MUSTEL GROUP
MARKET RESEARCH

Halcrow

TransLink's 2008 Regional Trip Diary Survey: Final Report

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TRANSLINK

Presented to:
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Executive Summary

Background and Context

The primary objective of TransLink's 2008 Regional Trip Diary was to obtain information on 24-hour weekday travel characteristics from a random sample of local residents. The survey used a combination of online and mail-out/telephone retrieval survey methods and was conducted from September 16th to December 12th, 2008. The study area includes Metro Vancouver, but stretches beyond to encompass the entire Lower Mainland, from Lions Bay to the District of Kent, including Abbotsford and Chilliwack.

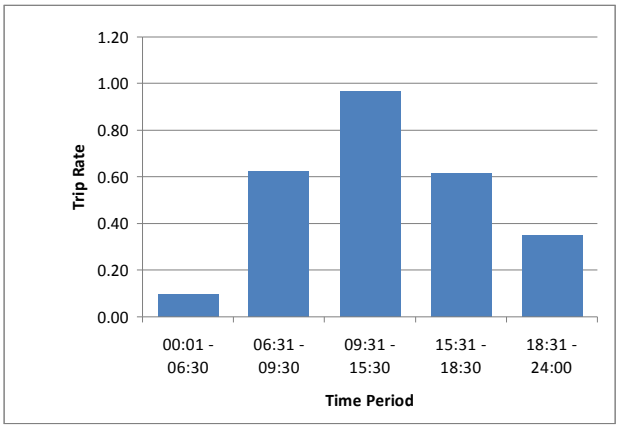
Nearly 245,000 placement calls were made with 40,826 households agreeing to participate in the survey through mail-out/telephone retrieval, online, or through immediate telephone retrieval of the previous day's travel. The placements for mail-out and online resulted in a total of 17,603 (1.9%) valid household survey returns, for a completion rate of 47 percent. Among those who completed the survey, the web option was chosen by 53 percent of respondents, while 47 percent opted for the mail-out/telephone retrieval option. The resulting survey database contains information on 17,603 households, 34,236 individuals and 92,187 trips. This information was expanded to regional controls in order to provide daily trip estimates and regional travel characteristics.

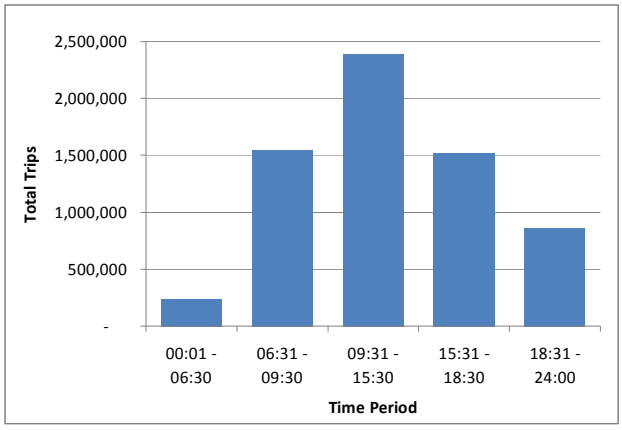
Note that an additional 3,449 valid household surveys were completed using a telephone-only yesterday retrieval method to report travel behaviour on the previous day, as an extension of the recruitment interviewing. This information is stored in a separate database due to differences in the survey methodology; further analysis and comparison of trip types reported will assist in use of this additional database. In addition, a 2,700 person over-sample of students at UBC and SFU was collected, summarised (in a separate document) and compiled into a database for further analysis by TransLink.

Results

Based on the expanded survey database, it is estimated that approximately 6.6 million daily trips are made by Lower Mainland residents on a typical fall weekday. This translates to a daily average of 2.65 trips per person. The survey results show that travel demand is fairly consistent for the AM and PM peak periods (6:31-9:30 and 15:31-18:30 respectively) as well as through midday (9:31-15:30), dropping off in the evening and night time periods. **Exhibit ES1** illustrates trip rates and total trips by time of day.

Exhibit ES1: Trip Rate and Total Trips by Time Period (Lower Mainland)



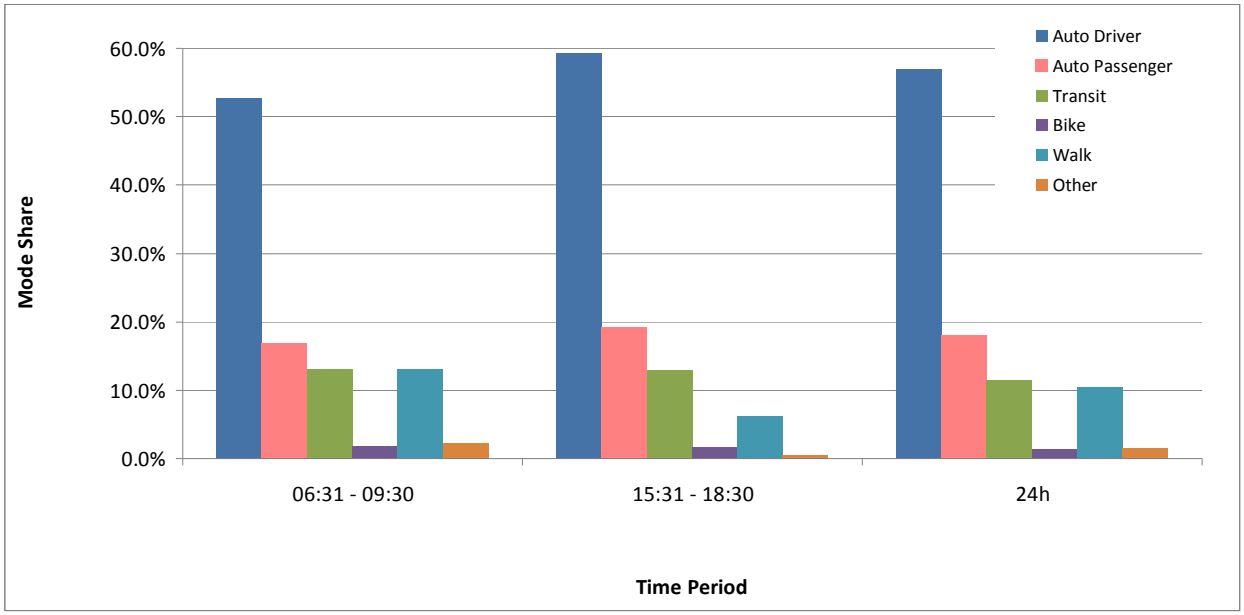


Lower Mainland daily travel mode shares are estimated as follows (Metro Vancouver resident mode share estimates in brackets):

- Auto driver – 57.0% (55.9%)
- Auto passenger – 18.1% (17.8%)
- Transit – 11.5% (12.6%)
- Bike – 1.4% (1.5%)
- Walk – 10.5% (11.0%)
- Other – 1.5% (1.2%)

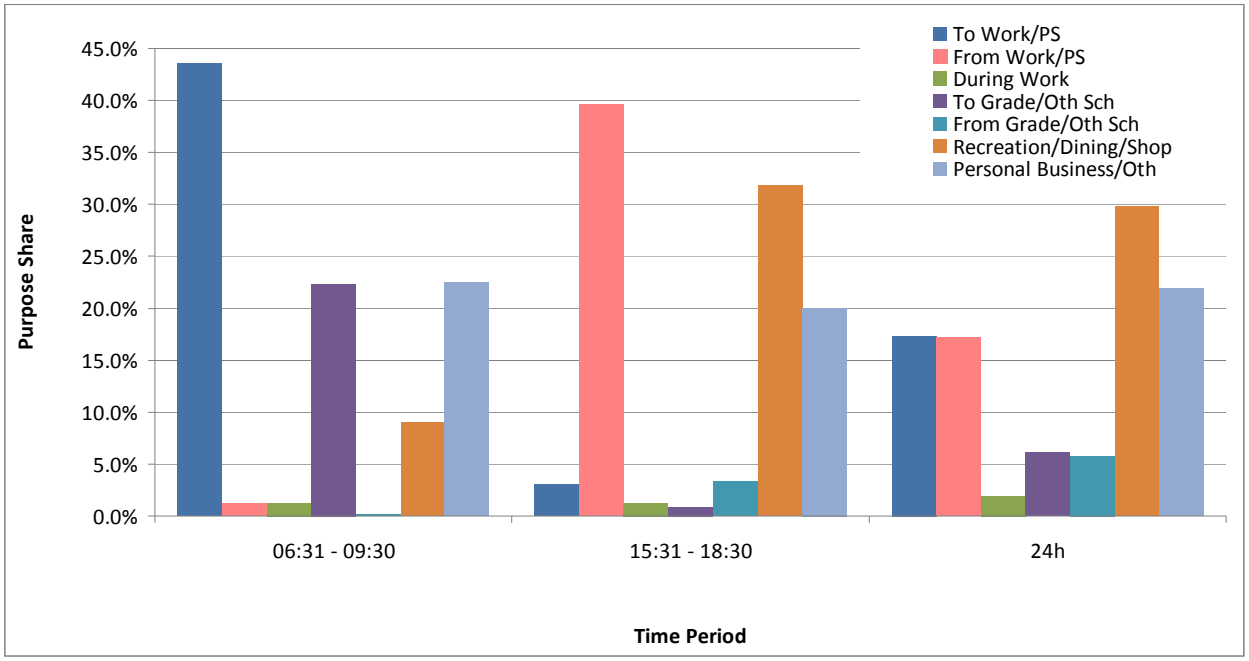
These mode shares vary by time period and by trip purpose. Auto travel mode share is notably higher during the late night but fairly stable throughout the day and evening. Transit, meanwhile, posts strong shares during the AM and PM peak periods. Finally, walking is consistently high through the AM peak and midday, dropping sharply for the PM peak, evening, and late night. **Exhibit ES2** illustrates mode share by time of day.

Exhibit ES2: Daily and Peak Period Mode Shares (Lower Mainland)



In terms of trip purpose, trips to and from work and post-secondary school account for almost 35 percent of daily travel – though during the AM peak, these trips represent over 40 percent. On a twenty-four hour basis, travel for personal business, recreation, dining and shopping represent close to 52 percent of trips. While trips to grade school are an important part of the AM peak, much of the travel from grade school occurs prior to the start of the PM peak at 15:31. **Exhibit ES3** illustrates trip purposes by time period.

Exhibit ES3: Trip Purpose by Peak Period and 24h (Lower Mainland)



In terms of trip length, the overall twenty-four hour average is approximately 9.3 kilometres. Nevertheless, trip lengths vary significantly by trip purpose and travel mode (note that they appear to be fairly stable for different time periods); for instance, the average trip to and from work and post-secondary school is approximately 14 kilometres, while the average trip to grade school (for which close to half of children are chauffeured by automobile) is only 4.6 kilometres. Similarly, the average trip made by drivers is 10.7 kilometres, compared with 12.0 kilometres for transit riders and 2.0 kilometres for pedestrians. **Exhibit ES4** illustrates trip length by purpose, while **Exhibit ES5** illustrates trip length by travel mode.

Exhibit ES4: Daily Trip Length by Purpose (Lower Mainland)

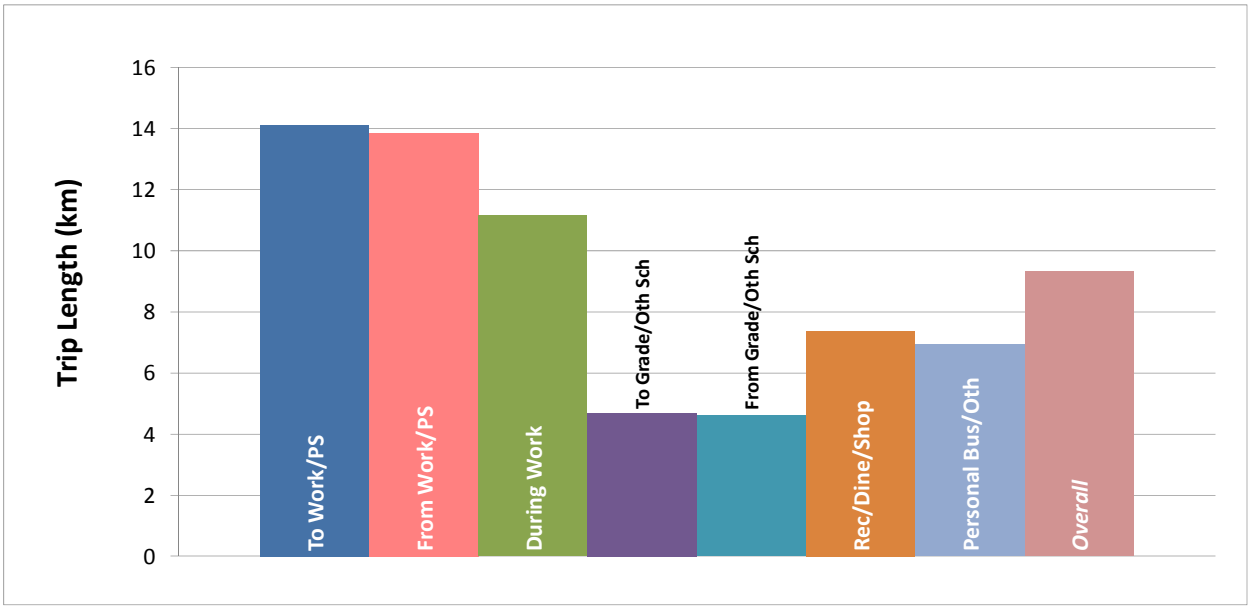
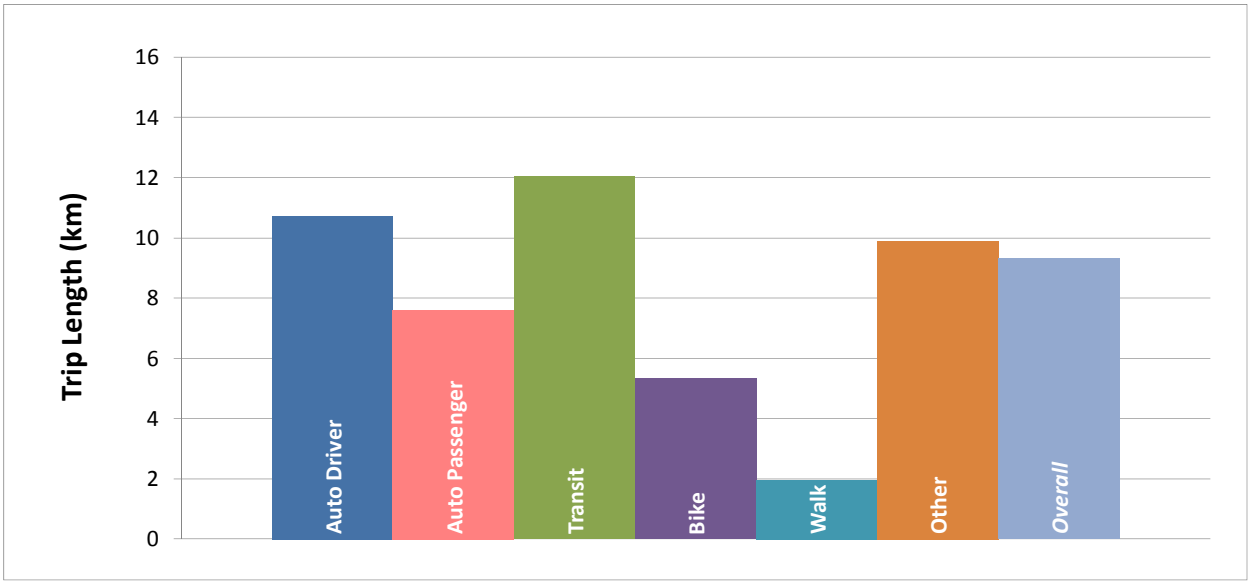


Exhibit ES5: Daily Trip Length by Travel Mode (Lower Mainland)



Glossary

This report makes extensive use of the following terms:

- Expansion – the act of applying factors to the sample population to ensure that it matches the universe according to specific demographic characteristics
- Logic check – when built into the web survey interface, logic checks prevent respondents from entering illogical information (for instance, the survey did not allow users to enter 'SeaBus' as a mode for trips between Richmond and Delta, or allow users who had entered an age under 16 to indicate that they had a driver's license); when performed on the database, logic checks are a means of flagging data for further review or correction (please see **Appendix 5.10** for further information on implemented logic checks)
- Mode share – the proportion of trips made by different forms of transportation
- Recruit – a household that agrees to participate in the survey
- Retrieval – the act of retrieving survey data, through the web or over the telephone
- Return – a household that has completed the survey
- Sample – the households and individuals who have completed the survey
- Trip rate – the total number of trips, divided by the total number of people or total number of households
- Universe – the actual population of the study area
- Yesterday-retrieval – a technique in which recruits were offered the opportunity to participate in an immediate retrieval telephone interview

1.0 Introduction

1.1 Foreword

Regional trip diary surveys have been conducted in the Metro Vancouver region periodically over the last 20 years. During the 1970s, several origin-destination (OD) surveys were conducted for specific municipalities (e.g., North Vancouver, City of Vancouver), but the first regional OD survey was conducted in 1985, prior to the construction of the Expo SkyTrain line. Since then, surveys have been conducted in 1992, 1994, 1999, and 2004. Summarised in **Exhibit 1.1**, these surveys have played an important part in planning for the future of the Lower Mainland in terms of both transportation and land use.

Exhibit 1.1: Past Regional Trip Diary Surveys

Year	Coverage	Households Sample	Households Universe	Sample Size	Time of Day	Method
1985	GVRD	25,000	518,000	4.8%	24h	Phone
1992	GVRD	15,000	642,445	2.3%	AM (6-9)	Phone
1994	Lower Mainland	1,600	743,000	0.2%	24h	Mail
1999	GVRD	2,990	742,000	0.4%	24h	Mail
2004	Lower Mainland	4,824	913,606	0.5%	24h	Mail/Web
2008	Lower Mainland	17,603	948,026	1.9%	24h	Phone/Web

Universe total for 1992 is estimated

Year	Coverage	Season	Sponsors
1985	GVRD	Fall	GVRD, Municipalities, BCMoTH, BC Transit, Transport Canada
1992	GVRD	Fall	GVRD, Municipalities, BCMoTH, BC Transit, Transport Canada
1994	Lower Mainland	Fall/Winter	GVRD, MoTH, BC Transit
1999	GVRD	Fall	TransLink, GVRD
2004	Lower Mainland	Spring	BCMoTH, TransLink
2008	Lower Mainland	Fall	TransLink

Information from the 2004 trip diary survey is now becoming dated and the sample size limited its application for certain planning purposes. As such, TransLink identified the need to undertake a comprehensive household trip diary survey based upon a significantly larger sample size for the entire Lower Mainland, including Metro Vancouver and a large portion of the Fraser Valley Regional District (FVRD).

Any survey is subject to sampling errors that can affect the reliability of the results. These errors can arise from a number of factors, including:

- Sampling error
- Biased response error
- Non-response error
- Coding and reduction errors

It is important to be aware of the context when interpreting the results of this survey, or when comparing it with past surveys. Differences in the economic situation, the weather, the survey technique and sponsorship can all have an effect on results. The survey methodology minimises and mitigates these sources of error. The analyses and techniques deployed to minimise the aforementioned sources of error (economic situation, weather, survey technique, sponsorship) are described at length in **Appendix 5.1**.

In addition, the survey team conducted extensive analysis of preliminary results and compared them with trends reported by other external sources, to ensure that survey results were consistent with overall trends. These sources included permanent screenline counts across the Lower Mainland, employment and economic data, school board and post-secondary enrolment, consumer spending, and weather. Further discussion of these 'back-checks' is presented in **Appendix 5.10**.

1.2 Report Organisation and Structure

This report documents TransLink's 2008 Regional Trip Diary Survey. The survey was commissioned in the summer of 2008 for Fall implementation and provides information on 24-hour travel characteristics from a random sample of 17,603 regional households. The major phases and tasks undertaken for this study included:

- Phase 1 – Survey Design
- Phase 2 – Data Collection
- Phase 3 – Data Processing and Validation
- Phase 4 – Analysis, Reporting, and Documentation

This report is organised into five sections:

- Section 1 includes the background and an overview of the report's structure;
- Section 2 provides an overview of the travel survey design elements, study area, survey instruments, implementation, data processing activities and the survey database structure;
- Section 3 provides a summary of key survey results and select comparisons with the previous surveys;
- Section 4 presents a summary of lessons learned, and;
- Section 5 contains the appendices to the report.

2.0 Survey Design and Implementation

2.1 Study Area and Sampling

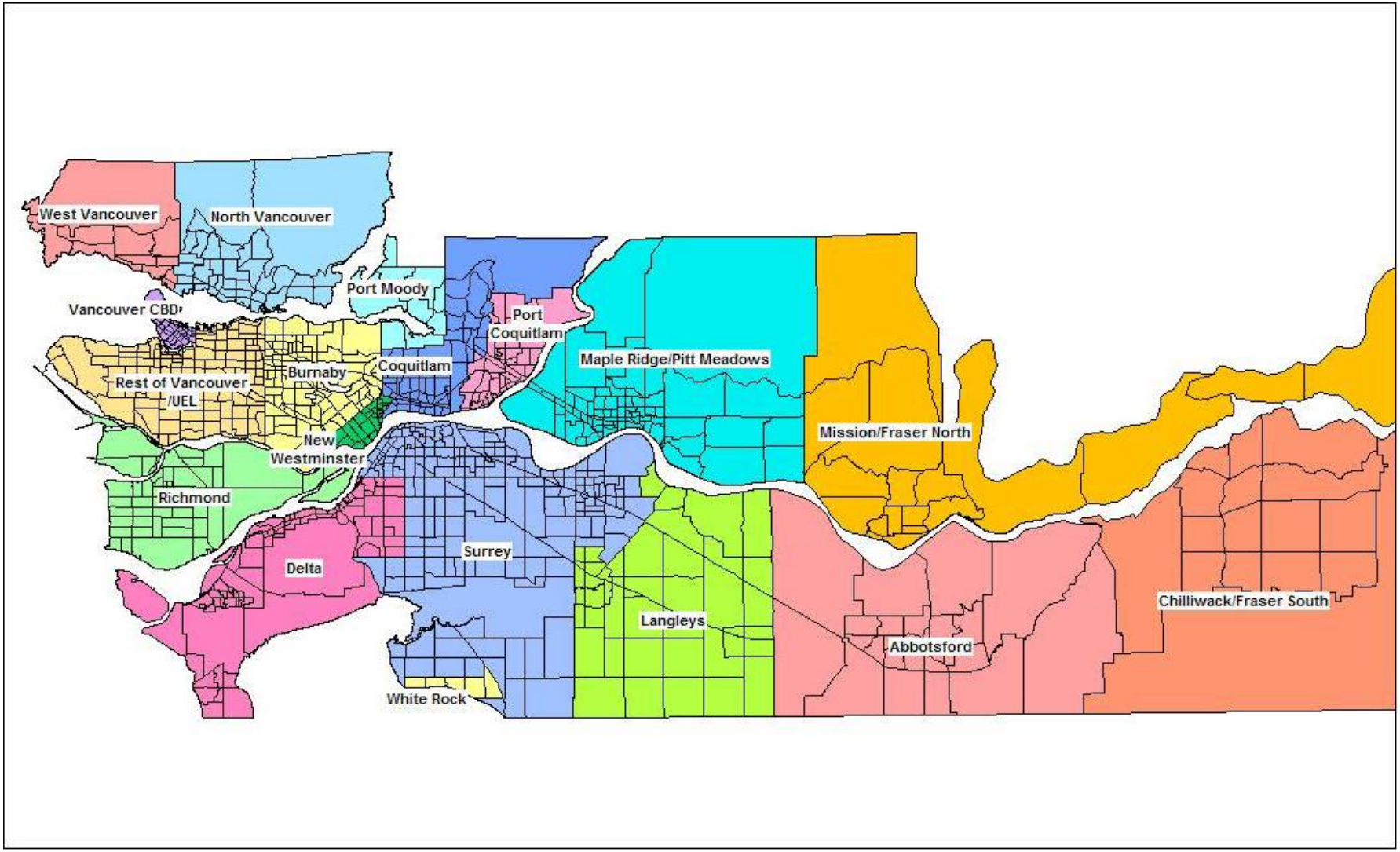
The 2008 TransLink Regional Trip Diary Survey is the latest in a series of travel surveys conducted in the Lower Mainland and south-western British Columbia since the mid 1980s. The methodology for the 2008 Trip Diary Survey used a similar approach to that carried out for the 2004 Metro Vancouver and 2006 Capital Regional District travel surveys. It was designed to collect information on 24-hour weekday travel characteristics from a random sample of study area residents. The travel survey used a telephone-initiated approach, with web-based and mail-out/telephone retrieval options for completing the trip diary. In addition, several new features were added to improve the survey design and encourage higher response rates as discussed below.

Following the Project Initiation meeting and submission of the final work program, the Project Team commenced the design and pre-test of the travel survey, including the following:

- Preparation of the Survey Sample
- Design of the Advanced Notice Letter
- Design and Pre-test of the Telephone Recruitment Survey
- Design and Pre-test of the survey instruments (web and print)

The survey area covered over 20 municipalities and districts across the Lower Mainland, including all of Metro Vancouver (from Bowen Island to Langley Township) and extensive parts of the Fraser Valley Regional District (including Abbotsford and Chilliwack). As per **Exhibit 2.1**, the study area stretched from Lions Bay and Bowen Island in the West to the District of Kent in the East. TransLink divided the study area into 18 sub-areas, with a total target completion of 20,000 weekday household surveys. Note that these 18 sub-areas, although they resemble municipalities, do not precisely correspond to municipal boundaries, but instead represent ensembles of traffic zones (TZs). A disproportionate sampling strategy was used to provide a minimum of 250 household surveys within each sub-area. This minimum sample size ensures a reasonable level of statistically reliability when reporting travel characteristics by sub-area. The 18 sub-areas roughly correspond to existing municipalities, with some aggregations (Port Moody/ Anmore/ Belcarra), some disaggregations (Vancouver/ UBC and Vancouver CBD), and some geographic diversions (e.g. Walnut Grove).

Exhibit 2.1: Sub-areas and Superzones



For the purposes of reporting travel behaviour in this report, the 18 sub-areas were aggregated into 10 sub-areas. **Exhibit 2.2** indicates this transition from the 18 sub-areas to the 10 used in this report. Note that the survey database preserves the 18 sub-area structure.

Exhibit 2.2: Aggregation of 18 Sub-Areas to 10 Sub-Areas

Sub-Area Description	Municipalities and Areas
Vancouver - CBD	Vancouver CBD (Downtown)
Vancouver - General	Rest of Vancouver / UEL
North Shore	North Vancouver, West Vancouver, Lions Bay
Burnaby / New West	Burnaby, New Westminster
Richmond / Delta	Richmond, Delta
Northeast Sector	Coquitlam, Port Coquitlam, Port Moody, Anmore, Belcarra
Surrey / White Rock	Surrey, White Rock
Langleys	City of Langley, Township of Langley
Maple Ridge / Pitt Meadows	Maple Ridge, Pitt Meadows
Fraser Valley	Abbotsford, Mission / Fraser North, Chilliwack / Fraser South

During the sampling process, two additional geographic scales were developed for post-survey analytical purposes. These include six 800 metre buffers of potential rapid transit corridors identified by TransLink as well as 101 'superzones,' which are aggregations of the traffic zones (TZs) used for modelling purposes.

In addition to these sampling activities, a protocol was created in collaboration with representatives of UBC and SFU for the development of the post-secondary student over-sample. Invitations to participate in the survey were distributed by email and reached all registered students.

2.2 Survey Instrument Design

As a hybrid survey comprising two options for participation, the design of the survey instruments was comprised of three tasks, namely the development of the telephone recruitment and retrieval interview scripts, producing the print material for mail-out to survey participants, and developing the web interface for data entry, which was used by both participants (through the web option) and survey staff (during the retrieval interviews). A full discussion of the development, pre-testing, and refinement of the web survey and the package mailed to mail-out/telephone retrieval participants can be found in **Appendix 5.1**, while the English and Chinese versions of the final survey forms can be found in **Appendix 5.4**.

The telephone recruitment survey was designed such that it would be possible to examine the effectiveness of deploying the advanced notice letter. By first asking the respondent whether or not they recalled receiving the advanced letter before embarking on the survey the survey team was able to compare refusal rates between individuals who had read the letter and those that did not. Findings reveal that the letter has a significant positive effect, as those who recall the advance letter are more than twice as likely to agree to participate in the study (61 versus 28 percent among those who did not receive or recall the advance letter). **Appendix 5.3** provides a sample of the final script for the telephone recruitment interview. Challenges identified with the draft script used during the pre-test and the subsequent modifications are listed in **Appendix 5.1**.

Extensive work was undertaken on the web-based survey to integrate user-friendly mapping as a means to engage respondents and allow them to visually confirm the locations they chose. As this web interface was also used by telephone retrieval interviewers, the same set of built-in logic checks were consistently applied to the entry of all data. **Appendix 5.5** provides a sample of key screenshots from the web survey. Compared with the 2006 CRD Travel Survey, the interface was considerably more graphic-oriented and made far more extensive use of built-in logic checks. Both the Mail-out/telephone-retrieval and the web-based travel survey were tested by Mustel and Halcrow staff for usability and logic by testing various response scenarios. TransLink staff also contributed to this process. The challenges of both formats and the actions taken were noted as shown in **Appendix 5.1**.

2.3 Survey Implementation

2.3.1 Survey Period and Implementation

From September 7th through to October 22nd, pre-notification letters introducing the study and endorsed by TransLink's CEO were sent to 102,000 households, with another 20,000 sent later in the survey process. The survey commenced September 16th, 2008 and continued for a fourteen-week period to December 12th, 2008. A random probability sample of about 300,000 telephone numbers was drawn from a frame of regularly updated list of residential telephone numbers, representing the 18 sub-areas in the region. In addition, a random digit dialling list (RDD) of about 9,000 telephone numbers was generated to augment the sample and allow inclusion of households with unlisted numbers, a growing concern particularly as the number of 'cell-only' households continues to grow.

The process of dialling these numbers resulted in contacting almost 146,000 household heads, of which over 40,000 were within the study area and agreed that their household would participate in the Trip Diary survey. The refusal rate overall was 59 percent of contacted households, a typical level, despite the pre-notification letter. The letter did have a favourable effect on completion rate however, boosting response among those who received it prior to recruitment. Respondents who elected to participate were given the choice of receiving trip diary survey materials and responding in one of two ways: i) via email and a secure web survey or ii) via a mail-out with telephone retrieval option. Approximately 62 percent of respondents selected the web option, with the remaining households choosing the mail-out/telephone retrieval format (38 percent).

In addition, to boost recruitment the 'yesterday retrieval' method was introduced late in the data collection period. A total of 3,630 additional households were recruited to report their travel on the previous day. In all, these placements resulted in a total of 22,516 household returns, or 21,052 fully usable household records after data cleaning. Of the usable households, 17,603 were retained for the main database. In terms of households, this represents an overall response rate of 52 percent and a 1.9 percent sample of regional households. Note that 22,516 household records were collected, or 55 percent of those recruited, but 1,464 were culled during data editing due to irreconcilable inconsistencies.

Furthermore note that the 3,630 households recruited using the yesterday retrieval method were removed from the main database as the average household trip rates were slightly lower than households completing the survey via web or mail-out/telephone methods. It is possible that the yesterday method may have introduced some response bias resulting in possible under-reporting on a household basis. This method is more likely to capture the more easily reached, at-home household member(s); although attempts were made to reach other

household members on subsequent days/weeks. As such, these records are stored in a separate database and are not included in the analysis presented in this report.

A total of 1,563 households were recruited whose home language was not English. The household surveys completed included 513 in languages other than English (424 Chinese, 63 Punjabi, 25 Korean and 1 Russian), resulting in a return rate of 33 percent.

2.3.2 Survey Outreach and Promotion

Several avenues for contact with the research team were made available to the public and those households randomly selected for the survey. A help line team was specially trained to handle the inquiries and issues that arose through the phone and email services. The Mustel Group website also had a page dedicated to the 2008 TransLink Travel Diary study with all relevant frequently asked questions, instructions and contact information.

A telephone hotline (or help line) was set up specifically for incoming inquiries from respondents with a live Mustel Group operator daytime and weekday evenings until 9pm. Voicemail was always available, since the operator(s) would sometimes be on another call or when the operators were not on shift. The team responded to phone inquiries and voice messages; these were addressed on a daily basis as efficiently as possible, depending on call volumes. As well, an email address at mustelgroup.com was set up for the Travel Survey inquiries and requests. The team responded to these emails on a daily basis, as efficiently as possible, depending on volume.

In addition, call-backs for clarification of data received from respondents were carried out where possible to retrieve missing, illogical or illegible person details or trip information (e.g., relating to trip locations, purpose, building/land-use, modes of travel, number of travel companions, etc.). Attempts were made to reach the person him/herself or the lead respondent. Depending upon the nature of the information and elapsed time since the travel date, call-backs were not attempted if there was a concern for accuracy of recall, particularly with regard to time/distance logic errors. Note that logic checking for the most critical data points were programmed into the online and telephone retrieval survey forms thereby minimising errors seen in previous trip diary studies. Call-backs were made to attempt to collect missing information or correct errors on mailed in paper surveys or phone retrievals recorded on paper (where the amount of information/number of trips was unusually long or the respondent was impatient with the data entry/Google map process). Helpline staff also assisted with call-backs to respondents who phoned or emailed in erroneous entries they had made or missing trip information. An edit-case process was programmed to allow interviewers to make corrections to cases that were closed (already submitted by respondents).

TransLink posted information about the 2008 Regional Travel Diary survey on their website, including what's new and a page devoted to information about the survey and a link to Mustel Group's website page. In addition, to help increase publicity about the survey, TransLink arranged for their Public Information Officer to mention the Travel Diary survey on his weekly reports on CityTV's *Breakfast Television* during the survey period. Incentives were provided to encourage higher response rates, offering 175 prizes, including 3 tiers of cash prizes (1x$1,000, 4x $500, 10x$100) and 160 retail gift cards ($25).

During the field period of the survey, various methods were developed to boost recruitment and participation. These methods were developed by the survey team in consultation with TransLink and were designed to improve the likelihood of success in both the recruitment call phase of the survey, as well as the post-recruitment return phase of the survey (e.g., encouraging recruited households to follow through). These strategies were employed to boost response rates in response due to TransLink concerns over lower-than-expected early returns. Reminders (calls, emails, and voicemails) were directed to recruits who had not yet submitted their completed trip diary.

- **Additional advance letters**
  As recruitment efforts were increased, additional advance letters were distributed to Lower Mainland households ahead of recruitment calls. In addition, since the positive effect of the advance letter was evident in preliminary analyses mid-way in the data collection period, the study team also decided to include the letter with the email invitations and out-going mail packages. This procedure was introduced on November 13, 2008.

- **Yesterday retrievals**
  Additional households were recruited using a custom-developed 'yesterday-retrieval method' inspired by methods commonly used in trip diary surveys conducted in other jurisdictions. This method involved specifically calling respondents on the day following their randomly selected travel day and offering them the opportunity to complete the survey on the spot, by recalling trips from the previous day. This procedure was introduced on November 24, 2008. In cases where other household members were not at home at time of the 'yesterday retrieval' call, the following procedure was followed. 1) The lead respondent was asked to inform/consult missing household members and record their trip details for the travel day/date (cross-streets/locations visited, time left/arrived, trip purpose, mode, number of travel companions). 2) Subsequent call-backs were made to the lead respondent or household member to retrieve person and trip information. 3) If information was available, the Mustel Group interviewer entered details into a telephone retrieval survey form.

- **Inclusion of mail-in option**
  As well, some respondents were taking it upon themselves to mail in their diaries,

rather than waiting for the telephone retrieval/or having missed past retrieval attempts. Therefore, later in the survey period, mail-out packages included a post-paid return mail envelope with instructions for returning by post. A total of 1,903 mail returns were received prior to field closing. This procedure was introduced on November 3, 2008.

- **Email reminders**

  Email reminders were initially sent about one week following the invitation. This was adapted to a more intensive system of reminders in an attempt to increase web response rates. A system of bracketed reminders was implemented each week for up to three weeks, reminding those who opted for web-based diaries about their travel day (one on the day preceding and another on the day following the travel day). Following the email reminder process, a telephone reminder was then initiated if needed. Note that these strategies were used even with households where some but not all household members had responded. Respondents received a maximum of six reminder emails and there were no complaints about use of this strategy of which the study team was aware (other than a few who advised the Help line staff that they had already completed). Email reminders began on September 30 with the bracketed reminder procedure being introduced on October 14, 2008.

- **Reminder calls**

  Those households that opted for mail-out diary packages with telephone call-back retrieval also received telephone reminder calls. Reminder calls were continued as needed in order to encourage response from all household members. As with the web-based group of respondents, those who opted for mail-phone retrieval received reminders before and after their travel day until all household members had responded or the maximum reminder level had been reached. Respondents received a maximum of 10 reminder calls and there were no registered complaints about use of this strategy. This procedure was introduced on October 17, 2008.

- **Reminder voicemails**
  An additional strategy was implemented late in the survey period to add variety to the reminders using an automated voice message. Both web-based and mail-phone retrieval recruits were reminded of their travel day (in two separate weeks). Web-based option non responders were reminded the day before and day after their travel day. Those who opted for mail with phone retrieval received the automated voice message only on the day preceding their travel day, as they were contacted by the telephone interviewing team on the day after their travel day). Respondents received a maximum of two reminder voicemails and there were no complaints about use of this strategy of which the study team was aware. This procedure was introduced on November 14, 2008. Please see **Appendix 5.7** for the script used in these voicemails.

2.3.3 Survey Progress and Monitoring

The flow of survey implementation tasks and options described above is graphically illustrated in **Exhibits 2.3a** and **2.3b**, and includes target and actual numbers at multiple stages in the process. For the duration of the survey, progress reports were prepared highlighting the survey return rates and distribution of returns between regions and household sizes. This information was used to identify where additional placement and reminder calls should be targeted.

Exhibit 2.4 shows the progress of survey recruitment and returns with reference to return targets across the fourteen weeks of field operations. Initially, returns were lower than expected, but a variety of enhancements to the recruitment process and the introduction of targeted reminder calls, voicemails, and emails resulted in returns pulling ahead of target by week 10 (mid-November).

Exhibit 2.3a: Survey Implementation Process (Part one)

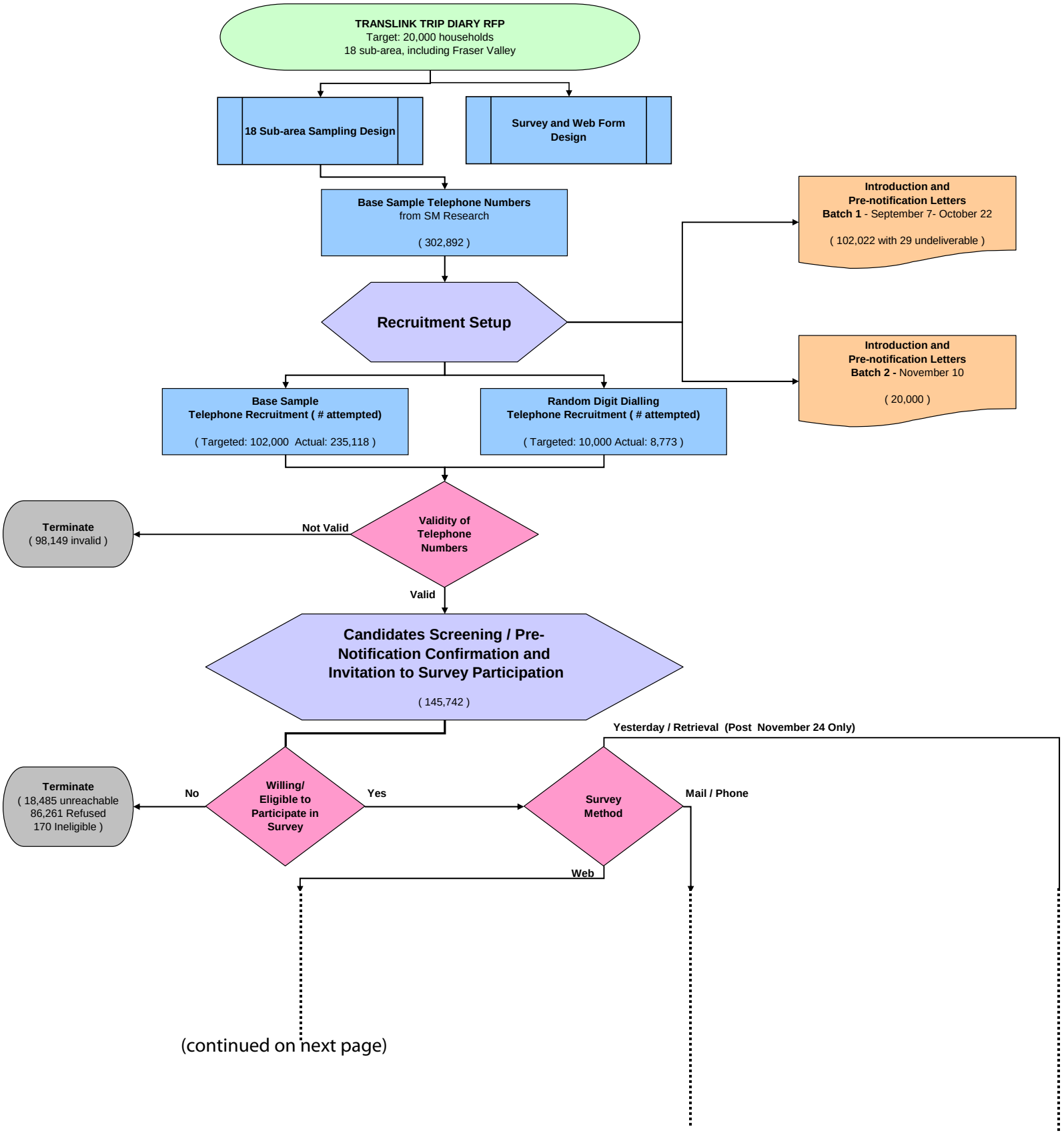


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Exhibit 2.3b: Survey Implementation Process (Part two)

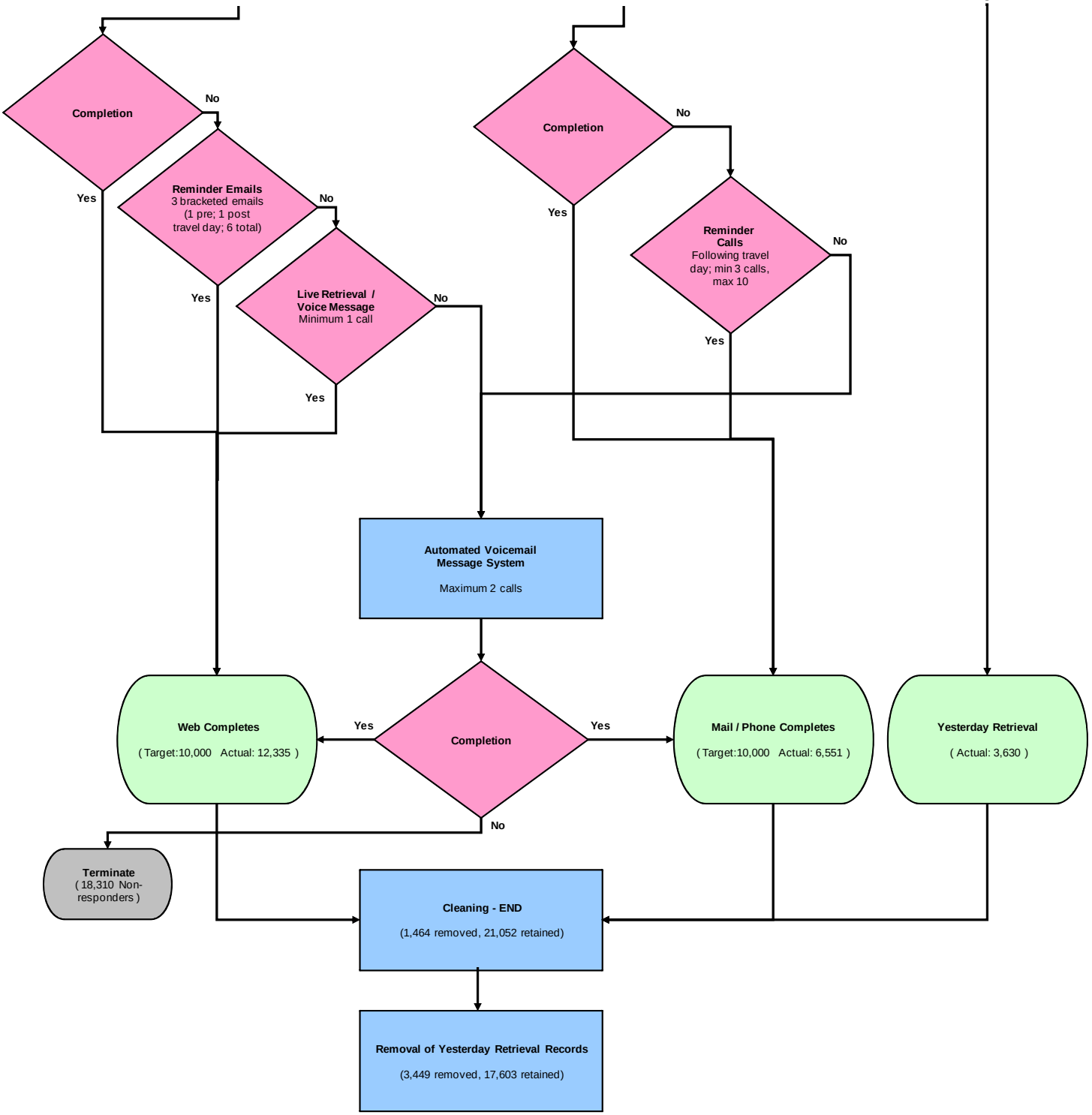
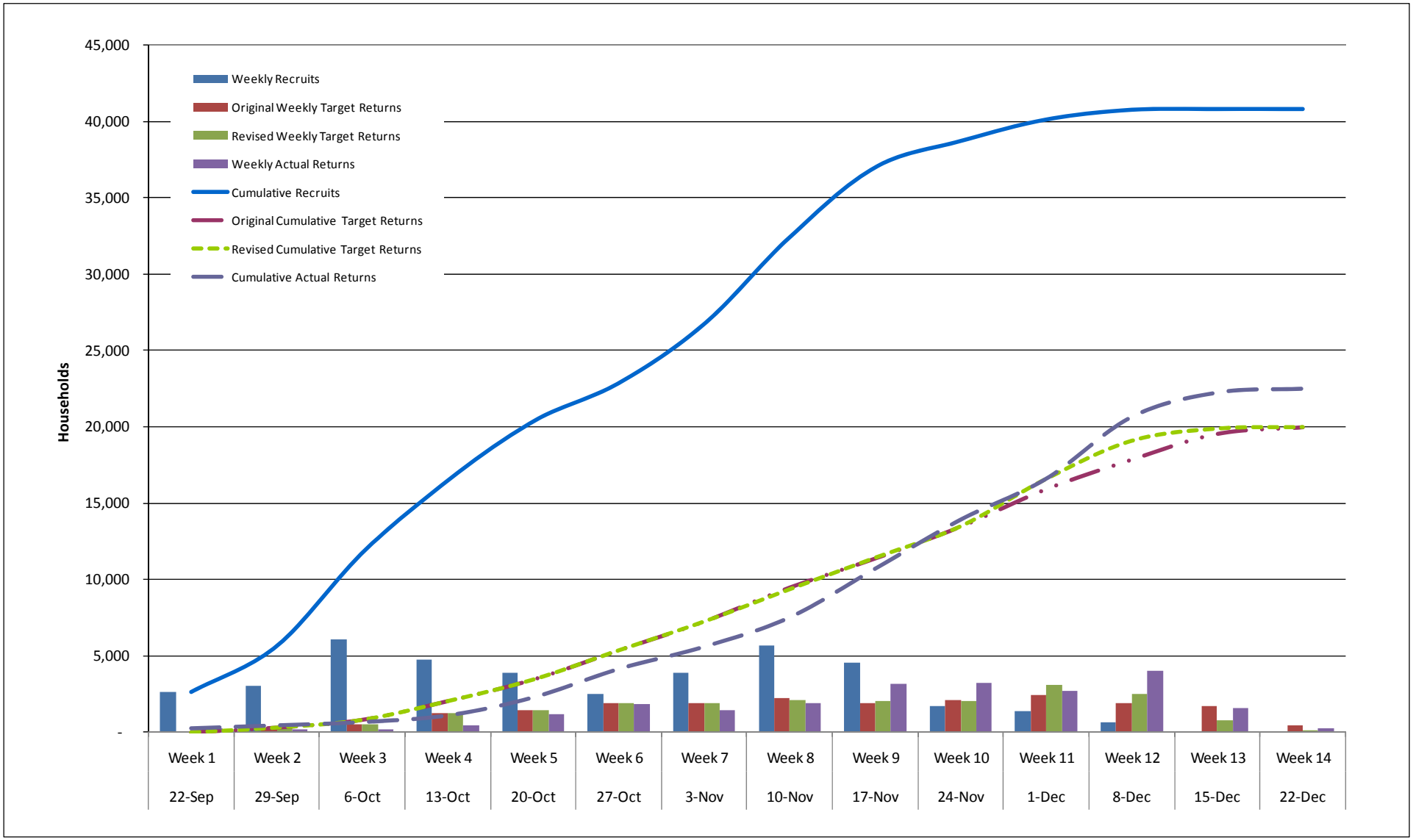


Exhibit 2.4: Progress of Survey Recruitment and Returns (Weekly and Cumulative)



2.3.4 Final Status of Survey Returns

A total of 37,196 survey invitations were distributed (22,973 web and 14,223 mail-outs). A total of 18,886 households returned surveys via web or post and/or were retrieved by telephone at the time of field cut-off, plus another 3,630 were retrieved by telephone via the 'yesterday retrieval' method, resulting in a total of 22,516 completions/returns (for an overall 53% completion rate). Following comprehensive post-processing logic checks, the final number of valid completions was 17,603 households, equivalent to a 47 percent completion rate excluding the yesterday method over-sample. The distribution of these survey returns in relation to sub-area targets is outlined in **Exhibit 2.5**. Note that the 3,449 valid completions through the yesterday method are stored in a separate database due to differences in the survey methodology and are not included in the analysis contained in this report. In addition, a 2,700 person over-sample of students at UBC and SFU was collected, summarised (in a separate document) and compiled into a database for further analysis by TransLink.

In terms of outreach and promotion activities, the team responded to 1,642 phone inquiries and voice messages and 3,065 emails which can be categorised into three groups: i) requests to switch survey method, ii) be removed from the survey list, and iii) a range of other issues, as illustrated in **Exhibit 2.6**. These other issues included a broad variety: technical issues (browser, dial-up, Mac, password/link problem), reminder-related (received reminder but not completed), link not received, clarification of trip definition, and comments about TransLink.

In summary, the lag in response, most likely due to intense public focus on the unusual global and local circumstances in the Fall of 2008, was overcome in the end as the regional quotas were reached. Since multiple recruitment and retention strategies were employed to meet the fixed deadline, it was difficult to distinguish the singular effectiveness of each of these methods. Collectively, however, they did result in exceeding the targets. Preliminary analysis of households that were sent the advance letter clearly indicated the effectiveness of this strategy, particularly when examining those who recall receipt. Those who recalled the letter were more than twice as likely to agree to participate (61 versus 28 percent of those who do not recall/did not receive a letter). As well, the completion rate was 24 percent higher among those who recalled the letter, suggesting a stronger commitment to the process. Note, however, that the actual effect of the letter alone is likely higher since a later strategy to include a copy of the letter with mail-out packages and email invitations was introduced (after November 13th) and thereby enhanced response to both those who received the letter in advance as well as those who did not. **Exhibit 2.7** displays a histogram between recruitment and response over time.

Exhibit 2.5: Final Status of Survey Returns

	2008 Household Estimates	TD08 Household Target Sample Size	TD08 Household Total Sample	% above or below Target	Web Recruit Actual Sample Size	Mail Recruit Actual Sample Size	Yesterday Retrieval Actual Sample Size
Burnaby	84,221	1,700	1,851	9%	960	519	372
Coquitlam	44,921	900	937	4%	567	280	90
Delta	36,517	750	840	12%	540	228	72
Langleys	47,070	1,000	1,081	8%	655	319	107
New Westminster	29,436	650	640	-2%	372	204	64
North Vancouver	55,649	1,100	1,252	14%	802	337	113
Port Coquitlam	20,361	400	415	4%	256	123	36
Port Moody/Anmore/Belcarra	11,619	250	295	18%	197	77	21
Richmond	66,722	1,400	1,511	8%	757	431	323
Surrey	142,420	3,000	3,239	8%	1,646	886	707
Vancouver CBD	59,600	1,200	916	-24%	485	224	207
Rest of Vancouver/UEL	195,167	4,400	4,814	9%	2,561	1,253	1,000
West Vancouver/Lions Bay	18,845	400	367	-8%	210	110	47
White Rock	9,877	250	251	0%	145	90	16
Maple Ridge/Pitt Meadows	33,177	700	762	9%	454	229	79
Abbotsford	46,940	900	883	-2%	534	266	83
Mission/Fraser North	15,569	400	390	-3%	248	101	41
Chilliwack/Fraser South	29,912	600	608	1%	365	171	72
Total	**948,024**	**20,000**	**21,052**	**5%**	**11,754**	**5,848**	**3,450**

Exhibit 2.6: Email and Hotline Inquiries by Topic

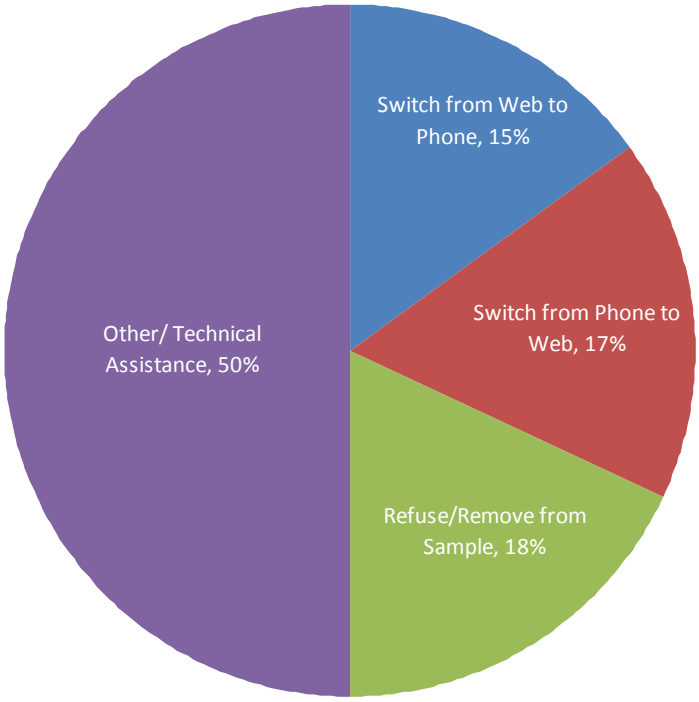
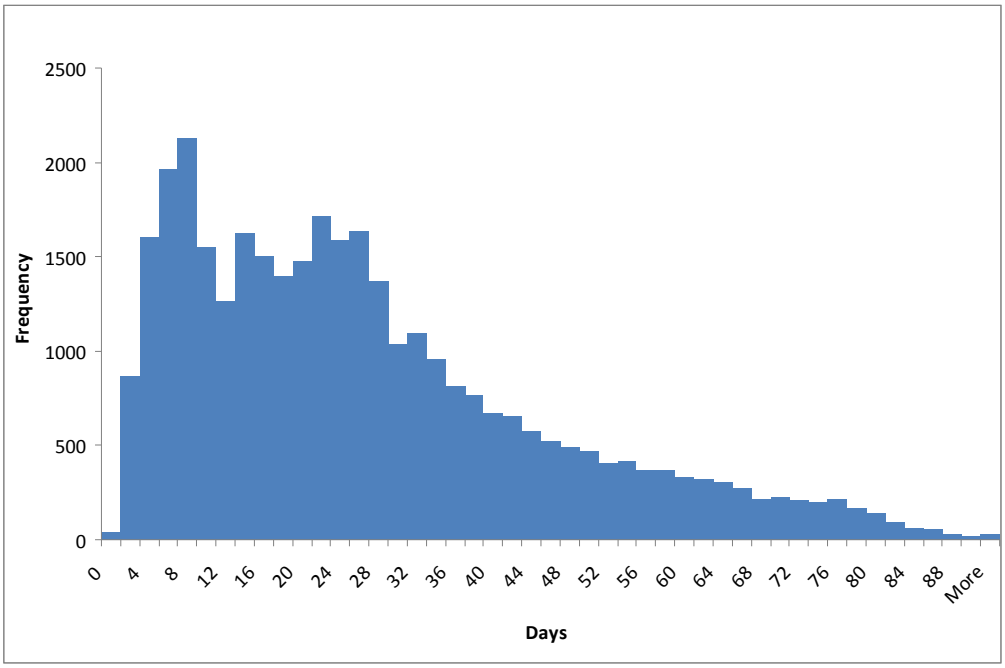


Exhibit 2.7: Days Elapsed Between Recruitment and Return (excl. yesterday retrievals)



2.4 Data Management

2.4.1 Data Processing and Database Creation

Survey recruits were uploaded to Mustel Group's secure web portal, after which passwords and instructions were sent to them either by email (for those who chose the web option) or by post (for those who chose the mail-out/telephone-retrieval option). All survey data were entered through a custom-developed online interface (see **Appendix 5.5** for screenshots of the survey website). Data entry was completed either by respondents themselves who had opted for the web survey, or by Mustel staff on behalf of respondents who had opted for the mail-out/telephone-retrieval survey. Please see **Appendix 5.6** for the script used in the telephone retrieval interview. In all cases, the same built-in logic checks were applied to the data as they were entered.

Once the survey's field period ended, all records were exported. This final data file was then received by Halcrow in SPSS format for coding and logic/verification purposes prior to conversion to a relational database format. Initial checks were conducted to verify at a high level that the text file had been exported accurately, followed by conversion to a relational format comprised of three tables (household, person and trip). Further checking and cleaning was then conducted on the relational database, including standardisation of 'other' responses for origins, destinations and modes. In the raw data, a number of respondents did not make a return trip home, which could have been legitimate – for instance s/he left the region or made a return trip the next day. Conversely, contrary to instructions, the respondent may have erroneously reported a round trip – i.e., home to work to home – as a single trip when it should have been two trips, namely home to work, and work to home). Reviewed records were flagged for confirmation. Additional return home trips were added to the database as a result of the confirmation process, making the percentage of non-return home trips comparable with past survey findings.

Respondents who had erroneously recorded travel on survey blackout dates were also removed from the person table and had their trips removed from the trips table. These dates included:

- October 13th – Canadian Thanksgiving
- October 14th – Federal Election
- November 11th – Remembrance Day

Further removal of household records and their associated person and trip records was also conducted to separate the 'yesterday retrieval' households from the main sample. The total number of recruited households was boosted by the additional 3,449 households that

participated in this manner, to a total of 21,052, or 105.3 percent of the target of 20,000 households. Nevertheless, analysis of the data provided by these households revealed consistently lower trip rates: 13.3 percent lower than those obtained through mail-out/telephone retrieval and 16.7 percent lower than those obtained through the online retrieval. The records obtained from the 'yesterday retrieval' method were subsequently removed from the main database and stored in a complementary database that may be used to supplement the main database if needed. Without these additional households, the total number analysed here is 17,603.

A key innovation in the 2008 survey was the ability for respondents to manually place their coordinates on an interactive online map, thereby offering a timely, informative, and visual means of checking that they obtained the correct location. In addition to conversion to UTM X/Y format, these points were tagged according to TZ, 'superzone,' sub-area, rapid transit buffer, and dissemination area (a unit used by Statistics Canada for demographic purposes). Verification of these points was conducted for respondents' home addresses as well as for key destinations, including post-secondary institutions.

Further details on data processing and database creation activities are available in **Appendix 5.10**, the Technical Note on Data Management. Please note that due to changes in expansion and adjustments since the original publication of **Appendix 5.10**, some figures may not precisely match those in this report. The latter are to be considered official.

2.4.2 Comparison of Sample and Study Area Universe

SM Research, the firm that provided the sample used for survey recruitment, also provided 2008 demographic estimates (based on 2006 Census Data) for use in the development of expansion factors. Census projections were made using the 2006 actual population data and projecting change over the period 2006 to 2008. Factors taken into account include birth rate, death rate, immigration and emigration for each age within gender within geographic projected category. The factor changes were made on a year-by-year basis to reach the final projections for 2008. These factors were based on how the survey data matched up with particular characteristics of the universe. These tables (of control/universe totals) are available for reference in **Appendix 5.9**. Note that probability weighting and transit passholder adjustments were applied in addition to these demographic factors. These techniques are described in further detail below.

The trip diary survey represents 1.9 percent of the study area households (17,603 out of 948,026 households). The 17,603 households sampled included 34,236 people, compared with the 2,476,392 people in the study area universe population. In order to use the information to estimate trip totals by area and by time of day, the information must be expanded to the

survey universe, that is, by the total number of households in the study area. Data expansion can also help to eliminate sampling biases that may be observed in the unexpanded data. To identify potential biases in the data, the demographic profiles of the unexpanded sample were compared with regional estimates as shown in **Exhibits 2.8** to **2.10**.

Exhibit 2.8 indicates the breakdown of the sample and the universe by age within gender. The unexpanded sample shows a higher proportion of people in the 50+ age categories, a fairly close match in the 40-49 age category, and lower proportions in the younger age categories (0-39), relative to the survey universe. **Exhibit 2.9** shows the survey responses by the 18 sub-areas developed for the study. The survey distribution is slightly different from the survey universe due to the sampling technique used to ensure a representative number of returns in each of the 18 areas. **Exhibit 2.10** shows the survey responses by household size. The survey shows a higher proportion of two-person households and a lower proportion of one-person and six-plus person households. The reason for the lower response in the one-person category is likely related to the difficulty in contacting people living alone. Interestingly, the three and four to five person households are representative. In these types of surveys, larger households often have lower return rates because it is more difficult to coordinate everyone in the household to complete the questionnaires.

Exhibit 2.8: Age and Gender Distribution of Sample Versus Universe (persons)

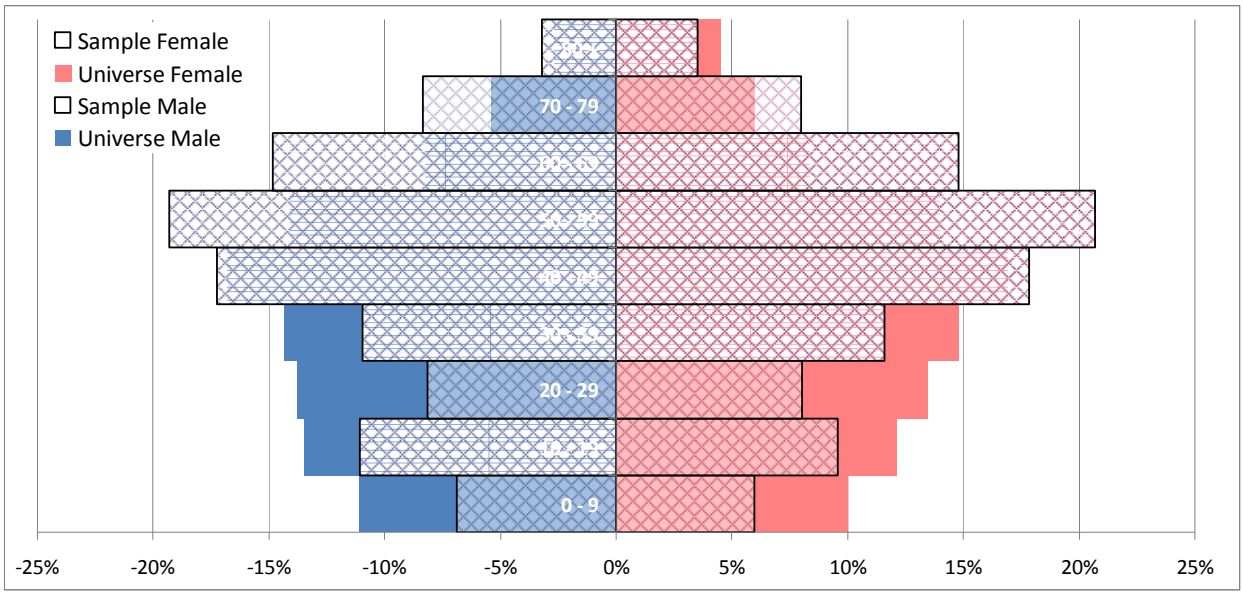


Exhibit 2.9: Sub-Area Distribution of Sample Versus Universe (persons)

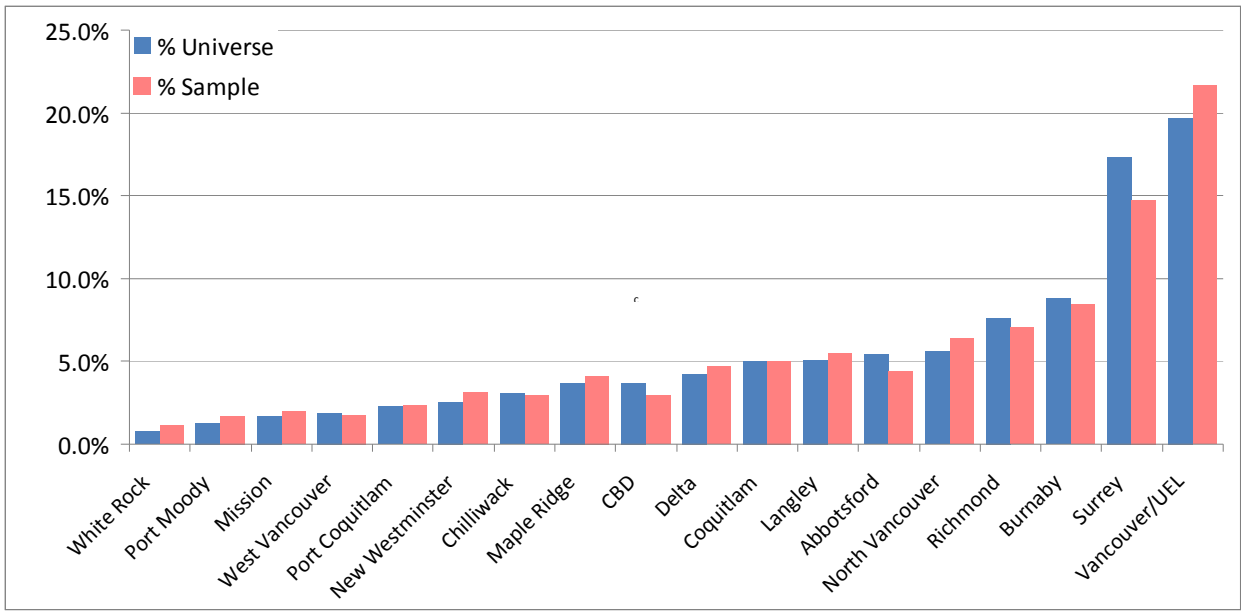
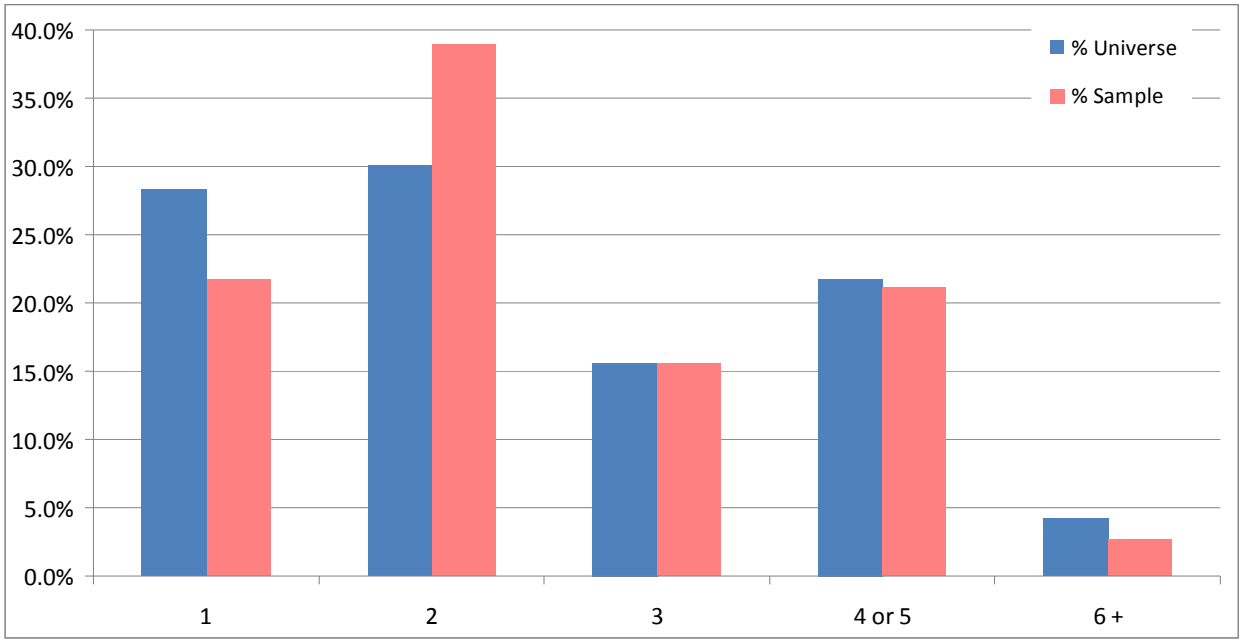


Exhibit 2.10: Household Size Distribution of Sample Versus Universe



2.4.3 Data Expansion and Weighting

In order to ensure the sample was statistically representative of the population, the project team developed expansion factors for the household and person tables. These factors focussed on matching known demographic characteristics by sub-area, notably household size, and age within gender. Additionally, probability weighting to account for incomplete households (where some but not all members completed the survey) and transit passholder adjustments were developed and applied. These factors and adjustments are described in more detail below:

- **Household Expansion**
  For the household table, basic expansion involved the development of factors based on the distribution of household size groups within each of the study's 18 sub-areas. For this study, 5 household size groups (1 person, 2 persons, 3 persons, 4 and 5 persons, and 6 or more persons) were used for each sub-area expansion, for a total of 90 expansion categories.

- **Person Expansion**
  This process was slightly more complex for the person table, involving the development of factors based on the distribution of age categories within gender, again within each of the study's 18 sub-areas. For this study, 9 age categories (0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80+) were used within the two genders within each sub-area, rendering a total of 324 expansion categories. For records with age refusal, a separate expansion factor was used based on sub-area and gender and was applied equally for records with age refusal within its expansion category. The number of age refusal records is very low at only 437 out of a total of 45,041 persons. The effect of the distributive age refusal expansion process does not have any significant effect on the distribution between the expansion categories.

- **Probability Weighted (PW) Person Expansion**
  There are multiple instances where the participation of a household in the trip diary survey was incomplete, in that some household members either refused or did not respond to the travel survey while others did. A probability weighted expansion process is used to take into account the household completion rate. The probability weight represents the total persons in the household divided by the number of individuals that completed the survey (noted as "probability weight"). This weight reflects the lower probability of returns from every member of a household and is then applied to the universe data in the person expansion process within the same sub-area, gender, and age category to ensure a statistically representative distribution. In terms of person and trip expansion, the PW person expansion, which is capped at 4, is then multiplied by the person expansion factor to produce the universe total.

- **Transit Adjustment**

  Upon expansion according to the methods described above, TransLink and the project team expressed concern that the sample may have inadvertently captured an over-representation of transit users, due to identification of the survey as a TransLink project. Adjusting for this potential sample bias involved comparing the expanded TD08 population against the universe in terms of the number of TransLink passholders, averaged across October, November, and December 2008. Using product sales information provided by TransLink, the project team compared these two figures by several categories, including Monthly FareCards, U-Passes, and Employer Passes. U-Passes were estimated by summing the total enrolment (full and part time) for the three participating institutions: UBC, SFU, and Langara. Please note that this approach assumes that the survey captured a reasonable and accurate distribution of TransLink passholders and FareSaver/cash users by age within gender within sub-area. At TransLink's request, the factor devised for this adjustment was also extended to respondents who had self-identified as having used transit in the past week and having paid by FareSaver (prepaid tickets) or cash. The project team therefore adjusted for transit passholders, FareSaver and cash users by taking the following steps:

  - Conducting an initial expansion (by age within gender within sub-area) of all records to match the universe,
  - Determining the degree of passholder over-representation in the sample (the surplus of passholders in the initial expansion compared to TransLink's passholder sales totals),
  - Applying a down-weight to all expanded passholders/ FareSaver/ cash users based on the degree of passholder over-representation previously derived, and
  - Applying an up-weight to non-passholders/ FareSaver/ cash users to match (by age within gender within sub-area) the universe minus the expanded and down-weighted passholders/ FareSaver/ cash users.

3.0 Survey Results and Analysis

3.1 Introduction

This section presents a summary of key findings from TransLink's 2008 Regional Trip Diary Survey. Information on regional trip totals, person trip rates, mode shares and trip purposes are described for different time periods and sub-areas. Select comparisons with previous surveys are also included. Comparisons of these data with historical surveys should be undertaken with caution due to potential differences in survey design, study area and timing (e.g. fall vs. spring). Additionally:

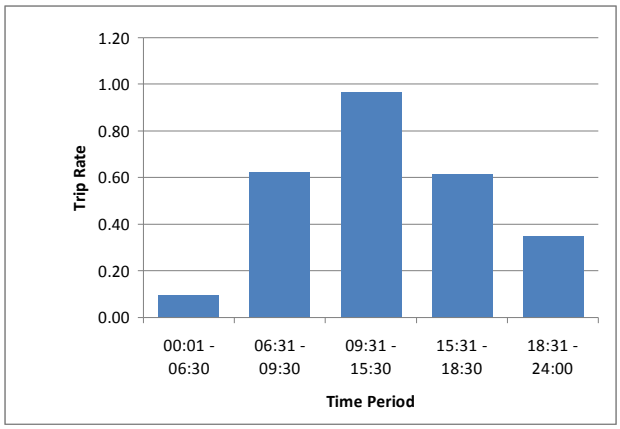
- Unless explicitly stated otherwise, statistics reported in text and tables are for the entire Lower Mainland,
- Non-resident, commercial, and passenger-serving trips are not included,
- Trip times are based on when trips started (when the person left their origin point),
- Due to rounding, amounts may not precisely add up to reported totals or match between tables, and
- Caution should be exercised in using figures where the number of trips are low (please refer to **Appendix 5.11** for further details on statistical reliability of the survey).

3.2 Results

3.2.1 Trip Totals and Trip Rates

For a typical 2008 weekday, the total number of daily trips made by residents of the study area is estimated at approximately 6.6 million. This translates to a daily average of approximately 2.65 trips per person or 6.93 trips per household. **Exhibit 3.1a** provides a summary of this information by time of day in chart format, while **Exhibit 3.1b** provides a tabular overview. On an hourly basis, the morning and afternoon peak periods represent the most intense travel periods followed by the midday and evening periods.

Exhibit 3.1a: Trip Rates and Total Trips by Time Period (Lower Mainland)



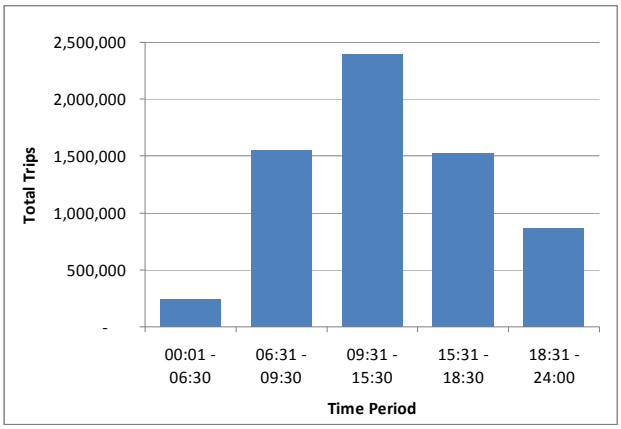


Exhibit 3.1b: Trips and Trip Rates by Time of Day (Lower Mainland)

	Night 00:01 - 06:30	AM Peak 06:31 - 09:30		Midday 09:31 - 15:30	PM Peak 15:31 - 18:30		Evening 18:31 - 24:00	24 Hours	
Total Trips	239,750	1,548,050		2,393,000	1,523,550		864,900	6,569,300	
% of Daily Trips	4%	24%		36%	23%		13%	100%	
Trips per Person	0.10	0.63	(0.01)	0.97	0.62	(0.01)	0.35	2.65	(0.02)
Trips per Hhld	0.25	1.63	(0.02)	2.52	1.61	(0.02)	0.91	6.93	(0.07)

Note: Numbers in parentheses represent the error range at the 95% confidence interval (e.g. daily trips per persons 2.63 - 2.67)

Exhibit 3.2 provides a summary of trip rates by age category and time of the day. The 25-49 age category has the highest trip rate, followed by individuals aged 50-64. It appears that elderly people conduct most of their travel during the midday period and that those aged 18-24 have the highest evening trip rate. Within the region, travel activity varies significantly by sub-area and time of day. For the purpose of this analysis, travel statistics are presented according to ten sub-areas. **Exhibit 3.3** shows the total number of trips originating from and destined to each of these sub-areas by time period.

Exhibit 3.2: Trip Rates by Age and Time of Day (Lower Mainland)

Age Group	Personal Trip Rates					
	Night 00:01 - 06:30	AM Peak 06:31 - 09:30	Midday 09:31 - 15:30	PM Peak 15:31 - 18:30	Evening 18:31 - 24:00	24 Hours
00 - 04	0.01	0.46	0.98	0.41	0.13	1.99
05 - 17	0.01	0.86	0.91	0.49	0.30	2.59
18 - 24	0.12	0.48	0.70	0.57	0.50	2.37
25 - 49	0.14	0.72	0.86	0.76	0.42	2.91
50 - 64	0.14	0.55	1.06	0.67	0.34	2.77
65 - 79	0.03	0.35	1.49	0.42	0.21	2.49
80+	0.02	0.23	1.13	0.21	0.10	1.68
Total	0.10	0.63	0.97	0.62	0.35	2.65

Exhibit 3.3: Trip Origins and Destinations by Sub-Area (Lower Mainland)

A. Trips Origins by Sub-Area

Sub-Area	Trip Totals					
	Night 00:01 - 06:30	AM Peak 06:31 - 09:30	Midday 09:31 - 15:30	PM Peak 15:31 - 18:30	Evening 18:31 - 24:00	24 Hours
Vancouver - CBD	7,550	55,750	121,750	137,550	58,300	380,950
Vancouver - General	29,850	320,600	499,650	325,500	182,900	1,358,550
North Shore	12,300	121,850	181,250	106,450	61,300	483,200
Burnaby / New West	23,650	169,350	262,600	193,850	102,450	751,850
Richmond / Delta	33,100	197,700	305,700	190,650	106,350	833,500
Northeast Sector	24,950	137,450	183,350	107,350	69,400	522,500
Surrey / White Rock	54,250	286,750	400,850	216,650	136,300	1,094,800
Langleys	10,350	55,350	112,300	66,250	38,550	282,800
Maple Ridge / Pitt Meadows	15,950	55,600	79,800	40,100	27,600	219,100
Fraser Valley	27,750	147,600	245,750	139,200	81,750	642,050
Total Trips	239,750	1,548,000	2,392,950	1,523,700	864,900	6,569,300

Note: Figures may not reconcile exactly due to rounding

B. Trips Destinations by Sub-Area

Sub-Area	Trip Totals					
	Night 00:01 - 06:30	AM Peak 06:31 - 09:30	Midday 09:31 - 15:30	PM Peak 15:31 - 18:30	Evening 18:31 - 24:00	24 Hours
Vancouver - CBD	28,450	125,700	113,200	73,350	40,600	381,300
Vancouver - General	41,500	327,000	487,100	323,200	179,650	1,358,450
North Shore	12,650	100,550	185,250	117,800	67,700	483,900
Burnaby / New West	37,000	194,550	255,050	176,500	90,950	754,050
Richmond / Delta	35,550	194,500	306,950	188,000	105,100	830,100
Northeast Sector	16,400	107,800	191,800	129,800	76,100	521,900
Surrey / White Rock	33,700	244,300	408,550	254,650	153,300	1,094,500
Langleys	8,850	66,250	109,850	62,450	35,150	282,550
Maple Ridge / Pitt Meadows	7,750	47,850	82,400	51,150	31,050	220,150
Fraser Valley	17,950	139,650	252,850	146,700	85,250	642,400
Total Trips	239,750	1,548,050	2,393,000	1,523,550	864,900	6,569,300

Note: Figures may not reconcile exactly due to rounding

Exhibit 3.4 shows the trip distributions between and within origin and destination sub-areas for total person, auto driver (i.e., vehicle trips) and transit trips for the AM peak period. The highest trip volume is related to travel within sub-areas (e.g., Vancouver to Vancouver); Vancouver-General has the highest number of internal trips within the study area, followed by Surrey. Between sub-areas, Burnaby/New West to Vancouver-General represents the highest trip interchange, followed by Richmond/Delta to Vancouver-General. Vancouver-General and Vancouver-CBD are the highest volume destinations for AM peak transit trips. **Exhibit 3.5** shows the same information for the PM peak period, which displays similar patterns. Please note that rows refer to trip origins, while columns refer to trip destinations.

Exhibit 3.4: AM Peak Origins and Destinations (Lower Mainland)

All Person Trips - AM Peak

Sub-Area	Vancouver - CBD	Vancouver - General	North Shore	Burnaby / New West	Richmond / Delta	Northeast Sector	Surrey / White Rock	Langleys	Maple Ridge / Pitt Meadows	Fraser Valley	Total
Vancouver - CBD	21,870	20,570	1,960	6,330	3,630	590	560	40	50	-	55,600
Vancouver - General	44,250	216,390	6,330	26,910	18,120	2,760	4,190	590	90	280	319,910
North Shore	13,860	13,460	81,880	8,460	2,150	720	880	90	60	200	121,760
Burnaby / New West	14,300	27,970	4,780	96,680	9,430	6,740	7,520	540	620	310	168,890
Richmond / Delta	10,350	26,980	1,400	10,300	133,710	1,450	12,430	300	160	460	197,540
Northeast Sector	8,570	7,550	2,100	23,680	2,480	84,960	3,130	1,070	2,980	690	137,210
Surrey / White Rock	9,310	10,110	1,250	15,470	23,090	4,380	198,470	20,190	590	3,310	286,170
Langleys	510	890	210	2,030	1,180	440	11,740	35,580	30	2,620	55,230
Maple Ridge / Pitt Meadows	1,430	590	520	3,350	350	4,320	1,240	500	40,970	2,050	55,320
Fraser Valley	780	1,300	160	740	760	910	3,800	7,020	1,730	130,300	147,500
Total Trips	125,230	325,810	100,590	193,950	194,900	107,270	243,960	65,920	47,280	140,220	1,545,130

Note: Figures may not reconcile exactly due to rounding

Transit Trips - AM Peak

Sub-Area	Vancouver - CBD	Vancouver - General	North Shore	Burnaby / New West	Richmond / Delta	Northeast Sector	Surrey / White Rock	Langleys	Maple Ridge / Pitt Meadows	Fraser Valley	Total
Vancouver - CBD	2,620	6,900	1,080	2,760	760	70	210	40	-	-	14,440
Vancouver - General	20,930	37,440	1,250	7,820	1,570	580	540	90	-	-	70,220
North Shore	5,790	3,120	4,980	850	30	30	-	-	20	-	14,820
Burnaby / New West	10,010	8,170	510	15,290	670	630	1,150	-	260	-	36,690
Richmond / Delta	5,070	6,430	770	2,330	5,250	-	1,060	-	-	-	20,910
Northeast Sector	5,530	2,210	60	4,020	200	3,670	320	-	-	-	16,010
Surrey / White Rock	5,640	3,270	-	5,300	790	130	5,460	1,310	-	60	21,960
Langleys	160	-	-	150	90	20	270	950	-	120	1,760
Maple Ridge / Pitt Meadows	1,260	160	-	740	-	280	-	-	740	-	3,180
Fraser Valley	450	70	30	50	-	120	-	-	-	2,600	3,320
Total Trips	57,460	67,770	8,680	39,310	9,360	5,530	9,010	2,390	1,020	2,780	203,310

Auto Driver Trips - AM Peak

Sub-Area	Vancouver - CBD	Vancouver - General	North Shore	Burnaby / New West	Richmond / Delta	Northeast Sector	Surrey / White Rock	Langleys	Maple Ridge / Pitt Meadows	Fraser Valley	Total
Vancouver - CBD	4,850	8,440	650	3,100	2,620	510	350	-	50	-	20,570
Vancouver - General	14,830	86,460	3,380	15,970	14,200	2,100	3,530	470	90	280	141,310
North Shore	7,380	8,400	42,210	6,420	1,780	610	850	90	40	200	67,980
Burnaby / New West	3,570	15,050	3,850	41,290	8,080	5,140	5,680	390	310	310	83,670
Richmond / Delta	4,810	17,260	630	7,180	69,330	1,400	9,010	240	160	460	110,480
Northeast Sector	2,410	4,560	2,040	16,900	2,210	43,520	2,310	950	2,410	620	77,930
Surrey / White Rock	3,120	6,040	930	9,330	18,330	3,950	98,910	13,890	580	3,200	158,280
Langleys	350	670	190	1,570	1,090	330	9,310	19,540	30	2,220	35,300
Maple Ridge / Pitt Meadows	110	440	520	2,580	350	3,430	1,050	270	19,930	1,710	30,390
Fraser Valley	-	890	50	650	760	750	2,610	5,340	1,430	75,600	88,080
Total Trips	41,430	148,210	54,450	104,990	118,750	61,740	133,610	41,180	25,030	84,600	813,990

Exhibit 3.5: PM Peak Origins and Destinations (Lower Mainland)

All Person Trips - PM Peak

Sub-Area	Vancouver - CBD	Vancouver - General	North Shore	Burnaby / New West	Richmond / Delta	Northeast Sector	Surrey / White Rock	Langleys	Maple Ridge / Pitt Meadows	Fraser Valley	Total
Vancouver - CBD	30,960	43,370	12,540	14,960	11,220	8,010	11,510	570	2,760	1,010	136,910
Vancouver - General	22,380	214,150	11,500	28,580	25,290	8,500	10,750	1,150	1,660	770	324,730
North Shore	4,460	7,740	81,840	6,040	1,580	2,240	2,020	100	210	360	106,590
Burnaby / New West	6,730	29,500	7,580	94,450	10,440	21,910	15,040	1,630	3,990	1,840	193,110
Richmond / Delta	4,310	18,310	1,940	10,180	120,510	2,970	28,950	1,710	790	830	190,500
Northeast Sector	1,580	2,710	760	12,240	1,610	76,440	4,300	420	5,740	1,320	107,120
Surrey / White Rock	1,660	4,900	1,570	8,510	15,260	3,080	155,850	18,240	1,420	5,210	215,700
Langleys	110	780	50	280	980	1,120	19,730	35,900	650	6,470	66,070
Maple Ridge / Pitt Meadows	150	170	250	580	130	3,850	880	110	31,700	2,160	39,980
Fraser Valley	750	510	170	130	490	1,270	4,780	2,370	2,250	127,250	139,970
Total Trips	73,090	322,140	118,200	175,950	187,510	129,390	253,810	62,200	51,170	147,220	1,520,680

Note: Figures may not reconcile exactly due to rounding

Transit Trips - PM Peak

Sub-Area	Vancouver - CBD	Vancouver - General	North Shore	Burnaby / New West	Richmond / Delta	Northeast Sector	Surrey / White Rock	Langleys	Maple Ridge / Pitt Meadows	Fraser Valley	Total
Vancouver - CBD	3,880	20,180	5,160	10,560	5,090	5,090	6,810	320	2,260	520	59,870
Vancouver - General	7,780	37,620	1,860	8,450	5,510	1,760	3,220	230	190	50	66,670
North Shore	1,440	1,280	3,290	680	610	100	30	-	-	-	7,430
Burnaby / New West	3,420	8,960	590	13,140	2,250	2,930	3,460	40	670	50	35,510
Richmond / Delta	700	1,520	190	1,070	3,920	220	840	220	-	-	8,680
Northeast Sector	340	350	-	1,100	-	2,650	100	40	190	140	4,910
Surrey / White Rock	510	310	30	2,110	490	350	4,360	200	-	20	8,380
Langleys	-	-	-	-	160	-	830	390	-	-	1,380
Maple Ridge / Pitt Meadows	50	-	20	80	-	70	-	-	410	-	630
Fraser Valley	10	-	-	-	-	-	290	110	-	1,960	2,370
Total Trips	18,130	70,220	11,140	37,190	18,030	13,170	19,940	1,550	3,720	2,740	195,830

Auto Driver Trips - PM Peak

Sub-Area	Vancouver - CBD	Vancouver - General	North Shore	Burnaby / New West	Richmond / Delta	Northeast Sector	Surrey / White Rock	Langleys	Maple Ridge / Pitt Meadows	Fraser Valley	Total
Vancouver - CBD	4,590	14,300	6,590	3,630	5,240	2,280	4,380	180	340	310	41,840
Vancouver - General	8,990	95,810	7,960	15,780	15,860	5,450	6,020	680	1,050	720	158,320
North Shore	2,200	4,870	50,950	4,390	970	2,080	1,660	80	210	320	67,730
Burnaby / New West	2,990	15,250	6,320	51,730	6,740	15,980	9,860	1,470	3,230	1,300	114,870
Richmond / Delta	3,170	14,290	1,560	8,110	77,190	2,440	23,630	1,500	790	830	133,510
Northeast Sector	800	2,020	690	8,640	1,270	48,760	3,580	380	4,570	1,180	71,890
Surrey / White Rock	880	4,070	1,170	5,220	12,480	2,310	97,980	13,090	1,370	3,590	142,160
Langleys	40	750	50	130	730	1,120	14,370	24,310	360	5,700	47,560
Maple Ridge / Pitt Meadows	100	170	230	500	130	3,150	880	110	17,890	1,720	24,880
Fraser Valley	490	230	170	130	290	1,180	4,060	1,910	1,720	88,510	98,690
Total Trips	24,250	151,760	75,690	98,260	120,900	84,750	166,420	43,710	31,530	104,180	901,450

3.2.2 Travel Mode and Trip Purpose

This section provides an overview of regional travel by mode and trip purpose. Travel mode and trip purpose percentages are presented according to time of the day. As mentioned earlier, comparisons with historical surveys should be undertaken with caution especially when comparing mode shares by time of day. **Exhibit 3.6** provides a summary of the travel mode share for six time periods for the **Lower Mainland**, and in select cases, disaggregated results for **Metro Vancouver**, as well.

- **Mode Share**

  Exhibit 3.6a provides an overview of the travel mode share during the AM and PM Peaks and over 24h for the Lower Mainland, while **Exhibit 3.6b** summarises this information in tabular format for **Metro Vancouver** and the entire **Lower Mainland**. For **Metro Vancouver** residents, total daily trips are estimated at 5.9 million with transit, bike and walk mode shares estimated at 12.6, 1.5, and 11.0 percent of daily travel, respectively. In the **Lower Mainland**, total daily trips are estimated at 6.6 million, with daily auto person trips (auto driver and passenger) accounting for 75 percent of the travel. Transit, bike and walk trips represent 11.5, 1.4, and 10.5 percent of travel, respectively. Auto mode share is stable throughout the day, slightly increasing in the afternoon and evening, though highest during the late night. Transit mode shares are stable during the peak periods, dropping off in the midday and evenings. Walk trips drop significantly in the afternoon and evening, with more than double the mode share during the AM peak compared to the PM peak. Bike trips are fairly stable throughout the day, ranging from 1.0 percent during the evening to 1.8 percent during the AM peak.

Exhibit 3.6a: Daily and Peak Period Mode Shares (Lower Mainland)

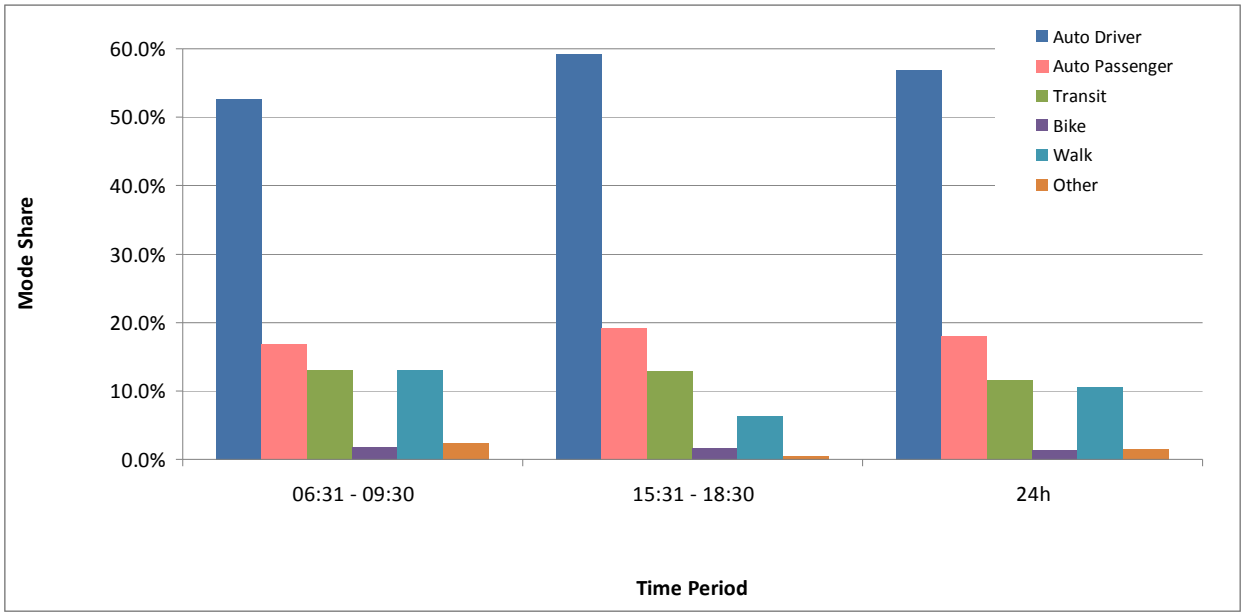


Exhibit 3.6b: Mode Share by Time of Day/ 24h (Metro Vancouver and Lower Mainland)

A. Residents of Metro Vancouver Area Only

Travel Mode	Travel Mode Percentages						24 Hour Total
	Night 00:01 - 06:30	AM Peak 06:31 - 09:30	Midday 09:31 - 15:30	PM Peak 15:31 - 18:30	Evening 18:31 - 24:00	24 Hours	
Auto Driver	72.2%	51.9% (0.7%)	54.7%	58.1% (0.7%)	58.0%	55.9% (0.3%)	3,292,300
Auto Passenger	6.1%	16.6% (0.5%)	16.4%	18.8% (0.5%)	25.0%	17.8% (0.3%)	1,046,150
Transit	17.2%	14.3% (0.5%)	11.4%	14.1% (0.5%)	8.8%	12.6% (0.2%)	742,050
Bike	1.5%	1.9% (0.2%)	1.1%	1.8% (0.2%)	1.0%	1.5% (0.1%)	86,650
Walk	2.3%	13.5% (0.5%)	14.8%	6.6% (0.3%)	6.3%	11.0% (0.2%)	650,250
Other	0.7%	1.7% (0.2%)	1.6%	0.6% (0.1%)	0.8%	1.2% (0.1%)	73,100
Total	211,100	1,398,750	2,131,150	1,372,600	776,950	100%	5,890,500

Note:
(a) Figures may not reconcile exactly due to rounding
(b) Numbers in parentheses represent the error range at the 95% confidence interval (e.g. daily transit mode split is 12.4% - 12.8%)

B. Entire Lower Mainland

Travel Mode	Travel Mode Percentages						24 Hour Total
	Night 00:01 - 06:30	AM Peak 06:31 - 09:30	Midday 09:31 - 15:30	PM Peak 15:31 - 18:30	Evening 18:31 - 24:00	24 Hours	
Auto Driver	73.8%	52.7% (0.7%)	55.8%	59.4% (0.7%)	58.9%	57.0% (0.3%)	3,742,050
Auto Passenger	6.7%	16.8% (0.5%)	16.8%	19.2% (0.5%)	25.3%	18.1% (0.2%)	1,189,100
Transit	15.5%	13.2% (0.5%)	10.4%	12.9% (0.4%)	8.0%	11.5% (0.2%)	756,400
Bike	1.3%	1.8% (0.2%)	1.1%	1.7% (0.2%)	1.0%	1.4% (0.1%)	91,100
Walk	2.1%	13.1% (0.5%)	14.0%	6.3% (0.3%)	6.0%	10.5% (0.2%)	689,900
Other	0.7%	2.3% (0.2%)	2.0%	0.6% (0.1%)	0.8%	1.5% (0.1%)	100,800
Total	239,800	1,548,100	2,393,200	1,523,450	864,700	100%	6,569,300

Note:
(a) Figures may not reconcile exactly due to rounding
(b) Numbers in parentheses represent the error range at the 95% confidence interval (e.g. daily transit mode split is 11.3% - 11.7%)

- **Trip Purpose**

  Exhibit 3.7a shows the breakdown by trip purpose for different time periods throughout the day for the entire **Lower Mainland** and for **Metro Vancouver** residents in tabular format. **Exhibit 3.7b** summarises this same information for the AM and PM peak hours, as well as the 24 hour total, for the Lower Mainland. **Exhibit 3.8** provides a breakdown of the daily trips by purpose and mode. For these analyses, the following general travel purposes are used:

  - To work or post-secondary school,
  - From work or post-secondary school,
  - During work,
  - To grade school,
  - From grade school,
  - Recreation/ dining/ shopping, and
  - Personal business (social, pick-up/drop-off, etc.).

  Note that specific travel purposes are coded in the survey database for each trip. As a result, very detailed trip purpose combinations can be examined if required (e.g., home to work, shopping to dining, etc.).

  For the **Lower Mainland**, travel to and from work and post-secondary school account for 34.4 percent of daily travel. Trips during work and grade school trips account for 1.9 and 11.9 percent of daily travel, respectively. Recreation/dining/shopping trips account for 29.8 percent of daily travel, while other personal business trips represent 21.9 percent. Note that the number of work and grade school trips is reasonably consistent with regional estimates of employed labour force (1.0M in Metro Vancouver) and school aged children (0.3M across the Lower Mainland). The AM peak period is dominated by travel to work, to grade school and for personal business. During the midday, travel is predominately for personal reasons. In the afternoon, personal travel continues to dominate, followed by travel from work, while in the evening, travel for recreation/dining/shopping predominates.

Exhibit 3.7a: Trip Purpose by Time of Day (Metro Vancouver and Lower Mainland)

A. Residents of Metro Vancouver Area Only

Trip Purpose	Trip Purpose Percentages										24 Hour Total
	Night 00:01 - 06:30		AM Peak 06:31 - 09:30		Midday 09:31 - 15:30	PM Peak 15:31 - 18:30		Evening 18:31 - 24:00	24 Hours		
To Work/PS	76.5%		44.3%	(0.7%)	9.0%	3.0%	(0.2%)	2.5%	17.6%	(0.3%)	1,034,300
From Work/PS	3.9%		1.2%	(0.2%)	13.8%	40.4%	(0.7%)	19.3%	17.4%	(0.3%)	1,025,450
During Work	0.5%		1.2%	(0.2%)	3.7%	1.3%	(0.2%)	0.3%	2.0%	(0.1%)	115,800
To Grade/Oth Sch	0.8%		21.9%	(0.6%)	1.4%	0.8%	(0.1%)	0.5%	6.0%	(0.2%)	353,800
From Grade/Oth Sch	0.5%		0.1%	(0.1%)	12.8%	3.5%	(0.3%)	1.7%	5.7%	(0.2%)	336,000
Recreation/Dining/Shop	8.9%		8.8%	(0.4%)	34.7%	31.1%	(0.6%)	56.2%	29.6%	(0.3%)	1,743,850
Personal Business/Oth	8.8%		22.5%	(0.6%)	24.6%	19.9%	(0.6%)	19.5%	21.8%	(0.3%)	1,281,300
Total	210,950		1,398,250		2,130,700	1,373,300		777,300	100%		5,890,500

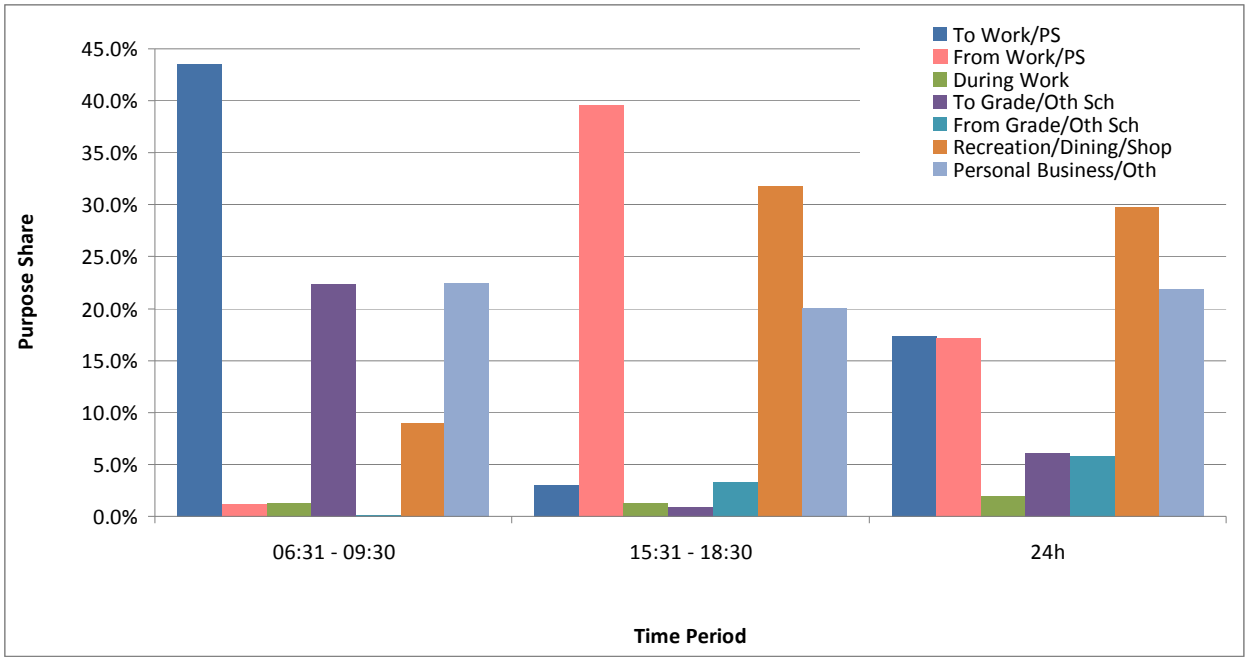
Note:
(a) Figures may not reconcile exactly due to rounding
(b) Numbers in parentheses represent the error range at the 95% confidence interval (e.g. daily to work/ps trips is 17.3% - 17.9%)

B. Entire Lower Mainland

Trip Purpose	Trip Purpose Percentages										24 Hour Total
	Night 00:01 - 06:30		AM Peak 06:31 - 09:30		Midday 09:31 - 15:30	PM Peak 15:31 - 18:30		Evening 18:31 - 24:00	24 Hours		
To Work/PS	76.7%		43.6%	(0.7%)	8.8%	3.1%	(0.2%)	2.5%	17.3%	(0.2%)	1,138,050
From Work/PS	4.0%		1.2%	(0.1%)	13.8%	39.6%	(0.7%)	18.9%	17.1%	(0.2%)	1,126,600
During Work	0.6%		1.2%	(0.2%)	3.6%	1.3%	(0.1%)	0.2%	1.9%	(0.1%)	127,150
To Grade/Oth Sch	0.7%		22.4%	(0.6%)	1.4%	0.9%	(0.1%)	0.5%	6.1%	(0.2%)	400,150
From Grade/Oth Sch	0.5%		0.1%	(0.0%)	12.9%	3.4%	(0.2%)	1.8%	5.8%	(0.2%)	379,950
Recreation/Dining/Shop	8.6%		9.0%	(0.4%)	34.6%	31.8%	(0.6%)	56.3%	29.8%	(0.3%)	1,958,750
Personal Business/Oth	8.9%		22.5%	(0.6%)	24.8%	20.0%	(0.5%)	19.7%	21.9%	(0.3%)	1,438,750
Total	239,650		1,547,650		2,392,700	1,524,200		865,050	100%		6,569,300

Note:
(a) Figures may not reconcile exactly due to rounding
(b) Numbers in parentheses represent the error range at the 95% confidence interval (e.g. daily to work/ps trips is 17.1% - 17.5%)

Exhibit 3.7b: Trip Purpose by Peak Period and 24h (Lower Mainland)



- **Mode Share by Trip Purpose**

  Exhibit 3.8 provides a breakdown of the daily trips by purpose and mode across the **Lower Mainland,** in which the percentages represent mode shares by trip purpose. For grade school trips, 50.0 percent of children are driven to school in the morning and 43.3 percent are driven from school in the afternoon. 31.4 percent of trips to school are by foot, while this figure rises to 35.9 percent for trips from school. Interestingly, the bicycle is not well used by children travelling to and from school, with only 1.6 percent of trips to grade school against 2.2 percent of trips to work or post-secondary institutions. Recreation/ dining/ shopping and personal business travel has higher than average auto usage (57.0 and 68.3 percent, respectively), with transit, bike and walk modes lower than regional averages (7.7, 0.9, and 9.0 percent for recreation/ dining/ shopping, respectively and 5.5, 0.7, and 10.0 percent for personal business, respectively).

  Although the automobile is the primary mode for commuting to and from work/post-secondary institutions (accounting for nearly two thirds of such trips), transit does manage to capture 19.9-20.8 percent of the market (compared to the 11.5 percent transit mode share for all trips across the Lower Mainland).

Exhibit 3.8: Mode Share by Trip Purpose (Metro Vancouver and Lower Mainland)

A. Residents of Metro Vancouver Area Only

Trip Purpose	Total Trips						
	Auto Driver	Auto Passenger	Transit	Bike	Walk	Other	Grand Total
To Work/PS	667,650	55,950	232,950	24,550	48,700	4,500	1,034,300
From Work/PS	668,350	56,950	221,700	24,450	49,750	4,250	1,025,450
During Work	96,050	6,650	7,950	700	3,650	800	115,800
To Grade/Oth Sch	9,100	178,750	24,950	5,750	117,100	18,150	353,800
From Grade/Oth Sch	9,150	145,900	30,250	5,450	127,550	17,750	336,050
Recreation/Dining/Shop	977,650	423,050	145,950	16,400	167,400	13,400	1,743,850
Personal Business/Oth	863,150	181,350	77,800	9,600	135,100	14,350	1,281,350
Total	3,291,100	1,048,600	741,550	86,900	649,250	73,200	5,890,600

Trip Purpose	Mode Share						
	Auto Driver	Auto Passenger	Transit	Bike	Walk	Other	Grand Total
To Work/PS	64.5%	5.4%	22.5%	2.4%	4.7%	0.4%	100.0%
From Work/PS	65.2%	5.6%	21.6%	2.4%	4.9%	0.4%	100.0%
During Work	83.0%	5.8%	6.9%	0.6%	3.1%	0.7%	100.0%
To Grade/Oth Sch	2.6%	50.5%	7.0%	1.6%	33.1%	5.1%	100.0%
From Grade/Oth Sch	2.7%	43.4%	9.0%	1.6%	38.0%	5.3%	100.0%
Recreation/Dining/Shop	56.1%	24.3%	8.4%	0.9%	9.6%	0.8%	100.0%
Personal Business/Oth	67.4%	14.2%	6.1%	0.7%	10.5%	1.1%	100.0%
Total	55.9%	17.8%	12.6%	1.5%	11.0%	1.2%	100.0%

Note: Figures may not reconcile exactly due to rounding

B. Entire Lower Mainland

Trip Purpose	Total Trips						
	Auto Driver	Auto Passenger	Transit	Bike	Walk	Other	Grand Total
To Work/PS	756,400	63,800	236,600	25,200	51,100	4,950	1,138,050
From Work/PS	755,550	64,700	224,550	25,000	52,150	4,700	1,126,650
During Work	105,500	7,800	8,300	750	3,900	850	127,100
To Grade/Oth Sch	12,200	199,950	25,500	6,550	125,600	30,350	400,150
From Grade/Oth Sch	11,650	164,450	31,900	6,200	136,500	29,200	379,900
Recreation/Dining/Shop	1,116,650	483,800	149,950	17,150	175,900	15,200	1,958,650
Personal Business/Oth	982,550	207,150	79,150	10,400	143,750	15,750	1,438,750
Total	3,740,500	1,191,650	755,950	91,250	688,900	101,000	6,569,250

Trip Purpose	Mode Share						
	Auto Driver	Auto Passenger	Transit	Bike	Walk	Other	Grand Total
To Work/PS	66.5%	5.6%	20.8%	2.2%	4.5%	0.4%	100.0%
From Work/PS	67.1%	5.7%	19.9%	2.2%	4.6%	0.4%	100.0%
During Work	83.0%	6.2%	6.5%	0.6%	3.1%	0.7%	100.0%
To Grade/Oth Sch	3.0%	50.0%	6.4%	1.6%	31.4%	7.6%	100.0%
From Grade/Oth Sch	3.1%	43.3%	8.4%	1.6%	35.9%	7.7%	100.0%
Recreation/Dining/Shop	57.0%	24.7%	7.7%	0.9%	9.0%	0.8%	100.0%
Personal Business/Oth	68.3%	14.4%	5.5%	0.7%	10.0%	1.1%	100.0%
Total	56.9%	18.1%	11.5%	1.4%	10.5%	1.5%	100.0%

Note: Figures may not reconcile exactly due to rounding

Trips by Age Group

The distribution of trips by age category provides further insight to afternoon travel. **Exhibit 3.9** shows the daily travel modes used by different age groups. Note that the highest transit mode share is in the 18-24 age category (31.5 percent). The highest bike mode share is in the 25-49 age category (1.8 percent), while the highest auto driver mode share is in the 50-64 age category (76.3 percent), while the highest walk mode share is in the 5-17 age category (27.1 percent).

Exhibit 3.9: Mode Share by Age Group (Lower Mainland)

Age Group	Total Trips						
	Auto Driver	Auto Passenger	Transit	Bike	Walk	Other	Grand Total
00 - 04	-	173,750	5,700	2,200	48,900	10,300	240,850
05 - 17	18,850	577,450	71,650	15,350	277,050	61,000	1,021,350
18 - 24	275,600	75,650	176,000	5,600	22,100	3,000	557,950
25 - 49	1,996,300	159,150	321,000	49,600	199,750	13,350	2,739,150
50 - 64	986,200	94,100	110,000	15,350	80,850	6,600	1,293,100
65 - 79	380,950	81,800	52,300	2,800	44,900	3,150	565,900
80+	82,850	29,050	19,800	350	15,250	3,450	150,750
Total	3,740,750	1,190,950	756,450	91,250	688,800	100,850	6,569,050

Age Group	24 Hour Mode Share						
	Auto Driver	Auto Passenger	Transit	Bike	Walk	Other	Grand Total
00 - 04	-	72.1%	2.4%	0.9%	20.3%	4.3%	240,850
05 - 17	1.8%	56.5%	7.0%	1.5%	27.1%	6.0%	1,021,350
18 - 24	49.4%	13.6%	31.5%	1.0%	4.0%	0.5%	557,950
25 - 49	72.9%	5.8%	11.7%	1.8%	7.3%	0.5%	2,739,150
50 - 64	76.3%	7.3%	8.5%	1.2%	6.3%	0.5%	1,293,100
65 - 79	67.3%	14.5%	9.2%	0.5%	7.9%	0.6%	565,900
80+	55.0%	19.3%	13.1%	0.2%	10.1%	2.3%	150,750
Total	57.0%	18.0%	11.5%	1.5%	10.5%	1.5%	6,569,050

Note: Figures may not reconcile exactly due to rounding

Trip Purposes by Age Group

Exhibit 3.10 shows the breakdown of daily trip purposes by age category. As expected, the younger age groups are travelling from school and for personal business. Grade school includes kindergarten and pre-kindergarten, which explains the grade school trips for the 00-04 age group. The 18-24 age category shows a high percentage of trips from work or post-secondary and for personal business. Individuals in the 25-64 age category are either travelling to or from work or for personal business.

Exhibit 3.10: Trip Purpose by Age Group (Lower Mainland)

Age Group	Total Trips							
	To Work/PS	From Work/PS	During Work	To Grade/Oth Sch	From Grade/Oth Sch	Recreation/Dining/Shop	Personal Business/Oth	Grand Total
00 - 04	-	-	-	22,400	22,050	96,450	100,200	241,100
05 - 17	11,950	11,650	600	365,600	346,050	206,100	79,750	1,021,700
18 - 24	182,100	173,700	7,000	3,550	3,150	130,750	57,500	557,750
25 - 49	653,550	650,300	69,150	6,200	6,200	650,650	702,500	2,738,550
50 - 64	262,300	262,450	44,650	2,200	2,350	441,100	278,050	1,293,100
65 - 79	25,700	26,050	5,750	300	300	334,700	173,400	566,200
80+	1,950	1,950	-	300	300	99,050	47,350	150,900
Total	1,137,550	1,126,100	127,150	400,550	380,400	1,958,800	1,438,750	6,569,300

Age Group	24 Hour Trip Purpose Distribution							
	To Work/PS	From Work/PS	During Work	To Grade/Oth Sch	From Grade/Oth Sch	Recreation/Dining/Shop	Personal Business/Oth	Grand Total
00 - 04	-	-	-	9.3%	9.1%	40.0%	41.6%	241,100
05 - 17	1.2%	1.1%	0.1%	35.8%	33.9%	20.2%	7.8%	1,021,700
18 - 24	32.6%	31.1%	1.3%	0.6%	0.6%	23.4%	10.3%	557,750
25 - 49	23.9%	23.7%	2.5%	0.2%	0.2%	23.8%	25.7%	2,738,550
50 - 64	20.3%	20.3%	3.5%	0.2%	0.2%	34.1%	21.5%	1,293,100
65 - 79	4.5%	4.6%	1.0%	0.1%	0.1%	59.1%	30.6%	566,200
80+	1.3%	1.3%	-	0.2%	0.2%	65.6%	31.4%	150,900
Total	17.5%	17.0%	2.0%	6.0%	6.0%	30.0%	22.0%	6,569,300

Note: Figures may not reconcile exactly due to rounding and minor adjustments applied based on age and purpose logic

3.2.3 Trip Lengths

Exhibit 3.11 provides a summary of the trip lengths by mode and purpose for the AM and PM peak period and 24-hours for the entire Lower Mainland where trip distances are based on information from the EMME model. For the most part, AM and PM peak trip lengths are consistent with daily averages, however PM peak trip lengths do appear to be slightly longer than the 24-hour average, which may be the case as these trips exclude the shorter trips to/from school that are included in the AM Peak.

Exhibit 3.11a: Trip Lengths by Mode and by Purpose (Lower Mainland)

Travel Mode	Avg Trip Length (km)		
	AM Peak 06:31 - 09:30	PM Peak 15:31 - 18:30	24 Hours
Auto Driver	11.1	11.2	10.7
Auto Passenger	6.4	8.0	7.6
Transit	12.7	12.8	12.0
Bike	5.7	6.1	5.3
Walk	2.1	1.8	2.0
Other	10.2	8.1	9.9
Total	9.2	10.1	9.3

*Trip length based on TZ origin and destination

Trip Purpose	Avg Trip Length (km)		
	AM Peak 06:31 - 09:30	PM Peak 15:31 - 18:30	24 Hours
To Work/PS	13.6	10.6	14.1
From Work/PS	10.7	14.4	13.9
During Work	11.8	11.3	11.2
To Grade/Oth Sch	4.5	5.4	4.7
From Grade/Oth Sch	6.9	5.6	4.6
Recreation/Dining/Shop	6.9	7.2	7.4
Personal Business/Oth	6.1	7.0	6.9
Total	9.2	10.1	9.3

Exhibit 3.11b: Daily Trip Length by Purpose (Lower Mainland)

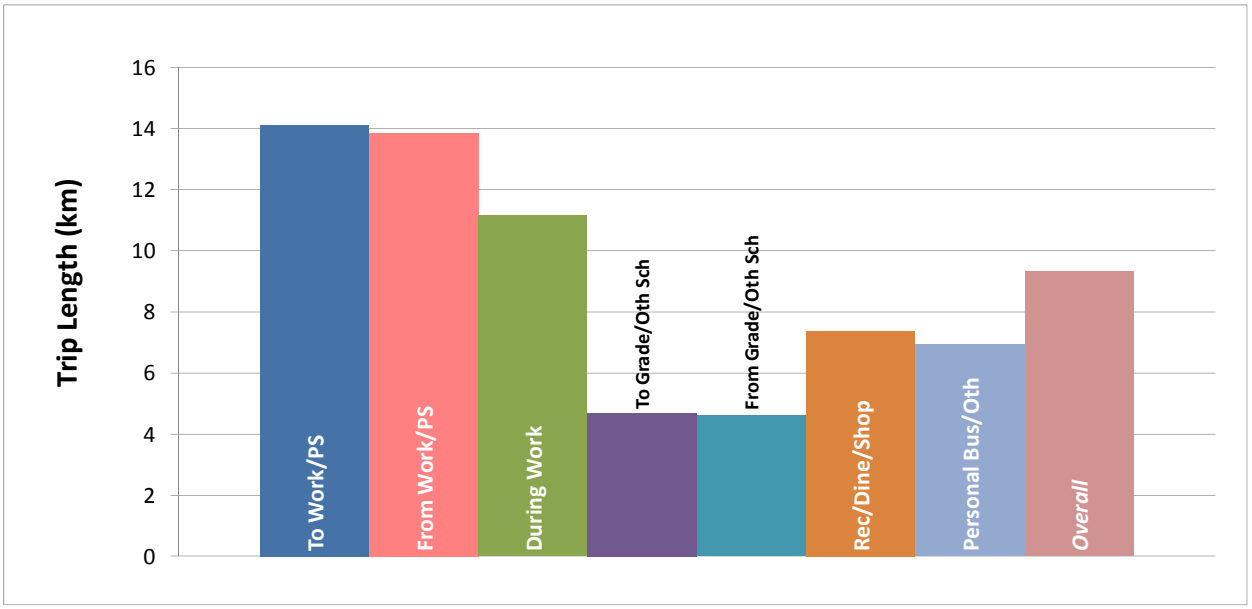
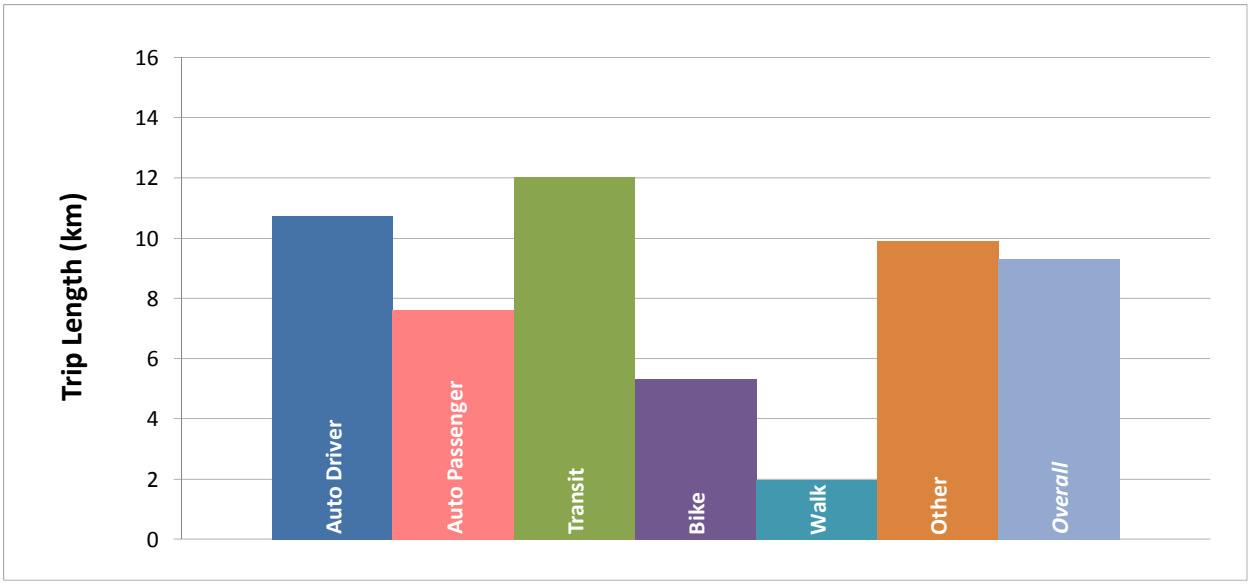


Exhibit 3.11c: Daily Trip Length by Travel Mode (Lower Mainland)



3.2.4 Trip Characteristics by Land Use

Exhibit 3.12 shows the land use at the trip origin by trip purpose. Of all trips to work or post-secondary institutions, 88.8 percent originate from a house/apartment, and approximately 38.7 percent of the trips from work or post-secondary originate at an office and about 19.3 percent from schools. Trips for recreation/dining/shopping are most likely to originate from a home (43.1 percent) or store/mall/restaurant (35.5 percent). Personal business trips originate from various land uses, with 52.3 percent from homes and 18.4 percent from schools or daycares. The percentages represent origin land uses's shares of each purpose's trips.

Exhibit 3.13 shows the land use at the trip destination. The majority of trips from work and post-secondary are to residential locations (83.6 percent), suggesting that many respondents head directly home from work. Just over 50 percent of both recreation/ dining/ shopping and personal business trips are destined to residential locations, while nearly 20 percent of trips to work or post-secondary are from school or daycare. Of all trips to work, 38.4 percent are to an office building, consistent with the origins of from work/post-secondary trip shown in **Exhibit 3.12**. **Exhibit 3.14** shows the land uses at the origin and destination for all daily trips. The highest interchanges are between houses/apartments and schools (12.5 percent), schools and houses/apartments (11.8 percent), and retail and houses/apartments (10.5 percent). Trips from houses/apartments to offices and industrial areas account for 7.1 and 3.0 percent, respectively. The percentages represent destinations land uses's shares of each purpose's trips.

Exhibit 3.12: Trip Origin Land Uses by Purpose (Lower Mainland)

Origin Land Use	Total Trips							
	To Work/PS	From Work/PS	During Work	To Grade/ Oth Sch	From Grade/ Oth Sch	Recreation/ Dining/Shop	Personal Business/Oth	Total
House/Apt	1,011,050	63,200	21,850	368,850	-	844,000	751,800	3,060,750
Office	9,800	435,550	39,250	750	1,150	27,400	81,300	595,200
Industrial	3,500	181,600	27,050	200	500	6,850	31,550	251,250
School/Day Care	45,950	217,450	8,300	21,500	370,450	58,500	265,150	987,300
Hospital	2,050	42,100	3,000	200	250	6,800	27,250	81,650
Store/Mall/Restaurant	44,150	96,200	12,750	2,000	-	695,050	98,250	948,400
Other Services	9,000	40,500	6,400	1,200	2,200	73,100	80,900	213,300
Airport/Ferry	800	10,600	700	-	-	3,250	9,050	24,400
Outdoor Recreation	950	4,250	800	1,250	350	58,050	13,700	79,350
Indoor Recreation/Gym	3,550	11,500	1,100	1,500	1,800	133,550	32,800	185,800
Other	7,300	23,750	6,000	2,700	3,250	52,250	47,000	142,250
Total	1,138,100	1,126,700	127,200	400,150	379,950	1,958,800	1,438,750	6,569,650

Origin Land Use	24 Hour Trips Distribution							
	To Work/PS	From Work/PS	During Work	To Grade/ Oth Sch	From Grade/ Oth Sch	Recreation/ Dining/Shop	Personal Business/Oth	Total
House/Apt	88.8%	5.6%	17.2%	92.2%	-	43.1%	52.3%	46.6%
Office	0.9%	38.7%	30.9%	0.2%	0.3%	1.4%	5.7%	9.1%
Industrial	0.3%	16.1%	21.3%	-	0.1%	0.3%	2.2%	3.8%
School/Day Care	4.0%	19.3%	6.5%	5.4%	97.5%	3.0%	18.4%	15.0%
Hospital	0.2%	3.7%	2.4%	-	0.1%	0.3%	1.9%	1.2%
Store/Mall/Restaurant	3.9%	8.5%	10.0%	0.5%	-	35.5%	6.8%	14.4%
Other Services	0.8%	3.6%	5.0%	0.3%	0.6%	3.7%	5.6%	3.2%
Airport/Ferry	0.1%	0.9%	0.6%	-	-	0.2%	0.6%	0.4%
Outdoor Recreation	0.1%	0.4%	0.6%	0.3%	0.1%	3.0%	1.0%	1.2%
Indoor Recreation/Gym	0.3%	1.0%	0.9%	0.4%	0.5%	6.8%	2.3%	2.8%
Other	0.6%	2.1%	4.7%	0.7%	0.9%	2.7%	3.3%	2.2%
Total	1,138,100	1,126,700	127,200	400,150	379,950	1,958,800	1,438,750	6,569,650

Note: Figures may not reconcile exactly due to rounding and percentage less than 0.05% are not reported

Exhibit 3.13: Trip Destination Land Uses by Purpose (Lower Mainland)

Destination Land Use	Total Trips							
	To Work/PS	From Work/PS	During Work	To Grade/ Oth Sch	From Grade/ Oth Sch	Recreation/ Dining/Shop	Personal Business/Oth	Total
House/Apt	62,350	942,050	22,800	-	342,500	986,500	759,500	3,115,700
Office	437,200	11,050	37,300	1,200	1,800	2,550	98,750	589,850
Industrial	185,050	5,250	24,800	550	300	700	34,250	250,900
School/Day Care	222,850	28,350	7,550	388,700	7,050	35,800	259,500	949,800
Hospital	42,900	2,800	2,850	150	500	450	31,500	81,150
Store/Mall/Restaurant	96,200	99,050	14,600	-	11,550	658,750	74,100	954,250
Other Services	40,200	14,150	8,400	2,850	4,700	45,950	98,750	215,000
Airport/Ferry	11,050	700	1,050	-	-	2,550	8,400	23,750
Outdoor Recreation	4,350	3,250	850	600	2,600	57,400	11,050	80,100
Indoor Recreation/Gym	10,950	12,550	1,750	2,050	6,150	124,200	26,650	184,300
Other	24,950	7,450	5,150	4,050	2,750	43,900	36,250	124,500
Total	1,138,050	1,126,650	127,100	400,150	379,900	1,958,750	1,438,700	6,569,300

Destination Land Use	24 Hour Trips Distribution							
	To Work/PS	From Work/PS	During Work	To Grade/ Oth Sch	From Grade/ Oth Sch	Recreation/ Dining/Shop	Personal Business/Oth	Total
House/Apt	5.5%	83.6%	17.9%	-	90.2%	50.4%	52.8%	47.4%
Office	38.4%	1.0%	29.3%	0.3%	0.5%	0.1%	6.9%	9.0%
Industrial	16.3%	0.5%	19.5%	0.1%	0.1%	-	2.4%	3.8%
School/Day Care	19.6%	2.5%	5.9%	97.1%	1.9%	1.8%	18.0%	14.5%
Hospital	3.8%	0.2%	2.2%	-	0.1%	-	2.2%	1.2%
Store/Mall/Restaurant	8.5%	8.8%	11.5%	-	3.0%	33.6%	5.2%	14.5%
Other Services	3.5%	1.3%	6.6%	0.7%	1.2%	2.3%	6.9%	3.3%
Airport/Ferry	1.0%	0.1%	0.8%	-	-	0.1%	0.6%	0.4%
Outdoor Recreation	0.4%	0.3%	0.7%	0.1%	0.7%	2.9%	0.8%	1.2%
Indoor Recreation/Gym	1.0%	1.1%	1.4%	0.5%	1.6%	6.3%	1.9%	2.8%
Other	2.2%	0.7%	4.1%	1.0%	0.7%	2.2%	2.5%	1.9%
Total	1,138,050	1,126,650	127,100	400,150	379,900	1,958,750	1,438,700	6,569,300

Note: Figures may not reconcile exactly due to rounding and percentage less than 0.05% are not reported

Exhibit 3.14: Trips by Origin and Destination Land Uses (Lower Mainland)

Land Use	Total Trips											
	House/Apt	Office	Industrial	School/ Daycare	Hospital	Store/Mall/ Restaurant	Other Services	Airport/Ferry	Outdoor Recreation	Indoor Rec./Gym	Other	Total
House/Apt	511,500	463,300	197,000	817,950	66,100	551,450	142,200	18,800	62,250	141,550	89,600	3,061,700
Office	426,100	34,500	10,400	20,150	2,450	71,200	11,100	850	1,850	7,750	5,750	592,100
Industrial	183,450	9,500	16,050	5,400	650	24,550	4,550	500	950	1,500	2,800	249,900
School/Day Care	777,900	29,950	6,500	59,700	4,000	61,850	14,150	1,000	7,050	17,600	8,400	988,100
Hospital	57,650	2,650	600	3,100	1,400	11,500	2,300	100	400	1,000	650	81,350
Store/Mall/Restaurant	687,700	31,650	12,050	22,450	3,350	150,650	21,550	1,250	3,800	7,150	8,800	950,400
Other Services	140,350	8,400	3,400	6,100	1,250	36,700	12,200	500	300	2,050	2,050	213,300
Airport/Ferry	18,500	1,150	250	650	400	1,900	600	600	250	-	-	24,300
Outdoor Recreation	64,850	500	750	2,250	200	7,750	900	-	650	1,150	550	79,550
Indoor Recreation/Gym	148,450	2,950	1,350	4,750	500	19,700	3,100	-	1,500	3,150	900	186,350
Other	99,200	5,350	2,600	7,400	800	17,000	2,350	200	1,050	1,350	4,950	142,250
Total	3,115,650	589,900	250,950	949,900	81,100	954,250	215,000	23,800	80,050	184,250	124,450	6,569,300

	Land Use at the Trip Origin and Destination (All Day Trips)											
	House/Apt	Office	Industrial	School/ Daycare	Hospital	Store/Mall/ Restaurant	Other Services	Airport/Ferry	Outdoor Recreation	Indoor Rec./Gym	Other	Total
House/Apt	7.8%	7.1%	3.0%	12.5%	1.0%	8.4%	2.2%	0.3%	0.9%	2.2%	1.4%	46.6%
Office	6.5%	0.5%	0.2%	0.3%	-	1.1%	0.2%	-	-	0.1%	0.1%	9.0%
Industrial	2.8%	0.1%	0.2%	0.1%	-	0.4%	0.1%	-	-	-	-	3.8%
School/Day Care	11.8%	0.5%	0.1%	0.9%	0.1%	0.9%	0.2%	-	0.1%	0.3%	0.1%	15.0%
Hospital	0.9%	-	-	-	-	0.2%	-	-	-	-	-	1.2%
Store/Mall/Restaurant	10.5%	0.5%	0.2%	0.3%	0.1%	2.3%	0.3%	-	0.1%	0.1%	0.1%	14.5%
Other Services	2.1%	0.1%	0.1%	0.1%	-	0.6%	0.2%	-	-	-	-	3.2%
Airport/Ferry	0.3%	-	-	-	-	-	-	-	-	-	-	0.4%
Outdoor Recreation	1.0%	-	-	-	-	0.1%	-	-	-	-	-	1.2%
Indoor Recreation/Gym	2.3%	-	-	0.1%	-	0.3%	-	-	-	-	-	2.8%
Other	1.5%	0.1%	-	0.1%	-	0.3%	-	-	-	-	0.1%	2.2%
Total	47.4%	9.0%	3.8%	14.5%	1.2%	14.5%	3.3%	0.4%	1.2%	2.8%	1.9%	100.0%

Note: Figures may not reconcile exactly due to rounding and percentage less than 0.05% are not reported

3.2.5 Post-Secondary

As a complement to TransLink's 2008 Regional Trip Diary Survey, a parallel survey was undertaken with the cooperation of staff at the two largest post-secondary institutions in the Lower Mainland, UBC and SFU. This over-sample consisted of 1,900 students at UBC and 800 students at SFU, for a total of 2,700 students. The post-secondary survey was conducted in a similar fashion to the main trip diary survey, with several important differences: recruitment was via emails to all students at the two institutions and participation was offered only via the online option, which asked students to indicate whether or not their household had already been invited to participate in the main survey.

Preliminary analysis of this over-sample revealed exceedingly high levels of transit use – possibly due to the popular association of TransLink with its transit service provision (discussed above) as well as high levels of transit use among post-secondary students. These factors led the project team, in consultation with TransLink, to keep this dataset separate from that of the main survey. Summary statistics of this dataset, including exhibits comparable to exhibits 3.1 and 3.6 are provided in a separate document.

3.2.6 Trend Analysis

Exhibit 3.15 presents data from TransLink's 2008 Regional Trip Diary Survey (TD08) and where relevant and equivalent, compares these data with previous trip diary surveys. Important methodological differences between these surveys, as well as significant contextual differences in the supply of transportation infrastructure, economic and weather conditions, suggest that this analysis must be independently validated against other independent data sources for both context and validity. For example, the 2004 survey was conducted during the spring (March/April) and sponsored by the Ministry of Transportation in the context of a long-anticipated freeway-construction project, while the 2008 survey was conducted during the fall (September-December) and sponsored by TransLink, which is broadly perceived as a public transit agency, so some variation in travel characteristics due to seasonal factors, economic conditions, and response bias, among other differences, is to be expected. Note also that at TransLink's request, the 2004 results have been modified by expansion adjustments akin to those undertaken for the 2008 survey. Other trend analysis undertaken as part of the 'back-checking' process can be reviewed in **Appendix 5.10**.

Exhibit 3.15: Key Trends Summary (Lower Mainland and Metro Vancouver)

	1985	1994	1999	2004	2008
Total Trips	3,420,900	5,659,500	5,478,400	7,676,550	6,569,300
Trip Rate	2.54	2.91	2.89	3.25	2.65
Driver	61.7%	57.1%	57.1%	62.0%	56.9%
Passenger	18.4%	19.1%	17.1%	17.4%	18.1%
Transit	8.1%	10.2%	10.3%	7.5%	11.5%
Bike/Walk	10.8%	12.7%	14.3%	12.0%	11.9%
Other	0.9%	0.9%	1.2%	2.0%	1.5%

Note:
(a) Figures may not reconcile exactly due to rounding
(b) 1985 and 1999 survey results are for GVRD only. All other years are for entire Lower Mainland.

Exhibit 3.16 presents the person trip rates by time of day for the last four trip diary surveys (1994-2008) and the total number of trips by time of day for the past four trip diary surveys: 1994, 1999, 2004, and 2008. This analysis highlights the main difference between these four surveys: while trip rates during the AM and PM peaks are relatively consistent, travel during the midday and evening has decreased since 1994. As independent confirmation of the 2004 and 2008 inter-municipal trip rates, the travel survey results could be compared to regional screenline counts (auto and transit), among other factors. Note however that this type of verification will not address internal trip-making (trips not crossing screenlines).

Exhibit 3.16: Trip Rates by Time of Day (Lower Mainland and Metro Vancouver)

	1994	1999	2004	2008
Total Trips	5,659,500	5,478,400	7,676,550	6,569,300
Trip Rate	2.91	2.89	3.25	2.65
00:01 - 06:30	0.06	0.06	0.09	0.10
06:31 - 09:30	0.61	0.62	0.69	0.63
09:31 - 15:30	1.01	0.97	1.28	0.97
15:31 - 18:30	0.73	0.75	0.74	0.62
18:31 - 24:00	0.50	0.49	0.45	0.35

Note:
(a) Figures may not reconcile exactly due to rounding
(b) 1999 survey results are for GVRD only. All other years are for entire Lower Mainland.

4.0 Lessons Learned

4.1 Introduction

This survey has successfully produced a robust database. In the interest of continual improvement, this section identifies lessons learned and opportunities for improvement. In order to assist with the planning, implementation, and analysis of future surveys, a list of lessons learned has been prepared for each phase of the survey process.

4.2 Survey Planning, Preparation, and Conduct

As the importance of online options for survey participation continues to grow, sufficient lead time will be increasingly required to properly implement the complex programming and development tasks involved in assembling a professional quality web interface that is compatible with the specialised data entry software used in the telephone interviewing industry.

Previously, a lead time of at least six to eight weeks between the award of the contract and the start of field surveying was suggested as being minimally sufficient for data synthesis, survey design and pilot testing; as online options and built-in logic checking that balances user-friendliness with logical rigour become increasingly important, it may be wise to revise this number upwards. This is particularly true when significant changes are made to past survey processes and/or survey logic checking. For example, inclusion of new technology, such as the Google Maps API, involved specialised programming and liaison with Google to deal with unexpected issues that arose, such as browser compatibility.

In a large survey, return rates can often be unpredictable. Unusual or infrequent circumstances beyond the surveyors control can have a profound effect on return rates and speed of returns (e.g., political or economic events diverting public attention). While experienced vendors have a good sense of likely return rates for different survey instruments or even topics, there is a certain amount of risk involved in this aspect of a travel survey project. In order to adapt to slower-than-expected initial returns, additional resources had to be devoted to recruitment and the development of reminder instruments, and the survey period had to be extended from November 28 to December 12, 2008.

4.3 Survey Design

- **Agency affiliation and sponsorship**
  This is a key component of the design of all aspects of the survey, including marketing and promotion, interview scripts, and survey instruments, both digital and print. Anecdotal

reporting from interviewers suggested that despite script modifications designed to counter the tendency, many potential respondents associated TransLink exclusively with its role as a regional public transit provider, rather than as a multi-modal agency. This resulted in two issues: respondents electing or declining to participate due to their use or interest (or lack thereof) in transit.

While agency affiliation is important in the name of transparency and is crucial in terms of affording an enhanced sense of legitimacy to the survey project in the eyes of potential respondents, future surveys should consider partnering with a greater variety of agencies in the marketing and promotion of the survey. As in the past, potential partners could include municipalities, regional districts (Metro Vancouver and the FVRD), the Province (MoTI), and even the Federal government. Such arrangements can serve as a means of ensuring that participation appeals to the broadest possible range of residents – regardless of their mode of transport.

- **Pre-notification letter**

  The pre-notification letter is an effective tool to increase agreement to participate and to increase completion rates. Although this tool does not appear to mitigate household refusals at the outset, it has significant effect on agreement to participate among those who agree to the survey screening process, improving acceptance of the survey invitation material. See **Appendix 5.2** for a copy of the letter.

- **Interface design**

  While the design of the web instrument included significantly more built-in logic checks than ever before, this could always be strengthened, keeping in mind the need to facilitate ease of use for respondents. Additional logic checks that could be usefully incorporated in the web instrument may be identified on the list of supplemental logic checks that were applied to the data once they had been converted into relational format. Note that although this could be accomplished with the current technology, it would require adequate lead time for design and testing.

  The use of a Google Maps-based interface for entering locations, while it introduced significantly more flexibility for users, including the ability to mark locations where an address was not known (a common occurrence for short, casual trips), did involve the introduction of several unanticipated technical challenges in terms of integration with the overall survey programming and ensuring compatibility with the broadest range of browsers, including Internet Explorer 6. With respect to ensuring the validity of points, the survey team's checks on point placement for home locations and major destinations (such as post-secondary institutions) suggests that although some points may have been inappropriately placed, this appears to be no more or less likely than the provision of an incorrect intersection name. In many cases it is virtually impossible to check the logic of point placement and one must trust the respondents' judgment. The intention behind inclusion of the Google Maps feature was to make this process as transparent as possible to the user and to allow for as many kinds of navigation as possible. The survey team feels

that although the programming and technical integration of this feature was challenging, its utility appears to be promising.

- **Sample size**

  Travel surveys typically have several objectives ranging from inputs to a regional model calibration exercise to providing travel statistics for planning purposes or policy research. As with all surveys, the decision is to balance accuracy and detail against project cost and complexity. To guide future studies, **Appendix 5.10** details this issue citing analysis undertaken for this study. Analysis (please see **Appendix 5.10**) demonstrates that a 2,000 household sample size should be sufficient for model calibration purposes. Nevertheless, the provision of detailed travel statistics (e.g., mode shares, trip rates) at municipal or larger neighbourhood areas could require more than 50,000 households. The majority of travel surveys conducted throughout North America today are typically in the 2,000-10,000 household size range. Cities such as Toronto and Montreal continue to undertake large-scale surveys (5% of households), but these are the exception rather than the rule as these surveys take longer to administer/process and are very costly. Please see **Appendix 5.10** for further discussion of means to select an appropriate sample size, based on different applications.

4.4 Survey Implementation

- **Reminder techniques**

  With respect to the response improvement strategies, it is difficult to assess their effect as they were usually employed in concert with each other. These reminders are likely a necessary part of a survey of this type and scale. Without reminders response rates would be lower. The response rates, which initially were lagging, did improve following the introduction of bracketed reminders, though this is a correlation and causality should not be assumed.

- **Yesterday retrieval option**

  The introduction of the 'yesterday-retrieval' method, in which recruits were offered the option of participating immediately via telephone as an extension to the recruitment call, is a method that may have flaws. Although the basic sample demographics examined are similar to the web-based and mail-phone retrieval samples, the difference in trip rates should be investigated further to determine if the type of trips reported are different, e.g., if lower reporting of /not remembering incidental trips. This said, call-backs were made to the sample and attempts were made to reach other household members not at home at the time of the yesterday retrieval.

- **Retrieval rate target maintenance**

  By providing weekly status updates throughout the period when the survey was 'live', the survey team was able to ensure that sub-area-specific recruitment and return targets were met. The ability to monitor this on a regular basis allowed for recruitment calling to be directed to the sub-areas that in most danger of falling short of their target. The survey team's experience in understanding the variable likelihood of recruitment success across the region proved valuable in this area. Due to lower than expected return rates though, the resources devoted to recruitment and the development of reminder techniques were greater than anticipated and may have had the side effect of slightly slowing the conduct of telephone-retrieval interviews. The ability to extend the survey into the first two weeks of December was invaluable in this regard.

- **Ongoing data evaluation**

  Although the survey team ensured that sampling proceeded according to known demographic features of the universe (sub-area specific distributions of age, gender, household size), it has been suggested that the ability to also include calculated items such as the trip rate and the mode share could be useful in future surveys. Given the difficulties inherent in comparing these items to reliable external sources (whether previous surveys, screenline counts, transit ridership, or others), the project team counsels that evaluating the data on an ongoing basis with respect to trip rate, mode share, and other calculated items would likely require significant resources and be of questionable value in terms of ensuring an even distribution of sampling.

  TransLink staff recommends that if undertaken, the monitoring of trip rates and mode shares should be an independent process from ensuring an even distribution of sampling. Furthermore, the trip rate and mode share should be monitored against historical trends where an unexpanded dataset should be sufficient for this purpose. If the general results indicate a notable departure from previous surveys, then call-backs should be initiated to verify that the new results are not due to a reporting problem from the respondents. In the context of an ongoing, panel-style travel survey, in which a smaller sample repeatedly participates on a regular basis, this would likely be a useful tool to consider. Life cycle, economic, and seasonal effects would also be observable with an on-going diary method.

Possible use of GPS tracking devices (as prices decline) or sophistication of cell phone technology may also make recording of trips easier in future diary surveys.

4.5 Data Processing and Management

TransLink's 2008 Regional Trip Diary Survey represented a substantial increase in scale from previous efforts, with roughly four times the number of respondent households compared with 2004. This increase in scale has several implications in the areas of data processing and management, notably with respect to the implementation of increased and expanded logic checking and follow-up actions.

- **Flat versus relational database formats**
  The survey team and TransLink have had considerable discussion as to the merits of flat versus relational database formats during the data collection stage of the survey. In the case of this project, the project team's telephone-interviewing and web survey software vendor's product employed a flat database format for use during the data collection phase, after which conversion to relational format took place. If changes to this practice are seen to be desirable, which they may be for the purposes of providing ongoing data evaluation (as discussed above), these issues would require significant lead discussion amongst all partners prior to survey design and implementation. The key advantage of using a relational format from the start would appear to be the ability to do more sophisticated mid-stream analysis; however such tasks would pose significant resource demands and would be unlikely to generate results that could reasonably alter the demographically-oriented sampling process, though findings could be used to boost call-backs or otherwise increase scrutiny of the survey process in the event of discrepancies with previous survey trends or outside data.

5.0 Appendices

5.1 Survey Pre-Testing and Modifications

Designing, preparing, and pre-testing the survey instruments involved refinement of the mail-out/telephone-retrieval package and the web-based travel survey. Both the mail-out/telephone-retrieval and the web-based questionnaires were based on the CRD 2006 OD Survey instruments and informed by experience from the 1999 and 2004 GVRD trip diary surveys. Several modifications were made to tailor the questionnaire for this study:

- Including modes of travel specific to Metro Vancouver, such as SkyTrain, SeaBus, and West Coast Express;
- Using trip examples specific to Metro Vancouver as part of the reference materials available online and included as part of the mail-out/telephone-retrieval survey package;
- Including transit fare payment options specific to Metro Vancouver;

The package sent to respondents also included a copy of the advanced notice letter for reference. An updated version of the materials was prepared for this study's survey package. Compared with the package used in the 2004 Metro Vancouver OD Survey, the new materials included more graphical elements to engage interest and understanding of trip concepts, re-organisation of the instructions and benefit from text editing by a communications professional to improve readability. **Appendix 5.4** provides a sample of the mail-out/telephone-retrieval package.

The web-based travel survey was designed to provide a lower-cost alternative to filling out the mail-out/telephone retrieval return travel survey. Logic checks were integrated into the programming of the survey to reduce the need for call backs later. Testing and logic checks were thoroughly integrated to maximize the ease of use for the participants. The web survey was also significantly enhanced with graphical elements to add colour and interest, and re-formatted to enable better visibility of error messages and navigation buttons. As this web interface was also used by telephone retrieval interviewers, the same set of built-in logic checks were consistently applied to the entry of all data. **Appendix 5.5** provides a sample of screenshots from the web survey.

Extensive work was undertaken on the web-based survey to integrate user-friendly mapping as a means to engage respondents and allow them to visually confirm the locations they chose. Compared with the 2006 CRD Travel Survey, the interface was considerably more graphic-oriented and made far more extensive use of built-in logic checks.
The recruitment interview, as well as both the Mail-out/telephone-retrieval and the web-based travel survey were thoroughly tested and the challenges of both formats and the actions taken were noted as shown in **Exhibits 5.1.1, 5.1.2, and 5.1.3**.

Exhibit 5.1.1: Recruitment Interview Pre-Test

Telephone Placement Survey Pre-test	
Issue	**Action Taken**
Conflict of interest (Study team employees/families) query	Question re-worded to include TransLink's operating subsidiaries, Mustel, and Halcrow
Insured v. uninsured vehicle query	Question maintained, as scooters driven on streets a growing shift to monitor
Clarification on eligibility for prize draw (individual v. household)	Mustel clarified that the household is entered in the draw and the lead respondent (from the telephone recruit interview) will receive the prize on behalf of the household
Options for electoral areas	Anything that doesn't fit into the named municipalities gets recorded under 'OTHER' so we can examine it and recode to its correct area if needed.
Confirmation of residence within study area	Addition of RDD sample, a confirmation question (based on postal code) has been included.
Limit study to weekdays only	Recruit interview text amended accordingly to refer only to Monday - Friday.
Change survey length estimate to a 'per household member' figure	Amended accordingly (approx. 5min per household member).
Lengthy email confirmation dialogue	Interviewer to repeat email address rather than asking for confirmation - successfully pre-tested.
Primary/secondary residence definitions	Question deleted as it referred to a CRD-specific issue.
Clarification of order between web and mail-out options	Order of options has been made to consistently prioritize the web option.
Number of survey forms per package	To conduct a more sustainable survey, we have tailored survey packages to household size (2, 5, 8).
Income bracket suitability	Income brackets have been revised to match census breakdowns and to facilitate expansion
Electoral Areas and municipality naming	Revisions have been made to include electoral areas and smaller sub-municipal communities in the appropriate sub-areas, while ensuring (through postal code) that respondents are indeed in the study area.
SCBCTA and TransLink could be confusing	SCBCTA retained as it adds legitimacy and remove some emphasis from TransLink (known as a transit provider); however, it is now only mentioned once and briefly.
Introduction persuaders	Information to be useful for communities in obtaining infrastructure funding to be left in the introduction as it has been identified in BC and in the US as a key factor in respondent buy-in.
Survey presence on TransLink website	Resolved through adding content to existing news and current projects sections.
Gender identification	No need for a 'refused' category, as gender is recorded by interviewers, rather than posed as a question.

Exhibit 5.1.2: Mail-out/Telephone Retrieval Pre-Test

A. Mail-out/Telephone Retrieval Pre-Test		
Area	**Issue**	**Action Taken**
Information package	Privacy information	Included on flip-side of example page
	Number of survey forms per package	To conduct a more sustainable survey, we have tailored survey packages to household size (2, 5, 8).
	Encouraging respondents to complete the survey regardless of the 'atypicality' of their travel day	Wording changed to restrict holidays yet drive home the point that it doesn't matter whether the travel day is typical or not.
	Enhance awareness of web survey materials (info and diary)	Rewording includes references to survey website for further information as well as to the ability to use the web to complete the diary.
	Deadlines and reminders	Dates are omitted from the instruction booklet, but reminder calls and emails include precise deadlines.
	Precision of origin/destination landmarks	Metrotown (as opposed to 'The Bay') confirmed by Halcrow as appropriate, in consideration of the level of geographic detail and the ability of respondents to recall exact locations and landmarks.
	Full street address example	Example syntax for entering a full street address has been provided.
	Inclusion of privacy letter in the trip diary package	Not to be included, as letter provides point of contact, TransLink website can authenticate survey and Mustel Group, and goal is to offer the least cluttered package possible.
Person Information	Separate licences by class	Too confusing for respondents, not necessary for data.
	Improved direct connection between workplace identification and address	Text re-alignment to clarify this relationship.
	Should 'trip' be defined on the diary form?	Trip' is already defined in the instruction booklet.
	Unclear question purpose.	"Did you make trips on the day prior to your travel day?" removed.
	Extra questions suggested regarding income and number of vehicles.	These questions are included in the recruit interview.
Diary	Inconsistent formatting of slashes (/)	Formatting amended accordingly.
	Work' and 'Home' are formatted differently.	These two remain bolded as they are the most common options.
	Trip purpose coding inconsistency.	Coding confirmed as per 2004 code book and database. 2004 code book was found to be incorrect - revision submitted to TransLink.
	Arrival time and trip length	Left as is, since research shows that people cannot accurately estimate trip length.
	Method of travel	Example added to Instruction Booklet illustrating 'Bus-SkyTrain-Bus' situation.
	Hotline number validity	Number confirmed to be still valid and operational.
	"Drop off" as a trip purpose	"Drop off" included

Exhibit 5.1.3: Web Survey Pre-Test

B. Web Survey Pre-Test	
Issue	**Action Taken**
Possibility of unclear choice of municipality when entering location visually (via map)	Require municipality to be recorded for all locations, via drop-down menu.
Complicated time-picking mechanism	Visual time-picker clock replaced with drop-down menus for hour, minute, and am/pm. Logic checks put in place to disallow end-times prior to starts, and to disallow subsequent trips from starting prior to previous trip ends.
Frequently asked questions, instructions, and trip examples should be accessible from the diary	Links put in place to appropriate PDF documents, but only from appropriate locations within the survey (ie, when trips are being entered), so as to avoid clutter elsewhere.
Clarification of the one-way nature of a trip	Emphasis and note added to relevant trip questions insisting that a trip is one-way.
Simplification of home location entry	Home location to be transferred from recruit interview and confirmed via postal code.
Ability to drop pin outside study area	Such occurrences will be dealt with in post-processing - if coordinates do not reside within a TZ or sub-area, a flag will be raised for call-back.
Distinction between Vancouver and Downtown Vancouver may be confusing	Distinction will be kept for analysis but Vancouver and Downtown Vancouver have been consolidated for the web survey.
Redirection to TransLink website	Respondents will be redirected to www.translink.bc.ca rather than to the Google homepage upon exit from the survey.
Logic Checks	Extensive logic checks have been built into the web survey in response to TransLink request and test feedback. In some cases, logic checks have been loosened in order to avoid frustrating respondents. These typically focus on consistency of options and skipping between questions, and either restrict options or ask respondents to confirm inconsistencies where these arise.
Browser compatability message	The browser compatability message has been reconfigured in a pop-up format so as to avoid confusion in situations where it is unnecessary.
Progress metering	Progress metering was explored but decided against due to the highly variable nature of the survey (dependent upon number of household members and number of trips).
Question numbering	The technical format of question numbers was identified as a resource for internal testing and has been removed from the final version of the web survey.
Municipality list	In response to TransLink comments and tester preferences, the list of municipalities has been alphabetized.
Exit/Finish Later terminology	Terminology for 'Finish Later' has been made consistent throughout the survey.
Finish Later redirection	The 'Finish Later' option has been changed to redirect to a survey page that thanks the respondent, asks them to 'come back soon' and offers instructions on how to log back into the survey to finish entering their trips.
Origin/Destination field entry clarification	A landmark has been added to the examples of appropriate entries in the address field. All other forms of entry (address, intersection, business name, postal code) have also been offered as examples, with suggested formatting.
Map navigation instructions	Clearer map navigation instructions (on zooming, panning, and adding/moving a point have been integrated into the web survey.
Work option for home-based workers	Work #1' has been removed from the list of origin/destination choices for respondents who have indicated that they work from home.
Radio button placement for workplace options	Radio buttons have been moved above the address fields for place of work location entry, thus presenting three options (work from home, no fixed work location, and workplace address).
Travel modes	Travel mode choice has been expanded from 4 to 6 modes, now offered as drop-down menus in sequence
Trips outside the Lower Mainland	New procedures were added to handle trips that ended or started outside the Lower Mainland, with a focus on capturing that portion of the trip within the study area and identifying the point of entry/departure.
Trips after midnight	Instructions were clarified that respondents should only enter trips that ended prior to midnight on their travel day.
Inconsistent end and start points	In some cases (commercial drivers and people who left and then returned to the Lower Mainland on the travel day) respondents will be able to specify that they did not begin their trip where the last one ended. Logic checks restrict this option to these two types of respondent.

5.2 Pre-Notification Letter

September 8, 2008

Dear Resident:

RE: Advance Notice of TransLink's Regional Trip Diary Survey

Your household has been selected for an important survey being conducted for TransLink, the South Coast British Columbia Transportation Authority. Planning for roads, transit and cyclists will be based on this data. **With your help on the survey, we can better understand and improve our transportation system to relieve congestion in your area and across the region.**

The survey will also help communities such as yours to obtain financial support from Provincial and Federal programs so that facilities can be improved for private automobiles, transit users, commercial vehicles and cyclists alike.

The survey is easy – it is simply a log or diary of the trips your household makes on a single assigned day. Please be assured that the information you provide in the survey will be treated as strictly confidential and your identity will not be revealed to anyone, including TransLink.

Mustel Group, a professional research firm, is conducting this survey for TransLink and will be contacting your household by telephone in the coming weeks to request your participation. Please notify other adults in your household to expect this call.

All households that participate in TransLink's Regional Trip Diary Survey will be entered into cash prize draws.

If you have any questions, please contact **Mustel Group** directly via telephone at 604.733.1138, toll free at 1.888.733.1138 or via electronic mail at tripdiary@mustelgroup.com. For answers to frequently asked questions, please visit the survey website at www.mustelgroup.com/tripdiary.

Thank you in advance for your cooperation with this highly important survey.

Yours truly,

Thomas F. Prendergast
Chief Executive Officer
TransLink

5.3 Telephone Recruitment Interview Script

TransLink's Regional Trip Diary Survey
Telephone Recruiting Questionnaire

Hello, we are calling on behalf of TransLink, (the South Coast British Columbia Transportation Authority) your regional transportation authority responsible for major roads, bridges, transit and cycling routes in the region. I'm ___ of Mustel Group, a professional polling firm. Our call today will only take about 5 minutes. You may have seen a letter from TransLink about this Trip Diary survey. We are not selling or soliciting anything and all responses are strictly confidential. (We are conducting an important survey to help plan improvements to the transportation network.)

A. May I please speak to the male or female <u>head</u> of your household? Would that be you? RE-INTRODUCE IF NECESSARY
Did you (your household) receive a letter about this Regional Trip Diary study?

1. IF YES, CONTINUE
2. **IF NO/DON'T KNOW:** (Our call today is very brief.) This survey will be one of the most important sources of information for transportation planning to relieve congestion and improve transportation infrastructure. The information will also help communities with local plans and support municipalities in obtaining grants from Provincial and Federal programs. Your household can make an important contribution to this goal by participating.

MORE DETAIL FROM ADVANCE LETTER, IF REQUIRED

Your household has been randomly selected for an important survey being conducted for TransLink (the South Coast British Columbia Transportation Authority). Planning for roads, transit and cyclists will be based on this important data. With your help on the survey, we can improve transportation infrastructure to relieve congestion across the region and in your area.

The survey will also help communities such as yours obtain financial support from Provincial and Federal programs to improve facilities for private automobiles, transit users, commercial vehicles and cyclists alike.

The survey is easy – it is simply a log or diary of the trips your household makes on a single assigned day. ***Please be assured that the information you provide in the survey will be treated as strictly confidential*** and your identity will not be revealed to anyone, including TransLink.

B. Please be assured we are not selling or soliciting anything and your participation is confidential and voluntary. Our call today will be brief.

PERSUADERS

- The survey will be about transportation choices people make and will help TransLink create transportation solutions across the region aimed at reducing congestion and improving the whole transportation system.
- It's important we include all types of residents of Metro Vancouver, no matter how much or how little you might travel—or whether or not you use public transit or your own vehicle.
- As a thank you, we will enter your household in a draw with multiple cash prizes and gift certificates, including a chance to win up to $1,000.Mustel Research Group is a member of the Better Business Bureau of BC.
- My questions today average less than five minutes, depending upon your responses.
- If you wish to validate the authenticity of this survey, please visit:
  www.translink.bc.ca/tripdiary/ or call 604-953-3040

Q1. RECORD GENDER (HEAD OF HOUSEHOLD/LEAD RESPONDENT)

1. MALE 2. FEMALE

Q2. And do you or does anyone in your household work for Mustel Group, Halcrow Consulting, TransLink or one of its operating subsidiaries? (ONLY IF ASKED ABOUT OPERATING SUBSIDIARIES: this includes Coast Mountain Bus Company (CMBC), SkyTrain, West Coast Express, Albion Ferry, AirCare, Canada Line Rapid Transit (CLCO))

1. Yes → REMOVE FROM PRIZE DRAW: Please note that while we can include your household in this study, due to standard contest rules you will not be eligible for the Prize Draw.
2. No
3. REFUSED → **REMOVE** THANK AND END INTERVIEW

Q3. To be sure we have your geographic area correct, may I please have your postal code at this residence?

IF LISTED SAMPLE: DISPLAY POSTAL CODE. IF DIFFERENT, ENTER CORRECT P.C. BELOW AND READ BACK TO CONFIRM ACCURATE ENTRY.

IF RDD SAMPLE, RECORD POSTAL CODE. READ BACK TO CONFIRM ACCURATE ENTRY
IF FSA ONLY (3 DIGIT) ASK Q4

__ __ __ __ __ __

IF POSTAL CODE/ADDRESS DIFFERENT FROM SAMPLE or IF RDD SAMPLE, ASK: Q4

Q4. In which municipality do you reside? READ ONLY IF NECESSARY

IF RESPONSE IS **"On a Reserve / First Nations Reserve",** ASK AND RECORD: **"Which reserve?"** RECORD UNDER "OTHER SPECIFY" AND ALSO PROBE & RECORD: **"What is the nearest community or municipality?"** RE-CODE INTO THE CATEGORY THEY MENTION. **NOTE TO CODER:** CHECK OTHER SPECIFY TO SEE IF RECODED CORRECTLY IF MENTIONS AN ELECTORAL AREA

SAMPLE AREAS

1. Burnaby
2. Coquitlam
3. Delta (including Ladner, Tsawwassen)
4. Langley (City or Township, including Aldergrove)
5. New Westminster
6. North Vancouver
7. Port Coquitlam
8. Port Moody/Anmore/Belcarra
9. Richmond (incl. Steveston)
10. Surrey (incl. Cloverdale, South Surrey, Barnston Island)
11. Vancouver CBD (Downtown, West End)
12. Rest of Vancouver/University Endowment Lands/ UBC
13. West Vancouver/Lions Bay / Bowen Island
14. White Rock
15. Maple Ridge/Pitt Meadows
16. Abbotsford (including Matsqui)
17. Mission/Fraser North (including Kent, Agassiz[pronounced AGA-SEE] Harrison Hot Springs, Harrison Mills)
18. Chilliwack/Fraser South (up to but excluding Hope)
19. **OTHER SPECIFY**: _____
20. NONE OF THESE

IF DETERMINED TO BE OUT OF STUDY AREAS, END INTERVIEW

Q5. INVITATION TO FOLLOW-UP TRAVEL SURVEY:

We would like to invite you to participate in a survey that will be used to help make important decisions about how to relieve congestion and improve transportation across the region and in your community.

READ AS NECESSARY

In order to find solutions and to improve the transportation network of roads, bridges and transit services, our regional planners need accurate information on where people travel and the transportation choices they make. By participating in the survey, you can be a part in helping find solutions.

READ

This survey involves keeping track of your travel for one day and completing a trip diary for each member of your household. As a thank you, we will enter your household in a draw with multiple cash prizes and gift certificates, including a chance to win up to $1,000.

A (clear, simple, and) user-friendly version of the survey is available for you to complete on the internet. May we provide you with a survey link by email for you to enter your household trip information? IF NO: We are also offering to mail a survey package that you could fill out and keep by the phone. We would then call back to collect your trip information. Would that work better for you?

1. Internet → **GO TO WEB SECTION**
2. Mail → **GO TO MAIL SECTION (Q8)**
3. REFUSED/DOESN'T WANT TO PARTICIPATE – SKIP TO TERMINATION SCREEN

WEB SECTION: Q6-7, THEN SKIP TO Q10

Q6a. IF WEB: Could I please have your email address?

RECORD EMAIL ADDRESS 1st time: _____

Q6b. To confirm, is that (READ ALOUD AND RE-ENTER AS YOU READ):

RECORD EMAIL ADDRESS 2nd time: _____

Q6c. IF EMAIL ADDRESSES DO NOT MATCH, RE-RECORD: I'm sorry, but I'll need to repeat and re-record your address

RECORD EMAIL ADDRESS 3rd time: _____

PROGRAMMER: ONCE TWO ADDRESSES MATCH, CONTINUE

Q7. We will email a link to the survey to you in the next day or so. The email message will ask you to complete the survey for a specific day of the week. In your case [MONDAY / TUESDAY / WEDNESDAY / THURSDAY / FRIDAY] is the day of the week we need your household to record their travel. (ONLY IF ASKED ABOUT LENGTH: Each household member can expect to spend about 5 minutes on the survey.)
May I have your first and last name? _____

INTERVIEWER: CONFIRM NAME AND SPELLING

MAIL SECTION: Q8-9

Q8a. **IF MAIL: Then may I please have the mailing address for this residence?** [DISPLAY FULL ADDRESS AND POSTAL CODE. ENTER IF DIFFERENT FROM SAMPLE]

CORRECT INFORMATION IF INCORRECT AND RECODE REGION IF NECESSARY. CONFIRM ADDRESS AND POSTAL CODE.

Q8b. **IF MAIL:** We will address the survey package to you, personally. May I have your first and last name?

_____

INTERVIEWER: CONFIRM NAME AND SPELLING

Q9. **IF MAIL:** You will receive a survey package within the next week. We will label the survey package [MONDAY / TUESDAY / WEDNESDAY / THURSDAY / FRIDAY]. This is the day of the week we need to know about where and how you travelled. (ONLY IF ASKED: Each household member can expect to spend about 5 minutes on the survey.)

When you have completed the survey, please review it to make sure you have completed all the sections that apply to you and your household. We will then call you to collect your household trip information.

EVERYONE: Q10-12

Q10. **So we can prepare your survey materials, how many people including all adults and children usually live together in your household**? Please do not include visitors or persons in a separate suite within your home. (A household is one person living alone OR a family or group of people living together who share a kitchen, living room and dining room.)

_____ Total # People in Your Household (CONFIRM #)

Q11. **How many, if any, motor vehicles** including cars, trucks, vans and motorcycles are insured at the present time for use by members of your household? Please include personal and business vehicles. (IF ASKED ABOUT MOTOR SCOOTERS, ONLY INCLUDE IF USED IN TRAFFIC, SUCH AS: 'Limited speed motorcycles' OR 'Motor assisted cycles' e.g., Vespa, Mo-ped, etc.)

_____ Insured motor vehicles (CONFIRM #)
_____ Uninsured motor vehicles being used on public roads in traffic (e.g., Vespa's, Mo-peds, etc.)

Q12. To make sure our sample includes a full range of household types, which of the following broad groupings best describes your total household income per year before taxes? READ

1. Less than $60,000 → Is that:
    2. Under $20,000
    3. $20,000 to less than $40,000, or
    4. $40,000 to less than $60,000
    5. REFUSED
6. $60,000 or more → Is that:
    7. $60,000 to less than $80,000
    8. $80,000 to less than $100,000
    9. $100,000 or more
    10. REFUSED
11. REFUSED

Q13. And into which of the following broad categories do you fall:

1. Under 35 years
2. 35-54 years
3. 55 year or over?
4. REFUSED

WEB CLOSING:

Thank you very much for agreeing to participate in our survey. *Please watch for the email from Mustel Group with subject line: TRANSLINK'S REGIONAL TRIP DIARY SURVEY and with a web link to the survey in the next few days. Your assistance with this important research will make a difference to your community and the region.*

PROGRAMMER: EMAIL INVITE INFO TO BE SENT TO FILE FOR AUTOMATED EMAILINGS:

- CASE/PIN #
- Name
- Email address
- Assigned day

MAIL CLOSING:

Thank you very much for agreeing to participate in our survey*. Please watch for mail from Mustel Group with TRANSLINK'S REGIONAL TRIP DIARY SURVEY on the envelope. Your assistance with this important research will make a difference to your community and the region.*

PROGRAMMER: MAILING LABELS MUST INCLUDE:

- CASE/PIN #
- Name
- Address line 1
- Address line 2
- Address line 3
- City, Province Postal Code
- Assigned day

MAILING LABELS TO BE SENT TO ELECTRONIC FILE WITH RECRUIT DATE, # IN HOUSEHOLD and ASSIGNED DIARY DAY

5.4 Mail-out/Telephone Retrieval Package

Example of a Trip Diary Day

The following table illustrates **all trips taken by a mother** on her Trip Diary Day.

See *Example "How to Record your Trips"* (next page) for how she entered information into her trip diary.

Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Mother left home in the family car. She first dropped off her children at Day Care.	*She then drove to the SkyTrain and traveled to Broadway Station. From there took a bus to arrive at work.*	*She left work to go for lunch. She walked from work to the restaurant.*	*She finished her lunch and walked back to the office.*	*She left work early, took a bus, the SkyTrain, and then transferred to another bus for a doctor appointment.*	*Took a bus from the doctor's office to the SkyTrain, then drove home.*
START  Home ↓	START  Day Care ↓	START  Work ↓	START  Restaurant ↓	START  Work ↓	START  Doctor Office ↓
 Car (with kids) ↓	 Car (alone) ↓	 Walk ↓	 Walk ↓	 Bus ↓	 Bus ↓
 Day Care END	 SkyTrain ↓	 Restaurant END	 Work END	 SkyTrain ↓	 SkyTrain to Park'n'Ride ↓
	 Bus ↓			 Bus ↓	 Car (alone) ↓
	 Work END			 Doctor Office END	 Home END

➔ The mother's baby and other child would also have their own separate trip forms.

➔ The father's trip form would include his trips to pick up the children from daycare.

How to Record your Trips

Travel for this Person by All Modes on *MONDAY*

Date Trips Made: *Sept. 22nd*
(WRITE IN Month and Date)

Example Traveler – This is how the mother would record her trips in the trip diary:

	TRIP 1	TRIP 2	TRIP 3	TRIP 4	TRIP 5	TRIP 6
Start location: If this trip started from home or usual place of work, write 'HOME', 'WORK#1" or "WORK #2.". Otherwise, give precise address OR nearby intersection OR landmark. PLUS *be sure to include municipality*	I started my first trip from: *Home*	Started from: *19th Ave & Mary Ave, Burnaby*	Started from: *Work #1*	Started from: *Broadway & Laurel, Vancouver*	Started from: *Work #1*	Started from: *Colbrook St, & Gilpin St, Burnaby*
End of trip location: Give precise address OR nearby intersection OR landmark. If trip ended at home or normal place of work, write 'HOME', 'WORK#1" or "WORK #2." PLUS *be sure to include municipality*	I went to : *19th Ave & Mary Ave, Burnaby*	I went to: *Work #1*	I went to: *Broadway & Laurel, Vancouver*	I went to: *Work #1*	I went to: *Colbrook St, & Gilpin St, Burnaby*	I went to: *Home*
End location building/facility: *(Choose one)* 1. House/Apt. 2. Office building 3. Industrial or commercial site 4. School/daycare 5. Hospital 6. Store/mall/ theatre/or restaurant 7. Other services 8. Airport/BC Ferries 9. Outdoor recreational (park, beach, golf, etc) 10. Indoor rec/gym	*4. Day Care*	*2. Office Building*	*6. Restaurant*	*2. Office Building*	*7. Other*	*1. House*
Main trip purpose: *(Choose only main one)* 1. **WORK** 2. Post-secondary 3. Other School 4. Personal business (e.g., bank, dentist, etc) 5. Recreational/social 6. Dining/restaurant 7. Shopping 8. **GOING HOME** 9. Pick-up/Drop-off a passenger	To go: *9. Drop Off*	To go: *1. Work*	To go: *6. Lunch*	To go: *1. Work*	To go: *4. Personal Business*	To go: *8. Going Home*
Start time: Write in Exact Time (or nearest 5 minutes) you left the start location. *Be sure to circle AM or PM!*	Left start location at: *8:00* (AM) PM	Left start location at: *8:25* (AM) PM	Left start location at: *12:00* AM (PM)	Left start location at: *12:50* AM (PM)	Left start location at: *3:05* AM (PM)	Left start location at: *5:00* AM (PM)
Arrival time: Write in Exact Time (or nearest 5 minutes) you arrived at this destination *(and circle AM or PM).*	Arrived at: *8:15* (AM) PM	Arrived at: *8:50* (AM) PM	Arrived at: *12:10* AM (PM)	Arrived at: *1:00* AM (PM)	Arrived at: *3:50* AM (PM)	Arrived at: *5:40* AM (PM)
Method of travel: *(Choose all that apply)* If more than one, list in order of use: 1. Auto driver 2. Auto passenger 3. Transit bus 4. SkyTrain 5. West Coast Express 6. SeaBus 7. HandyDART 8. School bus 9. Other bus 10. Bicycle 11. Walked whole way 12. Taxi 13. Other (describe)	Traveled by: *1. Auto Driver*	Traveled by: *1. Auto Driver* *4. SkyTrain* *3. Transit Bus*	Traveled by: *11. Walked Whole Way*	Traveled by: *11. Walked Whole Way*	Traveled by: *3. Transit Bus* *4. SkyTrain* *3. Transit Bus*	Traveled by: *3. Transit Bus* *4. SkyTrain* *1. Auto Driver*
If by automobile: Circle total # including driver (e.g., 2 means driver plus one passenger)	People in vehicle: 1 2 (3+)	People in vehicle: (1) 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: (1) 2 3+
If not by automobile: If transit/bicycle/walked/other: **Was an automobile available for you to use on this trip?** *Circle YES or NO*	YES NO	YES NO	YES (NO)	YES (NO)	YES (NO)	YES NO
Where did you go next? (Next trip starts where previous trip ended)	GO TO TRIP 2 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 3 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 4 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 5 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 6 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 7 ↗ Or check √ if returned after midnight ☐

Did you complete all sections for every trip? THANK YOU!!

TransLink's Regional Trip Diary Survey

Commissioned by the South Coast British Columbia Transportation Authority

Dear Survey Participant

Please be assured that Mustel Group maintains strict confidentiality of the information collected in this survey. We do not reveal the identity of respondents, nor give names and phone numbers to anyone, not even to TransLink.

We have been in business here in British Columbia since 1980 and we are a member of the Better Business Bureau. Below please find a summary of our privacy policy.

Our Privacy Policy:

1. Mustel Group is committed to protecting your privacy and the confidentiality of your personal information.
2. Mustel Group is committed to keeping the personal information you share with us confidential.
3. The information you provide will only be used for the purposes of this research. Under no circumstances do we sell contact lists or personal information to others.
4. The information you provide will be retained only for the time it is required for the purposes of this research.
5. Mustel Group will protect the information you provide with appropriate safeguards and security measures.
6. We are fully compliant with the federal privacy legislation (PIPEDA: Personal Information Protection and Electronic Documents Act)
7. The information you provide will be combined with the responses given by all other survey respondents and reported only in aggregate form. Your answers will remain completely confidential and anonymous.

For more information on our company visit our website at www.mustelgroup.com

By participating you are making an important contribution to the planning of the Metro Vancouver area and for your community. Thank you for your efforts.

Sincerely,

Jami Koehl

MUSTEL GROUP
MARKET RESEARCH

Jami Koehl, C.M.R.P.
Principal
Mustel Group Market Research

SURVEY FORM

Side 1 – Person Information

TO BE COMPLETED BY/FOR **EACH HOUSEHOLD MEMBER, NO MATTER WHAT THEIR AGE IS.**

In case we need to clarify your answers, please record your first name or initials: _____

Q.1 Gender: ☐ Male ☐ Female

Q.2 Year of birth: _____

Q.3 Do you have a valid driver's license? ☐ Yes ☐ No

Q.4a Do you currently attend school or another learning institution? (Grades K to 12 or post-secondary)

☐ **Yes … Is that:** *(check one)*
☐ Part time OR ☐ Full time
↓

☐ **No** – IF NOT A STUDENT
↓
Go to Q5

Q.4b PART-TIME OR FULL-TIME STUDENTS ONLY:

What is the type, name and location of your school?
(Please check school type and write in school name, location & city/ municipality)

Type of School:
☐ Grade School (Grades K to 12)
☐ Post-Secondary (University, College, Trade School, Night School, etc)

School Name: _____

Location: _____ and _____
Major Street Intersection

PLUS Municipality: _____

8/20/2008 VERSION

Everyone

Q.5 Are you currently employed? *(Please check)*

☐ Yes – Is that:
- ☐ Full time (30 hours or more per week)
- ☐ Part time (less than 30 hours per week)
- ☐ Self-employed
- ☐ Volunteer only (not for pay)

Go to Q.6

☐ No

Please indicate your status. Check all that apply to you.

- ☐ Student Go to Q.8a
- ☐ A preschooler
- ☐ Homemaker
- ☐ Retired
- ☐ Other not employed (excludes students & children)

Go to Q.9a

About Your Employment

Q.6 What is the address *(be sure to include city or municipality)* **of your normal place of work?**

- *IF WORK FROM YOUR HOME*, write in "home".

Work #1: _____
Street Address or Major Intersection

_____
PLUS write in City or Municipality

- *IF HAVE A SECOND JOB*, what is the address there?

Work #2: _____
Street Address or Major Intersection

_____
PLUS write in City or Municipality

- *NO FIXED PLACE OF WORK?…CHECK THIS BOX* → ☐

Q.7 Are you presently employed as a commercial driver? As a courier, taxi, truck or bus driver? *(Please check "yes" or "no")*

☐ Yes ☐ No
↓

** COMMERCIAL DRIVERS **

When filling in your Trip Form on Side 2:
Please record your PERSONAL TRIPS ONLY (travel to & from work and non-work trips). DO NOT include trips where the purpose is commercial delivery or driving a bus or taxi. Thank you!

Household # MO_____ ___

Your Travel Survey Day
MONDAY
Please do NOT substitute a different day of week.

Q.8a If you drive to work or school, who pays for your parking?
(Please check one below and if personally pay, write in amount paid by "DAY" OR by "MONTH")

☐ DO NOT USUALLY DRIVE
☐ Park free
☐ Paid parking *(Check one)*…
- ☐ Fully paid by employer/other
- ☐ Partially paid by employer/other
- ☐ No subsidy

IF PARTIAL OR NO SUBSIDY:
Amount you personally pay for parking: (write in $ amount)
$ _____ per DAY OR $ _____ per MONTH

Q.8b Do your employment duties require the use of an automobile?
☐ Frequently ☐ Occasionally ☐ Never

Everyone

Q.9a Have you traveled by public transit in the past month?
(Please check "yes" or "no")

☐ Yes ☐ No → *Go to Q10a below*
↓

IF TRANSIT

Q.9b How many one-way trips did you make in the past week? *(Check one)*

☐ 1-3 one-way trips ☐ 4-9 one-way trips ☐ 10 or more one-way trips
☐ None in past week

Q.9c How do you usually pay for your travel by transit?
(Check all that apply)

☐ Cash ☐ FareSaver ☐ Monthly FareCard ☐ U-Pass
☐ Employer Pass/Paid ☐ Annual Pass ☐ Other

Everyone

Q.10a Did you make any trips ON Your Travel Survey Day?

☐ Yes
↓
Go to "Trip Information" Side 2 (Back of this sheet)

☐ No
↓
Survey Complete. Thanks! Have the others in your household completed their surveys?

Side 2 – Trip Information

Record Travel for this Person by All Modes on *MONDAY*

Date Trips Made:_____
(WRITE IN Month and Day)

Please refer to the EXAMPLE PAGES to assist you in completing this form. Note: A trip is one-way travel to a destination (for example, a non-stop trip from home to work).

	TRIP 1	TRIP 2	TRIP 3	TRIP 4	TRIP 5	TRIP 6	TRIP 7	TRIP 8
Start location: If this trip started from home or usual place of work, write 'HOME', 'WORK#1" or "WORK #2.". Otherwise, give precise address OR nearby intersection OR landmark. PLUS *be sure to include municipality*	I started my first trip from:	Started from: ↓	Started from: ↓	Started from: ↓	Started from: ↓	Started from: ↓	Started from: ↓	Started from: ↓
End of trip location: Give precise address OR nearby intersection OR landmark. If trip ended at home or normal place of work, write 'HOME', 'WORK#1" or "WORK #2." PLUS *be sure to include municipality*	I went to :	I went to:	I went to:	I went to:	I went to:	I went to:	I went to:	I went to:
End location building/facility: *(Choose one)* 1. House/Apt. 2. Office building 3. Industrial or commercial site 4. School/daycare 5. Hospital 6. Store/mall/ theatre/or restaurant 7. Other services 8. Airport/BC Ferries 9. Outdoor recreational (park, beach, golf, etc) 10. Indoor rec/gym								
Main trip purpose: *(Choose only main one)* 1. **WORK** 2. Post-secondary 3. Other School 4. Personal business (e.g., bank, dentist, etc) 5. Recreational/social 6. Dining/restaurant 7. Shopping 8. **GOING HOME** 9. Pick-up/Drop-off a passenger	To go:	To go:	To go:	To go:	To go:	To go:	To go:	To go:
Start time: Write in Exact Time (or nearest 5 minutes) you left the start location. *Be sure to circle AM or PM!*	Left start location at: AM PM	Left start location at: AM PM	Left start location at: AM PM	Left start location at: AM PM	Left start location at: AM PM	Left start location at: AM PM	Left start location at: AM PM	Left start location at: AM PM
Arrival time: Write in Exact Time (or nearest 5 minutes) you arrived at this destination *(and circle AM or PM).*	Arrived at: AM PM	Arrived at: AM PM	Arrived at: AM PM	Arrived at: AM PM	Arrived at: AM PM	Arrived at: AM PM	Arrived at: AM PM	Arrived at: AM PM
Method of travel: *(Choose all that apply)* If more than one, list in order of use: 1. Auto driver 2. Auto passenger 3. Transit bus 4. SkyTrain 5. West Coast Express 6. SeaBus 7. HandyDART 8. School bus 9. Other bus 10. Bicycle 11. Walked whole way 12. Taxi 13. Other (describe)	Traveled by:	Traveled by:	Traveled by:	Traveled by:	Traveled by:	Traveled by:	Traveled by:	Traveled by:
If by automobile: Circle total # including driver (e.g., 2 means driver plus one passenger)	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+	People in vehicle: 1 2 3+
If not by automobile: If transit/bicycle/walked/other: **Was an automobile available for you to use on this trip?** *Circle YES or NO*	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
Where did you go next? (Next trip starts where previous trip ended)	GO TO TRIP 2 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 3 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 4 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 5 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 6 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 7 ↗ Or check √ if returned after midnight ☐	GO TO TRIP 8 ↗ Or check √ if returned after midnight ☐	If 9+ trips, use spare forms, photocopy or call 604-733-1138 or 1-888-733-1138.

Did you complete all sections for every trip? And other side of this sheet too? THANK YOU!!

謝謝您參與這項重要的運輸計畫調查！

我們將提供多項現金抽獎，
來感謝您所花費的時間與努力。

- 中獎的住戶將會由完整的調查問卷中隨機抽出。您一定要經由電話訪問或者在行程日誌紀錄網站上完成問卷調查，才具備抽獎資格。
- 一但所有問卷調查收集完畢，我們會舉辦包含現金一千元大獎以及其他現金及禮券等獎品的抽獎儀式。
- 有關獎品項目以及抽獎日期的更多訊息，請上網站 www.mustelgroup.com/tripdiary 查詢。

抽獎儀式由 Mustel Group Market Research 公司執行

MUSTEL GROUP
MARKET RESEARCH

您住戶的行程日誌址定日期：

在信封以及調查表格上有註明

歡迎參與

運輸聯網(TransLink)大溫地區行程日誌紀錄調查

說明手冊

謝謝您參與這項非常重要的計畫研究！這項調查所得資訊將對您的社區以及其他地區的各項運輸方式改善計畫有所助益。您所提供的所有資訊將會獲得最嚴密的隱私保護。

本套資料包括：

(請在您的行程日誌紀錄指定日期之前檢視資料內容)

- **本說明手冊**
- **「如何紀錄行程日誌」範本** (黃色)
- 供住戶每一位成員使用的**調查表格**

委託調查：

TRANS LINK

一般說明

- 本項調查非常簡單 – 是一項您住戶內成員在一日之內行程日誌的調查工作。

  請住戶所有成員登記一日之內的行程並且註明時間。
- **您的行程日誌紀錄日期→** 我們需要您住戶內每一成員在該日一齊完成行程日誌紀錄。如果在指定的日期包含非一般性的行程，也請紀錄下來。我們需要看所有計畫以及不在計畫之內的行程。
- **一個住戶可以**是一個人獨居或者是一個家庭或者是一群人住在一起共用廚房、起居室以及餐廳。
- 我們會在您的行程日誌指定日期之後打電話來收集您的家庭行程日誌調查資料或者您也可以上網完成調查，調查網站 www.mustelgroup.com/tripdiary.
- 您將有機會贏得現金大獎！
- 要了解行程日誌紀錄調查的更多資訊，請上網站：www.mustelgroup.com/tripdiary 查詢。

有問題嗎？ 需要協助嗎？
請聯絡 Mustel Group Market Research
電話： (604) 733-1138 or 1-888-733-1138
或是電郵： tripdiary@mustelgroup.com

MUSTEL GROUP
MARKET RESEARCH

經常被詢問的問題及提示：

1. 誰可以完成這項調查？

您住戶內的每一位成員，不論他們的年紀大小。請由成年的成員幫無法獨力進行的成員完成調查。所有資訊絕對保密。

2. 什麼是我的行程日誌指定紀錄日期 (Trip Diary Day)？

在您的信封前面以及在您的行程日誌紀錄表格上方(例如星期一、星期二、星期三、星期四、星期五等。)

如果：

- 您錯過了您的行程日誌紀錄日期→ 只要在下一週選擇同一天紀錄即可
- 如果您的行程日誌登記日是國定假日→ 只要在下一個星期同一天紀錄即可
- 如果沒有任何行程(例如生病在家或者出城) → 請在行程日誌紀錄表格 (Trip Dairy Form)的個人資料欄記載說明

3. 什麼是行程(Trip)?

把**行程(Trip)**想像成**到某一目的地的單程行動**。如果你因為某種原因向某一地點行動，然後又因為另外的原因向另外一個地點行動，這樣您就有兩個行程。

例如：您送小孩到學校，然後去上班 – 這樣您有兩個不同的行程：

行程 #1：由家裡到學校(送小孩上學)；以及，
行程 #2：由學校到公司(去工作)。

注意：轉換交通工具模式是同一行程的一部分。
例如：開車到 Park & Ride 停車場然後搭乘巴士去上班算是一個行程。

請參考「行程日誌紀錄日」範本的一些日常行程範例(下頁) ⇨

4. 包括所有的交通方式。

紀錄行程中所使用的各種交通工具模式：汽車、公眾巴士、自行車、或步行。

5. 「步行行程」的特別規定：

只有全程步行才算是步行。

不包括：

- 以運動為目的的步行或騎自行車
- 來/往公眾巴士車站的步行
- 停車場/停車位以及目的地之間的步行
- 溜狗
- 在校園中上下課/更換課室

6. 紀錄您行程的「起點」及「終點」位置

規畫道路及公眾運輸系統需要您行程開始以及結束地點的正確資訊。請使用以下三種方式之一紀錄：

紀錄方式 #1：**全部的街道名稱加上**市鎮名稱
例如： 1505 W. 2nd Ave, Vancouver

或

紀錄方式 #2：**最近的十字路口加上**市鎮名稱
例如： Westminster Hwy and Gilbert Rd, Richmond

或

紀錄方式 #3：**主要第標建築物加上**市鎮名稱
例如： Metrotown Shopping Centre, Burnaby　　Kitsilano Beach, Vancouver

行程日誌紀錄日範本

下列表格說明**一位母親**在她的行程紀錄日裡**所有行程**。

「如何紀錄您的行程」黃色範本會告訴您如何將行程資訊紀錄在表格上。

行程 1	行程 2	行程 3	行程 4	行程 5	行程 6
母親開家庭用車離開家。她首先把小孩送到日托中心。	*然後她開車到架空列車站搭架空列車到百老匯街車站，下車後她搭公眾巴士去公司上班。*	*她離開公司去餐廳吃午飯。她從公司走路到餐廳。*	*她吃完午飯後走路回公司。*	*她提早下班，搭乘巴士到架空列車車站搭車，然後換巴士去看醫生。*	*她從醫生診所搭乘巴士到架空列車站，下車後開車回家。*
開始	開始	開始	開始	開始	開始
家	日托中心	公司	餐廳	公司	醫生診所
汽車 (與小孩)	汽車(獨自一人)	步行	步行	公眾巴士	公眾巴士
日托中心 結束	架空列車	餐廳 結束	公司 結束	架空列車	架空列車 到 Park'n'Ride 停車場
	公眾巴士			公眾巴士	汽車(獨自一人)
	公司 結束			醫生診所 結束	家 結束

➔這位母親的小孩以及其他小孩也須各自填寫行程紀錄表格。

➔父親的行程紀錄表格會紀錄包括他到日托中心接小孩的行程。

如何紀錄您的行程

紀錄此人在 **星期一**(Monday) 所有形式的行程

行程日期： 9月 22日
(請寫下月份及日期)

行程紀錄人範例 — 這是一位母親如何在調查表格第二頁上紀錄她在星期一這一天的行程日誌：

	行程 1	行程 2	行程 3	行程 4	行程 5	行程 6
行程起點： 如果此一行程是從家裡或者平常的工作地點開始，請填寫「家裡」、「工作地點 #1」或 「工作地點 #2」。否則請填寫準確的地址**或**最近的十字路口**或**著名地標。**同時也**請寫市鎮名稱。	我從下列地點開始我的第一個行程： *家裡*	開始地點： *19th Ave & Mary Ave, Burnaby*	開始地點： *工作地點#1*	開始地點： *Broadway & Laurel, Vancouver*	開始地點： *工作地點#1*	開始地點： *Colbrook St, & Gilpin St, Burnaby*
行程終點： 請填寫準確的地址**或**最近的十字路口**或**著名地標。如果此一行程的終點是家裡或者平常的工作地點開始，請填寫「家裡」、「工作地點 #1」或 「工作地點 #2」。**同時也**請寫市鎮名稱。	我去： *19th Ave & Mary Ave, Burnaby*	我去： *工作地點#1*	我去： *Broadway & Laurel, Vancouver*	我去： *工作地點#1*	我去： *Colbrook St, & Gilpin St, Burnaby*	我去： *家裡*
終點建築物/場所： *(請選一項)* 1. 家/公寓柏文 2. 公司/寫字樓 3. 工業或商業區 4. 學校/日托中心 5. 醫院 6. 商店/商場 戲院/或 餐廳 7. 其他服務 8. 機場/渡船碼頭 9. 戶外娛樂場所 (公園、海邊、高球場等) 10.室內娛樂/健身房	*4. 日托中心*	*2. 公司/寫字樓*	*6. 餐廳*	*2. 公司/寫字樓*	*7. 其他服務*	*1. 家裡*
行程主要目的： *(請選擇最主要的一項)* 1. 工作 2. 大學專科 3. 其他學校 4. 私人事情 (例如去銀行、看牙醫等等) 5.娛樂/社交 6.餐飲/餐廳 7.購物消費 8.回家 9.接/送乘客	此行目的： *9. 送小孩到日托*	此行目的： *1. 工作*	此行目的： *6. 午餐*	此行目的： *1. 工作*	此行目的： *4. 私人事情*	此行目的： *8. 回家*
開始時間： 請寫下你離開行程起點的確實時間 (或前後五分鐘之內)。請務必圈選*上午或下午！*	離開起點時間： *8:00* (上午) 下午	離開起點時間： *8:25* (上午) 下午	離開起點時間： *12:00* 上午 (下午)	離開起點時間： *12:50* 上午 (下午)	離開起點時間： *3:05* 上午 (下午)	離開起點時間： *5:00* 上午 (下午)
抵達時間： 請寫下你抵達行程終點的確實時間 (或前後五分鐘之內)。請務必圈選*上午或下午！*	抵達終點時間： *8:15* (上午) 下午	抵達終點時間： *8:50* (上午) 下午	抵達終點時間： *12:10* 上午 (下午)	抵達終點時間： *1:00* 上午 (下午)	抵達終點時間： *3:50* 上午 (下午)	抵達終點時間： *5:40* 上午 (下午)
行程的交通方式： *(請選擇所有適用的方式)* 如果行程的交通方式超過一種，請按使用順序列出： 1. 汽車駕駛 2. 汽車乘客 3. 公眾巴士 4. 架空列車 5. West Coast Express 西岸特快車 6. SeaBus 海上巴士 7. HandyDART 殘障人士專車 8. 校車 9. 其他巴士 10. 自行車 11. 全程步行 12. 出租車 13. 其他 (請說明)	行程的交通方式是： *1. 汽車駕駛*	行程的交通方式是： *1. 汽車駕駛* *4. 架空列車* *3. 公眾巴士*	行程的交通方式是： *11. 全程步行*	行程的交通方式是： *11. 全程步行*	行程的交通方式是： *3. 公眾巴士* *4. 架空列車* *3. 公眾巴士*	行程的交通方式是： *3. 公眾巴士* *4. 架空列車* *1. 汽車駕駛*
如果使用汽車： 圈選包含駕駛在內的總人數。(例如 2 表示駕駛以及一名乘客)	汽車內總人數： 1 2 (3+)	汽車內總人數： (1) 2 3+	汽車內總人數： 1 2 3+	汽車內總人數： 1 2 3+	汽車內總人數： 1 2 3+	汽車內總人數： (1) 2 3+
如果不是使用汽車： 如搭乘公眾運輸/自行車/步行/或其他：**請問在此一行程中有汽車可供使用嗎？***請圈選「有」或「沒有」。*	有 沒有	有 沒有	有 (沒有)	有 (沒有)	有 (沒有)	有 沒有
請問您下一站要到哪裡？ (下一個行程開始於前一個行程結束的地點)	**到 行程 2** ↗ **或者** 如果午夜之後才回來請打 √ ☐	**到 行程 3** ↗ **或者** 如果午夜之後才回來請打 √ ☐	**到 行程 4** ↗ **或者** 如果午夜之後才回來請打 √ ☐	**到 行程 5** ↗ **或者** 如果午夜之後才回來請打 √ ☐	**到 行程 6** ↗ **或者** 如果午夜之後才回來請打 √ ☐	**到 行程 7** ↗ **或者** 如果午夜之後才回來請打 √ ☐

請問您完整填寫每趟行程的每一單元嗎？ 謝謝您的合作！！

運輸連網(TransLink)大溫地區行程日誌紀錄調查

由南岸卑詩運輸局(South Coast British Columbia Transportation Authority)
委託進行

親愛的受訪者

Mustel Group 對於這次調查所蒐集到的所有資訊完全保密，敬請放心。我們不會將受訪者的身分揭露，也不會將受訪者的姓名或電話提供給包括運輸聯網在內的任何人。

Mustel Group 自 1980 年起即在卑斯省執業，我們也是卑斯省商業優良局(Better Business Bureau)的會員。以下是我們的保護隱私政策的摘要。

我們的隱私保障政策：

1. Mustel Group 承諾保障您的隱私以及您個人資料的機密。
2. Mustel Group 承諾將您與我們分享的個人資料保守機密。
3. 您所提供的資料將只會用於此項調查。不管在任何情況之下，我們都不會將連絡名單或個人資料販賣給其他人。
4. 您提供的資料只會在這項調查研究所需的時間內保存。
5. Mustel Group 會提供適當的防範及安全措施來保存您所提供的資訊。
6. 我們完全遵守聯邦政府的隱私保護法 – PIPEDA：個人資料以及電子文件法案的一切規定。
7. 您所提供的所有資訊將會與其他受訪者所提供的資訊一起彙整並且以總數統計。您所回答的答案將會完全保密並隱匿姓名。

若欲了解本公司更多訊息，請上本公司網站： www.mustelgroup.com

經由您的參與，您對大溫哥華地區以及您的社區作出了重要的貢獻。謝謝您的努力。

Jami Koehl, C.M.R.P.
負責人
Mustel Group 市場調查公司

MUSTEL GROUP
MARKET RESEARCH

(請翻到反面參考行程範例→)

5.5 Web Survey Interface Screenshots

From: [INSERT TRIP DIARY EMAIL RETURN ADDRESS HERE]
Sent: Wednesday, October 1, 2008 12:20 PM
To: [INSERT Respondent's email address]
Subject: TRANSLINK'S REGIONAL TRIP DIARY SURVEY

Thank you for participating in this very important survey – valuable for planning a better transportation network in your community and the whole region. All surveys will be treated with strictest confidence.

The survey purpose is to record ALL transportation trips everyone in your household makes on a THURSDAY, your assigned TRIP DIARY DAY.

To view some of our files you need a **pdf** reader. Click below for a free download:

Foxit version (2mg download): http://www.foxitsoftware.com/pdf/reader_2/down_reader.htm
Adobe version (30mg download): http://www.adobe.com/products/acrobat/readstep2.html

Mac Users: access the survey with Firefox browser, v2.0 or higher. Click here for free download: http://www.mozilla.com/en-US/firefox/

How to proceed:

Step 1: **SAVE THIS EMAIL on your computer's desktop** (or where you'll find it easily). You will need to access it when you're ready to start.

Step 2: **Have each household member** (or an adult to help) **record their travel on your TRIP DIARY DAY**. To complete the survey faster, **KEEP A RECORD** of where you go, start & end times and modes of travel.

- To print a blank **TRIP DIARY RECORD**, click here: http://www.mustelgroup.com/tripdiary/blank.pdf
- Before you start, check these tips: http://www.mustelgroup.com/tripdiary/faq.pdf
- If you cannot complete this week, simply pick the same day next week
- If someone made no trips that day, we still need their basic information
- Remember that return trips count as separate trips!

Step 3: **ASSIGN EACH PERSON in your household one of the unique LINKs below**.

- As each person is ready, simply click their unique Link to access their own survey.
- Print this list to assign a Link to each household member and keep track.

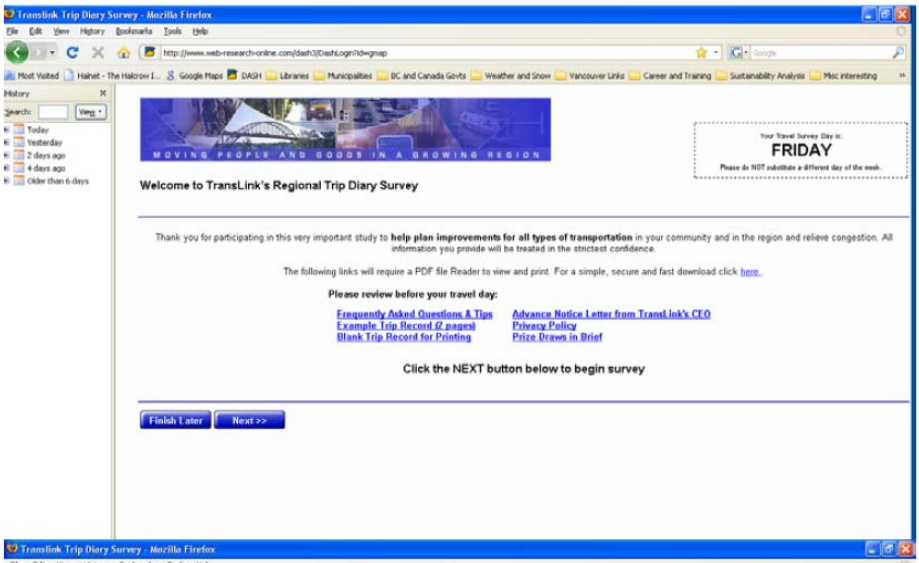
Name 1._____
https://www.web-research-online.com/mustelgroup/survey.php?fc=d&PIN=d1918a1
Name 2._____
https://www.web-research-online.com/mustelgroup/survey.php?fc=d&PIN=d1918a2
Name 3._____
https://www.web-research-online.com/mustelgroup/survey.php?fc=d&PIN=d1918a3
Name 4._____
https://www.web-research-online.com/mustelgroup/survey.php?fc=d&PIN=d1918a4

Once your household completes their surveys, you will be eligible for cash prize draws.
If you prefer to complete the survey by telephone, simply reply to this email and let us know.
Visit our website for more details on this study www.mustelgroup.com/tripdiary

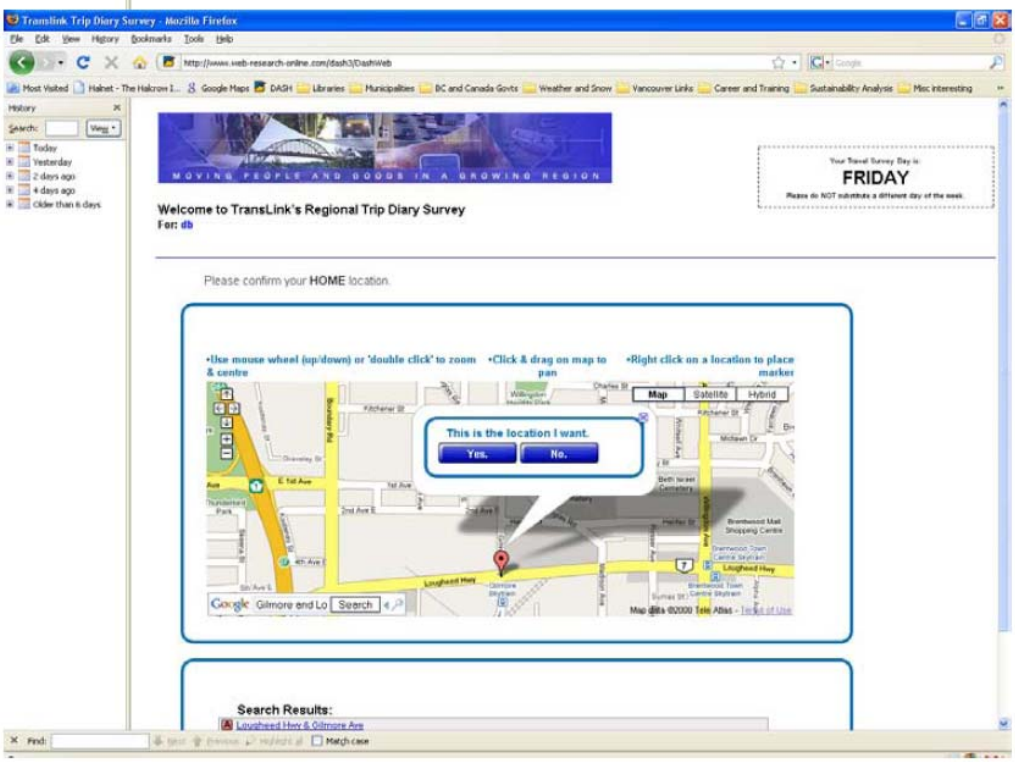
Again, on behalf of TransLink, **THANK YOU** for participating and making a valuable contribution to your community!

NOTICE: To administer and provide security for the survey, our site will send you a cookie. You must have your browser enabled to 'accept cookies' or you will not be able to log into the site.

NEED HELP? Our Trip Diary staff is happy to help; email us at tripdiary@mustelgroup.com




Translink Trip Diary Survey - Mozilla Firefox
MOVING PEOPLE AND GOODS IN A GROWING REGION
Your Travel Survey Day is:
FRIDAY
Please do NOT substitute a different day of the week.
Welcome to TransLink's Regional Trip Diary Survey
For: db
Please enter your HOME address.
Please enter ONE of these:
• Exact street address
• Nearby intersection (2 cross-streets)
Examples
• 1234 Main St
• Main and 5th ave , King George & 104th St
• Metrotown Shopping Centre
• Abbreviations are OK: e.g., St, Ave, W. 11, e 54th
• Postal code
• Postal code format: v6h3y4, V6H3Y4, V6H 3Y4
Please also enter a city/municipality: --Select One--
<< Back
Finish Later
Next >>


Translink Trip Diary Survey - Mozilla Firefox
MOVING PEOPLE AND GOODS IN A GROWING REGION
Your Travel Survey Day is:
FRIDAY
Please do NOT substitute a different day of the week.
Welcome to TransLink's Regional Trip Diary Survey
For: db
Please confirm your HOME location.
•Use mouse wheel (up/down) or 'double click' to zoom & centre
•Click & drag on map to pan
•Right click on a location to place marker
Map
Satellite
Hybrid
This is the location I want.
Yes.
No.
Search Results:

5.6 Telephone Retrieval Interview Script

INTRODUCTION

Hello, may I speak with … [NAMED PERSON FROM RECRUIT] …

IF NOT AVAILABLE: [IF NEEDED: I am from Mustel Group following up about the Trip Diary] We spoke to [NAMED PERSON] a few weeks ago.] When would be the best time to reach [NAMED PERSON]. **DO NOT LEAVE MESSAGES**

FOR NAMED PERSON: Hi, my name is …….from Mustel Group, following up on TransLink's Regional Trip Diary survey that you indicated you'd be willing to do for your community.**[IF NEEDED:** We spoke to you within the past month about this survey on behalf of TransLink (the South Coast BC Transportation Authority).]

A. **MAIL**: We mailed you a packet with survey forms and instructions. At this time, if convenient for you, we would like to collect the trip diaries for your household.

1. **IF YES**: Do you have the material near the phone, or shall I wait while you get it? WAIT.
2. **IF INCONVENIENT**: Then when would be a good time to call back? ARRANGE CALLBACK APPOINTMENT.

A. **WEB:** Over the past few weeks we emailed web links to you so that your household complete this survey.

A1. MAIL OR WEB: IF RESPONDENT VOLUNTEERS 'completed on line', SAY: Thank you! It will just be a moment for me to check that it was submitted. [DISPLAY # COMPLETED]

1. **IF ALL COMPLETED:** Thank you so much for participating. You are entered into the prize draw. (IF DOES NOT WANT TO BE IN PRIZE DRAW, MAKE NOTE). Your input will help planning for better transportation. Have a good day/evening.
2. **IF ANY INCOMPLETE** → SKIP TO 1a BELOW

IF "PARTIALLY COMPLETED" HOUSEHOLD (COMPSTAT=2):

1a) MAIL OR WEB: We noticed that some members of your household have not yet completed the survey. Will they be able to do so in the next week or two?

1. **YES**: Thank you! Perhaps they could complete their survey today, since [INSERT TRAVEL DAY] was your household's travel survey day. Even if they made no trips in the Lower Mainland on the travel day, we still need some basic data from them. Could we collect this information now? **IF YES:** PROCEED WITH PHONE RETRIEVAL. **IF NO:** ARRANGE CALLBACK DATE AND TIME (IN NEXT 2 DAYS OR AFTER THE NEXT TRAVEL DAY)
2. **NO:** We'd really appreciate if the others in your household fill out the survey too for the next [INSERT TRAVEL SURVEY DAY]. Can we help in any way? IF NEEDS ASSISTANCE, GET SUPERVISOR OR HAVE SUPERVISOR CALLBACK. Remember that even if a household member makes no trips in the Lower Mainland on the travel day, we still need some basic data about them.

   a) **OTHERS IN HOUSEHOLD REFUSE** → Do you know if: RECORD ALL THAT APPLY
   1) They had any problems with the survey,
   2) They haven't had time, or
   3) Another reason? (SPECIFY)_____

   b) **OTHERS IN HOUSEHOLD AWAY** PAST [DEC 12th] → Since they will not be making any local trips during our survey period, we would like to collect a few demographic questions for that person (those people). May we do that now? PROCEED WITH WEB RETRIEVAL.

   c) **SUPERVISOR RESOLVED** PROBLEMS &/OR GOT COOPERATION

   d) **SUPERVISOR COULD NOT RESOLVE NOW.** RECORD OUTCOME:
   1) RESPONDENT WANTS CALL BACK (SPECIFY PROBLEM/ISSUE)_____ & ARRANGE APPOINTMENT: What is the best time of day to reach you? _____
   2) GAVE HELPLINE # TO CALL: 1-888-733-1183 Monday to Friday 10-5

1b) MAIL OR WEB: IF SAYS "ALREADY COMPLETED WHOLE HOUSEHOLD":

May I just confirm that you have [INSERT #] people currently residing in your household including all adults and children? Do not include visitors or persons in a separate suite within your home.

REVISED HHSIZE #___ (RECODE TO CORRECT HHSIZE INFO IF NECESSARY)

(IF ASKED, THEY ARE INCLUDED IN PRIZE DRAW). THANK AND END SURVEY

MAIL: IF "NOTHING COMPLETED" HOUSEHOLD (COMPSTAT=0):

2a) MAIL: Have you received the Trip Diary Survey packet (with survey forms and instructions) that we mailed to you?

1. **YES** → GO TO Q3
2. **NO** → CONTINUE

2b) MAIL: If you can recall your travel on [INSERT TRAVEL DAY], could we collect your trips right now if convenient for you?

1. **YES** → PROCEED WITH PHONE RETRIEVAL
2. **NO** → CONTINUE
   a) IF NO INTERNET ACCESS: GO DIRECTLY TO 2b)-ii
   b) IF HAVE INTERNET ACCESS (SEE RECRUIT Q_): To minimize re-mailing, would you be willing to view the trip diary materials on our website?
      i. **YES**: You could print out a trip diary record if you like for each household member or make note of the information we need to collect and then we'll phone you back next week in the day or so after your travel day. If you're ready to copy it down, here is our trip diary website: www.mustelgroup.com/tripdiary/

      ii. BEFORE NOV 17: IF "NO INTERNET" or IF "**NO** TO 2b)", in that case, we could **mail** you another copy;

      2c) CONFIRM ADDRESS Thanks! Remember your household's travel survey day is [INSERT TRAVEL DAY]. We need you to try to complete the surveys [BEFORE NOV 30th, SAY: in the next week or two] [AFTER NOV 30th, SAY: before Dec 12th].

      We'll call back to collect your travel diary. May we try you again next week? (MAKE APPOINTMENT FOR NEXT WEEK OR WEEK AFTER) Thanks for helping out with this important transportation planning survey for your community and the region.

      iii. AFTER NOV 30: IF **NO** TO 2b): I'm sorry we don't have time to mail you another copy. Thank you anyway for your interest.

      [OPTIONAL: If you'd like to record your one-way trips on the next [INSERT TRAVEL DAY] we will call you back and collect the information. Are you willing to do that?

      IF NO: THANK POLITELY AND END.

      IF YES: If you could get some paper now, I will tell you how to record your trips. On the next [INSERT TRAVEL DAY], please write down each place you visit during the whole 24 hour period from midnight to midnight. Please make note of the following: 1) where you started your trip (such as from 'home'), 2) the location you visited noting the exact address, landmark or nearby cross-streets, 3) the trip purpose (such as work, shopping, etc.), 3) the time you started the trip and time you arrived and 4) the method of travel (e.g., auto driver, auto passenger, transit, bicycle, walked, etc.). If at all possible, we would like to also collect the same information for your other household members.]

WEB: IF "NOTHING COMPLETED" HOUSEHOLD (COMPSTAT=0):

2a) WEB: Have you received the email (with web links for your household)?

3. **YES** → GO TO Q3
4. **NO** → CONTINUE

2b) WEB: If you can recall your travel on [INSERT TRAVEL DAY], we could collect your trips right now if convenient for you?

1. **YES** → PROCEED WITH PHONE RETRIEVAL.
2. **NO** → When would be a convenient time to phone back and collect your trips for the most recent or the next [INSERT TRAVEL DAY]? ARRANGE CALLBACK APPOINTMENT.

IF DO NOT WANT CALLBACK: May we send you another email reminder with the links for your household members?

1. **YES →**
   2c) CONFIRM EMAIL ADDRESS (repeat address using phonetic alphabet as needed, e.g., "F as in FRANK")

   2d) CONFIRM # OF PEOPLE IN HH ____
   Thanks! Remember your household's travel survey day is [INSERT TRAVEL DAY]. Watch for the email-inthe next day or so. We look forward to receiving your household's responses. [BEFORE NOV 17th, SAY: Please try to complete the surveys in the next week or two] [AFTER NOV 16th, SAY: We need you to complete the surveys within the next week, that is BEFORE the Nov 30th closing date]. Thanks for helping out with this important transportation planning survey for your community and the region.

2. **NO →** CODE AS REFUSAL. END POLITELY (Alright then, have a nice day/evening.)

IF YES RECEIVED SURVEY PACKET: (Mail & Web)

3a) [INSERT DAY] was your household's travel survey day. Have you been able to collect the survey information yet?

1. **YES →** GO TO Q4
2. **NO →** CONTINUE

3b) Is there anything we can do to help you complete? Perhaps go through your first trip for [INSERT DAY] with you?

1. **IF 'YES TO HELP NOW' → GET A SUPERVISOR**
   a) **SUPERVISOR RESOLVED** PROBLEMS &/OR GOT COOPERATION
   b) **SUPERVISOR COULD NOT RESOLVE.** RECORD OUTCOME:
      a. RESPONDENT **WANTS CALL BACK** (SPECIFY PROBLEM/ISSUE)_____ & ARRANGE APPOINTMENT: What is the best time of day to reach you? _____
      b. **GAVE HELPLINE** # TO CALL Trip Diary Project Coordinator: 604-733-1138 (IF FRASER VALLEY, LIONS BAY, BOWEN ISLAND→CALL: 1-888-733-1138) Monday to Friday 10-5 or leave a message at other times for personal callback.

2. **IF SAYS 'WILL DO ON THEIR OWN'** ON-LINE/ON INTERNET/WEB/

   MAIL: That's great. We **will phone** you next week then to collect your trip diaries. If you need any help, you can email our Trip Diary Help line staff at traveldiary@mustelgroup.com If prefers to do survey via web, then record their email address and say we will email them their household PIN #s.

   ENTER EMAIL ADDRESS:_____ CONFIRM BY READING ALOUD USING PHOENETIC ALPHABET. REPEAT PROCESS UNTIL CORRECT EMAIL IS CONFIRMED BY RESPONDENT.

   WEB: That's great. We **look forward to receiving** your trip diaries. If you need any help, you can email our Trip Diary Help line staff at traveldiary@mustelgroup.com

3. **IF SAYS 'FORGOT WHERE I TRAVELLED'**
   That's ok**;** just record your trips the next time your day comes up—that will be next [INSERT TRAVEL DAY] and please remind any others in your household to do the same.

   [BEFORE DEC 1st, SAY: Please try to complete the surveys in the next week or two] [AFTER DEC 1st, SAY: We need you to complete the surveys within the next week, that is, BEFORE the Dec 12th closing date].

   We will call again to collect the information, and thanks for helping out with this important transportation survey for your community and the region.

4. May I collect your survey information now?

1. **NO** → ARRANGE CALLBACK
2. **YES** → Thank you → BEGIN 'PERSON AND TRIP INFO' RETRIEVAL

5.7 Reminder Voicemail Script

"Tomorrow is your diary day" Automated Voice Message

1) For web non-responders: automated pre-reminder sent 3 weeks post-invite (& after 2 weeks of bracketed pre/post email reminders); to be followed by final email with links.

2) For phone-mail retrievals not yet completed: automated pre-reminder to be followed by phone retrieval day after 'Trip Day'.

> Hello, this is TransLink's Regional Trip Diary research team, calling to remind you that tomorrow is your household's travel diary day. With your help on this survey we can plan a better transportation network for our communities. If you missed your travel day in the past few weeks, please do your diary tomorrow from midnight to midnight. Whether by car, transit, bicycle, walking, etc. or even if no trips at all, we need travel diaries from as many household members as possible.
>
> **FOR WEB:** Watch for our email the day after tomorrow with links to the web survey. We look forward to your responses. Thank you again.
>
> **FOR MAIL-PHONE RECRUITS & SWITCHERS:** We will try to contact you soon after your trip diary day to collect the information. We look forward to speaking with you.

Voice Mail Message for Answering Machines (for mail-phone retrievals)

> Hello, this is TransLink's Regional Trip Diary research team at Mustel Group, calling to collect your household's trip diary information. Your trip diary day of the week is any [**INSERT DAY**]. If you or others haven't yet recorded your travel day information, please do so for your travel day this week. We'll try calling you again in the next week or so. We look forward to speaking with you.

5.8 Database Codebook

HOUSEHOLD TABLE		
Field Name	**Field Type**	**Field Description**
HH_ID	Numeric	Household serial
INC_CODE	Numeric	Income code of the household
REGION	Text	Preload Region name
RCODE	Numeric	Preload Region code
INSR_VEH	Numeric	Number of insured vehicles in household
UNINSR_VEH	Numeric	Number of uninsured vehicles in household
HH_TOT_MEM	Numeric	Number of total members in household
HH_MEMRESPN	Numeric	Number of household members with survey response
HH_SIZE_GP	Text	Household size group
HH_COMP	Numeric	Household survey completion
HH_PW	Numeric	Household probability weight
CITY	Text	Preload CATI municipality
PROV	Text	Preload CATI province
FACT_HH_EXP	Numeric	Household expansion factor

PERSONS TABLE

Field Name	Field Type	Field Description
PER_ID	Numeric	Person serial
PER_IDX	Numeric	Person sequence index
HH_ID	Numeric	Household serial
FACT_PW_PERFACT	Numeric	Person expansion factor – non-probability weighted
HH_PW	Numeric	Probability weight
PW_EXPFACT	Numeric	Person expansion factor – probability weighted
TCPW_EXPFACT	Numeric	Transit pass holder controlled person expansion factor
MW	Numeric	Survey method
PRELOAD_TDAY	Text	Assigned travel day from recruitment
PRELOAD_REGION	Text	Assigned region from recruitment
PRELOAD_RCODE	Numeric	Assigned region from recruitment
GENDER	Numeric	Gender
YOB	Numeric	Year of birth
AGE_08	Numeric	Age at 2008
AGE_CAT	Text	Age category
AGE_CAT2	Text	Alternate age category
DRV_LIC	Numeric	Possession of a driver's license
HOME_LAT	Numeric	Home location latitude
HOME_LON	Numeric	Home location longitude
HOME_UTMX	Numeric	Home location UTMX
HOME_UTMY	Numeric	Home location UTMY
HOME_TZ	Numeric	Home location traffic zone
HOME_SA	Numeric	Home location sub-area
HOME_SZ	Numeric	Home location super-zones
HOME_BUFF	Numeric	Home location buffer zones
HOME_DA	Numeric	Home location census dissemination areas
SCH_ATT	Numeric	School status
SCH_TEN	Numeric	School tenure
SCH_NAME	Text	School name
SCH_TYP	Numeric	School type
SCH_PS	Text	Post-secondary type
SCH_LAT	Numeric	School location latitude
SCH_LON	Numeric	School location longitude
SCH_UTMX	Numeric	School location UTMX
SCH_UTMY	Numeric	School location UTMY
SCH_TZ	Numeric	School location traffic zone
SCH_SA	Numeric	School location sub-area
SCH_SZ	Numeric	School location super-zone
SCH_BUFF	Numeric	School location buffer-zone
SCH_DA	Numeric	School location census dissemination area
CUR_EMPL	Numeric	Employment status
EMP_STATUS	Numeric	Employment type
NEMP_STUD	Numeric	Non-employment – Student
NEMP_PRE	Numeric	Non-employment – Preschooler
NEMP_HOME	Numeric	Non-employment – Homemaker
NEMP_RET	Numeric	Non-employment – Retired
NEMP_OTH	Numeric	Non-employment – Other

WRK1	Numeric	Workplace 1 information
WRK1_ADDR	Text	Workplace 1 address
WRK1_LAT	Numeric	Workplace 1 latitude
WRK1_LON	Numeric	Workplace 1 longitude
WRK1_UTMX	Numeric	Workplace 1 UTMX
WRK1_UTMY	Numeric	Workplace 1 UTMY
WRK1_TZ	Numeric	Workplace 1 traffic zone
WRK1_SA	Numeric	Workplace 1 sub-area
WRK1_SZ	Numeric	Workplace 1 super-zone
WRK1_BUFF	Numeric	Workplace 1 buffer-zone
WRK1_DA	Numeric	Workplace 1 census dissemination area
SEC_JOB	Numeric	Has a second job
WRK2	Numeric	Workplace 2 information
WRK2_ADDR	Text	Workplace 2 address
WRK2_LAT	Numeric	Workplace 2 latitude
WRK2_LON	Numeric	Workplace 2 longitude
WRK2_UTMX	Numeric	Workplace 2 UTMX
WRK2_UTMY	Numeric	Workplace 2 UTMY
WRK2_TZ	Numeric	Workplace 2 traffic zone
WRK2_SA	Numeric	Workplace 2 sub-area
WRK2_SZ	Numeric	Workplace 2 super-zone
WRK2_BUFF	Numeric	Workplace 2 buffer-zone
WRK2_DA	Numeric	Workplace 2 census dissemination area
COMM_DRV	Numeric	Commercial driver
PARK	Numeric	Parking payment to work or school
PARK_SUB	Numeric	Parking subsidy by employer or other
PARK_AMT	Numeric	Parking cost per duration
PARK_DUR	Text	Parking duration
EMPL_CAR	Numeric	Employment requires use of a vehicle
TRAN_USE	Numeric	Traveled by public transit in the past month
TRAN_TRIPSGP	Numeric	Grouping of number of one-way trips made in the past week
TRAN_CASH	Numeric	Transit payment type – Cash
TRAN_FSAVE	Numeric	Transit payment type – FareSaver
TRAN_MONTH	Numeric	Transit payment type – Monthly Pass
TRAN_UPASS	Numeric	Transit payment type – UPass
TRAN_EPASS	Numeric	Transit payment type – Employer Pass
TRAN_APASS	Numeric	Transit payment type – Annual Pass
TRAN_OTHER	Numeric	Transit payment type – Other
TRAN_P_TPAY	Numeric	Primary transit payment type
TRIP_TOT	Numeric	Number of trips made

TRIPS TABLE

Field Name	Field Type	Field Description
TRIP_ID	Numeric	Trip serial
PER_ID	Numeric	Person serial
HH_ID	Numeric	Household serial
TRIP_IDX	Numeric	Trip sequence index
FACT_PW_PERFACT	Numeric	Person expansion factor – non-probability weighted
HH_PW	Numeric	Probability weight
PW_EXPFACT	Numeric	Person expansion factor – probability weighted
TCPW_EXPFACT	Numeric	Transit pass holder controlled person expansion factor
TRIP_DATE	Text	Trip diary date in long form
ST_PREV	Numeric	Start from previous location – only for commercial drivers
ST_CODE	Numeric	Starting location
ST_ADDR	Text	Starting location address
OUTLM_ST_MODE	Numeric	Mode of trips started outside of the lower mainland
OUTLM_ST_HWY	Numeric	Starting outside lower mainland – Highway
OUTLM_ST_HWYSP	Text	Starting outside lower mainland – Highway specified
OUTLM_ST_APRT	Numeric	Starting outside lower mainland – Airport
OUTLM_ST_APRTSP	Text	Starting outside lower mainland – Airport specified
OUTLM_ST_SEA	Numeric	Starting outside lower mainland – Marina
OUTLM_ST_SEASP	Text	Starting outside lower mainland – Marina specified
OUTLM_ST_BUS	Numeric	Starting outside lower mainland – Bus depot
OUTLM_ST_BUSSP	Text	Starting outside lower mainland – Bus depot specified
OUTLM_ST_TRN	Numeric	Starting outside lower mainland – Train station
OUTLM_ST_TRNSP	Text	Starting outside lower mainland – Train station specified
ST_LAT	Numeric	Start location latitude
ST_LON	Numeric	Start location longitude
ST_UTMX	Numeric	Start location UTMX
ST_UTMY	Numeric	Start location UTMY
ST_TZ	Numeric	Start location traffic zone
ST_SA	Numeric	Start location sub-area
ST_SZ	Numeric	Start location super-zone
ST_BUFF	Numeric	Start location buffer area
ST_DA	Numeric	Start location census dissemination area
END_CODE	Numeric	Ending location
END_ADDR	Text	Ending location address
OUTLM_END_MODE	Numeric	Mode of trips ended outside of the lower mainland
OUTLM_END_HWY	Numeric	Ending outside lower mainland – Highway
OUTLM_END_HWYSP	Text	Ending outside lower mainland – Highway specified
OUTLM_END_APRT	Numeric	Ending outside lower mainland – Airport
OUTLM_END_APRTSP	Text	Ending outside lower mainland – Airport specified
OUTLM_END_SEA	Numeric	Ending outside lower mainland – Marina
OUTLM_END_SEASP	Text	Ending outside lower mainland – Marina specified
OUTLM_END_BUS	Numeric	Ending outside lower mainland – Bus depot
OUTLM_END_BUSSP	Text	Ending outside lower mainland – Bus depot specified
OUTLM_END_TRN	Numeric	Ending outside lower mainland – Train station
OUTLM_END_TRNSP	Text	Ending outside lower mainland – Train station specified
END_LAT	Numeric	End location latitude
END_LON	Numeric	End location longitude

END_UTMX	Numeric	End location UTMX
END_UTMY	Numeric	End location UTMY
END_TZ	Numeric	End location traffic zone
END_SA	Numeric	End location sub-area
END_SZ	Numeric	End location super-zone
END_BUFF	Numeric	End location buffer area
END_DA	Numeric	End location census dissemination area
O_LNDUSE	Numeric	Origin land-use (or building)
D_LNDUSE	Numeric	Destination land-use (or building)
D_LNDUSESP	Text	Destination land-use specified
O_PURP	Numeric	Origin purpose
D_PURP	Numeric	Destination purpose
D_PURPSP	Text	Destination purpose specified
T_PURP6	Numeric	Trip purpose categorization – six groups
T_PURP12	Numeric	Trip purpose categorization – twelve groups
ST_HR	Numeric	Start time – hour
ST_MIN	Numeric	Start time – minute
ST_AMPM	Text	Start time – AM/PM
END_HR	Numeric	End time – hour
END_MIN	Numeric	End time – minute
END_AMPM	Text	End time – AM/PM
ST_TIME	Numeric	Start time in 24 hour format and decimal minutes
END_TIME	Numeric	End time in 24 hour format and decimal minutes
ST_TIMEGP	Text	Start time group
END_TIMEGP	Text	End time group
TRIP_DUR_HR	Numeric	Duration of the trip segment in hours
END_AFTER	Numeric	Trip ended after midnight
PRI_MODE	Numeric	Primary mode
MODE1	Numeric	Mode 1
MODE1SP	Text	Mode 1 – specify
MODE2	Numeric	Mode 2
MODE2SP	Text	Mode 2 – specify
MODE3	Numeric	Mode 3
MODE3SP	Text	Mode 3 – specify
MODE4	Numeric	Mode 4
MODE4SP	Text	Mode 4 – specify
MODE5	Numeric	Mode 5
MODE5SP	Text	Mode 5 – specify
MODE6	Numeric	Mode 6
MODE6SP	Text	Mode 6 – specify
AUTO_PER	Numeric	Number of person in automobile trips
AUTO_AVAL	Numeric	Availability of an automobile
RETURNLM	Numeric	Travel day trip returned to lower mainland
MORETRIPS	Numeric	Additional trip segments made by the same person
T_DWELL	Numeric	Dwell time in hours
FIRST_BOARD	Numeric	Primary mode based on transit first board
TRIP_MF	Text	Travel day – weekday
TRIP_MTH	Text	Travel day – month
TRIP_DAY	Numeric	Travel day – day
SYN_TRIP	Numeric	Synthetic return home trip
TZ_AUTOTIMAM_MINS	Numeric	Modeled automobile travel time based on TZ (in minutes)
TZ_TRNTIMAM_MINS	Numeric	Modeled transit travel time based on TZ (in minutes)

TZ_DISTANCE_KM	Numeric	Modeled travel distance based on TZ (in kilometres)
TRIP_TZSPD	Numeric	Speed based on TZ (in kilometres per hour)
TRIP_DIST_UTMXY	Numeric	Trip distance based on UTMXY coordinates

HOUSEHOLD TABLE

Field Name	Code Values
INC_CODE	1: Less than $60,000 2: Under $20,000 3: $20,000 - $40,000 4: $40,000 to $60,000 6: More than $60,000 7: $60,000 to $80,000 8: $80,000 to $100,000 9: $100,000 or more 99: Missing / No Response / Refused
RCODE	1: Burnaby 2: Coquitlam 3: Delta 4: Langleys 5: New Westminster 6: North Vancouver 7: Port Coquitlam 8: Port Moody/Anmore/Belcarra 9: Richmond 10: Surrey 11: Vancouver CBD 12: Rest of Vancouver/UEL 13: West Vancouver/Lions Bay 14: White Rock 15: Maple Ridge/Pitt Meadows 16: Abbotsford 17: Mission/Fraser North 18: Chilliwack/Fraser South
HH_SIZE_GP	HH1PR: 1 person household HH2PR: 2 persons household HH3PR: 3 persons household HH4_5PR: 4 or 5 persons household HH6UP: 6 or more persons household
HH_COMP	0: Partial household members completed survey 1: All household members completed survey

PERSONS TABLE	
Field Name	**Code Values**
MW	1: Web 2: Mail 3: Phone
PRELOAD_RCODE HOME_SA SCH_SA WRK1_SA WRK2_SA	1: Burnaby 2: Coquitlam 3: Delta 4: Langleys 5: New Westminster 6: North Vancouver 7: Port Coquitlam 8: Port Moody/Anmore/Belcarra 9: Richmond 10: Surrey 11: Vancouver CBD 12: Rest of Vancouver/UEL 13: West Vancouver/Lions Bay 14: White Rock 15: Maple Ridge/Pitt Meadows 16: Abbotsford 17: Mission/Fraser North 18: Chilliwack/Fraser South
GENDER	1: Male 2: Female
YOB	1900: Refused
DRV_LIC	0: No 1: Yes
HOME_TZ SCH_TZ WRK1_TZ WRK2_TZ	Please refer to MapInfo files
HOME_SZ SCH_SZ WRK1_SZ WRK2_SZ	Please refer to MapInfo files
HOME_BUFF SCH_BUFF WRK1_BUFF WRK2_BUFF	11: Broadway 21: 104 Ave EW 31: King George Hwy NS 41: Fraser Hwy SE 51: 106 Ave NS 61: Evergreen
SCH_ATT	0: Does not attend school 1: Attends school
SCH_TEN	1: Part-time 2: Full-time 3: Distant Ed
SCH_TYP	1: K-12 2: Post-secondary
CUR_EMPL	0: No

	1: Yes
EMP_STATUS	1: Full-time 2: Part-time 3: Self employed 4: Volunteer
NEMP_STUD NEMP_PRE NEMP_HOME NEMP_RET NEMP_OTH	0: Null 1: Yes
WRK1 WRK2	98: No fixed place 99: Work from home
SEC_JOB	0: No 1: Yes
COMM_DRV	0: No 1: Yes
PARK	1: Do not drive 2: Free parking 3: Paid parking
PARK_SUB	1: Full 2: Partial 3: No
EMPL_CAR	1: Frequently 2: Occasionally 3: Never
TRAN_USE	0: No 1: Yes
TRAN_TRIPSGP	0: None 2: 1-3 trips 6.5: 4-9 trips 10: 10+ trips
TRAN_CASH TRAN_FSAVE TRAN_MONTH TRAN_UPASS TRAN_EPASS TRAN_APASS TRAN_OTHER	0: Null 1: Yes
TRAN_P_TPAY	0: Null/Not applicable 1: Cash 2: FareSaver 3: Month 4: U-Pass 5: Employer Pass 6: Annual Pass 7: Other
TRIP_TOT	0 to 16

TRIPS TABLE	
Field Name	**Code Values**
ST_PREV	0: Null 1: Yes
ST_CODE END_CODE	1: Within lower mainland 2: Outside lower mainland 96: School 97: Workplace 2 98: Workplace 3 99: Home
OUTLM_ST_MODE OUTLM_END_MODE	0: Null 1: Ferry 2: Airplane 3: Seaplane/Helicopter 4: Private Auto 5: Bus/Coach 6: Train
OUTLM_ST_HWY OUTLM_END_HWY	0: Null 1: Hwy 99 at Lions Bay 2: Hope - Hwy 1 or Hwy 7 3: Peace Arch Crossing 4: Pacific Hwy Crossing 5: Aldergrove-Lynden Crossing 6: Abbotsford-Sumas Crossing 7: Point Roberts Crossing 98: Other
OUTLM_ST_APRT OUTLM_END_APRT	0: Null 1: YVR 2: Abbotsford Airport 3: Boundary Bay Airport 98: Other
OUTLM_ST_SEA OUTLM_END_SEA	0: Null 1: Tsawwassen Ferry 2: Horseshoe Bay Ferry 98: Other
OUTLM_ST_BUS OUTLM_END_BUS	1: Pacific Coach Depot - Station St 98: Other
OUTLM_ST_TRN OUTLM_END_TRN	1: Central Station - Vancouver 2: Philip/W 1st - N. Van 3: Terminal Ave - Vancouver 98: Other
ST_TZ END_TZ	Please refer to MapInfo files
ST_SA END_SA	1: Burnaby 2: Coquitlam 3: Delta 4: Langleys 5: New Westminster 6: North Vancouver 7: Port Coquitlam 8: Port Moody/Anmore/Belcarra

	9: Richmond 10: Surrey 11: Vancouver CBD 12: Rest of Vancouver/UEL 13: West Vancouver/Lions Bay 14: White Rock 15: Maple Ridge/Pitt Meadows 16: Abbotsford 17: Mission/Fraser North 18: Chilliwack/Fraser South
ST_SZ END_SZ	Please refer to MapInfo files
ST_BUFF END_BUFF	11: Broadway 21: 104 Ave EW 31: King George Hwy NS 41: Fraser Hwy SE 51: 106 Ave NS 61: Evergreen
O_LNDUSE D_LNDUSE	1: House/Apt 2: Office 3: Industrial/Commercial 4: School/Daycare 5: Hospital 6: Store/Mall/Rest 7: Other Services 8: Airport/Ferry 9: Out Recreational 10: Indoor Rec/Gym 98: Other
O_PURP D_PURP	1: Work 2: Post-secondary 3: Other School 4: Personal Business 5: Recreational/Social 6: Dining/Restaurant 7: Shopping 8: Going Home 9: Pick/Drop Passenger 98: Other
T_PURP6	1: To Work/PS 2: From Work/PS 3: During Work 4: To Grade Sch 5: From Grade Sch 6: Personal Business
T_PURP12	1: To Work 2: From Work 3: To Grade School 4: From Grade School 5: To PS 6: From PS 7: Home Based Recreational/Social 8: Home Based Shopping/Personal/Dining/Serve Pass/Other

	9: Non-home Based 10: Business to Business 11: From Home - Serve Pass 12: From Serve Pass - Home
ST_TIMEGP END_TIMEGP	Null = invalid time 00:01 – 06:30 06:31 – 09:30 09:31 – 15:30 15:31 – 18:30 18:31 – 24:00
END_AFTER	0: No 1: Yes
PRI_MODE MODE1 MODE2 MODE3 MODE4 MODE5 MODE6 FIRST_BOARD	0: Not stated 1: Auto driver 2: Auto passenger 3: Transit bus 4: SkyTrain 5: West Coast Express 6: SeaBus 7: HandyDART 8: School bus 9: Other bus 10: Bicycle 11: Walk 12: Taxi 98: Other
AUTO_PER	1: 1 person 2: 2 persons 3: 3+ persons
AUTO_AVAL RETURNLM MORETRIPS SYN_TRIP	0: No 1: Yes

5.9 Universe Control Totals

The tables below illustrate the universe totals used for the demographic expansion of the household records (first) and person records (second).

Exhibit 5.9.1: Universe Totals for Household Expansion

Region Code	Region Name	Household Size	Universe Households
1	Burnaby	1	23,120
1	Burnaby	2	25,013
1	Burnaby	3	14,943
1	Burnaby	4 or 5	18,016
1	Burnaby	6+	3,128
2	Coquitlam	1	9,923
2	Coquitlam	2	12,741
2	Coquitlam	3	8,171
2	Coquitlam	4 or 5	12,557
2	Coquitlam	6+	1,529
3	Delta	1	7,016
3	Delta	2	11,135
3	Delta	3	6,093
3	Delta	4 or 5	10,517
3	Delta	6+	1,756
4	Langley	1	10,647
4	Langley	2	15,493
4	Langley	3	7,534
4	Langley	4 or 5	11,569
4	Langley	6+	1,826
5	New Westminster	1	11,730
5	New Westminster	2	9,336
5	New Westminster	3	3,751
5	New Westminster	4 or 5	3,951
5	New Westminster	6+	667
6	North Vancouver	1	15,406
6	North Vancouver	2	17,683
6	North Vancouver	3	8,825
6	North Vancouver	4 or 5	12,533
6	North Vancouver	6+	1,203

Region Code	Region Name	Household Size	Universe Households
7	Port Coquitlam	1	4,083
7	Port Coquitlam	2	5,871
7	Port Coquitlam	3	3,906
7	Port Coquitlam	4 or 5	5,811
7	Port Coquitlam	6+	691
8	Port Moody	1	2,209
8	Port Moody	2	3,717
8	Port Moody	3	2,227
8	Port Moody	4 or 5	3,176
8	Port Moody	6+	291
9	Richmond	1	13,744
9	Richmond	2	18,860
9	Richmond	3	13,292
9	Richmond	4 or 5	17,622
9	Richmond	6+	3,204
10	Surrey	1	27,781
10	Surrey	2	40,808
10	Surrey	3	23,255
10	Surrey	4 or 5	39,291
10	Surrey	6+	11,286
11	Vancouver CBD	1	35,854
11	Vancouver CBD	2	17,459
11	Vancouver CBD	3	4,044
11	Vancouver CBD	4 or 5	1,961
11	Vancouver CBD	6+	282
12	Rest of Vancouver	1	67,510
12	Rest of Vancouver	2	55,960
12	Rest of Vancouver	3	29,153
12	Rest of Vancouver	4 or 5	35,248
12	Rest of Vancouver	6+	7,300

Region Code	Region Name	Household Size	Universe Households
13	West Vancouver	1	5,226
13	West Vancouver	2	6,363
13	West Vancouver	3	2,640
13	West Vancouver	4 or 5	4,140
13	West Vancouver	6+	477
14	White Rock	1	4,410
14	White Rock	2	3,485
14	White Rock	3	1,015
14	White Rock	4 or 5	860
14	White Rock	6+	108
15	Maple Ridge/Pitt Meadows	1	6,996
15	Maple Ridge/Pitt Meadows	2	10,602
15	Maple Ridge/Pitt Meadows	3	5,659
15	Maple Ridge/Pitt Meadows	4 or 5	8,725
15	Maple Ridge/Pitt Meadows	6+	1,195
16	Abbotsford	1	10,843
16	Abbotsford	2	15,139
16	Abbotsford	3	6,517
16	Abbotsford	4 or 5	11,139
16	Abbotsford	6+	3,301
17	Mission/Fraser North	1	3,808
17	Mission/Fraser North	2	5,201
17	Mission/Fraser North	3	2,451
17	Mission/Fraser North	4 or 5	3,434
17	Mission/Fraser North	6+	673
18	Chilliwack/Fraser South	1	8,102
18	Chilliwack/Fraser South	2	10,559
18	Chilliwack/Fraser South	3	4,303
18	Chilliwack/Fraser South	4 or 5	5,847
18	Chilliwack/Fraser South	6+	1,100

Exhibit 5.9.2: Universe Totals for Person Expansion

Region Code	Region Name	Gender	Age Cat	Universe Pop
1	Burnaby	Male	0 - 9	10,564
1	Burnaby	Male	10 - 19	13,153
1	Burnaby	Male	20 - 29	16,648
1	Burnaby	Male	30 - 39	15,843
1	Burnaby	Male	40 - 49	17,331
1	Burnaby	Male	50 - 59	14,634
1	Burnaby	Male	60 - 69	8,734
1	Burnaby	Male	70 - 79	6,295
1	Burnaby	Male	80 +	3,119
1	Burnaby	Female	0 - 9	9,966
1	Burnaby	Female	10 - 19	12,374
1	Burnaby	Female	20 - 29	16,175
1	Burnaby	Female	30 - 39	17,307
1	Burnaby	Female	40 - 49	18,700
1	Burnaby	Female	50 - 59	15,627
1	Burnaby	Female	60 - 69	9,399
1	Burnaby	Female	70 - 79	7,180
1	Burnaby	Female	80 +	5,502
2	Coquitlam	Male	0 - 9	6,700
2	Coquitlam	Male	10 - 19	9,578
2	Coquitlam	Male	20 - 29	8,241
2	Coquitlam	Male	30 - 39	7,767
2	Coquitlam	Male	40 - 49	11,034
2	Coquitlam	Male	50 - 59	9,149
2	Coquitlam	Male	60 - 69	4,661
2	Coquitlam	Male	70 - 79	2,940
2	Coquitlam	Male	80 +	1,182
2	Coquitlam	Female	0 - 9	6,202
2	Coquitlam	Female	10 - 19	8,847
2	Coquitlam	Female	20 - 29	8,042
2	Coquitlam	Female	30 - 39	8,753
2	Coquitlam	Female	40 - 49	12,041
2	Coquitlam	Female	50 - 59	9,216
2	Coquitlam	Female	60 - 69	4,910
2	Coquitlam	Female	70 - 79	3,231
2	Coquitlam	Female	80 +	2,206

Region Code	Region Name	Gender	Age Cat	Universe Pop
3	Delta	Male	0 - 9	6,019
3	Delta	Male	10 - 19	8,152
3	Delta	Male	20 - 29	5,649
3	Delta	Male	30 - 39	5,726
3	Delta	Male	40 - 49	8,746
3	Delta	Male	50 - 59	8,029
3	Delta	Male	60 - 69	5,171
3	Delta	Male	70 - 79	2,741
3	Delta	Male	80 +	1,404
3	Delta	Female	0 - 9	5,851
3	Delta	Female	10 - 19	7,685
3	Delta	Female	20 - 29	5,509
3	Delta	Female	30 - 39	6,491
3	Delta	Female	40 - 49	9,335
3	Delta	Female	50 - 59	8,339
3	Delta	Female	60 - 69	5,104
3	Delta	Female	70 - 79	3,090
3	Delta	Female	80 +	2,245
4	Langley	Male	0 - 9	7,566
4	Langley	Male	10 - 19	9,452
4	Langley	Male	20 - 29	7,398
4	Langley	Male	30 - 39	7,959
4	Langley	Male	40 - 49	10,355
4	Langley	Male	50 - 59	8,662
4	Langley	Male	60 - 69	5,189
4	Langley	Male	70 - 79	3,034
4	Langley	Male	80 +	1,752
4	Langley	Female	0 - 9	7,159
4	Langley	Female	10 - 19	9,265
4	Langley	Female	20 - 29	7,544
4	Langley	Female	30 - 39	8,701
4	Langley	Female	40 - 49	10,964
4	Langley	Female	50 - 59	9,057
4	Langley	Female	60 - 69	5,374
4	Langley	Female	70 - 79	3,696
4	Langley	Female	80 +	3,055

Region Code	Region Name	Gender	Age Cat	Universe Pop
5	New Westminster	Male	0 - 9	3,033
5	New Westminster	Male	10 - 19	3,222
5	New Westminster	Male	20 - 29	4,108
5	New Westminster	Male	30 - 39	5,176
5	New Westminster	Male	40 - 49	5,883
5	New Westminster	Male	50 - 59	4,666
5	New Westminster	Male	60 - 69	2,393
5	New Westminster	Male	70 - 79	1,624
5	New Westminster	Male	80 +	881
5	New Westminster	Female	0 - 9	2,953
5	New Westminster	Female	10 - 19	3,053
5	New Westminster	Female	20 - 29	4,406
5	New Westminster	Female	30 - 39	5,232
5	New Westminster	Female	40 - 49	5,783
5	New Westminster	Female	50 - 59	4,630
5	New Westminster	Female	60 - 69	2,648
5	New Westminster	Female	70 - 79	2,105
5	New Westminster	Female	80 +	1,936
6	North Vancouver	Male	0 - 9	7,343
6	North Vancouver	Male	10 - 19	9,504
6	North Vancouver	Male	20 - 29	7,789
6	North Vancouver	Male	30 - 39	8,576
6	North Vancouver	Male	40 - 49	11,951
6	North Vancouver	Male	50 - 59	10,147
6	North Vancouver	Male	60 - 69	5,909
6	North Vancouver	Male	70 - 79	3,747
6	North Vancouver	Male	80 +	1,835
6	North Vancouver	Female	0 - 9	7,001
6	North Vancouver	Female	10 - 19	9,026
6	North Vancouver	Female	20 - 29	7,765
6	North Vancouver	Female	30 - 39	9,847
6	North Vancouver	Female	40 - 49	13,473
6	North Vancouver	Female	50 - 59	10,560
6	North Vancouver	Female	60 - 69	6,462
6	North Vancouver	Female	70 - 79	4,679
6	North Vancouver	Female	80 +	3,401

Region Code	Region Name	Gender	Age Cat	Universe Pop
7	Port Coquitlam	Male	0 - 9	3,500
7	Port Coquitlam	Male	10 - 19	4,683
7	Port Coquitlam	Male	20 - 29	3,607
7	Port Coquitlam	Male	30 - 39	4,000
7	Port Coquitlam	Male	40 - 49	5,417
7	Port Coquitlam	Male	50 - 59	4,005
7	Port Coquitlam	Male	60 - 69	1,913
7	Port Coquitlam	Male	70 - 79	1,024
7	Port Coquitlam	Male	80 +	315
7	Port Coquitlam	Female	0 - 9	3,356
7	Port Coquitlam	Female	10 - 19	4,171
7	Port Coquitlam	Female	20 - 29	3,469
7	Port Coquitlam	Female	30 - 39	4,380
7	Port Coquitlam	Female	40 - 49	5,773
7	Port Coquitlam	Female	50 - 59	3,927
7	Port Coquitlam	Female	60 - 69	2,041
7	Port Coquitlam	Female	70 - 79	1,139
7	Port Coquitlam	Female	80 +	633
8	Port Moody	Male	0 - 9	2,159
8	Port Moody	Male	10 - 19	2,351
8	Port Moody	Male	20 - 29	1,718
8	Port Moody	Male	30 - 39	2,397
8	Port Moody	Male	40 - 49	2,994
8	Port Moody	Male	50 - 59	2,146
8	Port Moody	Male	60 - 69	1,108
8	Port Moody	Male	70 - 79	537
8	Port Moody	Male	80 +	183
8	Port Moody	Female	0 - 9	1,912
8	Port Moody	Female	10 - 19	2,193
8	Port Moody	Female	20 - 29	1,829
8	Port Moody	Female	30 - 39	2,811
8	Port Moody	Female	40 - 49	3,269
8	Port Moody	Female	50 - 59	2,206
8	Port Moody	Female	60 - 69	1,179
8	Port Moody	Female	70 - 79	540
8	Port Moody	Female	80 +	290

Region Code	Region Name	Gender	Age Cat	Universe Pop
9	Richmond	Male	0 - 9	9,203
9	Richmond	Male	10 - 19	12,515
9	Richmond	Male	20 - 29	12,870
9	Richmond	Male	30 - 39	11,362
9	Richmond	Male	40 - 49	15,233
9	Richmond	Male	50 - 59	14,564
9	Richmond	Male	60 - 69	7,523
9	Richmond	Male	70 - 79	5,038
9	Richmond	Male	80 +	2,306
9	Richmond	Female	0 - 9	8,793
9	Richmond	Female	10 - 19	11,697
9	Richmond	Female	20 - 29	12,707
9	Richmond	Female	30 - 39	13,514
9	Richmond	Female	40 - 49	17,786
9	Richmond	Female	50 - 59	15,768
9	Richmond	Female	60 - 69	8,337
9	Richmond	Female	70 - 79	5,844
9	Richmond	Female	80 +	4,020
10	Surrey	Male	0 - 9	28,818
10	Surrey	Male	10 - 19	31,946
10	Surrey	Male	20 - 29	27,720
10	Surrey	Male	30 - 39	28,827
10	Surrey	Male	40 - 49	34,422
10	Surrey	Male	50 - 59	28,110
10	Surrey	Male	60 - 69	17,064
10	Surrey	Male	70 - 79	10,189
10	Surrey	Male	80 +	4,766
10	Surrey	Female	0 - 9	26,807
10	Surrey	Female	10 - 19	29,975
10	Surrey	Female	20 - 29	28,743
10	Surrey	Female	30 - 39	31,564
10	Surrey	Female	40 - 49	35,085
10	Surrey	Female	50 - 59	29,109
10	Surrey	Female	60 - 69	17,434
10	Surrey	Female	70 - 79	11,516
10	Surrey	Female	80 +	7,846

Region Code	Region Name	Gender	Age Cat	Universe Pop
11	Vancouver CBD	Male	0 - 9	2,066
11	Vancouver CBD	Male	10 - 19	1,572
11	Vancouver CBD	Male	20 - 29	10,999
11	Vancouver CBD	Male	30 - 39	12,746
11	Vancouver CBD	Male	40 - 49	8,817
11	Vancouver CBD	Male	50 - 59	6,471
11	Vancouver CBD	Male	60 - 69	3,835
11	Vancouver CBD	Male	70 - 79	1,987
11	Vancouver CBD	Male	80 +	868
11	Vancouver CBD	Female	0 - 9	1,926
11	Vancouver CBD	Female	10 - 19	1,540
11	Vancouver CBD	Female	20 - 29	11,397
11	Vancouver CBD	Female	30 - 39	9,987
11	Vancouver CBD	Female	40 - 49	5,868
11	Vancouver CBD	Female	50 - 59	5,125
11	Vancouver CBD	Female	60 - 69	3,107
11	Vancouver CBD	Female	70 - 79	1,909
11	Vancouver CBD	Female	80 +	1,519
12	Rest of Vancouver	Male	0 - 9	22,784
12	Rest of Vancouver	Male	10 - 19	26,487
12	Rest of Vancouver	Male	20 - 29	36,363
12	Rest of Vancouver	Male	30 - 39	38,596
12	Rest of Vancouver	Male	40 - 49	39,056
12	Rest of Vancouver	Male	50 - 59	32,272
12	Rest of Vancouver	Male	60 - 69	18,142
12	Rest of Vancouver	Male	70 - 79	13,671
12	Rest of Vancouver	Male	80 +	6,763
12	Rest of Vancouver	Female	0 - 9	21,479
12	Rest of Vancouver	Female	10 - 19	24,880
12	Rest of Vancouver	Female	20 - 29	39,372
12	Rest of Vancouver	Female	30 - 39	42,251
12	Rest of Vancouver	Female	40 - 49	42,433
12	Rest of Vancouver	Female	50 - 59	34,898
12	Rest of Vancouver	Female	60 - 69	20,188
12	Rest of Vancouver	Female	70 - 79	15,716
12	Rest of Vancouver	Female	80 +	12,622

Region Code	Region Name	Gender	Age Cat	Universe Pop
13	West Vancouver	Male	0 - 9	1,939
13	West Vancouver	Male	10 - 19	3,394
13	West Vancouver	Male	20 - 29	1,956
13	West Vancouver	Male	30 - 39	1,436
13	West Vancouver	Male	40 - 49	3,108
13	West Vancouver	Male	50 - 59	3,958
13	West Vancouver	Male	60 - 69	2,988
13	West Vancouver	Male	70 - 79	2,055
13	West Vancouver	Male	80 +	1,220
13	West Vancouver	Female	0 - 9	1,776
13	West Vancouver	Female	10 - 19	3,390
13	West Vancouver	Female	20 - 29	1,913
13	West Vancouver	Female	30 - 39	1,939
13	West Vancouver	Female	40 - 49	4,069
13	West Vancouver	Female	50 - 59	4,289
13	West Vancouver	Female	60 - 69	3,150
13	West Vancouver	Female	70 - 79	2,387
13	West Vancouver	Female	80 +	2,273
14	White Rock	Male	0 - 9	604
14	White Rock	Male	10 - 19	776
14	White Rock	Male	20 - 29	900
14	White Rock	Male	30 - 39	997
14	White Rock	Male	40 - 49	1,228
14	White Rock	Male	50 - 59	1,498
14	White Rock	Male	60 - 69	1,180
14	White Rock	Male	70 - 79	837
14	White Rock	Male	80 +	760
14	White Rock	Female	0 - 9	624
14	White Rock	Female	10 - 19	735
14	White Rock	Female	20 - 29	915
14	White Rock	Female	30 - 39	1,035
14	White Rock	Female	40 - 49	1,459
14	White Rock	Female	50 - 59	1,873
14	White Rock	Female	60 - 69	1,374
14	White Rock	Female	70 - 79	1,146
14	White Rock	Female	80 +	1,508

Region Code	Region Name	Gender	Age Cat	Universe Pop
15	Maple Ridge/Pitt Meadows	Male	0 - 9	5,616
15	Maple Ridge/Pitt Meadows	Male	10 - 19	7,302
15	Maple Ridge/Pitt Meadows	Male	20 - 29	4,906
15	Maple Ridge/Pitt Meadows	Male	30 - 39	6,183
15	Maple Ridge/Pitt Meadows	Male	40 - 49	8,399
15	Maple Ridge/Pitt Meadows	Male	50 - 59	6,037
15	Maple Ridge/Pitt Meadows	Male	60 - 69	3,370
15	Maple Ridge/Pitt Meadows	Male	70 - 79	2,103
15	Maple Ridge/Pitt Meadows	Male	80 +	1,014
15	Maple Ridge/Pitt Meadows	Female	0 - 9	5,506
15	Maple Ridge/Pitt Meadows	Female	10 - 19	6,769
15	Maple Ridge/Pitt Meadows	Female	20 - 29	4,737
15	Maple Ridge/Pitt Meadows	Female	30 - 39	6,815
15	Maple Ridge/Pitt Meadows	Female	40 - 49	8,578
15	Maple Ridge/Pitt Meadows	Female	50 - 59	6,244
15	Maple Ridge/Pitt Meadows	Female	60 - 69	3,515
15	Maple Ridge/Pitt Meadows	Female	70 - 79	2,628
15	Maple Ridge/Pitt Meadows	Female	80 +	1,733
16	Abbotsford	Male	0 - 9	9,030
16	Abbotsford	Male	10 - 19	10,071
16	Abbotsford	Male	20 - 29	9,158
16	Abbotsford	Male	30 - 39	8,650
16	Abbotsford	Male	40 - 49	9,761
16	Abbotsford	Male	50 - 59	7,819
16	Abbotsford	Male	60 - 69	5,286
16	Abbotsford	Male	70 - 79	3,678
16	Abbotsford	Male	80 +	2,193
16	Abbotsford	Female	0 - 9	8,400
16	Abbotsford	Female	10 - 19	9,422
16	Abbotsford	Female	20 - 29	9,291
16	Abbotsford	Female	30 - 39	9,066
16	Abbotsford	Female	40 - 49	9,823
16	Abbotsford	Female	50 - 59	8,482
16	Abbotsford	Female	60 - 69	5,666
16	Abbotsford	Female	70 - 79	4,447
16	Abbotsford	Female	80 +	3,460

Region Code	Region Name	Gender	Age Cat	Universe Pop
17	Mission/Fraser North	Male	0 - 9	2,557
17	Mission/Fraser North	Male	10 - 19	3,202
17	Mission/Fraser North	Male	20 - 29	2,306
17	Mission/Fraser North	Male	30 - 39	2,802
17	Mission/Fraser North	Male	40 - 49	3,609
17	Mission/Fraser North	Male	50 - 59	2,992
17	Mission/Fraser North	Male	60 - 69	1,924
17	Mission/Fraser North	Male	70 - 79	1,239
17	Mission/Fraser North	Male	80 +	485
17	Mission/Fraser North	Female	0 - 9	2,402
17	Mission/Fraser North	Female	10 - 19	3,121
17	Mission/Fraser North	Female	20 - 29	2,269
17	Mission/Fraser North	Female	30 - 39	2,914
17	Mission/Fraser North	Female	40 - 49	3,734
17	Mission/Fraser North	Female	50 - 59	2,905
17	Mission/Fraser North	Female	60 - 69	1,910
17	Mission/Fraser North	Female	70 - 79	1,271
17	Mission/Fraser North	Female	80 +	763
18	Chilliwack/Fraser South	Male	0 - 9	4,797
18	Chilliwack/Fraser South	Male	10 - 19	5,645
18	Chilliwack/Fraser South	Male	20 - 29	4,258
18	Chilliwack/Fraser South	Male	30 - 39	4,487
18	Chilliwack/Fraser South	Male	40 - 49	5,780
18	Chilliwack/Fraser South	Male	50 - 59	4,805
18	Chilliwack/Fraser South	Male	60 - 69	3,539
18	Chilliwack/Fraser South	Male	70 - 79	2,772
18	Chilliwack/Fraser South	Male	80 +	1,399
18	Chilliwack/Fraser South	Female	0 - 9	4,642
18	Chilliwack/Fraser South	Female	10 - 19	5,301
18	Chilliwack/Fraser South	Female	20 - 29	4,248
18	Chilliwack/Fraser South	Female	30 - 39	4,860
18	Chilliwack/Fraser South	Female	40 - 49	5,945
18	Chilliwack/Fraser South	Female	50 - 59	5,045
18	Chilliwack/Fraser South	Female	60 - 69	3,923
18	Chilliwack/Fraser South	Female	70 - 79	3,149
18	Chilliwack/Fraser South	Female	80 +	2,166

5.10 Technical Note on Data Management

Introduction

This technical note describes the data processing activities undertaken by Halcrow as part of TransLink's 2008 Regional Trip Diary Survey. These activities include processing of the raw data, conversion from flat into relational format, verification and logic checking, cleaning, expansion, and back-checking against independent data sources. Each of these activities is discussed in Sections 2 to 8. Section 9 suggests potential follow up actions. **Please note that since the original publication of this technical note, expansion methodologies have been slightly adjusted, therefore many figures and totals may not match the preceding report (whose numbers should be taken as official).** The intent behind including this content is to offer an insight into the back-checking process that was undertaken.

Raw data

Survey recruits were uploaded to Mustel Group's secure web portal at which point the records were loaded into digital forms run in DASH, a multiuser software package for data collection and reporting. A script assigned passwords and sent invitation emails to households who had indicated they would complete the survey on the web. Passwords were generated for 'mail' respondents and sent the survey package by Mustel. Survey responses were then entered into the DASH forms either by respondents themselves, via the 'web' option, or by Mustel's telephone interviewers.

The survey itself was a standard DASH form that made extensive use of javascript for the pages incorporating the Google Maps application programming interface (API). Once the survey's field period came to a close, all records were exported duplicates removed, which had been created to enable editing cases while the web survey was active. This final data file was then received by Halcrow and converted into SPSS format for coding and logic/verification purposes prior to conversion to relational database format.

The format of the SPSS data output is structured based on individual survey response indexed by a unique id field PASSWORD. This PASSWORD field is the anonymized "secret" code that household members used when taking the survey online. The PASSWORD is referenced to the preload household ID assigned during recruitment to link the web response with household information. All responses are recorded in one record (one row) and stored in the DASH server. This single survey record contains all data on household, preload information, pre-trip diary survey responses, and trip related survey responses. Each trip leg is recorded in a set of identical fields with the field name suffixed to the trip number. There is a maximum of 15 trips that a person can enter into the survey.

Conversion

Below follows a brief summary of the data transformation process, through which the data was transformed from flat file format to a relational database into household, person, and trip tables.

Initial checks were conducted to verify at a high level that the text file had been exported accurately. Tests for the number of records and the number of fields per line were conducted. The main concern was whether any data entries had a tab which would have thrown off the

tab-delimited format. However, this problem was not apparent in the original data format. These checks confirmed the integrity of the file.

The original SPSS flat file was converted to a relational database containing three data tables: household, persons, and trips table. Each of these tables contains a relational link based on the household ID, person ID, and trip ID.

- *Household Table*

As the original data format is based on individual persons, there are repeating rows of the same household information that had to be collapsed to form a single entry in the household table. Checks were undertaken to ensure consistency between the person and household records.

A new unique numeric ID [field HH_ID] was assigned to the household table starting at 10000 to replace the alphanumeric id in the original data. As there were approximately 20,000 households, this offset would ensure a unique 5-digit id for every household.

- *Persons Table*

The persons table had checks performed to ensure that any coded fields have values within the allowable ranges. Any null or missing information are filled with 0 (zero). A new person id field is assigned to ensure each person had a unique id based on their household id. The persons id [PER_ID] is created based on (100 * HHID) + PER_IDX.

The household member id [PER_IDX] is continuous within a household ranging from 01 to the number of people in the household who responded.

- *Trips Table*

The trips information from the original data was disaggregated into individual trip records with consistent trip attribute fields derived from the original sets of 15 possible trip fields. A trip number [field TRIP_IDX] was created from 1-15 in order. A unique trip id field [TRIP_ID] is created based on the (100 * PER_ID) + TRIP_ID.

The disaggregation process of the 15 trips includes the many empty trip records from the original flat file format. These empty records were removed based on a heuristic approach by analyzing the completeness of the trip information such as origin, destination, purpose, land use, time, geographic coordinates, transportation modes, and other internal check fields.

For basic validation, unix command-line tools wc, sed, sort, uniq, grep and awk were used with the bulk of the conversion done by a series of awk scripts. Validation of the data coding and consistency were done post-conversion in the Access database.

Verification and logic checking

Logic checks are employed at two points during the processing of travel survey data. Initially logic checks are completed on the flat file. At this stage, 47 checks were performed on the data. Following the conversion to relational database format, expansion, and cleaning, the original 47 logic checks along with 36 additional logic checks, developed in consultation with TransLink, were performed on the relational formatted data. A detailed list of the logic checks along with the number of trips or persons flagged is attached in Appendix A of this technical note.

Cleaning

This section lists the fields that were cleaned by Halcrow and briefly describes the cleaning procedures.

Currently cleaned fields include:

- Trips Origin and destination purpose
  'Other' responses were examined for their content and then recoded into one of the standard categories
- Trips Origin and destination land use
  'Other' responses were examined for their content and then recoded into one of the standard categories
- Trips Mode
  'Other' responses were examined for their content and then recoded into one of the standard categories
- Trips Times
  Start and end times of trips were cleaned based on the completeness of the record
- Region name – Household table only
  Region names from the household table are cleaned to one of the 18 sample sub areas.
- Post-secondary school name (corrected into a standardized format)
  Post-secondary names are being examined for their content and then recoded into a common spelling and location for each major institution (universities and colleges) by campus. In the logic checks and verification described above (Section 4) and the back-checks described below (Section 8), education status is the key variable, as opposed to the institution attended.
- Origins and destinations outside the study area
  Origin and destination points outside the study area are being examined for their mode, origin, and destination, and corrected to one of the recognized gateways (such as airports, ferry terminals, or a number of highway/border crossing locations) corresponding with the origin, destination, and mode indicated by the respondent.
- Corrections stemming from logic checks
  Where the potential to correct errors can be reasonably established by examining the person record and/or that person's trip records, corrections may be made as appropriate.

Return Home Trips

In the raw data, a number of respondents did not make a return trip home, which can either be legitimate (e.g., leave the region or making a return trip the next day) or a reporting error stemming from reporting a round trip (home to work to home) as a single trip when it should be two (home to work, work to home) contrary to survey instructions. These records were reviewed and those where it was suspected that the respondents should have returned home were flagged for confirmation. Additional return home trips were added to the database as a

result of the confirmation process, bringing the percentage of non-return home trips inline with previous surveys.

Expansion

SM Research, the firm that provided the sample used for survey recruitment, also provided 2008 demographic estimates (based on censes data) for use in the development of expansion factors. These factors were based on how the survey data matched up with particular characteristics of the universe. This SM Research tables have been provided to TransLink for reference.

- *Household Expansion*

For the household table, basic expansion involved the development of factors based on the distribution of household size groups within each of the study's 18 sub-areas. For this study, 5 household size groups (1 person, 2 persons, 3 persons, 4 and 5 persons, and 6 or more persons) were used for each sub-area expansion, for a total of 90 expansion categories.

- *Person Expansion*

For the person table, this process was slightly more complex, involving the development of factors based on the distribution of age categories within gender, again within each of the study's 18 sub-areas. For this study, 9 age categories (0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80+) were used within the two genders within each sub-area, rendering a total of 324 expansion categories. For records with age refusal, a separate expansion factor was used based on sub-area and gender and was applied equally for records with age refusal within its expansion category. The number of age refusal records is very low at only 437 out of a total of 45,401 persons. The effect of the distributive age refusal expansion process does not have any significant effect on the distribution between the expansion categories.

- *Probability Weighted (PW) Person Expansion*

There are multiple instances where the participation of a household in the trip diary survey was incomplete, in that some household members either refused or did not respond to the travel survey while others did. A probability weighted expansion process is used to take into account the household completion rate.

The probability weight represents the total persons in the household divided by the number of individuals that completed the survey (noted as "probability weight"). This weight reflects the lower probability of returns from every member of a household and is then applied to the universe data in the person expansion process within the same sub-area, gender, and age category to ensure a statistically representative distribution. In terms of person and trip expansion, the PW person expansion is then multiplied by the probability weight to reproduce the universe total.

The probability weighted person expansion factors will be used as the standard reporting metric of this technical note and the study report.

- *Removal of Black-Out Dates*

One additional expansion adjustment was performed to the database in order to remove records that reported on the three black-out dates identified as October 13, 14, and November 11. As these records contain rich demographic information and profile characteristics, it was decided that these records be removed through the expansion factoring only but to retain the actual records in the database. The exclusion of records reporting travel on black-out dates

was conducted both at the person and trip level. All corresponding expansion factors have been recalculated to take the reduced sample population into account.

Trip Statistics

The tables below present data from the 2008 Trip Diary Survey (TD08) and where relevant and equivalent, compare trips and/or trip rates with 2004 Trip Diary Survey (TD04) by age, sub-area, and time of day. The TD04 was conducted during the spring (March/April), while the TD08 was conducted during the fall, so there will be some variation in travel characteristics due to seasonal differences.

Note that the 2008 trip rates are preliminary at this stage and subject to change with further processing and expansion.

- *Trips by age*

Table 1 presents a comparison of the person trip rates by age in 2004 and 2008. Overall, trip rates are lower in 2008. Keep in mind that 2004 trip rates were notably higher than the average person trip rates reported for the 1999 and 1994 trip diary surveys which were 2.92 and 2.96, respectively.

Table 1 – Person Trip Rate Comparison by Age

TD08			
Age Category	**Trip Rate**	**Trips**	**Persons**
00 - 04	2.34	278,892	123,530
05 - 17	2.65	1,037,368	391,701
18 - 24	2.35	600,282	255,896
25 - 64	2.88	4,133,543	1,436,836
65 +	2.34	752,758	322,354
Grand Total	**2.69**	**6,802,844**	**2,530,318**

TD04			
Age Category	**Trip Rate**	**Trips**	**Persons**
00 - 04	2.23	275,700	123,532
05 - 17	2.75	1,022,380	371,110
18 - 24	2.79	615,170	220,166
25 - 64	3.59	4,877,740	1,357,593
65 +	2.92	842,740	288,421
Grand Total	**3.23**	**7,633,730**	**2,360,823**

- *Trips by sub-area*

Table 2 presents the 2008 trip rates and number of trips by sub-area. For purposes of comparison, the 2004 person trip rate was 3.23. Note that Trip rates are relatively consistent by sub-area, suggesting consistent reporting throughout the region.

Table 2 – Person Trip Rate Comparison by Sub-Area

REGION2	RCODE	REGION	Trip Rates	%Var from Avg	Trips	Persons	Households
Metro-Vancouver	**1**	Burnaby	2.46	-8.01%	536,879	218,552	84,221
	2	Coquitlam	2.62	-1.71%	327,337	124,701	44,921
	3	Delta	2.85	6.69%	299,965	105,285	36,517
	4	Langley	2.87	7.30%	361,558	126,182	47,070
	5	New Westminster	2.63	-1.44%	167,742	63,732	29,436
	6	North Vancouver	2.88	8.02%	401,005	139,016	55,649
	7	Port Coquitlam	2.77	3.88%	159,095	57,351	20,361
	8	Port Moody	2.64	-1.28%	83,892	31,822	11,619
	9	Richmond	2.62	-1.94%	495,130	189,081	66,722
	10	Surrey	2.64	-0.97%	1,137,071	429,940	142,420
	11	Vancouver CBD	2.38	-10.99%	218,072	91,739	59,600
	12	Rest of Vancouver	2.66	-0.56%	1,423,019	535,881	214,226
	13	West Vancouver	3.03	13.57%	143,274	47,239	18,845
	14	White Rock	2.70	0.93%	52,426	19,450	9,877
	15	Maple Ridge/Pitt Meadows	2.84	6.23%	259,455	91,457	33,177
Metro-Vancouver Total			**2.67**		**6,065,920**	**2,271,429**	**874,663**
Fraser Valley	**16**	Abbotsford	2.91	2.16%	388,791	133,704	46,940
	17	Mission/Fraser North	2.69	-5.51%	121,634	45,224	16,595
	18	Chilliwack/Fraser South	2.83	-0.49%	226,499	79,961	31,158
Fraser Valley Total			**2.85**		**736,924**	**258,889**	**94,693**
Grand Total			**2.69**		**6,802,844**	**2,530,318**	**969,356**

- *Trips by time*

Table 3 presents the person trip rates by time of day for the last four trip diary surveys (1994-2008) and the total number of trips by time of day for 2004 and 2008. This highlights the main difference between these two surveys, which appears to be lower trip-making during the midday in 2008 compared with 2004, which was also considerably higher than 1999. It also highlights the general consistency in the AM peak trip rate. As independent confirmation of the 2004 and 2008 inter-municipal trip rates, the travel survey results could be compared to regional screenline counts (auto and transit). Note that this type of verification will not address local trip-making (trips not crossing screenlines).

Table 3 – Person Trip Rate Comparison by Time Period

	Trip Rates				Trips	
Time Category	**TD08**	**TD04**	**TD99**	**TD94**	**TD08**	**TD04**
00:01 - 06:30	0.06	0.09	0.06	0.07	139,214	200,970
06:31 - 09:30	0.61	0.69	0.64	0.63	1,547,446	1,621,280
09:31 - 15:30	0.93	1.27	0.98	1.02	2,342,970	2,999,190
15:31 - 18:30	0.67	0.74	0.75	0.73	1,690,478	1,744,290
18:31 - 24:00	0.43	0.45	0.49	0.51	1,082,735	1,067,370
Grand Total	**2.69**	**3.23**	**2.92**	**2.96**	**6,802,844**	**7,633,100**

- *Zero Trippers*

The number of respondents (unexpanded) who made zero trips on their survey day were compared with the rates in 2004. In 2008, 17% of respondents made zero trips, while in 2004 this figure was 14%. Due to some of the issues we had experienced with the web survey during the field component of this project, we sought to see if a relationship existed between survey method and reporting zero trips, which would suggest method bias. However, only 15% of web respondents reported making zero trips, compared with 20% of mail-out/telephone-retrieval and 21% of yesterday phone-retrieval respondents. This finding raised concerns regarding the phone-retrieval method, which are discussed later in Section 8.

Back-checking

Following preliminary expansion of the survey data, Halcrow undertook a series of back-checks against independent data sources to verify the 2008 survey results. In addition, as the regional trip diary survey will be used for an array of purposes beyond model calibration, we feel that conducting such checks has merit as trip diary statistics may end up being compared and contrasted with other data sources on regional transportation. This section discusses the methodology, data, and results of the back-checking process, including back-checks relating to demographics, methodology, and other trends. Section 9 (discussion) sets out potential courses of action stemming from the information below.

Given that the survey was expanded to the universe on the basis of household size within sub-area for the household table and age within gender within sub-area for the person table, these demographic characteristics will match the universe controls. However, there is still the possibility of discrepancy in other areas of interest, including employment characteristics such as labour force participation and school enrolment status, as well as person-related transportation characteristics including possession of TransLink passes (monthly and employer) and vehicle ownership. The tables below compare the expanded survey data with the most recent external data available in the areas just mentioned, as well as with the 2004 Trip Diary data where possible.

- *Population*

Between 2004 and 2008, the Lower Mainland has seen roughly 7% population growth. During the last study (2004) the population was 2,360,953, while in 2008, that figure had risen to 2,530,318.

- *Employment characteristics*

Back-checking of employment characteristics involved comparing the expanded survey population against the universe in terms of employment and the number of home workers. Table 4 compares the full and part time employment in the expanded TD08 sample with full and part time employment in the Statistics Canada Labour Force Survey for October and November 2008. This comparison reveals that for Metro Vancouver, the TD08 total employment estimates compare closely to Statistics Canada. Full time and part time controls deviate slightly.

Table 4 – Comparison of Employment Estimates

	Metro Vancouver (CMA)		
Source	**Full-time**	**Part-time**	**Grand Total**
TD08	957,943	277,118	1,235,061
Statistics Canada	1,005,200	234,100	1,240,500

In terms of home workers, Statistics Canada's 2006 Community Profile for Metro Vancouver (CMA) reveals that approximately 8.5% of employees worked from home. This compares with 9.4% of employees in the expanded TD08 population. In general, the employment statistics generated by the survey appear to be reasonable in our opinion.

- *Education*

Back-checking of education characteristics involved comparing the expanded TD08 population against the universe in terms of grade school (K-12) and post-secondary enrolment. The external statistics used for these comparisons were sourced from the BC Ministry of Education (K-12 enrolment by School District) and from Metro Vancouver (post-secondary enrolment).

Both of these external sources date from 2007-2008, but are suitable for back-checking purposes. Another caveat to keep in mind for comparing all school enrolment is that TD08 captures all post-secondary enrolment, no matter the institution; therefore, one should expect slight over-representation compared with the BC Ministry of Education and the Metro Vancouver KeyFacts figures, which only cover public schools, major universities, and colleges, but none of the smaller private institutions.

Table 5 reveals that grade school enrolment in the expanded TD08 population is higher than in the universe (including the Fraser Valley); while post-secondary enrolment is lower than in the universe (Metro Vancouver only). Note that the post-secondary sample will be reviewed further when the over-sample survey (UBC and SFU) is analyzed.

Table 5 – Comparison of Education Enrolment Estimates

	TD08		External Sources	
Region	**K-12**	**Post Secondary**	**K-12**	**Post Secondary**
Metro Vancouver	346,910	219,514	290,429	260,573
Fraser Valley	48,289	15,304	39,535	-
Total	**395,199**	**234,818**	**329,964**	**-**

Table 6 breaks down grade school enrolment by school district within the study area, revealing that the expanded TD08 population has a higher number of students than the universe in every School District; on average the expanded TD08 population has approximately 20% more grade school students than the BC Ministry of Education School District data. As the provincial data does not include private schools or pre-school programs and dates from the 2007-2008 school year, the survey results appear to be reasonable.

Table 6 – Comparison of Grade School Enrolment by School District

Region	SA	SD		K12 Students	BCED
Metro-Vancouver	**1**	**41**	Burnaby	29,842	25,734
	2, 7, 8	**43**	Coquitlam	36,961	31,960
	3	**37**	Delta	17,924	16,678
	4	**35**	Langley	23,536	19,871
	5	**40**	New Westminster	9,164	7,394
	6	**44**	North Vancouver	21,152	17,249
	9	**38**	Richmond	28,146	23,172
	11, 12	**39**	Vancouver	74,524	59,048
	13	**45**	West Vancouver	7,265	6,853
	10, 14	**36**	Surrey	79,726	67,112
	15	**42**	Maple Ridge/Pitt Meadows	18,671	15,358
Metro-Vancouver Total				**346,910**	**290,429**
Fraser Valley	**16**	**34**	Abbotsford	26,037	19,432
	17	**75**	Mission	8,518	6,774
	18	**33**	Chilliwack	13,735	13,329
Fraser Valley Total				**48,289**	**39,535**
				395,200	**329,964**

o *Transportation characteristics*

Back-checking of transportation characteristics involved comparing the expanded TD08 population against the universe in terms of the number of TransLink passholders, averaged across October and November 2008. Using product sales information provided by TransLink, we compared these two figures by several categories, including Monthly FareCards, U-Passes, and Employer Passes. U-Passes were estimated by summing the total enrolment (full and part time) for the three participating institutions: UBC, SFU, and Langara.

Table 7 reveals that the expanded TD08 population has a significantly higher number of TransLink passholders compared with the universe. The expanded TD08 population has 33% more monthly FareCards than the universe and nearly double the Employer Passes.

Table 7 – Comparison of TransLink Passholder Estimates

Payment Type	TD08	TransLink
Monthly FareCard	209,827	156,749
U-Pass	81,681	80,398
Employer Pass	34,323	17,236
	325,832	**254,383**

One possible impact of the above observation relates to the total number of transit trips reported in the survey, which can be examined through comparison with the universe. Comparing the total number of transit trips reported by the expanded TD08 population with TransLink's observed ridership reveals that the survey data contains a substantially higher number of transit trips. Where TransLink recorded 590,000 linked trips on an average weekday in October/November of 2008, the TD08 data show 895,000 transit trips. For comparison, in 2004, the survey figure was 643,000 (versus 512,000 average in Mar/Apr). This indicates that there was reporting bias by transit users in both years and that the survey should be expanded to the transit passholder controls and potentially to individual submode levels (e.g., Bus, SkyTrain, SeaBus, West Coast Express).

- *Vehicle Ownership*

On the automobile side, we also compared the vehicle ownership reported by the expanded TD08 population with the data published by Metro Vancouver and ICBC recording registered vehicles on 2009-01-01, the closest reporting date to the survey period. For Metro Vancouver, Table 8 shows that the expanded TD08 population has reported owning a number of registered vehicles that is approximately 8.2% lower than that reported by Metro Vancouver/ICBC. Note that the Metro Vancouver/ICBC figures include commercial vehicles, which may explain some of the difference. Additionally, the higher proportion of transit users in the sample will affect the vehicle ownership statistics (as transit users have lower car ownership levels).

Table 8 – Comparison of Vehicle Ownership Estimates

REGION2	RCODE	REGION	Insured Vehicles TD08	Insured Vehicles ICBC
Metro-Vancouver	**1**	Burnaby	120,847	133,069
	2	Coquitlam	80,288	83,378
	3	Delta	68,184	76,418
	4	Langley	92,280	111,153
	5	New Westminster	35,251	35,563
	6	North Vancouver	89,760	85,362
	7	Port Coquitlam	37,347	38,092
	8	Port Moody	20,573	23,933
	9	Richmond	110,188	131,243
	10	Surrey	260,304	282,412
	11, 12	Vancouver CBD	301,900	327,968
	13	West Vancouver	33,721	33,595
	14	White Rock	13,181	13,807
	15	Maple Ridge/Pitt Meadows	61,594	67,723
Metro-Vancouver Total			**1,325,420**	**1,443,716**
Fraser Valley	**16**	Abbotsford	89,063	-
	17	Mission/Fraser North	31,949	-
	18	Chilliwack/Fraser South	58,406	-
Fraser Valley Total			**179,418**	**-**
Grand Total			**1,504,838**	**-**

o *Survey Methodology*

Initially, TransLink's 2008 Trip Diary Survey offered respondents a choice of two reporting options: they could receive an email with secure links for each individual member of the household to an online survey interface, or they could elect to receive a paper package by mail, which they would then fill out and report via telephone to a Mustel representative. A third option, introduced to boost recruitment and return rates, allowed respondents to report immediately the trips taken by their household on the previous day as a continuation of the recruitment interview.

Upon preliminary analysis, respondents who were recruited using the same day phone method, common to many travel surveys (including Toronto's Transportation Tomorrow Survey), were found to have noticeably lower trip rates than their web or mail counterparts. Table 9 shows the trip rate by survey method. This is an important finding and not unexpected given that the households did not have pre-notification of the survey and would not have the same level of recall as the other respondents using web or mail methods (web and mail respondents had a chance to review the survey form and were aware of their survey day so they could make a conscious effort to record all of their trip-making activity). As such, we would recommend the phone-only households be adjusted for under-reporting or removed from the expanded trip statistics.

Table 9 – Comparison of Trip Rates by Survey Method and Household Size

Survey Method	Household Size	Trip Rate	Trips	Persons	Households
Web	HH1PR	2.84	232,068	81,814	113,055
	HH2PR	2.68	967,509	360,726	160,613
	HH3PR	2.64	804,906	305,402	93,074
	HH4_5PR	2.89	1,947,166	673,291	140,200
	HH6UP	2.69	323,755	120,305	22,998
Web Total		**2.77**	**4,275,404**	**1,541,538**	**529,940**
Mail	HH1PR	2.57	197,839	76,859	111,789
	HH2PR	2.57	452,918	176,380	86,216
	HH3PR	2.66	259,164	97,558	33,168
	HH4_5PR	2.87	519,105	181,122	39,643
	HH6UP	2.48	126,404	50,887	10,406
Mail Total		**2.67**	**1,555,431**	**582,807**	**281,222**
Phone	HH1PR	2.38	93,151	39,215	50,658
	HH2PR	2.32	235,977	101,759	44,870
	HH3PR	2.27	190,602	83,908	24,745
	HH4_5PR	2.52	359,149	142,746	30,497
	HH6UP	2.43	93,130	38,345	7,425
Phone Total		**2.39**	**972,009**	**405,972**	**158,194**
		2.69	**6,802,844**	**2,530,318**	**969,356**

Outside trends

In addition to the person-related back-checks reported above, we also looked at broader outside trends that may have influenced travel behaviour through the survey period. In addition to unemployment, two other trends in particular caught our attention: fuel sales and retail and restaurant spending. The former is of course an important indication of vehicle use, while the latter are closely tied in with the tendency to make discretionary trips.

- *Unemployment*

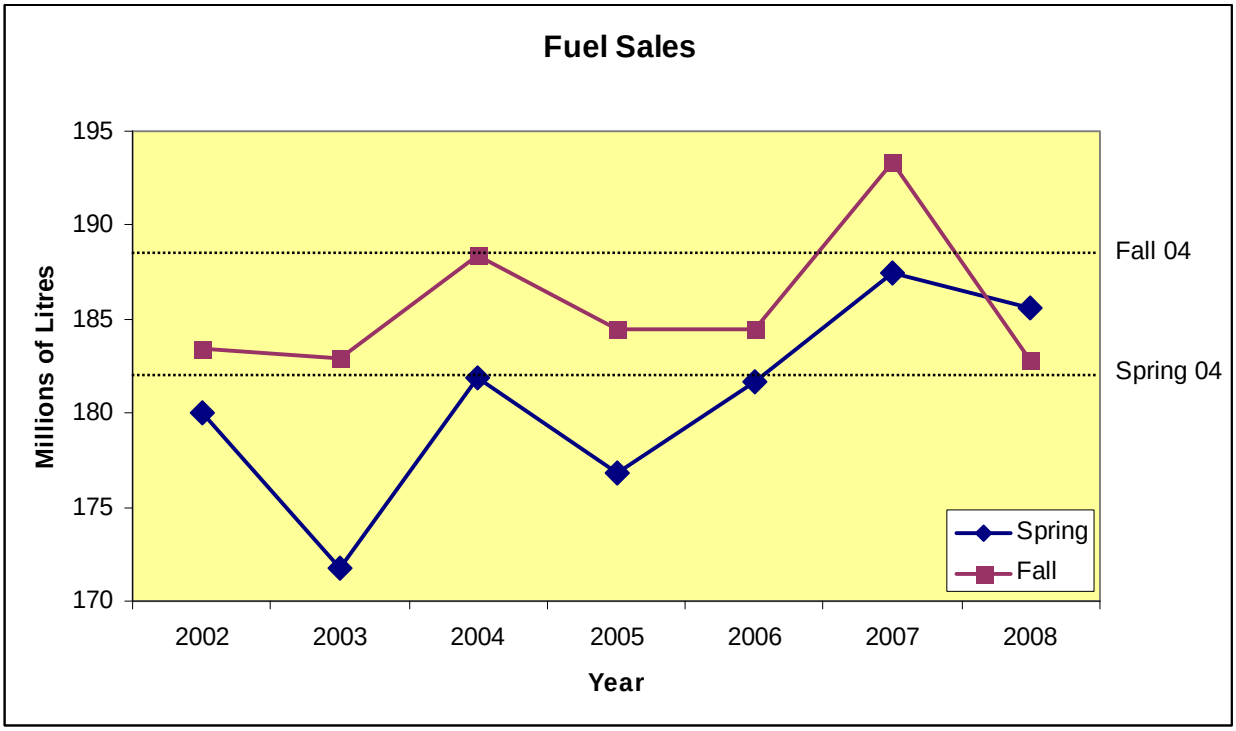
In the 2004 study months (March/April), the unemployment rate was 7.2%, while in October/November 2008, this had fallen considerably to 4.4% - the mood and discourse of economic crisis notwithstanding.

- *Fuel Sales*

Figure 1 tracks gasoline sales in Vancouver from 2002 to 2008. Comparing the 2004 and 2008 survey periods (October/November and March/April, respectively) yields a slight increase in total fuel sales, while comparing October/November 2008 with the same period in 2004 reveals a 3 percent drop, suggesting that despite a 7% increase in population, fuel sales have in fact decreased by 3%. Assuming similar fleet fuel efficiency, this would suggest automobile

travel in the Lower Mainland has decreased relative to 2004. We would recommend that this finding be confirmed against regional screenline data.

Figure 1 – Spring and Fall Fuel Sales by Year



o *Retail and Restaurant Spending*

Figures 2 and 3 chart retail and restaurant spending respectively for 2004 and 2008 by month. These numbers have been adjusted for inflation and population growth. It appears that retail spending in Metro Vancouver (CMA), adjusted to 2002 dollars, decreased from $1,883,959,000 in March/April 2004 to $1,772,999,500 in October/November 2008. A straight comparison between October/November in 2004 versus 2008 reveals a 0.9% decline. Restaurant spending in BC (adjusted to 2002 dollars) increased only marginally from $563,929,500 in March/April 2004 to $569,193,000 in October/November 2008. A straight comparison between October/November in 2004 versus 2008 reveals a 4.8% decline. Both of these findings suggest a decline in total discretionary trip-making.

Figure 2 – Monthly Vancouver Retail Spending 2004 & 2008

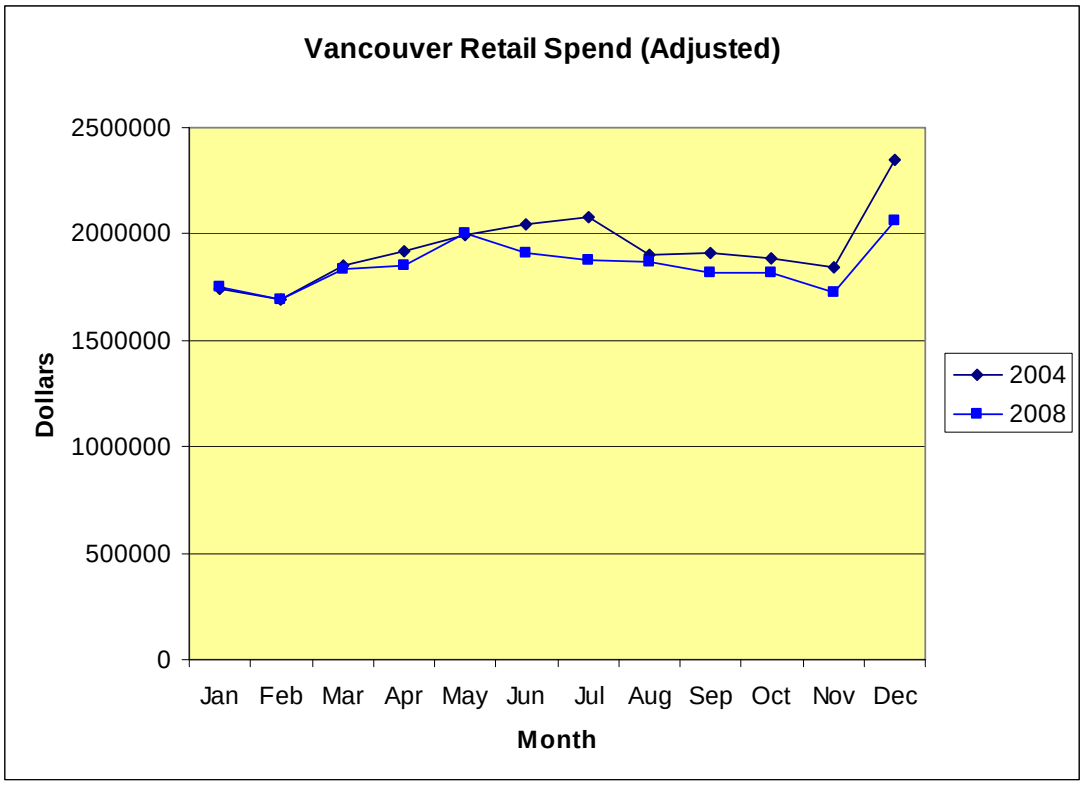
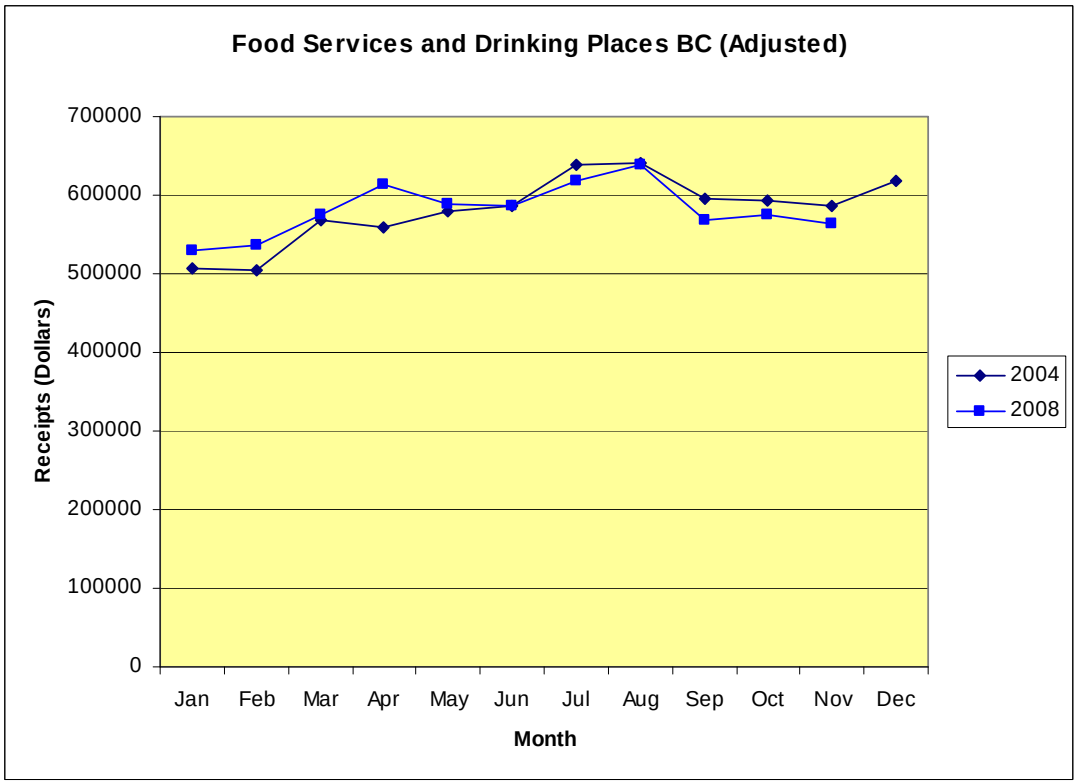


Figure 3 – Monthly Vancouver Restaurant Spending 2004 & 2008



- *Internet Use*

Another trend examined in the course of the back-checking exercise were changes in internet use. This is of interest in two ways: first, as a replacement for trips, particularly discretionary social trips, and second, as a replacement for shopping trips. Interestingly, Statistics Canada reports that more Canadians used the Internet to purchase goods and services in 2007, placing almost $12.8 billion worth of orders, up 61% from 2005. B.C. was one of three provinces that had a higher Internet-user percentage than the national average, and whose residents, therefore, are more likely to indulge in on-line shopping than other Canadians. One potential implication of this trend is a decrease in discretionary trips related to shopping.

Discussion and possible courses of action

This section summarises and discusses the content of the sections above and proposes possible courses of action for dealing with the findings brought to light by the back-checking process, particularly.

- *Comparability and backwards compatibility*

An important proviso to keep in mind when discussing the development of supplemental expansion factors, whether for the household, person, or trip tables, is that the same measures would need to be applied to the TD04 in order to undertake a meaningful comparison of the two data sets.

- *Additional expansion measures*

Based on the external indicators discussed in Section 8 (Back-checking), consideration should be given to the following expansion techniques to ensure consistency with independent data sources:

(i) Total number of TransLink passholders - this would involve altering the weight of TransLink passholders so that their totals within the expanded population matches the registered passholders reported by TransLink.

(ii) Total number of post-secondary (particularly UBC and SFU) students - this would involve altering the weight of post-secondary students so that their total within the expanded population matches the school enrolment figures.

(iii) Total number of transit trips, by mode - this would involve down-weighting transit trips to ensure that they equate with independent counts by sub-mode as provided by TransLink.

(iv) Total number of trips, by screenline - this would involve altering the weight of certain trips known to cross a regional screenline to ensure that they equate with independent counts provided by the Ministry and TransLink. Note that this will not adjust for any under-reporting at the local level.

(v) Trips by survey method - this would involve either removing or up-weighting the trips made by respondents who participated in the survey via the 'yesterday/telephone-retrieval' method. If the trips are up-weighted, it would be according to trip purpose, age, gender and sub-area. Factors would be developed by comparing the telephone rates against the combined web and mail rates.

For this additional expansion of the person table to be successful, the passholders, for instance, would need to be taken out of the main universe and factored separately, side-by-

side with the non-passholders in the rest of the (concurrently reduced) universe, and eventually all combined. The age and gender distribution of passholders as reported in the survey, as well as their distribution across the survey's sub-areas, would have to be taken as correct given that the external passholder data is merely a regional total. A similar methodology could be used for the other proposed factoring measures.

Logic Checks

2008 Metro Vancouver Survey Logic Checks			
Field Name	**Description**	**Value**	**Freq**
Persons Related Checks			
CHKP_U16DRV	Age under 16 with DL	0: False 1: True Logic: age<16, drv_lic=0	330
CHKP_U16EMPL	Age under 16 with FT employment status or self-employed	0: False 1: True Logic: age<16, cur_empl=1, emp_status=1 or 3	191
CHKP_14EMPL	Age under 14 and are employed	0: False 1: True Logic: age<14, cur_empl=1	251
CHKP_14FT	Age under 14 with FT employment	0: False 1: True Logic: CHKP_14EMPL=1, emp_status=1	161
CHKP_U16NE	Age under 16 with non-employment and is Retired or Homemaker status	0: False 1: True Logic: age<16, sum of ne ret, hm >0	125
CHKP_U17PS	Age under 17 attending post-secondary	0: False 1: True Logic: age<17, sch_att=1, sch_typ=2	89
CHKP_O19K2	Age over 19 attending grade school (K-12)	0: False 1: True Logic: age>19, sch_att=1, sch_typ=1	40
CHKP_FTSW	FT school along with FT work	0: False 1: True Logic: sch_att=1, sch_ten=2, cur_empl=1, emp_status=1	115
CHKP_HMOUT	Home is outside 18 sub area	0: False 1: True Logic: home sa=0	126
CHKP_WK1OUT	Work is outside 18 sub area	0: False 1: True Logic: work1 lat<>0, wokr1 sa=0	253
CHKP_WK2OUT	Work2 is outside 18 sub area	0: False 1: True Logic: work2 lat<>0, work2 sa=0	16
CHKP_NESTU	Not registered as student but picked "Student" under Non-employment Status	0: False 1: True Logic: sch_att=0, ne stud not null	-

Field Name	Description	Value	Freq
Persons Related Checks			
CHKP_NE12	Non-employment status: student and preschooler	0: False 1: True Logic: ne_stud and ne_pre not null	8
CHKP_NE14	Non-employment status: student and retired but under 16	0: False 1: True Logic: ne_stud and ne_ret not null, age<16	1
CHKP_NE13	Non-employment status: student and homemaker but under 16	0: False 1: True Logic: ne_stud and ne_hm not null, age<16	-
CHKP_NE23	Non-employment status: preschooler and homemaker	0: False 1: True Logic: ne_pre and ne_hm not null	1
CHKP_NE24	Non-employment status: preschooler and retired	0: False 1: True Logic: ne_pre and ne_ret not null	2
CHKP_NE99	Non-employment status: picked other but is a student, or under 12 or picked student (nonemp) or preschooler (nonemp)	0: False 1: True Logic: ne_oth not null, either: sch_att=1, or age<12, or ne_stud not null, or ne_pre not null	321
CHKP_PKSUB	Paid parking amount when parking are subsidized	0: False 1: True Logic: park_sub=1, park_amt<>0	5
CHKP_PKDAYP	Pay more than $30 per day	0: False 1: True Logic: park_dur=Day, park_amt>30	4
CHKP_PKMNP	Pay more than $400 per month	0: False 1: True Logic: park_dur=Month, park_amt>30	6
CHKP_EMPVEH	Employment uses car but not employed or don't have a DL	0: False 1: True Logic: emp_veh >0 <3, cur_empl=0, or drv_lic=0	9
CHKP_UCODRV	Under age 22 commercial driver (Provincial min age)	0: False 1: True Logic: comm_drv=1, age<22	16
CHKP_TP3	Transit Payment: Use of monthly pass and UPASS, Annual, or Employer Pass	0: False 1: True Logic: tran_use=1, trans_month>0, upass>0, or annual>0 or epass>0	17
CHKP_TP4	Transit Payment: Use of UPASS and Annual, or empl pass	0: False 1: True Logic: tran_use=1, trans_upass>0, annual>0 or epass>0	-
CHKP_TP5	Transit Payment: Use of Annual and empl pass	0: False 1: True Logic: tran_use=1, trans_annual>0, epass>0	27
CHKP_TPUP	Transit Payment: Use of non-student using UPASS	0: False 1: True Logic: tran_use=1, trans_upass>0, sch_att=0	1

5.11 Sample Size Estimation and Statistical Reliability

A. Summary

Travel surveys typically have several objectives ranging from inputs to a regional model calibration exercise to providing travel statistics for planning purposes or policy research. This analysis, developed for the survey design phase of the project, demonstrates that a 2,000 household sample size should be sufficient for model calibration purposes. However, the provision of detailed travel statistics (e.g., mode shares, trip rates) at municipal or larger neighbourhood areas could require more than 50,000 households. Please note that the figures may not be what was achieved in terms of actual returns for the survey.

The majority of travel surveys conducted throughout North America today are typically in the 2,000-10,000 household size range. Cities such as Toronto and Montreal continue to undertake large-scale surveys (5% of households), but these are the exception rather than the rule as these surveys take longer to administer/process and are very costly. It is also important to note that the survey methodology used in Toronto and Montreal is telephone-only, focusing on one household member reporting trip-making for the family. While this results in significant time-savings on the data collection end, these surveys are best at capturing travel during the AM peak. On a daily basis, the telephone-only surveys produce significantly lower trip rates than trip diary-based surveys.

B. Sample Size Requirements for Model Calibration

The estimation of an acceptable sample size is one of the first steps required prior to undertaking a travel survey. The size of the sample will depend largely on the primary purpose of the survey and the sample universe. If the primary purpose is to use the information to calibrate a Regional Transportation Model, sample sizes can be determined if the following information is available:

- The variable to be measured (e.g. trip rates, trip lengths, mode shares, etc.)
- The coefficient of variation of the variable (the variable's standard deviation divided by its mean – available from previous surveys)
- Desired accuracy level and confidence limits (e.g. ± 10 percent with a 90 percent confidence interval – which means the actual value will be with 10 percent of the survey value 9 out of 10 times)

The sample size can be computed using the following formula:

$$n = \left(\frac{Z_{\alpha/2} CV}{e} \right)^2$$

where:

n	=	number of samples
$Z_{\alpha/2}$	=	normal variate
α	=	1.0 – confidence coefficient
CV	=	coefficient of variation (standard deviation divided by the mean)
e	=	accuracy level expressed as a proportion

This sampling equation can be used to determine the required sample for each stage of the traditional modelling process (e.g. trip generation, trip distribution, mode split).

Trip Generation

Field Name	Description	Value	Freq
Trips Related Checks			
CHKT_BP1	Building/Purpose check: House / Post-sec, school, shopping	0: False 1: True Logic: d_lnuse=1, dpurp=2, 3, 7	158
CHKT_BP2	Building/Purpose check: Office / Dining, rec, home	0: False 1: True Logic: d_lnuse=2, dpurp=5, 6, 8	208
CHKT_BP3	Building/Purpose check: Industrial / Dining, shopping, rec, home	0: False 1: True Logic: d_lnuse=3, dpurp=5, 6, 7, 8	589
CHKT_BP4	Building/Purpose check: School-DayC / Dining, shopping, home	0: False 1: True Logic: d_lnuse=4, dpurp=6, 7, 8	41
CHKT_BP5	Building/Purpose check: Hospital / rec, dining, shop, home	0: False 1: True Logic: d_lnuse=5, dpurp=5, 6, 7, 8	131
CHKT_BP6	Building/Purpose check: Store-Mall / post-sec, school, home	0: False 1: True Logic: d_lnuse=6, dpurp=2, 3, 8	78
CHKT_BP7	Building/Purpose check: Other / home	0: False 1: True Logic: d_lnuse=7, dpurp=8	42
CHKT_BP8	Building/Purpose check: Airport / post-sec, school, home	0: False 1: True Logic: d_lnuse=8, dpurp=2, 3, 8	3
CHKT_BP9	Building/Purpose check: Outdoor Rec / post-sec, shop, home	0: False 1: True Logic: d_lnuse=9, dpurp=2, 7, 8	7
CHKT_BP10	Building/Purpose check: Indoor Rec / post-sec, shop, home	0: False 1: True Logic: d_lnuse=10, dpurp=2, 7, 8	10
CHKT_WKTRIPS	Not employed but have work trips	0: False 1: True Logic: cur_empl=0, dpurp=1	319
CHKT_SCHTRIPS	Not a student but have school trips	0: False 1: True Logic: sch_att=0, dpurp=2 or 3	523
CHKT_TRANSIT	Used transit mode in trip diary, but responded did not use transit in pre-trip diary	0: False 1: True Logic: tran_use=0, first board mode 3 to 7	224
CHKT_WALK	Walk mode choose as 1st mode but also picked additional modes	0: False 1: True Logic: syn_trips=0, mode1=11, sum mode2 to 6 >1	249
CHKT_STOUTREG	Trips started outside of the 18 sub-areas	0: False 1: True Logic: st lat<>0, st_sa=0	811
CHKT_ENDOUTREG	Trips ended outside of the 18 sub-areas	0: False 1: True Logic: end lat<>0, end_sa=0	868
CHKT_ENDPURP	Last trip didn't end in "Going Home" and trip did not past mid-night	0: False 1: True Logic: dwell pst12=0, trip end pst12=0, moretrips=0, dpurp <>8	131
CHKT_ENDBLDG	Last trip didn't end in "House/Apt" and trip did not past mid-night	0: False 1: True Logic: dwell pst12=0, trip end pst12=0, moretrips=0, d_lnduse <>1	142
CHKT_ENDSUM	Combination of chk_tripend_purp and chk_tripend_bldg. If 1 then either purp or bldg is flagged, if 2 then both purp and bldg is flagged.	0: False 1: Either one tripend check is flagged 2: Both tripend check is flagged	273
CHKT_TTOT*	Total number of trip related logic checks for the trip record	Sum of all CHKT flags including TransLink's requests.	Not Applicable

Field Name	Description	Value	Freq
TransLink Requested Logic Checks			
CHKPER_PERHOME	Distance b/w hhld table homeloc & prsn table homeloc > 100m	Cannot be done b/c hhld tbl does not have geocoded home address	-
CHKT_NODLDRV	Person without driver's license chose auto driver as mode	0: False 1: True Logic: dl=0, primode=1	66
CHKT_UAGEDRV	Person under 17 chose auto driver as mode	0: False 1: True Logic: age<17, primode=1	534
CHKT_DROPOFF	Only one person in vehicle and purpose is drop-off	0: False 1: True Logic: dpurp=9, primode=1, autoper<=1	2,372
CHKT_SCHMUNI	Home municipality is different from school muni and age < 13	0: False 1: True Logic: age<13, dpurp=3, home sa <> end sa Remk: based on school trips only	431
CHKT_SBOD	Trip involving SeaBus does not cross Burrard Inlet	0: False 1: True Logic: primode=6, od tzsa <> 404, 302 vice versa Remk: not reliable due to transfers & origin/dest differ from boarding loc	182
trip_geo_SkyTrain	Trip involving SkyTrain as mode1 does not start in the SkyTrain service area	Not Conducted Remk: not reliable due to transfers & origin/dest differ from boarding loc & xtrm complex due to od stops permutations	-
trip_geo_WCE	Trip involving WCE as mode1 does not start in the WCE service area	Not Conducted Remk: not reliable due to transfers & origin/dest differ from boarding loc & extrm complex due to od stops permutations	-
CHKT_PEDTM	Walking trip travel time exceeds 1h	0: False 1: True Logic: primode=11, tripdur>1	193
CHKT_PEDDIST	Walking trip distance is less than 100m or exceeds 15km	0: False 1: True Logic: primode=11, tz tripdist>15km count: 415	706
		0: False 1: True Logic: primode=11, utmxy dist<.1km Remk: Based on triangulation of utmxy coordinates count: 328	
CHKT_PEDSPD	Walking trip speed exceeds 10km/h	0: False 1: True Logic: primode=11, tripspeed>10km/hr Rmk: trip speed based on triangulated utmxy dist, undefined speeds are excluded and coded as 0	1,566
CHKT_BKTM	Cycling trip travel time exceeds 2h	0: False 1: True Logic: primode=10, tripdur>2	11

Field Name	Description	Value	Freq
TransLink Requested Logic Checks			
CHKT_BKDIST	Cycling trip distance is less than 100m or exceeds 30km	0: False 1: True Logic: primode=10, tz tripdist>30km count: 6	12
		0: False 1: True Logic: primode=10, utmxy dist<.1km Remk: Based on triangulation of utmxy coordinates count: 6	
CHKT_BKSPD	Cycling trip speed exceeds 15km/h	0: False 1: True Logic: primode=10, tripspeed>15km/hr Rmk: undefined speeds are excluded and coded as 0	675
CHKT_BUSTM	Transit Bus trip travel time exceeds 2h	0: False 1: True Logic: primode=3, tripdur>2	146
CHKT_BUSDIST	Transit Bus trip distance is less than 100m	0: False 1: True Logic: primode=3, utmxy dist<.1km Remk: Based on triangulation of utmxy coordinates	32
CHKT_BUSSPD	Transit Bus trip speed exceeds 40km/h	0: False 1: True Logic: primode=3, tripspeed>40km/hr Rmk: undefined speeds are excluded and coded as 0	320
CHKT_SBTM	SeaBus trip travel time is less than 10min or exceeds 2h	0: False 1: True Logic: primode=6, tripdur>2	9
		0: False 1: True Logic: primode=6, tripdur<0.166666	
CHKT_SBDIST	SeaBus trip distance is less than 3km	0: False 1: True Logic: primode=6, utmxy dist<3km Remk: Based on triangulation of utmxy coordinates	13
CHKT_SBSPD	SeaBus trip speed exceeds 20km/h	0: False 1: True Logic: primode=6, tripspeed>20km/hr Rmk: undefined speeds are excluded and coded as 0	67
CHKT_SBOPHRS	SeaBus trip starts between 1h30 and 5h30	0: False 1: True Logic: st_time gp not null, st_time between 1.5 and 5.5, primode=6	-
CHKT_STTM	SkyTrain trip travel time exceeds 2h	0: False 1: True Logic: primode=4, tripdur>2	135
CHKT_STDIST	SkyTrain trip distance is less than 300m	0: False 1: True Logic: primode=4, utmxy dist<.3km Remk: Based on triangulation of utmxy coordinates	31
CHKT_STSPD	SkyTrain trip speed exceeds 60km/h	0: False 1: True Logic: primode=4, tripspeed>60km/hr Rmk: undefined speeds are excluded and coded as 0	3

Field Name	Description	Value	Freq
TransLink Requested Logic Checks			
CHKT_STOPHRS	SkyTrain trip starts between 2h and 4h30	0: False 1: True Logic: st_time gp not null, st_time between 2 and 4.5, primode=4	4
CHKT_WCETM	WCE trip travel time is less than 10min or exceeds 2h30	0: False 1: True Logic: primode=5, tripdur>2.5	11
		0: False 1: True Logic: primode=5, tripdur<0.166666	
CHKT_WCEDIST	WCE trip distance is less than 2km	0: False 1: True Logic: primode=5, utmxy dist<2km Remk: Based on triangulation of utmxy coordinates	6
CHKT_WCESPD	WCE trip speed exceeds 50km/h	0: False 1: True Logic: primode=5, tripspeed>50km/hr Rmk: undefined speeds are excluded and coded as 0	34
CHKT_WCEOPHRS	WCE trip starts between 19h30 and 5h	0: False 1: True Logic: primode=5, st_time gp not null, st_time less than 5 and greater than 19.5	3
CHKT_CARTM	Car trip travel time exceeds 2h30	0: False 1: True Logic: primode=1, tripdur>2.5	439
CHKT_CARDIST	Car trip distance is less than 100m	0: False 1: True Logic: primode=1, utmxy dist<.1km Remk: Based on triangulation of utmxy coordinates	320
CHKT_CARSPD	Car trip speed exceeds 90km/h	0: False 1: True Logic: primode=1, tripspeed>90km/hr Rmk: undefined speeds are excluded and coded as 0	2,421
CHKT_K12_1	K12 student aged under 13 has trip to primary school longer than 30min	0: False 1: True Logic: sch_att=1, age<13, dpurp=3, tripdur>0.5hrs	139
CHKT_K12_2	K12 student aged under 13 has trip to primary school less than 100m or in excess of 5km	0: False 1: True Logic: sch_att=1, age<13, dpurp=3, utmxy dist <.1km OR >5 Remk: Based on triangulation of utmxy coordinates	92

Field Name	Description	Value	Freq
TransLink Requested Logic Checks			
CHKT_K12_3	K12 student aged under 13 ends trip to primary school between 10h to 24h or 0h to 6h	0: False 1: True Logic: sch_att=1, age<13, dpurp=3, end_tmgp not null, end_time > 6 to <10 then do not flag	329
CHKT_K12_4	K12 student aged under 13 starts trip from primary school between 19h to 24h or 0h to 10h	0: False 1: True Logic: sch_att=1, age<13, opurp=3, st_tmgp not null, st_time >10 to < 19 then do not flag	45
CHKT_K12_5	K12 student aged 13-16 has trip to secondary school less than 100m	0: False 1: True Logic: sch_att=1, age>=13 and <=16, dpurp=3, utmxy dist<.1km Remk: Based on triangulation of utmxy coordinates	13
CHKT_K12_6	K12 student aged 13-16 ends trip to secondary school between 13h to 24h or 0h to 6h	0: False 1: True Logic: sch_att=1, age>=13 and <=16, dpurp=3, end_tmgp not null, end_time > 6 to <13 then do not flag	111
CHKT_K12_7	K12 student aged 13-16 starts trip from secondary school between 19h to 24h or 0h to 10h	0: False 1: True Logic: sch_att=1, age>=13 and <=16, opurp=3, st_tmgp not null, st_time >10 to < 19 then do not flag	60

Special Note: The process of compiling trip logic flags included synthetic return home trips. However, the frequency reported herein does not include synthetic trips because such logic would have been propagated from the last trip records. The inclusion of synthetic trips in the flagging process is only for completeness. It is advised that synthetic trips be filtered out when conducting data integrity tests.

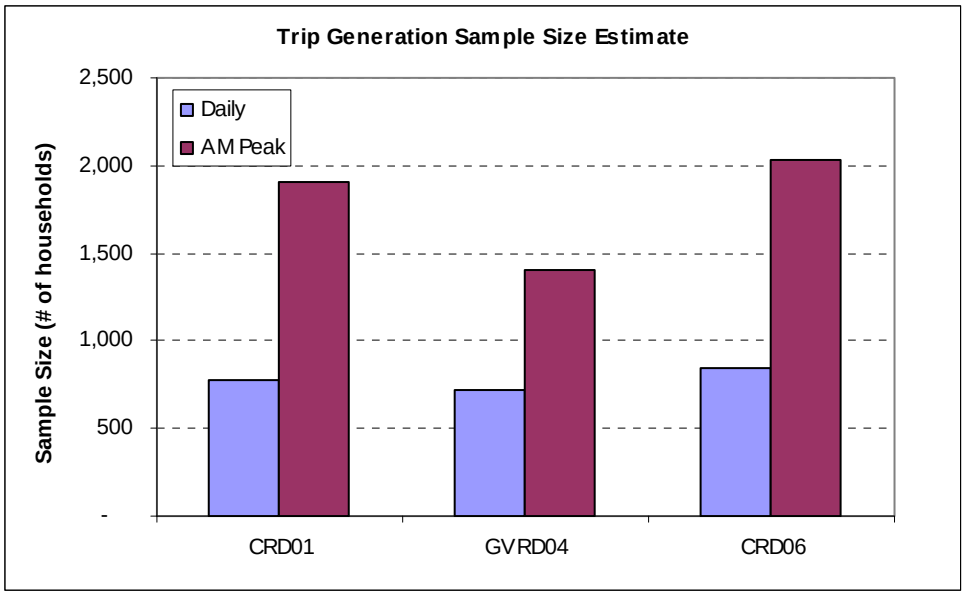
Unless otherwise noted, all speed calculations are using distance calculation based on origin and destination TZ.

(*) - Denotes all trip related logic flags per trip record. The maximum logic flags per trip record is 7.

Trip generation includes trip productions and attractions from households, employment locations or other land uses. Since the household is the sampling unit, an appropriate variable to measure is trips per household. Depending on the jurisdiction and time of day, the sample size requirement can vary. Based on information from three recent household travel surveys, **Table D1** shows the daily and AM peak sample sizes required to meet a 95 percent confidence interval accurate to within ± 5 percent (results in a normal variate $Z_{\alpha/2} = 1.96$).

Table D1 – Household Sample Size Estimate for Trip Generation

	n	CV	hhld rate	std dev
A. Daily				
CRD01	777	0.71	8.03	5.71
GVRD04	721	0.69	9.04	6.19
CRD06	845	0.74	7.97	5.91
B. AM Peak				
CRD01	1,905	1.11	1.50	1.67
GVRD04	1,407	0.96	1.92	1.84
CRD06	2,037	1.15	1.52	1.75



Assuming peak period trip rates are required, a sample size of 2,000 households appears to be sufficient.

Trip Distribution

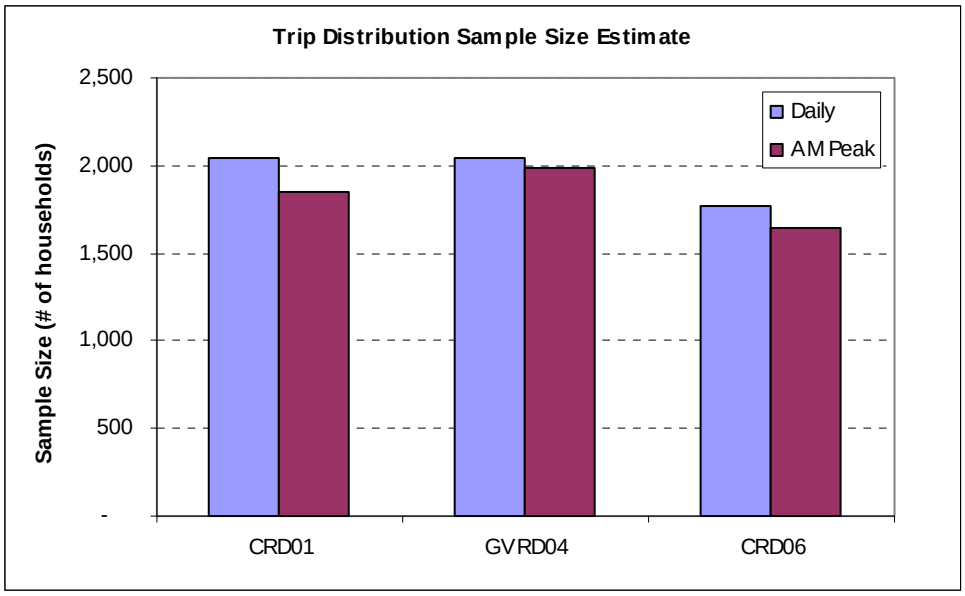
One way to determine the sample size required for trip distribution is to ensure that each cell of an origin-destination (OD) matrix achieves an acceptable degree of precision. For OD pairs with an expected volume of 1,000 trips, a sample of 5% (50 observations) is required to ensure ± 25 percent error at the 95 percent confidence level. This suggests that even for very large interchange volumes, a high sampling rate is required to produce acceptable volume estimates. In many instances, typical expected OD volumes can be less than 100 trips, which would require sampling rates close to 100%. As such, it is not feasible to produce an accurate OD trip table from any reasonably sized household survey.

The other option is to collect statistically acceptable trip length distribution data that can be used to calibrate the trip distribution models. The calibrated models should produce reasonably accurate origin-destination matrices.

For trip distribution, the same sampling equation is applied, but in this case the variable is the average trip length for each trip purpose. **Table D2** shows the daily and AM peak sample sizes required to meet a 95 percent confidence interval accurate to within ± 5 percent (results in a normal variate $Z_{\alpha/2} = 1.96$). Note that this table is based on trip lengths for all trips and would typically be run by each purpose to confirm the sample size. Again, this suggests a sample size of 2,000 households would be sufficient to calibrate a gravity distribution model.

Table D2 – Household Sample Size Estimate for Trip Distribution

	n	CV	avg trpdist	std dev
A. Daily				
CRD01	2,043	1.15	6.66	7.68
GVRD04	2,043	1.15	8.50	9.80
CRD06	1,769	1.07	6.43	6.90
B. AM Peak				
CRD01	1,853	1.10	6.93	7.61
GVRD04	1,984	1.14	8.80	10.00
CRD06	1,646	1.04	6.57	6.80



Mode Split

Many regional transportation models utilizes a logit model for estimating mode split. The required sample size for a logit model is difficult to derive theoretically, but previous studies have shown that sample sizes of 500 to 1,300 households produce adequate models.

The above discussion indicates that a sample of approximately 2,000 households is required to achieve model calibration requirements. If more precise information is required in specific planning areas, additional surveys can be administered using a stratified sampling technique. This approach over-samples key areas so that the information can be disaggregated further and used for other planning purposes.

B. Calculating the Sampling Error Associated with Travel Survey Statistics

Another objective of the survey will be to produce travel statistics (e.g. trip rates, trip lengths, mode shares, etc.) for specific sub-areas to assist with various planning studies. The reliability of these statistics is largely dependent on the sample size and can be computed using a standard set of formulas as demonstrated in the following examples.

Example 1

The error associated with a statistic such as an average household trip rate or average trip length can be determined using the following formula:

where:

$$\chi - \frac{Z_{\alpha/2}s}{\sqrt{n}} < \mu < \chi + \frac{Z_{\alpha/2}s}{\sqrt{n}}$$

χ	=	sample mean
μ	=	population mean
$Z_{\alpha/2}$	=	normal variate
a	=	1.0 – confidence coefficient
s	=	sample standard deviation
n	=	number of samples

To illustrate this equation, the error associated with the average trips per household in a sub-area is computed. In this example, an estimate of 7.7 trips per household is determined from a sample of 1,800 households with a standard deviation of 0.87. Applying this equation for a 95% confidence interval and an error level of ±5 percent (e.g. $Z_{\alpha/2}$ =1.96) results in a range of error of ±0.040 or 7.66< μ <7.74

Example 2

The error associated with mode shares and other proportional statistics is computed using the following formula:

where:

$$p' - Z_{\alpha/2}\sqrt{\frac{p'q'}{n}} < p < p' + Z_{\alpha/2}\sqrt{\frac{p'q'}{n}}$$

p	=	proportion of the population
p'	=	proportion of the sample
q'	=	1 – p'
$Z_{\alpha/2}$	=	normal variate
a	=	1.0 – confidence coefficient
n	=	number of samples

To illustrate this equation, the error associated with the walk mode split to the downtown core is estimated. Assuming a survey captures information on 1,000 trips destined to the downtown and 20% of the trips are walk (note that a survey of 5,000 households will capture information on approximately 45,000 trips). This equation is applied for a 95% confidence interval and an error level of ±5 percent (e.g. $Z_{\alpha/2}$ =1.96) as follows:

p'	=	0.20		
q'	=	1 – 0.20	= 0.80	
a	=	1 – 0.95	= 0.05	
$Z_{\alpha/2}$	=	1.96		
n	=	1,000		
This yields:	0.175 < p < 0.225		or	p = 0.20 ± 0.025

Based on a sample of 1,000 trips, we can be 95% confident that the proportion of walk trips destined for downtown in the morning is between 17.5 and 22.5%.

C. Statistical Implications of different Household and Trip Sample Sizes

In order to illustrate the statistical implications of using different household sample sizes, we show how the sample size affects the average household trip rate and transit mode share estimates in **Table D3**. The information is presented for the entire Lower Mainland, the 18 sub-areas defined by the RFP and Transit Village areas defined by the Urban Showcase Program.

For larger sub-areas like Vancouver or Surrey, a 5,000 household sample provides a reasonable level of accuracy. For smaller areas like White Rock or Transit Villages, even a 50,000 household sample may not be sufficient.

Figure D1 plots the error ranges for the household trip rate information according to household sample size and number of households in a sub-area. If we can accept an error range of +/-15% on the household trip rate, the 10,000 household sample size would be sufficient for the 18 sub-areas. A 20,000 household sample size brings the maximum error range to +/-10% and a 50,000 sample size to +/-7.5%. Ultimately, the decision on household sample size is a trade-off between accuracy and cost.

Finally, this analysis demonstrates the potential range of sampling error that can be associated with certain statistics based on different sample sizes. Given the vast array of statistics and cross tabulations that can be generated from a trip diary survey (e.g. mode shares by time of day by trip purpose), it is critical that the analyst report both the estimate and associated error.

Table D3 – Travel Statistic Error Ranges by Sub-Area

Location	Hhlds	Daily Hhld Trip Rate	+/- Error for Household Sample Size				Daily Total Trip Origins	Transit Mode Split	+/- Error for Household Sample Size			
			5,000	10,000	20,000	50,000			5,000	10,000	20,000	50,000
Lower Mainland	901,200	8.6	0.2	0.1	0.1	0.1	7,802,500	8.2%	(0.3%)	(0.2%)	(0.1%)	(0.1%)
A. 18 Sub-Areas												
1 Burnaby	78,000	7.7	0.6	0.4	0.3	0.2	652,700	13.1%	(1.2%)	(0.8%)	(0.6%)	(0.4%)
2 Coquitlam	41,200	8.6	0.7	0.5	0.4	0.2	357,100	5.5%	(1.1%)	(0.8%)	(0.5%)	(0.3%)
3 Delta	33,600	11.2	1.0	0.7	0.5	0.3	388,300	2.0%	(0.7%)	(0.5%)	(0.3%)	(0.2%)
4 Langleys	43,900	10.3	1.0	0.7	0.5	0.3	434,000	0.9%	(0.4%)	(0.3%)	(0.2%)	(0.1%)
5 New Westminster	27,000	7.9	1.0	0.7	0.5	0.3	219,700	11.8%	(1.9%)	(1.4%)	(1.0%)	(0.6%)
6 North Vancouver	51,100	8.5	0.8	0.5	0.4	0.2	414,000	5.8%	(1.0%)	(0.7%)	(0.5%)	(0.3%)
7 Port Coquitlam	18,700	9.6	1.2	0.9	0.6	0.4	146,400	3.7%	(1.4%)	(1.0%)	(0.7%)	(0.4%)
8 Port Moody/Anmore/Belcarra	10,900	8.6	1.5	1.1	0.8	0.5	80,900	3.1%	(1.7%)	(1.2%)	(0.8%)	(0.5%)
9 Richmond	61,400	9.6	0.8	0.6	0.4	0.3	650,000	4.4%	(0.8%)	(0.6%)	(0.4%)	(0.2%)
10 Surrey	131,100	8.8	0.5	0.4	0.3	0.2	1,034,100	4.5%	(0.6%)	(0.4%)	(0.3%)	(0.2%)
11 Vancouver CBD	54,400	4.1	0.9	0.6	0.4	0.3	422,600	28.7%	(2.2%)	(1.6%)	(1.1%)	(0.7%)
12 Rest of Vancouver/UEL	198,800	8.3	0.3	0.2	0.2	0.1	1,682,300	14.4%	(0.7%)	(0.5%)	(0.4%)	(0.2%)
13 West Vancouver/Lions Bay	18,700	7.9	1.2	0.9	0.6	0.4	152,700	3.8%	(1.4%)	(1.0%)	(0.7%)	(0.5%)
14 White Rock	9,500	5.9	1.4	1.0	0.7	0.4	58,400	2.4%	(1.5%)	(1.1%)	(0.8%)	(0.5%)
15 Maple Ridge/Pitt Meadows	30,800	9.6	0.9	0.6	0.4	0.3	219,100	3.4%	(1.0%)	(0.7%)	(0.5%)	(0.3%)
16 Abbotsford	43,600	9.5	1.0	0.7	0.5	0.3	374,500	0.7%	(0.4%)	(0.3%)	(0.2%)	(0.1%)
17 Mission/Fraser North	18,200	9.3	1.5	1.1	0.7	0.5	119,700	1.8%	(1.1%)	(0.8%)	(0.6%)	(0.4%)
18 Chilliwack/Fraser South	30,200	9.7	1.1	0.8	0.5	0.3	285,400	0.9%	(0.5%)	(0.4%)	(0.3%)	(0.2%)
B. Transit Villages												
Broadway/Commercial Station							45,000	23.8%	(5.5%)	(3.9%)	(2.7%)	(1.7%)
Metrotown Station							68,900	23.2%	(4.5%)	(3.2%)	(2.2%)	(1.4%)
Edmonds Station							15,000	29.3%	(12.5%)	(8.8%)	(6.2%)	(3.9%)
Surrey Central Station							47,700	10.3%	(4.4%)	(3.1%)	(2.2%)	(1.4%)

1. The daily transit mode share estimate for White Rock is between 0.9%-3.9% with a 5,000 household sample size, 1.3%-3.5% at 10,000 hhlds, etc.
2. The daily household trip rate for White Rock is between 4.5-7.3 with a 5,000 household sample size, 4.9-6.9 at 10,000 hhlds, 5.2-6.6 at 20,000 hhlds and 5.5-6.3 at 50,000 hhlds.

Figure D1 – Daily Household Trip Rate Error by Household Sample Size