussion with Lance Berelowitz and Max Wyman at the Vancouver Public Library.
The first concerns the heavy emphasis on condominium development in the region in the past 15 years. Catering to trendy urban elites, developers have begun to concentrate their efforts on the construction of luxury condominiums\(^\text{32}\), recent examples of which include developments in the neighbourhoods of False Creek North, Yaletown and Coal Harbour, New Westminster, the Joyce-Collingwood neighbourhood and, more recently, Edmonds.

These developments are built primarily for a complex, but economically distinct, middle class: Ley’s (1996) ‘New Middle Class’, as well as the beneficiaries of Vancouver’s transition to a post-industrial economy. Ley describes how the New Middle Class and their residential preferences for downtown neighbourhoods have altered the urban cores of Canadian cities. The conclusions he drew in 1997 are consistent with census data collected a few years later. The number of occupied dwelling units in the downtown core increased by 131% between 1991 and 2001, well above the regional average of 25% (c.f. Section 4.3.a).

Despite the unabated housing construction in the city-region responding to both the economic boom and population growth of the 1990s, the number of rental units has not kept pace with the expansion of housing stock. The ratio of rented units to owned units dropped from approximately 16.1% in 1991 to 14.6% in 2001. This translates into 10 500 rental units\(^\text{33}\) that have been ‘lost’ within the span of 10 years had the proportion of rental housing kept pace with the regional housing stock expansion. In light of the prerequisite condition that rental status has for affordable housing, the reduced proportion of rental units is alarming to the degree that housing unaffordability in the region

\(^{32}\) It should be noted that single family dwellings are still being developed in the urban periphery. As a trend, however, the 1990s saw much more focus on high density development.

\(^{33}\) This estimate was generated by calculating the difference between 16.1% and 14.7% of the added housing stock constructed in the region in the 1990s.
increased by almost 20% in the 1990s. Coincidentally, the GVRD now has a social housing waitlist of approximately 10,500 units (Lois Jackson\textsuperscript{34}, GVRD).

Perhaps one the starkest responses stemming from this emphasis on condominium development over the 1991-2001 period (and beyond), concerns the way these developments have shaped the geography of rental housing in the region. In 1991, rental housing was relatively ubiquitous, with a majority of census tracts characterized by the regional average proportion of rented dwellings, approximately 16%. By 2001, the proportion of rented dwellings in some census tracts, particularly those in the downtown core, had swelled to an order of 65% while other census tracts showed relative declines. Significant clusters of rental housing stock are now found in New Westminster, South Vancouver (specifically, the Marpole neighbourhood) and the downtown core. For census tracts located within walking distance to the SkyTrain line, the proportion of rental housing remained unchanged during the 1990s. Figure 4.6 and Figure 4.7 show the distributional change in rental housing between 1991 and 2001.

\textsuperscript{34} GVRD Sustainable Region Initiative: The Price We Pay, March 27, 2006. Simon Fraser Wosk Centre for Dialogue.

\textsuperscript{35} The clustering effect of rental housing stock can also be derived aspatially by comparing standard deviations between years. A higher ‘standard deviation’ indicates greater variability. In 1991, the mean proportion of rental housing within a census tract was 16.1% with a standard deviation of 7.5. In 2001, the mean dropped to 14.7%, but the standard deviation increased dramatically to 13.5.
Figure 4.6 Distribution of Rented Dwellings by Census Tract, 1991. (Map by K.Olson. Data Source: Statistics Canada, Spatial Data Source: DMTI Spatial Inc., Software: ArcMap 9.0)
Figure 4.7 Distribution of Rented Dwellings by Census Tract, 2001. (Map by K.Olson.; Data Source: Statistics Canada; Spatial Data Source: DMTI Spatial Inc.; Software: ArcMap 9.0)
Confirming this trend aspatially are the means and standard deviations of the proportions of rental housing (Table 1). The smaller standard distribution in 1991 of rental housing stock composition per census tract exemplifies the relative uniformity of rental housing. By 2001, a much greater standard deviation, with a reduced mean, indicates a ‘clustering’ of rental housing within census tracts.

![Table 4.2 Distribution of Tenant Households by Census Tract (Source: Statistics Canada)](image)

This spatial re-configuration highlights concerns over the concentration of low-income households, and draws some level of concern in light of the kinds and costs of rental stock added in these centres. A significant proportion of the units built in the downtown core in the past 15 years have been bachelor or 1-bedroom suites (see Figure 6: Average Number of Rooms per Dwelling). These numbers reflect developer emphases on bachelor suites and one-bedroom apartments—wholly inadequate for households with children. Effectively, these statistics indicate a squeeze in the market for affordable family (2 or more bedroom) rental units.

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36 The increase in the standard deviation may also be due to the increase in the number of census tracts between 1991 and 2001.
Figure 4.8 Average Number of Rooms per Dwelling. (Map by K.Olson; Data Source: Statistics Canada; Spatial Data Source: DMTI Spatial Inc.; Software: ArcMap 9.0)
The size and type of housing units being built becomes a secondary issue when the cost of renting (and owning) is considered. With 2-bedroom suites averaging $1069 in Vancouver in 2001 (CMHC), median household income for 2001 suggests that 'affordable rent' would be $919 per month, representing a $150 per month (or $1800 a year) gap in affordable rental housing for the average household in Vancouver. The gap between affordable rent for a low-income household and the average rent for a 2-bedroom apartment jumps to $276 per month or $3312 per year. In other words, it would take approximately an additional $3300 a year for a low-income household to obtain an affordable and adequate suite.

The spatial re-configurations come from locally based decisions to re-zone and develop particular lots and neighbourhoods. Berelowitz (2004), for example, credits the 'Cult of the View' in Vancouver for shaping much of the area in and around the downtown peninsula, arguing that this amenity determines which lots are favoured over others and in which places the price of buildings and units are inflated. There are other factors however, that account for the spatial changes in rental housing, many of which are tied to the celebrated forms in the Vancouver Model: the increasing attractiveness of the downtown core through the development of urban amenities (Section 4.3.c), the expanding cachet of living in the downtown area (Section 4.3.a), the expansion of speculative real estate and the desire on the part of owners to pay off mortgages through subletting. Moreover, these local influences (re)shaping the geography of rental housing in Vancouver are situated within a host of broader factors that influence housing prices, such as gentrification, immigration and polarization (Ley et al, 2002).

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37 CMHC and Statistics Canada consider a dwelling unaffordable if more than 30% of household pre-tax income goes towards rent. In 2001, median household income was $57925. This translates into a median $919 per month for affordable rent (Statistics Canada Census Survey 2001)

38 Statistics Canada defined the low-income cut-off level for 2001 as $28560 for a 3-person family, or the size of family that can reasonably demand a minimum 2-bedroom dwelling. This figure translates into $793 per month as an affordable rent.
The role of Vancouver’s urban economy cannot be underestimated in the way it has influenced the concretized forms of the Vancouver Model. By building upscale condominiums catered to single, couple and young families, developers are responding to a clear market preference for this type of housing. Entire developments are often sold out before construction even begins, with owners waiting up to three years before their respective buildings are ready to be occupied.

Demographic changes alone only minimally justify the focus on luxury condominiums. With this much economic activity geared towards smaller and younger families and households, the trend towards condominium towers might indicate a dramatic shift in the demographics and demographic preferences of the city. Yet household size has remained steady over the 1991-2001 decade at 2.7 people per household. The average number of children per household inched upwards from 1.10 to 1.14, against what might be expected given the tremendous market push for smaller dwelling spaces. Developer emphasis on childless or young families is not convincingly explained by any shift in household demographic profile or composition.

Clearly, cultural acceptance of (and demand for) high density downtown living factors significantly in driving these types of development. Ley (1997) describes these preferences as characteristic of a new middle class. For Berelowitz (2004), it is the ‘Cult of the View’ and the extensive demand for dwellings that offer a view of Vancouver’s mountains and waters. Larry Beasley ascribes the desirability of the downtown core to simply ‘good planning’.

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39 February 23, 2006. Vancouver Public Library panel discussion with Lance Berelowitz and Max Wyman, in response to a question from the audience regarding what Surrey could learn from Vancouver’s example given the different economic challenges faced by the two municipalities.
4.4.4. Proliferation of Secondary Suites: Micro-scale Developments and Affordable Housing

Housing affordability had reached crisis proportions before the 1990s. To deal with housing shortages in earlier years, City Hall equivocated on the issue of density. While the majority (two-thirds) of residents were against secondary suites, these units proliferated under a milieu of tolerance by City Hall and an unwillingness to crack down on zoning and building violations in light of the affordable housing crisis. Many of the secondary suites constructed in this decade were primarily of the ‘Vancouver Special’ variety.

By the mid-1980s, City Hall changed the zoning codes in some neighbourhoods in order to allow the construction of (more) secondary suites. Common local knowledge, however, reveals that there is still a significant number of ‘illegal suites’. These are rental units – often suites that are annexed to detached or semi-detached houses – that violate zoning laws, building codes, tenancy laws, safety requirements, or are simply unclaimed by owners as a separate suite. For property owners with an expensive mortgage, there is tremendous incentive to build and rent out portions of their property. The demand for affordable housing coupled with the municipality’s inability to deal with housing needs has translated into an unofficial de facto ‘blind eye’ towards these illegal, secondary, and often sub-standard suites.

The role of secondary and illegal suites to provide housing needs was inferred when CityPlan (1995) acknowledged that market-housing is expected to provide the bulk of affordable housing, particularly in the absence in CityPlan of specific details, mechanisms or policies by which the market might be able to provide affordable housing. More recently, housing advocate groups such as the Tenants Rights Action Coalition, Lower Mainland Affordable Housing Network, the BC Non-Profit Housing Association,

40 According to City Hall, a suite is considered a separate dwelling if it has a separate entrance as well as a kitchen stove. Many illegal suites are ‘legalized’ by certain loopholes – furnishing the suite with a hotplate and microwave, or re-ordering the entranceways of suites
and the BC Women’s Housing Coalition have been lobbying for the legalization of secondary suites. Both legal and illegal secondary suites simultaneously serve a demand for affordable housing while also comprising an ‘unplanned’ portion of Vancouver’s celebrated density. Their status as part of the ‘Vancouver Model’ is thus ambiguous.

Figure 4.9: Secondary Suites in Kitsilano. (Images have been altered to protect privacy). (Photos by Kristin Olson, March 5, 2006)

At this juncture, it is useful to think of the official and unofficial faces of Vancouverism. If the former can be characterized by spatially concentrated large-scale condominium developments geared towards the city’s younger, wealthier, childless households, the latter is comprised of more spatially-dispersed micro-scale developments geared towards a variety of lower-income households, from single students to households with children. Both the reluctance to enforce zoning and housing laws as they pertain to secondary suites, as well as an ambiguous reference to the role of the market in providing affordable housing, relate to the implicit parts of the Vancouver Model that City Hall has encouraged. Secondary suites have been the responses in urban form to the myriad contexts and trends bound up with Vancouverism. Their erasure from the official version of the planning model, I propose, is one of the ways in which the Vancouver Model opens itself up to inequities and disconnects between housing and transportation.
This is related to the spatial flexibility of secondary and illegal suites in which rental costs are sensitive to both market pressures and hedonic pricing variables related to accessibility. Although secondary suites comprise a significant proportion of affordable housing in the region, they have clearly not kept up with demand. Consequently, there has been a downward pressure on the rental market by households that might otherwise have left the rental market for ownership. The original intention of this project was to look at whether these pressures on the rental market were re-configuring housing geographies – and by extension, geographies of access – in a way that disconnected affordable housing from transportation.

4.4.5. Suburbanization of Employment Opportunities

While post-industrialization is largely discussed in the context of the urban core, the reality of a regionally-based economy opens up the question of how neighbourhoods and areas in the urban periphery are influenced by post-industrialization. The tendency in boosterist rhetoric is to dissociate urban form from economic climate. The LRSP provides a regional and long-term planning framework, but it has unfolded within an evolving economic context further constrained by a fragmented regional governance structure.

The LRSP calls for the co-location of housing and employment opportunities within the region, so as to minimize commuting distances and mitigate against traffic demand. The designation of regional town centres was seen as a way of simultaneously dispersing employment opportunities throughout the region, which would bring employment opportunities closer to where people lived. For the urban core, this plan meant focusing on residential development; for the urban periphery, this meant confining development within the LRSP-designated growth concentration area while directing employment and commercial activities to regional town centres.

With the exception of Metrotown (in Burnaby), this plan has largely failed to materialize. The growth of employment opportunities outside the Growth Concentration
Area (GCA, defined in the LRSP) expanded by 9.5% between 1996 and 2001, and exceeding employment growth within the GCA, which expanded by only 6.2% within the same period. Much of this has to do with the economic and political context in which peripheral municipalities are placed in economic competition both with each other and with thriving new economy activity in Vancouver’s urban core.

The effects are seen in the proliferation of suburban office and industrial parks that offer low rent office space (Shaw, 2006). These also translate into high transportation costs for employees (see chapter 5). Manufacturing activity that had taken place close to Vancouver’s core along the shoreline in east Vancouver have moved to, for example, North Surrey along Scott Road. Suburban municipalities, faced with economic competition from Vancouver, have responded in part by developing office/industrial parks that offer low rental office space to firms41. Firms that might otherwise have located in Vancouver or a regional town centre choose instead to locate in the city-region periphery. A representative from a commercial real estate firm observes, “Consulting companies, high-tech firms, any start up companies and tenants in lower class buildings -- eventually those buildings are going to see significant rent increases so they will be pushed out [to the suburbs] as well” (Shaw, 2006). The trend is significant: the GVRD reports that 50% of the region’s new jobs are located in suburban office parks.

I do not mean to imply that economic activity within a city-region is a zero-sum game. However, given the LRSP’s goal of directing commercial and office space growth to regional town centres in contrast with the reality of a continued suburbanizing and exurbanizing of office activities in peripheral municipalities, it is difficult to imagine a stronger incentive than an economic one that would lead peripheral municipalities to stray so drastically from the LRSP and from the tenets of ‘Vancouverism’. Post-industrialization affects the urban periphery by setting up different economic contexts and challenges between municipalities. The outcome of this dynamic undermines objectives laid out in the LRSP to create compact and complete communities. The result is seen in

41 Hutton (1998) notes that a third of the region’s industrial zoned land is (was) within the municipality of Vancouver.
the re-location of certain industries and firms from the urban core (or regional town centres) to suburban office parks.

The inscription of post-industrialization on suburban forms, however, is more complex than what I have described. Hutton (2004), for example, describes the new-economy core-periphery relationship as more mutually dynamic. New economy industries in the core serve firms within the CBD and firms located in the periphery. At the same time, a number of ICT industries in the urban core often serve as subcontractors for larger corporations located in the suburbs. From this perspective, new economy activities play a much more direct role in shaping the economic activities in suburban municipalities.

Figure 4.10 Construction begins on Surrey’s Campbell Heights Industrial Office Park. (Photo by K. Olson, June 15, 2006)
While more research is needed to tease out the influence of new-economy activities on Vancouver’s suburban geographies and forms, Vancouver’s post-industrialization in conjunction with a political structure that sets municipalities in economic competition
with one another summarizes in a very general sense what this influence might look like. Office and industrial parks that cater to businesses that might otherwise locate in designated regional town centres thus become an unintended consequence of the ‘Vancouver Model’.

4.5 Conclusion

What becomes lost in the story of Vancouver’s ‘successful’ land use and urban planning strategies are the contexts and other factors that have enabled the dramatic changes in the downtown area to happen. Using the Vancouver Model as an exemplar of good urban form becomes moot in the absence of large-scale developers willing to invest in high-density developments. Much of what we associate with Vancouver’s Model of urban planning comes down to a plethora of upscale condominium developments in the downtown core and along the SkyTrain route. The economic context of Vancouver has been a significant force in shaping Vancouver’s urban form. More precisely, this has come about largely from the city’s transition to a post-industrial economy, the benefactors of which are young, wealthy households that David Ley described 10 years ago as ‘The New Middle Class’. Their penchant for upscale condominium living is part of the driving force behind Vancouver’s densification.

More broadly, the suite of changes in Vancouver’s urban form, built on a flourishing post-industrial economy in the past number of years, have broadly bifurcated into two categories: the official model of Vancouverism packaged and marketed as the Vancouver brand of livability, and the unofficial or forgotten side, integrally tied to the factors and forces that have allowed the official model to unfold and develop, but neither acknowledged as part of Vancouverism nor recognized as linked to these changes. Vancouver’s urban core, the celebrated focus of Vancouver, is part of a larger process of change: deconcentration of low-income households from the downtown core, dispersal of employment opportunities, increased levels of housing precariousness, and reconfigurations of the rental housing market leading to a proliferation of secondary (and often illegal) suites as a micro-scale reaction to the larger-scale developments in the core.
The tension between the official and unofficial sides of the Vancouver model delineate the means by which livability – the spatial and pecuniary connections between housing, transportation and employment – produced in the core come about largely from an exportation of unlivability to the urban peripheries. Ley (1996) is careful to note that the New Middle Class is indifferent to short commuting distances. But not all households can afford the luxury of this indifference (or of short commuting distances). For some, this issue is resolved by broadening the scale of mobility to that of migration. Unable to enter the housing market in Vancouver, these are households who relocate to other cities in which they can afford home ownership. For other households, the ones who remain in Vancouver, home ownership or the cost of rental housing comes at the expense of mobility and accessibility. As City Councilor Peter Ladner42 remarked, “Most people south of the Fraser would gladly give up their cars, live in the Burrard Peninsula and take transit, but the simple fact is they just can’t afford to live in the places that can support good transit.” In the next chapter, I explore the implications these two categories of change hold for SkyTrain’s effective contribution to livability and equity in the GVRD as Vancouver continues to pursue its eponymous style of planning.

5. DISCUSSION PART II: Cracks in the Model: The Housing-Transportation (Dis)Connection

This project focuses on the ways in which the Expo SkyTrain Line (ESTL) has contributed to livability – the connection between affordable housing and adequate transportation - in the GVRD. But this contribution is largely dependent on context. In chapter 4, I outlined how this context is comprised of two trajectories of change – the feted urban forms included in the ‘Vancouver Model’, and its’ (dis)associated geographies. In this chapter, I address the specific land use and geographical changes along the transit route. The last section of this chapter situates the land use and geographical changes along the Expo line within this bifurcated context described in Chapter 4.

Table 5.1 outlines specific changes in housing and rental housing in census tracts within walking distance of the SkyTrain Line, while Table 5.2 lists incidence of low-income and median household income in the same census tracts (see Chapter 3 for description of data collection and analyses). This provides a two-snapshot view of how census tracts have changed between 1991 and 2001. For comparative purposes, I designated census tracts by municipality. I also included changes along the entire route and within all census tracts within the GVRD. Many of these changes varied greatly by municipality.
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<th>Proportion of Tenant Households Spending 30%-99% on rent (%)</th>
<th>Proportion Tenant Households</th>
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<th>Average Rent</th>
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Table 5.1 Housing Characteristics in Census Tracts (CTs) within walking distance of the Expo SkyTrain Line in 1991 and 2001. (Source: Statistics Canada)
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<th>Incidence of Low-Median Family Income (%)</th>
<th>Median Family Income ($)</th>
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<td>108.6</td>
</tr>
<tr>
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<td>14.8</td>
</tr>
<tr>
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<tr>
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<td>23.2</td>
</tr>
<tr>
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<td>13.1</td>
</tr>
<tr>
<td>SkyTrain - all CTs</td>
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</tr>
<tr>
<td>SkyTrain (minus Downtown)</td>
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Table 5.2 Selected Socio-Demographic Characteristics of Census Tracts (CTs) within walking distance of an Expo SkyTrain Station (Source: Statistics Canada)
The net proportional change in number of dwellings along the SkyTrain route, for example, increased by 43%, higher than the regional average increase of 24%. This addition of housing stock aligns with both goals of the Expo Line – promotion of economic development, and, consistent with the vision laid out in the LRSP, development of ‘transit-oriented’ housing. Much of this addition is concentrated within the downtown core, which increased its housing stock by 131% (in Census tracts within walking distance, 750m, to the SkyTrain line). Even without the downtown core, the housing stock along the line exceeded the regional average with a 27% increase in the number of private occupied dwellings. From a housing perspective, the addition of occupied private dwellings is an indication that the Expo SkyTrain line has moved towards one of its stated purposes: connecting housing with good transit access.

5.1 Connecting Affordable Housing with the Expo SkyTrain Line

5.1.1. Rental Housing

Any changes in rental housing near Expo SkyTrain stations must be considered in light of the regional re-configuration of the rental housing market. I examined changes in the rental housing stock of census tracts within walking distance to the Expo SkyTrain Line (see Figure 3.3 for a map of these census tracts, and Table 3.1 which lists how the rental housing variable was derived). Using the regional average change in rental housing – a reduction of 9% - as a benchmark, census tracts along the Expo Skytrain line did comparably well for rental housing with an overall increase of 24.7%. Even with the effects of the downtown core taken out of consideration, the rental housing stock along the line increased by 2.1%. This represents a net addition of rental housing in light of the higher-than-average increase in the number of private occupied dwellings.
5.1.2. Profiles of Housing near Expo SkyTrain stations: Implications for Affordable Rental Housing

Although a net increase in the number of dwellings and the proportion of rental housing suggests a positive outcome, dwelling size can undermine the suggestion that the Expo Skytrain line has been associated with affordable family rental housing. Construction of bachelor suites and 1-bedroom apartments offers very little for households with children seeking affordable rental housing. Regionally, there was an average reduction in dwelling size (i.e., number of bedrooms per dwelling) of about 1%, with the construction of multiple-bedroom houses in the suburban municipalities offsetting the construction of smaller units downtown. Within walking distance of the Expo SkyTrain line, however, there was tremendous variation in changes in housing size.

Average dwelling size (number of rooms per dwelling) increased in downtown Vancouver and Surrey between 1991 and 2001. For Surrey, with an average of 5.7 bedrooms per dwelling in 2001, this increase represents the construction of, or the conversion to, larger single-detached houses. The lower-than-average increase in the number of occupied private dwellings reflects this interpretation. The late addition of the SkyTrain extension into Surrey in 1989 may mean that delayed development around stations is missed by the time of the 1991 census. However, with the construction of the Central City Towers in 2003 representing the most significant residential development associated with a Surrey SkyTrain station to date with changes in housing elsewhere along the route showing up only a few years after the Line opened, it is more likely that the suppression of development has more to do with other factors than simply the time-lag associated with the late extension into Surrey.

For the downtown core, dwelling size (number of rooms per dwelling) in 2001 was 3.48, significantly below the regional average of 6.34. The increase over the 1991-2001 decade comes from the net addition of 1-bedroom and 2-bedroom units in the form of condominium and apartment complexes alongside an approximate 16% reduction in
the number of Single Room Accommodation (SRAs) in the downtown core\textsuperscript{41} (City of Vancouver, SRO By-Law).

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<thead>
<tr>
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</tr>
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<td>1.79</td>
</tr>
<tr>
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<tr>
<td>All Expo SkyTrain CTs (minus Downtown Core)</td>
<td>5.02</td>
<td>5.36</td>
<td>-6.34</td>
</tr>
</tbody>
</table>

Table 5.3 Average Dwelling Size (Number of Rooms per Dwelling) for Census Tracts (CTs) within walking distance of an Expo SkyTrain Station, broken down by municipality. (Source: Statistics Canada)

Elsewhere along the Expo Line, however, there was a significant decrease in the average dwelling size, particularly in Vancouver and Burnaby. In Burnaby, zoning changes in Metrotown and Joyce-Collingwood have allowed for the construction of residential towers (with smaller sized suites) next door to the SkyTrain station (Joyce-Collingwood) or within 15 minutes walk of a station (Metrotown, Royal Oak station).

\textsuperscript{41} The City estimates that the number of SRAs remained stable through the early 1990s in the midst of condominium and apartment construction (Punter, 2004), with a 16\% reduction between 1997 and 2005 (City of Vancouver, Community Services, 2005).
Figure 5.1 Apartment and Condominium complexes next to Joyce-Collingwood Expo SkyTrain station (View from station platform). Photo by K.Olson

Figure 5.2 Residential towers within 15-20 walking distance from Skytrain stations in Burnaby (between Patterson and Metrotown stations). Photo by K.Olson.

5.1.3. Housing Precariousness and Low-Income

Unaffordable housing – defined as the proportion of tenant households spending more than 30% of household income on rent – increased by varying degrees along the Expo SkyTrain Line, with increases above the regional average of +19.2% in three areas or municipalities: the downtown core, Burnaby and Surrey.
The downtown core represented the most significant increase in the level\(^2\) of unaffordable housing at 67% between 1991 and 2001, with Burnaby a close second at 44% and Surrey at 29%. It is difficult to establish the nature of unaffordable housing in the downtown core – the increase in the incidence of low-income (at 36%) was slightly less than the regional average increase of 40.6%. With median household incomes well above the regional average, this unaffordable housing may not necessarily represent a high level housing precariousness in the core, but rather a willingness and ability to spend a greater proportion of income in exchange for views, amenities, cachet, and for some, accessibility to white-collar jobs in the CBD. Corroborating this interpretation is Bunting et.al. (2004) who found that the suburban neighbourhoods of the GVRD contain a significantly high number of households experiencing housing affordability stress (low-income households with unaffordable rent).

The dramatic rise of unaffordable housing in Burnaby tells a different story and can most likely be accounted for by the increase in the incidence of low-income in census tracts near the Expo SkyTrain stations. The incidence of low-income increased 111% between 1991 and 2001, while the median household income decreased. These statistics suggest an increase in the level of actual housing precariousness – low-income households living in unaffordable rental units.

For Surrey, the relatively low number of dwellings overall has translated into exaggerated rates of change. A general picture emerges from the statistics in Table 5.1. The reduction in the proportion of rental housing, coupled with a lower-than-average increase in the incidence of low-income and a higher-than-average increase in unaffordable rental housing suggest two trends in the census tracts within walking distance of the Expo SkyTrain stations: (1) development of larger, single-detached, owner-occupied housing, (2) some degree of social polarization, with household

\(^2\) The proportion of tenant households in a census tract spending more than 30% of household income on rent (variables derived from Statistics Canada Census Survey data, see Chapter 3 for explanation of how this variable was derived).
characteristics diverging into one of two categories: renter households struggling to pay rent, and owner households with increased incomes.

Remarkably, unaffordable housing in New Westminster remained unchanged between 1991 and 2001. The number of occupied private dwellings within walking distance of an Expo Skytrain station was (and still is) relatively low, thus percentage changes can appear to exaggerate the level of change in the municipality in Expo line census tracts. Nevertheless, the increase in the number of dwellings and the proportion of tenant households in combination with a lower-than-average increase in the incidence of low-income suggest that the municipality has managed the land use impacts associated with the Expo Skytrain line in a way that has attracted developer (and market) interest. Moreover, this development has unfolded in a manner that aligns with the dual-purpose of the Expo SkyTrain Line: economic development and transit-oriented housing.

Additionally, median household income in New Westminster increased at a faster rate between 1991-2001 than census tracts elsewhere along the Expo line (with the exception of those in the downtown core). Capitalizing on heritage buildings and a view of the Fraser River, New Westminster is setting itself as a satellite version of the 'Vancouver Model' – residential densification, amenity-rich heritage and view-full neighbourhoods, and access to an expensive iconic light rail line.

These profiles of census tracts within walking distance of Expo SkyTrain stations present some dramatically different land use and housing responses to the elevated light rail line. Common to nearly all census tracts within walking distance of a station, however, were above average rates of increases in the number of occupied private dwellings and the proportion of rental housing, both of which suggest a relative ‘successful’ connection over the 1991-2001 decade between (un)affordable housing and well-served transit.

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43 Interestingly, one of the Vancouver Model’s foremost proponents, Lance Berelowitz, now works for the City of New Westminster.
The next section explores another angle to this (dis)connection using quintile analysis.

5.2 Quintile Analysis of Unaffordable Rental Housing: The Connections to Transit

Using a simple spatial analysis (outlined in Chapter 3.4), I examined spatial changes of census tracts characterized by a high proportion of unaffordable rental housing between 1991 and 2001. I used three basic indices of ‘accessibility’ and ‘urban mobility’ – proximity to the downtown core, proximity to a permanent route of well-serviced public transit, and location with the Burrard Peninsula. The rationale behind choosing these 3 spatial indicators of transit service is related to the degree of ‘urban mobility’ represented by each location.

5.2.1. Proximity to the Expo SkyTrain Line

Between 1991 and 2001, census tracts characterized by a high proportion of unaffordable rental housing (‘Highest Quintile’) increased from a total count of 8 in 1991 to 15 in 2001 (out of 37 and 28 total census tracts along the line, respectively). For census tracts characterized by a high proportion of affordable rental housing (‘Lowest Quintile’), the tally of census tracts close to the SkyTrain Line decreased from 4 in 1991, to 3 in 2001. Figure 5.3 shows these census tracts counts along with the total tallies of census tracts along the Expo route.
Figure 5.3 Census Tracts within Walking Distance to the SkyTrain Line: Census Tracts characterized as Affordable Rent (Lowest Quintile), and Unaffordable Rent (Highest Quintile)

The tally of census tracts characterized by a high proportion of (un)affordable rental housing indicates a spatial connection to a regional public transit line. Other dwelling variables, such as size and rental prices of dwellings, however, can lead to spurious conclusions. Average rents in all census tracts within walking distance of an Expo Skytrain station were lower than the regional average (see Table 5.1). In light of the lower median household income and larger average dwelling sizes in those outside the
downtown core, this analysis indicates some degree of spatial connections between precariously housed households and well-served public transit.

5.2.2 Proximity to the Downtown Core

For census tracts characterized by a high proportion of unaffordable rental housing, a greater number of census tracts were closer to the downtown core in 2001 than in 1991. Since the downtown core carries its own independent influence over the rental housing market, this analysis demonstrates that the results in the previous section are determined, in part, by proximity to the downtown core.
Figure 5.4 Census Tracts within Walking Distance to the Downtown Core: Census Tracts characterized as Affordable Rent (Lowest Quintile), and Unaffordable Rent (Highest Quintile)

The clustering of census tracts with unaffordable rental housing in and around the downtown core in 2001 reiterates the high degree of 'unaffordable' rent in the area. For reasons described above, the high proportion of unaffordable rent does not necessarily reflect a high proportion of housing precariousness. For low-income households in these census tracts spending more than 30% of household income on rent, the downtown core itself represents a spatial connection to good transit (see explanation Chapter 3.4.4).
5.2.3. Proximity to the Expo SkyTrain Line and the Downtown Core

Census tracts with a high proportion of unaffordable rental housing were more prevalent near the SkyTrain line and Downtown core in 2001 than in 1991. There are a few possible trends to account for this: (a) the downtown core and skytrain line are considered high amenity areas in which households trade-off housing features for access to the downtown or SkyTrain line, (b) the downtown core and Expo SkyTrain line are low-amenity areas into which lower-income households are pressured to move.

Figure 5.5 Number of Census Tracts within Walking Distance to Expo SkyTrain stations and the Downtown Core: Census Tracts characterized as Affordable Rent (Lowest Quintile), and Unaffordable Rent (Highest Quintile)
Realistically, it is a combination of both trends. The Expo Skytrain Line extends both benefits and externalities to households within walking distance of the Line. On the one hand, it offers the benefit of relatively easy access to the downtown core and other employment centres along the line, like Metrotown (and more recently, Surrey Central). On the other hand, the SkyTrain line is noisy and reduces privacy of households immediately adjacent to the line (SkyTrain Report, 1987). Additionally, the rapid transit line has been associated in the public imagination with crime\(^{44}\). Whether the benefit of proximity to Expo SkyTrain stations outweighs the externalities, or vice versa, depends on individual household circumstances and preferences.

Since no data are available to indicate household location preferences for those already living within walking distance to an Expo SkyTrain station, it is impossible to characterize the ‘clustering’ of census tracts with unaffordable rental housing near the Expo line and the downtown core. Although an early housing preference survey in the GVRD indicated that for first time home buyers, access to transportation or proximity to workplaces/universities/colleges were low on the list of residential location considerations, there is evidence to suggest that housing preferences for low-income tenant households would be dramatically different than for first-time home-buyers. In Vancouver, the Bus Riders Union\(^{45}\) explains that transit-dependent households in the GVRD, comprised primarily of female-headed households (female single-parent), would not likely consider living outside the Burrard Peninsula because the service in the suburban municipalities is not sufficient (or in some places, non-existent) and thus completely impractical for living. Research on commuting patterns has consistently shown that inadequate access to transportation negatively influences employment prospects (Ong and Blumenberg, 1998).

\(^{44}\) The media attention around a 1996 study from Simon Fraser University on the proximity of crimes in the GVRD to Expo Skytrain Line stations helped to instill in the public imagination the notion that the SkyTrain serves to ‘transport the criminal element’. (Letter to the Editor, North Shore News, May 28, 2001).

At the same time, not all households with ‘unaffordable rent’ are necessarily captive transit users, particularly those with higher household incomes (which characterizes many households within the downtown core) – these may be choice transit riders, walkers, bikers, or car users. In describing the ‘New Middle Class’, for instance, Ley (1996) points out that residential preferences for the downtown core have very little to do with access or proximity to workplaces. Additionally, lower-income households elsewhere along the Expo SkyTrain Line may have purchased vehicles to access suburban office parks, suburban manufacturing centres or workplaces in Vancouver (with late-night or over-night shifts).

The quintile analysis and SkyTrain census tract profiles provide a picture of how the light rail line has contributed to mobility and equity of mobility in the region. Conclusions drawn from these analyses in terms of connections and disconnections between housing and transportation, however, are tenuous and contingent upon further study.

5.3 A Re-Configuration of Urban Mobilities

Both the profile analysis and the quintile analysis point to a spatial connection between (un)affordable rental housing and a permanent route of well-served public transit. Although land use impacts varied widely between municipalities (and in the case of Burnaby and Vancouver, between stations), the addition of private occupied dwellings and the increase in the proportion of rented dwellings along the entire line at rates greater than the regional average suggest that the Expo SkyTrain line has contributed to livability and equity of transportation-accessibility.

This is significant in light of the common association between middle-income neighbourhoods and rail (or light rail) transit. This is an association that was epitomized in the 1992 class action suit against the Los Angeles Metropolitan Transit Authority,
which was found guilty by court of law of classist and racist transit planning\textsuperscript{46}. Another example comes from Bangkok, Thailand, where Jenks (2003) found segregated mobility associated with the Bangkok SkyTrain (the same technology used for the Expo Line). He found that the rapid transit line serves middle and upper income individuals and tourists; additionally, he furthers this analysis by linking this widening disparity in the ability to get around the city with globalization. In Vancouver, for the Expo SkyTrain Line to serve lower-income neighbourhoods both prior to and in the years following construction completion, the SkyTrain line presents an uncommon case. In this light, the land use and geographical changes associated with the Expo Line offer credence to Vancouver's oft-cited livability.

Part of this is related to the decrease in relative property values between 1991 and 2001 for dwellings within walking distance of the SkyTrain Line (Buzzelli & Olson, 2006 work in progress). It has been the relative suppression of dwelling values and rental prices that has allowed lower-income households to remain in the neighbourhoods adjacent to the Expo SkyTrain stations. Since one of the expectations of the Expo Line was the catalyzing of development, the suppression of housing prices and the subsequent increase in (un)affordable rental housing near the Expo Line presented a success for one of the goals of the light rail line (promotion of livability) at the expense of the other goal (economic development). Had the hoped-for economic development surrounding SkyTrain stations been built, it is likely that a smaller proportion of housing close to the stations would be affordable, and the spatial connection between (un)affordable housing and access to the line would have been lessened.

For middle and upper-income households in Vancouver, the amelioration of the downtown core and cachet of an 'urban lifestyle' may have trumped the increased accessibility offered along the SkyTrain. For households in the market for home ownership, neighbourhood characteristics and proximity to family and friends are the most significant factors for household residential location preferences for first-time

\textsuperscript{46}Haskell Wexler's (2000) documentary 'Bus Riders Union' highlights the legal struggle between the Los Angeles Bus Riders Union and the Metropolitan Transit Authority.
buyers (GVRD Survey 1994). Although this group of households may locate in the downtown core for reasons other than access and proximity to work/college, transit-dependent households sensitive to good transit access may value proximity to a SkyTrain station. This is one of a number of different explanations for the prevalence of lower-income households near the rapid transit line, and the relative equitability of access to an expensive, well-served route of transit infrastructure that, in other cities, might otherwise serve middle-income neighbourhoods.

Externalities associated with the Expo SkyTrain Line have also lent themselves to this spatial connection between (un)affordable rental housing and a well-served transit route. These include the noise associated with the SkyTrain cars, the loss of privacy for dwellings with windows facing the SkyTrain Line (BC Ombudsman Report, 1989), as well as a public perception of SkyTrain stations as magnets for crime.

Even with the spatial ‘connection’ between unaffordable rental dwellings and access to good transit, the re-configuration of the rental market draws some level of concern. The maps in 4.4.3 (Figures 4.6 and 4.7) suggest that the development of secondary suites in the inner suburbs – the more affordable portion of the rental housing market – have not kept pace with the development of rental housing in Vancouver, nor have they sufficiently met demand as indicated by the increase in unaffordable rent between 1991 and 2001. If transit-dependent households are sensitive to residential proximity to transit and amenity access (as Gibbens & Matchin’s 2005 results suggest), the squeeze on the rental housing market might translate into either higher rental prices closer to the transit line (if the market responds to the variable of accessibility) and/or an

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47 With the Expo SkyTrain Line elevated for large portions of the route, passengers can often peer into apartment windows as the train passes.

48 A 1996 study found that 49% of the region’s crimes took place within 750 m of all Skytrain stations (Buckley, 1996). While the author concluded that the land uses surrounding SkyTrain stations were conducive to crime, the publicity of the study served to further the association between the SkyTrain Line and crime in the public imagination. This fear has recently culminated with the introduction of ‘SkyTrain Police’: armed officers with the powers to pursue and arrest off SkyTrain property.
increase in the incidence of households with true housing precariousness (low-income households with unaffordable rent).

The statistics in Table 5.1 point towards the interpretation that the squeeze on the rental market has affected housing near SkyTrain stations, albeit inconclusively. Average rent for dwellings along the Expo Line (minus the downtown core) are consistently lower than the regional average. Additionally, the incidences of low-income households were also above the regional average both in 1991 and in 2001. In other words, it appears that households were struggling to pay for what was already cheaper-than-average rent. It is impossible from data presented here to determine whether lower-income transit-captive households have traded-in access to the SkyTrain line for increased housing precariousness, or whether the SkyTrain line has successfully provided precariously housed households with a well-served light rail line. Additionally, there is no information on whether residents who live within walking distance to the Expo line actually use public transit (or the line). For Burnaby, the 111% increase in the incidence of low-income indicates that there had been some degree of pressure on lower-income households to locate near SkyTrain stations in Burnaby. The alternate explanation is that households near the SkyTrain line in Burnaby experienced, in significant numbers, systematic decreases in household income. The first explanation, in consideration of other externalities associated with the SkyTrain line (such as the noise and perception of ‘SkyTrain crime’), seems more plausible.

The deconcentration of low-income households is a concern to the extent that it is indicative of pressure for low-income households to locate peripherally. Anecdotally, transit-captive households in the GVRD have re-located to more suburban neighbourhoods, only to move back to the Burrard Peninsula after realizing both the economic and time costs associated with suburban transit service (BRU, 2005). The deconcentration of low-income households corroborates the interpretation that low-

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49 Transit fares are determined by ‘Transit Zone’, with the outer-lying areas of the GVRD associated with higher transit fares than trips contained in the urban core.

income households along the Expo SkyTrain route value the transit service associated with the Expo SkyTrain Line. It is, however, a tenuous conclusion to draw – the ‘deconcentration of low-income households’ outlined in 4.4.c. is more indicative of a trend and does not offer any sense of the magnitude with which this ‘deconcentration’ may be occurring.

Poor transit infrastructure and lack of physical access to the city in the suburbs, compounded by high unemployment rates, factored into the social exclusion in Paris’s banlieues51. The Paris example represents an extreme and palpable case of social exclusion when greater value is placed on a livable urban core at the expense of surrounding suburbs. Research from the UK (Lukas, 2004) has shown that lower-income households without access to a car or adequate transit service (i.e. both spatial and economic disconnection to transportation) experience some degree of social exclusion. For example, 40% of transit-dependent job-seekers indicated that lack of transport was a barrier to getting a job. Additionally, 18% found seeing family/friends difficult due to transport problems (vs. 8% of those with cars), and over a 12-month period, 1.4 million people missed, turned down or chose not to seek medical help because of transportation problems.

There is evidence to suggest that social exclusion reinforced through land use and transportation planning may be an issue that extends beyond the documented cases in the Europe. In Vancouver, one of the respondents from the BRU study remarked, “It is not good for my kids if I tell [them] that they can’t go anywhere because I can’t afford to pay the bus fare”. Another respondent explains, “There are no late night buses from downtown to Burnaby, especially on the weekends. Many people go out and have no possibility to get home. It especially affects women.” (Respondent #21). Underlying

51 A documentary by Patric Jean (released in 2003) ‘La Raison du Plus Fort’, explores the dynamics and causes of social exclusion in Paris’s suburbs, the same suburbs where race riots erupted the year following the documentary’s release. One of the interviewees in the documentary remarked that the banlieue was isolating because of the lack of public transit, employment and ‘things to do’. The neighbourhood, he explained, was thus isolating, boring and carried a strong sense of being excluded from the rest of Paris.
these statements is the theme of social exclusion facilitated through transportation planning.

Suburbanization of employment opportunities, one of the ‘disassociated’ outcomes of the Vancouver Model, clearly presents an accessibility issue for transit-dependent households seeking employment\textsuperscript{52}, thus undermining the connection between (un)affordable rental housing along the ESTL with good public transit. The low density of these office parks makes transit service to these places – when it is supplied – inefficient to the point of unserviceable.

Additionally, diverting transit operation services (and budgeting) to service the region’s light rail line and feeder\textsuperscript{53} bus routes places further constraints on the Greater Vancouver Transit Authority’s ability to provide bus service hours to the rest of the region. The Expo SkyTrain Line directly uses 13.2\% of TransLink’s operating budget (Translink Annual Report, 2005), but this does not include the ‘feeder’ bus routes diverted to serve the Expo Line. This arrangement provides good transit access near a station in exchange for a longer transit commute for households on the feeder routes. When the Expo SkyTrain Line opened, households along feeder routes indicated that their ‘accessibility’ had decreased as a result of the transit line.

To see how bus service operated in south east Surrey, I took the #590 bus during one of its weekday afternoon runs. This is not a feeder route, but it does provide basic level service to an office/industrial part of the municipality. A trip that would take approximately 10 minutes by car took 45-50 minutes on the bus as it wove back and forth through southeast Surrey picking up passengers. Suburbanization of employment

\textsuperscript{52} Employers in these suburban office parks are now concerned about a lack of access to the region’s labour market, and a number are now working with TransLink to determine workable transit options.

\textsuperscript{53} These are bus routes that serve to ‘feed into’ the Expo SkyTrain Line. Feeder routes serve to boost ridership along the line. While they boost ridership on the ESTL, they improve access and mobility for some, and decrease such for others depending on household location in relation to the feeder route.
opportunities re-configures the geography of urban mobility, while constraining the Expo SkyTrain Line's effectiveness in bridging (un)affordable rental housing with good transit access.

These 'disconnections' do not necessarily represent confirmation of the 'spatial mismatch' hypothesis proposed 40 years ago (Kain, 1968). First, Kain's analysis was premised on inner-city racial segregation, a premise that holds tenuously-at-best for Vancouver today (Bauder & Sharpe 2002, Ray et. al. 1997, Driedger 1999). Secondly, spatial mismatch underscores the differences in locations of (lower-income) housing and employment opportunities in addition to transportation options, a feature that only partially applies to Vancouver. Deconcentration of low-income households (Chapter 4.4.d.), particularly census tracts in the suburban municipalities with higher-than-average incidences of low-income, removes the spatial (or location) differences between housing and employment opportunities in the GVRD. The municipalities of Surrey and Langley, for example, have census tracts characterized by a high incidence of low-income, and it is in these municipalities that many suburban office parks are locating.

But this 'co-location' of (un)affordable housing with suburban office park employment has not removed the transportation disconnection. Some office parks are now looking at transportation and transit options, recognizing that their inaccessible location has reduced their labour market pool. This points toward the impracticality of reaching these places without a vehicle and renders the 'co-location' theory of planning (Cervero 1989) untenable in the suburban office-park context. Co-location in other cities has not been found to reduce commuting distances or influence commuting patterns (Cervero 1995). Spatial mismatch as an explanatory theory for the housing-transportation-employment opportunity disconnections does not fit for the Vancouver case.
5.4 SkyTrain in Vancouver: A Model of Mobility?

Evidence from this project points toward the ability of rail lines (over other modes of transit service) to facilitate and contribute to regional livability as context-dependent. ‘Context’ must be understood as operating on two distinct levels – the broader economic, political and socio-cultural climates that go into producing urban and suburban forms, and the physical land use changes and impacts of planning policies (transportation and otherwise). For Vancouver, the broader economic and political context (in which I include ‘governance structure’) is a tension between a livability-oriented ethos and a desire, particularly in the early 1980s, to stimulate and attract economic growth. On the ground, this tension translates into physical impacts on housing, rental housing, employment opportunities, commercial hubs and transportation infrastructure. One outcome stemming from this bi-layered context is a re-configuration of urban mobilities; for the Expo SkyTrain Line, this means a complex and highly context-dependent contribution to urban mobility in the GVRD.

The land use and geographical changes associated with the Expo SkyTrain Line (ESTL) in the GVRD have shaped mobility and livability to an equal, if not greater, extent than the line itself: Housing development in the 15 years following the opening of the ESTL has been catalyzed at a marginally greater rate than the regional average, with greater than average increases in rental dwellings. While this, in light of the ESTL’s ridership having recently reached capacity, would signal a bridging of (un)affordable rental housing with some level of affordable and convenient rapid transit, the urbanizing of residential locations and suburbanizing of commercial and employment opportunities (into areas that are difficult to serve by public transit) severely limit the ESTL’s contribution to regional mobility. If, for example, the downtown core had remained the sole employment and commercial hub in the region, the ESTL’s contribution to mobility and livability would have been significantly different (although perhaps no less complex). For these reasons, context has had a greater influence in shaping the ESTL’s contribution to mobility and livability in the region.
To begin with, the ESTL itself was borne out of a tension between livability and economic development. When discussions of the rapid transit line had begun in the 1970s during a time of worsening traffic congestion, 'accessibility' and 'livability' were the key terms under which the route had been designed and planned. By 1981, economic recession, political calls for an 'executive city', and the city's successful bid to host the World's Exposition 1986 (whose theme was transportation), had combined to supplant 'regional mobility' as the transit route's primary objective with a post-hoc focus on 'catalyzing development'. This subtle re-ordering of the route's objectives carried significant implications for the mode and technology of the line, the effects of which would carry through to the operations, budgeting, service hours and routing for the rest of the regional transit system. The ESTL, like its contribution to mobility in the GVRD, was a product of the context in which it was borne.

This broader contextual tension itself carries a re-configuring force that has altered mobility in the GVRD. For mobility and accessibility, the push for 'livability' has centred on the creation of regional town centres so as to reduce commuting distances and traffic demands on the city's transportation infrastructure (as outlined in the LRSP). On the transportation planning side, bus service has consistently been ranked as a top priority for transit. Yet stimulating economic growth within the widely differing contexts and challenges of the 21 municipalities in the GVRD has meant deviating from the LRSP goal of creating vibrant regional town centres, focusing instead on suburban and ex-urban industrial office parks. It had also meant, in 1981, construction of the ESTL at partial expense to the bus network. With 50% of the region's new jobs locating distal in the city-region in areas particularly difficult to serve by public transit, mobility and accessibility in the GVRD are significantly altered in a way that undermines the city-region's claim as 'transit-oriented'.

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54 C.f. Siemiatycki, 2007 Tunnel Vision (forthcoming from UBC Press). The author uncovers some of the politics behind the (Provincial government) decision to construct the Canada Line despite local stated priorities for improved bus service.

55 Again, this 'expense' comes from the re-routing of bus routes and re-directing or reduction in bus service hours to go towards the SkyTrain. Capital costs associated with the ESTL were paid for primarily by the Federal and Provincial governments.
As a result, the Expo Skytrain Line’s contribution to regional mobility becomes muted. Even with its (growing) connection to rental housing and to census tracts characterized by high proportions of unaffordable rental housing and higher-than-average incidences of low-income, mobility in the GVRD is more widely governed by the land use impacts of the region’s post-industrialization. Larry Beasley\textsuperscript{56} commented that transportation planning is a ‘red herring’, implying that land use planning is much more important for livability. While results from this project support Beasley’s comment, the ESTL’s ‘contribution’ to mobility may come more indirectly in the re-routing and reduction of service hours in the rest of the transit system. This would carry much more important implications for the equity of mobility and access.

Thus, the degree to which other aspects of the regional transit are re-routed or reduced in service-hours is the degree to which both housing and endpoint destinations (or employment opportunities) must (or should) locate along the route in order to make a solid case that the ESTL has contributed to equitable mobility and livability in the region. While the downtown core still presents itself as a major employment hub, Metrotown (in Burnaby) has been the only station to significantly develop as a commercial (and employment) centre. The unevenness of not only the housing-transportation connection, but also that of employment opportunities along the line complicates any contribution to equitable mobility and livability.

In accessibility studies that focus on trip-destinations, employment hubs are often viewed as equal-opportunity employment prospects and in reality this is often not the case. The topography of employment opportunity differs dramatically for white- and blue-collar (or pink collar – England, 1993) work. Thus, a well-served rail line that leads to, for example, the Central Business District, offers greater benefit to a subgroup of the labour pool; namely, white-collar workers. Such was found in San Francisco for the Bay Area Rapid Transit (BART) line. In this case, white-collar workers who worked in the CBD had located near a BART station and took transit to work. Lower-income

\textsuperscript{56} “Looking Back, Looking Forward”. Public talk with Larry Beasley, Anne McAfee and Bruce Maitland. Simon Fraser University Harbour Centre, July 12, 2006.
households 3 miles away from BART stations, however, used vehicles to get to work in places located away from any public transit. The BART example exemplifies a disparity in the housing-transportation connection.

Additionally, this inserts another context-dependency into the ESTL's contribution to regional mobility and livability, one that is related to the scale of observation. Because the line has now met ridership expectations in addition to its sleek innovative image, the ESTL lends itself well as an icon of livability. Within walking distance to an Expo SkyTrain station, the Expo Line exemplifies tenets of the LRSP and offers credence to its iconic stature. On a broader scale, with employment opportunities moving away from the urban core and away from transit access, with the re-routing and re-directing of the operations budget, the livability offered by this piece of the 'Vancouver Model' is limited.

This analysis does not necessarily lend itself to the suggestion that local particularities will confound attempts to predict contributions to livability of rapid transit lines like the Expo SkyTrain line. Sensitivity to the interaction between these two contextual levels can facilitate greater policy insights into the livability-oriented outcomes of major transportation projects. The route, infrastructure and decision to build Vancouver's latest light rail project, the Canada Line, for example, was an outcome of 'path-dependent' policy-making situated in a neo-liberal climate (Siemiatycki, 2005). In this case, the local historical context played a crucial role in laying out the financing, routing, technology and construction method of the line. The regime under which these decisions were made will likely influence some of the land use and geographical impacts that will be associated with the new rapid transit line. For example, the current provincial government – which had also pushed for the Canada Line - is now poised to direct $3 billion towards the controversial expansion of highways and bridges in the GVRD, a project that will considerably undermine the Canada Line's ability to connect affordable housing and employment opportunities.
5.5 Conclusion

Land use impacts along the Expo SkyTrain route vary by municipality and by station. Overall, there was a greater-than-average increase in the number of occupied private dwellings and the proportion of rental housing. For Downtown Vancouver and New Westminster, the most distinct changes were the rate at which residential development increased as well as a rise in median household income. For Burnaby and Surrey, land use impacts were less dramatic and were associated with increases in the incidences of low-income and housing precariousness.

Between 1991 and 2001, the number of census tracts characterized by having a high percentage of unaffordable rental housing increased along the Expo route. At the same time, census tracts characterized by having a high percentage of affordable rental housing decreased along the route. While this analysis offers no indication of the absolute changes of affordable and unaffordable rental housing near the rapid transit line, it indicates that between 1991 and 2001, there was some degree of increase in the connection between unaffordable rental housing (and low-income households) and access to public transit. This presents an uncommon outcome for rapid rail transit in the North American context.

At the same time, this increasing ‘connection’ between the well-served SkyTrain Line and tenant households spending more than 30% income on rent has been offset by one of the ‘associated changes’ of the Vancouver Model – suburbanization of employment opportunities. This leaves the success of the SkyTrain line as a model of mobility within Vancouver highly contingent on both scale and the broader implications and outcomes of the Vancouver Model itself.

Connecting households and endpoint destinations is, as the Expo SkyTrain demonstrates, an outcome of much more than transportation planning. Changes in accessibility – as those that might be associated with construction of a rapid transit line – are also a function of changes in household socio-economics and ability to afford a car
(or cars), changes in both the topography of employment opportunities and location of affordable housing. For Vancouver, these changes (described in Chapter 4) considerably limit the notion of light rail being a key component of equitable and livability-centred city-planning.

As a result, evaluating the accessibility outcomes of light rail is context-dependent on a few different levels: the scale of observation, the land use impacts of transportation planning, and the wider political, economic, social and cultural forces that influence land uses, land use arrangement, transportation infrastructure and transit modes. Examining the Expo SkyTrain line within these contexts shows that (a) the ways in which rapid transit has altered the geography of urban mobility is complex, (b) is dependent upon the context out which it was borne and (c) contingent on regional urban changes in the other variables of accessibility – affordable housing, rental housing (and size of rental units), types and locations of employment opportunities.
6. CONCLUSION

This project highlights changes associated with Vancouver’s 20-year-old rapid transit line, and situates them within a regional context to critique how rapid transit has thus far contributed to ‘livability’ in Vancouver. I employed a regional and context-based methodology to evaluate the Expo SkyTrain Line. This approach provided insight into how broader forces of urban change, such as post-industrialization, are shaping geographies of urban mobility in Vancouver and how the Expo Skytrain Line fits into these changes.

This chapter addresses the conclusions of this study, limitations of the analysis, and direction for future research, respectively.

6.1 Research Conclusions and Implications

Results from this project manifest on two different scales, the local land use and socio-economic changes associated with the Expo Skytrain Line between 1991 and 2001, and the broader context of these changes. I will briefly review these results on their respective scales, and then draw implications for the Expo SkyTrain Line.

First, on the local scale of the Expo SkyTrain, land use impacts between 1991 and 2001 showed both an increase in the supply of housing stock (44%), as well as the percentage of rental housing (25%) – both of which indicate positive outcomes associated with the Expo Line. Changes in the incidence of low-income households (within walking distance of the Expo Line) varied by municipality, as did the incidence of tenant households with unaffordable rent. Additionally, census tracts characterized by high percentages of tenant households spending more than 30% income on rent increased in number along the Expo route between 1991 and 2001. Conversely, the number of census tracts with a high percentage of tenant households with affordable rent decreased.
In light of the overall regional increase in housing stress (+19%) and incidence of low-income households (+19.6%), as well as a decrease in the proportion of rented dwellings in the GVRD (-9%), these changes along the Skytrain route indicate that the rapid transit line has provided some degree of equitable transit service and mobility. Alternatively or additionally, externalities associated with the transit line may have effectively created a ‘push’-factor for lower-income households to locate close to an Expo SkyTrain station. If tenant-households with unaffordable rent can benefit most by spatial access to good public transit, thereby reducing the combined household housing-transportation costs, the Expo SkyTrain line presents at first glance a ‘good news’.

But these changes are linked to a wider story of urban transformation, one that gives pause to Vancouver’s stature as a paradigm of good planning. Premising both the increased connection between rapid transit and (un)affordable housing, and the celebrated components of Vancouver’s ‘livability’ has been, among myriad factors, the city’s post-industrialization. It is this, in combination with a set of local factors (history, key actors, geography, cultural preferences, etc.) that has allowed condominium towers to proliferate in the core and urban amenities to be leveraged from large-scale developers. Tied to these changes, however, have been significant changes in the supply and distribution of rental housing, deconcentration of low-income households, and suburbanization of employment opportunities. By re-configuring the geography of trip-origins and trip-destinations, urban changes in Vancouver – both the celebrated ones comprising the Vancouver Model as well as the less recognized changes – are subsequently altering the geography of mobility and accessibility in the GVRD.

Recognizing the ways that broader forces of urban change are altering mobility and access is important to developing responsive policies that address housing and transportation in an integrated manner. The Expo Skytrain line was a step towards this integration. The Collingwood neighbourhood, for example, developed significantly in response to the Joyce-Collingwood station on the Expo Line. With increased housing stock, increased rental housing stock, and affordable housing, alongside amenities such as parks and a community centre, the neighbourhood epitomizes numerous goals for the
Expo Line: economic development, transit-oriented neighbourhoods, increased housing stock and increased percentage of affordable housing (Sandercock and Attili, 2005).

Again, however, the overall regional context of change in the GVRD muted some of these contributions. What does access to a well-served transit line mean when endpoint destinations elsewhere in the municipality or region do not have fully developed transit service? The transit modal split in Vancouver is low compared with other major Canadian cities suggesting that transit service beyond the Skytrain lines is relatively poor\(^1\). Yet it is a well-integrated network blanketing the city-region that lends itself to a good transit service (Mees, 2000), not just a single piece of infrastructure. Subsequently, integrating housing and transit in one part of the system such as the Expo route may offer limited benefit.

The Expo SkyTrain Line presents a unique – and complex – case. Compared with rapid transit lines elsewhere in North America, the Expo Line is to some extent inclusive – its route passes through a number of census tracts with higher than average incidences of low-income and households experiencing unaffordable rent. On the other hand, this inclusivity has been, perhaps, an unintended outcome. Externalities associated with the Expo Line have outweighed the potential for economic development near some stations, an equation that differs by municipal-level policies and economic contexts. Thus, these municipal-level differences play a role in determining which outcome is more emphasized – inclusivity or economic development.

What do these conclusions mean for rapid light rail in Vancouver? What lessons can be learned from case of the Expo SkyTrain Line? First, the economic context in which large-scale transit projects are constructed is tremendously important for the mode and operational expenses of the line and the land use development responses surrounding stations. Secondly, and subsequently, trends and changes in the distribution of affordable

\(^1\) Note that the Skytrain was extended in 2001 with the opening of the Millennium Line, and will expand further (and farther) with the addition of the Canada Line in 2009. This study, however, was based on data between 1991 and 2001, before the addition of these two extensions.
housing need to be considered if the rapid transit line is intended to exemplify equity and livability. Third, housing and development responses to rapid light rail lines hinge (in addition to economic factors) on externalities associated with the line and municipal-level policy and zoning. Fourth, sensitivity to location-shifts in employment opportunities is crucial to future use and equity associated with the rapid transit line, albeit difficult to predict.

Overall, the implications of these conclusions are three-fold: first, if the social purpose of public transit is to be maintained, the specific mode of rapid transit must be considered. With an evolving regional context, the mobility/access and equity outcomes of a permanent route of transit infrastructure may come about unintentionally. In the Expo Line’s case, the increase in low-income households and (un)affordable housing near stations was largely facilitated through externalities associated with the line alongside an abundance of residential housing in the downtown core. The noise, loss of privacy and the perception of increased opportunities were likely factors that influenced the housing prices – and rents – of dwellings near Expo stations. Additionally, the evolving regional context of not only housing distribution but also employment distribution means that equitable and efficient transit may need some degree of flexibility in order to maintain proper service across the network. If the expo Line, for example, were consuming a disproportionate amount of the transit service budget at the expense of other routes and components of the transit network, the contribution to ‘livability’ may need to be re-thought. Third, conclusions from this project suggest that there are disparities in the ability to move around the region and that this disparity is changing – for whom and by degree. The local Bus Riders Union maintains that transit planning in Vancouver, and in particular the decision to invest in light rail transit, diverges from the best interests of lower-income transit dependent households. The clustering of lower-income census tracts with unaffordable housing near Expo SkyTrain stations suggest that the geography of access and mobility in the region is being altered, but with the suburbanization of employment opportunities, there is not yet enough research to draw any definitive conclusions about transit planning in Vancouver.
One of the important lessons of the Expo SkyTrain line is precisely how broader contextual factors – urban transformation, economic re-structuring and local governance, to name a few – can direct outcomes associated with the line. Livability, ridership and development responses stem from a wide variety of regional factors that may have very much, or very little, to do with the transit line itself. Evidence from the Expo SkyTrain Line thus presents a strong case for a regional level strategy that considers both land uses and transportation projects.

Vancouver does have a regional transportation and land use strategy, the Livable Region Strategic Plan (LRSP), however, the LRSP is a vague and non-binding document. Tenets of the LRSP are often trumped when municipalities in the GVRD compete for land use development. Even with a regional transportation strategy in place, and with a strong transit link connecting some of the municipalities (as the Expo SkyTrain does), travel patterns and accessibility are still much more broadly influenced by the geography of trip origins (residential locations) and trip destinations (places of work, services, activities, etc.).

The other important lesson from the case of Vancouver and the Expo SkyTrain line has to do with the specific objectives of building large-scale transit infrastructure. Large-scale and expensive transit projects, including the Expo Line, are built under two general goals: to catalyze economic development, and to move people (a goal variously described as promoting livability, reducing traffic congestion, etc.). These two goals may not necessarily be mutually compatible. Emphasizing either economic development or the movement of people can tremendously influence the technology, costs and outcomes of transit projects. In the case of the Expo SkyTrain line, there was considerable expectation that the project would spur economic development (SkyTrain Report, 1989). In drawing tremendous financial resources from the rest of the transit system, the movement of people in the rest of the region, such as those needing to travel to business and industrial parks in the outer suburbs, is reduced. Thus, expectations and objectives of transportation projects need to be carefully considered, and need to be considered within the context of the regional change.
6.2 Limitations and Future Research

This project presents more questions than answers. There is much potential for research into the degree to which changes in mobility are taking place or the 'axis of difference' along which disparity in mobility is being stretched. Limitations of this study also include issues with data and scale. For example, more recent data aggregated at smaller scale (through surveys or through Public Use Micro Data) would offer a clearer picture of who has been using the Expo SkyTrain and how different households and transit users value the rapid transit line.

For magnitude of change, I could only uncover the direction of change between 1991 and 2001, and even then, these changes were not indicative of anything that may have happened in the years in-between. The real estate market, for example, experienced a downturn in 1996 with a strong recovery in time for the 2001 census. This downturn could have affected both the supply and distribution of affordable rental housing. Indeed, some researchers have found that the timing of the analysis may play an important role (Giuliano, 1989; Landis et al., 1995). A more data-intensive study might help answer some of these questions.

Resource-intensive research, such as surveys, would be suitable for future research, and would help to tease out some of the underlying questions in this project: is spatial access to good transit such as the Expo Line a priority for low-income households and does this play a role in residential location decisions? How often have members of a household turned down a job prospect or have turned down opportunities to visit friends/family or participate in a community event because of inadequate transportation?

This research may not completely answer specific questions about the modes of transit most suitable for the myriad objectives of major transportation projects: livability, economic development, mobility, etc. In conducting research for this project, a few imperatives surfaced: the need for adequate benchmarks for mobility and access and the
need to re-examine the priorities of public transit and how these priorities subsequently influence the ability to get around the city, and for whom.

Lastly, it has been 20 years since the Expo SkyTrain Line began operation, enough time for land use impacts to develop and influence the surrounding social ecology. The GVRD, however, is still undergoing rapid change and may, in fact, still be in the midst of its ‘instant urbanism’. The longer-term impacts and changes associated with the Expo Line alongside the short and longer-term impacts associated with the recently-completely Millennium Line (2002) and the soon-to-be completed Canada Line (scheduled for operation in 2009) have yet to be observed. Research from this project suggests that these impacts will largely be determined by trends in the downtown core and suburbs, interactions between the two, and the mediating economic and political contexts.
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