

Methodology Report

2009 EXTERNAL TRAVEL SURVEY

Prepared for
**City of Ottawa &
TRANS Committee**

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SECTION 1: PROJECT OVERVIEW

The 2009 External Travel Survey (ETS) was conducted in 2009 on behalf of TRANS by R.A. Malatest & Associates Ltd. in partnership with HDR/iTRANS and in collaboration with representatives of the client organizations.

TRANS is a joint technical committee on transportation systems planning in the National Capital Region (NCR). It spans both sides of the Ottawa River and includes all levels of government through its member agencies: the National Capital Commission (NCC), the Ontario Ministry of Transportation (MTO), the City of Ottawa (including OC Transpo), the ministère des Transports du Québec (MTQ), Ville de Gatineau and the Société de transport de l'Outaouais (STO). Since it was established in the late 1970s, TRANS has played a key role in coordinating area-wide data collection efforts in the region. In particular, TRANS has managed the recurring regional Origin-Destination (O-D) surveys over the span of several years, notably the more recent surveys of 1995 and 2005.

The External Travel Survey (ETS) represents an important follow-up to the 2005 O-D Survey. The purpose of the project was to capture information on trip patterns not captured in the household-based 2005 O-D Survey – specifically trips that originate outside the NCR – as well as improve data on external trips made by NCR residents. The data from this survey will be critical in identifying area-wide transportation infrastructure needs and services, measuring trends, and monitoring progress in implementing transportation policies. The survey captured peak period travel in the morning and afternoon, as well as off-peak daytime travel. The survey was intended to capture personal, not commercial travel.

R.A. Malatest & Associates Ltd. provided overall project and research management, data collection, geocoding of trip origins and destinations, and data validation. HDR/iTRANS advised on the methodology and prepared the analytic report of the survey results (under a separate cover). R.A. Malatest & Associates Ltd. and HDR/iTRANS worked jointly on the research design and preparation of the data file.

At high volume sites, data collection was undertaken through licence plate capture and mail out of surveys. At low and medium volume sites, on-site intercept surveys were conducted. The survey collected travel data at twenty-three survey stations on Tuesdays, Wednesdays and Thursdays between May 19th and June 25th 2009, with supplementary data collection on July 14th, 15th and 28th. Data collection generally occurred in two periods, between 6:00 a.m. and 12:00 p.m., and between 2:00 p.m. and 7:00 p.m.

The licence plate capture/mail-out survey approach involved the use of survey crews to record licence plates of private vehicles passing survey stations, followed by a mailing of survey questionnaires to the registered owners of the observed vehicles. Survey questionnaires asking drivers about their travel at the observed location, date, time, and direction of travel were mailed to 26,136 registered owners of private automobiles, and 3,242 completed surveys were returned. The intercept survey approach involved the diversion of a portion of passing traffic to waiting survey staff, who administered the questionnaire to drivers. The on-site intercept method collected 13,597 completed surveys.

In addition to collecting origin-destination information from a sample of vehicles, the research team at the intercept sites also completed classification and occupancy (C&O) counts for vehicles travelling on the selected routes during the enumeration day. C&O counts were also undertaken for most of the routes for which licence plate capture was undertaken, except for Highway 416 and Highway 417E.

In total, 16,839 surveys were obtained. Trip origins and destinations were geocoded, and the survey data were reviewed for completeness and validated for internal logic. Some trip records with incomplete and illogical data were flagged for deletion. For surveys from licence capture sites for which respondents had indicated travel in the opposite direction during the survey period, additional trip records in the opposite direction were created from the survey information. This approach was not required for intercept surveys, as the intercept method captured travel in both directions (i.e., one driver could have been surveyed multiple times during the data collection period).

After the creation of 'opposite trips' where appropriate (1,869 records), data validation, and removal of poor/unusable data (964 records), the final survey data set numbers 17,744 trip records.

The purpose of this report is to describe the design and conduct of the travel pattern survey. Traffic data, data coding and expansion, and the analysis and summary of survey findings are provided separately.

SECTION 2: SURVEY PLANNING

2.1 Survey Design

The 2009 Ottawa ETS survey instrument was based on the trip capture portion of the 2005 O-D questionnaire with only slight modal modifications since these surveys were conducted by surveyors at roadside rather than on the telephone, as it was delivered in 2005. A self-administered version of the survey instrument was also developed for the licence capture mail-out/mail-back methodology.

The survey was designed to capture standard trip information, including the trip origin, type of origin (work, home, school), trip destination, trip purpose, vehicle licensing province, type of vehicle, number of vehicle occupants, times of travel and arrival, whether a Park & Ride facility was used during any part of the trip, whether a trip was made in the opposite direction on the same day, frequency of travel on the trip route, and information about the intercept or licence capture time, location, and direction of travel.

The survey forms are presented in Appendix A in both English and French.

2.2 Survey Locations

Data was recorded for private vehicles at twenty-three survey locations within the NCR, as shown in Figure 2-1. During initial site planning twenty-seven survey sites were identified by TRANS as gateways to the majority of the NCR. The survey site locations were either on or within close proximity to the boundary used for the 2005 NCR O-D Survey. Due to budgetary restraints, four of the sites depicted (site 1, 3, 15 and 19) were not included in the final data collection plan.

Given agreement on the number and general location of the survey locations, the specific survey station locations for set-up purposes were determined through site visits by the Consultant and the client in November 2008, with further directions provided by appropriate police authorities who also participated in the site selection process. The locations were evaluated for good vehicle sight lines, traffic travel speed, sufficient shoulder area, separation from intersections or driveways, and other safety and survey quality considerations.

High volume roads and highways were identified for licence capture (and subsequent mail-out of a self-administered survey) rather than intercept surveys.

Table 2-1, later in this section, lists the survey site, the direction of traffic, and the data collection method. Sites 1, 3, 15 and 19 are included in the table for reference, even though they were not included in the final survey plan.

2.3 Anticipated Sample Sizes

The expected number of surveys was calculated based on previous ATR (Automated Traffic Recorder) results collected by the MTO, City of Ottawa and MTQ. Table 2-1 details this information for the sites in each province. The previous ATR counts were used to determine the most appropriate survey method for each site, and assisted in planning for the resources required for data collection and data processing. However, the actual number of surveys collected varied from the planned number depending on actual traffic volumes and response rates on the survey day.

Figure 2-1: 2009 TRANS External Survey Locations

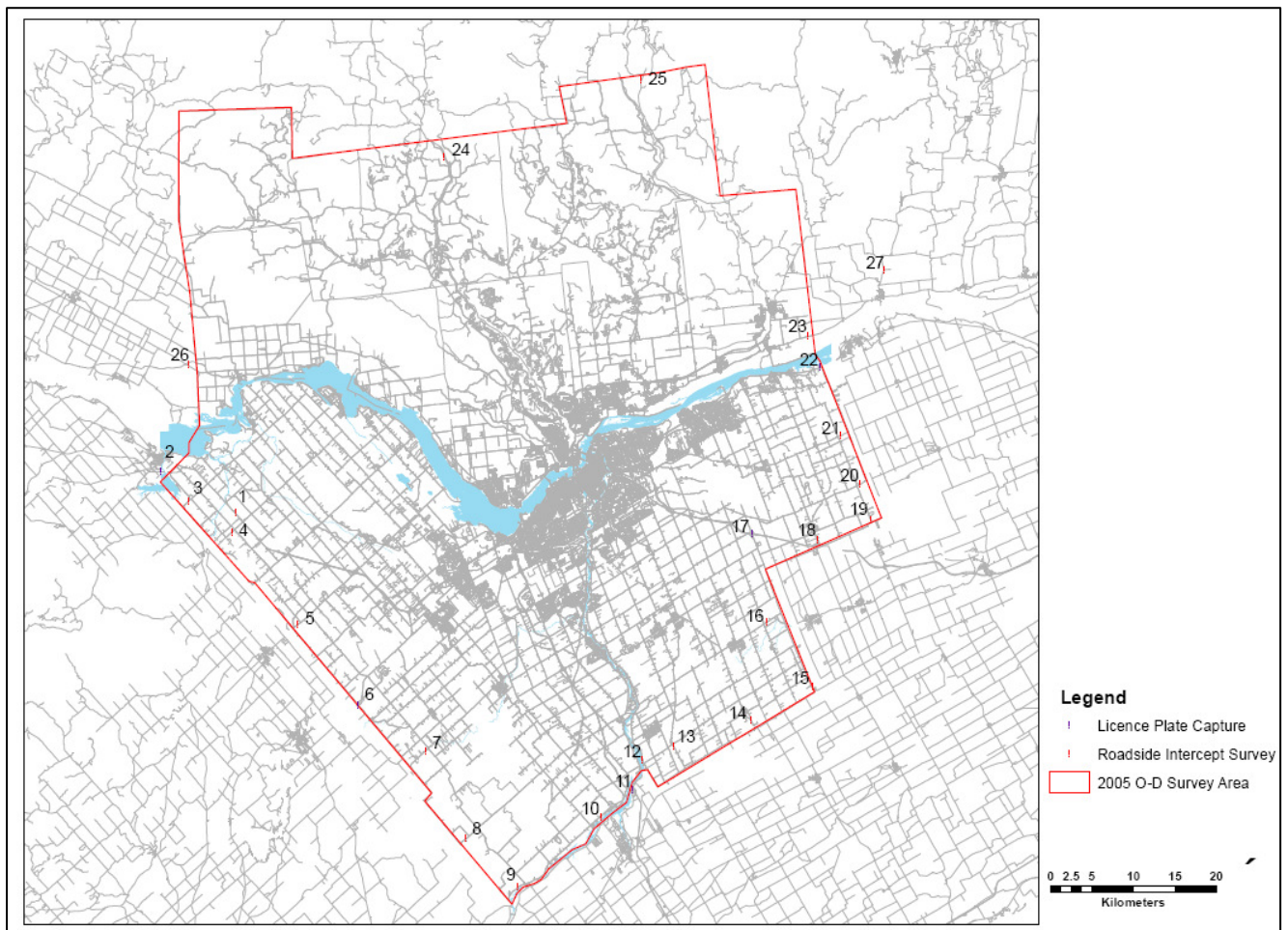


Table 2-1: Survey Planning: Survey Sites, Data Collection Methods, and Previous ATR Counts
QUÉBEC ^(a)

Site #	Road	Direction of Travel (Inbound/Outbound)	Data Collection Method	Previous ATR Counts	Estimated Surveys
23	Rte 148 Est (près de Masson)	West/East	Intercept	10,400	1,040
24	Rte105 (Farrellton)	South/North	Intercept	5,200	780
25	Rte309 (Notre-Dame-de-la-Salette)	South/North	Intercept	2,800	520
26	Rte 148W (près de Quyon)	East/West	Intercept	3,200	520
27	Autoroute 50 (près de Thurso)	West/East	Intercept	5000	780

ONTARIO

Site #	Road	Direction of Travel (Inbound/Outbound)	Data Collection Method	Previous ATR Counts	Estimated Surveys
1 ^(b)	Hwy17 (North of Rd 20)	East/West	N/A	1,500	260
2	Hwy 417W (Near Arnprior)	East/West	Licence plate capture	15,480	1,170
3 ^(b)	Rd 29 (Galleta Side Rd)	North/South	N/A	1,000	260
4	Rd 20 (Kinburn Side Rd)	East/West	Intercept	1,880	520
5	Rd 49 (March Rd)	East/West	Intercept	8,210	1,040
6	Hwy 7 (Near Ashton Station Rd)	East/West	Licence plate capture	16,500	1,031
7	Rd 10 (Franktown Rd)	East/West	Intercept	2,910	520
8	Rd 6 (Roger Stevens Dr)	East/West	Intercept	2,980	520
9	Rd 2 (Donnelly Dr)	East/West	Intercept	1,000	260
10	Rd 44 (Merlyn Wilson Rd)	North/South	Intercept	1,000	260
11	Hwy 416 (River Rd)	North/South	Licence plate capture	19,830	1,200
12	Rd 19 (Rideau River Rd)	North/South	Intercept	4,200	780
13	Rd 25 (Stagecoach Rd)	North/South	Intercept	2,170	520
14	Rd 31 (Bank St)	North/South	Intercept	5,630	780
15 ^(b)	Rd 41 (Gregoire Rd)	North/South	N/A	1,000	260
16	Rd 6 (Victoria St)	West/East	Intercept	2,810	520
17	Hwy 417E (Near Limoges)	West/East	Licence plate capture	29,450	1,250
18	Rd 33 (Rockdale Rd)	North/South	Intercept	5,860	780
19 ^(b)	Rd 5 (Sammure Rd)	North/South	N/A	1,000	260
20	Rd 26 (Russell Rd)	West/East	Intercept	5,310	780
21	Rd 28 (Colonial Rd)	West/East	Intercept	2,810	520
22	Rd 174* (West of Canaan)	West/East	Licence plate capture	19,580	1,170

^(a) Note: sites in Quebec are identified in the survey dataset with alphanumeric codes as follows:
 23 = QC-1, 24 = QC-2, 25 = QC-3, 26 = QC-4, 27 = QC-5

^(b) Site 1 Hwy 17 (North of Rd 20), Site 3 Rd 29 (Galleta Side Rd), Site 15 Rd 41 (Gregoire Rd), and Site 19 (Sammure Rd) were removed from the survey plan for budgetary reasons.

2.4 Survey Staff

Roadside staff was trained under the Consultant's standard training program that is administered to all in-house survey staff. Individuals who were responsible for traffic control were provided with additional training in accordance with provincial regulations. The training manual employed in Ontario was the *Ontario Traffic Manual Book 7*, while in Québec, *Tome V – Signalisation Routière* was used.

Table 2-2 details both the positioning on-site and the role of various roadside staff members at intercept sites.

Table 2-2: Key Personnel Roles at Intercept Sites

Title	Positioning	Role
Interviewers	In reserved (closed) lane, on the driver's side	Conduct the survey with the drivers in the language of their choice. Also responsible for directing surveyed vehicles back into traffic.
Traffic control person	At roadside, 200m upstream of the survey zone per se (interview zone)	Controls traffic using paddles ('Slow' and 'Stop'). Also responsible for directing surveyed vehicles back into traffic. Trained and dressed in accordance with the Ontario Ministry of Transportation and the ministère des Transports du Québec standards
Classification & Occupancy (C&O) staff	At roadside, near the end of the survey site	Note: for each vehicle passing by, the direction, the type of vehicle and the number of occupants.
Site coordinator	Mobile	Ensures that operations are running smoothly and safely.
Replacement staff	Mobile	Available to take over other staff's responsibilities (for breaks, meals, etc.).

SECTION 3: SURVEY IMPLEMENTATION

3.1 Site Preparation

Each week for the duration of the study, rental cars were obtained by the Consultant on Monday in preparation for the week of surveying. The rental cars were returned either on Thursday night or on Friday morning. At each site, there were numerous logistical considerations to account for. On high volume sites, ATR equipment had to be installed by the Ontario Ministry of Transportation (MTO) several days prior to the site study. ATR equipment was also installed on low and medium volume sites on the City of Ottawa side by City staff and on the Québec side by the ministère des Transports du Québec (MTQ). This equipment was checked by the Consultant prior to the visit to ensure proper functioning. Other considerations included ensuring that a suitable rest area was available to park the rental cars that would not obstruct traffic in any way. On sites where police presence was a factor, the Consultant ensured that they were punctual and were properly briefed for their role on-site. Typically, police were positioned in front of the survey site, so that respondents were aware of their presence prior to participating in the survey. Other relatively minor considerations included ensuring that the portable washrooms were delivered to the survey site, and that the survey site staff were aware of their location. Additionally, a checklist was compiled to ensure that all the necessary equipment was present at each site. That list included the following items:

- Authorization form;
- Sign in sheet and timesheet;
- Contact information;
- C/O screeners;
- Clipboards;
- Chairs;
- Pens/pencils;
- PDAs;
- Cell phones;
- Walkie Talkies;
- Boots;
- Water coolers;
- Ice for coolers;
- Fluorescent vests;
- First aid kit;
- Sunscreen;
- Insect repellent;
- Hand sanitizers;
- FAQ;
- GPS/maps;
- Camera;
- Laptop computer;
- Site plan; and
- Licence capture screeners (for ATR sites only).

Both Québec and Ontario sites also required stop signs, hard hats, and questionnaires in both official languages. For Ontario sites, the Book 7 manual was kept on-site, and traffic control personnel kept Ontario Traffic Control Personnel (TCP) badges on hand. For Québec sites, Québec TCP badges were also kept on-site.

3.2 Survey Execution

3.2.1 Intercept Survey

Intercept surveys were carried out at 18 locations in the NCR between May 20th and June 25th, 2009. Before each survey date, all involved parties were notified about the dates,

locations, and nature of surveying activities. ATR equipment was installed on the site for approximately three days leading up to the survey site visit and remained on site for approximately three days following the survey date. Police were present at most survey locations. The selection of survey stations for each day was based on minimizing travel for survey supervisors, while reducing the potential for multiple observations of the same vehicle at different stations on their trip.

The survey team departed from the Consultant's Ottawa office at 5:00 a.m. on each survey date. Upon arrival at the survey sites, the crew were split into groups in order to monitor both directions of traffic. Appropriate equipment was then distributed among the staff based upon their assigned role. Two traffic control personnel (TCP) were situated on each side of the road. In Ontario and Québec, vehicles were funnelled into a line-up and slowed to a stop. Between two and six interviewers would approach the leading vehicles in a line-up to administer the survey. When this first batch of between two and six vehicles had completed the survey, they were released and the next batch of vehicles in the line-up would advance and take the survey. If there was any concern that the waiting vehicles had been in the line-up too long, the next batch would be drawn from the last two to six vehicles in the line-up while those in between were let go. During rush hour, the interviewers were concentrated on the roadside that yielded the higher traffic volume.

While the purpose of this survey was to gather information on the travel of personal vehicles, due to the nature of the intercept method, many commercial vehicles such as cars, vans, small trucks, or SUVs with business logos were also pulled over with the other traffic. Large commercial vehicles were waved through. As the vehicles were pulled in, and survey staff were available, surveys were conducted with the drivers of commercial vehicles. Decisions were made later as to whether to retain this survey data if the trip purpose was non-commercial.

The intercept survey may have captured multiple surveys from the same driver at different times during the survey day (for example, a traveller's trip to work, and their return home in the opposite direction on the same route later that day).

Each survey location was staffed by three to six bilingual interviewers. Two Classification and Occupancy (C&O) staff were also present at each site. One to two supervisors managed each location, overseeing all research activities. Lunch breaks were timed to ensure that survey and C&O staff were at their posts for the full duration of the shift. At approximately 12:00 p.m. on each survey date, the first survey team returned to the Consultant's Ottawa office, where they immediately exchanged equipment with a second shift of surveyors. The second shift returned to the site, where they implemented the same processes and procedures as the first survey team. The second survey shift began at 2:00 p.m. on each survey date. At 7:00 p.m. on each survey date, the second shift was complete and the survey team returned to the Consultant's Ottawa office. Upon their return, shift supervisors began to prepare for the following day of surveying, and data was filed and encrypted in accordance with strict confidentiality procedures. Across all intercept sites, 13,597 surveys were completed.

Signage and pylons demarcated each site, and comprehensive safety procedures were established in accordance with each province's Health and Safety authority. Figure 3-1 provides an example of the layout employed at a survey site on Franktown Road in Ottawa.

Detailed Site Plan for Ottawa Rd 10 Survey Site, Franktown Rd.
Detailed Close-Up of Survey Area – Eastbound Lane

Map drawn using Ontario Traffic Manual Book 7, in particular Figure TL-73B (p. 202) and Table 2 (p. 143)

Speed Limit=80km/h
 Traffic Count=2910 Total
 Number of lanes=1
 Shoulder wide enough= yes

Please note that this map was not drawn up to scale, and is intended to demonstrate the way the survey will be conducted only.

Barrels shield staff and surveyed cars from moving vehicles.

70m

Static sign thanking drivers.

Direction of traffic Eastbound lane

Interviewer

Police Officer in traffic control position

Shoulder is about 3m wide

ATR approximate location

1. The Police Officer motions drivers to stop their vehicles in the survey area.

2. Interviewers conducts the survey with the driver

3. Surveys would be done on shoulders to enable the flow of traffic during rush hour

70m

150m

Traffic control person with portable state (11-25)

Survey area 650m West of Dwyer Hill Rd and Franktown Rd intersection

Please refer to the previous site plan for a broader view of the survey site and a more comprehensive lineup of road signs that are intended to be used.

Licence plate capture was carried out at five (5) locations around the NCR. Daylight conditions in early morning or late evening hours did not pose any safety issues or problems with accurate recording of licence plates. The selection of survey stations for each day was based on minimizing travel for survey supervisors, while reducing the potential for multiple observations of the same vehicle at different stations on their trip.

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- The protection configurations outlined in the MTO Book 7 Figure TL-6 were employed;
- The survey vehicles on either side of the highway were staggered in order to be less disruptive to the traveling public;
- Each vehicle had the following safety equipment: traffic cones, safety vests, hard hats, traffic protection plan, and first aid kit; and
- Vehicles were not parked on private property, except with prior permission from property owners.

As with the intercept sites, C&O counts were undertaken at three of the licence capture sites. However, C&O counts could not be undertaken for site 11 (Highway 416) and site 17 (Highway 417E), as the available vantage points for the licence capture, looking down from a bridge over the highway, did not allow for identification of the numbers of occupants in each vehicle.

The licence plate recording excluded trucks and commercial vehicles as well as international plates. However, a numeric count of these vehicles and commercial vehicles was maintained by the survey crew for statistical and control purposes.

Overall, a high percentage of licence plates were recorded for the vehicles passing the stations during the survey period. Some of the challenges to accurately recording licence plate numbers included the following:

- High speed of traffic at some survey locations;
- An increase in the length of licence plate numbers in recent years from the previous six digits to seven;
- Licence plate frames which obscure the province of registry; and
- Vehicles towing trailers or other equipment which block the vehicles' back licence plate.

At the end of each survey date, licence plate records were compiled in an electronic database and sent to the MTO for address retrieval. The number of plate observations by hour and location were noted to ensure that all time periods were well represented in the survey mail-out.

While a given vehicle may have been recorded multiple times during the same survey day (e.g., commuting to work and returning home later the same day), the survey design required that only one survey be sent to each vehicle owner. For this reason, duplicates of the same licence plate at the same site and same survey date were removed from the database sent to MTO, with only one of the capture times recorded at random. While steps were taken to randomize the removal of duplicate licence capture times, due to the occasional carryover of a given survey day's data entry from one data entry session to the next, somewhat more evening duplicates may have been removed than daytime duplicates. This was later compensated for in the creation of trips in the opposite direction using relevant survey data.

Only Ontario licence plates were included in the file to MTO for retrieval of addresses for the mail-out/mail-back survey. An equivalent arrangement did not exist with MTQ for the

retrieval of address information. Therefore, it should be noted that the travel captured at licence capture sites is based on only the travel of the owners of vehicles registered in Ontario.

3.2.3 Survey Mailing (Licence Capture Sites)

In order to ensure a high return rate and a reasonable degree of accuracy in the respondents' recollection of trip details, priority was placed upon minimizing the turn-around time for the mail-out portion of the survey. In most instances, each site's licence plate database was submitted to MTO the night of each survey day for overnight processing. Upon receipt of the address files from MTO, the Consultant re-formatted the addresses from block capitals with surname first to title case and proper name order. The re-formatted address list was submitted for MTO approval. Upon obtaining MTO approval, the list was redirected to a subcontractor, who performed the mail-out portion of the survey.

Malatest acknowledged that the licence plate capture activities did not proceed on schedule for certain sites and resulted in fewer than expected completions. To compensate, additional licence captures were obtained in late June mid-July to obtain additional licence plates for the survey. These additional site visits were intended to obtain a number of surveys to yield a sample of error of less than +/- 5% for these sites when combined with the previously collected data.

Table 3-1 summarizes the results of the mail-out portion of the survey. It may be noted that the figures in the table will not reconcile exactly with the number of records for each site in the survey dataset: some surveys were incomplete or spoiled and may not have been data entered or retained after data entry.

Table 3-1: Mailout Survey Returns

Site	Survey Packages Mailed Out	Returned to Sender	Survey Mailed Back
Site #2 (417 West Near Arnprior)	3,654	210	489
Site #6 (Hwy 7 Near Ashton Station Rd)	3,924	369	538
Site #11 (416 Near River RD)	5,789	264	520
Site #17 (417E Near Limoges) East or West	6,935	222	760
Site #22 (174 West of Canaan)	5,834	124	935
Total	26,136	1,189	3,242

A total of 26,136 surveys were mailed. Of these, 1,189 were returned by means of return to sender (in other words, the listed driver no longer lived at the address in MTO records), and 3,242 completed surveys were mailed back. A total of 4,401 envelopes were returned.

The envelopes returned by means of return to sender constituted close to 5% of the gross sample. This would suggest that a larger percentage of the sample addresses were incorrect or outdated, as not all households would necessarily return misaddressed mail to sender.

Overall, the survey completions represent a gross survey response rate of 12.3%, which is within the normal range for mail-out surveys with no follow-up or incentive, and considering that the registered vehicle owners may have had to refer to the survey to the actual driver for the trip, and considering that drivers were being asked to recall detailed information about a trip they would have made a few days before receiving the survey. Gross survey response by site varied from 9.0% (site 11) to 16.0% (site 22).

3.3 Final Data Collection Schedule

Survey work generally took place between the hours of 6:00 a.m. and 7:00 p.m. Data collection was organized into two data collection periods, from 6:00 a.m. to noon and 2:00 p.m. to 7:00 p.m. Shift changes occurred normally between noon and 2:00 p.m. during which time equipment was exchanged between a.m. and p.m. survey teams with a few exceptions.

The majority of data collection took place as originally planned and scheduled. However, there were some variations due to weather and logistical reasons. For example, data collection for Site 16 was rescheduled from June 6 to June 25 due to inclement weather. Staff availability dictated that data collection for Sites 4, 9, 10, and 16 took place in one extended shift, from 6:00 a.m. to 6:00 p.m. The data collection for these sites continued between noon and 2:00 p.m., when a shift change normally would have been underway with no data collection occurring. Also, due to lower than anticipated response from certain licence capture sites, additional licence capture dates were later added to the schedule for Sites 11, 17, and 22. During these shifts, the same staff stayed on through both time periods and collected data continuously until sufficient licence captures were obtained, including during the noon to 2:00 p.m. time period.

The main data collection efforts spanned May 19 through June 25, with supplementary licence capture dates added for July 14, 15 and 28.

Table 3-2: Final Data Collection Schedule
QUEBEC

Site #	Road	Data Collection Method (a)	Survey Date	Direction
25	Rte 309 (Notre-Dame-de-la-Salette)	Intercept	May 20 th	North, South
26	Rte 148W (près de Quyon)	Intercept	May 21 st	East, West
23	Rte 148 Est (près de Masson)	Intercept	May 26 th	East, West
27	Autoroute 50 (près de Thurso)	Intercept	May 27 th	East, West
24	Rte 105 (Farrellton)	Intercept	May 28 th	North, South

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Site #	Road	Data Collection Method	Survey Date	Direction
2	Hwy 417W (Near Arnprior)	Licence plate capture	May 19 th	East, West
5	Rd 49 (March Rd)	Intercept	June 2 nd	East, West
6	Hwy 7 (Near Ashton Station Rd)	Licence plate capture	June 2 nd	East, West
11	Hwy 416 (River Rd)	Licence plate capture (a)	June 3 rd June 4 th July 14 th (b)	North South North, South
12	Rd 19 (Rideau River Rd)	Intercept	June 3 rd	North, South
13	Rd 25 (Stagecoach Rd)	Intercept	June 4 th	North, South
17	Hwy 417E (Near Limoges)	Licence plate capture (a)	June 9 th June 10 th July 15 th (b)	East, West East, West East, West
18	Rd 33 (Rockdale Rd)	Intercept	June 10 th	North, South
22	Rd 174 (West of Canaan)	Licence plate capture	June 11 th July 28 th (b)	East, West East, West
21	Rd 28 (Colonial Rd)	Intercept	June 11 th	East, West
7	Rd 10 (Franktown Rd)	Intercept	June 16 th	East, West
8	Rd 6 (Roger Stevens Dr)	Intercept	June 16 th	East, West
14	Rd 31 (Bank St)	Intercept	June 17 th	North, South
20	Rd 26 (Russell Rd)	Intercept	June 18 th	East, West
9	Rd 2 (Donnelly Dr)	Intercept	June 23 rd (c)	East, West
10	Rd 44 (Merlyn Wilson Rd)	Intercept	June 23 rd (c)	North, South
4	Rd 20 (Kinburn Side Rd)	Intercept	June 24 th (c)	East, West
16	Rd 6 (Victoria St)	Intercept	June 25 th (c)	East, West

(a) Data collection also included collection of C&O data for all sites except for sites 11 and 17, for which it was not possible to observe the number of vehicle occupants.

(b) Supplementary survey dates were later added for sites 11, 17, and 22.

(c) For logistical reasons, data collection for sites 4, 9, 10 and 16 took place between 6:00 a.m. and 6:00 p.m. (and included data collection between noon and 2:00 pm).

SECTION 4: DATA PROCESSING

In total, 16,839 surveys were completed, with 3,242 from the five licence capture mail-out/mail-back sites, and 13,597 completed through the intercept survey. The work involved in processing the data and preparing the final data set is outlined below.

4.1 Data Entry and Geo-Coding

4.1.1 Data entry Protocols

Data entry of all survey data was undertaken in an MS Access database. The data entry form included controls to ensure that only valid response options were entered, and to automatically check for certain kinds of logical discrepancies between certain fields. For the data entry of geographic locations (origins, destinations), the data entry form included lookups and search functions to allow for the standardized entry of streets, intersections, landmarks and towns. Comments fields were also made available to data entry staff to allow them to flag possible data issues.

The intercept surveys were collected from the data collection sites in batches organized by time and direction of travel. The intercept surveys received from the various intercept sites were assigned unique survey identifiers which included the site and survey direction in their coding. Data entry was organized into batches by date, site, and direction. Mail back surveys associated with licence capture sites were stamped with a unique survey identifier when received, and data entered within a week of receipt.

Entered data were reviewed to check for completeness, to verify that entered values were within range, and to recode open-ended responses to existing response categories if appropriate.

4.1.2 Geocoding Protocols

Geocoding of the origins and destinations was generally undertaken after data entry. However, as landmarks and intersections could be selected at the time of data entry if it was possible to do so quickly, certain locations did not need to be manually coded.

Manual geocoding was undertaken in a number of passes, with the first pass encompassing the coding of locations that could easily be understood and coded. Subsequent coding passes examined cases with incomplete, vague or ambiguous information and more attention was given to researching possible locations, misspellings, and trip logic. Further geocoding may have been undertaken during the data validation phase, as cases which failed validation tests were re-examined to ensure that the correct decisions were made with respect to geocoding.

Geocoding staff were provided with a number of tools to assist them in determining appropriate codes to assign, including maps, a GIS viewer including street address lookups and traffic zones, and a database with sophisticated landmark and intersection search functions.

Locations were treated differently depending on whether they were located within the 'internal' area of Ottawa, Gatineau and MRC les Collines-de-l'Outaouais or in the 'external' area, being any place outside of the aforementioned areas. Geocodes were assigned in the following order of preference, as the completeness of location descriptions would allow:

Internal locations:

1. Intersection with x,y coordinates;
2. Landmark with x,y coordinates;
3. Internal traffic zone;
4. Random pick of limited number of possible traffic zones (e.g., if only street name or neighbourhood known);
5. Internal district (aggregations of traffic zones, e.g., if only street name or neighbourhood known); and
6. Random pick of very limited number of possible districts (e.g., if only street name or neighbourhood known).

External locations:

1. Town with known x,y coordinates;
2. Town with known traffic zone but undetermined x,y coordinates; and
3. External traffic zone.

For external locations, coding was undertaken according to the town, and addresses or landmarks provided were ignored, unless they provided more information that helped to resolved coding issues (such as towns the same name as another town in Ontario or Québec).

In the case of locations that lay outside the boundaries of the external traffic zones provided by the client for geocoding purposes, the location was assigned to the closest external traffic zone at the extremity of the available zones (for example, locations in New Brunswick were coded to the traffic zone for Rest of Quebec).

When only the internal district was known, a traffic zone was assigned at random from the available traffic zones within the district. In order to better maintain the natural distribution of origins/destinations within the district, the probability of the random selection of the traffic zone was determined by the traffic zone frequency for locations that had already been accurately geocoded.

For those locations that could not be coded to the precision of x,y coordinates, for data validation purposes, x,y coordinates were assigned on the basis of the x,y coordinates of the centroid of the traffic zone, district, or external town to which the location was coded.

A code was assigned to each location identifying the degree of accuracy of the estimated x,y coordinates. It may be noted that the level of accuracy of the assigned x,y coordinates varies considerably depending on the size of the traffic zone or district to which the location was geocoded, and is worse for larger external traffic zones (such as Rest of Quebec).

Outlined in the following table is the approximate percentage of origins and destinations coded to each level of accuracy. The table includes coded records but excludes records with poor data that were removed from the dataset, and excludes records created for trips in the opposite direction (see Section 4.2.2, Treatment of Selected Data).

It may be noted that some of the coding of locations described by street number and street name was undertaken to the level of internal traffic zone, rather than to intersection or landmark; As many of the internal zones encompass only a few blocks, for the analysis undertaken for this project, the loss of precision (e.g., in computing distances) may be relatively negligible (i.e., may average out).

Table 4-1: Precision of Geocoding

Level of Precision of X,Y coordinates	Origins	Destinations
INTERNAL LOCATION CODING		
Intersection or Landmark	49%	53%
Smaller Internal Traffic Zone	23%	23%
Large Internal Traffic Zone ^(a)	5%	4%
Internal District	23%	20%
Total	100%	100%
	n = 7,011	n = 8,550
EXTERNAL LOCATION CODING		
Town	89%	88%
External zone ^(b)	9%	8%
Huge external zone ^(c)	3%	3%
Total	100%	100%
	n = 8,917	n = 7,361

^(a) Large internal traffic zones = larger traffic zones around the fringes of the internal region.

^(b) x,y coordinates of town unknown, so coded to external zone in which town is located.

^(c) x,y coordinates of town unknown, huge external zones = the Northwest of Québec, Montréal and Rest of Québec, Toronto and Southern Ontario, Rest of Ontario, USA.

Note: Individual percentages may not add to exactly 100% due to rounding.

A small portion of the surveys obtained had descriptions of origins or destinations that could not be coded due to ambiguous or vague information, place names that could not be matched to a known place, missing information, missing town name, or refused information. A total of 505 surveys (2.7% of all survey records) did not have sufficiently detailed information to confidently code both the origin and the destination for the trip. The proportion of records that could not be coded is in line with other origin-destination surveys, particularly considering that a portion of the surveys were self-administered. The records have been flagged for removal from the analysis associated with this project, however, the records have been left in the dataset should they be useful for other kinds of analysis that do not require complete origin and destination information.

4.2 Data Validation and Preparation of Data Files

4.2.1 Data Validation Tests

The coded survey data were submitted to a number of tests to confirm the validity of the trip information and geocoding, and to identify as invalid any records that could not be used for the analysis to which it would be submitted.

Initial tests were undertaken to verify the completeness of survey data relevant to the analysis, and to ensure that all assigned geocodes and response codes were valid and within expected ranges. Selected survey responses were tested in relation to each other to ensure the logic and feasibility of the responses (e.g., comparison of stated start and arrival times against captured intercept times). Where appropriate, sets of survey records that failed tests were reviewed individually with the goal of verifying the test or improving the data.

Ambiguous responses, data capture or keystroke errors, and miscoded information were identified and corrected to fit the obvious logic of the trip, where appropriate (e.g., misidentification of times as a.m. where the only logical time would be in the p.m.). In some instances, further examination of the data revealed responses that were in fact feasible under circumstances too unusual or complex to be considered in the given test of logic (e.g., a round trip to drive around the block would fail the test that the origin and destination be on different sides of the internal/external boundary, but were in fact feasible). Some data failed validation tests and did not survive further scrutiny, but no logical correction was suggested by the other responses provided on the survey. Such data were flagged for further consideration or for removal from the analysis.

In instances where information was missing, where appropriate, data values may have been imputed based on the logic of the trip (e.g., missing arrival time imputed by estimating of the length of time to travel from the intercept site to the destination, and adding this to the known intercept time).

Due to the estimated nature of some of the data, such as x,y coordinates estimated from the centroids of large traffic zones, the logical tests were subject to error and false failures. It was not feasible to manually review all cases that failed tests of trip logic, particularly those where the test was not 'air-tight'. However, manual review was undertaken for every case that failed a test of logic that was deemed essential to the composition of a logically coherent trip.

Logical tests and manual review of the data entailed, but were not limited to, consideration of the following:

- Trips missing key information;
- Either origin or destination or both not able to be geocoded;
- Both origin and destination coded to external towns or traffic zones;
- Both origin and destination coded to internal locations;
- Outlier (extreme) values in data fields (e.g., start or arrival times);

- Intercept/licence capture time outside planned survey hours (before 6:00 a.m., between 12:00 p.m. and 1:59 p.m., or 7:00 p.m. or later);
- Start time earlier than intercept time, which in turn should be earlier than the arrival time;
- Time of trip in the opposite direction falling within current trip start and arrival times;
- General direction of travel captured at the intercept/licence capture site was inbound (or outbound) but general direction of travel from origin to destination appears to be the reverse;
- Direction of travel at the intercept site considerably different than direction of travel from origin to intercept, or from intercept to destination, using either the 16 points of the compass (W, WNW, NW, etc.) or the angle in degrees to compare directions; and
- Distance between locations (origins, intercept points, destinations) not consistent with stated duration of travel (only for cases with distances based on reasonable estimates of x,y coordinates).

It may be noted that while every effort was undertaken to correct data that failed trip logic tests, not all surveys with issues could be salvaged. Also, validation of the data required a great deal of manual review, and it was not always possible to review every single case in full detail. A small percentage of issues associated with the logic of respondent answers may still persist within the data. For very large origin-destination datasets, it is normal to have a small amount of 'noise' within the data due to anomalous respondent answers.

4.2.2 Treatment of Selected Data

In collaboration with client representatives decisions were made regarding the treatment of systemic data issues, as follows:

- **Surveys for intercept times or licence capture times outside of the prescribed survey frame.** As discussed in the section on intercept survey execution earlier in this report, additional data was collected between noon and 2:00 p.m. at certain sites. In addition, occasionally survey crews would be working shortly before, or continue working shortly after, the hours of the survey frame (6:00 a.m. to noon, and 2:00 p.m. to 6:59 p.m.). Furthermore, respondents to the mail-out/mail-back survey occasionally changed the stated licence capture sign at the survey site to reflect a different trip they remembered clearly (e.g., they were asked about an evening trip, but provided information about their morning trip in the opposite direction¹).

Rather than throw away this data, some of it was used as proxy data for the actual times of interest to the survey frame. For example, if the intercept time was originally recorded as 7:03 p.m., it was close enough to the survey period to be of a similar nature to trips in the 6:00 p.m. to 6:59 p.m. time frame, and was coded as 6:59 p.m. to include it in the analysis. Similarly, it was assumed that extra data collected between 1:00 p.m. and 1:59 p.m. would be relatively similar in nature to travel in the 2:00 p.m. to 2:59 p.m. time frame, and such trips were used as proxy

¹ Respondents to origin-destination surveys occasionally are unclear about the definition of a trip and may sometimes provide information for a round trip or the first leg of a round trip, rather than for the return portion of their day's trip chain.

data by adding one hour to all times recorded. Presuming the general characteristics of the travel are similar (trip purposes, etc.), use of such proxy data increases the variety of the geocodes in the weighted survey data, which serves to mitigate the 'over-representation' of specific geocodes in small data sets that are weighted.

Conversely, it was decided that extra data collected between noon and 1:00 p.m. could not be assumed to be similar in characteristics to other periods before or after. Therefore, such extra data was flagged for removal, as were outlier values significantly outside the hours of the survey frame.

- **Origins or destinations identified only as being in Gatineau.** As discussed earlier, some respondents refused to provide information on specific locations or provided vague or ambiguous information, sometimes just indicating that the origin or destination was 'Gatineau' or 'Ottawa'. Normally, in such circumstances, geocodes could not be assigned. However, examination of Gatineau's geography, which runs rather narrowly East-West with a more limited span from North to South, revealed a limited number of traffic districts, and common feeder routes to many parts of the municipality. Analysis of the successfully geocoded survey data was undertaken to determine the distribution of origins/destinations by district, revealing different probability of travel to/from different districts within Gatineau depending on the start or end point of the trip. For example, travellers from the south of Ottawa were more likely to head to certain downtown Gatineau areas, whereas travellers from North of Gatineau typically had different origin/destination profiles. Random assignment of Gatineau districts to as yet un-coded Gatineau locations was undertaken based on the probability of assignment for accurately coded trips with similarly positioned intercept sites. Approximately 235 Gatineau destinations that would otherwise not be geocoded were assigned an internal traffic district using this method. Some cases with short driving times were checked to ensure that the randomly assigned codes made sense.

A similar treatment could not be undertaken to locations simply identified as being in 'Ottawa'. The area covered is too broad, containing too many traffic zones and districts to warrant random assignment, and there are too many possible routes in to and out of the municipality.

- **Survey completed with respect to commercial vehicles.** Surveys completed with drivers of commercial vehicles (e.g., cars, trucks, vans, SUVs with business logos) were data entered. As it is common for contractors and business owners to use their business vehicle for personal uses as well, it was decided that surveys with drivers of commercial vehicles could be used as proxy data for travel in personal vehicles, as long as the purpose of travel was not commercial. Surveys for commercial vehicles with trip purposes of 'work related' were flagged for removal from the analysis, whereas clearly personal trip purposes were flagged for inclusion in the analysis.

There was less certainty as to how to treat trips made in commercial vehicles with the trip purpose of 'go to work': such trips could either be the first trip of the day to the respondent's place of work or a jobsite (in other words, equivalent to a personal trip) or could be a subsequent trip between job sites (equivalent to a business related trip). Therefore, such trips were examined in context of the time of day of

the trip, and the type of origin: for example, trips with a purpose of 'go to work' with an origin type of 'work' were flagged for removal from the analysis.

- **Opposite trips.** As noted earlier in this report, duplicate licence plates were eliminated from the licence capture survey: only one survey was sent out per respondent, and regarding only one trip. However, the survey was designed to capture information on whether the respondent had or would make a trip in the opposite direction on the same day as the survey, and the start time of such a trip. Therefore licence capture surveys could yield two trip records for analysis: (1) the original trip record for the trip surveyed and (2) a second record created from the first, but in the opposite direction. 'Opposite trip' were only created if supported by information from the original trip surveyed providing a reasonable degree of confidence as to the opposite trip's purpose, origin, time, etc, and only if the resulting time at the licence capture point was within the hours of the survey design. A total of 1,869 opposite trips were imputed using this method, though a small number were flagged for exclusion from the final dataset for unrelated reasons.

The same treatment could not be applied to 'opposite trips' for surveys obtained through the intercept survey method: respondents with repeat travel through one intercept site on a given day would have been flagged down each time and would already have been surveyed with respect to their 'opposite trips' as long as they took place within the hours of the survey frame.

- **Unusable survey data.** Trip data were deemed unusable and were flagged for removal from the data set to be used for analysis if the trips had any of the following problems: commercial vehicle with commercial purposes, unknown vehicle type and unknown trip purpose, destination could not be coded, origin could not be coded, or other issues with incomplete, infeasible or contradictory data. A total of 964 trip records were flagged for removal, or 5.2% of all trip records². These records have been flagged for removal but left in the data tables, as some of these records may be useable for other kinds of analysis, just not the current analysis. This figure includes some trip records created as 'opposite trips' which had other data issues of the kind just discussed.

4.3 Valid Survey Data by Site

After data validation, the creation of 'opposite trips' where appropriate, the identification of 'proxy trips' (e.g., from different time frames or for commercial vehicles with personal trip purposes) to supplement the data where appropriate, and removal of poor/unusable data, the final survey data set numbers 17,744 trip records.

The following tables illustrate the scope of the data collected by survey site. As indicated, inbound and outbound travel was relatively balanced at most sites, and the total usable trip records pre site varied from 369 for Site 9 (a low volume site) to 1,492 for Site 22 (a high

² It is typical in origin-destination surveys to have a percentage of records that are rejected due to incomplete or unusable trip information. 2.7% of all trip records were removed due to poor origin/destination data, and 2.5% of all trip records were removed for other reasons. The total proportion of records (5.2%) removed from this data set is reasonable for this research, especially considering that a number of the records removed were 'extra' data, such as trips intercepted outside of the survey hours or trips for commercial vehicles on commercial business, which were outside the survey frame.

volume site). Coverage of the hours of the survey frame is good for most sites, although it may be noted that a very few times of day at certain sites appear to be low. Provisions to address this have been undertaken in the final analysis of the data.

Comparing the number of trip records obtained by site in Table 4-2 to the number anticipated during survey planning, as outlined in Table 2-1, revealed that, for almost all of the intercept sites, the number of surveys obtained exceeded expectations, sometimes considerably. However, the survey returns for licence capture sites were often lower than expected, with the exception of site 22, which exceeded expectation. The total number of trip records gathered was in the general range of the expected total (when the exclusion of four potential intercept sites for budgetary reasons is accounted for). The lower returns for licence capture sites should be considered in future survey planning.

Table 4-2: Number of Valid Trips by Direction of Travel

Site #	Road	Data Collection Method	Inbound	Inbound Direction	Outbound	Outbound Direction	Total Trips
2	Hwy 417W (Near Arnprior)	Licence plate capture	338	East	363	West	701
4	Rd 20 (Kinburn Side Rd)	Intercept	365	East	265	West	630
5	Rd 49 (March Rd)	Intercept	399	East	448	West	847
6	Hwy 7 (Near Ashton Station Rd)	Licence plate capture	423	East	401	West	824
7	Rd 10 (Franktown Rd)	Intercept	428	East	267	West	695
8	Rd 6 (Roger Stevens Dr)	Intercept	395	East	235	West	630
9	Rd 2 (Donnelly Dr)	Intercept	221	East	148	West	369
10	Rd 44 (Merlyn Wilson Rd)	Intercept	381	North	325	South	706
11	Hwy 416 (River Rd)	Licence plate capture	359	North	354	South	713
12	Rd 19 (Rideau River Rd)	Intercept	452	North	354	South	806
13	Rd 25 (Stagecoach Rd)	Intercept	317	North	282	South	599
14	Rd 31 (Bank St)	Intercept	517	North	467	South	984
16	Rd 6 (Victoria St)	Intercept	349	West	319	East	668
17	Hwy 417E (Near Limoges)	Licence plate capture	575	West	543	East	1,129
18	Rd 33 (Rockdale Rd)	Intercept	467	North	518	South	985
20	Rd 26 (Russell Rd)	Intercept	446	West	318	East	764
21	Rd 28 (Colonial Rd)	Intercept	366	West	303	East	669
22	Rd 174 (West of Canaan Rd)	Licence plate capture	765	West	727	East	1,492
23	Rte 148 Est (près de Masson)	Intercept	433	West	439	East	872
24	Rte105 (Farrellton)	Intercept	454	South	324	North	778
25	Rte 309 (Notre-Dame-de-la-Salette)	Intercept	276	South	293	North	569
26	Rte148W (près de Quyon)	Intercept	254	East	335	West	589
27	Autoroute 50 (près de Thurso)	Intercept	388	West	337	East	725
GRAND TOTAL			9,368^(a)		8,365^(a)		17,744

Counts of inbound and outbound trips exclude valid trips for which it was not possible to assign a direction of travel from origin to destination as either inbound or outbound (e.g., both origin and destination were internal locations, or both origin and destination were external locations).

Table 4-3: Number of Valid Trip Records by Hour of Intercept or Licence Capture

			A.M. Survey Hours						P.M. Survey Hours				
Site #	Road	Data Collection Method	6	7	8	9	10	11	14	15	16	17	18
2	Hwy 417W (Near Arnprior)	Licence plate capture	48	69	65	63	53	45	59	76	97	87	39
4	Rd 20 (Kinburn Side Rd)	Intercept	72	101	67	55	79	29	65	45	37	50	30
5	Rd 49 (March Rd)	Intercept	50	87	93	56	41	64	95	114	93	56	98
6	Hwy 7 (Near Ashton Station Rd)	Licence plate capture	46	116	88	46	47	55	35	97	129	130	35
7	Rd 10 (Franktown Rd)	Intercept	116	109	68	79	29	50	57	56	41	62	28
8	Rd 6 (Roger Stevens Dr)	Intercept	84	105	85	71	15	33	56	65	40	55	21
9	Rd 2 (Donnelly Dr)	Intercept	36	74	50	31	42	41	35	31	21	7	1
10	Rd 44 (Merlyn Wilson Rd)	Intercept	76	113	108	54	64	52	113	39	72	14	1
11	Hwy 416 (River Rd)	Licence plate capture	17	76	85	80	71	48	17	65	79	138	37
12	Rd 19 (Rideau River Rd)	Intercept	59	93	85	41	66	40	83	78	76	122	63
13	Rd 25 (Stagecoach Rd)	Intercept	57	93	54	30	22	25	37	66	73	98	44
14	Rd 31 (Bank St)	Intercept	146	148	68	97	82	48	63	88	78	97	69
16	Rd 6 (Victoria St)	Intercept	108	112	81	58	68	15	114	52	58	2	
17	Hwy 417E (Near Limoges)	Licence plate capture	47	231	72	71	56	47	45	175	190	148	47
18	Rd 33 (Rockdale Rd)	Intercept	128	124	87	74	72	56	119	90	70	115	50
20	Rd 26 (Russell Rd)	Intercept	120	121	120	49	62	36	54	66	57	78	1
21	Rd 28 (Colonial Rd)	Intercept	87	84	84	38	17	42	55	86	82	67	27
22	Rd 174 (West of Canaan)	Licence plate capture	174	195	136	62	94	64	104	120	222	220	101
23	Rte 148 Est (près de Masson)	Intercept	51	110	97	46	78	67	41	114	74	117	77
24	Rte 105 (Farrellton)	Intercept	81	108	84	54	50	63	64	58	59	99	58
25	Rte 309 (Notre-Dame-de-la-Salette)	Intercept	31	70	46	14	48	59	28	74	74	73	52
26	Rte 148W (près de Quyon)	Intercept	32	61	74	33	45	40	28	66	47	90	73
27	Autoroute 50 (près de Thurso)	Intercept	74	127	86	54	59	59	50	57	52	71	36
GRAND TOTAL			1,740	2,527	1,883	1,256	1,260	1,078	1,417	1,778	1,821	1,996	988

The following table outlines the extent of C&O data gathered for the time frames of this survey (6:00 a.m. to 11:59 p.m., 2:00 p.m. to 6:59 p.m.). As mentioned earlier, it was not possible to conduct C&O counts at two survey sites: For these, historical C&O data were provided by the City of Ottawa for use in data weighting and other purposes, and are also listed in the table.

Table 4-4: Classification and Occupancy (C&O) Counts Obtained (11-hr Survey Period)

Site #	Road	Survey Data Collection Method	C&O Source, if different ^(a)	Personal Vehicles	Commercial Vehicles	Total
2	Hwy 417W (Near Arnprior)	Licence plate capture		6,737	1,356	8,093
4	Rd 20 (Kinburn Side Rd)	Intercept		1,288	118	1,406
5	Rd 49 (March Rd)	Intercept		8,316	901	9,217
6	Hwy 7 (Near Ashton Station Rd)	Licence plate capture		6,754	1,009	7,763
7	Rd 10 (Franktown Rd)	Intercept		2,546	254	2,800
8	Rd 6 (Roger Stevens Dr)	Intercept		2,182	236	2,418
9	Rd 2 (Donnelly Dr) ^(b)	Intercept		700	70	770
10	Rd 44 (Merlyn Wilson Rd) ^(b)	Intercept		2,040	328	2,368
11	Hwy 416 (River Rd) ^(a)	Licence plate capture	City of Ottawa May 26, 2008	10,699	1,041	11,740
12	Rd 19 (Rideau River Rd)	Intercept		1,932	238	2,170
13	Rd 25 (Stagecoach Rd)	Intercept		1,382	199	1,581
14	Rd 31 (Bank St)	Intercept		3,761	646	4,407
16	Rd 6 (Victoria St) ^(c)	Intercept		1,411	181	1,592
17	Hwy 417E (Near Limoges) ^(a)	Licence plate capture	City of Ottawa May 17, 2007	21,094	2,771	23,865
18	Rd 33 (Rockdale Rd)	Intercept		3,819	532	4,351
20	Rd 26 (Russell Rd)	Intercept		2,992	470	3,462
21	Rd 28 (Colonial Rd)	Intercept		1,899	230	2,129
22	Rd 174 (West of Canaan)	Licence plate capture		10,392	1,375	11,767
23	Rte 148 Est (près de Masson)	Intercept		3,442	690	4,132
24	Rte 105 (Farrellton)	Intercept		2,870	610	3,480
25	Rte 309 (Notre-Dame-de-la-Salette)	Intercept		1,220	181	1,401
26	Rte 148W (près de Quyon)	Intercept		1,669	228	1,897
27	Autoroute 50 (près de Thurso)	Intercept		2,691	688	3,379
GRAND TOTAL				101,836	14,352	116,188

Note: Counts exclude data gathered during time periods outside the survey time frames.

^(a) For the C&O sites where it had not been possible to conduct C&O counts as part of this research, historical C&O counts were provided by the City of Ottawa. For these sites, no C&O data is available for the 6:00 a.m. to 7:00 a.m. period.

^(b) Sites for which limited or no data were collected after 6:00 p.m. for logistical reasons.

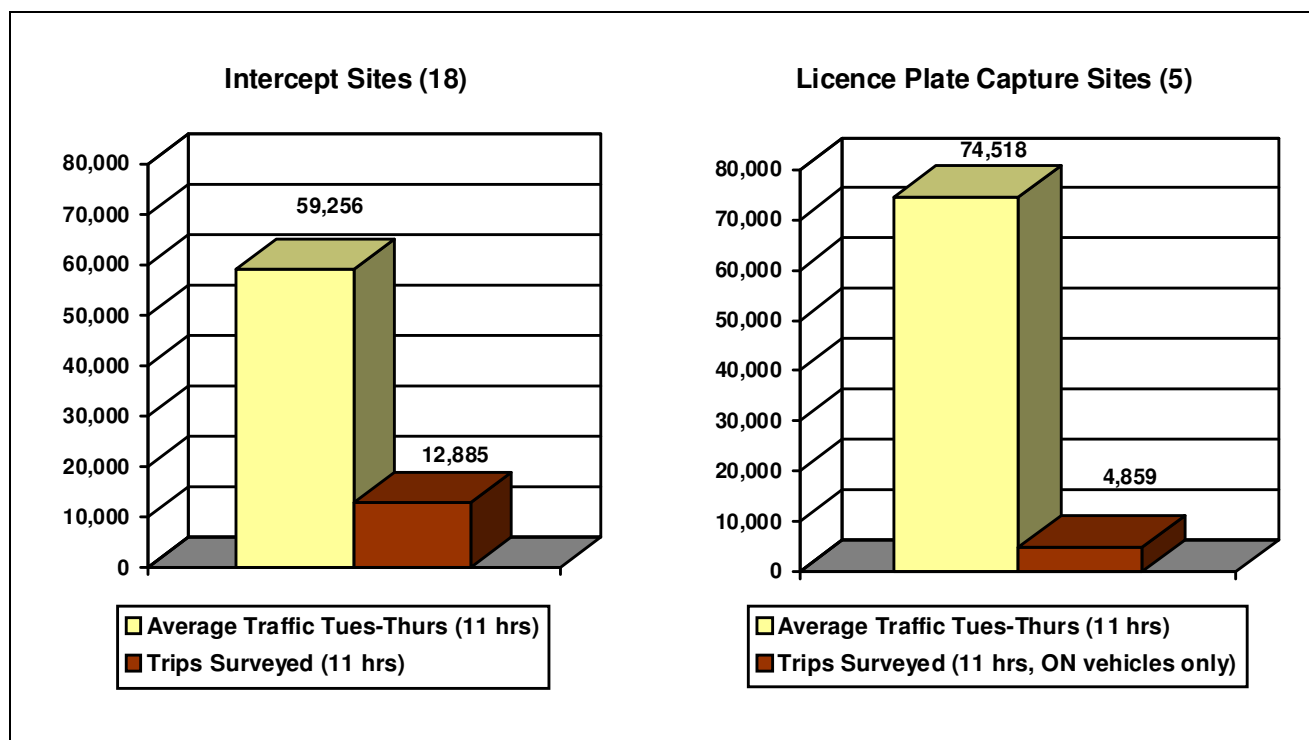
^(c) Site for which limited or no data were collected after 5:00 p.m. for logistical reasons.

4.4 Survey Coverage and Sample Error

The following figure summarizes the total average traffic at the licence capture and intercept sites observed in ATR counts (number of vehicles, including commercial traffic, in both directions on Tuesdays, Wednesdays, and Thursdays, during the 11 hours of the survey frame) and the number of valid trip records captured by the survey at those sites. At the 18 intercept sites, the survey captured 21.7% of the average Tuesday-Thursday traffic for the 11-hour period of interest (6 a.m. – noon, 2 pm to 7 pm). At intercept sites, all personal vehicles that could efficiently be flagged over were surveyed, regardless of vehicle origin.

At the five high traffic volume highway sites for which licence capture was undertaken, the survey returns represented 6.5% of the average Tuesday-Thursday traffic during the survey hours. In the use and interpretation of the data from licence capture sites, it should be emphasized that it was only possible to collect data from drivers of vehicles licensed in Ontario. For the purposes of data analysis or data modelling, it may be possible to introduce scaling factors based on the proportion of Ontario traffic out of all traffic, should such data be available for the sites of interest.

Figure 4-5: Proportion of Average Weekday Traffic Captured by the Survey (11-hour period)



The following table summarizes the coverage and the sampling error associated with the survey results by site, at a 95% confidence level (19 times out of twenty). Sampling error, or maximum variation, is the expected maximum difference between response proportions in sampled data and the true value for the full population.

Table 4-6: Coverage of Average Traffic Volumes and Sample Error, by Site

Site #	Road	Data Collection Method	Average 11-h Traffic Volume ^(a)	Number of Trips Surveyed	% of 11-h Survey Period Traffic Volume	Estimated Sample Error (± %) ^(b)
2	Highway 417 West (Near Arnprior) ^(c)	Licence plate capture	11,127	701	6.3%	3.7% (4.4%)
4	Rd 20 (Kinburn Side Rd)	Intercept	1,559	630	40.4%	3.9%
5	Rd 49 (March Rd)	Intercept	6,617	847	12.8%	3.4%
6	Highway 7 (Near Ashton station Rd)	Licence plate capture	11,444	824	7.2%	3.4% (4.2%)
7	Rd 10 (Franktown Rd)	Intercept	3,233	695	21.5%	3.7%
8	Rd 6 (Roger Stevens Dr)	Intercept	2,986	630	21.1%	3.9%
9	Rd 2 (Donnelly Dr)	Intercept	1,132	369	32.6%	5.1%
10	Rd 44 (Merlyn Wilson Rd)	Intercept	3,461	706	20.4%	3.7%
11	Highway 416 (River Rd)	Licence plate capture	14,854	713	4.8%	3.7% (4.3%)
12	Rd 19 (Rideau River Rd)	Intercept	2,732	806	29.5%	3.5%
13	Rd 25 (Stagecoach Rd)	Intercept	1,908	599	31.4%	4.0%
14	Rd 31 (Bank St)	Intercept	5,020	984	19.6%	3.1%
16	Rd 6 (Victoria St)	Intercept	2,328	668	28.7%	3.8%
17	Hwy 417 East (Near Limoges) ^(c)	Licence plate capture	21,712	1,129	5.2%	2.9% (3.6%)
18	Rd 33 (Rockdale Rd)	Intercept	4,876	985	20.2%	3.1%
20	Rd 26 (Russell Rd)	Intercept	4,366	764	17.5%	3.5%
21	Rd 28 (Colonial Rd)	Intercept	2,534	669	26.4%	3.8%
22	Rd 174 (West of Canaan Rd)	Licence plate capture	15,381	1,492	9.7%	2.5% (3.2%)
23	Rte 148 Est (près de Masson I)	Intercept	5,519	872	15.8%	3.3%
24	Rte 105 (Farrellton)	Intercept	3,202	778	24.3%	3.5%
25	Rte 309 (Notre-Dame-de-la Salette)	Intercept	1,729	569	32.9%	4.1%
26	Rte 148 Ouest (près de Quyon)	Intercept	2,198	589	26.8%	4.0%
27	Autoroute 50 (près de Thurso III)	Intercept	3,856	725	18.8%	3.6%
GRAND TOTAL			133,774	17,744	13.3%	0.7%

^(a) 11-h survey period traffic volumes are based on the average weekday (Tuesday, Wednesday and Thursday) traffic volumes for the following periods: 6:00 -11:59 and 14:00 – 18:59 and include commercial vehicles. Data were obtained from automated traffic counts undertaken by MTO, MTQ and City of Ottawa during the time of the surveys.

^(b) For licence capture sites, sample error was calculated using two methods: using the number of surveys as 'n', yielding a higher value of sample error listed in brackets; and using the number of trips as 'n' (for such sites, trips in the opposite direction were created from the survey data) yielding a lower sample error. While adding 'opposite trips' to the data set increases the amount of useable data thus increasing the accuracy and reducing sample error, the opposite trips added are not strictly randomly sampled, which may negatively affect sampling error. The actual sample error would fall somewhere between these two numbers.

^(c) Site for which ATR data were not collected during the survey.

With from 701 to 1,492 valid completions by licence capture site, the estimated sampling error for each licence capture site ranges from $\pm 3.1\%$ to $\pm 2.5\%$ (at a 95% confidence level).³ Again, it should be emphasized that data for the licence capture sites represent only the travel of Ontario-based drivers.

With from 369 to 985 valid survey completions by intercept site, the estimated sampling error for each site ranges from $\pm 5.1\%$ to $\pm 3.7\%$ (at a 95% confidence level). It may be noted that for the intercept site with the fewest valid surveys (369, site 9), those surveys nevertheless represent a good proportion (33%) of the average traffic at that site during the survey hours, and it may not have been practicable to obtain additional surveys with the allocated survey resources (as field staff had to wave through a certain amount of traffic to avoid backups, particularly during rush hours and other heavier waves of traffic).

The sampling errors presented in the table are estimates, and are based on unweighted data. Unequal data weighting can introduce sampling design effects that may affect the sampling error.

It is important to note that the sampling errors for smaller subsets of the data will be greater than those listed here.

4.5 Data Weighting and Data Analysis

An approach to data weighting was developed in collaboration between the consultants (R.A. Malatest & Associates Ltd and HDR/iTRANS), and representatives on the client side. The weighting approach is based on C&O counts and/or ATR counts where applicable, and uses proxy data where appropriate to compensate for the occasional survey hour for which there were few valid surveys obtained.

As mentioned earlier, data weighting may affect the estimated sampling error if there is a wide range of variation in the data weights. Data weighting may also affect the accuracy with which the survey data represent actual traffic at the survey sites: If unusual or exceptional data are amongst the survey observations, data weighting may over-emphasize such unusual results. As with any survey research, while the whole of the survey results may be representative of the surveyed population as a whole, survey statistics based on small subsets of the data may occasionally reflect the influence of data anomalies.

HDR/iTRANS, the transportation analysis and planning experts on the consultants' team, undertook detailed analysis of the survey data and the preparation of an analytic report including tables and maps presenting the results. The consultants worked together to troubleshoot any data issues identified during the analysis phase. The results of the research analysis are presented in detail under a separate cover.

³ Sample error for licence capture sites computed using the total number of trips records (n). At licence capture sites, some trip records were created from surveys which indicated the time of day a trip occurred along the same route in the opposite direction, but only if the origin and trip purpose information suggested a logical opposite trip with switched origin and destination. While the sample error estimate associated with licence capture sites is improved on by the addition of opposite trips, it may be affected by the guaranteed (rather than entirely random) sampling of such opposite trips.

SECTION 5: RECOMMENDATIONS FOR FUTURE SURVEYS

Based on the experience with the 2009 External Travel survey, potential improvements could be achieved in future surveys with regards to their planning and implementation. Each of the following suggestions could help achieve a more efficient, high-quality survey project:

- **Web-Based Questionnaire.** The licence capture mail-out/mail-back approach employed in this survey for high volume sites would be best supplemented by a web-based questionnaire as an optional alternative to completing and mailing a form. In this mixed-mode approach, the mail-out survey would be accompanied by instructions on how to log on to a secure website address for the on-line survey. Mixed mode surveys are a proven way of increasing response rates and reducing non-response bias from those who are less likely to respond via one mode or the other. The on-line questionnaire would allow users to select responses from various drop-down lists and could include provisions to automatically geo-code certain locations. This would increase the efficiency of the coding process.
- **Greater Adherence to Planned Survey Periods.** In the 2009 survey, there was some variance from the planned survey times and/or dates due to weather and/or logistical concerns such as the availability of trained staff. If the survey were to be conducted again, provisions would be made to ensure that additional 'spares' received the full traffic management and survey training to ensure that staff were available to do the survey on all dates in any eventuality (staff illness, quits, etc.), and to ensure adherence to the prescribed survey hours and methodology. That stated, some eventualities (such as inclement weather) cannot always be predicted, and occasional interruptions in the data schedule may occur despite the best planning efforts.
- **Improved Licence Data Entry/Address Retrieval Protocols.** Improvements could be made to the licence capture/address retrieval process to ensure entire (rather than partial) data files for a given site would be sent to MTO⁴ and to ensure efficient turn around of the mail-out process.
- **Inclusion of Vehicles Licensed in Quebec in the Mail Out Survey Methodology.** At the time of the survey, due to privacy considerations, it was not possible to undertake licence capture at Quebec highway sites at the perimeter of the survey region, nor was it possible to retrieve addresses for Quebec licence plates recorded at Ontario licence capture sites. Therefore the trip data for the licence capture sites reflects travel by Ontario residents only.⁵ Clearance to undertake address retrieval

⁴ Even if it would mean a delay to complete data entry, working with a complete file would eliminate the bias towards eliminating p.m. duplicate licence observations over a.m. observations due to a.m. observations having already been data entered and sent to MTO the night before, and would reduce duplication of effort (carrying out the same steps twice for one intercept site).

⁵ The lack of data for Quebec-based travelers at the five high volume licence capture sites is an important consideration in both the interpretation of the survey results and in the use of the data for transportation modelling purposes. It is not known at this writing whether external data sources may be used to

through MTQ in order to mail out surveys to travellers passing through high volume sites would significantly improve the coverage of the data set.

- **Use of Electronic Capture for Classification and Occupancy (C&O) Counts.** C&O counts would be best achieved if there were an electronic means of recording the data on-site as the observation is made, but devices like this could not be provided by the city this year. Instead C&O counts were recorded on paper by surveyors, necessitating additional data entry at a later time. Overall, on-site electronic devices would be expected to enhance the accuracy of the vehicle counts obtained.
- **Full Automated Traffic Reader (ATR) Counts at all Relevant Sites.** ATR counts at certain licence capture sites were required for weighting and comparison purposes for the analysis being conducted by the Consultant's partner through subcontract on this project, HDR/iTRANS. Historical data from previous years were used when 2009 ATR counts were not available, however, it is recommended that all counts used be of the same general vintage (including time of year).
- **Police Presence at all Sites.** Police presence at all sites regardless of the size of the site would improve safety and lend legitimacy to the project. For example, during rush hour data collection, even at low volume sites, when there was no police presence, some drivers felt free to bypass the traffic barriers and avoid the survey altogether. Having police on-site would allay any scepticism about the legitimacy of the research and likely increase participation.

appropriately rescale the traffic counts at these sites to reflect only travel of Ontario residents, or to model travel by Quebec residents.

Appendix A: Survey Forms

Appendix A: Survey Forms

Intercept



UN COMITÉ CONJOINT POUR LA PLANIFICATION DES TRANSPORTS
DANS LA RÉGION DE LA CAPITALE NATIONALE

A JOINT TRANSPORTATION PLANNING COMMITTEE
SERVING THE NATIONAL CAPITAL REGION

2009 EXTERNAL TRAVEL SURVEY

Date: _____ Time: _____ ☐ AM ☐ PM

Location (Station Code): _____

Direction: ☐ Northbound ☐ Eastbound ☐ Southbound ☐ Westbound

OBSERVE – Do not ask type of vehicle or license plate information. Also do not ask number of occupants unless unclear.

Vehicle License? ☐ Ontario ☐ Quebec ☐ Canada - Other ☐ USA

7. Vehicle Type? ☐ Personal car/truck/van/SUV ☐ Motorcycle
☐ Commercial car/truck/van/SUV ☐ Other (please specify): _____

8. Total Number of occupants in the vehicle, including driver? _____

READ: Hello, we are conducting a short survey about travel across the National Capital Region. Could we ask you a few quick questions about your trip today?
Completion of the survey is **voluntary**.

1. Where did your trip start? (Provide location details in the space below.)

Name of place or nearest major intersection: _____

Town/City: _____

Province/State: _____

2. At what time did your trip start? _____ ☐ AM ☐ PM

3. What best describes the location where you started your trip? (Check one box only.)

☐ Home ☐ Work ☐ School ☐ Other (please specify): _____

4. Where will your trip end? (Provide location details in the space below.)

Name of place or nearest major intersection: _____

Town/City: _____

Province/State: _____

5. At what time do you expect to arrive at your destination? _____ ☐ AM ☐ PM

6. What is the purpose of your trip? (Check one box only.)

☐ Go to work	☐ Go to business related to work
☐ Go to school	☐ Go shopping / go to restaurant
☐ Visit friends/family	☐ Medical/dental visit
☐ Drop someone off / pick someone up	☐ Tourism / recreation
☐ Return home	☐ Other (please specify): _____

9. Did you use or will you use an OC Transpo/STO Park-and-Ride facility for any part of this trip? ☐ Yes ☐ No

If yes, which facility? (Name of facility) _____

10. Did you make or will you make a trip on this route in the opposite direction today? ☐ Yes ☐ No

If yes, at what time was it / will it be made? _____ ☐ AM ☐ PM

11. How often do you make this trip? (Check one box only.)

☐ Once daily	☐ 2 or more times each day
☐ Once weekly	☐ 2 or more times per week
☐ Other (specify): _____	

THANK YOU FOR YOUR PARTICIPATION IN THIS SURVEY



Étude sur les déplacements externes de 2009

Date: _____ Heure: ____ h ____ ☐ AM ☐ PM

Lieu (code du site): _____

Direction: ☐ Nord ☐ Est ☐ Sud ☐ Ouest

OBSERVATIONS – Ne pas poser de question au sujet du type de véhicule ou de la plaque d'immatriculation. De plus, ne pas poser de question au sujet du nombre d'occupants, sauf si vous ne pouvez le déterminer.

Plaque d'immatriculation du véhicule? ☐ Ontario ☐ Québec ☐ Canada - Autre ☐ États-Unis

7. Type de véhicule? ☐ Voiture/camion/VUS personnel(le) ☐ Motocyclette
☐ Voiture/camion/VUS commercial(e) ☐ Autre (SVP préciser): _____

8. Nombre total d'occupants dans le véhicule, incluant le conducteur? _____

LIRE: Bonjour, nous effectuons une étude au sujet des déplacements dans la région de la capitale nationale. Est-ce que nous pourrions rapidement vous poser quelques questions au sujet de votre déplacement actuel?

Le choix de répondre à ce questionnaire se fait sur une base **volontaire**.

1. D'où êtes-vous parti(e) pour ce déplacement? (Donnez des informations sur la localisation dans l'espace qui suit.)

Nom du lieu ou de l'intersection majeure la plus proche : _____

Ville/Mun. : _____

Province/État : _____

2. Quelle était l'heure de départ de ce déplacement ? _____ h ____ ☐ AM ☐ PM

3. Qu'est-ce qui décrit le mieux le lieu de départ de votre déplacement? (Cocher une case seulement.)

☐ Domicile ☐ Travail ☐ École ☐ Autre (SVP préciser): _____

4. Où se terminera votre déplacement? (Donnez des informations sur la localisation dans l'espace qui suit.)

Nom du lieu ou de l'intersection majeure la plus proche : _____

Ville/Mun. : _____

Province/État : _____

5. À quelle heure prévoyez-vous arriver à votre destination? _____ h ____ ☐ AM ☐ PM

6. Quel est le but de votre déplacement? (Cocher une case seulement.)

☐ Aller ou retour du travail ☐ Déplacement d'affaires lié au travail
☐ Études ☐ Magasinage / restaurant
☐ Visite d'amis / famille ☐ Médecin / dentiste
☐ Reconduire / aller chercher une personne ☐ Tourisme / loisirs
☐ Retour à domicile ☐ Autre (SVP préciser): _____

9. Est-ce qu'un parc de stationnement incitatif de OC Transpo ou de la STO a été ou sera utilisé lors de ce déplacement? ☐ Oui ☐ Non

Si oui, dans quel parc? (Nom du parc de stationnement) _____

10. Est-ce qu'un déplacement a été ou sera effectué sur la même route en direction inverse aujourd'hui?

☐ Oui ☐ Non

Si oui, à quelle heure a-t-il été / sera-t-il effectué? _____ h ____ ☐ AM ☐ PM

11. Quelle est la fréquence de ce déplacement? (Cocher une case seulement.)
☐ Une fois par jour ☐ 2 fois ou plus par jour
☐ Une fois par semaine ☐ 2 fois ou plus par semaine
☐ Autre (préciser): _____

NOUS VOUS REMERCIONS D'AVOIR PARTICIPÉ À CETTE ÉTUDE

Mail-out



2009 EXTERNAL TRAVEL SURVEY

Dear Motorist:

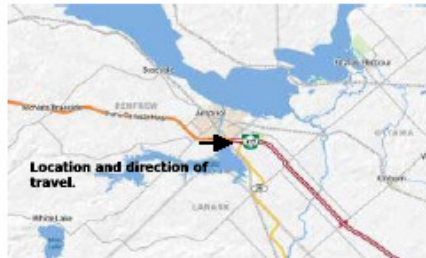
TRANS, a governmental transportation planning committee, is conducting a survey to identify travel characteristics to, from and through the National Capital Region (NCR), including City of Ottawa and Ville de Gatineau.

The information you provide is important for future transportation planning in the NCR, eastern Ontario and western Quebec.

Completion of the survey is **voluntary**.

If you or a member of your household were driving a vehicle at the following location on **TUESDAY, MAY 19, 2009**, please take a few minutes to complete the survey below:

Time: **7:30 AM**
Location: **HIGHWAY 417 / Rd 29**
Direction: **EASTBOUND**



Personal information will not be collected during this survey. The information you provide is treated in **confidence** and will be much appreciated. The information will be used only for the purpose of transportation planning. Questions about this survey and data collection can be directed to Ahmad Subhani, City of Ottawa, 4th Floor, 110 Laurier Ave West, Ottawa, ON, K1P 1J1, or you can call toll free 1-800-268-4686 or 416-235-4686. Information about the survey is also provided at www.ncr-trans-rcn.ca

When you have completed the survey, please place it in the addressed envelope provided and mail it as soon as possible. No postage required.

ABOUT YOUR TRIP

Station Code -- 417W-EB-01

1. Where did your trip start? (Provide location details in the space below.)

Name of place or nearest major intersection: _____

Town/City: _____

Province/State: _____

2. At what time did your trip start? (Write in the time and check one box.) _____ ☐ AM ☐ PM

3. What best describes the location where you started your trip? (Check one box only.)

☐ Home ☐ Work ☐ School ☐ Other (please specify): _____

4. Where did your trip end? (Provide location details in the space below.)

Name of place or nearest major intersection: _____

Town/City: _____

Province/State: _____

5. At what time did you arrive? (Write in the time and check one box.) _____ ☐ AM ☐ PM

6. What was the purpose of your trip? (Check one box only.)

☐ Go to work	☐ Go to business related to work
☐ Go to school	☐ Go shopping / go to restaurant
☐ Visit friends/family	☐ Medical/dental visit
☐ Drop someone off / pick someone up	☐ Tourism / recreation
☐ Return home	☐ Other (please specify): _____

7. What type of vehicle was used? (Check one box only.) ☐ Personal car/truck/van/SUV ☐ Motorcycle
☐ Commercial car/truck/van/SUV ☐ Other (please specify): _____

8. How many people were travelling in the vehicle, including yourself? _____ (Write the number in.)

9. Did you use an OC Transpo Park-and-Ride facility for any part of this trip? (Check one box only.) ☐ Yes ☐ No

If yes, which facility? (Name of facility) _____

10. If you made a trip along the same route in the opposite direction on this day, at what time was it made?

(Write in the time and check one box.) _____ ☐ AM ☐ PM

11. How often do you make this trip? (Check one box only.)
☐ Once daily ☐ 2 or more times each day
☐ Once weekly ☐ 2 or more times per week
☐ Other (specify): _____

THANK YOU FOR YOUR PARTICIPATION IN THIS SURVEY





UN COMITÉ CONJOINT POUR LA PLANIFICATION DES TRANSPORTS
DANS LA RÉGION DE LA CAPITALE NATIONALE

A JOINT TRANSPORTATION PLANNING COMMITTEE
SERVING THE NATIONAL CAPITAL REGION

Étude sur les déplacements externes de 2009

Cher/Chère automobiliste:

Le Comité TRANS, qui regroupe les autorités gouvernementales de la région en matière de planification des transports, mène une étude afin d'identifier les caractéristiques des déplacements en provenance ou à destination de la région de la capitale nationale (RCN), qui comprend notamment la ville d'Ottawa et la ville de Gatineau. Les déplacements en transit dans la région font aussi l'objet de cette étude.

Les informations que vous nous transmettez sont importantes pour la planification future des transports dans la RCN, l'ouest du Québec et l'est de l'Ontario.

Le choix de répondre à ce questionnaire se fait sur une base **volontaire**.

Si vous ou un(e) membre de votre ménage conduisait un véhicule à l'endroit suivant le **MARDI 19 MAI 2009**, veuillez svp prendre quelques minutes afin de compléter le questionnaire ci-dessous:

Heure: **7 : 30 AM**
Lieu: **AUTOROUTE 417 / Ch 29**
Direction: **Est**



Aucun renseignement personnel ne sera recueilli au cours de cette étude. Les informations que vous nous transmettez seront très appréciées et traitées **en toute confidentialité**. Les données récoltées ne serviront qu'à des fins de planification des transports. Si vous avez des questions au sujet de cette étude ou de la cueillette de données, faites les parvenir à M. Ahmad Subhani, Ville d'Ottawa, 4^e étage, 110, avenue Laurier Ouest, Ottawa (Ontario), K1P 1J1 ou téléphonez sans frais au 1-800-268-4686 ou au 416-235-4686. Des renseignements au sujet de cette étude sont également disponibles sur le site www.ncr-trans-rcn.ca.

Lorsque vous aurez rempli ce questionnaire, veuillez svp l'insérer dans l'enveloppe pré-adressée qui l'accompagne et l'envoyer par la poste le plus tôt possible. Aucun frais de poste n'est requis.

À PROPOS DE VOTRE DÉPLACEMENT

Code du site - 417W-EB-01

1. D'où êtes-vous parti(e) pour ce déplacement? (Donnez des informations sur la localisation dans l'espace qui suit.)

Nom du lieu ou de l'intersection majeure la plus proche : _____

Ville/Mun. : _____

Province/État : _____

2. Quelle était l'heure de départ de ce déplacement? (Inscrire l'heure et cocher une case.) ____ h ____ ☐ AM ☐ PM

3. Qu'est-ce qui décrit le mieux le lieu de départ de votre déplacement? (Cocher une case seulement.)

☐ Domicile ☐ Travail ☐ École ☐ Autre (SVP préciser): _____

4. Où s'est terminé votre déplacement? (Donnez des informations sur la localisation dans l'espace qui suit.)

Nom du lieu ou de l'intersection majeure la plus proche : _____

Ville/Mun. : _____

Province/État : _____

5. À quelle heure êtes-vous arrivé(e)? (Inscrire l'heure et cocher une case.) ____ h ____ ☐ AM ☐ PM

6. Quel était le but de votre déplacement? (Cocher une case seulement.)

☐ Aller ou retour du travail ☐ Déplacement d'affaires lié au travail
☐ Études ☐ Magasinage / restaurant
☐ Visite d'amis / famille ☐ Médecin / dentiste
☐ Reconduire / aller chercher une personne ☐ Tourisme / loisirs
☐ Retour à domicile ☐ Autre (SVP préciser): _____

7. Quel est le type de véhicule utilisé? ☐ Voiture/camion/VUS personnel(le) ☐ Motocyclette (Cocher une case seulement.) ☐ Voiture/camion/VUS commercial(e) ☐ Autre (SVP préciser): _____

8. Combien de personnes étaient à bord du véhicule, y compris vous-même? ____ (Inscrire le nombre de personnes.)

9. Vous êtes-vous garé dans un parc de stationnement incitatif de OC Transpo lors de ce déplacement?

(Cocher une case seulement.) ☐ Oui ☐ Non

Si oui, dans quel parc? (Nom du parc de stationnement) _____

10. Si un déplacement a été effectué sur la même route en direction inverse, à quelle heure ce déplacement a-t-il été effectué? (Inscrire l'heure et cocher une case.) ____ h ____ ☐ AM ☐ PM

11. Quelle est la fréquence de ce déplacement? (Cocher une case seulement.)

☐ Une fois par jour ☐ 2 fois ou plus par jour
☐ Une fois par semaine ☐ 2 fois ou plus par semaine
☐ Autre (préciser): _____

NOUS VOUS REMERCIONS D'AVOIR PARTICIPÉ À CETTE ÉTUDE

