Greater Vancouver Trip Diary Survey

2004

BRITISH COLUMBIA
Ministry of Transportation

TRANSLINK
Greater Vancouver Transportation Authority

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Acknowledgements & Contact

The 2004 Greater Vancouver Trip Diary Survey was jointly funded by the British Columbia Ministry of Transportation (MoT) and the Greater Vancouver Transportation Authority (GVTA).

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1 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to present information on the daily travel characteristics of GVRD residents observed in the recently completed 2004 Trip Diary Survey. The characteristics and trends identified in this survey also serves to highlight why transportation remains a significant public concern. The survey information will be used in responding to the needs of the region for an improved transportation system as a whole.

1.2 BACKGROUND

Travel surveys are invaluable in providing a synopsis of the travel characteristics of the region's residents and emerging trends. They provide an indication of the effectiveness of past transportation investments and programs in achieving regional transportation objectives. They also help to identify future needs for improving the region's transportation system. In addition, a survey such as this is used to update computer models that are used to forecast future travel demands and develop plans and projects to respond to those needs.

Surveying travel behaviour and updating computer models on a regular basis (typically 3 to 5 years) is a practice of most major cities throughout the world. Trip diary surveys have been periodically conducted in the Greater Vancouver region over the last 20 years, most recently in 1994 and 1999.

The 2004 Trip Dairy Survey was funded by the BC MoT and the GVTA and included all municipalities in the GVRD.

The 2004 survey was conducted in the spring of 2004, from late March to the end of April. The Mustel Group prepared the survey design and conducted the surveys, and TSi Consultants provided overall project management and preliminary analysis of the survey data. The report presents the results of the 2004 survey and also draws some comparisons with the 1994 and 1999 trip diary surveys[1].

1.3 REPORT STRUCTURE

Following this brief introduction, an overview of the survey methodology and survey responses is provided in Section 2. Section 3 presents an analysis of the regional demographic and transportation supply trends to provide a context for reviewing and assessing the survey results. Section 4 presents the survey findings, including regional travel demand, travel patterns, travel modes (e.g. transit, auto) and travel purposes, as well as other travel characteristics. Finally, Section 5 presents the conclusions.

[1] It should be noted that the 1999 and 1994 surveys were conducted in the fall, while the 2004 survey was conducted in the spring. There can be significant seasonal variations observed in travel characteristics, particularly those related to mode of travel. In presenting the 2004 results, adjustments to the regional transit mode share were made to reflect seasonal variations based on observed transit ridership data by time of year.

2 SURVEY METHODOLOGY & RESPONSES

The 2004 Greater Vancouver[2] Trip Diary Survey was designed to collect information on 24-hour weekday travel characteristics from a random sample of Lower Mainland residents.

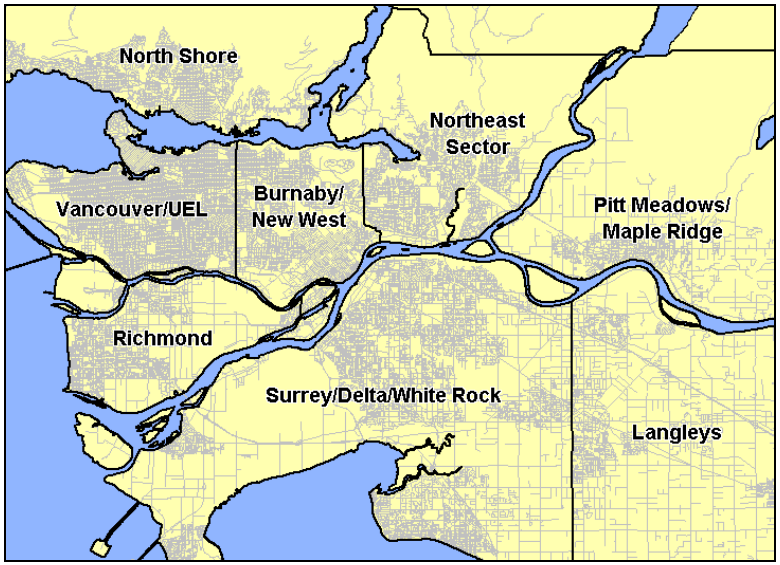
2.1 SURVEY METHODOLOGY

The survey used a group of randomly selected households recruited by telephone. The households, which agreed to participate, were offered either a mail-back questionnaire or a web-based survey. The survey area included all municipalities in the Greater Vancouver Regional District (GVRD) and Fraser Valley Regional District (FVRD), excluding Hope and the Fraser Canyon. Although the survey data was geo-coded to detailed traffic zones for use in the regional computer-based transportation demand forecasting model, for the purposes of this report, the results are presented in eight geographic sub-areas[3] as shown in **Exhibit 1**. The survey was carried out over a six-week period from March 18 to the end of April 2004. After making initial placement calls, approximately 10,200 Greater Vancouver households agreed to participate in the survey.

2.2 SURVEY RESPONSES

Among the 10,200 households surveyed in 2004[4], a total of 4,824 surveys were successfully completed and returned. This resulted in an overall return rate of 47%, or a 0.53% random sample of a total of 913,600 households in the Lower Mainland. This is considered to be a high return rate and shows that people are willing to participate in transportation-related surveys. The survey produced travel records of over 11,100 individuals, with over 37,300 trips.

Exhibit 1: Greater Vancouver Sub-Areas



The analysis of the survey responses revealed that all sub-areas of the Lower Mainland were sufficiently sampled and different household sizes and various age groups were appropriately represented. The survey provides a wealth of information for identifying the travel characteristics of the region's residents and monitoring trends in regional travel behaviour.

[2] A separate report presents results for the Fraser Valley Regional District.

[3] Summary tables and graphs are aggregated based on these geographic sub-regions.

[4] The 1994 and 1994 Trip Dairy Surveys included 1,600 and 3,000 households respectively.

3 REGIONAL CONTEXT

This section provides a brief insight into some of the background changes that influence travel which can help to provide a context upon which to assess changes in travel behaviour. Key background influences are population and employment changes, as well as changes in private automobile ownership and the supply of transit services.

3.1 POPULATION AND EMPLOYMENT TRENDS

The overall population growth in Greater Vancouver slowed down considerably, while job growth increased significantly, when comparing the 5-year periods, from 1994 to 1999, to the period from 1999 to 2004.

As **Exhibits 2 and 3** indicate, population growth in the region slowed down significantly during the period from 1999 to 2004, compared to the period from 1994 to 1999. The region's population grew by 119,600 people (or 5.9%) from approximately 2.01 million in 1999 to 2.13 million in 2004. This represents a growth of approximately 23,900 people or 1.2% per year. This is significantly slower than the earlier period from 1994 to 1999 when the region's population grew by 264,000 (or 15.1%), from approximately 1.75 million in 1994 to 2.01 million in 1999, representing a growth of approximately 52,800 people or 3.0% a year.

While the population growth slowed down during the period from 1999 to 2004, the region's jobs grew faster than the previous period from 1994 to 1999. The region gained 96,500 jobs (or 10.6%), from 899,700 in 1994 to 986,400 in 1999. This represents a growth of 19,300 jobs (or 2.1%) per year. Growth in jobs accelerated during the period from 1999 to 2004, growing by 135,000 (or 13.4%) over the 5-year period, translating to approximately 27,000 jobs (or 2.6%) per year.

Exhibit 2: GVRD Population and Employment[5] (1994-2004)

	1994	1999	2004
Population	1,800,700	2,013,200	2,132,800
Employed Labour Force	908,900	1,005,400	1,140,400

Exhibit 3: GVRD Population and Employment Change

Growth Over 5 Years	**1994-1999**		**1999-2004**	
Population	212,500	11.8%	119,600	5.9%
Employed Labour Force	96,500	10.6%	135,000	13.4%
Average Growth Per Year				
Population	42,500	2.4%	23,920	1.2%
Employed Labour Force	19,300	2.1%	27,000	2.7%

Population and job growth places increased pressure on regional transportation infrastructure, especially the road system which has not expanded substantially over the five-year period. The largest population growth occurred in the areas outside the core municipalities where a higher share of automobile trips are made compared to the inner parts of the region. The continued dispersal of jobs into outer municipal office parks makes it even more challenging to serve by transit services.

[5] Sources: Population estimates from BC STATS and Employed Labour Force from Statistics Canada's Labour Force Survey.

3.2 RAPID POPULATION GROWTH OUTSIDE THE CORE MUNICIPALITIES

The largest population growth over the period 1999-2004 has been in the outer parts of the region, with the Surrey/Delta/White Rock and Langley Sub-areas accounting for approximately 39% of the region's population growth.

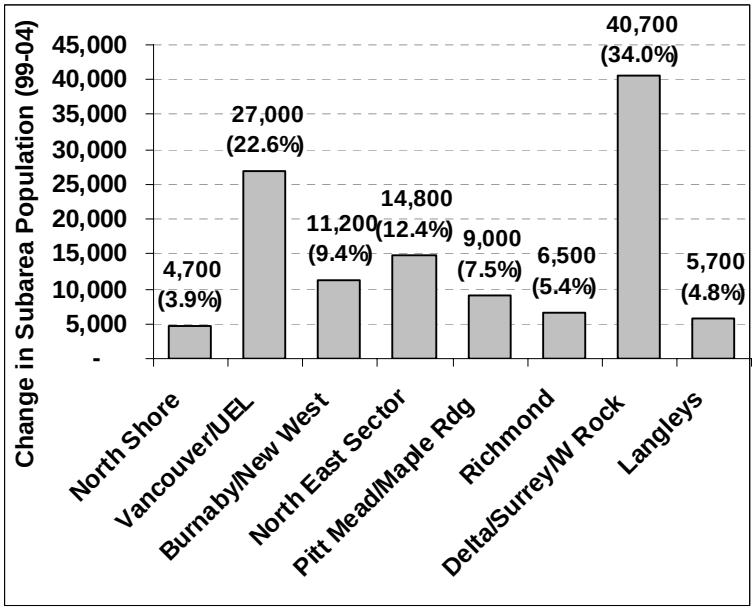
Employment has continued to become more dispersed in the last 10 years (50% of the new office jobs have gone into outer municipal office parks versus only 7% into regional town centres).

According to BC Stats, the highest growth between 1999 and 2004, in terms of absolute population numbers, was observed in the Surrey/Delta/White Rock sub-area with an addition of 40,700 people, accounting for 34% of the region's growth for the 5-year period (**Exhibits 4 and 5**). Vancouver/UEL followed with an increase of 27,000 people, while the Northeast Sector sub-area ranked third, with an increase of 14,800 people.

Exhibit 4: Population Growth from 1994, 1999 and 2004

	Population			Change	
Sub-Area	**1994**	**1999**	**2004**	**1994-1999**	**1999-2004**
North Shore	172,200	181,600	186,300	9,400	4,700
Vancouver/UEL	520,200	566,200	593,200	46,000	27,000
Burnaby/New West	228,000	250,000	261,300	22,000	11,300
North East Sector	164,200	191,700	206,500	27,500	14,800
Pitt Mead/Maple Rdg	68,300	77,700	86,700	9,400	9,000
Richmond	143,900	166,200	172,700	22,300	6,500
Delta/Surrey/W Rock	404,200	465,600	506,300	61,400	40,700
Langleys	99,600	114,300	120,000	14,700	5,700
Total	**1,800,600**	**2,013,300**	**2,133,000**	**212,700**	**119,700**

Exhibit 5: Population Growth by Sub-Areas (1999-2004)



Note: percentage in brackets represents the share of total regional population growth.

Another key observation is that with the exception of Pitt Meadows/Maple Ridge, the population growth in the GVRD sub-areas slowed down in the period of 1999 to 2004, when compared to the period from 1994 to 1999 (**Exhibit 4**). For example, the Vancouver/UEL sub-area grew by 27,000 (or 5,400 people per year) in the period from 1999 to 2004. This is approximately half of the growth for the 1994-1999 period, in which population grew by 46,000 (or 9,200 people a year). The growth in Richmond also showed a decline, dropping from 22,300 (or 4,500 people a year) to 6,500 (or 1,300 people per year), when comparing the same two periods.

The Surrey/Delta/White Rock sub-area's share of the region's population growth increased, while the shares of the Vancouver/UEL and Richmond sub-areas declined. Most noticeable are the population growth trends taking place in the Surrey/Delta/White Rock, Pitt Meadows/Maple Ridge and Richmond Subareas. Comparing the 1994-1999 period and the 1999-2004 period, the share of Surrey/Delta/White Rock increased from 28.9% to 34% and that of Pitt Meadows/Maple Ridge went up from 4.4% to 7.5%. Richmond's share of population growth, on the other hand, declined from 10.5% to 5.4% (**Exhibits 6 & 7**).

Exhibit 6: Percent of Sub-Area Population Growth (99-04)

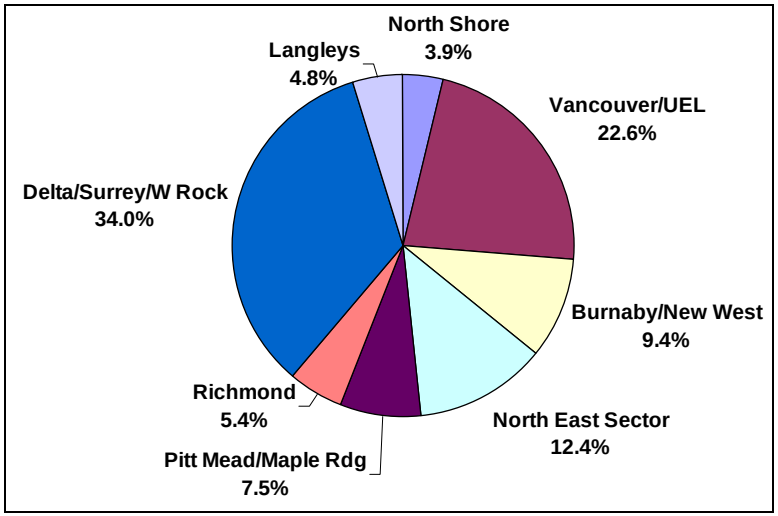
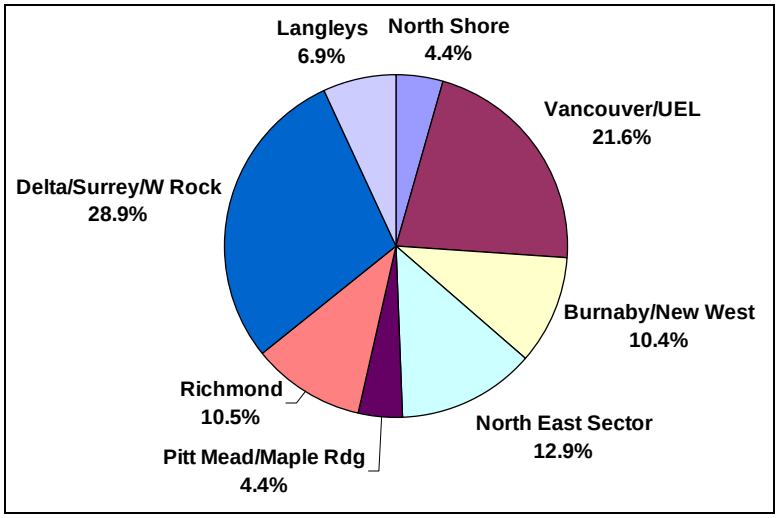


Exhibit 7: Percent of Sub-Area Population Growth (94-99)



3.3 Steady Growth in Employment

Employment has grown steadily in the region over the past five-year period from 1996 to 2001. The majority of this growth has occurred outside of the central area.

Employment[6] in the Greater Vancouver Region has grown steadily between the period from 1996 to 2001[7]. **Exhibit 8** shows that the net increase in the number of jobs in the region is almost 80,000. This increase represents a regional average growth of 8.6% over the five-year period.

[6] Employment differs from the employed labour force in that employment represents the number jobs and the employed labour force represents the number of people that are employed.

[7] Sub-regional employment data is only available during census years (1996, 2001, etc.)

Exhibit 8: Growth in Employment[8] by Sub-Area (1996-2001)

	Employment		Growth	
Sub-Area	**1996**	**2001**	**Absolute**	**Percent**
North Shore	60,903	61,777	874	1.4%
Vancouver/UEL	320,843	324,823	3,980	1.2%
Burnaby/New West	121,170	132,965	11,795	9.7%
Northeast Sector	47,670	54,365	6,695	14.0%
Richmond	89,960	103,725	13,765	15.3%
Surrey/Delta/WR	130,115	149,435	19,320	14.8%
Pitt M/Maple R	17,990	20,310	2,320	12.9%
Langleys	39,624	46,395	6,771	17.1%
No Fixed Workplace	88,950	102,595	13,645	15.3%
Total	**917,225**	**996,390**	**79,165**	**8.6%**

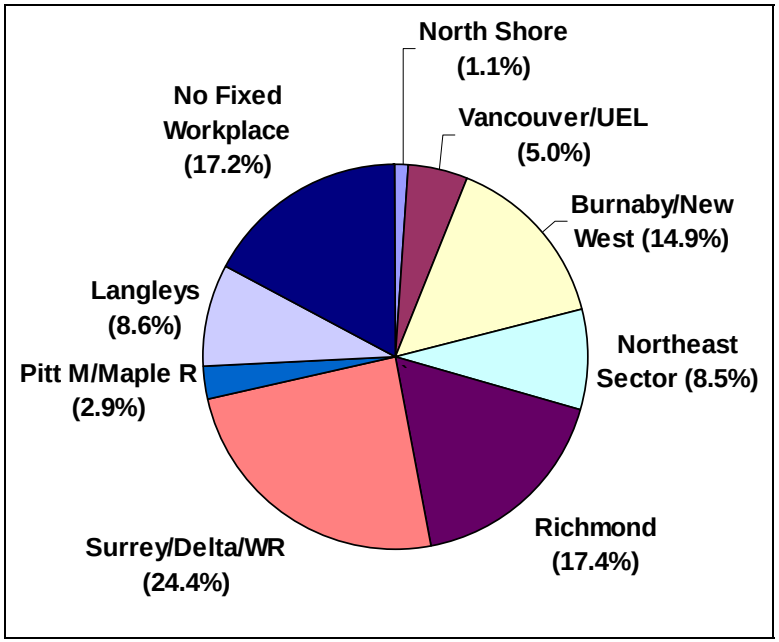
The growth in employment varies significantly among the sub-areas of the region. In absolute terms, the Surrey/Delta/White Rock sub-area has experienced the highest growth with an addition of 19,300 jobs. The Langley sub-area has shown the highest percentage growth of 17.1%. A large proportion of new jobs fall into the 'no fixed workplace' category which entails a job with a changing worksite (eg. taxi driver, travelling sales-person, etc.).

The sub-area share of regional employment growth is shown in **exhibit 9**. The Surrey/Delta/White Rock sub-area has the largest share of the regional growth in employment at 24.4%. Over half of the regional employment growth has occurred in the Burnaby/New Westminster, Surrey/Delta/White Rock, and Richmond sub-areas.

A large proportion of job growth has occurred in the 'no fixed workplace' category. These types of jobs require a high degree of mobility throughout the work day. This trend in a more mobile work force might help explain the increase in midday travel as shown in section 4.4.

[8] Source: Employment figures from Census Data, Statistics Canada.

Exhibit 9: Share of Employment Growth (1996-2001)



The dispersal of employment to outer municipalities is highlighted by the growth in office parks in those municipalities. According to the GVRD's Office Market report[9], in the period from 1990 to 2000, 50% of new office jobs have gone into office parks in the outer municipalities, while only 7% have located in the regional town centres.

[9] Source: Greater Vancouver Regional District, *The GVRD Office Market: Supply, Demand and Spatial Distribution*, December 2001.

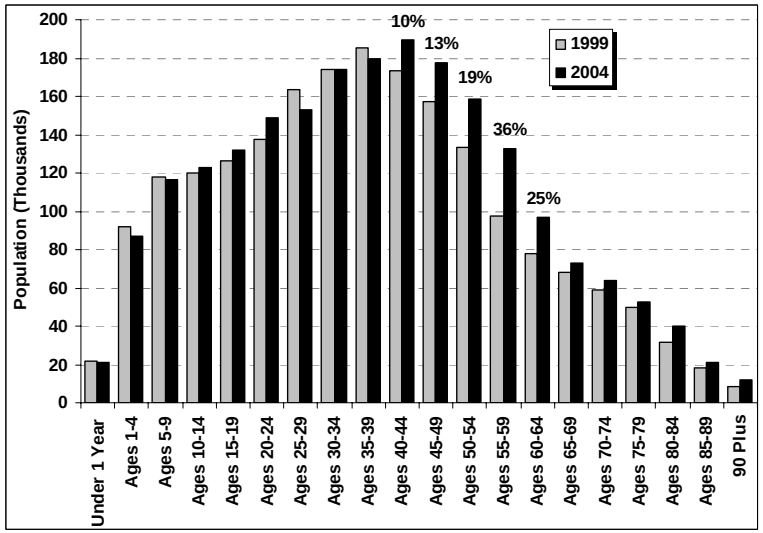
3.3 AGING POPULATION

The residents of Greater Vancouver continue to age as the 'baby boom' generation begins to leave the labour force after reaching retirement age. In the period from 1999 to 2004, the average age in the region increased from 36.8 to 38.2 years.

An aging population has significant impacts on the demands for transportation services and infrastructure because people's trip making behaviour changes over time. For example, people in older age groups tend to make trips during the midday period rather than during the peak periods and they will have different needs in the design of regular and accessible transit services. **Exhibit 10** shows the population by age groups for 1999 and 2004, with the percentages in the chart highlighting the significant increases for some older age groups.

As shown in the **Exhibit 10**, every age group older than 40 has seen a substantial increase in its share of population. For instance, the age group of 55-59 years old has increased by 36% and the age group of 60-64 has grown by 25%. As a result, the regional average age has increased from 36.8 to 38.2 in the five-year period from 1999 to 2004. This reflects the aging of the 'baby boomers' and the fact that some of them have already started to reach retirement age.

Exhibit 10: Population by Age Groups (1999-2004[10])



3.4 HIGH VEHICLE OWNERSHIP

Vehicle ownership continues to grow at 3.3 additional vehicles per hour, a rate higher than that of population growth from the period 1999 to 2004.

The number of registered and insured vehicles in the GVRD grew by over 143,400 vehicles, a growth of 12.5% for the five-year period from 1999 to 2004. This is faster than that of population growth, which grew by 119,600 people (or 5.9%) during the same time period. This may in part reflect the high job growth in the region and the significant increase of high-

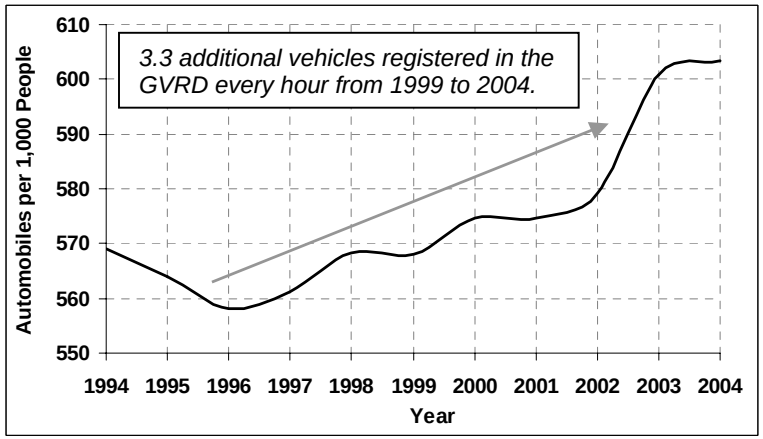
[10] Population estimates by age group are produced by the Population Section of BC Stats, Ministry of Management Services, Government of British Columbia.

income earning age groups of 35-65, from 40.9% to 43.5% of the total population.

Exhibit 11 shows the trend in the number of registered vehicles per person in the Greater Vancouver region over the last ten years. To put this growth into perspective, this is equivalent to approximately 3.3 additional vehicles insured and registered in the GVRD every hour during the five-year period from 1999 to 2004. The rapid growth in vehicle ownership results in an upward trend, with over 600 vehicles per 1,000 people in 2004, up from approximately 570 vehicles per 1,000 people in 1999 and 1994.

In 2004, there were close to 1.29 million vehicles registered in the GVRD. With only a minimal increase in road space over the years, increased vehicle ownership together with population and job growth places enormous pressures on the region's transportation system.

Exhibit 11: Automobiles per 1,000 People (1994-2004[11])



[11] Source: Insurance Corporation of British Columbia.

3.5 IMPROVED TRANSIT SUPPLY AND CHOICE

Transit supply (in terms of service hours) has exceeded the growth in population in the five years from 1999 to 2004.

In terms of transit supply, with the exception of 2001 (when there was a stoppage in bus service), there has been a steady increase in vehicle service hours[12] provided (buses, SeaBus, West Coast Express and SkyTrain), at a growth of 13.0% from 4.15 million hours to approximately 4.69 million hours, between 1999 and 2004 respectively. This is a similar level of growth compared to the previous period from 1994 to 1999 when service hours grew by 10.8% from 3.60 million hours to 4.15 million hours. Some of the transit improvements include opening of the Millenium SkyTrain line, more B-Line and express services and other bus improvements.

The improvements in transit supply have contributed to a 23.8% increase in annual passengers[13] from approximately 126 million in 1999 to 156 million in 2004. Of particular significance is the impact of the U-Pass program at UBC and SFU. TransLink introduced the U-Pass program in 2003 with sponsorship support from VanCity Credit Union. About 60,000 UBC/SFU students participated in the program, which produced ridership increases of 53% at UBC and 39% at SFU.

[12] A transit service hour is one vehicle in service for one hour.

[13] A passenger (often referred to as a transit revenue passenger) is a transit trip from an origin to a final destination and could involve multiple boardings. For example from Metrotown to UBC via SkyTrain and then bus involves one revenue passenger trip, but two boardings.

4 SURVEY FINDINGS FOR THE GVRD

4.1 PEOPLE ARE TRAVELLING MORE – TRIP MAKING IS GROWING FASTER THAN POPULATION

The number of trips being made by GVRD residents has grown by 16.5% while population has grown by 5.9% since 1999.

The 1999 Trip Dairy Survey showed that the total number of daily one-way trips made by GVRD residents grew from around 4.8 million in 1994 to 5.5 million in 1999, a 14.6% increase, higher than population growth (10.6%) and just under the growth in auto ownership (15.6%) during the same period. This trend continued for the period 1999-2004, when the total daily trips made by GVRD residents grew from 5.5 million in 1999 to 6.4 million in 2004, a 16.5% increase during the five-year period. This is higher than both the regional population growth rate of 5.9% and the growth in auto ownership of 12.6% during the same period (**Exhibit 12**).

Population and employment growth alone were insufficient to account for the scale of this increase. One of the key factors contributing to this increase was the outer municipal location of much of the population and employment growth. Consequently, the share of regional trips from Surrey/Delta/White Rock and Richmond have all increased over the last five years (see more detailed discussion in Section 4.5).

Exhibit 12: Growth in Regional Trips, Population[14] and Registered Vehicles[15]

			Change	
	1999	2004	Absolute	Percent
Daily Trips	5,478,400	6,383,600	905,200	16.5%
Population	2,013,200	2,132,800	119,600	5.9%
Vehicles	1,143,400	1,286,900	143,500	12.6%

4.2 MORE TRIPS MADE PER PERSON, PARTICULARLY BY SENIORS

People are making more trips increasing the daily trip rate from 2.93 trips per person in 1999 to 3.17 trips per person in 2004[16]. Of particular significance is the trip making behaviour of an aging population as people in older age groups tend to drive more.

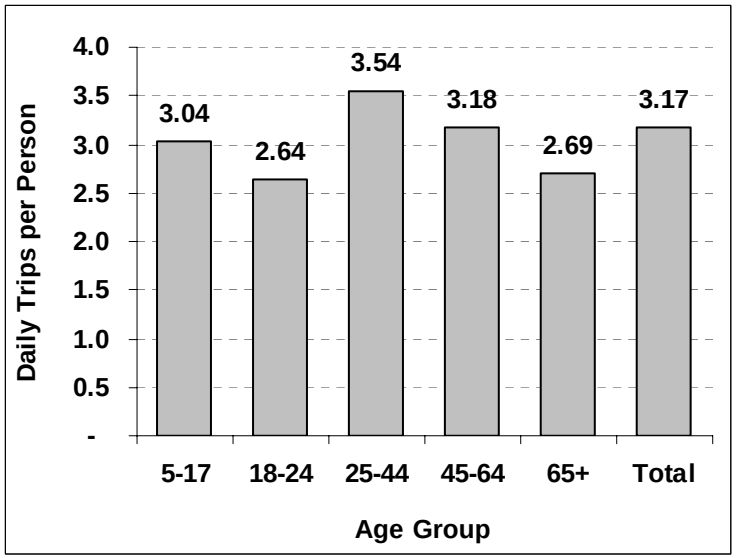
Exhibit 13 shows daily trips per person by age group for 2004 and highlights the significant number of trips made by people aged 45 and older. This probably reflects the aging of "baby boomers" and may support anecdotal evidence that people in older age groups are leading more active lifestyles.

[14] Source: Population Section, BC Stats, Ministry of Management Services, Government of British Columbia.

[15] Source: Insurance Corporation of British Columbia.

[16] As explained later in Section 4.11, the 2004 Survey was methodologically different from 1999 as more effort was put in for call backs on incomplete responses.

Exhibit 13: 2004 Daily Trips per Person by Age Group

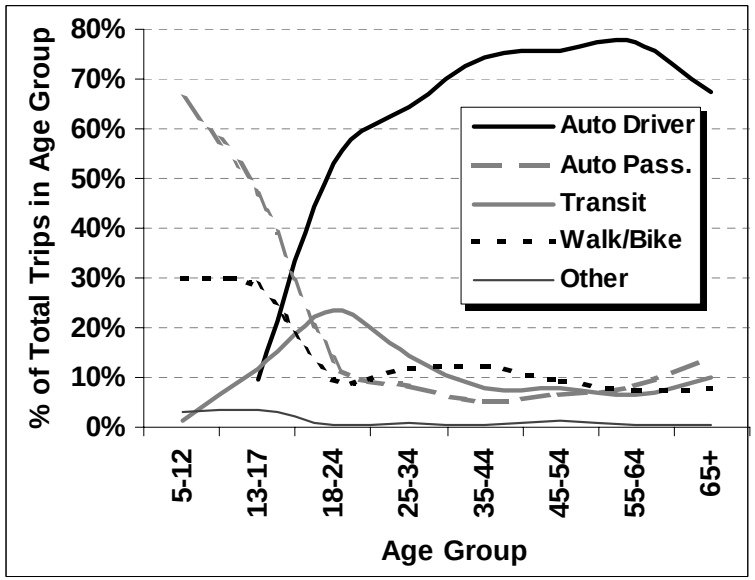


As people enter the work force age groups (18-64), their disposable income generally increases with a corresponding increase in auto ownership.

As shown in **Exhibit 14**, auto use for the age groups 18 years old and over continues to increase significantly up to the 55-64 age group. There is a corresponding drop in non-auto modes of travel as people enter the 18-24 age group and beyond. Auto passenger, walk/bike and other trips decrease sharply as people enter this age group. The aging of the population and the increase in driving presents a challenge to increasing the share of trips made by transit.

Transit use peaks in the 18-24 age group, which is also illustrated in **Exhibit 14**. The proportion of transit use in this age group has increased since 1999, probably due, in part, to implementation of the U-Pass program at UBC and SFU. From 1999 to 2004, the proportion of people using transit in the 18-24 age group has increased from 22% to over 23%.

Exhibit 14: Mode of Travel by Age Groups (2004)



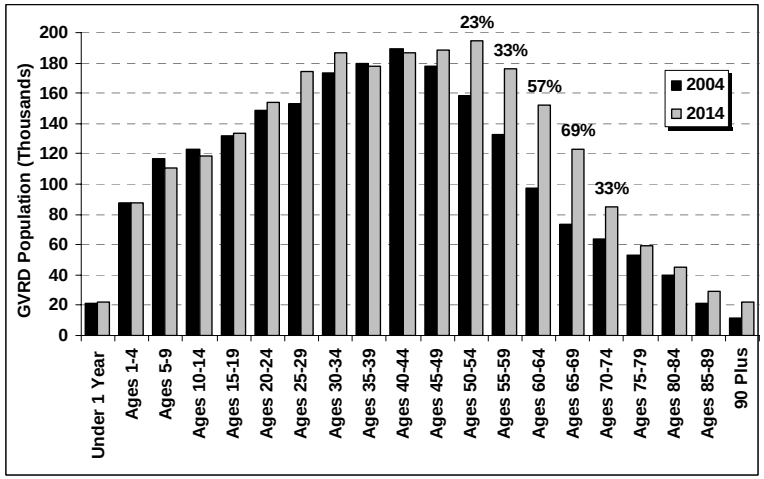
4.3 AGING POPULATION WILL HAVE CHANGING TRANSPORTATION NEEDS

Greater Vancouver has an aging population as the 'baby boomers' move into older age groups. Travel making behaviour will change significantly over the next ten years as more people enter into retirement age.

By 2014, the increase in the number of people moving into older age groups will create new and varied transportation needs. The following graph illustrates the shift in the number

of people entering older age groups over the ten years from 2004 to 2014 (**Exhibit 15**).

Exhibit 15: Population Age Distribution (2004, 2014[17])



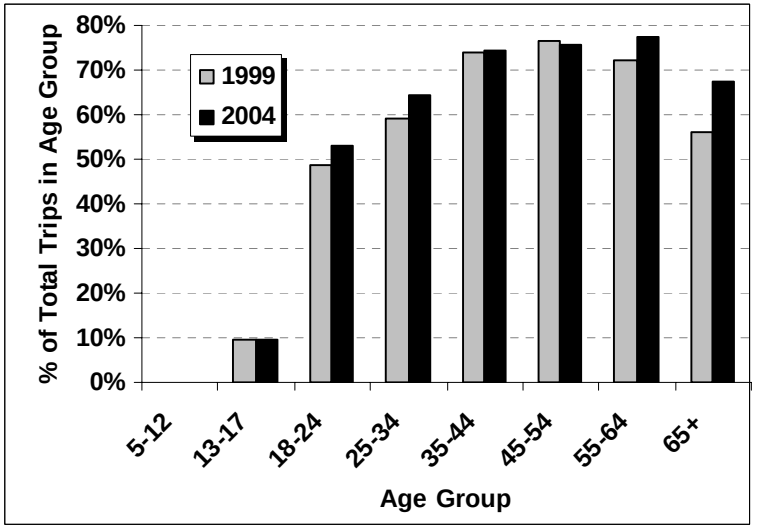
As is shown in the above illustration, a large proportion of the Greater Vancouver population will be entering older age groups (ages 50-74). By 2014, the population aged 50 and older will make up 36.5% of the population, whereas in 2004 they only made up 30.3% of the population.

Exhibit 16 shows a comparison of the proportion of auto driver trips between the 1999 and 2004 surveys. It is apparent from this illustration that auto trip making behaviour by age groups has remained relatively constant over the past 5 years.

Assuming that the proportion of people choosing a particular mode of travel today remains constant within the age groups, by 2014 there should be a considerable shift in the proportion of trips made by auto as people age.

Since people in middle age and older age groups have a higher propensity to make auto trips, and because the number of older people is expected to increase significantly over the next ten years, the proportion of auto trips is expected to increase based on today's travel behaviour.

Exhibit 16: Proportion of Auto Trips by Age Group[18]



[17] 2014 population projections are produced by the Population Section of BC Stats, Ministry of Management Services, Government of British Columbia. The P.E.O.P.L.E. 29 regional population projections account for not only aging but many other factors such as migration at the intra-provincial, inter-provincial and international levels.

[18] The increase in auto use in the 55+ age groups might be due to the fact that more people are driving more. The increase could also be attributable to survey methodology as more effort was made with call-backs in the 2004 survey. The call-backs might improve reporting of personal business travel.

4.4 MOST TRIPS MADE DURING MIDDAY PERIOD

Midday trips have increased the most accounting for over 1/3 of daily trips in 2004 as peak period travel spreads to other parts of the day.

Exhibit 17 shows the share of trips throughout the day. Travel during the midday period grew significantly and accounts for 34.6% of the daily trips in the 2004 survey. It is followed by the afternoon peak period which accounts for over a quarter of daily trips. Travel during the morning and afternoon peak periods grew the least, as the level of growth during off-peak periods indicates that capacity constraints and the changing nature of trips are likely limiting the amount of trip growth during the peak periods. Peak period travel seems to be spreading to other parts of the day as more trips are being made during non-peak periods.

Exhibit 17: Trips by Time of Day

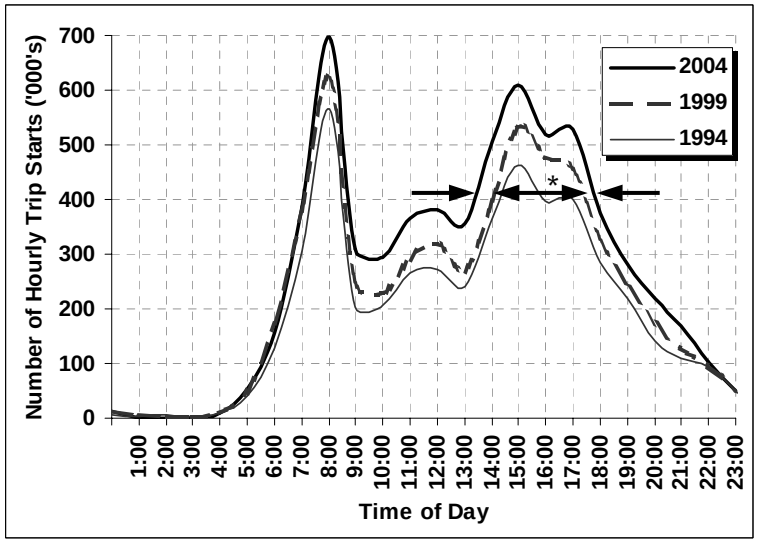
Time Period	Time of Day	Total Trips	Daily Share
Early Morning	12am-6am	78,100	1.2%
AM Peak	6am-9am	1,240,200	19.4%
Midday	9am-3pm	2,211,900	34.6%
PM Peak	3pm-6pm	1,655,800	25.9%
Evening	6pm-12am	1,197,700	18.8%
Daily	**24 Hour**	**6,383,700**	**100%**

4.5 RUSH PERIODS SPREADING TO OTHER PARTS OF THE DAY

The amount of travel has increased significantly causing more congestion and delays to commuters. The rush-hour periods are continuing to spread to other parts of the day.

Exhibit 18 illustrates total trip starts by hour for a 24-hour period. The graph shows the morning and afternoon peak periods when most trip starts are made. The trip start profiles of 1994, 1999 and 2004 are generally similar in shape, but show that trip growth is more prominent during the midday and afternoon rush-hour periods. The high peaks during both the morning and afternoon rush-hour periods show the demand for travel during these times. The increase in demand during the PM peak period has caused the afternoon rush time to increase by almost an hour (peak spreading). This may be due to the constrained capacity of the transportation system that cannot handle the peak period demands and the significant increase in personal business trips that tend to avoid the peak periods, as discussed later in Section 4.11 of this report.

Exhibit 18: Total Trip Starts by Hour (1994–2004)



**Peak Spreading: the afternoon peak period has extended almost one hour since 1999.*

4.6 TRIPS FROM OUTER MUNICIPALITIES CONTINUES TO INCREASE

The share of trips being made from the Vancouver/UEL subarea has declined since 1994. The share of trips being made from the Richmond and Delta/Surrey/WR subareas has increased.

Using the number of daily trips originating from each subarea as an indicator of the amount of travel activity in a particular sub-area, the 1999 Trip Diary Survey identified that Vancouver showed the greatest relative decline in the proportion of regional trip origins followed by the Burnaby/New Westminster sub-area. Conversely, the increase in daily trips from the Richmond and Surrey/Delta/White Rock sub-areas reflected an increase in travelling outside of the core urban area. The 2004 Trip Dairy Survey confirmed that this trend is continuing, although at a reduced rate (**Exhibit 19**).

Exhibit 19: 24-Hour Trip Shares by Subarea (1999–2004)

	1999		2004	
Subarea (Origin)	**Trips**	**Share**	**Trips**	**Share**
North Shore	452,600	8.3%	528,400	8.3%
Vancouver/UEL	1,741,100	31.8%	2,002,200	31.4%
Burnaby/New West	711,200	13.0%	815,600	12.8%
NE Sector	461,600	8.4%	529,300	8.3%
Richmond	482,100	8.8%	596,000	9.3%
Surrey/Delta/WR	1,128,300	20.6%	1,343,800	21.1%
Pitt M/Maple Ridge	173,800	3.2%	194,100	3.0%
Langleys	325,000	5.9%	374,200	5.9%
Total	**5,475,700**	**100%**	**6,383,600**	**100%**

The 2004 Trip Diary Survey shows that the Vancouver/UEL sub-area generated the highest number of trips at 31.4% of the total regional trips. This was followed by Surrey/Delta/White Rock (21.1%) and Burnaby/New Westminster (12.8%). Richmond, the Northeast Sector and the North Shore individually have close to 10% of the regional trip origins.

4.7 INCREASINGLY LESS FOCUSED AND MORE COMPLEX MANY-TO-MANY TRAVEL PATTERNS

The region continues to exhibit complex, many-to-many travel patterns as people's travel is increasingly dispersed. The dispersed nature of trips is more difficult to serve by transit and will increase traffic congestion.

The 2004 Trip Diary Survey further confirms the increasingly complex travel making patterns in the region. The predominant suburb-to-downtown commuting that some other cities experience no longer exists in this region, and has not for quite some time. Instead, people travel from everywhere to everywhere. The majority of trips begin and end somewhere in the outer municipalities (either within one outer municipality or in adjacent outer municipalities).

As shown in **Exhibit 20**, overall a higher proportion of trips are travelling outside of their origin sub-area in 2004 when compared to 1999 (i.e. 27.5% vs. 27.2% of trips leaving their origin sub-area). However, this situation varies significantly between sub-areas. The inner parts of the region have become more self-contained with less trips leaving while the outer areas of the region have become more dispersed with more trips leaving their sub-areas in 2004.

Exhibit 20: Percent of Trips Leaving Origin Sub-Area

	Trips Leaving Sub-Area		
Origin Subarea	**1999**	**2004**	**Change**
North Shore	24.3%	21.6%	-2.7%
Vancouver/UEL	23.1%	21.2%	-1.9%
Burnaby/New West	42.5%	41.0%	-1.5%
NE Sector	29.8%	30.7%	0.9%
Richmond	31.2%	28.9%	-2.3%
Surrey/Delta/WR	19.1%	20.9%	1.8%
Pitt M/Maple Ridge	21.1%	26.1%	5.0%
Langleys	26.3%	29.8%	3.5%
Average	**27.2%**	**27.5%**	**0.4%**

For example, there are fewer people leaving the Vancouver/UEL sub-area for making their trips over the last five years. Similar travel patterns have occurred in the North Shore, Burnaby/New Westminster and Richmond sub-areas as fewer people are leaving these sub-areas for making trips. In comparison, the outer sub-areas have seen an upward shift in trips leaving their origin sub-area.

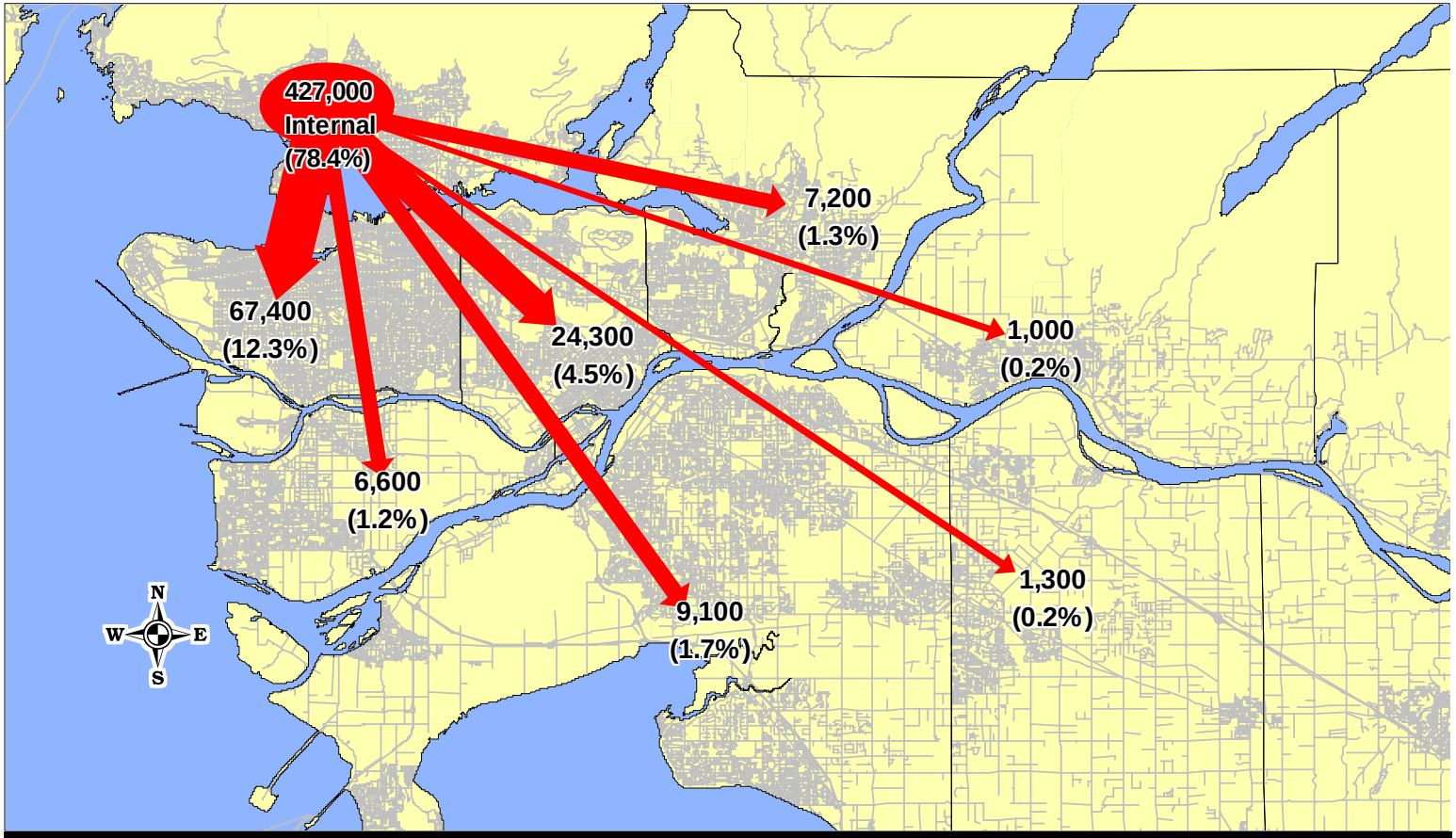
Exhibits 21-28 on the following pages provide the daily travel patterns for each of the eight sub-areas. **Appendix A** contains the travel patterns for the morning peak period (6:00-9:00 am). They again highlight the many-to-many, complex travel characteristics. This is in part due to the growing outer municipalities and the dispersal of jobs. For instance, for all the trips leaving the Surrey/Delta/White Rock sub-area, only 25% are going to Vancouver. Each map also contains a table showing the proportion of trips staying within and leaving the sub-area. These proportions differ from those of the Census Journey to Work information[19], as the Trip Diary numbers represent daily trips for all purposes of travel. The Journey to Work information is strictly for work trip purposes.

The multi-directional nature of daily travel is particularly challenging for the regional transportation system as it is difficult to design and provide effective transit services for these types of trips. This also causes congestion at locations that were not designed to handle the demand from these trip patterns.

[19] The Journey to Work Information is from Statistics Canada's Census, which surveys 20% of the households to gather information on the household member's travel characteristics including origins and destinations, as well as mode of transportation.

Exhibit 21: Distribution of Daily Trips Leaving the North Shore

(West Vancouver, North Vancouver City, North Vancouver District)

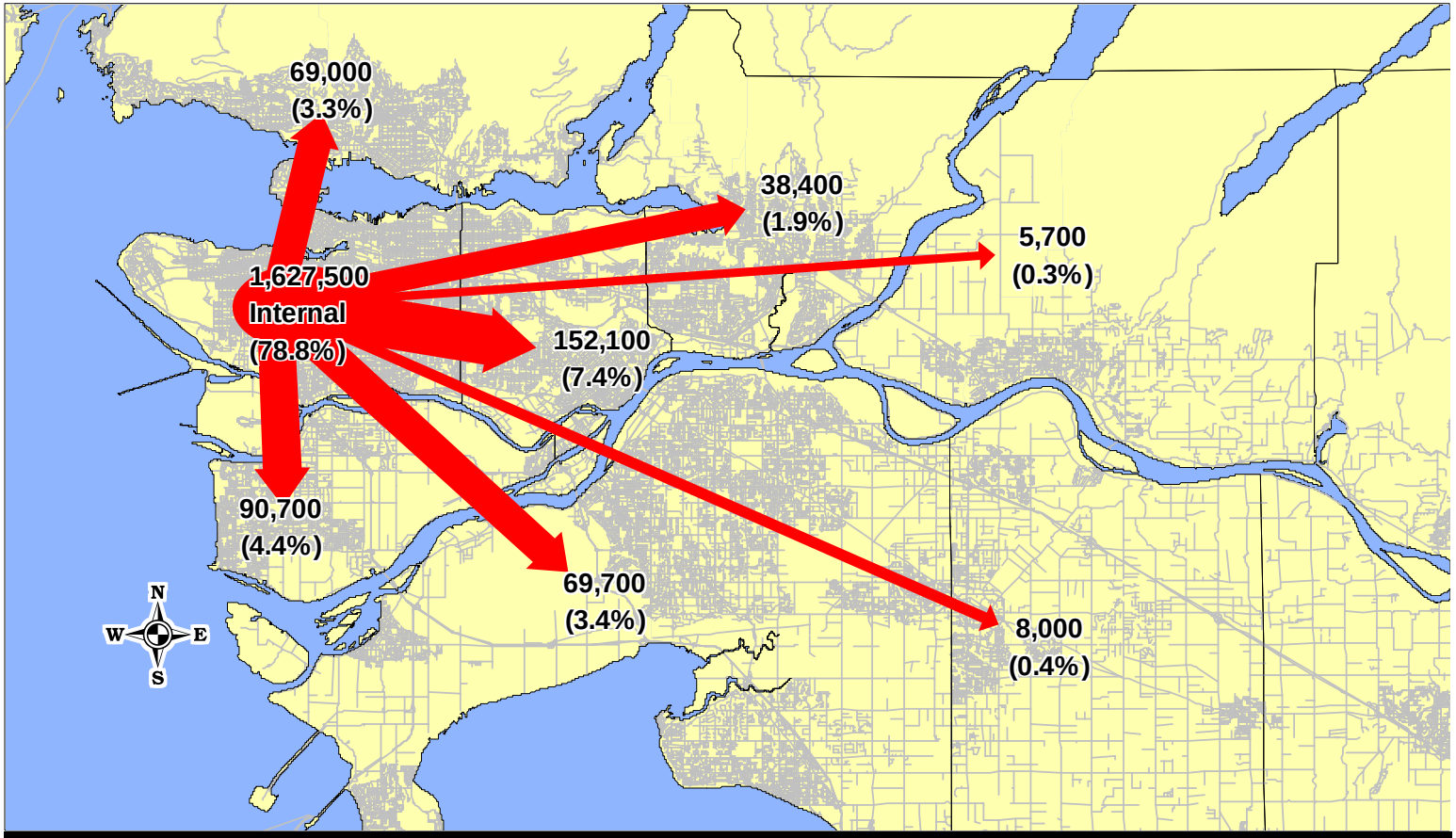


Trips Leaving North Shore Sub-Area

The North Shore sub-area has the lowest number and proportion of trips leaving the GVRD. Of all the trips travelling to other GVRD sub-areas, 58% are destined to Vancouver/UEL and 21% are destined to Burnaby/New Westminster. The remaining trips are evenly distributed to the other Greater Vancouver sub-areas.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	427,000	78.4%
Other Sub-Areas	116,900	21.5%
Outside the GVRD	300	0.1%
Total Trips	544,200	100%

Exhibit 22: Distribution of Daily Trips Leaving Vancouver/UEL

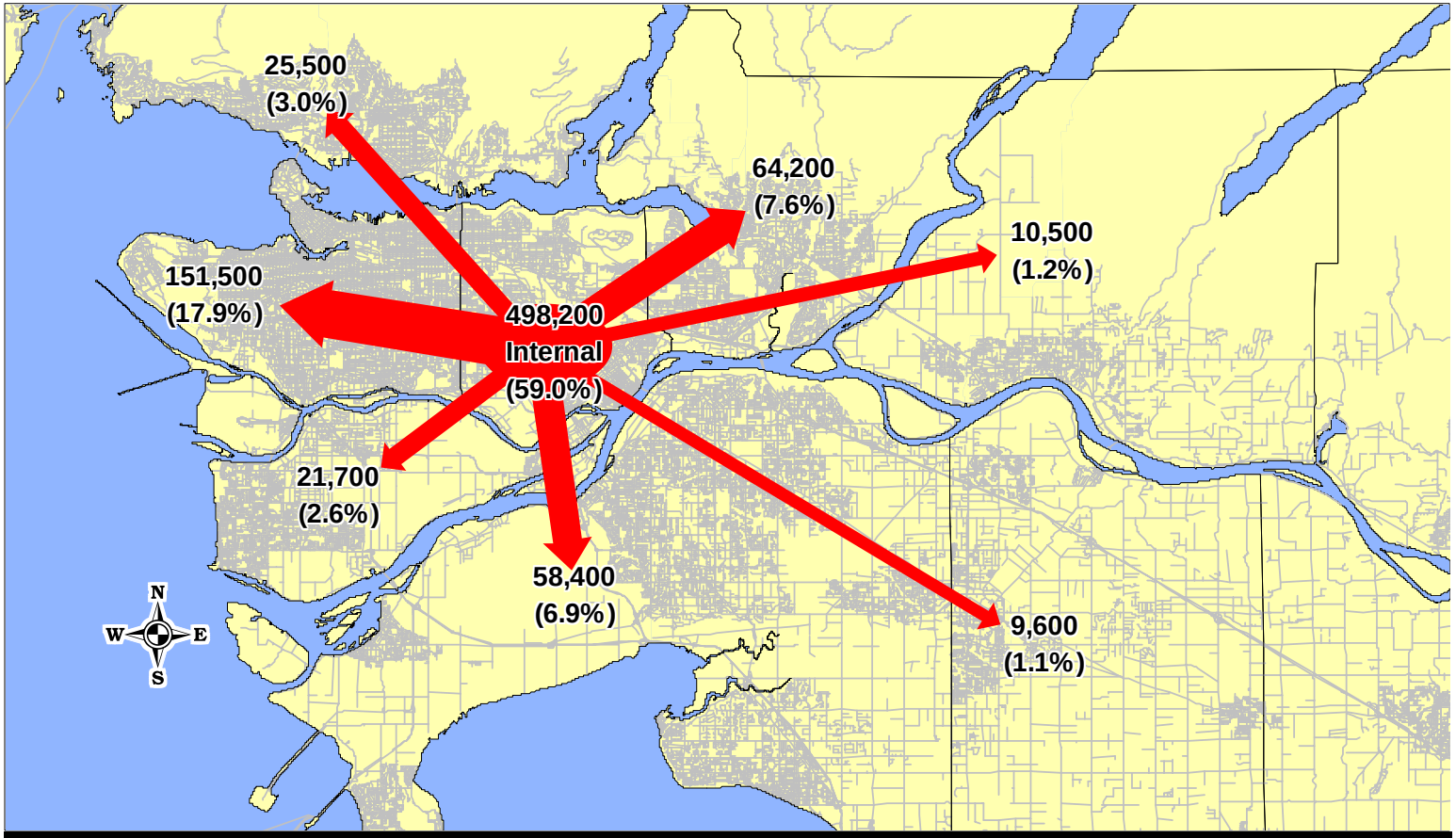


Trips Leaving Vancouver/UEL Sub-Area

The Vancouver/UEL sub-area produces the largest number of trips due to the highest population base. Vancouver/UEL has the second lowest proportion of trips leaving the sub-area. Most of the trips leaving this sub-area are destined to the Burnaby/New Westminster and Richmond sub-areas.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	1,627,500	78.8%
Other Sub-Areas	433,600	21.0
Outside the GVRD	4,000	0.2%
Total Trips	2,065,100	100%

Exhibit 23: Distribution of Daily Trips Leaving Burnaby/New Westminster

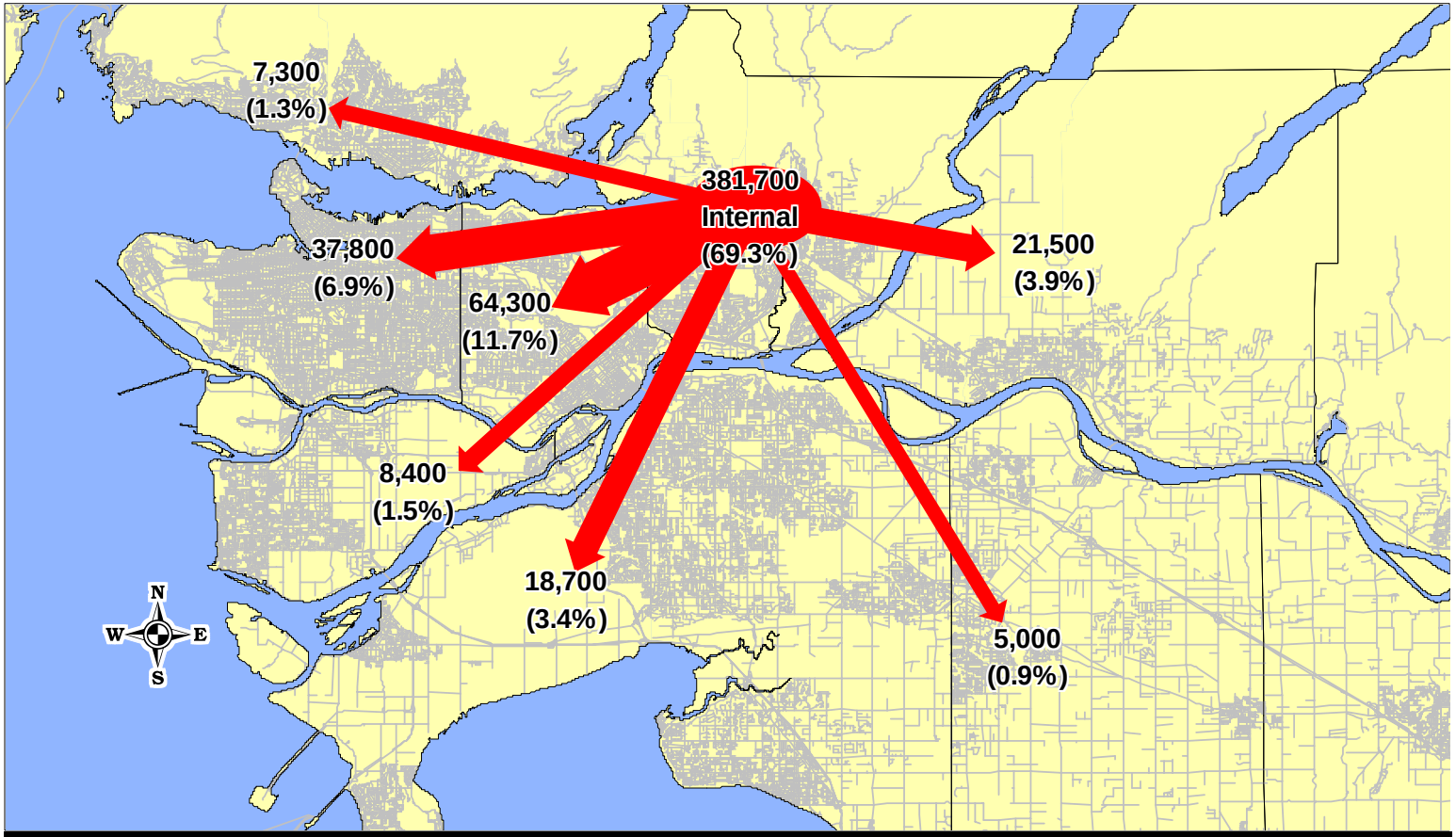


Trips Leaving Burnaby/New Westminster Sub-Area

The Burnaby/New Westminster sub-area has the highest proportion of trips leaving the sub-area at 40%. Most of these trips are travelling to the Vancouver/UEL sub-area. The remaining trips are fairly evenly distributed throughout the rest of the region.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	498,200	59.0%
Other Sub-Areas	341,400	40.4%
Outside the GVRD	4,600	0.6%
Total Trips	844,200	100%

Exhibit 24: Distribution of Daily Trips Leaving Northeast Sector
(Anmore, Belcarra, Port Moody, Coquitlam, Port Coquitlam)

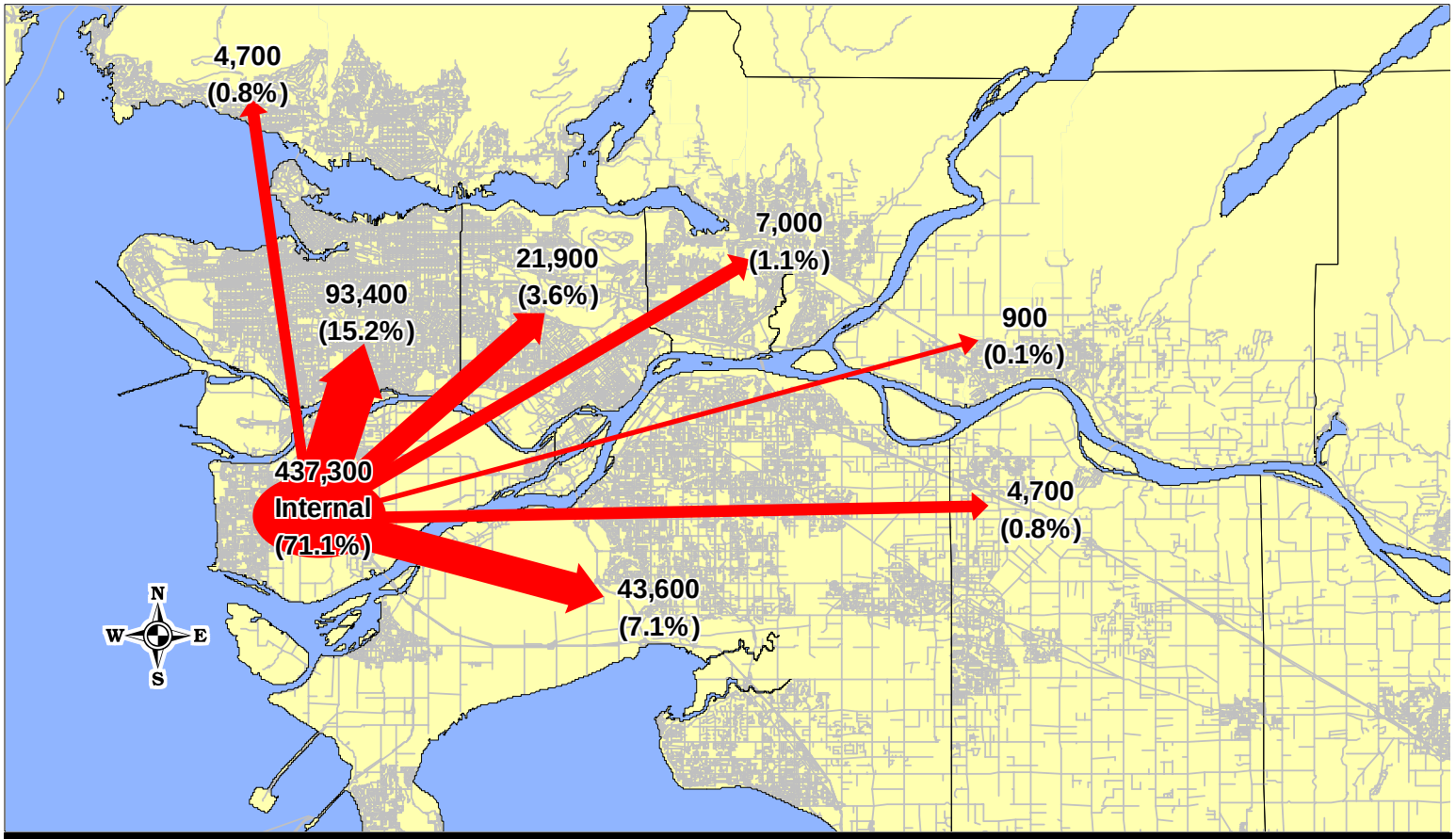


Trips Leaving Northeast Sector Sub-Area

The Northeast Sector sub-area has the second highest proportion of trips travelling to other GVRD sub-areas. Most of these trips are travelling to the Burnaby/New Westminster sub-areas. The remaining trips are fairly evenly distributed throughout the rest of the Greater Vancouver region.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	381,700	69.3%
Other Sub-Areas	163,000	29.6%
Outside the GVRD	5,900	1.1%
Total Trips	550,600	100%

Exhibit 25: Distribution of Daily Trips Leaving Richmond

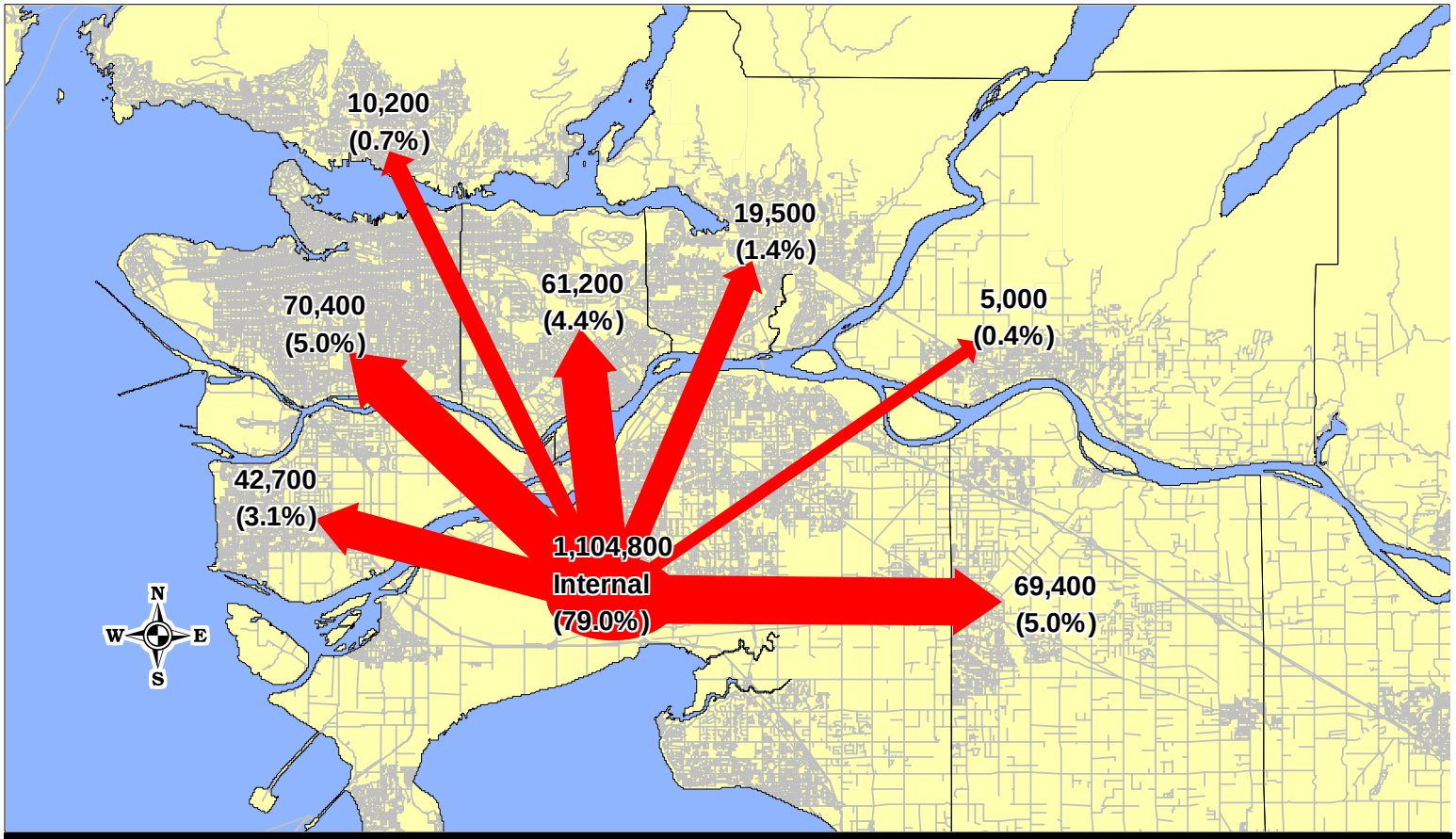


Trips Leaving Richmond Sub-Area

The Richmond sub-area is in the middle ground in terms of the proportion of trips travelling within and outside of the region. Most of the trips leaving Richmond are destined mainly to the Vancouver/UEL and the Surrey/Delta/White Rock sub-areas. Richmond has a very low proportion of trips leaving the GVRD.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	437,300	71.1%
Other Sub-Areas	176,200	28.6%
Outside the GVRD	1,800	0.3%
Total Trips	615,300	100%

Exhibit 26: Distribution of Daily Trips Leaving Surrey/Delta/White Rock

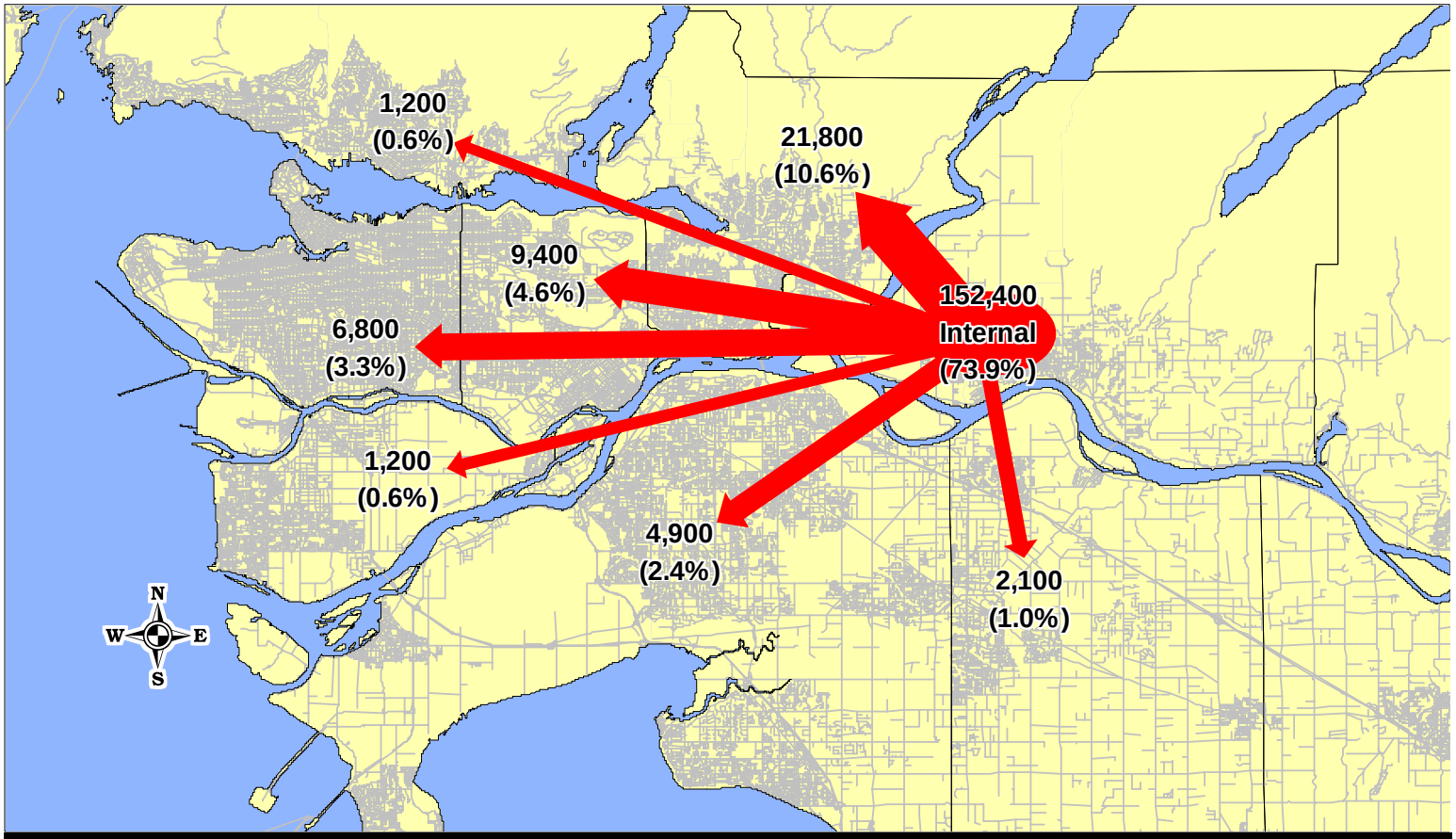


Trips Leaving Surrey/Delta/White Rock Sub-Area

The Surrey/Delta/White Rock sub-area produces the second highest number of total trips on a daily basis. This sub-area also has the highest proportion of internal trips at 79%.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	1,104,800	79.0%
Other Sub-Areas	278,400	19.9%
Outside the GVRD	14,400	1.0%
Total Trips	1,397,600	100%

Exhibit 27: Distribution of Daily Trips Leaving Pitt Meadows/Maple Ridge



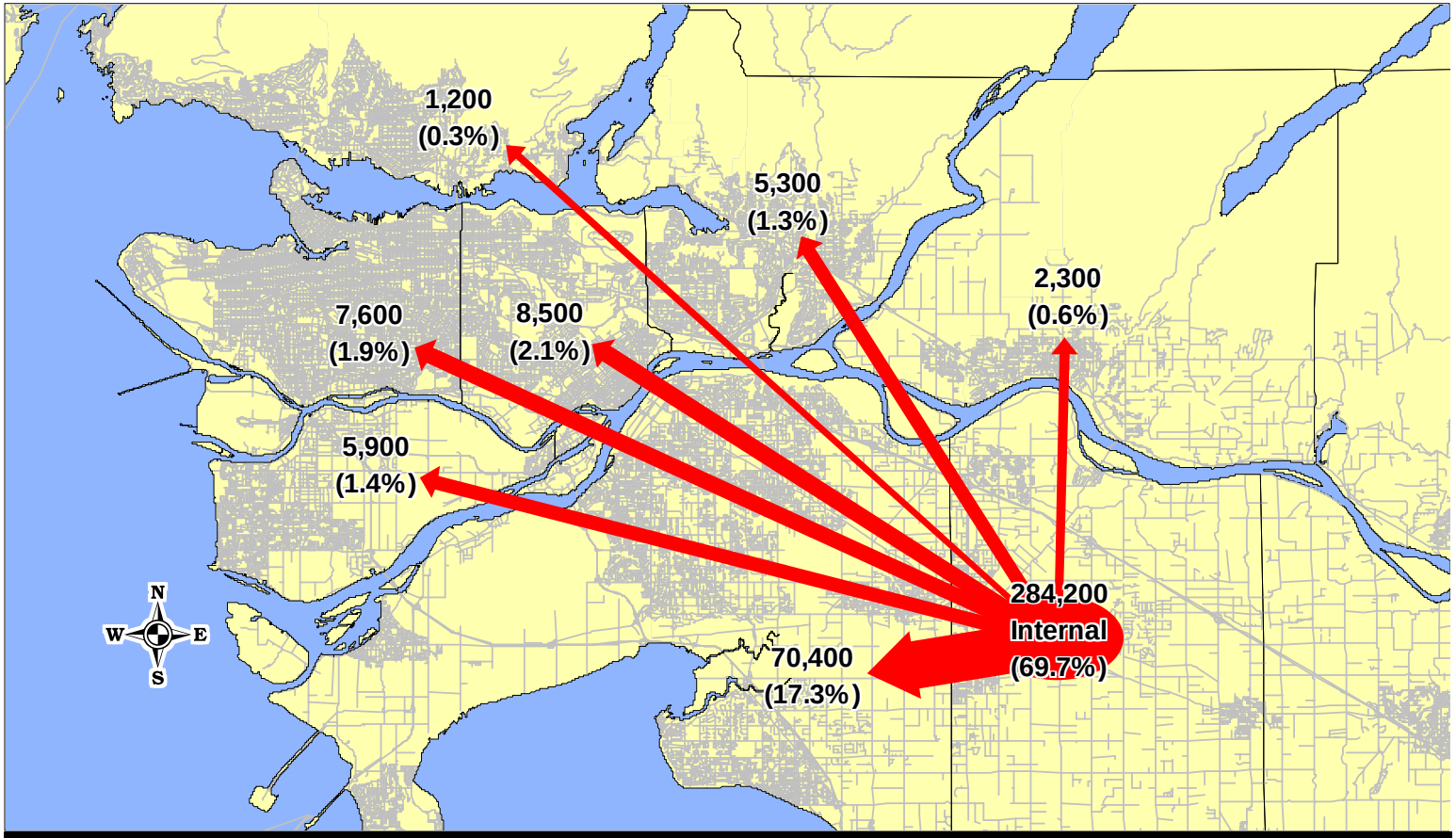
Trips Leaving Pitt Meadows/Maple Ridge Sub-Area

The Pitt Meadows/Maple Ridge sub-area produces the least number of total trips on a daily basis. This does not come as a surprise since this sub-area has the lowest population of all the sub-areas within the GVRD. This sub-area has the second highest proportion of trips leaving the GVRD due to its close proximity to the FVRD.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	152,400	73.9%
Other Sub-Areas	47,400	23.0%
Outside the GVRD	6,300	3.1%
Total Trips	206,100	100%

Exhibit 28: Distribution of Daily Trips Leaving Langleys

(Langley City, Langley District)



Trips Leaving Langley Sub-Area

The Langley sub-area has the highest proportion of trips leaving the GVRD due to its close proximity to the FVRD. The majority of trips leaving the Langley sub-area are destined to the Surrey/Delta/White Rock sub-area highlighting the close ties to neighbouring South of Fraser municipalities.

Trips Destined To:	Number of Trips	Percent
Within Sub-Area	284,200	69.7%
Other Sub-Areas	101,200	24.8%
Outside the GVRD	22,600	5.5%
Total Trips	408,000	100%

4.8 TRANSIT SHARE INCREASING

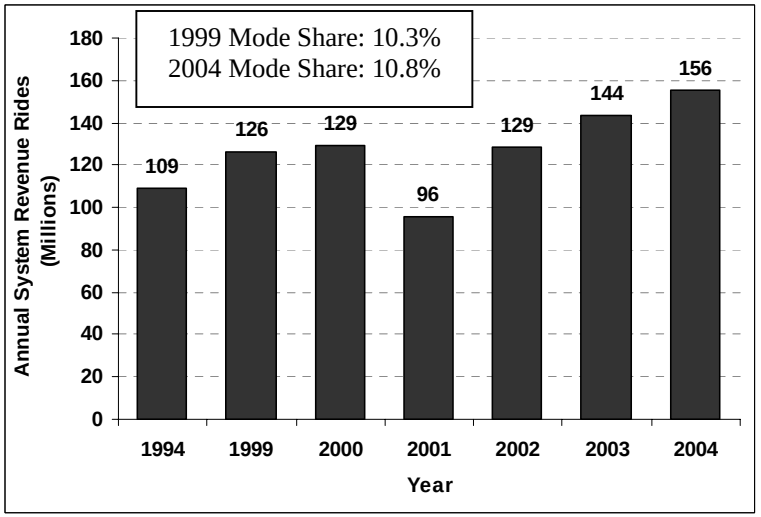
Despite rapid growth in vehicle ownership and outer municipal population growth, the proportion of people taking transit seems to be on the rise, reflecting improved transit investment and services.

As noted earlier, the 2004 Trip Diary Survey was conducted in the spring (late March to the end of April) whereas the 1999 and previous surveys were conducted during the fall (October/November). Observed ridership data shows that transit use in the fall is typically higher. After making a seasonal adjustment based on the observed monthly revenue rides for the last 10 years, the 2004 survey shows that the regional transit share increased from 10.3% in 1999 to 10.8% in 2004. This is more or less in line with trends in the observed system-wide revenue transit ridership, which shows an increase of 23.8% from 1999 to 2004 (**Exhibit 29**).

This is significant considering the long-term trend of growth in outer parts of the region and rapid growth in vehicle ownership and travel demand in the Greater Vancouver region. This reflects the significant improvements the region has made in transit investment and services. As noted earlier in Section 2, for the first time, the increase in transit service hours (24.5%) was greater than the population growth (5.9%) in the region during the period 1999 to 2004. Of particular significance during this period was the impact of the U-Pass program, the introduction of Millennium SkyTrain and significantly expanded bus services.

The number of people using transit at least once per day gives an indication of the proportion of transit users over total residents in the region. The 2004 Trip Diary Survey shows that 13.4% of GVRD residents used transit at least once during a typical weekday. This percent is higher than the transit mode split since some people might use transit for one segment of their daily travel and a non-transit mode for another segment.

Exhibit 29: Annual System Total Revenue Rides[20]



4.9 MIDDAY TRANSIT TRIPS GROWING FASTER THAN PEAK PERIOD TRANSIT TRIPS

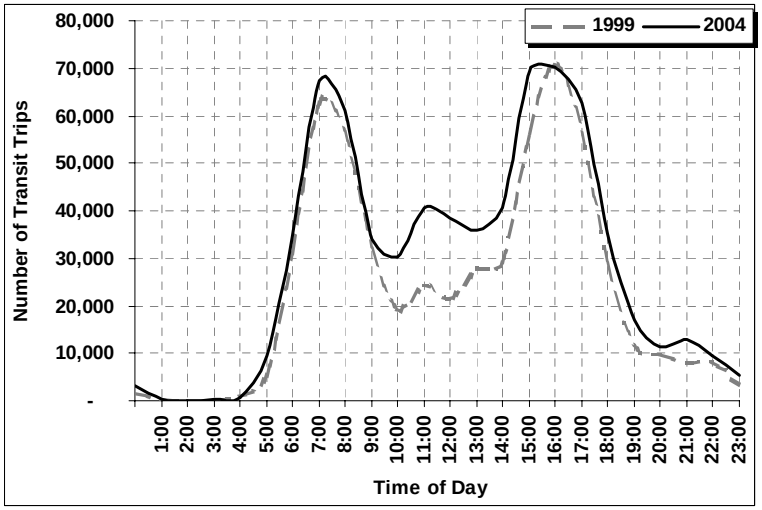
The number of midday transit trips has increased significantly since the 1999 Trip Diary Survey.

Exhibit 30 displays transit trips by hour during the day for the years 1999 and 2004. It shows that transit use during the midday has grown faster than during the peak periods. This reflects the observation made earlier that midday travel in the region has increased by 25% and the peaks are spreading

[20] Revenue rides are the number of fare-paid transit trips. This differs from the number of total boardings as these could include transfer boardings.

into the shoulder hours. This may also be due to increased transit services during the midday period.

Exhibit 30: Transit Trip Starts by Hour (1999–2004)



The proportion of daily transit trips during the midday has increased from 27% to 32% as shown in **Exhibit 31**. A corresponding decrease in the proportion of daily transit trips during the AM and PM peak periods has occurred.

Exhibit 31: Proportion of Daily Transit Trips (1999-2004)

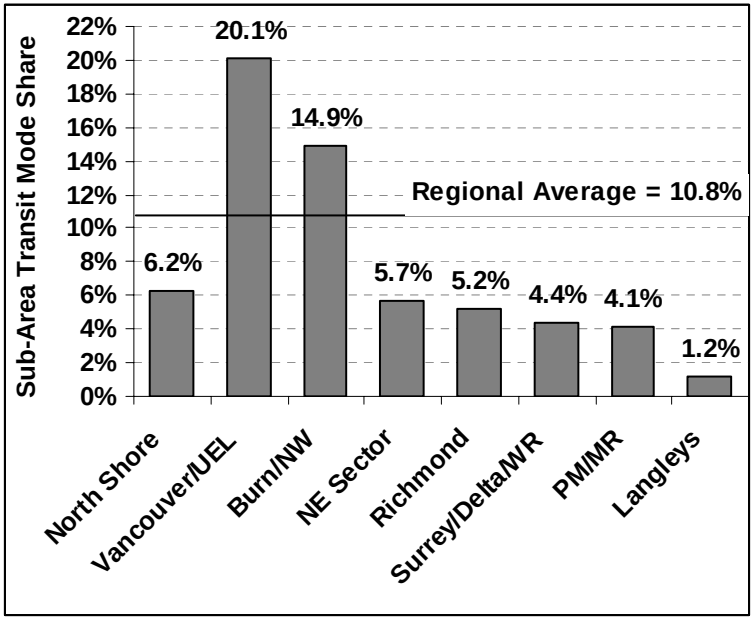
		Proportion of Daily Transit Trips	
Time Period	**Time of Day**	**1999**	**2004**
Early Morning	12am-6am	1%	2%
AM Peak	6am-9am	27%	24%
Midday	9am-3pm	27%	32%
PM Peak	3pm-6pm	32%	29%
Evening	6pm-12am	12%	13%
Daily	**24 Hour**	**100%**	**100%**

4.10 Transit Use varies Significantly Across the Region

The proportion of trips made by transit varies between sub-areas of the region.

While overall transit use increased slightly in the region, there is significant variation across the region. **Exhibit 32** shows daily transit shares by subarea for 2004. While the Burrard Peninsula (i.e. Vancouver, Burnaby and New Westminster) has relative high transit usage, the shares in many municipalities are below the regional average. Again, the dispersed nature of most of these destinations means that the automobile is often a faster and more convenient travel option (and may be the only option), rather than public transit, walking or cycling.

Exhibit 32: Daily Transit Shares by Sub-Area

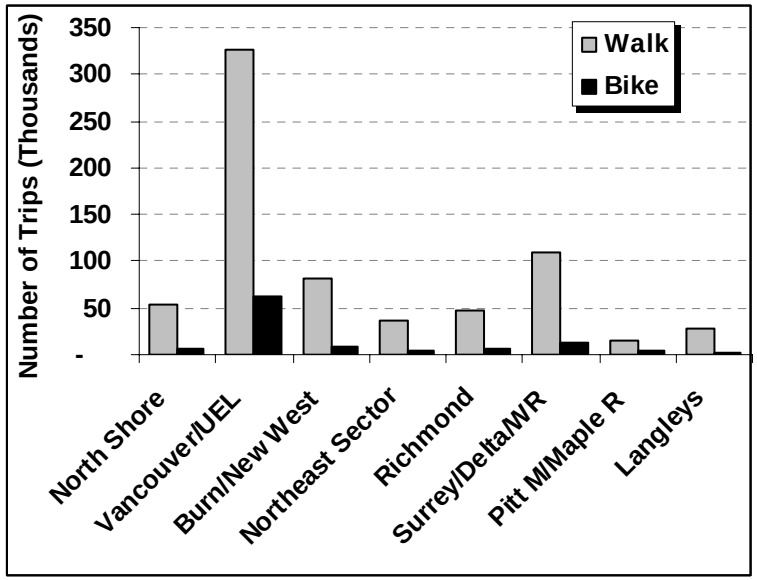


4.11 WALK AND BIKE TRIPS

The number and proportion of walk and bike trips varies significantly between sub-areas of the region.

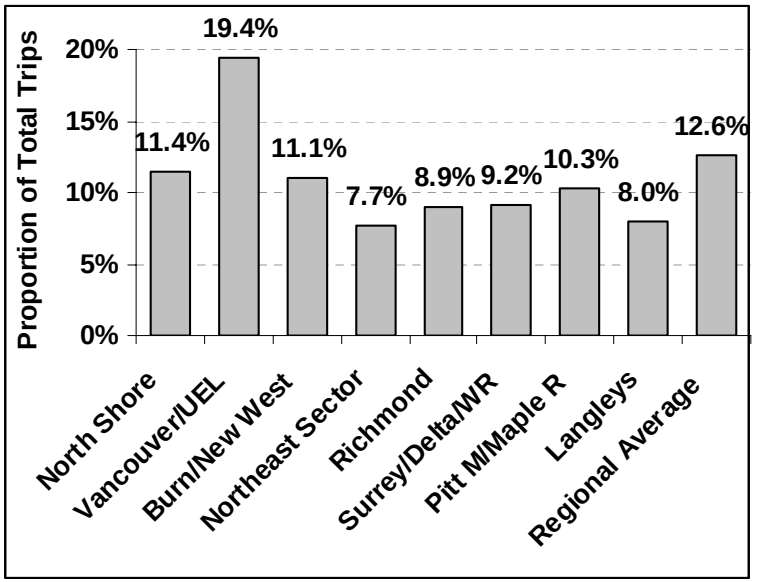
The number of walk and bike trips varies significantly between sub-areas of the Greater Vancouver region. On average, walk and bike trips represent approximately 11.0% and 1.7% of total regional trips respectively. **Exhibit 33** illustrates the distribution of walk and bike trips among the eight sub-areas of the Greater Vancouver region. The Vancouver/UEL sub-area has the highest number of walk and bike trips compared to the other sub-areas.

Exhibit 33: Walk and Bike Trips (2004)



As shown in **exhibit 34**, the Vancouver/UEL sub-area also has the highest proportion of walk/bike trips at almost 20% with a regional average of 12.6%.

Exhibit 34: Proportion of Walk and Bike Trips (2004)



4.12 PERSONAL TRIPS INCREASING

The number of personal trips has increased since 1999 possibly due to more people entering retirement age groups.

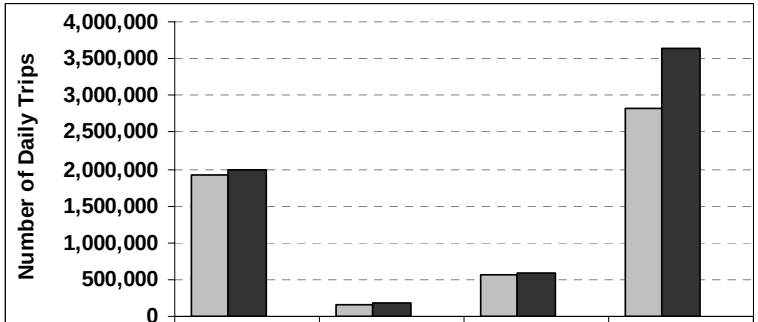
The demand for travel is derived from the need to make a trip for a certain purpose. As such, understanding the characteristics of various trip purposes gives insight into travel demand and its impacts on the transportation system. Travel purposes can be summarized into four trip purpose categories as follows:

- Work Trips (i.e. trips made to and from work & post secondary school)
- During Work Trips (i.e. trips made during work)
- Grade School Trips (i.e. trips made to and from elementary and high schools, kindergarten to grade 12)
- Personal Business Trips (i.e. trips made for social / recreational /personal business)

Exhibit 35 illustrates the relative change in the number of daily trips for each trip purpose category. The number of personal business trips[21]. has increased much more in absolute and relative terms compared to the other trip purpose categories This category includes trips made for a variety of reasons – visiting, shopping, going to a fitness club, and seeing a doctor, among others.

These trips grew significantly both in the urban core and in the outer municipalities. Again, the dispersed nature of most of these destinations meant that the automobile was a faster and more convenient travel option than public transit, walking, or cycling.

Exhibit 35: Daily Trip Purpose Totals (1999-2004)



	Work/Post Secondary	During Work	Grade School (K-12)	Personal Business
1999	1,918,300	157,900	575,300	2,827,000
2004	1,990,300	174,100	578,200	3,641,000
Change	3.8%	10.3%	0.5%	28.8%

[21] The increase in pers onal business trips might be due to a number of factors including: the aging population, seasonal variations compared to earlier surveys, a stronger economy or the survey methodology which involved more callbacks than earlier surveys.

5 CONCLUSIONS

The 2004 Trip Diary Survey involved a sample of over 4,300 Greater Vancouver households covering all municipalities in the region. The survey collected travel information for over 11,100 individuals in the region, with over 37,300 trips reported.

The survey shows that the population and employment growth, the aging population and their active lifestyle and high vehicle ownership in the region all place tremendous pressure on the regional transportation system. However, it is the long-range trend of growth outside the regional core in the Greater Vancouver region and the dispersal of many jobs to office parks that presents some of the greatest challenges to the transportation system.

The aging population presents further complexities to the way transportation and transit services are planned and financed in the region. Some people entering older age groups will have unique needs in terms of accessible transit and services such as HandyDart.

While the City of Vancouver is still the largest source of trip origins and destinations, its regional share of overall travel has been declining. Many of the surrounding municipalities are growing faster with more people and jobs, and as a result, more overall travel demands. This creates more complex travel patterns, as people travel from many origins to many locations, making it more challenging to provide effective transit services, manage the road demands or provide other alternative modes to private vehicles, such as cycling.

Due to the constrained capacity of the transportation system and significantly increased trips for recreation and personal business (up 28.8% during the period from 1999 to 2004), the rush-hour periods are continuing to spread and midday travel is increasing. The typical The PM rush-hour period has increased by almost one hour from 1999 to 2004 and it now lasts close to 5 hours.

Nonetheless, despite the twin pressures of regional growth and rapid increase in vehicle ownership and travel demand, transit usage has increased. The 2004 Trip Diary Survey showed an increase in the regional daily transit share, which increased from 10.3% in 1999 to 10.8% in 2004. While this might appear small in percentage terms, given the rapidly growing population and the overall trend in Canadian cities for transit ridership to decline, this is significant and represents an increase of almost 25% or around 30 million transit rides per year since 1999.

As noted earlier in the report, to some degree, this may reflect the significant expansion in transit services in the region. The increase in transit service hours (24.5% growth from 1999 to 2004) is significant during the five-year period and has provided the capacity to meet some of the unmet demand for transit service. As well, programs such as U-Pass have established higher transit usage among people in younger age groups.

APPENDIX A – AM PEAK PERIOD TRAVEL PATTERNS

The maps on the following pages illustrate the distribution of morning peak period (6:00-9:00 a.m.) travel.

Exhibit A.1: Morning Peak Period Travel Patterns for North Shore
(West Vancouver, North Vancouver City, North Vancouver District)

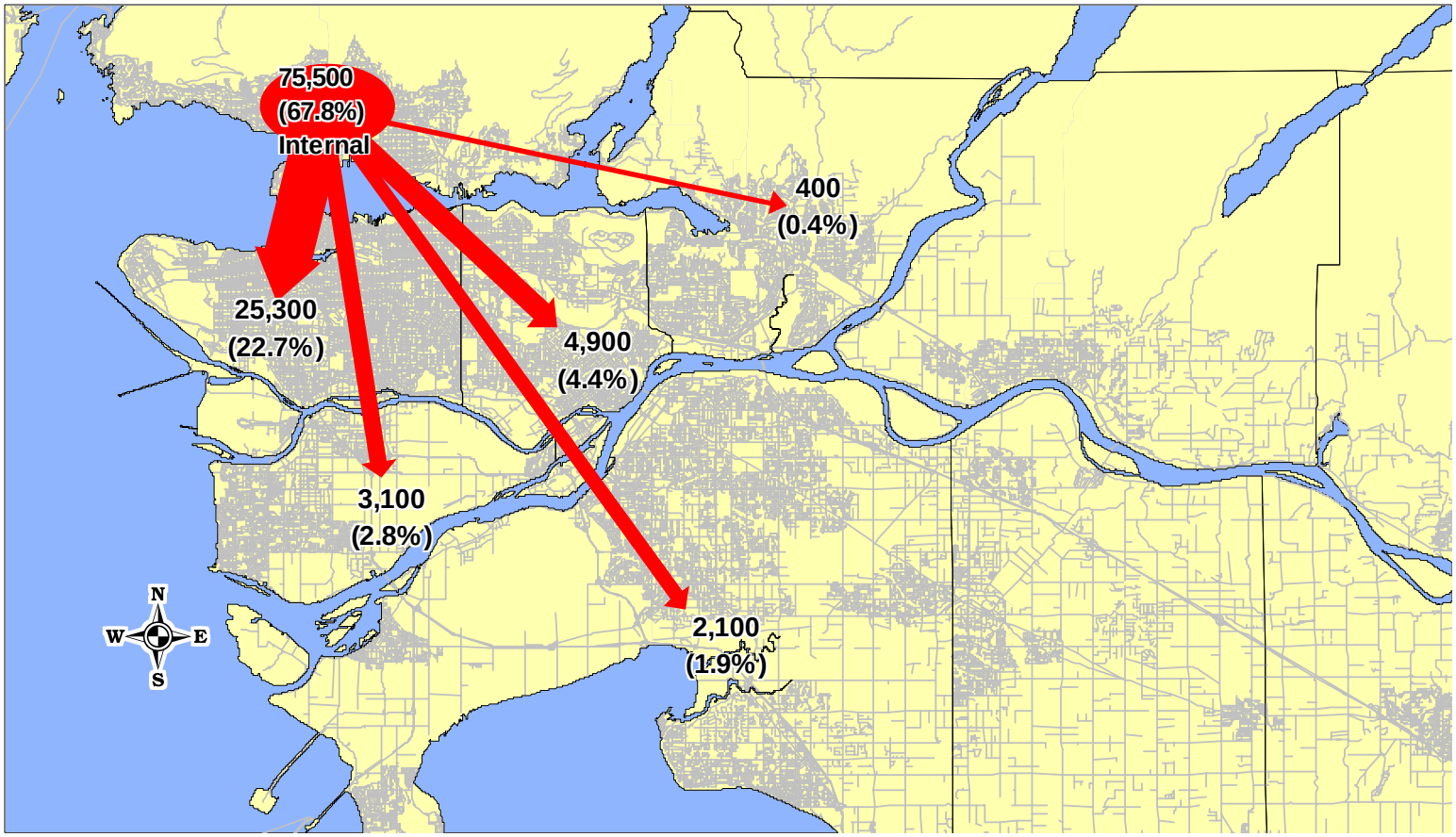


Exhibit A.2: Morning Peak Period Travel Patterns for Vancouver/UEL

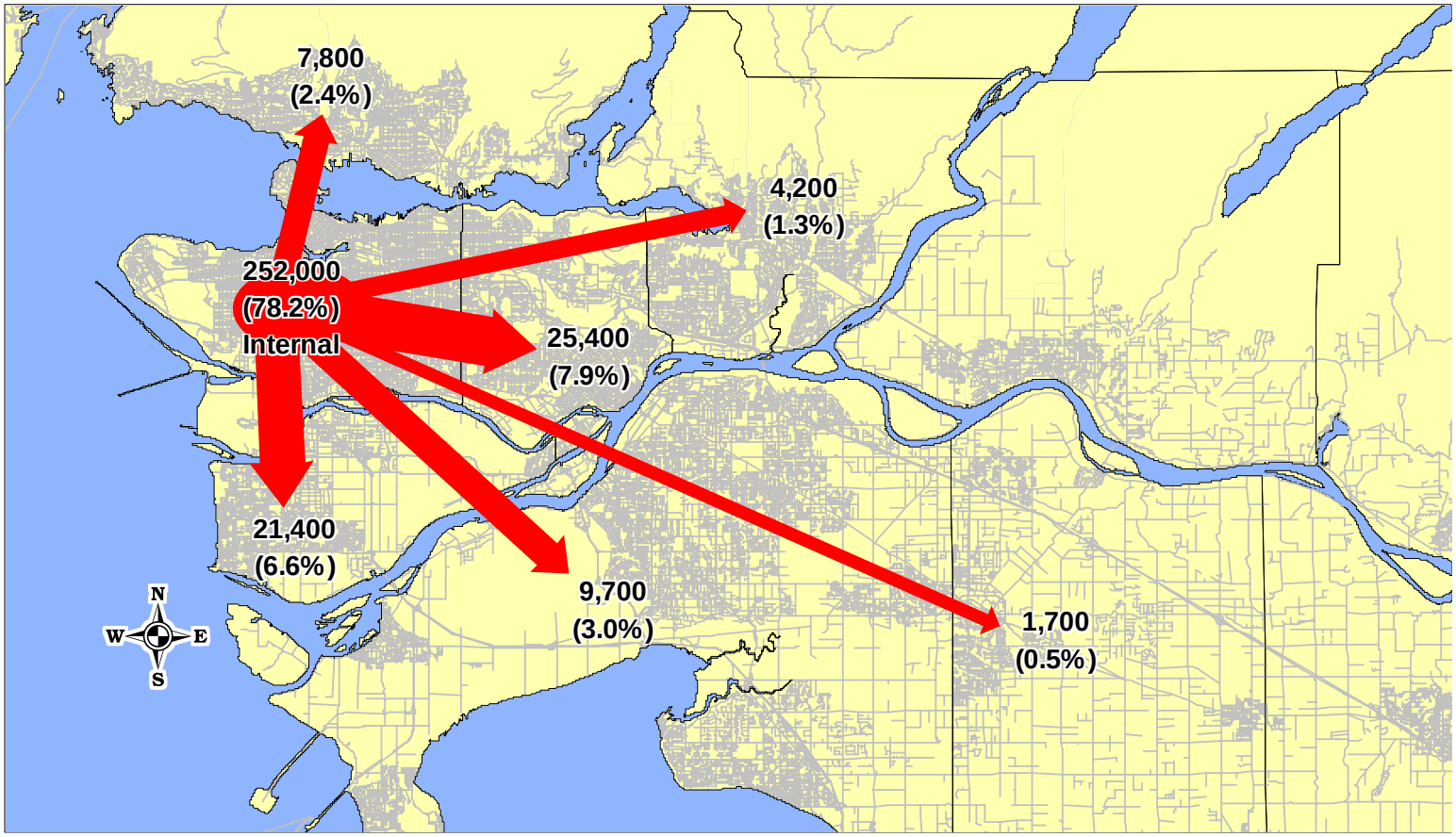


Exhibit A.3: Morning Peak Period Travel Patterns for Burnaby/New Westminster

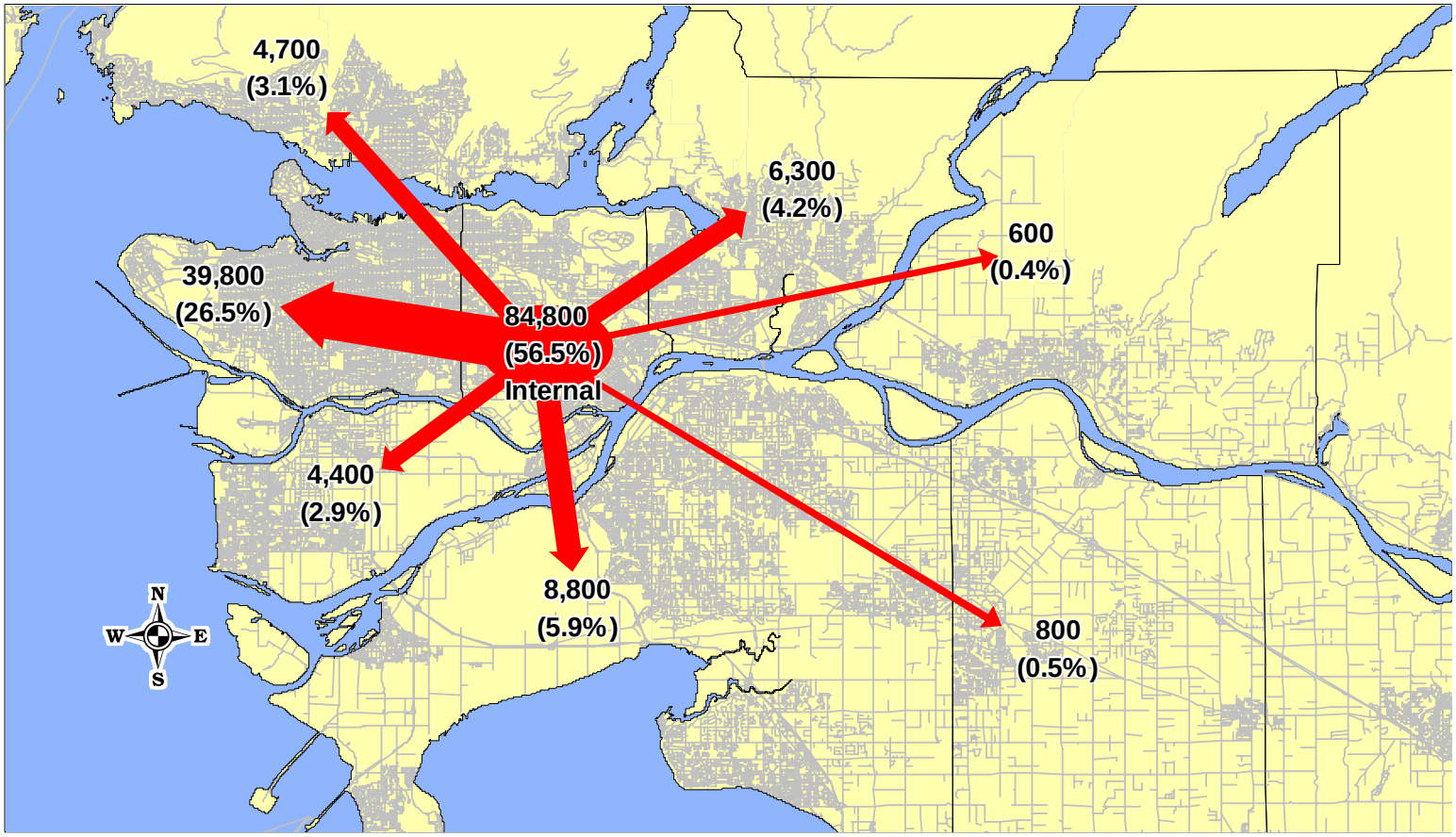


Exhibit A.4: Morning Peak Period Travel Patterns for Northeast Sector

(Anmore, Belcarra, Port Moody, Coquitlam, Port Coquitlam)

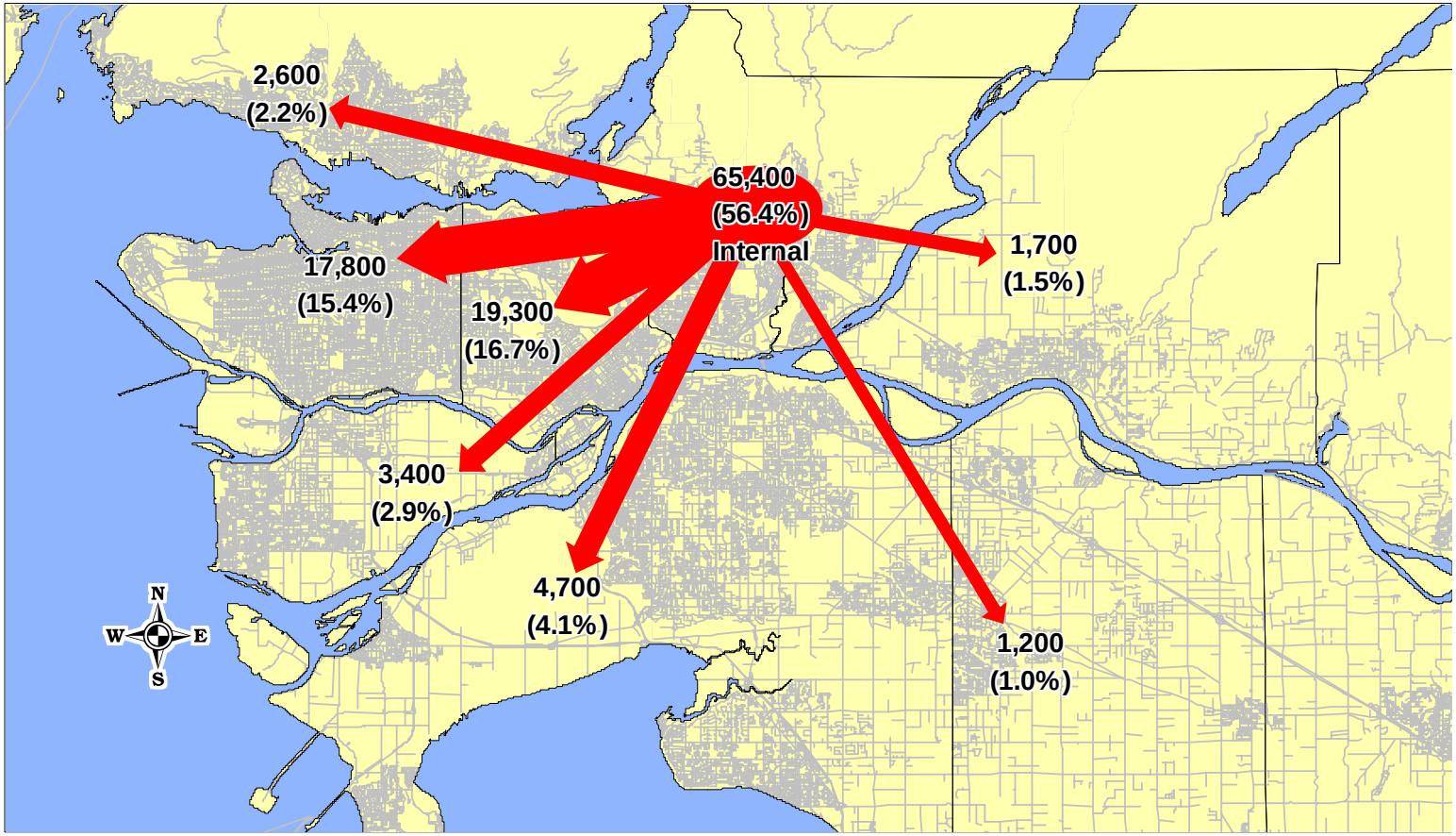


Exhibit A.5: Morning Peak Period Travel Patterns for Richmond

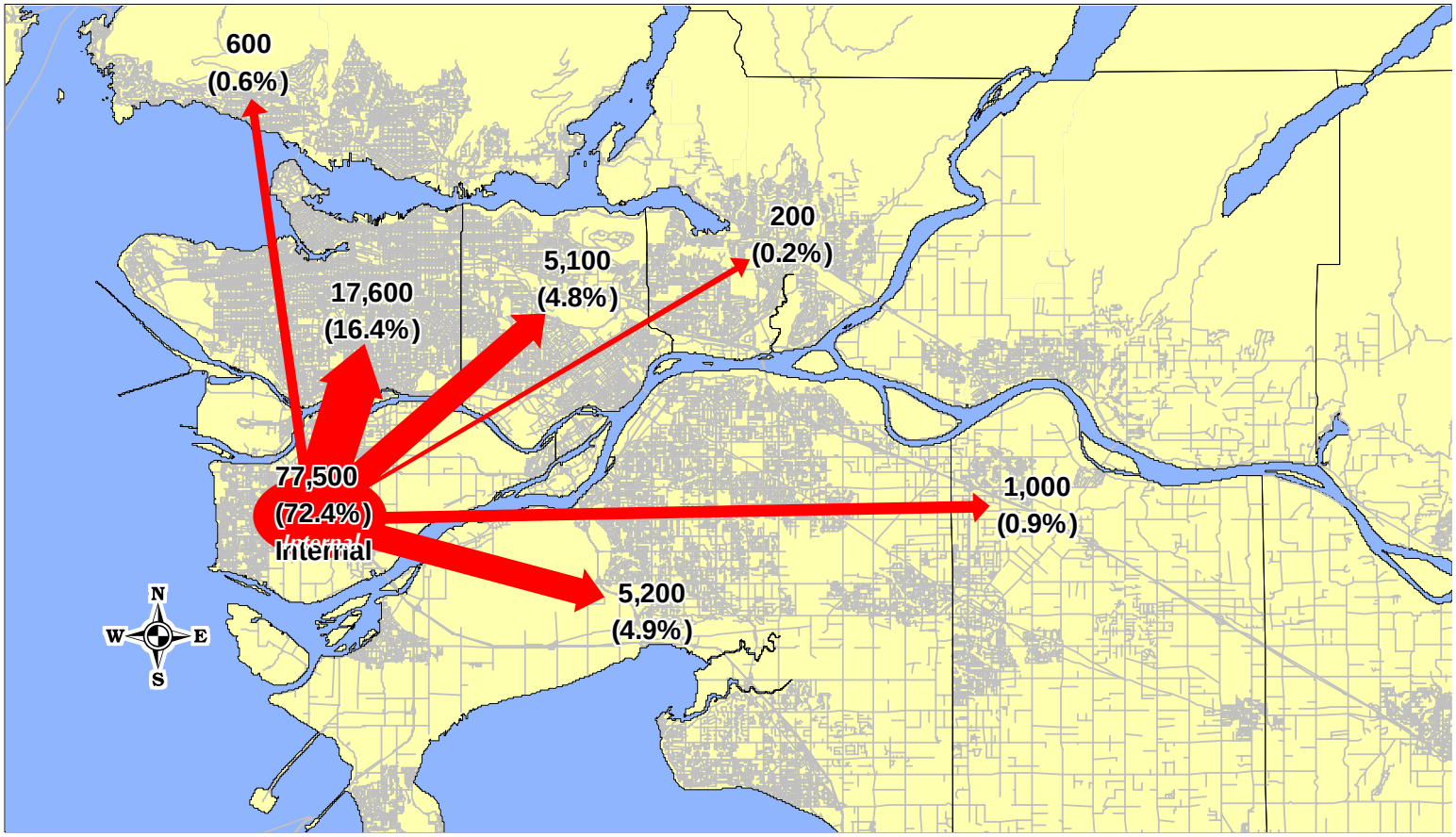


Exhibit A.6: Morning Peak Period Travel Patterns for Surrey/Delta/White Rock

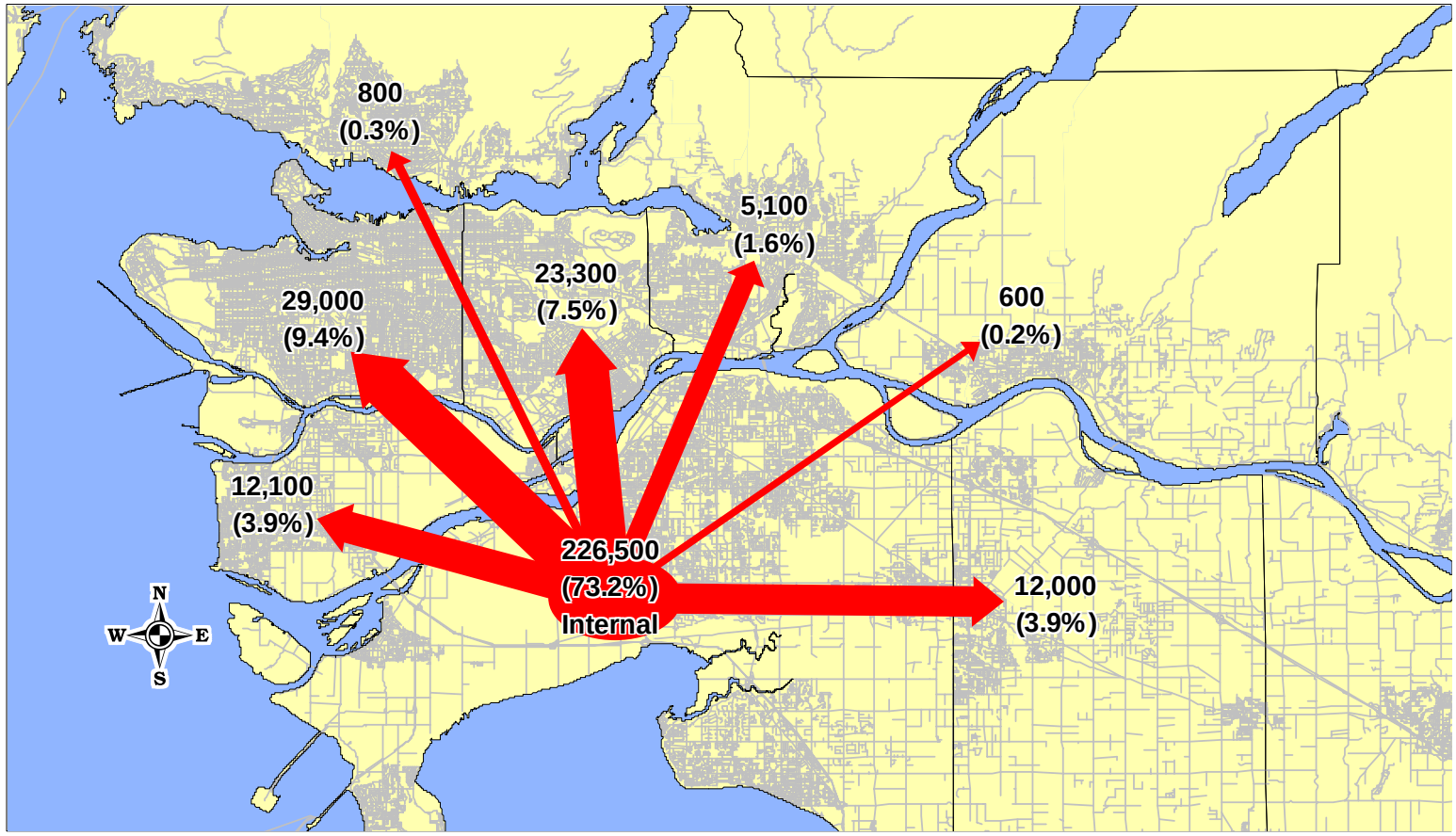


Exhibit A.7: Morning Peak Period Travel Patterns for Pitt Meadows/Maple Ridge

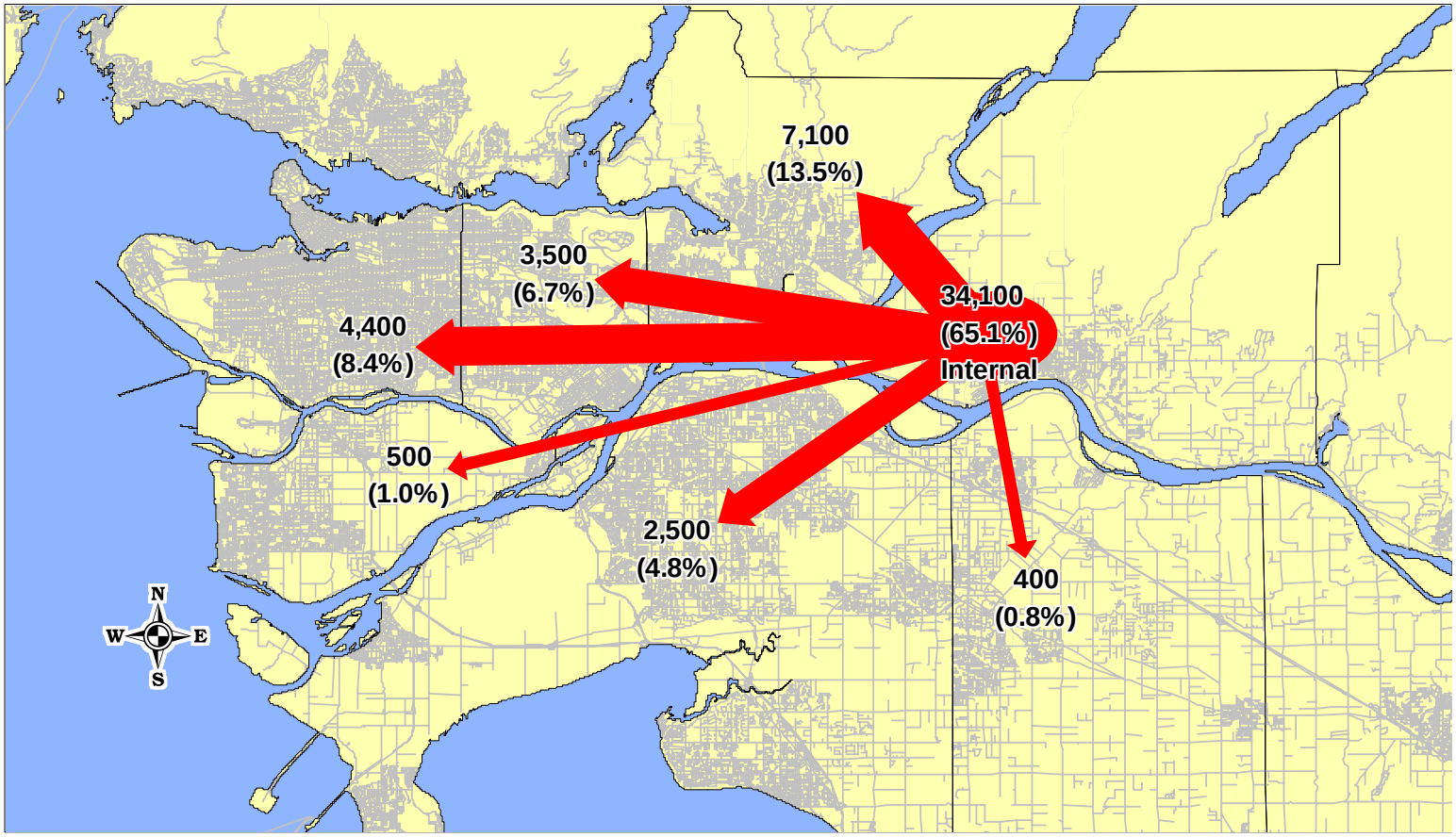


Exhibit A.8: Morning Peak Period Travel Patterns for Langleys

(Langley City, Langley District)