

**THE CONSCIOUS CITY I:
TRAFFIC CONGESTION AND CHANGE TOWARD
SUSTAINABILITY IN GREATER VANCOUVER**

by

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ABSTRACT

Using collaborative, grounded theory research, this study explores the relationship between traffic congestion and change toward sustainability in Greater Vancouver.

The paper draws on document analysis and nineteen elite interviews to assess how traffic congestion has served as a catalyst for change through the development of a social consciousness of sustainability.

The research finds that traffic congestion can be a powerful force for change. However, the nature of this change is subject to the two distinct and incompatible mental models that shape perspectives and behaviour in the region. The models break down mainly along urban and suburban boundaries, creating a major split in the region and significant variation in social consciousness.

The paper concludes that future development in the region—and ultimately progress toward sustainability—will depend on the mental model of the dominant actors. Future research is needed to determine the applicability of the research to other metropolitan regions.

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1.0 Introduction

This paper provides an examination of the relationship between traffic congestion and social change in the Greater Vancouver region. More specifically, the paper explores how traffic congestion has served as a catalyst for change toward sustainability in the region. The study is qualitative, and is based on a mixed-method, collaborative approach to research.

The paper is organized into five chapters. Chapter one provides a background to the study, describes the rationale and purpose for the research, and explains the Greater Vancouver context. Chapter two provides a review of the relevant literature, chapter three explains the study's methodological approach, and chapter four presents the findings of the research. The final chapter includes the conclusions of the study, a comment on the limitations of the research, and a discussion of possible directions for future research.

1.1 **BACKGROUND: THE GROWING ECONOMIC AND POLITICAL IMPACT OF TRAFFIC CONGESTION**

In recent years, traffic congestion has emerged as one of the single biggest challenges facing cities across North America. Modern social and economic structures, shaped by generations of auto-oriented urban development and rapid growth in vehicle ownership, have established congestion as an inescapable reality of urban life. The growing impact of congestion on quality of life, livability, and economic development is playing an important role in public discourse about cities, and is increasingly reflected in popular media coverage.

Traffic congestion is unique among problems associated with urban development. Other significant urban social problems, such as homelessness and drug addiction, do not

affect such a broad spectrum of citizens as does congestion. Given its ongoing, pervasive impact on urban residents, traffic congestion—both real and perceived—is an important political issue in many cities (Gordon 2007; Sandalck and Dewalt 2007; Jonas 2006). As such, traffic congestion has the potential to be an important catalyst for change, and may have a role to play in the evolution of public discourse on sustainability, specifically regarding how we build our cities and organize our lives within them.

1.2 PROJECT RATIONALE, KEY TERMS, AND RESEARCH QUESTIONS

The International Centre for Sustainable Cities defines a sustainable city as one that “enhances and integrates the economic, social, cultural and environmental well being of current and future generations” (ICSC 2006). Traditional social norms in North America place an overarching emphasis on individual rights, accountability, and consumption; shifting these social norms to help achieve change toward sustainability will require the development of a collective will to approach the management of social, environmental, and economic resources with a global sensibility. Such a change will require a commitment to engage in processes that enable shared values and further a common purpose. This commitment has been characterized as a *social consciousness of sustainability*,¹ defined for the purposes of this research as a collective sense of, and responsiveness to, challenges and obligations associated with sustainability, independent of formal government, business and professional institutions (with Holt 2007). Social consciousness therefore, is an integral part of a sustainable city.

This paper proposes that traffic congestion has contributed significantly to a social consciousness that supports the principles of sustainability in the region, and explores

¹ Although the concept of social consciousness could be used to assess a wide range of trends, this research uses the term ‘social consciousness’ to refer exclusively to ‘social consciousness of sustainability’, as per the definition above.

this relationship through the following research question: *has traffic congestion served as a catalyst for change toward sustainability in Greater Vancouver?*

During the course of the research, three sub-questions were also considered. The sub-questions are intended to create a structure from which to base the analysis, and to help categorize the key concepts at work in the research. The first sub-question deals with congestion and individual behaviour: *how does traffic congestion influence individual behaviour in the region?* Sub-question two addresses congestion in terms of collective discourse and public priorities: *how does traffic congestion influence public debate and transportation priorities in the region?* Finally, sub-question three deals specifically with the concept of social consciousness: *has the influence of traffic congestion on public debate and regional transportation priorities contributed to an underlying social consciousness in the region that supports the principles of sustainability?*

In a companion paper to *The Conscious City I*, entitled *The Conscious City II: Traffic Congestion and the Tipping Point in Greater Vancouver*, Rebecca Holt uses a model adapted from Malcolm Gladwell's *Tipping Point* framework to explore how traffic congestion can foster change toward sustainability by mobilizing social consciousness. Holt's research is rooted in an attempt to assess the applicability of the *Tipping Point* framework to sustainability research in the urban context, and to determine if there is power in this mainstream framework to trigger positive change toward sustainability.

1.3 RESEARCH PURPOSE: TRAFFIC CONGESTION AND CHANGE TOWARD SUSTAINABILITY

The issue of traffic congestion has been the subject of a great deal of study in recent years. However, congestion research, like transportation research more broadly, has traditionally been quantitative in nature, and dominated by applied research and engineering-based approaches. In this context, the economic costs of congestion have

been well documented and strategies for congestion mitigation have received considerable attention. However, comparatively little work has been done on the social and behavioural implications of congestion. Moreover, very little work has been completed that seeks to understand the role of congestion in terms of sustainable cities.

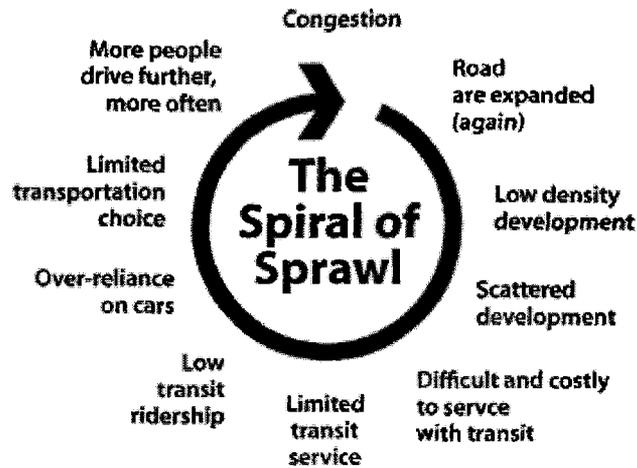
By its very nature, sustainability research requires an effective understanding and consideration of social and behavioural norms. This is especially true in the field of sustainable transportation. In their recent work on transport and social change, Black and Nijkamp make the case for interdisciplinary research that “highlights the contribution of the social, economic, and behavioral sciences to the theoretical and methodological development of research in the transport field” (2002). In this vein, this project explores the relationship between traffic congestion and change toward sustainability.

As part of this research, it is important to recognize and address the counterpoint to the main research question. That is, simply, that traffic congestion does not bring about change toward sustainability. Indeed, the term ‘sustainable city’ does not generally bring to mind traffic congestion, and it seems counter-intuitive to conceive of one of urban society’s biggest problems as a potential catalyst for change toward sustainability.

Admittedly, there is much more familiarity with the traditional transportation planning paradigm, in which congestion is viewed as a supply ‘problem’ with a technical ‘solution’. As illustrated by Figure 1, congestion is traditionally addressed through capacity expansion, which leads to additional low-density development, limiting the effectiveness of transit and the attractiveness of other transportation alternatives. This approach ultimately leads to an auto-dependent transportation system in which travel distance and frequency increases, eventually leading to more congestion. In this context, traffic

congestion feeds the 'spiral of sprawl', and reinforces and expands the auto-oriented status quo.

Figure 1: The Spiral of Sprawl



(City of Burnaby 2006)

This paper explores the potential for traffic congestion to break the 'spiral of sprawl', and challenge the outcome of the traditional transport planning paradigm by acting as a catalyst for change toward sustainability.

1.4 THE GREATER VANCOUVER CONTEXT

There are a number of factors that make the Greater Vancouver region well suited to study traffic congestion as it relates to change toward sustainability. First and foremost, transportation in general, and traffic congestion in particular, are of critical importance to residents of the region; transportation and traffic congestion are the focus of much public debate and dialogue. Second, both the Greater Vancouver Regional District and the City of Vancouver are widely recognized for their progressive planning efforts, including the pursuit of a balanced transportation system and the integration of land use and

transportation planning. Finally, Greater Vancouver has a reputation for its social consciousness and leadership on sustainability issues, illustrated by achievement in a number of key areas.

1.4.1 Traffic congestion: an important regional issue

Traffic congestion is a very topical issue for Greater Vancouver. The region's transportation debate, of which congestion is a core element, is a divisive one. It has pitted driver against bus rider, homeowner against apartment dweller, and suburbanite against urban resident. Indeed, the provincial government's proposal to invest \$3 billion dollars in a new Fraser River crossing and several other regional highway projects (BC Ministry of Transportation 2007) has galvanized the public, fueling the ongoing debate over traffic congestion and transportation planning in the region (Nagel 2006; Boei and Scott 2006). The project is intended to 'address congestion' in the Highway 1 corridor, specifically on the Port Mann Bridge, which is the most congested bottleneck in the region. The bridge serves 65 percent more traffic now than in 1985, an increase of more than 50,000 vehicles on a given day (BC Ministry of Transportation 2007)

Known as the Gateway Program, the project is an initiative of the provincial government, and has the support of local industry and trade associations. However, the regional government, the Greater Vancouver Regional District (GVRD), has publicly opposed the highway expansion, largely because it is inconsistent with its long-standing growth management strategy, the Livable Region Strategic Plan (LRSP). While public opinion on the project is divided, the current debate seems to suggest a growing recognition that traditional approaches to transportation planning are not sustainable (Simpson 2006; Kennedy 2006). More specifically, the debate points to increasing levels of discomfort with the project among residents and elected officials in the region's higher density

urban core, including the cities of Vancouver, North Vancouver, Burnaby and New Westminister (Boei 2005; Bula 2006; GVRD, September 22, 2006).

The built form of Greater Vancouver is inseparable from its natural setting, and the region is best understood in this context. Outward growth is limited by the Pacific Ocean to the West, the Coast Mountains to the North and East, and the United States border to the South. As a result, development is more concentrated in Greater Vancouver than in most North American cities. While the region's higher than average density levels support good transit infrastructure, the pattern of urbanization in the region presents a challenge for transportation planners. The urban core is at the western edge of the metropolitan area, rather than the centre, and the bulk of the region's development has occurred in a linear form, rather than a radial one (Berelowitz 2005).

The Fraser River delta, Burrard Inlet, and False Creek further complicate urban development and transportation infrastructure: travel across the region (and in some cases, travel through a single municipality), often requires the use of a bridge, tunnel, or ferry. The provincially legislated Agricultural Land Reserve plays a very significant role in shaping development in the region, and essentially acts as urban growth boundary. Finally, at a macro level, Vancouver's role as Canada's primary west coast port increases the importance, pressure and need for transportation infrastructure in the region.

1.4.2 The livability agenda: progressive planning in the Vancouver region

The road building approach of the current provincial government, as illustrated by the proposed Gateway Program, contrasts sharply with the 'livability agenda' that has dominated past planning practice and current policy in Greater Vancouver. The region has a long history of progressive planning, particularly in the City of Vancouver and the

GVRD, beginning with the 'Great Freeway Debate' of 1967. Widespread public opposition, led by inner city residents, defeated a proposed freeway project through their communities and into downtown Vancouver (Gutstein 1975; Hasson and Ley 1994). The debate was a pivotal moment in regional development, and marked a new era in Vancouver city politics.

Opposition to the freeway project was a reflection of the changing political climate of the late 1960s, and an indication of the growing discomfort with the approach to planning and development of Vancouver's then governing party, the Non-Partisan Association (Punter 2003). The changing political environment led to the election in 1972 of a civic council dominated by The Electors' Action Movement (TEAM), a new, moderate political organization that "fundamentally re-oriented the vision for the future of Vancouver..." (Newman and Kenworthy 1999, 219). The new council began a long-term strategy of managing congestion through existing infrastructure, and laid the foundation for the City of Vancouver's current transportation hierarchy: pedestrians, cyclists, transit, goods movement, and the private automobile (City of Vancouver 1997). In keeping with this vision, the City of Vancouver has added virtually no new automobile capacity to its existing road network in thirty-five years (Price 2006).

At the regional level, the Greater Vancouver Regional District serves as the metropolitan government for the twenty-one municipalities that make up Greater Vancouver. While the GVRD does not have formal legislative authority for regional planning, it plays a very important role in shaping regional growth and development. In their assessment of the evolution and role of regional government in Greater Vancouver, Artibise, Cameron and Seelig note that the GVRD operates in an environment where land use planning is dominated by the municipal level, while transportation is dominated by the province (2004). However, they also argue that despite a lack of formal power, the GVRD has

developed significant policy influence in its regional planning function (ibid). Since its creation in the late 1960s, the GVRD has used its influence to make livability a key regional objective. Through a series of regional growth management strategies—most recently the 1996 Livable Region Strategic Plan—the GVRD has attempted to contain sprawl and support regional transportation alternatives.

In 1994, the GVRD and the Government of BC approved a comprehensive transportation plan entitled Transport 2021. Transport 2021 had a twenty-five year outlook, and demonstrated an early recognition of the interactive and interdependent nature of transportation planning and land use. The plan concluded that "heavy reliance on the automobile is unhealthy", and formally adopted a policy of reversing practices that favoured the automobile (GVRD and Province of BC 1993). To do so, the plan identified four interrelated policy levers: 1) control land use (e.g. by zoning regulations); 2) apply transport demand management (to change travel behaviour); 3) adjust transport service levels (e.g. by letting congestion worsen); 4) supply transport capacity (e.g. by building more roads and transit) (ibid.).

Transport 2021 provided the framework for the Livable Region Strategic Plan, which was adopted by the GVRD in 1996, and called upon local governments to use transportation policy and land use controls to manage regional growth. The LRSP outlined four key objectives for the region: 1) protecting the region's green zones; 2) building complete communities; 3) achieving a compact metropolitan region; 4) increasing transportation choice for the region. Building on Transport 2021, the LRSP identified transportation policy as the primary means to support the Plan's objectives, suggesting that integrated land use and transportation planning have played an important role at the GVRD for some time (Smith and Oberlander 1998).

The LRSP called for coordinated planning and increased transportation choices in the region through a series of municipal partnerships. Specifically, the LRSP identified the need for improved coordination vis-à-vis municipal road construction, improved local transit service, a comprehensive rapid transit network, cycling programs, emission control programs and a transportation demand management strategy for the region (GVRD 1996). Historically each one of these services had been coordinated separately through a combination of municipal, regional and provincial programs. The desire to use transportation policy as a means to an end, rather than an objective end in itself, represented a dramatic shift in thinking regarding the region's transportation system, and one that would set the stage for the development of a regional transportation agency—the Greater Vancouver Transportation Authority—in 1999 (Fershau 2003).

The GVTA, commonly known as TransLink, was established as the central coordinating agency for transportation planning and funding within the GVRD. TransLink was allocated specific responsibility for transit service delivery, major arterial roads, regional cycling facilities, transportation demand management (TDM) and vehicle emission testing programs. With the creation of TransLink in April 1999, Greater Vancouver became Canada's first metropolitan area to institutionally link land use planning and transportation at a regional level (Fershau 2003). TransLink is required to support the growth management and air quality objectives identified in the GVRD's Livable Region Strategic Plan. The development of a regional transportation authority was a critical step toward the implementation of the LRSP, and TransLink has been recognized as a model for urban transportation planning in Canada (Conference Board of Canada 2007).

Despite the creation of TransLink, the overall success of regional planning efforts has been limited, in part because of a failure to implement several important demand management strategies outlined in Transport 2021 and the LRSP, including regional

tolling. In the absence of anticipated financial disincentives aimed at the automobile, auto-oriented development has intensified, particularly in the suburban municipalities. In this context, auto use has increased, development has dispersed (particularly employment centres), and traffic congestion has grown, creating a ring of suburban development around the urban core that has been described as “Paris surrounded by Phoenix” (ACD-D).

1.4.3 A tradition of environmental consciousness

The Greater Vancouver region has a reputation for leadership on environmental and sustainability issues. The physical geography and mild climate of Greater Vancouver have helped inspire in local residents an intense awareness and appreciation of the natural environment, and a profound and unique sense of place. There is a tradition of environmentalism in the region, expressed by Berelowitz as “a strong, almost ‘moral’ sensibility that unsullied nature is superior to human artifact and that the urban construct is an intrusion on, and not a complement to, the landscape” (Berelowitz 2005, 163). This tradition of environmentalism has in turn helped foster a social consciousness in the region, which is apparent in the region’s history (the freeway debates of the 1960s, the founding of Greenpeace in the 1970s), in current public discourse (the current Gateway Program debate), and in the principles and goals of the region as a sustainable city (the GVRD Sustainable Region Initiative).

On a number of fronts, the region is reaping the benefits of its regional and municipal planning initiatives. The number of transit trips per capita is nearly two times the average for thirteen large US cities (117 trips per person vs. 63 trips per person), and automobile use and the provision of road infrastructure are both 25 percent below the US city average (Newman and Kenworthy 1999). According to Statistics Canada, Greater Vancouver is the only metropolitan region in Canada in which the average time spent

commuting has not increased over the last thirteen years. In fact, during this period, the average daily commute time in the region went down by three minutes, from 70 to 67 minutes for a round trip (2006). In contrast, the average daily commute time in Calgary increased by 14 minutes between 1992 and 2005.

Greater Vancouver's success is in large part due to the development of higher density, mixed-use communities in the region's town centres (downtown Vancouver in particular) that allow people to live near where they work. In a 2005 study, more Vancouver residents were found to live in compact communities (i.e. neighbourhoods in which residents can meet their immediate needs without a car) than was the case in 15 other US cities (Sightline 2005). As the research will demonstrate, this has important and immediate transport implications, as compact development supports transportation alternatives. In downtown Vancouver for example, two thirds of all trips are made by foot, bicycle or public transit (Montgomery 2006).

Indeed, Greater Vancouver's collective efforts at creating desirable and livable communities have become the subject of international attention in recent years; Vancouver ranked highest on the Economist Intelligence Unit's list of livable cities in 2005 (The Economist 2005) and third on Mercer's 2006 and 2007 quality of living surveys (Mercer Human Resource Consulting 2007).

2.0 Literature Review

The purpose of this chapter is to review the urban studies literature relevant to traffic congestion in the North American context, and to understand current thinking on traffic congestion as it relates to social change and sustainability. First, the evolution of transportation planning vis-à-vis the rise of auto-dependent cities is reviewed. Second, the cost and implications of traffic congestion are discussed, along with strategies for congestion mitigation. Finally, social change and sustainability are discussed in terms of traffic congestion.

2.1 THE RISE OF AUTOMOBILE DEPENDENCE: THE POST-WAR PLANNING PARADIGM

Since the end of the Second World War, North American transportation planning has been dominated by a growth oriented, engineering based, modernist paradigm, focused primarily on the mobility provided by the automobile. In this context, highways in North America have historically been considered public utilities—not unlike like the water or power supply—to be supplied ‘on demand’ (Orski 1990). Continuous expansion of the transportation system to accommodate growing demand has been a fundamental premise of surface transportation policy and planning. The traditional paradigm views traffic as an independent physical phenomenon, and traffic congestion is treated as a supply problem with a technical, value-free solution. This paradigm has been characterized by ‘predict and provide’ rather than ‘debate and decide’ (Kenworthy 2006). Not surprisingly, traditional approaches to traffic congestion have centered on supply-side solutions, with the intent of staying one step ahead of travel demand (Ferguson 1990).

For the last 50 years, urban development in cities across North America has decentralized and dispersed, dramatically increasing travel distances, limiting the effectiveness of transit, and reinforcing the primacy of the automobile (Duany, Plater-Zyberk, and Speck 2000). The important relationship between transportation priorities and land use is well documented in the literature (Calthorpe 1993; Newman and Kenworthy 1999; Shoup 2005; Cervero 1986). In *The Next American Metropolis*, Calthorpe labels the automobile “the defining technology of our built environment” (1993, 17). One of the key principles guiding this relationship, and therefore the built form of our cities, is the tendency for people not to want to commute on average for more than 45 minutes to major urban destinations (Zahavi and Ryan 1980; Garreau 1991). Historically, improvements in transportation technology have allowed people to move further away from the urban core; however, with the mass production of the automobile, it became possible to develop as far as 50 kilometers from the city centre. It also became possible to separate residential and business centres through zoning.

In its various forms, this auto-oriented development pattern has been described generally as suburban sprawl, and more specifically as auto city (Newman and Kenworthy 1999), and edge city (Garreau 1991). A wide and diverse segment of the literature points to the increasingly significant gap in built form, social experience, and political environment between post-war suburban communities and North America’s traditional urban neighbourhoods (Beauregard 2006; Berelowitz 2006; Cervero 1986; Duany, Plater-Zyberk and Speck 2000; Garreau 1992; Newman and Kenworthy 1999). There is no consensus regarding the long-term implications of this growing divide, but it’s increasing size and significance appears to be universally appreciated.

In the ‘auto city’, automobile use is the rational choice for the majority of citizens, since it is the most convenient mode available (and in some cases, the only mode available).

Furthermore, in this context, drivers do not pay the full costs of owning and operating their vehicle. Hart and Spivak argue that when something is free, or valued incorrectly, the market does not function properly and “demand goes through the roof” (1993, 2). “In most American cities, parking spaces, roads and freeways are free goods. Local government services to the motorist and to the trucking industry—traffic engineering, traffic control, traffic lights, police and fire protection, street repair and maintenance—are all free goods” (ibid.). Similarly, Downs argues that congestion exists largely as a result of the perennial failure of society to force drivers to confront the full costs of their travel during peak hours (1992).

2.2 TRAFFIC CONGESTION: CAUSES, COSTS, AND IMPLICATIONS

By the 1990s, a substantial body of research had begun to cast doubt on the wisdom of trying to address anticipated growth simply through continual expansion of road and highway networks (Newman and Kenworthy 1999; Calthorpe 1993; Downs 1992; Zuckermann 1991; Hart and Spivak 1993; Holtz-Kay 1997). For many, it had become clear that traditional planning did not adequately consider the impact that new or expanded roads and highways would have on future growth, land use, or transportation demand. In particular, the literature has noted that traditional travel demand forecasting methods fail to adequately account for induced demand; that is, the increment of new vehicle traffic that would not have occurred without capacity increases (Bartholomew 1995; Lim 1997; Ferguson 1990; Orski 1990). Induced demand is important to this research, as it causes congestion to develop much faster than anticipated. Indeed, Orski notes that it is not unusual for new highways to be operating at or above capacity within a few years (1990).

Most research suggests that a region ‘cannot build itself out of congestion’; that is, highway expansion is not an effective strategy for addressing traffic congestion,

particularly over the long term (Downs 2004, Litman 2006). In fact, traffic congestion can be a symptom of fundamental community design problems—notably inadequate transportation choice and sprawling land use—that cannot be addressed by expanding capacity (Litman 2006). Indeed, there is strong support in the literature for the casual nature of the relationship between new highway capacity and increases in vehicle miles traveled (VMT) (Goodwin 1996; Hansen and Huang 1997; Downs 2004). Specifically, a consensus has developed around the general effect of highway capacity on VMT: for every 1 percent increase in road network capacity, there is a corresponding increase in the short run of 0.2 to 0.6 percent in vehicle kilometers traveled (Fulton et al. 2000). In the long run, this percent increase rises from 0.6 to 1.0 (ibid). Despite the consensus that has emerged in the literature, the public discourse over highway expansion and induced demand is far less cohesive; two recent reports dispute the notion that expanding highway infrastructure increases total VMT (AHUA 2004; Conference Board 2006).

In a recent report, the American Highway Users Alliance (AHUA) argues that traffic congestion can, and should be addressed through capacity expansion. The report claims that capacity expansion will reduce congestion, and therefore reduce total emissions from idling vehicles. In so doing, the report makes no effort to address the concept of induced demand (AHUA 2004). A 2006 report from the Conference Board of Canada provides a more sophisticated assessment that considers regional socio-economic variables in the analysis, including density, demographics, gas prices, and vehicle specific data. The report concludes that the most important determinant in travel demand is population density, whereas increased capacity has only a weak correlation with travel demand. However, the report does not acknowledge the important relationship between transportation and land use, especially over the long term (Conference Board 2006).

The literature identifies a wide range of strategies to mitigate traffic congestion. The most thorough analysis of the options, from increases in capacity on the supply side, to pricing mechanisms (increasing gas tax, road pricing) and land use (smart growth) on the demand side, is provided by Downs (1992). According to Downs, the most effective solutions are improved pricing mechanisms, including increased gas taxes, pay-parking during the AM peak, and congestion pricing on major arterials (ibid). Downs' conclusions are supported by Banister (2002) and McDonald et al (1999). Ironically, in the North American context, congestion tolling remains a difficult proposition, while highway expansion often receives public and political support. As Dunphy notes, "actions that may be popular may not help solve the transportation problem, and actions that may help may not be popular" (1997). Indeed, the debate is far from over. Despite decades of experience suggesting otherwise, several recent publications argue that expanding urban highways is a cost effective and desirable way to reduce traffic congestion (AHUA 2004; Cox and Pisarski 2004; Hartgen and Fields 2006).

The ongoing importance of traffic congestion as a social and political issue is reflected in a number of recent contributions to the literature on congestion management and transportation planning (Downs 2004; Balaker and Staley 2006; Richards 2006; Litman 2006). The growing negative impact of congestion on quality of life, livability, and economic development is also reflected in a number of new studies (Conference Board of Canada 2006; Statistics Canada 2006; Transport Canada 2006), and in the popular media (Hunter 2006; Campbell 2006; Sullivan 2006). The economic impact of congestion has been well documented, especially in the United States. In Canada, a major study recently commissioned by the federal government estimated that the annual aggregated cost of congestion in Canada's largest urban areas is between \$2.3 and \$3.7 billion (Transport Canada 2006). The study examined the value of additional time

spent in traffic, the extra fuel used, and the additional greenhouse gasses emitted under congested conditions. The study attributed more than 90 percent of the costs to time wasted in traffic (ibid.)

Finally, the literature review demonstrated the notable lack of quantitative data available on traffic congestion in the Canadian context. As documented in Transport Canada's recent report, there is no routine measurement or national estimate of traffic congestion in Canada's urban areas. Of the studies that have been completed, there are inconsistencies in the methods and data upon which they are based (2006). As a result, we have limited ability to compare levels of congestion from one region to another, or from one part of an urban area to another; the lack of comprehensive quantitative data for specific parts of the Vancouver region has limited this analysis to the regional level. The data available in the United States stands in sharp contrast to that available in Canada. The Texas Transportation Institute (TTI) at Texas A & M University has studied congestion trends in urban areas across the United States since 1982. The TTI publishes its congestion research annually in the Urban Mobility Report, which is widely cited for its catalogue of congestion delays in America's biggest cities.

2.3 TRAFFIC CONGESTION, MOBILITY, AND SUSTAINABILITY

Kenworthy draws an explicit connection between congestion and change toward sustainability in a lecture entitled *Disappearing Traffic! The Challenge of Reallocating Public Space*, presented last year at SFU (Kenworthy 2006). In his presentation, he refutes the assertion that traffic congestion increases total fuel consumption and emissions—an argument made, interestingly, by both the BC Government (2007) and the American Highway Users Alliance (2004). Kenworthy argues that traffic congestion is part of a system of urban feedback loops in which congested traffic leads to increased fuel consumption and emissions in individual vehicles, but leads to lower overall

emissions as a result of decreased driving speed, decreased car use, increased use of alternate modes, and ultimately changes in land use. He further argues that traffic congestion, if not addressed through expanded road capacity, can help leverage better conditions for pedestrians and cyclists, more effective transit, and more transit-oriented development. Admittedly, the timeframe for land use changes is a long one, but it will ultimately generate greater livability and economic attractiveness (Kenworthy 2006).

Kenworthy's contribution notwithstanding, the literature on traffic congestion is dominated by research into the economic impact of congestion and strategies for its mitigation. There has been relatively little work on the social or behavioural implications of traffic congestion, or on congestion as it relates to sustainable cities or change toward sustainability. Yet traffic congestion is a significant problem in urbanized areas around the world; indeed, Cervero argues that "mounting congestion is apt to force both behavioural and institutional changes" and can be "a powerful force in prodding developers, employers and the populace at large into changing their customary practices" (1986, 97).

How will congestion force behavioural and institutional change? What conditions are necessary for this to happen? What level of congestion will be required for developers, employers, and commuters to change their current behaviour? The gaps in the literature raise these and other important questions, some of which will be addressed by this research. By doing so, this study hopes to provide a small contribution to the ongoing debate around transportation and sustainable cities.

3.0 Research Methodology

This chapter explains the methodology used in the project. First, the theoretical paradigm guiding the research is discussed. This is followed by a review of the project's methodological approach, including a discussion of the collaborative approach used in the research design and data collection. Next, the project's two stages are presented, along with a detailed discussion of the research methods used, including the development of instrumentation, sampling procedures, and data collection. Finally, the tools used to analyze the data and ensure reliability and validity are discussed.

3.1 PARADIGM: COLLABORATIVE GROUNDED THEORY RESEARCH

This paper seeks to understand the strength and nature of the relationship between traffic congestion and change toward sustainability in Greater Vancouver. The paper explores the nature of this relationship through qualitative, inductive research, using a two-stage mixed-method approach to data collection. Using a grounded theory approach to data analysis, the study draws on the ongoing interplay between research and analysis and the continuous comparison of data in order to explain the research question (with Holt 2007). The goal of research conducted using a grounded theory approach is to understand the research situation and discover the theory implicit within the data. Rather than test a single hypothesis, theory is developed as themes emerge from the data and illustrate new concepts and hypotheses (Glesne 2006; Dick 2004).

The research upon which this paper is based is the product of the collaborative efforts of Rebecca Holt and Graham Senft, colleagues in the Urban Studies Program. The collaborative approach used is consistent with the constructivist nature of the project, whereby learning is an active process from which meaning is created through shared experience and interaction (with Holt 2007). Collaboration enabled the researchers to

pursue research of mutual interest, at a depth that may not have been possible through independent inquiry. More specifically, collaboration is well suited to the inductive approach to knowledge acquisition common in qualitative research (Glesne 2006; Dick 2005). This approach fit well with the study's characterization of the role of collaborative and collective value in sustainability and social consciousness (with Holt 2007).

The collaborative approach supported the iterative process inherent in grounded theory research, improving the validity of the data and the analysis through ongoing dialogue and shared reflection and interpretation (Strauss and Corbin, 1994). This process fostered mutual learning throughout the project, contributing to a greater understanding of the subject matter than may have been possible otherwise. On a practical level, the two researchers brought complementary interests and experience to the table, along with compatible research skills and analytic styles.

Beginning with a topic of mutual interest, and a history of successful collaboration on other urban studies projects, the two researchers developed a proposal based on a collaborative approach to data collection and analysis. By working together, the researchers were able to draw on two unique perspectives at each stage of the project. The results of these efforts are contained in two companion papers, *The Conscious City I: Traffic Congestion and Change Toward Sustainability in Greater Vancouver* by Graham Senft, and *The Conscious City II: Traffic Congestion and the Tipping Point in Greater Vancouver*, by Rebecca Holt. Further discussion of the specific nature of the collaborative research is included in Appendix A.

3.2 METHODOLOGY: A QUALITATIVE, TWO-STAGE APPROACH

The project is qualitative, inductive, and intensive, and used a two-stage, mixed method approach to data collection. Secondary data was collected in the first stage, and was

used to establish the background for the study and inform the rest of the research. Primary data was collected in the second stage through a series of elite interviews. Data collected through the interview process directly addressed the project's primary and secondary research questions.

The study draws on discourse analysis in order to more effectively explore the perceptions, attitudes, and actions underlying the statements made during the participant interviews. Discourse analysis is well suited to the data generated by this study, as it enables the researchers to evaluate not just the words and phrases used in each interview, but link common themes and identify broader structures and frameworks within which ideas are produced, structured, and communicated (with Holt 2007).

The project began with a preliminary review of the literature in order to focus the research questions and inform the research design. In keeping with the grounded theory approach used in the research, the literature review was iterative, and continued through both the research and analysis stages of the project. The literature was examined again following the data collection in order to juxtapose the research findings with key themes, and to contextualize the contributions provided by the research.

3.2.1 Stage One: secondary data collection

The first stage of the research established the context for the study through an analysis of relevant secondary data. The researchers developed a document collection strategy that established four major themes upon which to base the analysis of key background documents and materials. Documents relevant to each theme were identified and collected from a range of sources, including municipal and regional government meeting minutes, media reports and editorials, municipal and regional planning reports, provincial government reports, and historical planning documents (see Table 1).

Table 1: Document Collection

Analytical Theme	Document
Greater Vancouver as a sustainable region	<ul style="list-style-type: none"> • Advancing the Sustainable Region Report, 2006 • GVRD Sustainability Report, 2003-2005 • CoV Community Climate Change Action Plan, 2005 • Various media reports, 2000-2007
Transportation planning and traffic congestion	<ul style="list-style-type: none"> • Transport 2021, 1994 • CoV Downtown Transportation Plan, 1997 • Statistics Canada commute time report, 2006 • Various media reports, 2004-2007
Regional planning and policy	<ul style="list-style-type: none"> • Livable Region Strategic Plan, 1996 • LRSP Review: Implementation Issues, 2006 • Various media reports, 2004-2007
Provincial Gateway Program	<ul style="list-style-type: none"> • City of Burnaby public consultation report, 2007 • Gateway Program consultation summary report, 2006 • Smart Growth BC Gateway review, 2005 • Langley Economic Dev. Gateway review, 2006 • GVRD board reports, 2005, 2006, • Livable Region Coalition Gateway report, 2006 • GVTA board reports, 2005, 2006 • City of Vancouver Council reports, 2005, 2006 • Various media reports, 2004-2007

(with Holt 2007)

At this stage, documents were reviewed with the intention of establishing background for the study and building a foundation for the interview process in Stage Two. During this process, the researchers considered interview questions, themes, and potential subjects.

3.2.2 Stage Two: primary data collection

The focus of Stage Two was the collection of primary data through a series of elite interviews. Interviewing is a common method used in qualitative research and is well suited to the exploratory nature of this study. The decision to use interviews to collect data for this project was based on the type of information needed to address the research questions and the scope of the project itself. This study attempts to evaluate and gauge the effects and perceptions of concepts such as social consciousness on the

region as a whole; as such, interviews with knowledgeable regional experts and elites were the most practical data collection method.

Participant categorization and identification

A long list of potential interview candidates was compiled during the literature review and the document review process in Stage One. Interview participants were identified and grouped into six categories, which are consistent with the groups active in the Vancouver region's transportation and sustainability policy networks: non-government agencies (NGO), elected officials, the media, land use and transportation professionals (practitioners), academia, and private industry. In order to ensure the sample was representative of Greater Vancouver as a whole, potential interview candidates were identified from across the region. Following the document analysis, additional participants were identified through snowball sampling in order to ensure adequate representation from each category. The two researchers used a shared, online spreadsheet to compile contact information for all potential participants.

Participant recruitment

Participants were recruited through a formal invitation sent via email, which included a letter from the researchers on university letterhead, along with a one-page overview of the study. Additional invitations were sent as other potential interviewees were identified through snowball sampling. The researchers coordinated interview invitations, responses and appointments through a shared, online calendar system. A total of 40 potential participants from six categories were invited to participate in a research interview.

Sampling

This study utilized two techniques in order to obtain a representative sample. First, purposive sampling was used to identify potential interviewees, as noted above. This method was employed to ensure information rich interviews. Once the initial group of participants was selected, snowball sampling was used during the interview process. At the conclusion of each interview, participants were asked for recommendations for further interview contacts. If appropriate, the researchers also invited participants who were named or referred to during the course of the interviews. The sample included a total of 19 interviewees (from 40 invitations), grouped within the predetermined categories as noted in Table 2 below:

Table 2: Respondent Sample

Category	Invited	Sample
Academia	9	4
Non-Governmental Organizations	5	2
Industry	12	3
Elected Officials	5	4
Media	3	1
Professional Practitioners	6	5
Total	40	19

(with Holt 2007)

Interview questions

The interview guide was customized for each interview, based on the respondent category and the expertise of each interview subject. The interviews were semi-structured in order to encourage a conversational tone and enable the researchers to respond to specific comments and new ideas. The interview questions were developed

collaboratively based on the literature view and document analysis, and were grouped by theme: Greater Vancouver as a sustainable region, transportation planning, traffic congestion, social consciousness, and the tipping point framework. Three to four questions were developed per theme. Following the completion of the draft interview guide, the interview questions were reviewed with four classmates in Urban Studies. After this review, the interview questions were formally piloted.

Pilot interviews

Two pilot interviews were used to test the preliminary interview guide. The interviews were conducted by phone, following an email introduction including the interview guide and project overview. The first pilot was a professional colleague of one of the researchers, while the second pilot was a professional in the transportation planning field, known to both researchers through academic and professional circles. The pilot interviews proved to be very constructive for the development of the interview guide, and for the data collection more generally. The pilot interviews demonstrated a number of problems with the draft interview guide, including confusing questions, overly broad or specific questions, and missing questions. Furthermore, the piloting process enabled the researchers to get comfortable with the interview process.

As a result of the pilot interviews, several adjustments were made to the interview guide and the project overview. For example, the researchers decided that the term *social consciousness* should be excluded from the questions, and assessed through the broader discussion. Similarly, to simplify the background materials, the researchers decided not to include a diagram of the tipping point framework. Finally, to avoid receiving an overly general data set, a number of questions were made more specific.

Interview procedure

The majority of interviews were conducted between mid-October and late-November, following the distribution of initial invitations in late September and early October. Upon receiving expressions of interest, the researchers scheduled interview times with each of the participants using a shared online calendar linked with the interview database. Due to geography and/or scheduling considerations, three interviews were conducted by telephone. Both researchers participated in all interviews.

Prior to the interview, each participant was sent an interview guide (see Appendix B), a backgrounder on the project, and an informed consent form. All participants signed a consent form, authorizing the researchers to use all interview data with attribution. No participant chose to withdraw from the interview process. As the research proceeded however, the researchers determined that the analysis and reporting would be as effective without attribution. In order to present data consistently throughout the remainder of the study, and maintain respondent confidentiality, each respondent has been assigned a code (see Table 3).

The researchers used a digital voice recorder to document each interview. The field notes of each researcher supplemented the voice recorder data. Following a short round of introductions, each interviewee provided a description of their relevant education and experience. The researchers posed questions in alternating format, encouraging discussion throughout. As the data set became more developed and the interviews became more detailed, one researcher was tasked with most of the questioning and dialogue while the other was responsible for taking detailed field notes.

Table 3: Interview Respondents

No.	Code	Respondent Category	Experience / Perspective
1	NGO-A	Non-Government Org	Senior staff, regional NGO working to support alternative development strategies
2	NGO-B	Non-Government Org	Senior staff, regional NGO working to support regional transportation alternatives
3	EO-A	Elected Official	Suburban city councilor, GVRD, GVTA board member
4	EO-B	Elected Official	Suburban mayor, GVRD board member
5	EO-C	Elected Official	Suburban mayor, GVTA board member
6	EO-D	Elected Official	Urban mayor, GVRD board member
7	MD-A	Media	Regional urban issues journalist, instructor
8	LUTP-A	Transportation and Land Use Professional	Transportation planning consultant
9	LUTP-B	Transportation and Land Use Professional	Transportation planning consultant
10	LUTP-C	Transportation and Land Use Professional	Transportation planner, suburban municipality
11	LUTP-D	Transportation and Land Use Professional	Land use and transportation planner, GVRD
12	LUTP-E	Transportation and Land Use Professional	Senior official, TransLink
13	ACD-A	Academia	Transportation and urban issues consultant
14	ACD-B	Academia	Geographer
15	ACD-C	Academia	Geographer and urbanist
16	ACD-D	Academia	Geographer and planner
17	IND-A	Industry	Senior official, regional transportation organization
18	IND-B	Industry	Senior official, regional transportation organization
19	IND-C	Industry	Senior official, regional real estate organization

(with Holt 2007)

The researchers reviewed the data immediately following the conclusion of each interview. At this stage, new information, emerging themes, and conflicting responses were addressed, and the interview questions were revised as necessary.

3.3 DATA ANALYSIS

Analysis began while data collection was still in progress, so that new information or important emerging themes could be addressed while fieldwork was ongoing. As soon as possible after interviews and debriefing sessions were complete, the researchers listened to each interview voice recording and transcribed a summary based on the list of interview questions. The interview questions, in turn, were coded by research theme: Greater Vancouver as a sustainable region, transportation planning, traffic congestion, social consciousness, and the tipping point framework. The researchers split this task for the purposes of efficiency and then exchanged written transcripts and discussed and compared the results again.

A second stage of coding was executed for each study according to the research questions under investigation. For this paper, the data was coded based on the three research sub-questions: congestion and individual behaviour; congestion and public discourse / transportation priorities; and congestion and social consciousness. In order to conduct additional analysis, data was sorted based on urban versus suburban perspective. Once both researchers had completed their respective coding procedures, further debriefing and discussion took place to confirm major data trends, themes and observations.

3.4 RELIABILITY AND VALIDITY

In order to ensure a valid and reliable data set upon which to base the research, and to ensure the sample was not a self-referencing one, the researchers established a long-list of interview candidates based on a variety of sources, including the literature review, document analysis, and personal experience. The interview candidates were grouped into six representative groups, and were selected from all parts of the region. Snowball sampling was used to identify additional interview candidates; it became clear that a

satisfactory sample had been achieved once interviewees began recommending similar groups of people.

During the course of the study, the researchers attended three regional forums on transportation, sustainability, and behavioural change. Two forums were part of the GVRD's *Future of the Region Sustainability Dialogue* series—"Regional Economy: The World is Watching" on September 25th 2006 and "Transportation: We Can't Get There from Here" on October 30th 2006—while the third event was a GVRD *Sustainability Breakfast* on January 11th 2007, on the subject of peak oil and transportation planning. Nine of the project's nineteen interview subjects were either panelists or participants at these events. This observation was made after the interviews had all been scheduled.

In order to confirm the study's findings, the researchers triangulated the three data sources: interviews, document analysis, and regional forums. The collaborative approach used in the project research added an additional level of reliability and validity to the findings (see Appendix A for further discussion). Throughout the study, the researchers discussed and compared field notes, interpretations, and analysis in order to confirm findings.

The data collection and analysis methods were explicit, and connected directly to the research questions in order to ensure reliability. The researchers followed clear protocols in order to maintain consistency in data and analysis, and they acknowledged personal assumptions, values and biases and discussed how these might influence the study.

4.0 Results & Analysis

This chapter presents the results of the study, grouped by research sub-question: traffic congestion and individual behaviour, traffic congestion and public discourse, and traffic congestion and social consciousness.

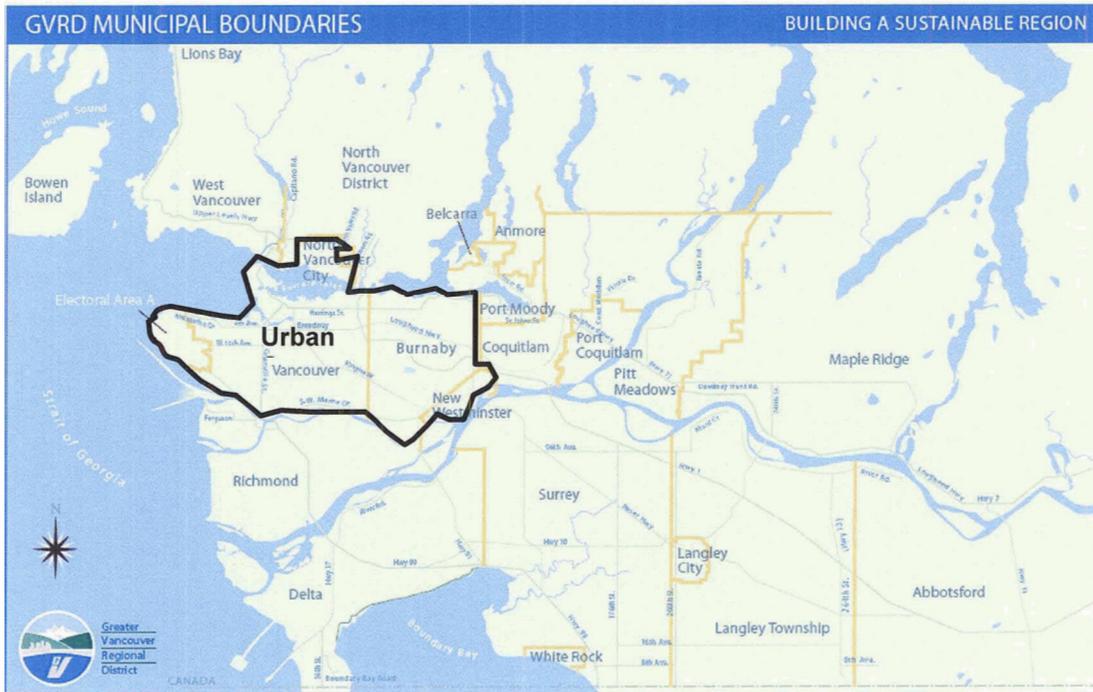
4.1 TRAFFIC CONGESTION AND INDIVIDUAL BEHAVIOUR

Sub-question one was concerned primarily with congestion and individual behaviour, however, the interview questions in this section focused on the aggregate travel choices and behaviour of Greater Vancouver residents, rather than on the preferences of individual interview subjects. As an expert informant, each interview subject provided a unique perspective that was used to establish a profile for individual resident categories in the region. A number of categories were identified, including urban, suburban, commuter, non-commuter, parent, non-parent, and so on. The assessment of individual behaviour within the region is based on these types. While the data were mixed, a number of respondents across categories saw traffic congestion as a significant influence on individual behaviour with respect to transportation, housing, and employment choices.

The most significant emergent theme in the data at this point was the difference in the perceived perspectives of residents in different parts of the region. Respondents frequently and consistently identified differences in perspectives among residents of the urban core and residents of the surrounding suburban municipalities (LUTP-C, LUTP-E, NGO-B). The majority of respondents identified the urban core as the cities of Vancouver, Burnaby, New Westminster, and North Vancouver (see Figure 2). Respondents from a number of categories felt that congestion was a major factor in determining behaviour, but indicated that this was much more likely to be true in the

urban core than in the suburbs (NGO-B, EO-D, MD-A, ACD-A, ACD-C, ACD-D, IND-A). Conflicting regional perspectives emerged as a major theme throughout the research. This has significant implications for the findings.

Figure 2: Municipalities of the Greater Vancouver Regional District



(GVRD 2007)

Respondents continually identified transportation alternatives, housing choice, and family demographics as important factors contributing to distinct perspectives among urban and suburban residents. Collectively, these factors form a framework for the development of a social consciousness of sustainability within different parts of the region. First, the availability of alternative transportation options was an important theme. Interviewees across categories consistently noted that quality transportation alternatives are key to behavioural change: congestion is more likely to encourage people to leave the car at home if they have convenient and consistent access to transportation alternatives (IND-B, IND-C, LUTP-B, LUTP-C, MD-A, NGO-A). These respondents

stressed the significance of disparities in the region's alternative transportation infrastructure and the divergent transportation patterns that occur as a result: for example, while the majority of trips in the core are made by single occupant vehicle, density is increasing, car ownership is decreasing, and transportation alternatives are gaining mode share. Contrast this with the experience in the suburbs, where auto-oriented development is dominant, auto ownership is increasing, and densities are not generally high enough to make transit attractive (LUTP-C, NGO-A, NG-B, MD-A).

Second, housing choice emerged as an important theme related to traffic congestion and behaviour. Housing choice is directly related to the availability of transportation alternatives. Generally speaking, the data suggest that people consider there to be more options available in the older, higher-density neighbourhoods of the urban core. The majority of respondents noted the significant role of housing price in determining where people live and how they travel (LUTP-A, LUTP-B, LUTP-C, ACD-B, ACD-C). IND-B noted that most people would prefer to live closer to the core, but cannot afford to do so. More importantly, according to ACD-D, people don't feel they can afford to live closer: "perception of housing price is more important than actual price, because people underestimate what they could save by reducing their transportation costs". Respondents consistently indicated that housing choice was influenced more by cost than by commute time: "People still live the single-family suburban dream. They still want single-family homes on the cul-de-sac, and that's their view, and they will sacrifice an hour's commute time, easily, everyday" (EO-D).

Conversely, some respondents (NGO-B, MD-A) firmly refuted the primacy of housing affordability: "housing affordability issues are not as significant as people would like to think, it is a false assumption that you have to own, it is more about choice and trade offs" (NGO-B). The conviction with which these perspectives were shared, and the

sharp contrast between them is striking. How can both be valid? The data illustrated a significant relationship between family demographic and housing choice and housing tenure, which may help explain the different perspectives above. The data on housing tenure highlight the economic element of the debate. The majority of single-family homes in suburban municipalities are owner occupied, representing a substantial investment in the suburban system on the part of the individual owner, and a massive investment by suburban residents overall. Many suburban residents are structurally dependent on the suburban system—physically, economically, and socially. This has clear implications for the development of social consciousness.

Finally, the connection between demographic factors and housing choice was a strong, recurrent theme. A number of respondents suggested that at the broadest level, the urban core tends to attract a resident category comprised mainly of those without children, students, and retired people. The suburbs, on the other hand, tend to attract a different type of resident, that is, families with children. (LUTP-C). Many respondents noted that many families feel they must choose between affordable ground-oriented housing in the suburbs (generally auto-dependent), and expensive and/or non-ground-oriented housing in a more central (but often transit-accessible) location (LUTP-C, IND-B, IND-C). In this context, LUTP-C notes that families will always exercise a preference for ground-oriented or detached housing over a shorter commute:

“Most young families are looking for options in more walkable areas... they’re looking at town centres, but most of our town centres don’t have [the kind of environment they want] to raise kids, with tree lined streets, lovely parks and playgrounds... we’re not developing areas that are transit oriented that are really to a high urban quality that would attract [families].”

Several respondents pointed out the potential for exceptions and variation within the urban-suburban resident categories. Obviously each individual will have a different threshold at which they will alter their behaviour in response to congestion (or to avoid dealing with congestion); for some, this may be a ninety minute commute, for others, it may be twenty minutes (ADM-D, LUTP-C). Indeed, IND-C argued that for many suburban residents, congestion plays a role in deciding to work closer to home (to avoid travel to the core or to another municipality, particularly if it requires crossing a bridge), suggesting a level of sensitivity to traffic congestion even in suburban environments without good transportation choice.

4.2 TRAFFIC CONGESTION AND PUBLIC DEBATE

Sub-question two addresses congestion in terms of collective discourse and public priorities. Participant responses were mixed on this question, suggesting very significant variation in how traffic congestion can influence public debate and priorities in transportation planning. Indeed, while all respondents noted that traffic congestion has fostered increased debate, perspective differs greatly across the region.

A number of respondents indicated that regional traffic congestion has fostered additional support for transit and additional TDM measures, while helping the public recognize the limits to unrestrained growth in automobile use. This perspective is one that challenges the traditional transportation planning paradigm, and has been characterized in terms of a 'language of sustainability' (ACD-B). At the same time, other respondents argued congestion is fostering demand for more road capacity, and is in large part the driving force behind the Gateway Program. This perspective is one that is consistent with the traditional transportation planning paradigm, and has been characterized in terms of a 'language of utility' (ACD-B). Table 4 provides an overview of the conflicting discourses at play within the region.

Table 4: Distinct Regional Discourses

	Toward Sustainability	Counter to Sustainability
Discourse	Language of sustainability – congestion is a limitation of auto-oriented systems	Language of utility - congestion is a regular reminder of restrictions on personal mobility
Transportation Planning Paradigm	Challenges the traditional paradigm by illustrating the flaw in planning primarily for the automobile	Reinforces the traditional transportation planning paradigm - congestion is a technical problem
Priorities	Transit projects, TDM measures, supply chain efficiency	Expansion of the road network – support for the Gateway Program
Tolling Debate	Some support for tolling as TDM	Opposition to tolling, or support as a funding mechanism only

LUTP-E noted that traffic congestion has helped TransLink leverage additional funding and support for more transit infrastructure in the region, and stressed that it has been a very important factor on this front: “traffic congestion can be harnessed to create an appetite and recognition of the economic value in investment in transportation alternatives” (LUTP-E). More specifically, congestion has helped create support for TDM measures such as U-Pass and Employer Pass², and for initiatives such as HOV lanes on Broadway³. Significantly, LUTP-E also noted that congestion might ultimately make people more ready to accept density in their neighbourhoods, since “most people would rather have more people in their neighbourhood than more traffic”. This comment may suggest a growing level of understanding among residents of the relationship between residential density and transportation choice, and the limitations of capacity expansion.

Perhaps more significantly, the respondents representing elected officials, planning professionals, and industry noted that congestion has helped industry see that increased

² The U-Pass is a heavily discounted transit pass for students at UBC and SFU. The pass is mandatory and has generated substantial increases in transit ridership since implementation in 2003. The Employer Pass program is a voluntary program that provides employees with an annual pass at a discounted rate.

³ The City of Vancouver finally approved HOV lanes on Broadway in 2006 following years of lobbying by TransLink.

capacity alone will not solve the transportation problem, “they must realize that more than one strategy is necessary to change demand” (IND-A, IND-B). LUTP-E agreed: “Thinking in supply chains will need to be part of the solution, rather than thinking only about a capacity approach”, suggesting that industry in the region is beginning to think not just about increasing transport capacity in order to meet their needs, but also about how to maximize efficiency all the way up through their distribution system. In other words, congestion has helped illustrate to industry the physical limitations of the road network, and has prompted industry to attempt to add value elsewhere.

Conversely, a number of respondents indicated that congestion does not help bring about a more rational debate on transportation; in fact, congestion can directly encourage the expansion of the road network. Many residents see congestion as an ongoing reminder that their mobility within the region is limited (EO-A, MD-A, LUTP-A, LUTP-C). This reminder fosters demand for supply-side ‘solutions’ through road construction and expansion. More specifically, a large number of respondents indicated that congestion has made a compelling case for the Gateway Program (IND-B, LUTP-B) and has created a residential population and business community willing to invest substantially in roads to alleviate congestion. For example, IND-C notes that in the absence of any other proposal, the provincial Gateway Program is the best solution on the table and deserves public support.

The respondents were asked to comment on the recent public dialogue on tolling—both as a demand management strategy and a cost recovery model—in order to assess how traffic congestion has factored into the discussion. Clearly the politics of congestion are significant. According to EO-B, “regional traffic congestion is the most important factor driving the dialogue around tolling”. Respondents across a number of categories noted that traffic congestion has fueled the debate on regional tolling (EO-D, IND-A), and

pointed to the significance of the debate for future transportation policy considerations. A number of respondents pointed to the increasing level of support for tolling as a demand management measure, especially among those with the urban core perspective (LUTP-C, LUTP-D, ADM-A, IND-C). Conversely, a significant number of respondents noted the opposition to tolling that has emerged from the debate on traffic congestion. Again, opposition has been attributed largely to those with a suburban perspective.

Finally, perhaps ironically, one participant used the example of an American Sunbelt city, where "money is no object", to illustrate the potential for traffic congestion to shift the debate and ultimately serve as a catalyst for change toward sustainability. Phoenix is a congested, freeway-saturated city "where money is no object", yet the public has repeatedly rejected plans for rapid transit (ACD-C). However, public discourse and understanding has recently shifted, due largely to ongoing and worsening levels of traffic congestion: "most people have figured out that we simply cannot build enough freeways to handle the traffic" (ACD-C). Frustration with the problem ultimately galvanized regional politicians and the public behind a new light rail transit (LRT) project. A twenty-mile LRT line is currently under construction, and an additional sixty miles is being planned. Traffic congestion has changed the debate in Phoenix, and "helped early adopters think more rationally about transportation supply" (ACD-D), but at the same time, the LRT project is "never expressed in terms of the environment or sustainability" (ACD-D). So while the region may have made a step in the direction of sustainability, it was more a function of utility than sustainability. Indeed, LRT is not perceived as the only solution: "some of the municipalities growing most rapidly on the west side of Phoenix are coming up with their own money to speed up transportation road building projects. It's incredible" (ibid).

4.3 TRAFFIC CONGESTION AND SOCIAL CONSCIOUSNESS

As noted earlier, social consciousness—as a collective sense of, and responsiveness to, challenges and obligations associated with sustainability—is critical to the success of a sustainable city. The results presented in this section are intended to address the relationship between traffic congestion and sustainability through the development of social consciousness. Though social consciousness was not discussed explicitly in the majority of the interviews, it was assessed through other research questions and broader interview themes.

The data showed the importance of social and cultural norms in shaping behaviour. Several respondents noted the conflict between the urban core and suburban municipalities is both reflected in, and shaped by, different cultural norms. These norms shape the use of transportation alternatives, because behaviour is in part shaped by what people see happening around them. Cultural norms evolve over time, and in the process change perspective and behaviour. For example, growing numbers of residents living in high-density condominiums and the growing popularity of car-sharing reflect shifting cultural norms and reinforce the behaviour associated with more sustainable choices.

“I think in Vancouver, there is a cultural component to people’s transportation choices... I really believe that people’s behaviour is in part shaped by what they see happening around them. There are people at work that bike or walk to work, and it makes you think – ‘oh, they live as far away from work as I do, I could do that too’. Whereas out in the suburbs, you can have the exact same person with the exact same vague interests of saving the planet, but they’re surrounded by people who are [saying] ‘oh, they tell me to take the bus, but I have to get my kids here, and I have to be there, so what am I supposed to do?’” (MD-A).

At the root of these conflicting and largely incompatible regional perspectives are what this study has identified as mental models, one of which is dominant in the urban core, the other in the surrounding suburbs. These models reflect among residents a divergence in understanding, attitudes, perception, and above all, social consciousness.

The mental model dominant in the urban environment appears to see congestion as a limitation, and recognizes congestion as a flaw in auto oriented community design that can only be addressed through a wide range of measures, including TDM. In contrast, the mental model dominant in the suburban environment sees congestion as a problem that can be solved through road and highway expansion. As noted earlier, the data suggest suburban attitudes support methods to maximize traditional ideas of efficiency, individual mobility and convenience, and can be characterized as based on a 'language of utility'. On the other hand, the data suggest that urban attitudes are more likely to support methods that address the collective benefit, and can be characterized as based on a 'language of sustainability'.

A number of respondents personalized this distinction by pointing to public figures within the region as reference points. At the 'utility' end of the spectrum is *Vancouver Sun* columnist Pete McMartin, self-appointed representative of the hapless suburban driver and frequent critic of public transit (MD-A, ACD-A). McMartin encapsulates the very essence of the 'language of utility' in his many columns on transportation issues, most of which describe his increasing frustration commuting to downtown Vancouver from his home South of the Fraser River. At the 'sustainability' end of the debate is urban planning consultant and lecturer Gordon Price, currently director of the SFU City Program. Price was a longtime Vancouver city councilor, and is well known for his work as an advocate for cyclists and transit users, and his opposition to the Gateway Program

and other major expansions in automobile capacity (ACD-C, IND-B, IND-A, LUTP-C, NGO-A).

4.4 TRAFFIC CONGESTION AND CHANGE TOWARD SUSTAINABILITY IN GREATER VANCOUVER

To address the main research question, the analysis draws on the data presented as part of the previous three sections: section one demonstrated the potential for traffic congestion, under certain circumstances, to influence behaviour in a manner that supports sustainability objectives; section two showed how congestion can drive the transportation debate in conflicting directions; and section three illustrated the variation in social consciousness around the region.

Cumulatively, the data demonstrate that traffic congestion may serve as a catalyst for change toward sustainability in the urban core of Greater Vancouver. For example, LUTP-D argues, “Congestion is not a major factor in terms of social consciousness or behavioural change in the region, except for core parts of the region where transportation alternatives exist”. However, it is not apparent that congestion is driving positive change in the suburbs. In fact, the data suggest that congestion is playing an entirely different role outside of the core—one that does not contribute to change toward sustainability.

As a catalyst for change, congestion is subject to certain key criteria: transportation choice, housing choice, and demographics. As noted by respondents across categories, these elements are directly related to the nature of the environment in which people live, and generally differ between the region’s urban core, and its suburbs. The analysis demonstrated the role of two conflicting mental models in the region, one of which is dominant in the urban core, the other of which is dominant in the surrounding suburbs. These models account for wide variation in understanding, perception, attitudes, and

social consciousness. Table 5 provides a summary of the key elements of the dominant mental models in the region.

Table 5: Distinct Regional Mental Models

	Urban Mental Model	Suburban Mental Model
Primary geographic area	Cities of Vancouver, North Vancouver, Burnaby, New West	Most other municipalities
Typical social norms	Mainstream use of a range of alternative transportation modes;	Very limited use of alternate modes
Degree of social consciousness	Highly developed	Less developed
Discourse	Language of sustainability	Language of utility
Typical resident type	Diverse: primarily singles or couples without kids, retirees, students, empty nesters,	More homogenous: typically young families with children
Transportation options	Wide range of alternatives, including transit, walking, cycling, car-sharing	Auto-oriented transportation system
Housing options	Mixed use housing, higher density housing, multiple housing types	Primarily single family detached homes
Land use	Medium to high-density, mixed use, pedestrian and transit oriented	Low density, single use, primarily auto-oriented

Finally, while some people are beginning to connect the dots between auto-oriented development, poor transportation alternatives, and traffic congestion, many are not. Data suggest a distinction in responses to this question between the public, as identified through profiles of resident categories in the region, and members of the professional, political and academic elite. The public is not, for the most part, making the connection between traffic congestion and auto-oriented land use, those who make decisions in the region generally seem to understand the relationship (LUTP-B, LUTP-E, LUTP-D). Conversely, LUTP-C feels that elected officials have a lot to learn: “four of five politicians just don’t get it”. Downs also notes a general failure amongst the public to link suburban development with congestion. In fact, he argues that despite worsening congestion,

people continue to pursue patterns of behaviour that exacerbate the problem. Downs argues these patterns reflect certain cherished goals held by most Americans: two working parents, two cars, and a desire to live in low-density settlements dominated by single-family housing (Downs 2004).

5.0 Discussion & Conclusion

This paper set out to determine the relationship between traffic congestion—one of urban society’s biggest problems—and change toward sustainability. The term ‘sustainability’ does not generally bring to mind traffic congestion, and it seems counter-intuitive to conceive of traffic congestion as a catalyst for change toward sustainability, particularly in light of the proposed Gateway Program. This study has found that traffic congestion is indeed a powerful force for change. Congestion can be a catalyst for change toward sustainability, but it can also be a catalyst for change that is not sustainable. The potential for change is subject to two distinct and incompatible mental models that shape perspectives, behaviour, and social consciousness in the region. These models break down largely along urban and suburban boundaries, creating a major split in the region and significant variation in social consciousness.

In the David Suzuki Foundation’s *Sustainability Within a Generation Report*, William Ruckelshaus, former head of the US Environmental Protection Agency, compares the scale of the sustainability agenda to the Industrial and Agricultural Revolutions. Moreover, he describes the need for sustainability to be a “fully conscious operation, guided by the best foresight that science can provide” (2004). Similarly, the literature on social change acknowledges the importance of consciousness to change and behaviour modification. Indeed, Capra argues that a common consciousness is necessary to build truly sustainable communities (1996).

The future development of the region will depend on the level of social consciousness, and thus the mental model, of the dominant actors. The data indicated a frustration with the lack of leadership being provided at the regional level (NGO-B, EO-D, LUTP-A,

ACD-A). In fact, several respondents blamed a lack of leadership at the regional level for current transportation problems. Indeed, if the mental model dominant in the suburbs drives the regional agenda, then projects like Gateway will continue to be proposed as solutions to congestion. Many respondents indicated that the general public was ready for change, but needed strong regional leadership to leverage this support (LUTP-E).

The challenge then, is to begin to bridge the gap between urban and suburban, in part by addressing the root causes of congestion, ultimately through an alternative to the traditional suburban development pattern. No other lifestyle choice has captured the hearts and imaginations of North Americans like the suburban ideal (or caused such significant transportation problems). Changing the suburban ideal is a one of the most important challenges of change toward sustainability, and one that will require a wholesale shift in how society thinks about local travel and transportation.

5.1 LIMITATIONS AND APPLICABILITY

This study focused explicitly on the Greater Vancouver region, so its conclusions are specific to this region, and will be most representative of Greater Vancouver. As noted earlier, the local context was very important to the research, so the broader applicability of the study may be limited. Furthermore, due to the limited availability of quantitative traffic congestion data for Canadian cities, the research focused on perceptions and impressions of traffic congestion, which may be difficult to effectively compare from region to region.

However, the sample size for the study was large, and the depth and scope of the data collection and analysis was significant. With this in mind, there may be some potential to apply the results of the research to other similar metropolitan areas, providing they are sufficiently similar to Greater Vancouver.

5.2 DIRECTIONS FOR FUTURE RESEARCH

As noted, the study found a significant divergence in social consciousness throughout the region, suggesting two very different mental models at work within the urban and suburban parts of Greater Vancouver. In this context, *The Conscious City II: Traffic Congestion and the Tipping Point in Greater Vancouver*, by Rebecca Holt, provides an assessment of how social consciousness can be mobilized to create change toward sustainability in the region.

Additional research is needed to further develop the mental model framework at a local or neighbourhood level within the Greater Vancouver region, and to understand the impact of higher density 'urban' development on the suburban mental model. Future research may seek to identify and explore variations in the urban / suburban divide. Finally, additional research is needed to determine the applicability of this study's conclusions to other metropolitan regions. Future research may consider a multiple case study approach to assess the mental models dominant in other regions. By evaluating a number of cases, it may be possible to assess the importance of factors specific to the Vancouver region, such as a history of progressive planning and an existing level of social consciousness. Finally as data become available, it may be possible to assess the relationship between specific levels of traffic congestion and different mental models.

Appendix A: Notes on Collaboration

This project is part of a collaborative effort between Rebecca Holt and Graham Senft, colleagues in the Master of Urban Studies Program at Simon Fraser University. We have included this section in order to describe the motivation for doing joint research, detail our collaborative approach, and present our case for the benefits of collaborative academic work.

A tradition of collaboration: context and motivation for collaborative research

We value the collaborative learning environment fostered by the faculty and students in the Urban Studies program very highly. One of the program's strengths is its support for students who are working full-time, achieved in part by drawing on students' own professional experience and expertise. In particular, the program recognizes that many of its students work in highly collaborative environments in which a team approach is used to generate effective, creative and innovative results. An integrated and collaborative process can yield results that are not only more ambitious than those realized by someone working alone, but results that are especially compelling and successful. Our professional experiences echo this strategy, and we believe that working on academic pursuits in tandem has strengthened our ability to contribute to our respective professional teams.

This project was undertaken jointly in order to explore research themes of mutual interest, at a depth of inquiry that may not have been possible individually. We were interested in exploring connections between social change, sustainability and transportation planning; having worked successfully together on a number of class assignments, we were keen to use our final project to further develop these ideas

through the synergy of collaborative learning. We approached the Urban Studies faculty with a proposal to complete the project in tandem, and upon permission to proceed, developed a joint research policy and evaluation method.

The Conscious City I and II: the collaborative approach

We were asked to propose a method of evaluation that could provide an effective means of evaluating both joint and individual effort. We agreed that the topic to be pursued would be treated as joint intellectual property; as such, if one of us withdrew from the project or program for any reason, the topic would become unavailable to both. We proposed to explore two distinct but linked questions through collaborative research and analysis, although we were required to submit and defend two separate papers.

We began the process with a series of brainstorming sessions to establish the preliminary research questions, methodological approach, and theoretical framework for the project. This process was extensive, and required multiple meetings, drafts, and revisions. At this stage, we developed each idea collaboratively in order to ensure the development of a solid methodological and theoretical foundation for the research. Following the submission of a joint research proposal, we proceeded to develop the methodological tools for the project, including interview guides and a document collection strategy. We revised the proposal and research materials as necessary following a review by the project supervisor.

The next stage of collaborative work was the data collection itself. Following the development of a system for tracking interview invitations and scheduling, we conducted a total of 19 interviews. We were both equally involved in all interviews. The interview strategy evolved over time, as we refined the interview guides and became more comfortable with the interview process. Initially, we both asked questions and made

short notes. As more interviews were completed, the level and complexity of the discussion increased, and one researcher became responsible for questions while the other made more detailed notes to support the recorded transcript. We debriefed after each interview, identified key themes, compared notes, and raised follow-up questions to guide the analysis. As soon as possible after each interview, one of the researchers transcribed a summary of the interview by research question. We split this task equally, and then exchanged and reviewed each written transcript.

Following the data collection and transcription process, we worked together to identify key themes as they related to each research question. Based on these themes, we created outlines for each research paper. Using the outlines we had generated together, we began analyzing the data and writing our own paper. On a regular basis, we met to compare results and review progress. Following the review of the two drafts by the project supervisor, we worked together to address areas of weakness and ensure the effective integration of our analysis and discussion.

Although the research papers have been written separately and address separate research questions, we wish to note that the analytical insight in both papers was a result of ongoing collaborative reflection on the research as a whole. The research and analysis was iterative, in that both research questions were explored together. The process used to separate the research questions was based on the strengths of our previous work and our interest in the themes within the questions

To help facilitate individual evaluation during the collaborative process, and to provide us with an opportunity to reflect on our experience, we each kept a process journal in the form of a weblog, or 'blog'. The blogs serve as personal narratives on the evolution of the project, documenting revisions to the research questions, the methodological

approach, and the theoretical framework. The blogs provide members of the supervisory committee with an ongoing account of the collaborative process through the personal lens and learning of each researcher. The blogs can be accessed at the following web addresses:

Rebecca Holt: rholt.wordpress.com

Graham Senft: wondercat.wordpress.com

Why work collaboratively? The benefits of collaborative academic work

Collaborative learning is a well-established value in both academia and professional practice. It is based on the understanding that learning is a social process, and the acquisition of knowledge comes mostly through discussion and negotiation (Soller 2001). The method also implies a belief in the democratic process: all team members are equal in their pursuit of a common goal and their contributions are all equally valuable (Soller 2001). Collaboration is well suited to the inductive approach to knowledge acquisition in qualitative research (Glesne 2006; Dick 2005); it significantly enhanced the level of dialogue and interaction between researchers during the study, and served as a catalyst for deeper research and reflection. In addition, this approach fit well with the study's focus on the role of collaborative and collective value in sustainability and social consciousness. At the heart of the project's research questions is the idea that the collective impact of humanity and the power of collaboration are key to building better cities.

Advocates of collaborative learning suggest that sharing and exchanging ideas with others promotes critical thinking and enhanced interest among learners (Gokhale 1995). Johnson and Johnson (1986) note that there is much evidence to suggest that cooperative groups achieve a greater depth of knowledge and retain information longer

than students working alone. Shared learning encourages critical thinking by making students accountable for their individual learning and providing opportunities to engage in discussion (Totten et al. 1991). Glesne also stresses the role that collaboration can play in qualitative inquiry. They note that in collaborative research, all participants are both teachers and learners: “knowledge is not acquired didactically, rather, it is developed inductively through dialogue among reading, individual research, and reflection” (1992, xiv).

In professional practice, particularly in organizations and disciplines working toward change toward sustainability, collaborative work processes, integrated across professional disciplines, are becoming increasingly necessary. The development and enhancement of critical-thinking skills through collaborative learning is required for workers to be able to think creatively, solve problems, and make decisions as a team. For example, building professionals are increasingly applying an Integrated Design Process (IDP) as opposed to a conventional ‘top-down’ or hierarchical approach, when developing and designing for the built environment. IDP brings all stakeholders to the table at the earliest possible stages of design and development in order to facilitate the exchange of knowledge and ideas between key and specialized disciplines. Accomplishing this cooperative effort results in creative and innovative solutions for efficient, high performance buildings. In addition, IDP supports an open and synergistic relationship between disciplines, resulting in more opportunity for learning and creative expression (IISBE 2007).

Conclusion

We feel we have benefited significantly from working collaboratively on our final research projects. We acknowledge that a positive and fruitful collaborative experience can only

be possible by establishing and maintaining a strong and equal working relationship in the academic context. The collaborative and interdisciplinary nature of the Urban Studies program, and the support received by faculty and staff, were major contributors to the success of this research team. In particular, the opportunity to explore group learning afforded to both team members during coursework was instrumental in the decision to undertake this research as partners.

In closing, we wish to suggest that the future of academic collaboration in Urban Studies could be further supported by allowing researchers to co-author written work. Although we were generally satisfied with the outcome of this project, we both feel that a co-authored approach would have better suited the intended research objectives of this project. Co-authoring acknowledges ideas generated in tandem and supports efficiencies in writing and research, freeing up more time and scope to devote to exploring themes in greater depth.

Appendix B: Interview Guide

Rebecca Holt & Graham Senft, Fall 2006

Final Projects, Master of Urban Studies Program, Simon Fraser University

Interview Objectives:

1. To determine the role of traffic congestion as a catalyst for change toward sustainability in Greater Vancouver.
2. To explore the role of traffic congestion in bringing about a Tipping Point toward sustainability in Greater Vancouver.

Questions for Consideration:

Introduction

1. Please tell us about your professional background as it relates to urban issues in Greater Vancouver.
2. What perspective do you bring to these issues? Bias/values?

Greater Vancouver as a Sustainable Region

3. Greater Vancouver is widely perceived as a 'green' city, and has been recognized internationally as one of the most livable cities in the world. In your opinion, what is the difference between livability and sustainability?
4. Greater Vancouver, through programs such as the GVRD's *Sustainable Region Initiative*, is working toward becoming a more sustainable region.
 - a. How successful has the region been in this effort?
 - b. What are some of the most important examples of progress?
 - c. What are some of the most significant shortcomings?
 - d. Is anything about Greater Vancouver's experience unique?
5. What organizations / institutions have been critical to the success that Greater Vancouver has had in working toward a sustainable region? How?
6. What people have been critical to the success that Greater Vancouver has had in working toward a sustainable region? How?

Transportation Planning

7. What is the biggest challenge we face with respect to transportation planning in Greater Vancouver today?
8. How can the region most effectively address this challenge?

Traffic Congestion

9. In your view, how does traffic congestion impact the region?
10. How has traffic congestion influenced transportation priorities in the region?
11. In your experience, how do perspectives on traffic congestion differ throughout the region?
12. How has traffic congestion contributed to the regional debate on tolling (both as a funding mechanism and demand management measure)?
 - a. Has congestion fostered a more rational debate about transportation and transportation supply in the region?
13. How does traffic congestion influence behaviour in the region?
 - a. How does congestion influence aggregate housing & work location?
 - b. How does congestion affect aggregate trip generation and mode choice?
14. Do you think traffic congestion has (or will) create a social climate that is more conducive to sustainable alternatives?
15. Do you think congestion can help people recognize the limitations of auto oriented and dependant communities?
16. Do you think congestion can help the region prepare for and/or accept the behavioural change needed to foster more sustainable alternatives?
 - a. Do you think traffic congestion has (or will) create pressure for governments to provide more transportation choice?
 - b. Do you think traffic congestion can encourage people to consider sustainable alternatives outside of transportation?

The Tipping Point

17. What factors do you think will contribute most significantly to a *tipping point* in terms of becoming a more sustainable region?
 - a. Do you think traffic congestion has a role to play in this process?

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