



2007 Niagara Border Crossing Origin-Destination Survey



**Prepared for:
URS Canada Inc.
Ministry of Transportation Ontario**

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PROJECT SUMMARY

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ORIGIN-DESTINATION SURVEY**

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EXECUTIVE SUMMARY

During the month of July 2007, a comprehensive passenger vehicle survey was conducted at the four international border crossings between Ontario and New York. The study was a bi-national initiative of a number of Canadian and American transportation agencies, with the Ministry of Transportation Ontario (MTO) and the Greater Buffalo-Niagara Regional Transportation Council acting as lead agencies. The overall study activities and findings are outlined herein and are summarized below.

The travel survey was conducted for one 24-hour weekday and one 24-hour weekend day at the following international bridges between July 10 and July 29, 2007:

- ▶ Peace Bridge,
- ▶ Queenston-Lewiston Bridge,
- ▶ Rainbow Bridge, and
- ▶ Whirlpool Bridge

The survey netted a total of 29,214 travel surveys (after cleaning and logic checks), for an overall sample rate of 33.8% of the passenger vehicles crossing the international border during the survey period. The data collected has been used to create a comprehensive database of cross-border travel that will provide the necessary information for the participating agencies to carry out studies of travel characteristics and transportation requirements in this corridor.

E.S.1 General Findings

There are several key findings that are highlighted throughout the report and include:

- ▶ During the survey period, a total of about 51,000 vehicles passed through the survey area during the weekend time period and represent 59% of the total observed traffic. 16,333 surveys were retained after data cleaning for a sample rate of 32%. 35,480 vehicles were recording during the weekday time period and represent 41% of the total observed traffic. A total of 12,881 surveys were retained after data cleaning for a sample rate of 36.3%.
- ▶ There is a high degree of tourist related travel on the bridges, both during the weekend and weekday survey periods.
- ▶ The bridges serve predominantly local traffic (travel between Niagara and Erie Counties in New York and Niagara Region in Canada) on both the weekend (42%) and during the week (54%), with a higher percentage of intermediate and long distance trips on the weekend.

E.S.2 Vehicle Characteristics

The registered state or province of the license plate of each passenger vehicle entering the survey area was recorded. Ontario and New York plates comprised 78.5% of the vehicles on the weekend and 80.4% of the vehicles during the week at the four bridges. United States license jurisdictions accounted for 68.8% of the weekend trips and 55.6% of the weekday trips and Canadian license jurisdictions accounted for 31.2% of the weekend trips and 44.4% of the weekday trips.

Autos (including vans, pickups and sport utility vehicles) accounted for 96% or more of the vehicles crossing the border on both the weekend and weekday. The average vehicle occupancy was found to be 2.52 persons on the weekend and 2.09 persons during the week. It is noted that truck traffic was not included in the survey.



E.S.3 Trip Characteristics

The most common activity at the Canadian trip destination for New York-plated vehicles was recreation and entertainment (28.3%) on the weekend and (31.2%) during the week. The most common destination of Ontario-plated vehicles was shopping in the United States during the weekend (27.7%) and during the weekdays (24.2%).

Other trip characteristics of note are:

- ▶ Tourism related activities account for about 70% of the travel into Ontario on both the weekend and during the week. Tourism related activities include recreation and entertainment, vacation, tourist attraction and casino trip purposes and is similar to the tourism grouping from the 2000 survey
- ▶ Traditional home and school travel accounts for about 3% of the Ontario bound travel on the weekend and less than 1% during the week.
- ▶ Work trips account for about 2% of the Ontario bound travel on the weekend and about 8% during the week.
- ▶ Trips into New York for traditional home and school related activities is about 2% of the total trips on the weekend and 3% during the week.
- ▶ Work related trips into New York account for about 7% of the weekend travel and about 23% of the weekday travel across the bridges.
- ▶ About 13% of the trips made by Ontario-plated vehicles were to visit friend/relatives in New York State on the weekend and about 12% during the weekday.
- ▶ "Other" trips represent about 14% of the travel into New York for Ontario vehicles both on the weekend and during the week, while "Other" trip purposes accounted for only about 3% for New York-plated vehicles entering Ontario on the weekend and 4% during the week.

E.S.4 Spatial Characteristics of Data

Local trips are defined to represent travel between Niagara Region to Erie or Niagara County, New York. Intermediate length trips are defined to represent travel between Niagara Region or Erie and Niagara Counties to/from destinations outside these areas such as The City of Hamilton in Ontario and Rochester in New York. Long distance trips are defined as having no origin or destination within Niagara Region and Erie and Niagara Counties.

It was generally found that the bridges served a high proportion of local traffic. However the Queenston-Lewiston Bridge has a higher proportion of intermediate/long distance crossings. More specifically:

- ▶ Local trips (between Niagara Region in Ontario and Erie and Niagara Counties in New York) account for 42% of the weekend crossings and 54% of the weekday crossings.
- ▶ The Whirlpool Bridge accommodates a large percentage of local trips at 82% (of total trips at this bridge) on the weekend and 88% during the week.
- ▶ Queenston-Lewiston Bridge serves as the main crossing for long-distance trips at 37% of its total trips on the weekend and 26% of its total weekday trips. Local traffic represents 15% and 28% of the traffic on the weekends and weekdays respectively.
- ▶ Both the Rainbow Bridge (about 43%) and Peace Bridge (53%) accommodate a significant amount of local traffic on the weekend. During weekdays, local traffic at the Rainbow Bridge increases to 54% while the Peace Bridge local trips increase to 65% of the total at this bridge.



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1.0 INTRODUCTION

1.1 Overview

Paradigm Transportation Solutions Ltd. (Paradigm) was retained by URS Canada Inc. (URS) in July 2007 to conduct a roadside interview survey of the origins, destinations and trip characteristics of cross-border passenger vehicle traffic traveling between Ontario and New York at the four international bridge crossings across the Niagara River: Peace Bridge, Queenston-Lewiston Bridge, Rainbow Bridge and Whirlpool Bridge. The survey information and resulting analyses will provide critical input into the Ministry of Transportation Ontario's (MTO) Niagara to Greater Toronto Area (GTA) Corridor Planning and Environmental Study. This information will also support on-going and subsequent local planning initiatives on both sides of the border.

The Cambridge office of Paradigm served as the overall lead for the origin-destination (O-D) survey and comprised a team of transportation, data collection and data management experts. The approach, scope of work and level of effort to undertake the July 2007 survey was similar to that employed by URS in the design and conduct of the August 2000 survey conducted at the same locations. The detailed study approach and resulting analyses are outlined herein.

1.2 Background

An origin-destination survey of passenger vehicles crossing the four international bridges on the Niagara frontier was last conducted in August 2000 to capture information on the nature of the cross-border travel between Ontario and New York on the Peace, Queenston-Lewiston, Rainbow and Whirlpool Bridges. The survey took place over a period of 1½ weeks near the end of August and involved 19,500 interviews of vehicle drivers conducted in a roadside intercept format. Similar survey information on passenger vehicles had previously not been collected on either side of the border since 1990.

This project was conducted as a bi-national initiative with the MTO as the lead agency for the project with the following participating agencies:

- ▶ Greater Buffalo-Niagara Regional Transportation Council (GBNRTC), New York;
- ▶ Regional Municipality of Niagara (RMON), Ontario;
- ▶ New York State Department of Transportation (NYSDOT), New York;
- ▶ Niagara Falls Bridge Commission, United States and Canada;
- ▶ Buffalo and Fort Erie Public Bridge Authority, United States and Canada; and
- ▶ Canada Border Services Agency

The MTO is currently carrying out a Niagara to GTA Corridor Planning and Environmental Assessment Study that will look at all options to add capacity to the transportation corridor that links Niagara to the GTA. Understanding the international travel patterns in this corridor is critical since the EA Act requires a proponent to fully demonstrate the need for their proposed undertaking. Up-to-date traffic information is necessary to support this initiative and the results of this survey provide the support.



1.3 Study Purpose and Scope

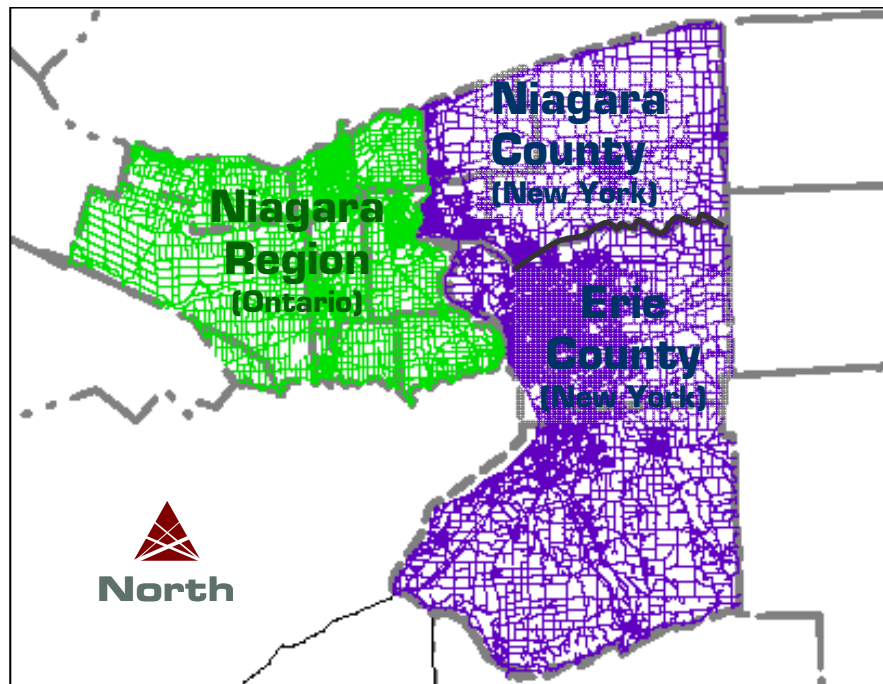
The main objective of this assignment was to develop a database of cross-border passenger vehicle travel characteristics in support of the Niagara to GTA Corridor Planning and EA study. The data includes information about 2007 summer traffic on one weekday and one weekend day in both directions at each bridge in July 2007. The information was collected in July in order to capture the tourist as well as regular bridge traffic. Additionally, the data will be used by the Region of Niagara and the Greater Buffalo-Niagara Regional Transportation Council (GBNRTC) to support their travel demand forecasting models and evaluation of border related projects.

This data will also be made available to the Niagara Falls Bridge Commission, Peace Bridge Authority, Canada Border Services Agency and tourism agencies to support project planning, economic analyses and program evaluation.

1.4 Study Area

The internal study area is shown in **Figure 1.1** and includes the Region of Niagara on the Canadian side and the Counties of Niagara (northerly) and Erie (southerly) on the U.S. side. While there is interest in finding out from the survey what the origin and destination patterns are for this internal area, there is also interest in determining the trip patterns into the external areas, affecting the need for inter-regional and international transportation facilities.

Travel across the international bridges is affected by the distribution of population in the study area. The largest population of residents is centred in Buffalo (approximately 1.1 million people), with the largest urban concentrations on the Canadian side located at Niagara Falls, Ontario (about 82,000) and St. Catharines, Ontario (about 132,000). The GTA is located about 130 km west of the border and represents the largest economic market in the vicinity with a population of about five million people. It is the overall interaction of residents on both sides of the border through trade, tourism, shopping and social and business activities that determines the amount of travel across the international bridges.



2007 Cross-Border O-D Survey

Figure 1.1



**Internal
Study Area**



2.0 SURVEY DESIGN

2.1 Design of the Interview Questionnaire

The survey form was consistent with that used in 2000 in that it collected the following information:

- ▶ Form identifiers: date, location, time, travel direction and surveyor initials;
- ▶ Vehicle type;
- ▶ Vehicle occupancy including driver plus passengers;
- ▶ License plate jurisdiction;
- ▶ Journey information: trip start and end locations, trip purpose activity;
- ▶ Extended journey information; and
- ▶ Additional tourism related questions: enjoyment of experience (if tourist related attraction), if staying overnight, if they made a reservation and home state or province.

Aside from safety, the roadside survey questionnaire is the most important element of the project since it represents the direct interface between the traveler (the source of information) and the ultimate database. It should be noted that the questionnaire did not represent the sole source of contact with respondents as limited basic data was collected before the main interview and drivers were initially screened to obtain cooperation as participation in the survey was voluntary.

The survey questionnaire is shown in **Figure 2.1** below. Each survey sheet was printed with a unique identification number to ensure that each survey record would be independent and traceable if required.

2.2 Development of Survey Schedule

The interviews were collected over a 24-hour period during a typical tourist weekday and a typical tourist weekend day in July 2007. The interviewing schedule recognized the need to avoid holiday weekends as traffic patterns on the days before, during and after holiday weekends are not “typical” of the rest of the month. The design also recognized the need to collect data for both U.S. and Canadian inbound traffic at the Peace, Queenston-Lewiston and Rainbow Bridges for a 24 hour period and at the Whirlpool Bridge for a 16 hour period since it only operates between 7 am and 11 pm. In order to facilitate data collection for a 24-hour period, three eight hour shifts (two in the case of Whirlpool Bridge) were scheduled and staffed. The schedule primary days were as follows:

- ▶ Tuesday, July 10: Queenston-Lewiston Bridge and Rainbow Bridge Canada-bound;
- ▶ Wednesday, July 11: Queenston-Lewiston Bridge and Rainbow Bridge U.S.-bound;
- ▶ Saturday, July 14: Queenston-Lewiston Bridge and Rainbow Bridge Canada-bound;
- ▶ Sunday, July 15: : Queenston-Lewiston Bridge and Rainbow Bridge U.S.-bound;
- ▶ Tuesday, July 17: Peace Bridge and Whirlpool Bridge Canada-bound;



Niagara Cross-Border Travel Survey Form					
Date Month <input type="text"/> <input type="text"/> Day <input type="text"/> <input type="text"/>	Time Hour <input type="text"/> <input type="text"/> Minute <input type="text"/> <input type="text"/>	Surveyor <input style="width: 100%;" type="text"/>	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Location 1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge </td> <td style="width: 50%;"> Direction <input type="checkbox"/> 1. Into Canada <input type="checkbox"/> 2. Into USA </td> </tr> </table>	Location 1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge	Direction <input type="checkbox"/> 1. Into Canada <input type="checkbox"/> 2. Into USA
Location 1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge	Direction <input type="checkbox"/> 1. Into Canada <input type="checkbox"/> 2. Into USA				
1. Vehicle Type ▶ <input type="checkbox"/> 1. Auto / Van / Pickup / Sport Utility 2. Car and Trailer 3. Motorcycle 4. Taxi <i>OBSERVE - Do not ask type of vehicle or license plate information</i> 5. Motorhome / RV 6. Towing 7. Other		7. What was the ACTIVITY there? ▶ <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <i>If answer is 7, 8, 9, or 10 to question 7, ask the following:</i> 7a. Did you enjoy your experience there? ▶ <input type="checkbox"/> </div>			
2. Vehicle License ▶ <input type="checkbox"/> 1. Ontario 2. New York 3. Other Canada (Specify) _____ 4. Other USA (Specify) _____		8. Where are you going NOW? (City/Town) _____ (State/Province) _____ (Intersection, Monument) _____			
3. Total Number of OCCUPANTS ▶ <input type="checkbox"/> <i>Do not ask # of occupants unless unclear. Include the driver in the total number.</i>		9. What will be the ACTIVITY there? ▶ <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused <i>Note: the specific location and activity should be the IMMEDIATE destination after crossing the border. Write in specific attraction for 9 through 11.</i>			
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> READ: Hello, we are conducting a short survey about travel across the international bridges. Could we ask you a few quick questions about your trip today? </div> VERY IMPORTANT – Obtain specific monument or intersection for # 4, 6, 8 and 10. If in Niagara Region or New York State, otherwise City/Town Name and State/Province OK. Do not list gas stations or restaurants on route.		10. Is that your final destination? (City) _____ (State/Province) _____ (Intersection, Monument) _____			
4. Where are you coming from today? (City/Town) _____ (State/Province) _____ (Intersection, Monument) _____ <i>Note: the specific location and activity should be a PREVIOUS destination prior to arriving at the border. Write in specific attraction for 9 through 11.</i>		11. What will be the ACTIVITY there? ▶ <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <i>If answer is 7, 8, 9, or 10 to question 5, ask the following:</i> 5a. Did you enjoy your experience there? ▶ <input type="checkbox"/> </div>			
5. What was the ACTIVITY there? ▶ <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused		12. Will you be staying in United States /Canada for at least one night? ▶ <input type="checkbox"/> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <i>If answer to 12 is YES, ask the following question:</i> 12a. Have you made a hotel reservation? ▶ <input type="checkbox"/> </div>			
6. Were you any where before that? (City/Town) _____ (State/Province) _____ (Intersection, Monument) _____ <i>Note: Need ULTIMATE origin of trip on the side of the border they are coming from.</i>		13. What is your home State/Province (Country)? _____			

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Figure 2.1



- ▶ Wednesday, July 18: Peace Bridge and Whirlpool Bridge U.S.-bound;
- ▶ Saturday, July 21: Peace Bridge and Whirlpool Bridge Canada-bound; and
- ▶ Sunday, July 22: Peace Bridge and Whirlpool Bridge U.S.-bound.

At the outset of the survey, five alternate days were designated (three weekdays and two weekend days) in case of inclement weather conditions or other unanticipated events that would have made it inadvisable to conduct interviews on any of the scheduled primary days. Two of the alternate days were required as follows:

- ▶ Saturday, July 28 from 4 pm to midnight at the Queenston-Lewiston Bridge due to rain delay on Saturday, July 14; and
- ▶ Sunday, July 29 midnight to 8 am at the Queenston-Lewiston Bridge as a police officer was not available on Sunday, July 15.

2.3 Vehicle Classification Counts

In order to be able to expand the survey data from the interviews to represent activity over the entire day, hour by hour traffic counts of passenger vehicles were conducted at each bridge over the survey day. As part of the survey, hourly counts were conducted in 15 minute intervals. A copy of the count/classification form is provided in **Figure 2.2** below.

2.4 Sampling Procedure

In developing the sampling procedure, a number of factors were considered: target level of sampling (a minimum of 10% sample was required in the peak hour), safety of the survey operation in the traffic flow, sufficient space in the interview area, staff availability and randomness of sample. A target sample rate of 15% was attempted in order to ensure that a minimum 10% sample was achieved after surveys with incorrect or missing data were discarded.

Due to the high volume of traffic at the bridges and the need to collect a random sample, it was evident that collecting interviews strictly from every n^{th} vehicle was not plausible. Therefore, a system was designed that would allow for efficient data collection. The sites were configured to allow for multiple interviews to be conducted simultaneously in designated areas. When interview spaces were available, vehicles were directed into the survey zone with all other traffic diverted around the survey area. Randomness was preserved wherever possible by continuously filling the survey area throughout each shift. This survey method was deemed preferable to other types of designs such as the selection design since the number of interviews conducted is similar, but the process is more controllable and physically safer for all on-site staff.

Due to the design and effective operations of the survey area and the efficient interview skills of the survey staff, a total of 31,206 interviews were conducted (raw sample before cleaning and data verification). Given the total volume of 86,560 vehicles that passed through the survey areas on the survey days, the resulting overall sample rate was 36.1%.



Niagara Cross-Border Survey Classification Form

Date		Start Time		End Time		Surveyor	Location	<input type="checkbox"/>	Direction	<input type="checkbox"/>
Month	Day	Hour	Minute	Hour	Minute	_____	1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge		1. Into Canada 2. Into USA	
□ □	□ □	□ □	□ □	□ □	□ □					

Cars		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Sport Utility Vehicles (SUV)		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Passenger Vans		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Pickup Trucks		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Buses (School & Other)		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Motorcycles		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Motorhome / RV		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Commercial Trucks / Vans		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>
Other		TOTAL <div style="border: 1px solid black; width: 50px; height: 20px; margin: 0 auto;"></div>

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Figure 2.2

**Classification
Form**



2.5 Survey Design and Setup

The survey site design considered a number of factors, with safety of both the interviewers and respondents being paramount. Minimizing traffic congestion within the survey area was also a major consideration. Lastly, the survey was designed to provide the largest possible interview area subject to meeting the safety requirements. The intent was to capture information from as many vehicles as possible at any one time.

At all locations, for all shifts, off-duty police officers were hired and stationed at the survey locations to undertake initial flagging operations and to provide traffic control. Staff was provided by Niagara Regional Police and the Niagara Parks Commission (Whirlpool Bridge only). At each location, an officer with a police cruiser was provided throughout the duration of the interview period. The effect of police presence is to slow down approaching traffic and enhance the credibility and visibility of the survey operation. The police car was placed in a highly visible location adjacent to the traffic stream and with rooftop lights illuminated. This was effective in slowing down approaching motorists and directing them into the interview zone.

Interview zones were setup on the Canadian side at each bridge and at each location. With the exception of Peace Bridge Canada-bound, traffic cones were arranged to create interview zones. (The Peace Bridge Canada-bound surveys were conducted in double-wide parking stalls underneath the canopy near Secondary Inspection allowing up to eight simultaneous interviews.) All traffic entering or exiting the bridge area was controlled such that each vehicle passed a Niagara Regional or Niagara Parks Commission police officer stationed in front of the interview zone and when interview stations were available, the police officer directed traffic into the interview zone.

Once diverted from the traffic stream, vehicles were directed by Paradigm traffic controllers to the farthest available interview location. Additional traffic was directed into the interview location behind the initial vehicle, or in the case of Peace Bridge Canada-bound, to an empty position. If all interview locations were occupied, new traffic was waved past the interview area. Once the interview was completed, the vehicles were safely released by Paradigm traffic controllers back into the main traffic flow.

The site layouts including the interview zones were similar to the 2000 survey and were refined for this survey through discussions and site visits with the respective Bridge Authorities. The site layouts are provided in **Figures 2.3a through 2.6b** and are outlined below. Note that the Peace Bridge and Queenston-Lewiston Bridge accommodate truck traffic across the international border. However they are accommodated separately from auto/bus traffic and therefore no provisions were required for them in the site layouts.

2.5.1 Peace Bridge

Surveying the Canada-bound traffic was conducted at the end of the secondary inspection canopy. Traffic was merged into one lane on the north side of the canopy and two lanes on the south side of the canopy in order to accommodate buses on the south side. During daytime hours, both sides were operational and had a police officer directing traffic towards the survey area. During the overnight hours, the north side inspection lanes were closed, therefore the survey only operated on the south side. Vehicles approaching both survey areas were directed by police officers towards the survey area, at which point Paradigm traffic control directed them into an available survey stall. At this location, each interviewer had their own station and was not dependent on other vehicles in the survey area to exit before receiving another vehicle. Upon completion of the interview, traffic controllers stationed on the inside of the interview area directed vehicles to pull forward to exit the area. This configuration is shown in **Figure 2.3a**.



Automobile and bus traffic to the United States (eastbound) at the Peace Bridge approach from two roadways: the Queen Elizabeth Way (QEW) and from the Duty Free exit road as shown in **Figure 2.3b**. The police cruiser was stationed in the gore area between the two roadways and the police officer directed traffic into the interview zone on the left hand side of the road. Extensive signage was used on both the Queen Elizabeth Way (QEW) eastbound and the merging Duty Free exit road. Due to recent re-alignment of the QEW through this area, pavement markings and final pavement were not in place and this aided in slowing down traffic and effectively providing only one approach lane during peak periods. During non-peak periods, traffic barrels were used to pinch traffic into only one approach lane on the QEW to ensure slower speeds and safer operations of the survey.

During final paving of the QEW re-alignment on Wednesday, July 18, a separate survey setup was used to accommodate pavement operations and is shown in **Figure 2.3c**. During typical survey periods, the interview zone was located on the left hand side of the roadway in the “no man’s land” that was available with re-alignment. During paving, the survey zone was located on the right side of the roadway. The presence of the paving operations was reviewed with the client and it was determined that the nature of the operation was not significant enough to affect “normal” operations and travel patterns at the Peace Bridge.

2.5.2 Queenston-Lewiston Bridge

While inbound traffic to Canada did not present the same challenges as outbound in terms of speed and safety, the challenge here was to effectively sample two streams of traffic. As with the Rainbow Bridge, vehicles that were required to visit Secondary Inspection use a different exit point to the left of the main traffic stream, thereby requiring their transition into the traffic stream very close to the entrance to the interview zone. The design for this location is shown in **Figure 2.4a** below.

The main approach to the Queenston-Lewiston Bridge from the Canadian side is Highway 405. Given the speed with which vehicles approach the bridge entrance, signage was placed to alert motorist well in advance of the survey. Although currently closed, the toll booths are in advance of the survey area and assisted in slowing traffic approaching the survey area. In addition, traffic volumes at this location on the weekend prohibited speeding through the area. The police officer was stationed immediately downstream of the toll booths and directed vehicles into the survey area as illustrated in **Figure 2.4b**.

2.5.3 Rainbow Bridge

Canada-bound Rainbow bridge traffic required interview stations in two separate traffic streams as shown in **Figure 2.5a**. In this case, vehicles which were directed to Secondary Inspection were interviewed on the supplemental access road just before the final exit onto the local street system. Traffic from Secondary inspection was limited so interview staff were relocated to the primary stations to make more efficient use of these staff. Primary traffic was diverted into two parallel interview lanes on the north side of the bridge plaza. Traffic exiting the inspection booths was intercepted by the police officer stationed on the tarmac and directed into an available interview channel.

Figure 2.5b illustrates the survey layout for traffic bound for the United States. The main entrance to the bridge is located in a plaza on the east side of Falls Avenue with an additional entrance lane to the bridge provided through the Duty Free Shop located at the south end of the bridge plaza. In order to concentrate the main traffic flow, cones were set up to channel all entering traffic into two lanes where the police officer diverted traffic into the interview zone. Traffic that accessed the bridge via the Duty Free exit were also intercepted and interviewed through the use of the Duty Free exit where possible.



2.5.4 Whirlpool Bridge

Recently, the Whirlpool Bridge was converted to a Nexus-cardholder-only crossing that is fully automated into the U.S. and with an inspection booth into Canada. The Nexus program is an initiative of both Canada and the United States to, “expedite the border clearance process for low-risk, pre-approved travelers into Canada and the United States”¹. Due to its Nexus-only status, this bridge operates between 7 am and 11 pm only, seven days per week.

The survey configuration for Whirlpool Bridge traffic westbound into Canada and onto River Road is shown in **Figure 2.6a** below. Interview vehicles were directed into an area under the railway bridge, immediately after and clear of the inspection booth. A Niagara Parks Commission police officer was situated in a coned off area just south of the interview location.

Figure 2.6b illustrates the Whirlpool Bridge survey layout for traffic outbound to the United States. The interview zone was established on the approach to the bridge and all vehicles passed through the survey area. A police cruiser was situated adjacent to the interview zone with its rooftop lights illuminated in order increase visibility and safety.

¹ www.cbsa.asfc.gc.ca

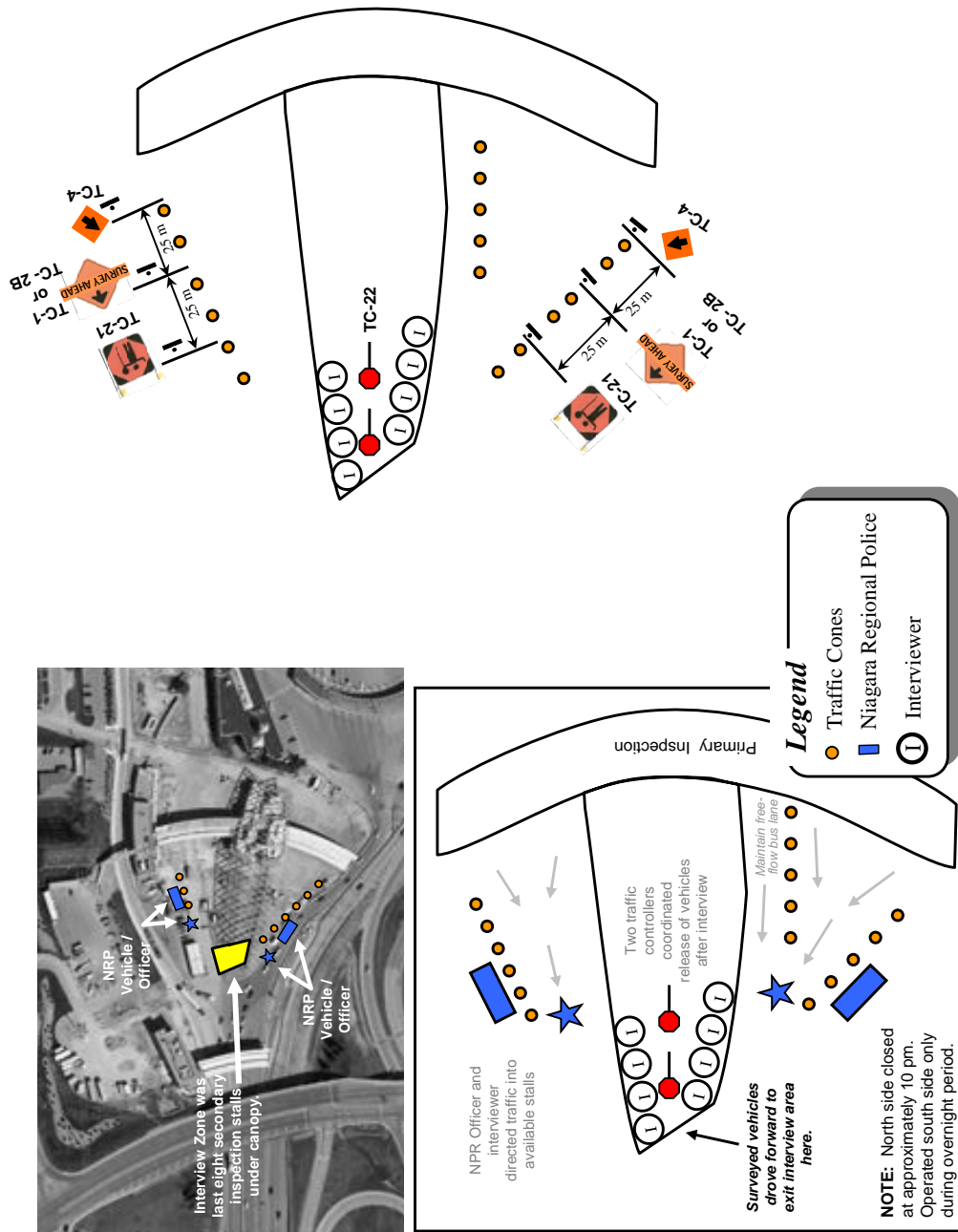
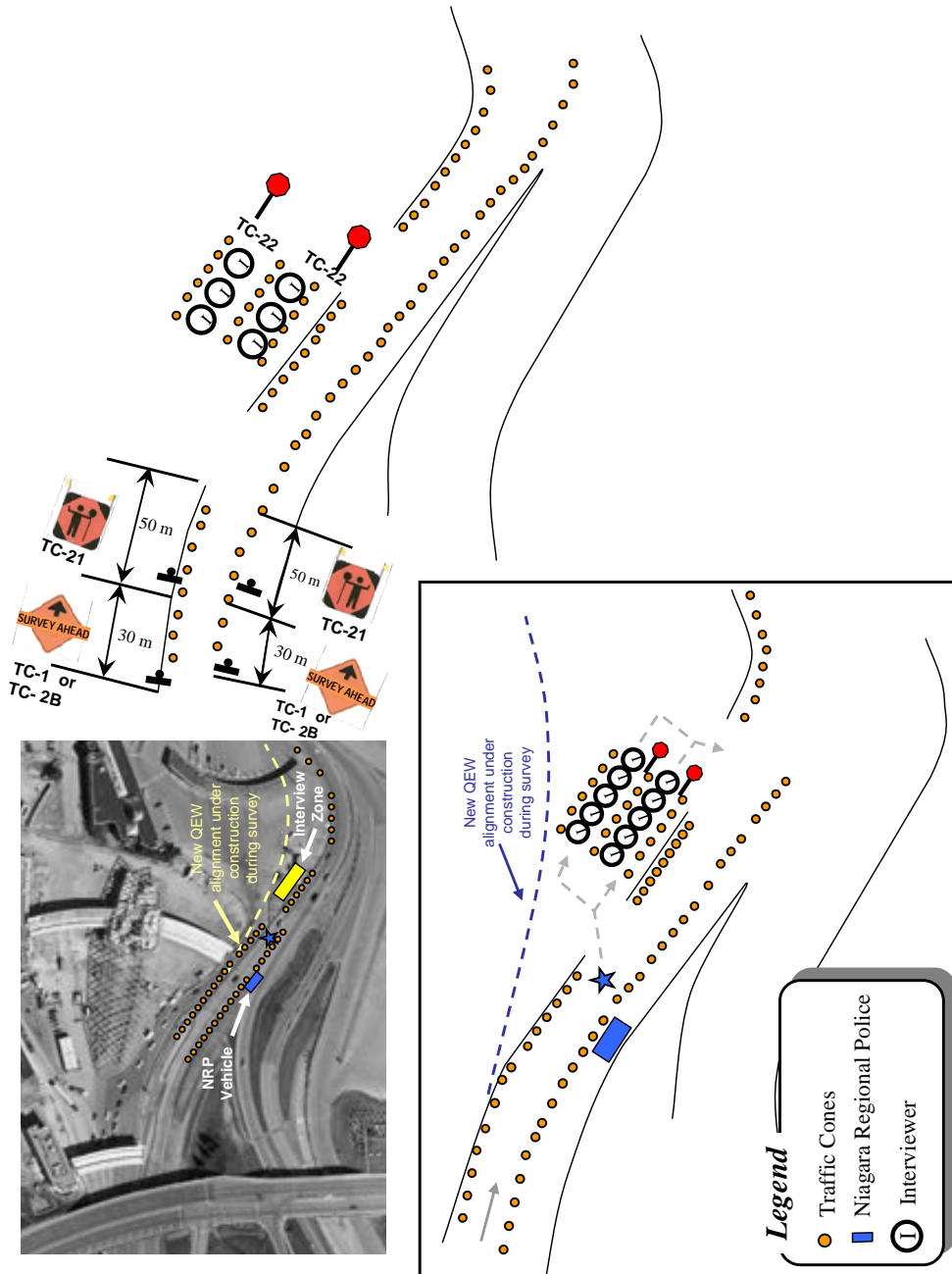


Figure 2.3a
Peace Bridge Into Canada
Traffic Control Plan

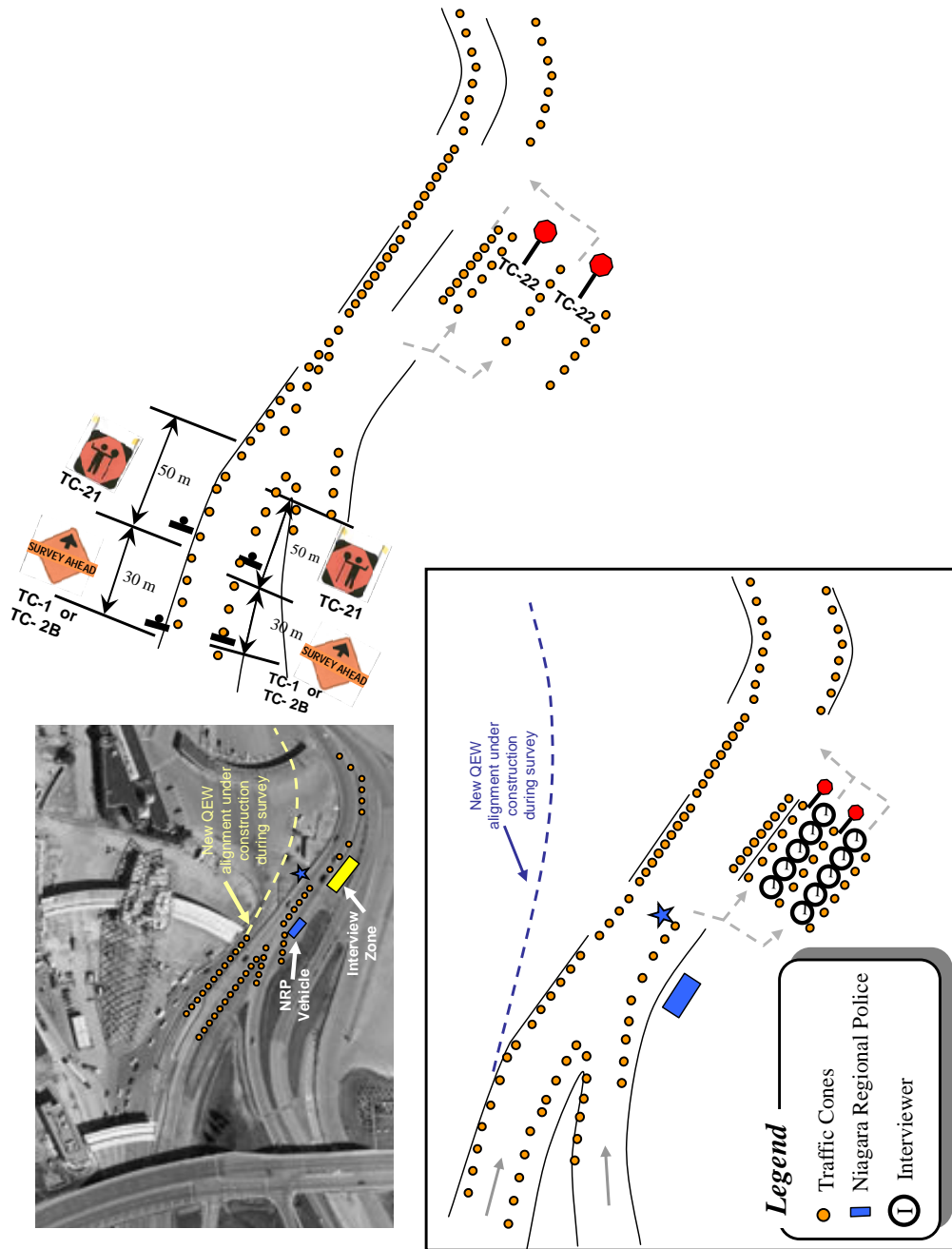
2007 Cross-Border O-D Survey





2007 Cross-Border O-D Survey

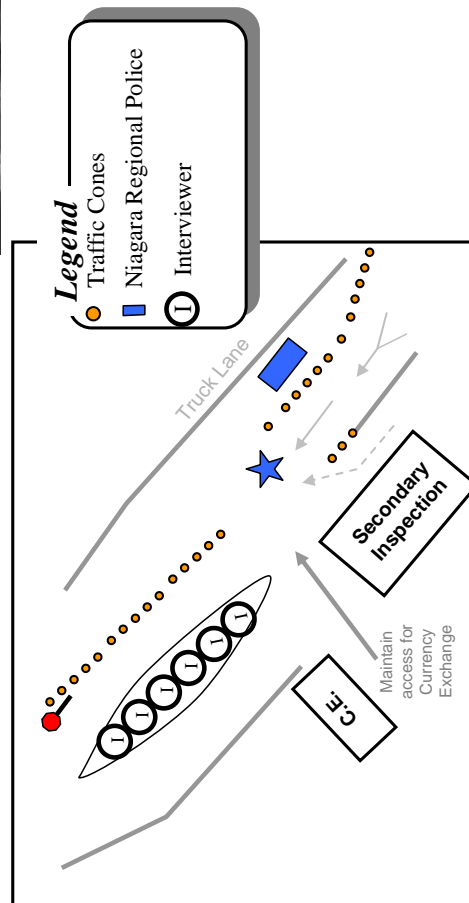
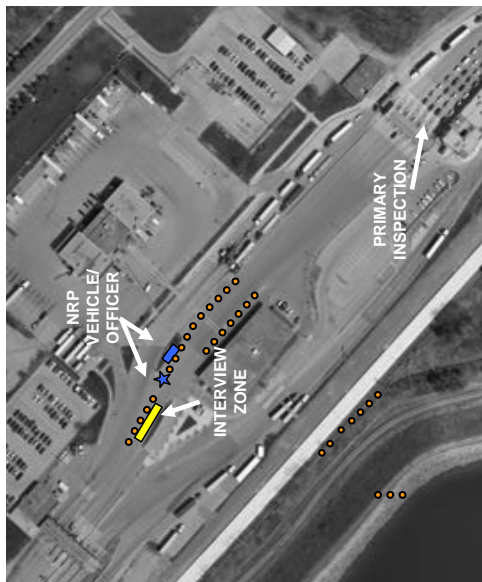
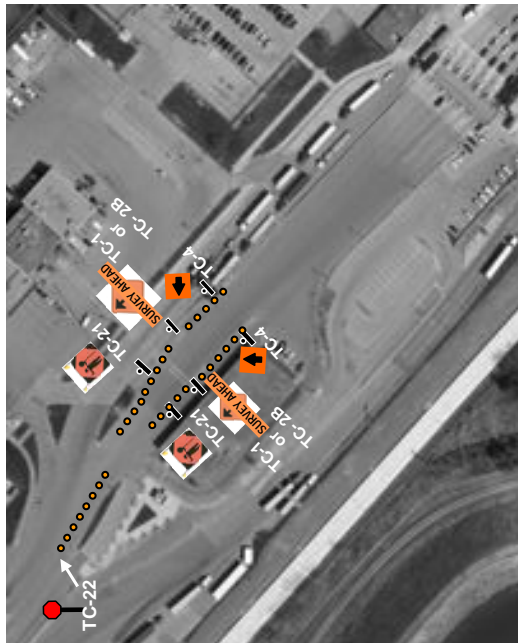




2007 Cross-Border O-D Survey

Figure 2.3c
Peace Bridge Into U.S. Opt. 2
Traffic Control Plan

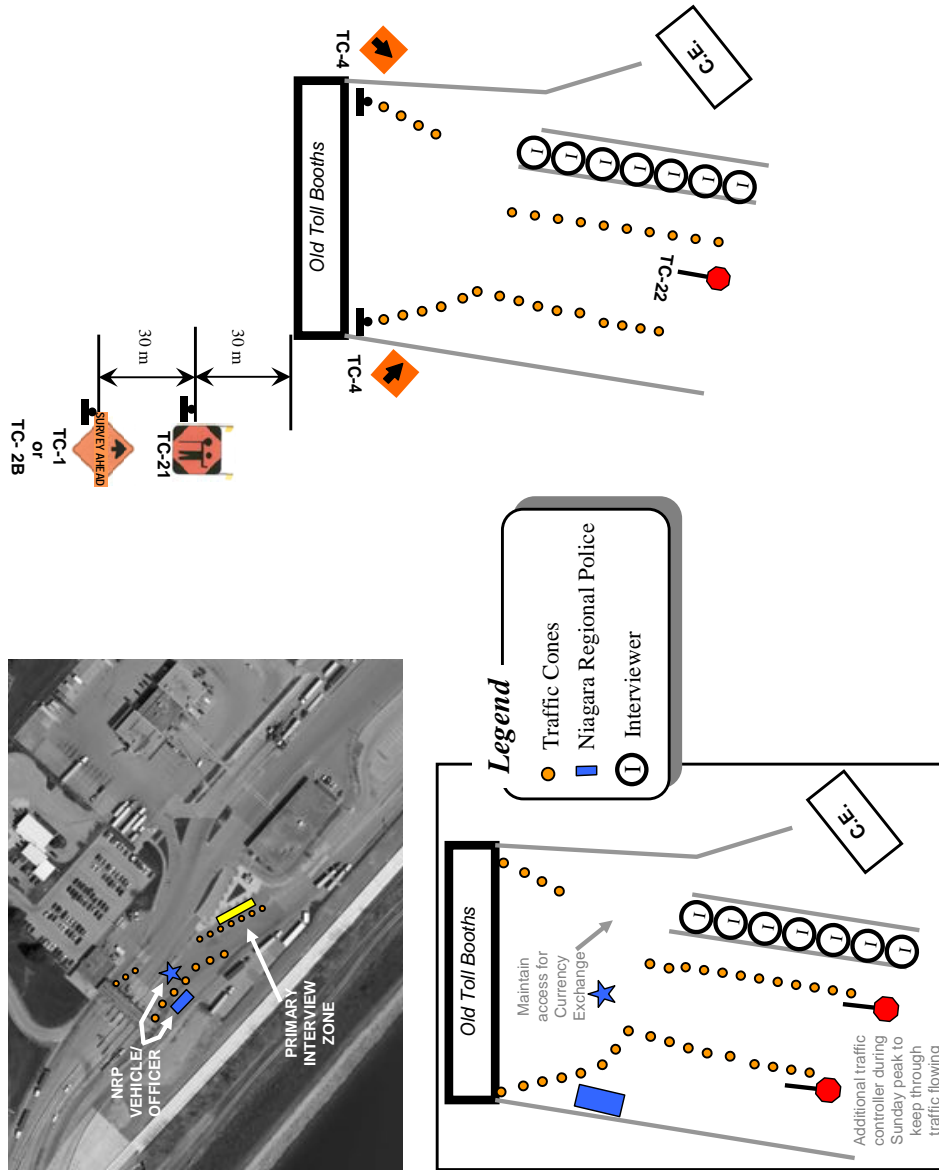




2007 Cross-Border O-D Survey



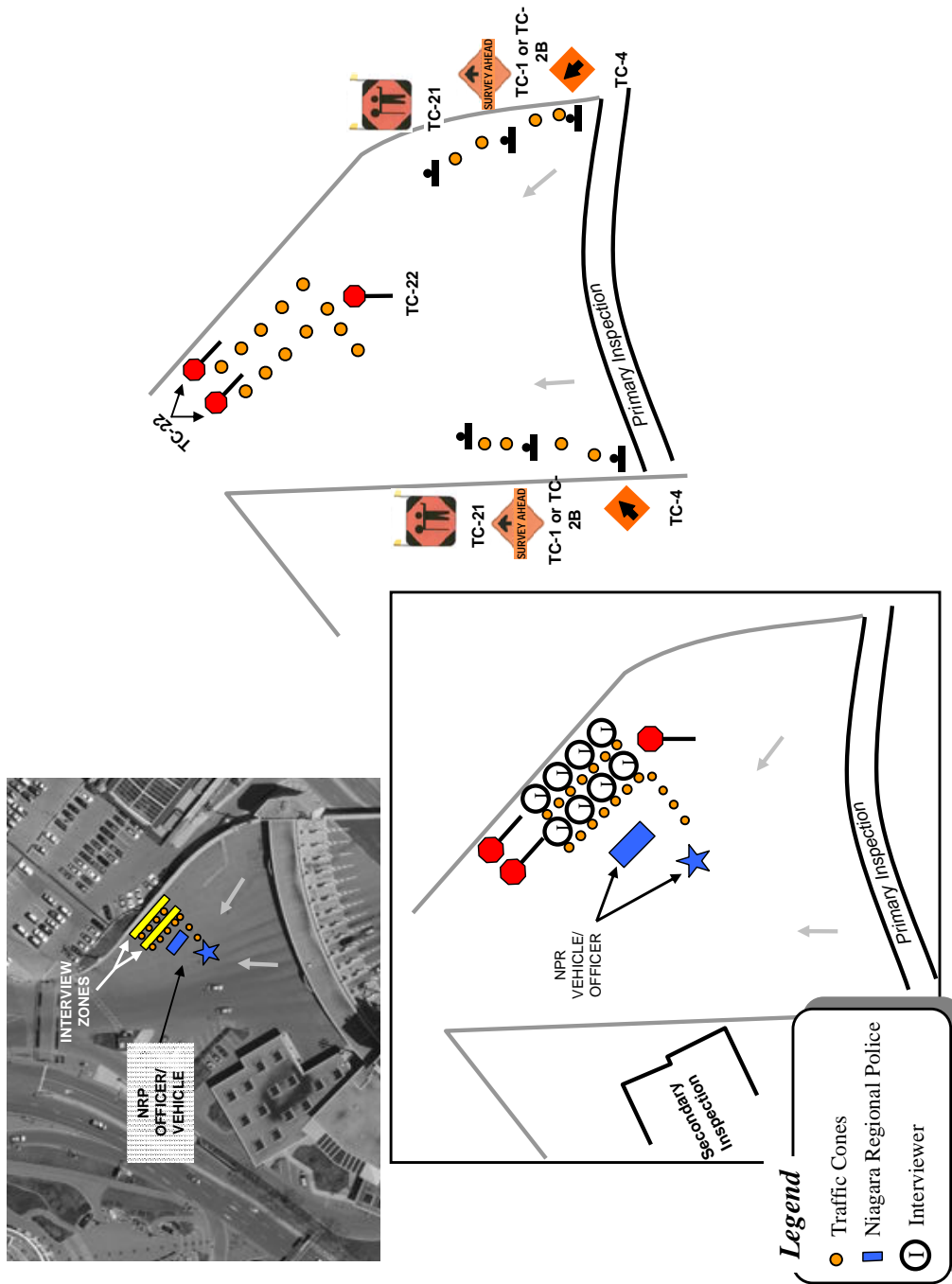
Figure 2.4a
Queenston-Lewiston Bridge Into Canada
Traffic Control Plan



2007 Cross-Border O-D Survey

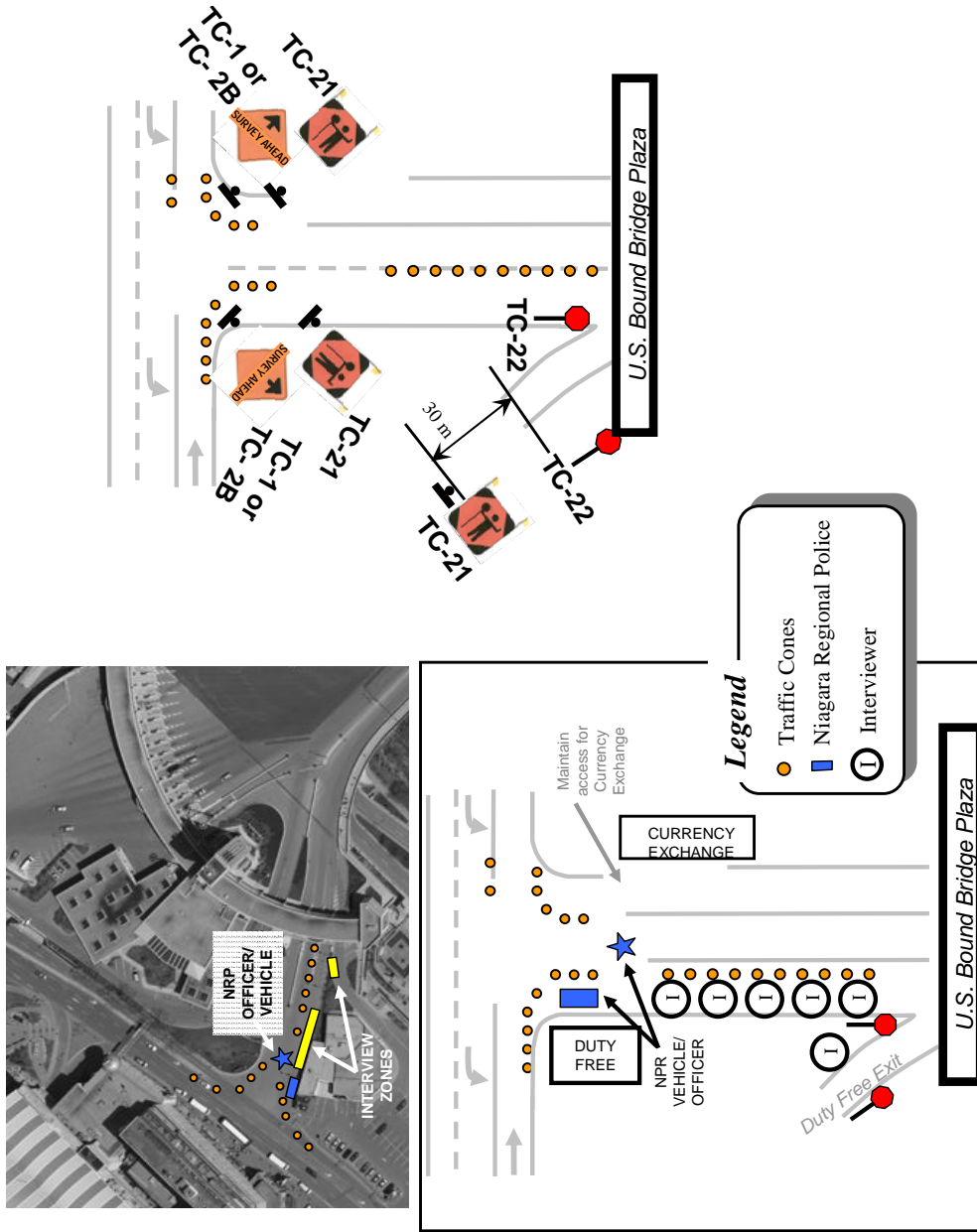


Figure 2.4b
Queenston-Lewiston Bridge Into U.S.
Traffic Control Plan



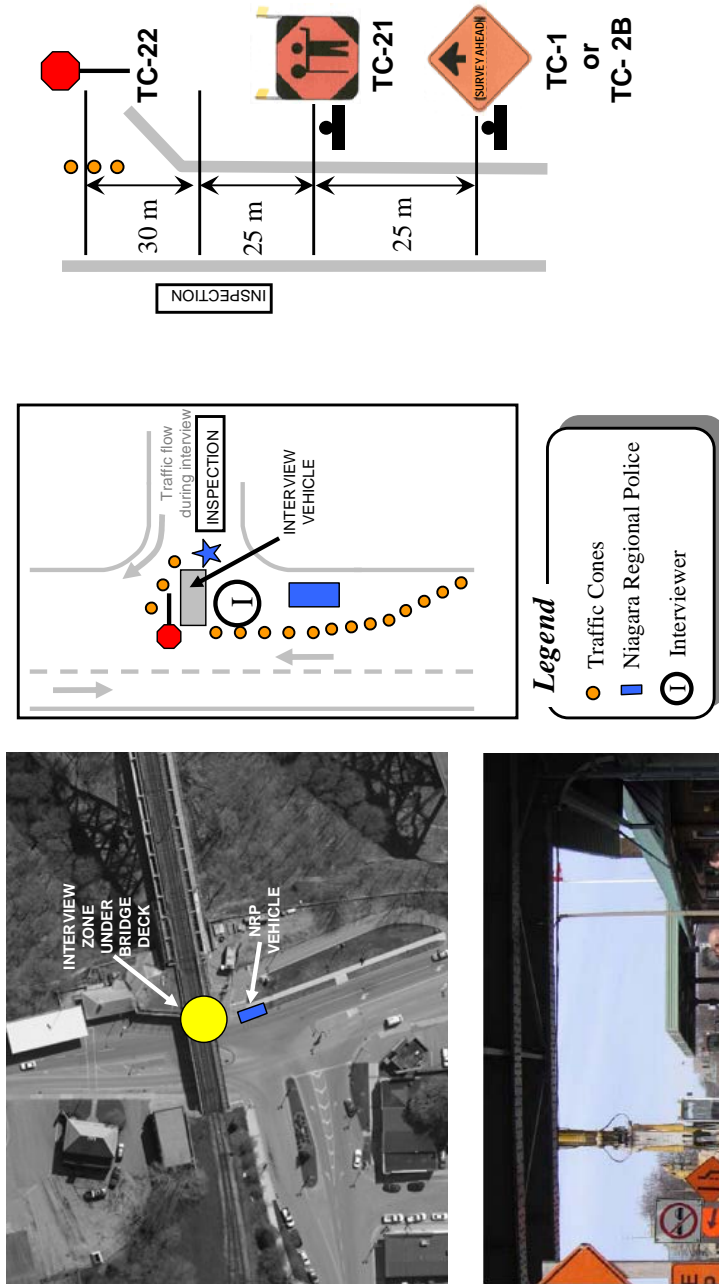
2007 Cross-Border O-D Survey

Figure 2.5a
Rainbow Bridge Into Canada
Traffic Control Plan



2007 Cross-Border O-D Survey





2007 Cross-Border O-D Survey

Figure 2.6a
Whirlpool Bridge Into Canada
Traffic Control Plan

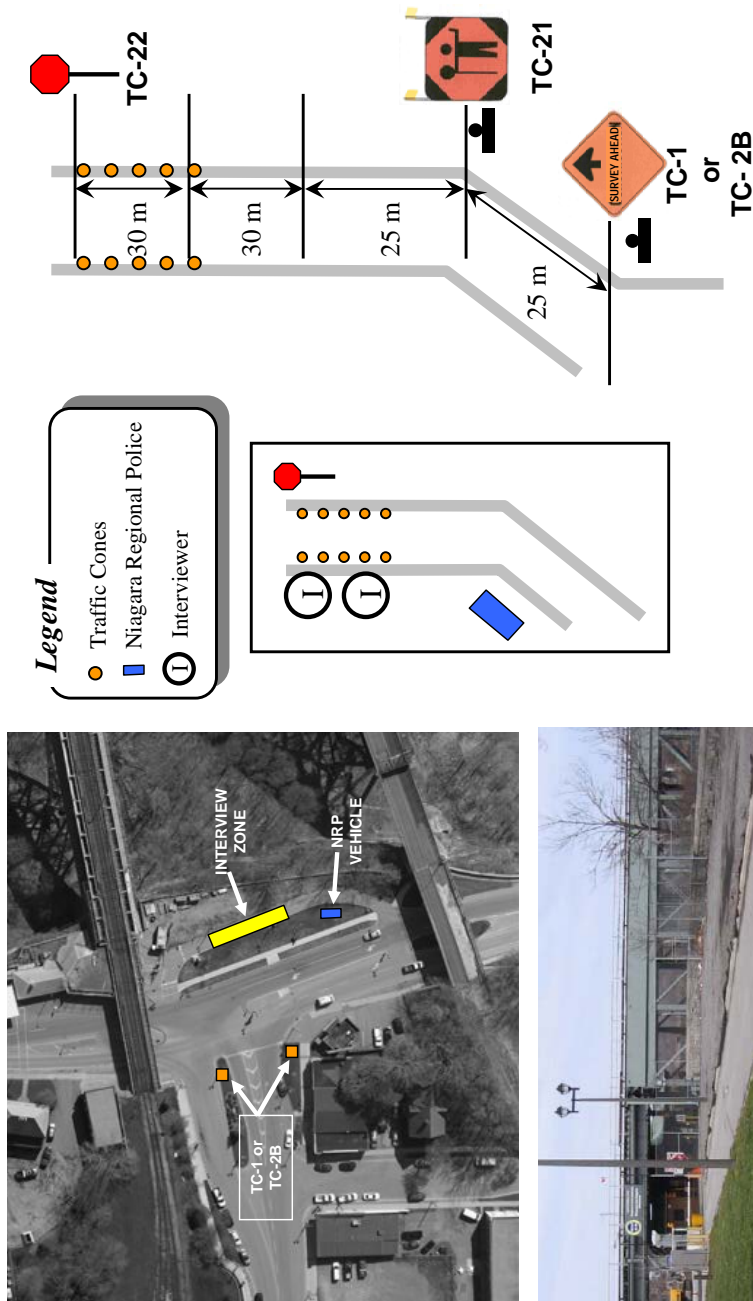


Figure 2.6b
Whirlpool Bridge Into U.S.
Traffic Control Plan

2007 Cross-Border O-D Survey





3.0 SURVEY STAFFING

3.1 Staff Positions

At each bridge location, the interview team was divided into a number of different positions in order to make the operation as efficient and safe as possible. These positions included:

- ▶ **Flagger** which is primarily the Niagara Regional Police officer supplemented by survey staff when required. The flagger was the initial contact person and was responsible for slowing down traffic, controlling the interview sample and diverting vehicles into the interview zone. The police officer was equipped with appropriate safety equipment (i.e. a lighted glow baton, safety vest, and arm/leg bands) during the overnight hours in order to increase visibility.
- ▶ **Interviewers** who conducted the interviews with the vehicle drivers.
- ▶ **Traffic Controllers** which were responsible for directing vehicles within the interview zone, holding vehicles during interviews and safely releasing vehicles back into the traffic stream after the interview completion. Traffic controllers were equipped with STOP/SLOW signs to direct traffic and glow batons for use during overnight hours.
- ▶ **Traffic Counter/Classifiers** were located in or near the interview area in a position that provided excellent visibility of all traffic moving through the interview zone. Their main task was counting and classification of all passenger vehicle traffic entering or exiting the bridge location. One traffic counter/classifier was assigned to each location with the exception of the Peace Bridge where two were required for the daytime hours Canada-bound with a second counter/classifier added during peak traffic activity for traffic destined to the United States.
- ▶ **Shift Supervisors** (Paradigm staff) and were responsible for managing the staff and survey at each location. The supervisor was responsible for organizing the team, assigning tasks within the team, scheduling and covering for rest periods, monitoring the sample rate and reviewing the completed interviews for accuracy. Shift supervisors were also responsible for hiring and training staff for this project.

Two bridge surveys were conducted simultaneously. A Paradigm Principal was accessible to both sites at all times and was available to co-ordinate the interview effort in accordance with the original design, undertake troubleshooting, assist with quality control, make decisions relating to termination of the survey due to inclement weather and give reports to URS and MTO on a regular basis.

3.2 Manpower Requirements and Scheduling

In order to achieve the goal of 24-hour survey coverage for each location and direction, it was necessary to devise a schedule that accomplished this within the given time frame. At the Peace Bridge, Queenston-Lewiston Bridge and Rainbow Bridge; three eight-hour shifts were scheduled: midnight to 8 am, 8 am to 4 pm and 4 pm to midnight. Two eight-hour shifts were scheduled at the Whirlpool Bridge: 7 am to 3 pm and 3 pm to 11 pm.

Interviewing began at the Queenston-Lewiston and Rainbow Bridges at midnight, Tuesday, July 10th in the Canada-bound direction. The interviews began at midnight on the weekday so as to give the survey teams some experience in the setup and operation of the interview zones before traffic increased for the day. The



decision was made to start at Queenston-Lewiston and Rainbow bridges in order to give the teams practice and preparation before moving to the higher volume Peace Bridge location.

In order to determine the staffing requirements for each bridge, hourly traffic profiles from the Peace Bridge were used to identify potential interview requirements by hour of day. Since data of this type was not available for the other bridges, it was assumed that the Peace Bridge traffic profile would be representative of the other bridges. It was assumed that each interviewer could conduct 20 surveys per hour, increasing with time and experience. Based on these criteria, it was determined that a total of up to 49 staff would be required to complete the survey (all bridges), and were allocated as shown in **Table 3.1** below.

TABLE 3.1: STAFFING REQUIREMENTS BY BRIDGE

Date/Time /Location					Staff																							
					Shift 1: 0 to 8							Shift 2: 8 to 16							Shift 3: 16 to 24							Total		
Day	Date	Day of Week	Location	Direction	Police/Cruiser	Interviewer	Floater	Traffic Control	Classifier	Total	Shift Total	Police/Cruiser	Interviewer	Traffic Control	Floater	Classifier	Total	Shift Total	Police/Cruiser	Interviewer	Floater	Traffic Control	Classifier	Total	Shift Total	Staff	Police/Cruiser	
1	10-Jul	Tuesday	Queenston	Canada Bound	1	2	1	2	1	6	11	1	4	3	1	1	9	17	1	5	1	3	1	10	19	25	47	3
1	10-Jul	Tuesday	Rainbow	Canada Bound	1	2	1	1	1	5	11	1	4	2	1	1	8	17	1	5	1	2	1	9	19	22	47	3
2	11-Jul	Wednesday	Queenston	US Bound	1	2	1	2	1	6	11	1	4	3	1	1	9	18	1	5	1	3	1	10	19	25	48	3
2	11-Jul	Wednesday	Rainbow	US Bound	1	2	1	1	1	5	11	1	5	2	1	1	9	18	1	5	1	2	1	9	19	23	48	3
3	14-Jul	Saturday	Queenston	Canada Bound	1	2	1	2	1	6	11	1	5	3	1	1	10	19	1	5	1	3	1	10	19	26	49	3
3	14-Jul	Saturday	Rainbow	Canada Bound	1	2	1	1	1	5	11	1	5	2	1	1	9	19	1	5	1	2	1	9	19	23	49	3
4	15-Jul	Sunday	Queenston	US Bound	1	2	1	2	1	6	11	1	5	3	1	1	10	19	1	5	1	3	1	10	19	26	49	3
4	15-Jul	Sunday	Rainbow	US Bound	1	2	1	1	1	5	11	1	5	2	1	1	9	19	1	5	1	2	1	9	19	23	49	3
5	17-Jul	Tuesday	Peace	Canada Bound	1	3	1	4	1	9	9	2	7	4	1	2	14	18	2	8	1	4	2	15	19	38	46	5
5	17-Jul	Tuesday	Whirlpool	Canada Bound	0	0	0	0	0	0	9	1	1	1	1	1	4	18	1	1	1	1	1	4	19	8	46	2
6	18-Jul	Wednesday	Peace	US Bound	1	3	1	4	1	9	9	1	7	4	2	1	14	18	1	8	2	4	1	15	19	38	46	3
6	18-Jul	Wednesday	Whirlpool	US Bound	0	0	0	0	0	0	9	1	1	1	1	1	4	18	1	1	1	1	1	4	19	8	46	2
7	21-Jul	Saturday	Peace	Canada Bound	1	3	1	4	1	9	9	2	9	4	1	2	16	20	2	9	1	4	2	16	20	41	49	5
7	21-Jul	Saturday	Whirlpool	Canada Bound	0	0	0	0	0	0	9	1	1	1	1	1	4	20	1	1	1	1	1	4	20	8	49	2
8	22-Jul	Sunday	Peace	US Bound	1	3	1	4	1	9	9	1	9	4	2	1	16	20	1	9	2	4	1	16	20	41	49	3
8	22-Jul	Sunday	Whirlpool	US Bound	0	0	0	0	0	0	9	1	1	1	1	1	4	20	1	1	1	1	1	4	20	8	49	2

3.3 Staff Recruiting

Recruitment of staff for the survey took place in the Niagara Region during the months of May and June 2007. An advertisement was printed in the Niagara Falls Review for seven days, Niagara This Week for six days and the St. Catharines Standard for 3½ weeks in late May and early June. Other postings were placed at the Region of Niagara, City of St. Catharines, City of Niagara Falls, URS Canada and MTO offices and online advertisements were placed at Brock University and Mohawk College. All advertisements stated that interested parties should call a Paradigm number to receive further details regarding the job and to register their name, phone number and e-mail address if they wished to be interviewed for the survey. A copy of the generic posting is provided in **Appendix A**.

Interviewing of potential staff was conducted by Paradigm shift supervisors on June 26, 2007 at the Regional Municipality of Niagara Office located in Thorold, Ontario. A personal interview enabled the selection of mature and responsible people who have well-developed interpersonal skills and good knowledge of the area. Potential employees were rated and screened and the top candidates were subsequently contacted for a job offer and to arrange training.



Photos and personal information was collected from each potential staff member during their interview so that when staff were selected and hired, their information could be passed along to the Niagara Falls Bridge Commission for preparation of staff identification badges and parking passes as these were required for the Queenston-Lewiston, Rainbow and Whirlpool Bridges.

3.4 Staff Training

A staff training manual was created by Paradigm and provided to all survey staff. Two days of training were provided for team members on July 3 and 4 at the Regional Municipality of Niagara offices in Thorold. On both training days, the morning session consisted of in-class training by Paradigm staff on the setup, operation and responsibilities of each team member while on the survey site. The afternoon session consisted of a practice interview session to review and address potential trip scenarios and interview issues or formal traffic controller training to meet MTO requirements (July 3 only).

During the training session, survey staff was advised of parking locations and were instructed on appropriate clothing on the site and provided a neon yellow-green t-shirt with the Paradigm logo and "Survey Staff" on the sleeve. All staff was required to wear this t-shirt when reporting for duty as it increased their visibility and identification while maintaining a professional look at the site. Staff was informed that steel toe safety shoes were required onsite at all times, for all staff positions. Staff was also informed that all other safety equipment would be provided onsite each day and that restroom facilities would be available at all bridge locations and food and refreshments were their responsibility.

A copy of the surveyor training manual is provided in **Appendix B**.



4.0 SURVEY CONDUCT

4.1 Site Activity

Conducting a survey of this magnitude, both in terms of sample size and duration, presents many logistical issues. Staff were responsible for providing their own transportation to/from the site and were asked to carpool where possible. Staff were required to report to their survey location 30 minutes prior to the start of their initial shift in order to allow for site familiarization. Any staff member not reporting for their shift on time was contacted by telephone where possible in order to maintain the largest possible complement of staff. Each site, with the exception of Whirlpool Bridge, was intentionally over-staffed by a few members to allow greater flexibility with break periods and to fill in when needed in case of no-shows.

Since each shift was eight hours in length, team members were entitled to two fifteen-minute breaks and one thirty-minute lunch period over the course of each shift, in accordance with Canadian labour regulations. Breaks were scheduled such that break periods were provided for each staff member approximately every two hours. Shift supervisors were responsible for scheduling all staff assignments and break periods and for covering various positions for these periods.

Team leaders were responsible for monitoring the interviews as they were conducted, especially during the first few days while staff were becoming accustomed to the interview process and survey site operations. The monitoring procedure required shift supervisors to observe an interview in progress and confirm the interview was properly conducted and that the all required information was collected and properly placed on the form. If there was a problem with the interview, such as failure to ask a question or incorrect sequencing of questions, the shift supervisor would inform the interviewer of the error and help them to correct the problem. In order to streamline the data collection process and avoid cumbersome surplus information, the interviewers were instructed to collect detailed origin and destination information (address, monument, etc) if the trip end was located in Niagara Region or western New York. If the trip end was located outside these areas, the interviewers were instructed to collect only the city/state name of the destination (Hamilton, Syracuse, Pennsylvania).

At the end of each shift, all completed questionnaires and count sheets were collected and organized by bridge and shift. The forms were then further checked for accuracy and the team leader made notes in order to give feedback regarding potential areas of concern. The completed materials were prepared for data entry.

4.2 Equipment

Each shift was provided with clipboards, pencils, safety vests, and flashlights, glow batons and arm/leg bands for overnight work. Staff was required to wear their "Survey Staff" t-shirt, safety vests, steel-toed footwear and identification badge to work each day.

All survey signage, sand bags and traffic cones were provided and delivered by RMON staff. All equipment was stored on-site at each bridge between the weekday and weekend survey periods and was transferred from one site to another by Regional Municipality of Niagara staff. A list of the sign and traffic control requirements by location is provided in **Table 4.1** below.

**TABLE 4.1: EQUIPMENT ALLOCATION BY LOCATION**

Date/Time /Location				Equipment				
Date	Day of Week	Location	Direction	TC 1	TC 21	TC 4	TC 22	Cones
10-Jul	Tuesday	Queenston	Canada Bound	2	2	2	3	60
10-Jul	Tuesday	Rainbow	Canada Bound	3	3	2	3	34
11-Jul	Wednesday	Queenston	US Bound	1	1	2	1	28
11-Jul	Wednesday	Rainbow	US Bound	3	3	0	2	25
14-Jul	Saturday	Queenston	Canada Bound	2	2	2	3	60
14-Jul	Saturday	Rainbow	Canada Bound	3	3	2	2	34
15-Jul	Sunday	Queenston	US Bound	1	1	2	1	28
15-Jul	Sunday	Rainbow	US Bound	3	3	0	2	25
17-Jul	Tuesday	Peace	Canada Bound	2	2	2	2	15
17-Jul	Tuesday	Whirlpool	Canada Bound	1	1	0	1	16
18-Jul	Wednesday	Peace	US Bound	3	3	1	4	90
18-Jul	Wednesday	Whirlpool	US Bound	1	1	0	1	10
21-Jul	Saturday	Peace	Canada Bound	2	2	2	2	15
21-Jul	Saturday	Whirlpool	Canada Bound	1	1	0	1	16
22-Jul	Sunday	Peace	US Bound	3	3	1	4	90
22-Jul	Sunday	Whirlpool	US Bound	1	1	0	1	10

TC 1 - Survey Ahead

TC 21 - Flagman

TC 4 - Merge

TC 22 - Stop/Slow paddle

4.3 Safety Requirements

The survey was designed in accordance with the MTO and Ministry of Labour guidelines. A meeting with the Occupational Health and Safety representative from the Ministry of Transportation was arranged, at which the survey plans and safety procedures were discussed. Prior to the beginning of fieldwork, Paradigm and URS reviewed the safety procedures required with all regulations. A copy of the Occupational Health and Safety Act² was kept onsite at all times for reference by both staff and supervisors. As well a Traffic Safety Plan was prepared.

4.4 Deployment of Survey Signs and Markers

Figures 2.3a through 2.6b show the setup of each site and have the approximate positioning of the signs and traffic cones used at each location. Equipment was delivered to the site the afternoon before the survey commenced and was setup by Paradigm staff approximately one hour before the start of the survey. At the end of each survey day, where required, the survey site was taken down and moved to the other direction.

Placement of the signs and cones were given an extensive review by URS, Paradigm, RMON, MTO and the Bridge Authorities prior to commencement of the survey. The sign system design and location were based on applicable Ontario Traffic Manual Book 7 Temporary Conditions³ recognizing that in many cases, the site

² Occupational Health and Safety Act and Regulations for Construction Projects, Publications Ontario, October 2006

³ Ontario Traffic Manual Temporary Conditions, Field Edition, Publications Ontario, March 2001



constraints do not permit all dimensions to be accommodated. In case of on-site setup changes, a copy of Book 7 was available at all times. Ongoing refinement of each site setup was carried out to ensure minimal traffic disruption and maximum survey sample.

4.5 Police Presence

At each location, a uniformed police officer and vehicle from either Niagara Regional Police or Niagara Parks Commission was provided in order to increase visibility of the survey. Police presence at the survey site was useful in slowing down vehicles entering the survey area from freeway approaches at Queenston-Lewiston and Peace Bridges and added an extra degree of legitimacy to the survey itself. As well, the police officers provided flagging duties to divert traffic into the survey station.



5.0 DATABASE ASSEMBLY

5.1 Data Entry and Cleaning

After the survey was completed, data entry staff was selected from the interviewers that worked on the survey. Using staff who participated in the actual survey increased the likelihood of survey information being entered properly and corrected during the data entry process.

Before data entry commenced, completed questionnaires were sorted by bridge and survey day and then photocopied. The original set of surveys were kept in an off-site, secure location for reference and as backup if required. Data entry staff was provided a Microsoft Access database and instructions on data entry as well as a number of forms to enter. A list of the database fields and their descriptions are provided in Appendix D. Data entry was scheduled for three weeks and was assigned to a total of 10 individuals. Paradigm staff was readily available during data entry to answer questions and provide feedback and suggestions when required.

After initial data entry, the database contained 31,206 records. Based on a combined traffic volume of 89,315 vehicles recording during the survey, the initial sample rate was 34.9%.

Concurrent to data entry, classification counts were entered by bridge, direction and day to be used later for data expansion purposes.

5.2 Data Cleaning

After completion of data entry, a Paradigm staff member reviewed and “cleaned” the data. This process included ensuring that each record had a unique survey number and that bridge, date, time and surveyor information was complete. In addition, addresses were provided for monuments listed in the database and trips were checked for completeness. After the initial cleaning, the database was checked for consistency and to ensure correct spelling and capitalization of all state, province and country names.

5.3 Data Verification

After data cleaning, the database was verified which included the removal of all New York to New York, Ontario to Ontario and Home to Home trips that could not be corrected. Records were also checked to ensure the origin and destination information matched the direction of travel and to ensure the data fit within the appropriate parameters: i.e.: month should only equal July and motorcycles should not have more than three passengers. Any records found to have reverse information were corrected within the database. Any trips that did not have a valid origin or destination or did not include basic information were removed from the database.

In instances where information was not recorded but sufficient information was provided, the database was updated to include information where appropriate. I.e.: the license plate was not recorded, home state was listed as New York and the trip purposed was home; therefore the license plate recorded as New York.

5.4 Survey Dates and Sample Rates

Table 5.1 below displays the total traffic volumes and final cleaned database entries by bridge by day. A total of 86,560 vehicles passed through the survey areas. After data cleaning and verification, a total of 29,214 records remained in the database for a total sample rate of 33.8%. A total of 1,992 records were removed from the database during data cleaning and verification, resulting in a 2.2% reduction in the total



survey count. This table shows the highest sampling rate was at the Whirlpool Bridge, at an overall rate of 54.6%. The lowest overall sample rate was at the Peace Bridge at 32.5%.

During the survey period, a total of 51,080 vehicles passed through the survey area during the weekend time period and represents 59% of the total observed traffic. 16,333 surveys were retained after data cleaned for a sample rate of 32%. 35,480 vehicles were recording passing through the survey area during the weekday time period and represent 41% of the total observed traffic. A total of 12,881 surveys were retained after data cleaning for a sample rate of 36.3%.

It should be noted that a rain event at the Queenston-Lewiston Bridge during the 4 pm to midnight shift on Saturday, July 14 resulted in a very low sample rate for the day and the decision was made to re-survey that shift on Saturday, July 28. In addition, the midnight shift on Sunday, July 15 at the Queenston-Lewiston Bridge did not have a police officer or cruiser present; therefore the shift was canceled and completed on Sunday, July 29. The makeup surveys and additional traffic volumes are included in the originally scheduled day in **Table 5.1** below. Intermittent rain also resulted in the loss of about 1 hour of weekday surveys in the US bound direction at the Rainbow Bridge (10:30 to 11:30 AM) and about 1.5 hours at the Queenston-Lewiston Bridge (10:45 PM to 12:15 AM). A total of 3 hours of survey time was lost at the Rainbow Bridge for the Canada Bound weekend survey (3:15 to 5:15 PM) and (10:00 to 11:00 PM) due to rain. A longer rain event at the Queenston-Lewiston Canada Bound weekend survey resulted in the loss of 45 minutes of surveys (3:15 to 4:00 PM) given that the 4 PM to 12:00 PM shift was repeated as noted above. The daily log by bridge is included in **Appendix C** and includes information regarding any issues that arose during surveying.

TABLE 5.1: FINAL SAMPLE RATE BY BRIDGE AND DAY

	Tuesday 10	Wednesday 11	Saturday 14*	Sunday 15*	Tuesday 17	Wednesday 18	Saturday 21	Sunday 22	TOTAL
Queenston-Lewiston Bridge									
Traffic Volume	4,524	3,706	6,855	5,518					20,603
Cleaned Sample	1,470	1,519	2,373	1,903					7,265
Final Sample Rate	32.5%	41.0%	34.6%	34.5%					35.3%
Rainbow Bridge									
Traffic Volume	4,735	5,394	6,453	8,017					24,599
Cleaned Sample	1,763	1,670	2,422	2,243					8,098
Final Sample Rate	37.2%	31.0%	37.5%	28.0%					32.9%
Peace Bridge									
Traffic Volume					8,321	8,003	11,543	11,644	39,511
Cleaned Sample					3,089	2,927	3,934	2,892	12,842
Final Sample Rate					37.1%	36.6%	34.1%	24.8%	32.5%
Whirlpool Bridge									
Traffic Volume					307	490	428	622	1,847
Cleaned Sample					274	168	216	350	1,008
Final Sample Rate					89.3%	34.3%	50.5%	56.3%	54.6%
TOTAL TRAFFIC VOLUME									86,560
TOTAL CLEANED SAMPLE									29,214
TOTAL SAMPLE RATE									33.8%

5.5 Canadian Trip End Geocoding

After the data was cleaned, it was then prepared for geocoding. Geocoding is the process of taking trip information (intersection or monument data) and placing it on an electronic map, for the purpose of establishing the X,Y coordinates of the trip end. Preparation for geocoding included joining the intersecting streets into one field and adding geocoding fields in the database.



The Canadian origin and destination information was geocoded by Paradigm staff using MapInfo Professional 9 using a single line representation network (SLRN) within Niagara Region and place name geography outside Niagara Region, and the same zone systems used in the 2000 survey.

The Canadian data was geocoded firstly based on intersection (for Niagara Region data only) and then city for the remaining data. Geocoding in this order ensures the most accurate results possible. All intersection and street addresses (monuments only) were geocoded using the Single Line Road Network file provided by RMON. All data was automatically geocoded first and then interactively geocoded to match as many records as possible. Trip ends that could not be matched based on any of the criteria due to misinformation was assigned a generic city zone and geocoded to that zone. This process is outlined in Section 5.8.

5.6 United States Trip End Geocoding

The United States data was geocoded by GBNRTC staff using the Microsoft Access database provided by Paradigm staff. Prior to geocoding, GBNRTC staff reviewed the data and made corrections to misspelled words and locations of points (i.e.: Buffalo International Airport is in Cheektowaga, not Lewiston). The latest United States TIGER street file was used as the base street network for geocoding with ESRI Arcview used to geocode records with a valid address to specific coordinates.

5.7 Zone System Development

The zone system that was developed for the 2000 survey was utilized for this survey. The zone system consists of 1002 internal traffic zones and 48 external zones for Canada and the United States combined. The zone system was based on a number of considerations: compatibility with the traffic zones in current use for the traffic studied in the Niagara Frontier area and comparability with the zones used for the 2000 bridge survey.

The zone system in Canada has several components. The Niagara Region Traffic Zones were used for zone coding trips within the Region boundaries. For the remaining areas of Central Ontario as far as Muskoka and Haliburton on the north and Hastings on the east, trip ends were geocoded to Census Division municipality (e.g. City of Hamilton = CD 25). To identify the orientation of trips external to the study area in Canada, seven external superzones were used as shown in **Figure 5.1**. These superzones generally define the corridors through which traffic will approach the Niagara Bridges on the Canadian side.

In the United States, the internal study area is made up of Niagara County to the north and Erie County to the south. These counties are divided into 554 traffic zones or Traffic Analyses Zones as identified by the GBNRTC. To facilitate analyses, the internal TAZ were grouped into seven superzones as indicated in **Table 5.2**. A number of external zones were selected by GBNRTC for the geocoding outside the internal area. These consist of the next ring of counties adjacent to the internal study area as well as an additional four zones which subdivide the remainder of the continental United States as shown in **Figure 5.2**. The last of these zones, -608, was a unique designation that could be used to identify United States to United States trips that cross between Southwestern Ontario and the Niagara bridges.

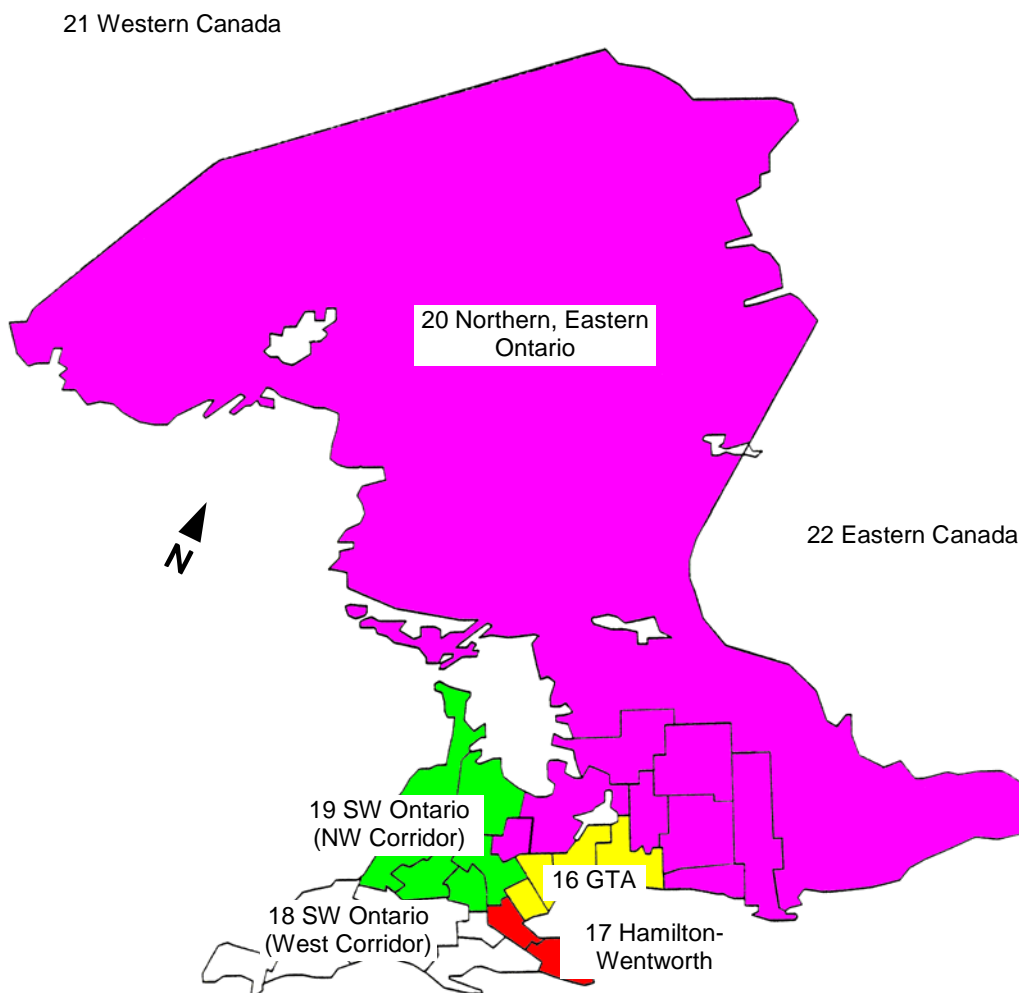
In order to differentiate the American from Canadian zones, the American zone numbers were assigned a negative value and are consistent with both the 2000 and 1990 surveys. This has the distinct advantage of instant recognition of the trip end location when reviewing the data.

A superzone system with 32 zones was developed for doing broad level analyses of the results of the survey and is presented in **Table 5.3**. It consists of 15 internal zones and 17 external superzones. Superzone



32 was a special code used to identify trips that began or ended at an international location such as Denmark or Switzerland. These trips are of interest from a tourist perspective and because many of these bridge trips originate from an airport. The superzones are shown in **Figure 5.3**.

From a practical standpoint, while a 32 SAZ trip table contains 1024 elements, it provides a useful overview of bridge trips to areas such as the Central Business District (CBD) in Buffalo or the GTA. It also provides sufficient definition for illustrating high level travel patterns and desire lines between the bridges and various areas of the Greater Niagara Region. It also enables the presentation of results for evaluation and comparison purposes.



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Figure 5.1

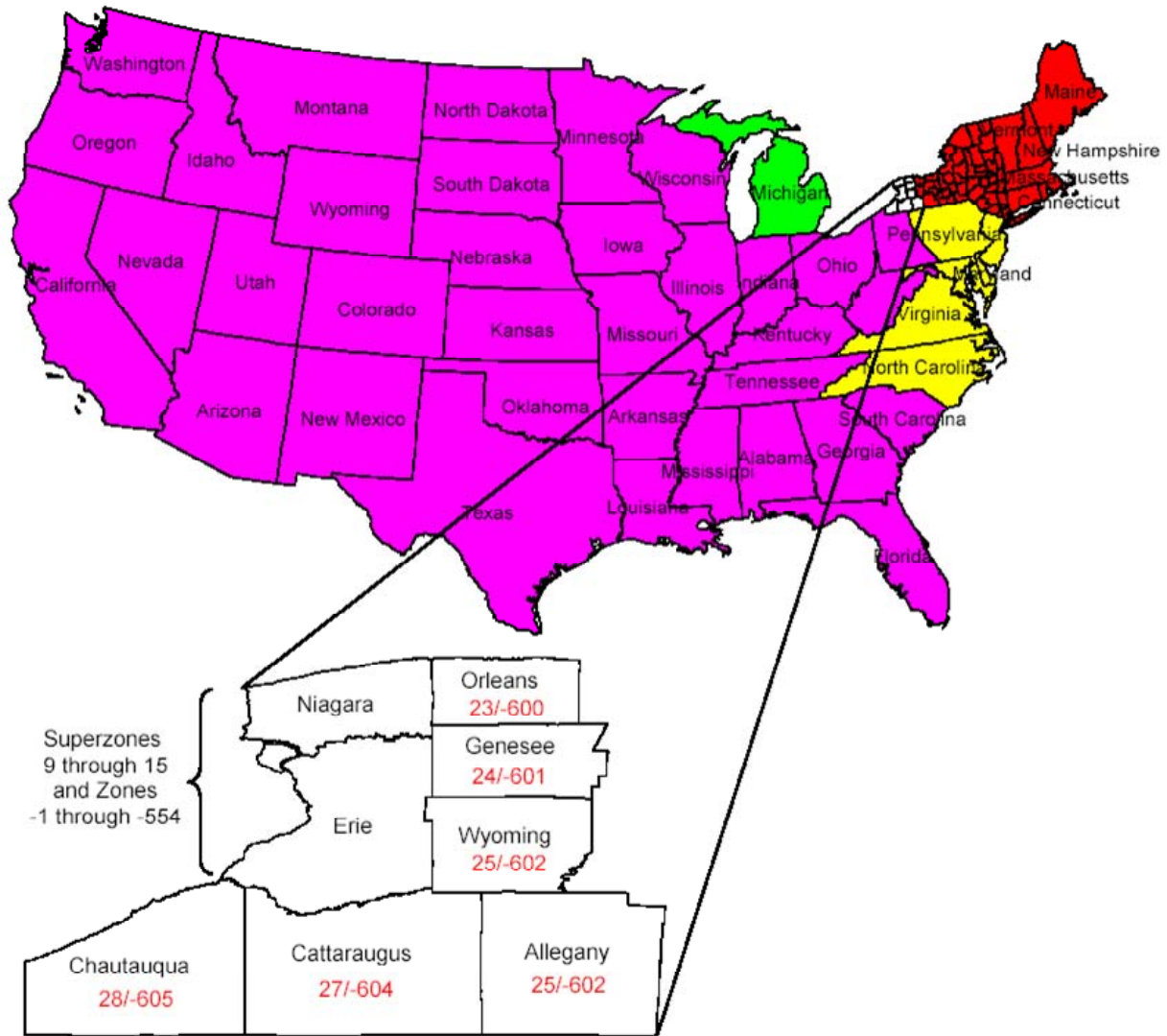
**Canadian External
Superzones**

**TABLE 5.2: UNITED STATES SUPERZONE GROUPING OF TRAFFIC ANALYSIS ZONES**

Superzone	TAZ Range
9 Buffalo CBD	1 - 22
10 Remainder of City of Buffalo	23 - 91
11 City of Niagara Falls & Town of Niagara	293 - 319, 442 - 448
12 Northwestern Niagara County	449 - 462
13 Remainder of Niagara County	191 - 200, 320 - 343, 402 - 422, 463 - 487
14 Northern Erie County	92 - 157, 179 - 190, 201 - 253, 334 - 359, 423 - 432, 488 - 497
15 Southern Erie County	158 - 178, 254 - 292, 360 - 401, 433 - 441, 498 - 554

TABLE 5.3: SUPERZONE SYSTEM

1 - Fort Erie	17 - City of Hamilton
2 - Niagara Falls	18 - SW Ontario (West Corridor)
3 - Port Colborne	19 - SW Ontario (Northwest Corridor)
4 - Thorold/Welland	20 - Northern, Eastern Ontario
5 - St. Catharines	21 - Western Canada
6 - Niagara-on-the-Lake	22 - Eastern Canada
7 - Grimsby/Lincoln	23 - U.S. 600: Orleans County
8 - West Lincoln/Wainfleet/Pelham	24 - U.S. 601: Genesee County
9 - Buffalo - CBD	25 - U.S. 602: Wyoming/Allegany Counties
10 - City of Buffalo	26 - U.S. 603: Mid-Atlantic/Eastern Seaboard
11 - Niagara Falls/Niagara U.S.	27 - U.S. 604: Cattaraugus County
12 - Northwestern Niagara County	28 - U.S. 605: Chatauqua County
13 - Southern Niagara County	29 - U.S. 606: Balance of NY State/NE U.S.
14 - Northern Erie County	30 - U.S. 607: Remainder of US (southeast and west)
15 - Southern Erie County	31 - U.S. 608: Michigan (for U.S. to U.S. trips only)
16 - GTA	99,172,159 - International



Legend

- Superzone and Zone as shown on inset
- Superzone 26/Zone -603 Mid-Atlantic/Eastern Seaboard
- Superzone 29/Zone -606 Balance of New York State and Northeast US
- Superzone 30/Zone -607 Remainder of US (Southeast and West)
- Superzone 31/Zone -608 Michigan (for US-to-US trips only)

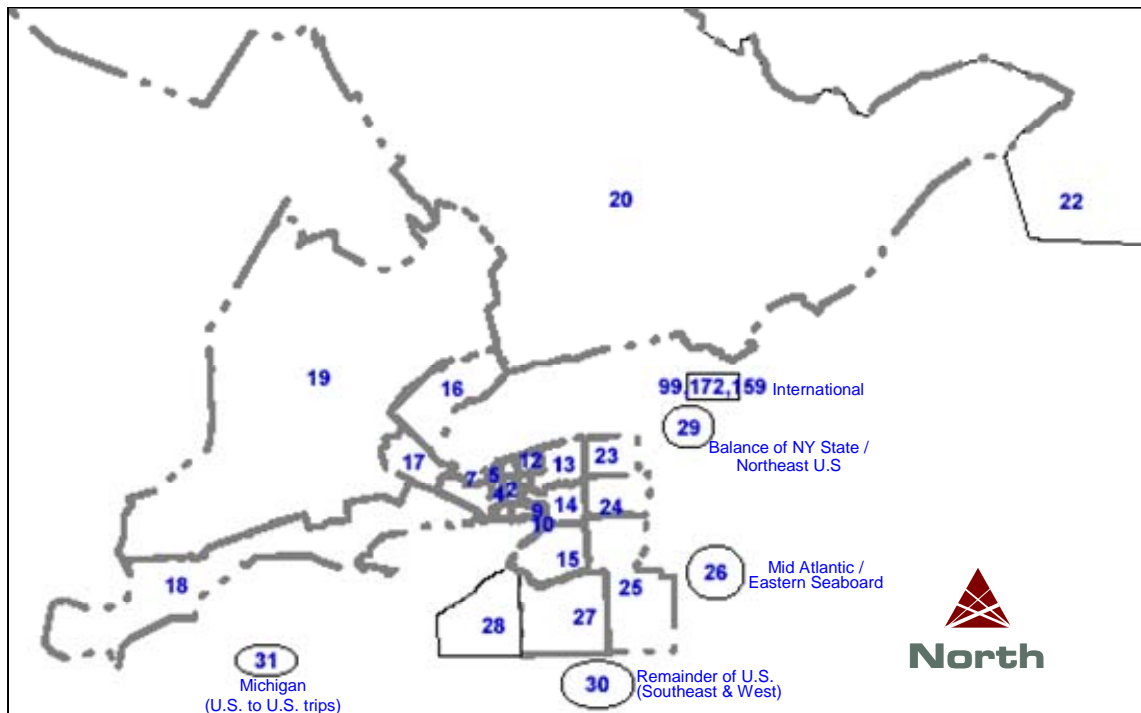
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Figure 5.2

**U.S. External Superzones/
Traffic Analysis Zones**



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Figure 5.3



Superzones



5.8 Canadian Zone Coding and Co-ordinate Extraction

All Canadian data was zone coded based on the zones outlined in Section 5.7. After initial geocoding, trip ends in Niagara Region that could not be matched based on intersection or monument address information were geocoded. These files included general information such as Niagara Falls or St. Catharines only with no further information provided. In order to make these records geocodable, several steps were taken. They are as follows:

- ▶ The previously geocoded Niagara Region records were queried to find out the number of trips by purpose and area (St. Catharines, Niagara Falls, Fort Erie, etc).
- ▶ This information was then aggregated to derive the proportions by purpose and zone.
- ▶ The generic trips were divided by purpose and then assigned a zone number based on proportions.
- ▶ These records were then geocoded to the centroid of the assigned traffic zone.

After geocoding was completed, all trip ends in central Ontario records were coded to their CMD and then coordinates were extracted for all Canadian trip ends. Two methods were utilized for this as follows:

- ▶ For trip ends in Niagara Region, the Universal Transverse Mercator North American Datum 83 Zone 17 coordinates were extracted for each point.
- ▶ For all other Canadian trip ends, the latitude and longitude of each point was extracted based on generic city location.

The decision was made to use two different methods of coordinate extraction in order to provide the most precise and reliable coordinate data. Using the UTM coordinates for the Niagara data ensures reliable coordinates; however UTM data is not as reliable over the larger area and requires more than one UTM zone. Therefore the latitude/longitude information was used for points outside the Niagara Region.

5.9 American Zone Coding and Co-ordinate Extraction

For the American data, all internal trips were geocoded with internal trips assigned TAZ numbers and latitude/longitude values. Generic trip ends were proportionally assigned to zones in the same manner as the Canadian data. All external trips were assigned zone numbers based on the zone system outlined in Section 5.7.

After geocoding and zone coding was complete, the United States data was returned to Paradigm in Microsoft Access format with the TAZ information and X,Y coordinate information for each United States trip end.

5.10 Database Re-Assembly and Final Checking

Upon receipt of the geocoded data from GBNRTC, Paradigm staff merged the two sets of data into one file. This task was undertaken in Microsoft Access by matching and importing data into the appropriate fields based on survey number. A further round of logic checks and adjustments were made to the data to ensure that it was as comprehensive and complete as possible.



5.11 Data Expansion

Once the data was re-merged to create the final dataset, the survey records were expanded by assigning expansion factors based on bridge, direction and hourly traffic volumes. Since less than 100% of the total traffic entering the survey area was interviewed, the assignment of expansion factors allows the data to be inflated to represent a 100% sample rate at all locations on all days.

Surveying was carried out on two Saturday afternoon shifts at the Queenston-Lewiston Bridge due to rain delay on the 14th and make up work on the 28th. To account for this, both day's data and traffic volumes were combined into one day (the 28th) as the representative sample from that bridge for that direction. An additional field was added to the database, "Expansion Day" which was used to identify the data in question and ensure it was properly expanded.

The expansion factors for the database were developed by dividing the total traffic volume per hour by the total number of survey records collected in that hour for each bridge and direction for both weekday and weekend conditions. The resulting factors were then imported into and attached to the survey records based on bridge, direction and hour.



6.0 ANALYSIS OF SURVEY DATA

In order to analyze the data and to develop accurate travel patterns, the data was separated into weekend and weekday data so as to better analyze the travel patterns and trip purposes and to remain consistent with the 2000 survey.

This section provides information for both weekend and weekday time periods for the following:

- ▶ License jurisdiction,
- ▶ Trip purpose by license plate,
- ▶ Vehicle type,
- ▶ Occupancy Level,
- ▶ Home Country, and
- ▶ Whether or not trips are staying overnight in destination country

6.1 Weekend Bridge Travel

6.1.1 Weekend License Jurisdiction by Bridge

In order to better understand the nature of the trips crossing the international border, the license plate state/province of vehicles was recorded. When analyzing the data, they were assigned to one of four categories: New York, Other United States, Ontario, and Other Canada.

During the weekend survey period, a total of about 51,000 vehicles passed through the survey areas as shown in **Table 6.1** below. This data shows that overall the Peace Bridge accommodates significantly more traffic than the other bridges. However, the data also shows that Canadian license plates use the Queenston-Lewiston Bridge more often than any other. As expected, a low volume of trips cross at the Whirlpool Bridge since this bridge is limited to Nexus cardholders only. Overall, there were almost twice as many Americans crossing the bridges than Canadians during the survey period.

TABLE 6.1: WEEKEND LICENSE PLATE JURISDICTIONS BY BRIDGE

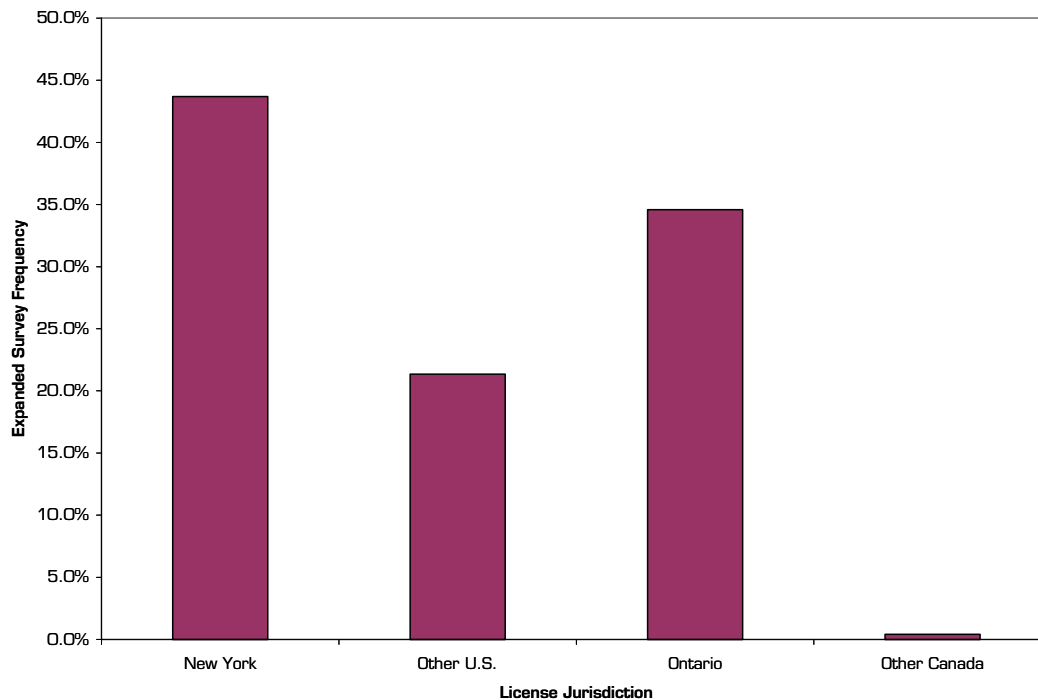
Bridge	Canadian License Jurisdictions		U.S. License Jurisdictions		TOTAL
Peace	6,185	34.6%	16,999	51.2%	23,184
Queenston-Lewiston	6,526	36.5%	5,837	17.6%	12,363
Rainbow	4,813	26.9%	9,657	29.1%	14,470
Whirlpool	340	1.9%	710	2.1%	1,050
TOTAL	17,864	35.0%	33,203	65.0%	51,067

6.1.2 License Plate Jurisdiction of Weekend Trips

The license plate information was also analyzed to determine what percentage of trips was made by New York or Ontario plated vehicles and by other American or Canadian license jurisdictions. **Table 6.2** and **Figure 6.1** below show that based on expanded surveys, New York-plated vehicles accounted for 43.7% and Ontario-plated vehicles account for 34.6% of the trips crossing the bridges on the weekend.

**TABLE 6.2: WEEKEND LICENSE JURISDICTION**

License Jurisdiction	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
New York	7,058	43.2%	22,305	43.7%
Other U.S.	3,302	20.2%	10,898	21.3%
Ontario	5,911	36.2%	17,660	34.6%
Other Canada	58	0.4%	204	0.4%
TOTAL	16,329	100.0%	51,067	100.0%



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**Figure 6.1****Weekend
License Jurisdictions**

6.1.3 Weekend Trip Purpose

Table 6.3 below shows that during the weekend time period, 47.9% of the vehicles crossing the bridges were returning home. Tourism related trips; including vacation, recreation and entertainment, tourist attractions and casino trips; accounted for 30% of the trips with visiting friends and relatives accounting for approximately 19% of the trips crossing the bridges.

**TABLE 6.3: WEEKEND TRIP PURPOSE**

Trip Purpose	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Home	7,614	46.6%	24,477	47.9%
Vacation	2,359	14.4%	7,124	13.9%
Recreation and entertainment	1,589	9.7%	4,713	9.2%
Visit friend/relatives	1,579	9.7%	4,722	9.2%
Shopping	763	4.7%	2,592	5.1%
Tourist attraction	758	4.6%	2,159	4.2%
Other	654	4.0%	1,972	3.9%
Casino	464	2.8%	1,379	2.7%
Work	206	1.3%	551	1.1%
School	181	1.1%	540	1.1%
Business	164	1.0%	844	1.7%
TOTAL	16,331	100.0%	51,073	100.0%

To get a better picture of the trip purpose across the bridges on the weekend, the trips were split into two categories: New York-plated vehicles entering Ontario and Ontario-plated vehicles entering New York. These two categories were chosen as they represent the greatest percentage of travel across the international bridges. This section provides information for both.

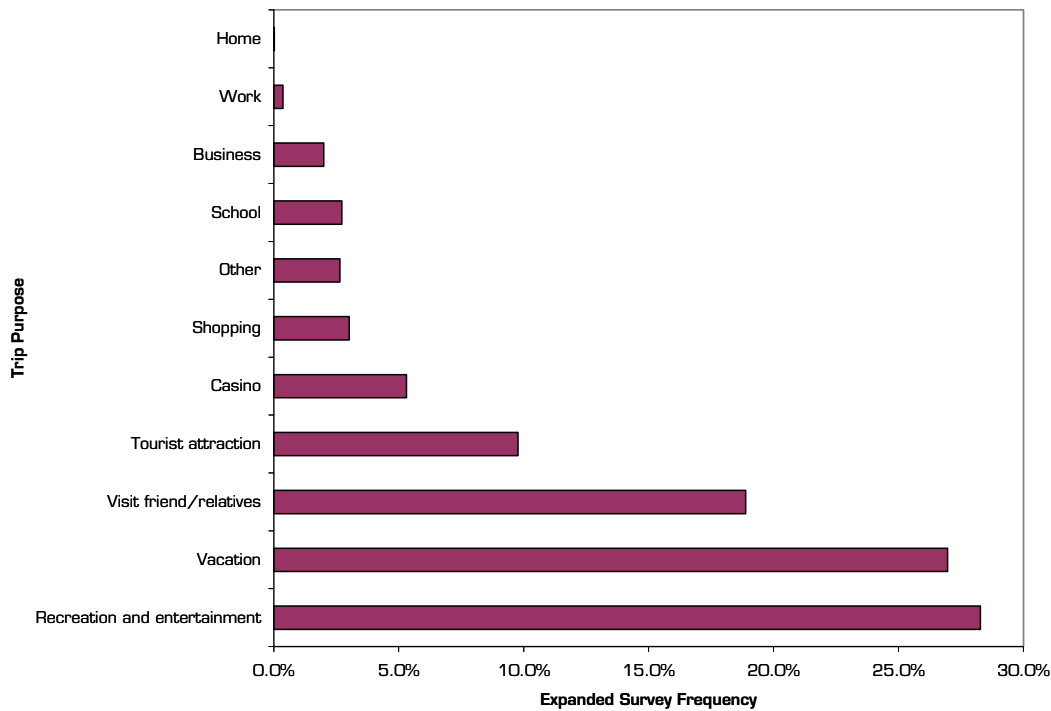
New York-Plated Vehicles Entering Ontario

Table 6.4a and **Figure 6.2a** below show the trip purpose of the New York-plated vehicles entering Ontario. This data shows that tourism related activities account for approximately 70% of the travel into Ontario during the weekend time period. Note that tourism related activities include recreation and entertainment, vacation, tourist attraction and casino trip purposes and is similar to the tourism grouping in the 2000 survey.

Traditional home, work and school travel accounts for approximately 5% of the travel and visit friend/relative accounting for approximately 19% of the total trips. Shopping trips accounted for 3% of the total trips and "Other" trip purposes account for about 3% of the total trips and include mainly airport related activities.

TABLE 6.4A: WEEKEND TRIP PURPOSE OF NEW YORK-PLATED VEHICLES ENTERING ONTARIO

Trip Purpose	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Recreation and entertainment	1,015	28.1%	2,938	28.3%
Vacation	955	26.5%	2,801	27.0%
Visit friend/relatives	689	19.1%	1,962	18.9%
Tourist attraction	377	10.4%	1,015	9.8%
Casino	213	5.9%	552	5.3%
Shopping	110	3.0%	313	3.0%
Other	100	2.8%	275	2.6%
School	99	2.7%	283	2.7%
Business	30	0.8%	207	2.0%
Work	20	0.6%	38	0.4%
Home	1	0.0%	2	0.0%
TOTAL	3,609	100.0%	10,388	100.0%



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Figure 6.2a
Weekend
Trip Purpose of
New-York Plated Vehicles Entering Ontario

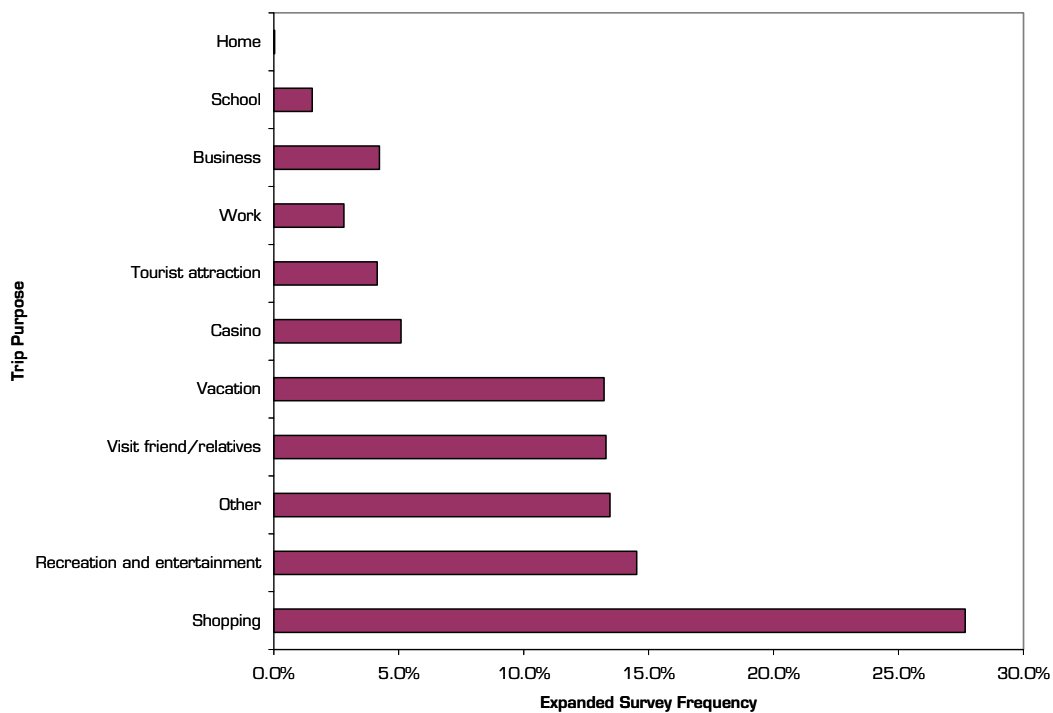
Ontario-Plated Vehicles Entering New York

Table 6.4b and **Figure 6.2b** below show the trip purpose of the Ontario-plated vehicles entering New York. Shopping related trips account for approximately 28% of the trips made by Ontarians into New York. The higher percentage of trips in this direction may be attributed to the stronger Canadian dollar and the appeal of discount sales in New York State.

Traditional home, work and school travel accounts for approximately 9% of the travel and visit friend/relative accounting for approximately 13% of Canadian trips entering New York. "Other" trips purposes account for about 13% of the total trips and include mainly airport related activities as flights to/from Buffalo international airport tend to be less costly than from Canada. Tourism related activities accounted for about 37% of the weekend trips into New York and include recreation and entertainment, vacation, tourist attraction and casino trip purposes, similar to the tourism grouping in the 2000 survey.

**TABLE 6.4B: WEEKEND TRIP PURPOSE OF ONTARIO-PLATED VEHICLES ENTERING NEW YORK**

Trip Purpose	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Shopping	605	26.1%	2,134	27.7%
Recreation and entertainment	337	14.5%	1,120	14.5%
Other	331	14.3%	1,037	13.5%
Visit friend/relatives	319	13.7%	1,025	13.3%
Vacation	311	13.4%	1,019	13.2%
Casino	110	4.7%	392	5.1%
Tourist attraction	101	4.4%	319	4.1%
Work	86	3.7%	216	2.8%
Business	85	3.7%	325	4.2%
School	35	1.5%	119	1.5%
Home	1	0.0%	2	0.0%
TOTAL	2,321	100.0%	7,710	100.0%



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Figure 6.2b
Weekend
Trip Purpose of
Ontario-Plated Vehicles Entering New York

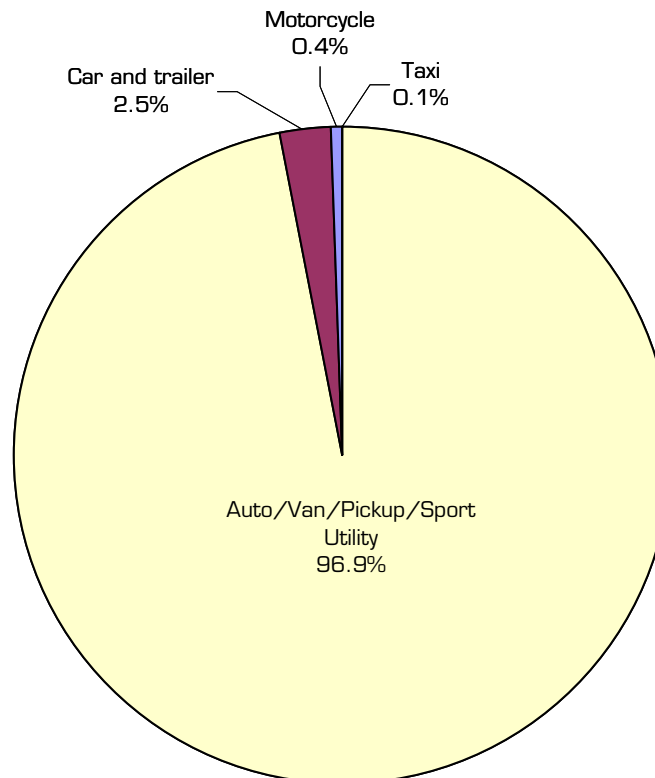


6.1.4 Weekend Trip Vehicle Type

Table 6.5 and **Figure 6.3** below show that auto/van/pickup/sport utility vehicles account for 96.9% of the vehicles crossing the international bridges during the weekend time period, with car and trailers trips following a distant second at 2.5%. Car and trailer trips are about 1.5% higher on weekends than on weekdays due to the tourist nature of weekend trips. Note: trucks and buses were not included in this survey and therefore were not counted and classified.

TABLE 6.5: WEEKEND TRIP VEHICLE TYPE

Vehicle Type	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Auto/Van/Pickup/Sport Utility	15,810	96.8%	49,520	96.9%
Car and trailer	432	2.6%	1,279	2.5%
Motorcycle	72	0.4%	218	0.4%
Taxi	9	0.1%	30	0.1%
Motorhome/RV	7	0.0%	24	0.0%
Other	2	0.0%	4	0.0%
Bicycle	1	0.0%	4	0.0%
TOTAL	16,333	100.0%	51,079	100.0%



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Figure 6.3

**Weekend
Vehicle Type**

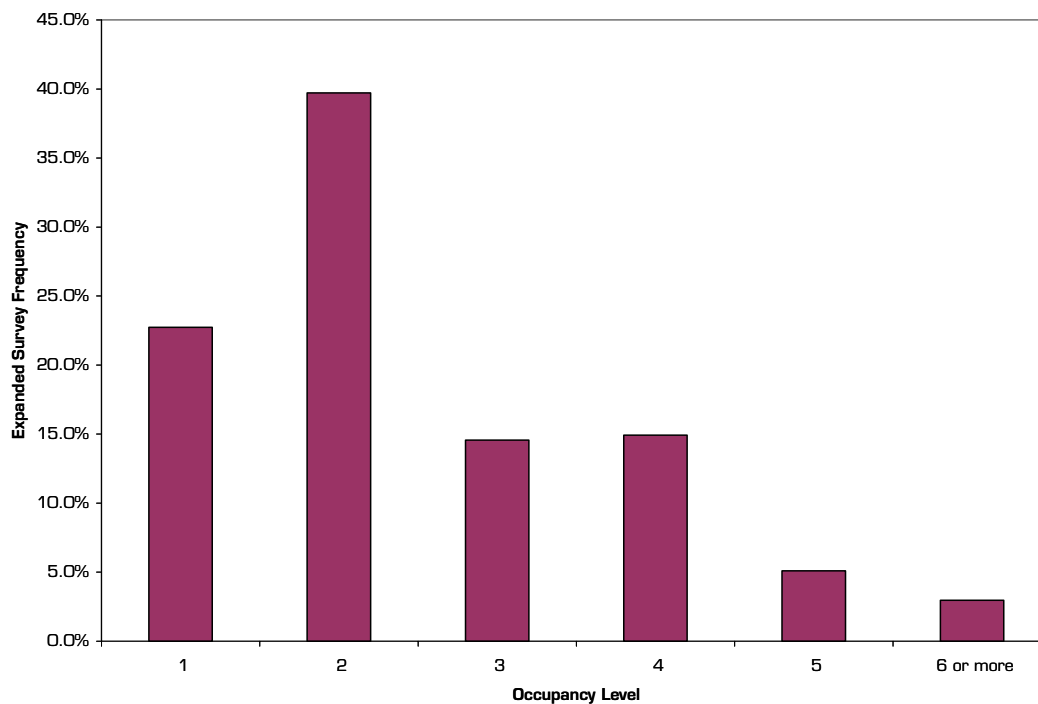


6.1.5 Weekend Trip Vehicle Occupancy

During the weekend survey period, the average occupancy of vehicles crossing the international bridges was 2.52. Vehicles with two occupants comprised about 40% of the weekend trips and single-occupant vehicles comprised a further 22.7%. It should be noted that single occupant vehicles accounted for fewer trips on the weekend than during the week and may be due to the trip purpose. **Table 6.6** and **Figure 6.4** below outline the vehicle occupancy of weekend trips.

TABLE 6.6: WEEKEND TRIP VEHICLE OCCUPANCY

Occupancy Level	Surveys	Survey Frequency	Expanded Surveys	Average Occupancy	Expanded Survey Frequency	Weighted Occupancy
1	3,798	23.3%	11,612	1	22.7%	11,612
2	6,502	39.8%	20,289	2	39.7%	40,577
3	2,322	14.2%	7,441	3	14.6%	22,323
4	2,404	14.7%	7,623	4	14.9%	30,493
5	810	5.0%	2,601	5	5.1%	13,005
6 or more	497	3.0%	1,514	7	3.0%	10,598
TOTAL	16,333	100.0%	51,079	2.52	100.0%	128,608



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Figure 6.4

**Weekend
Occupancy Level**

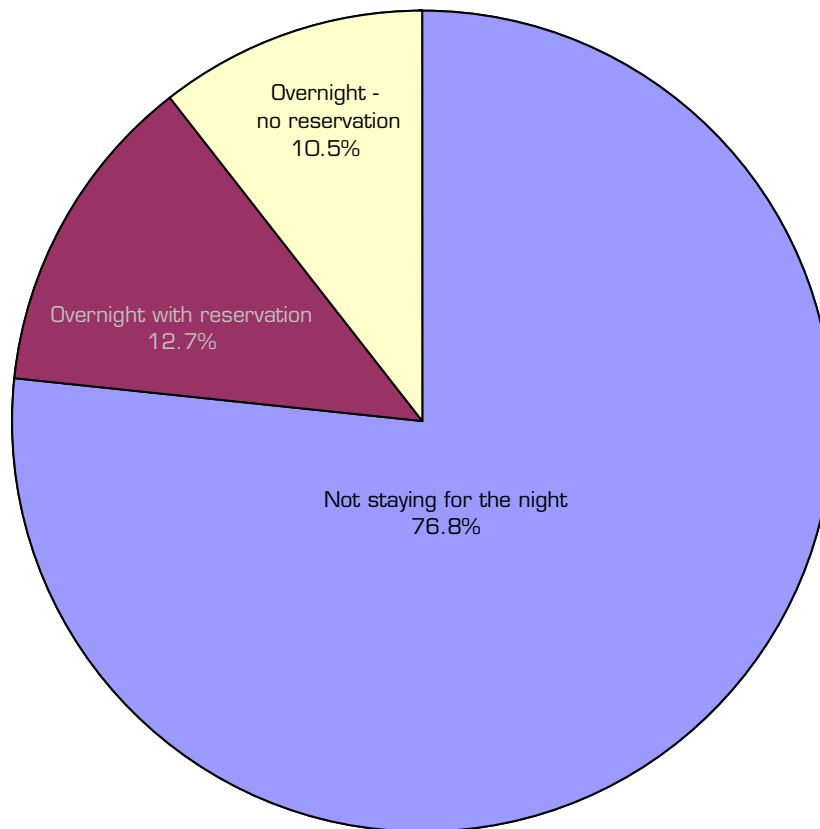


6.1.6 Weekend Trips Staying Overnight

Several questions related to tourism were included in the survey and were designed to determine what percentage of travelers intended to stay the night in their destination country and whether or not they had made a reservation. **Table 6.7** and **Figure 6.5** below indicate that about 23% of the trips crossing the bridges during the weekend survey period intended to stay for at least one night and of those, approximately 55% of them indicated that they had made a reservation.

TABLE 6.7 WEEKEND TRIPS STAYING THE OVERNIGHT IN DESTINATION COUNTRY

Stay for the Night	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
No	12,523	76.7%	39,227	76.8%
Yes with reservation	2,072	12.7%	6,494	12.7%
Yes - no reservation	1,738	10.6%	5,358	10.5%
TOTAL	16,333	100.0%	51,079	100.0%



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Figure 6.5
Weekend
Trips Staying Overnight

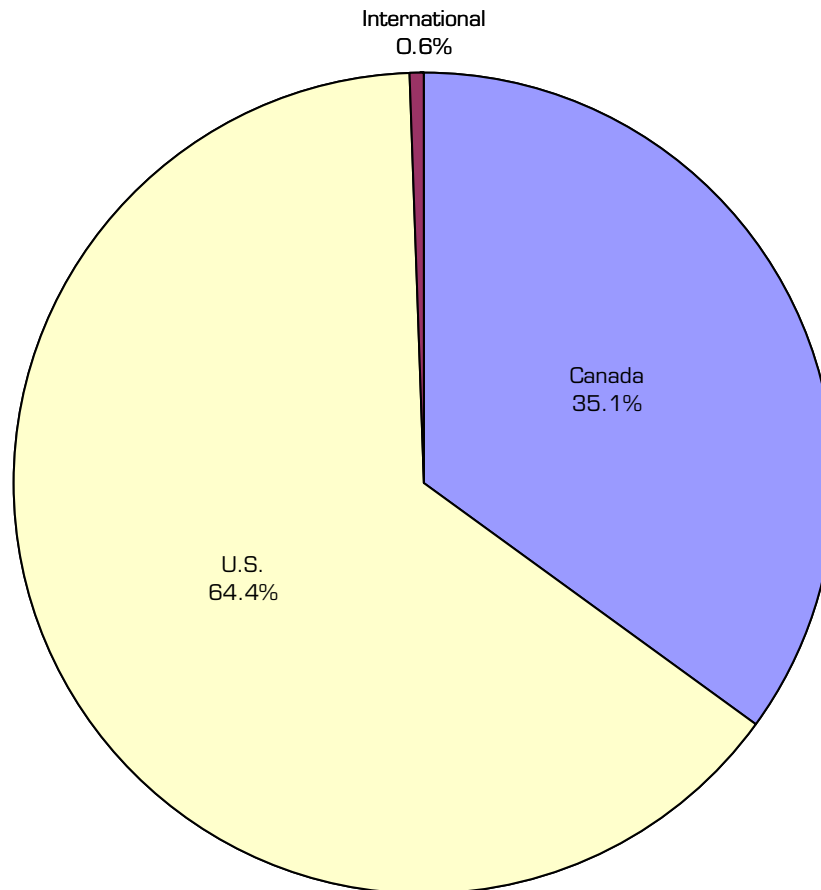


6.1.7 Home Country of Weekend Travelers

The final question on the interview dealt with the home state/country of drivers. This information is used to further determine the trips that are of a tourist nature. **Table 6.8** and **Figure 6.6** below show that less than 1% of the drivers crossing the border are from countries other than Canada or the United States and that there are almost twice as many Americans crossing the border than Canadians.

TABLE 6.8: HOME COUNTRY OF WEEKEND TRAVELERS

Home Country	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Canada	5,974	36.6%	17,886	35.1%
U.S.	10,252	62.8%	32,839	64.4%
International	91	0.6%	303	0.6%
TOTAL	16,317	100.0%	51,028	100.0%



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Figure 6.6

**Weekend
Home Country**



6.1.8 Weekend Travel Patterns

Travel patterns between the internal and external parts of the study area for the weekend day trips were analyzed by bridge. In order to capture the travel patterns and to show the relationships of the bridges to these types of travel, the trips have been grouped into four categories:

- ▶ Internal zone to internal zone (local trip),
- ▶ Internal zone to external zone (intermediate length trip),
- ▶ External zone to internal zone (intermediate length trip), and
- ▶ External zone to external zone (long distance trip)

As shown in **Table 6.9** below, trips between the internal Niagara Region and Niagara/Erie Counties zones (local trips) account for the greatest percentage of traffic, 41.7%, during the weekend time period. The internal to external, external to internal and external to external trips each represent about 20% of the total travel patterns between larger study area zones.

TABLE 6.9: WEEKEND INTERNAL/EXTERNAL TRIPS BY BRIDGE

Bridge	Internal to Internal		Internal to External		External to Internal		External to External		TOTAL
Peace	12,345	53.2%	3,275	14.1%	3,156	13.6%	4,408	19.0%	23,184
Queenston-Lewiston	1,807	14.6%	3,413	27.6%	2,553	20.6%	4,602	37.2%	12,376
Rainbow	6,279	43.4%	3,733	25.8%	3,093	21.4%	1,365	9.4%	14,470
Whirlpool	858	81.7%	64	6.1%	112	10.7%	16	1.5%	1,050
TOTAL	21,289	41.7%	10,485	20.5%	8,914	17.5%	10,391	20.3%	51,079

Table 6.9 further outlines the relationship between the bridge and the type of international travel it accommodates. At the Whirlpool Bridge, 81.7% of the trips are shorter length, internal to internal trips. This may be attributed to it serving only Nexus cardholders. The Queenston-Lewiston Bridges serves as the main crossing for long-distance, external to external trips, which account for 37.2% of the weekend trips at this bridge. The Rainbow Bridge mainly serves the local and intermediate distance travel. During this survey, it was found that more than 50% of the traffic accommodated by the Peace Bridge is local traffic. Overall, the weekend trips account for a higher percentage of intermediate or long distance travel than during the week.

A weekend analysis period trip matrix is provided in **Appendix E**.



6.2 Weekday Bridge Travel

6.2.1 Weekday License Jurisdiction by Bridge

During the weekday survey period, a total of about 35,350 vehicles passed through the survey areas as shown in **Table 6.10 below**. This data shows that overall the Peace Bridge accommodates significantly more traffic than the other bridges; however the Rainbow Bridge has more U.S. license jurisdiction crossings than the other bridges and the Queenston-Lewiston Bridge has more Canadian license jurisdiction crossings than the other bridges. As expected, a low volume of trips cross at the Whirlpool Bridge since this bridge is limited to Nexus cardholders only; however the weekday trips at this bridge are about 25% lower than on the weekend. The mix of U.S and Canadian license jurisdictions at the Whirlpool Bridge is about equal during the weekday period.

TABLE 6.10: WEEKDAY LICENSE PLATE JURISDICTIONS BY BRIDGE

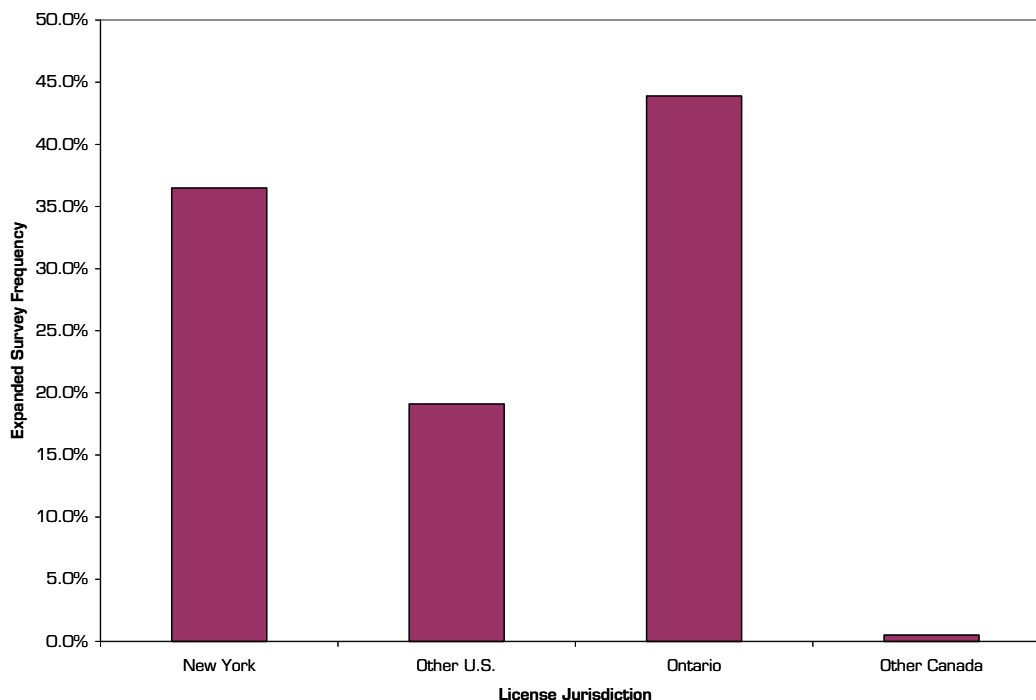
Bridge	Canadian License Jurisdictions		U.S. License Jurisdictions		TOTAL
Peace	6,614	40.5%	9,705	59.5%	16,319
Queenston-Lewiston	5,138	62.5%	3,086	37.5%	8,224
Rainbow	3,571	35.3%	6,558	64.7%	10,129
Whirlpool	429	53.8%	368	46.2%	797
TOTAL	15,752	44.4%	19,717	55.6%	35,469

6.2.2 License Plate Jurisdiction of Weekday Trips

The license plate information was analyzed to determine what percentage of trips were made by New York or Ontario plated vehicles and by other American or Canadian license jurisdictions. **Table 6.11** and **Figure 6.7** below shows that New York-plated vehicles accounted for 36.5% of the trips and Ontario-plated vehicles accounted for 43.9% of the trips crossing the bridges during the weekday survey period.

TABLE 6.11: WEEKDAY LICENSE JURISDICTION

License Jurisdiction	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
New York	4,976	38.6%	12,945	36.5%
Other U.S.	2,264	17.6%	6,772	19.1%
Ontario	5,575	43.3%	15,572	43.9%
Other Canada	61	0.5%	179	0.5%
TOTAL	12,876	100.0%	35,468	100.0%



2007 Cross-Border O-D Survey

Figure 6.7**Weekday
License Jurisdictions**

6.2.3 Weekday Trip Purpose

Table 6.12 below shows that during the weekday time period, approximately 39% of the vehicles entering New York were returning home from trips into Canada. Tourism related trips; including vacation, recreation and entertainment, tourist attractions and casino trips; accounted for approximately 31% of the trips with visiting friends and relatives accounting for approximately 8% of the trips crossing the bridges into Ontario.

TABLE 6.12: WEEKDAY ANALYSIS PERIOD TRIP PURPOSE

Trip Purpose	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Home	5,149	40.0%	13,656	38.5%
Vacation	1,647	12.8%	4,604	13.0%
Recreation and entertainment	1,231	9.6%	3,653	10.3%
Visit friend/relatives	1,020	7.9%	2,924	8.2%
Work	826	6.4%	2,315	6.5%
Shopping	764	5.9%	2,291	6.5%
Other	716	5.6%	1,814	5.1%
Tourist attraction	508	3.9%	1,451	4.1%
Casino	470	3.7%	1,304	3.7%
Business	444	3.4%	1,155	3.3%
School	97	0.8%	288	0.8%
TOTAL	12,872	100.0%	35,455	100.0%



In order to get a better picture of the trip purpose across the bridges on the weekday, the trips were split into two categories: New York-plated vehicles entering Ontario and Ontario-plated vehicles entering New York. These two categories were chosen as they represent the greatest percentage of travel across the international bridges.

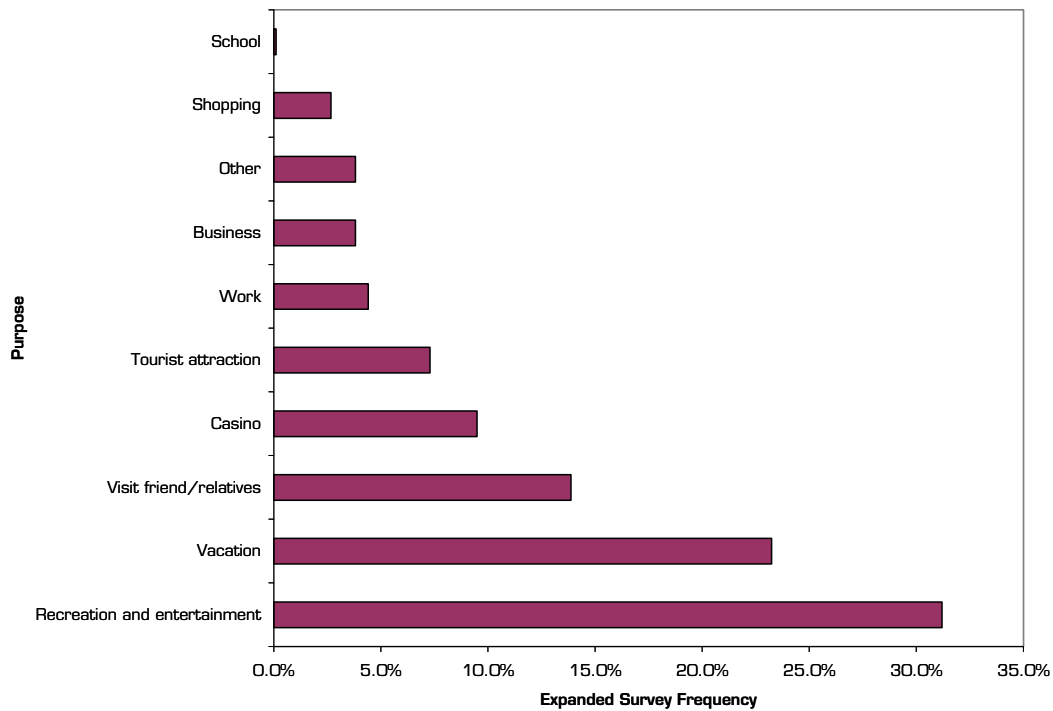
New York-Plated Vehicles Entering Ontario

Table 6.13a and **Figure 6.8a** below show the trip purpose of the New York-plated vehicles entering Ontario. This data shows that tourism related activities account for approximately 71% of the travel into Ontario and is about the same percentage as the weekend day trips. Note that tourism related activities include recreation and entertainment, vacation, tourist attraction and casino trip purposes and is similar to the tourism grouping in the 2000 survey.

Traditional home, work and school travel accounts for approximately 8% of the travel, which is about 3% higher than during the weekend day period. Visit friend/relatives accounting for approximately 14% of the trips, shopping represents about 3% of the trips and "Other" trips purposes account for about 4% of the total trips and include mainly airport related activities.

TABLE 6.13A: WEEKDAY TRIP PURPOSE OF NEW YORK-PLATED VEHICLES ENTERING ONTARIO

Trip Purpose	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Recreation and entertainment	789	29.9%	2,175	31.2%
Vacation	586	22.2%	1,620	23.2%
Visit friend/relatives	368	14.0%	967	13.9%
Casino	256	9.7%	662	9.5%
Tourist attraction	187	7.1%	508	7.3%
Work	154	5.8%	307	4.4%
Business	115	4.4%	266	3.8%
Other	105	4.0%	266	3.8%
Shopping	73	2.8%	186	2.7%
School	2	0.1%	7	0.1%
TOTAL	2,637	100.0%	6,971	100.0%



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Figure 6.8a
Weekday
Trip Purpose of
New-York Plated Vehicles Entering Ontario

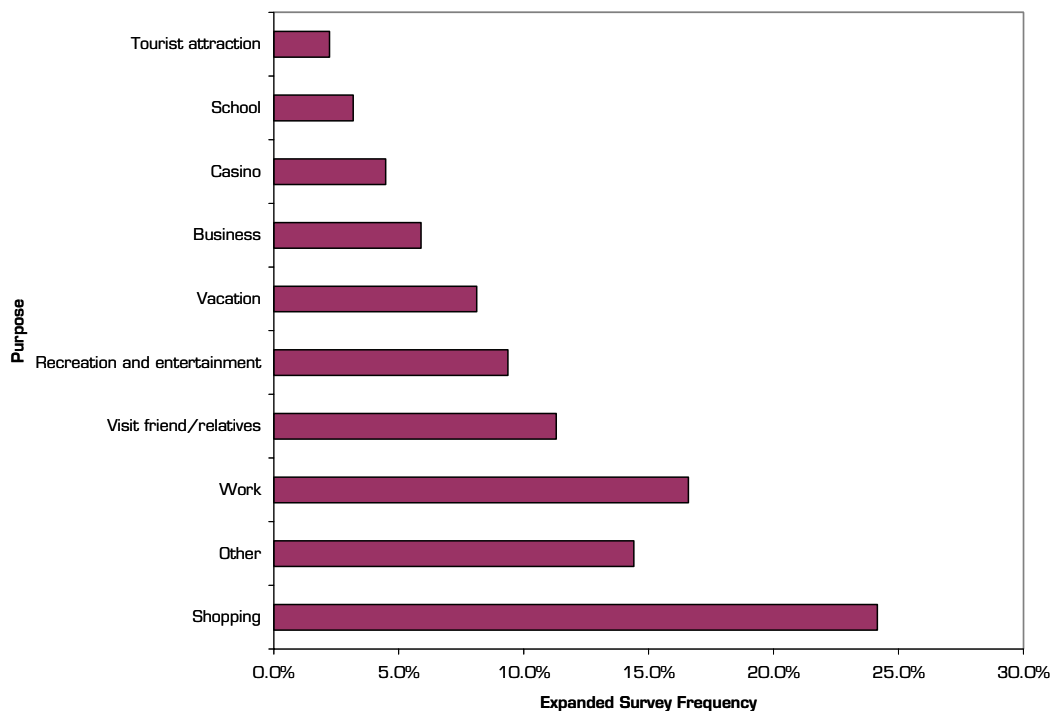
Ontario-Plated Vehicles Entering New York

Table 6.13b and **Figure 6.8b** below show the trip purpose of the Ontario-plated vehicles entering New York. This data shows that shopping related trips decreases to approximately 24% of the trips made by Ontarians into New York, which is about 4% lower than on the weekend. Tourism related activities account for approximately 24% of the travel into New York during the weekend day time period which is about 13% lower than the weekend time period. Note that tourism related activities include recreation and entertainment, vacation, tourist attraction and casino trip purposes and is similar to the tourism grouping in the 2000 survey.

Traditional home, work and school travel accounts for approximately 10% of the travel. Visit friend/relatives account for approximately 26% of the trips and "Other" trips purposes account for about 14% of the total trips and include mainly airport related activities as flights to/from Buffalo international airport tend to be less costly than from Canada.

**TABLE 6.13B: WEEKDAY TRIP PURPOSE OF ONTARIO-PLATED VEHICLES ENTERING NEW YORK**

Trip Purpose	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Shopping	632	22.6%	1,931	24.2%
Other	456	16.3%	1,152	14.4%
Work	430	15.4%	1,326	16.6%
Visit friend/relatives	341	12.2%	904	11.3%
Recreation and entertainment	254	9.1%	749	9.4%
Vacation	242	8.7%	649	8.1%
Business	174	6.2%	471	5.9%
Casino	118	4.2%	358	4.5%
School	85	3.0%	254	3.2%
Tourist attraction	58	2.1%	178	2.2%
TOTAL	2,796	100.0%	7,974	100.0%



2007 Cross-Border O-D Survey



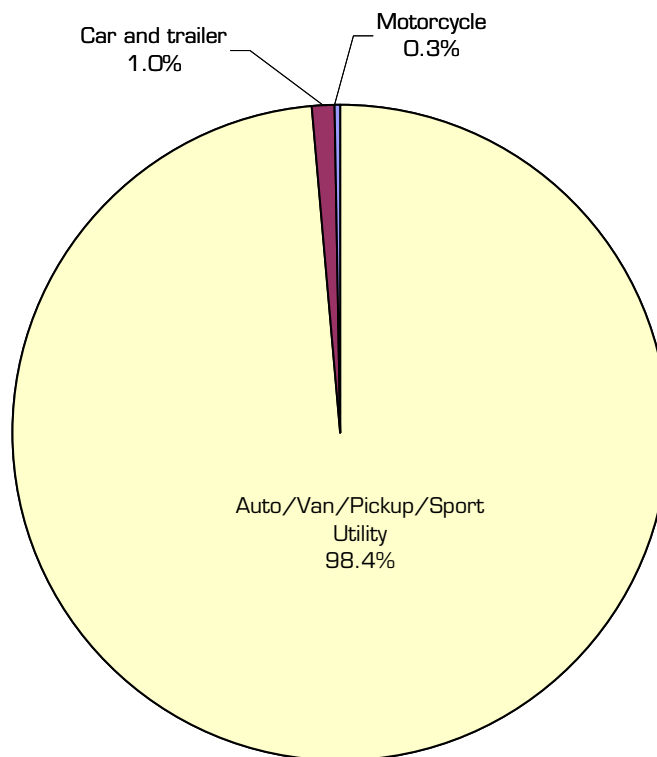
Figure 6.8b
Weekday
Trip Purpose of
Ontario-Plated Vehicles Entering New York

6.2.4 Weekday Trip Vehicle Type

Table 6.14 and **Figure 6.9** below show that auto/van/pickup/sport utility vehicles account for 98.4% of the vehicles crossing the international bridges during the weekday time period with car and trailer trips a distant second at 1.0%. Note: trucks and buses were not included in this survey and therefore were not counted and classified.

**TABLE 6.14: WEEKDAY TRIP VEHICLE TYPE**

Vehicle Type	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
Auto/Van/Pickup/Sport Utility	12,672	98.4%	34,922	98.4%
Car and trailer	130	1.0%	362	1.0%
Motorcycle	41	0.3%	106	0.3%
Taxi	25	0.2%	60	0.2%
Motorhome/RV	7	0.1%	19	0.1%
Other	6	0.0%	13	0.0%
TOTAL	12,881	100.0%	35,483	100.0%



2007 Cross-Border O-D Survey

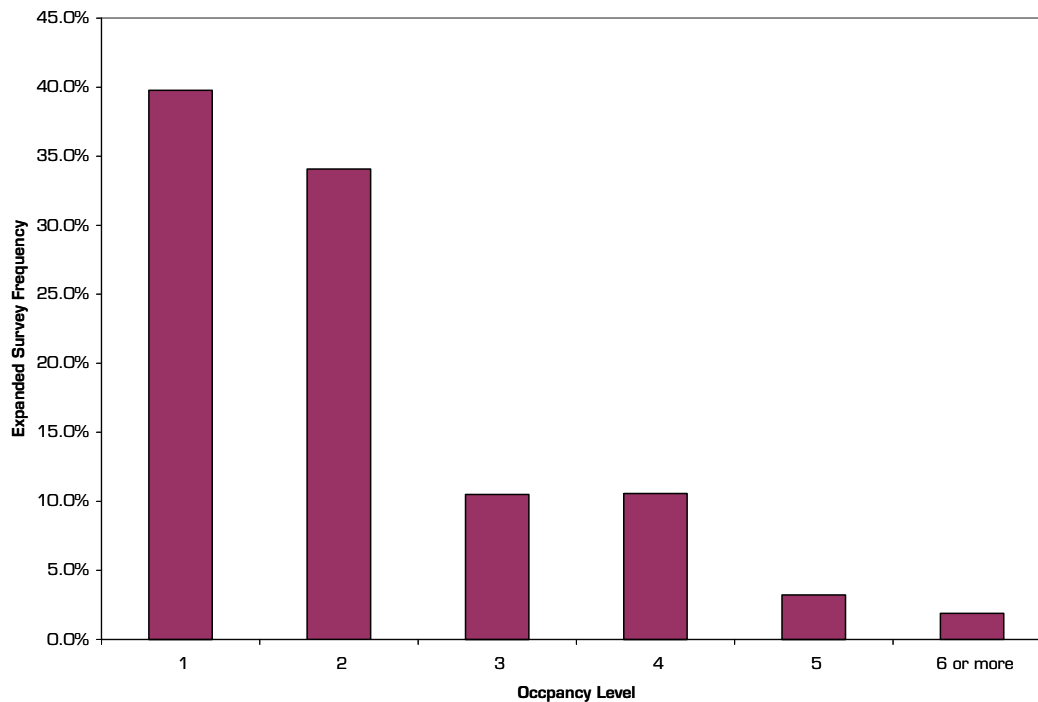

Paradigm
 www.ptsl.com
Figure 6.9
**Weekday
Vehicle Type**

6.2.5 Weekday Trip Vehicle Occupancy

During the weekday survey period, the average occupancy of vehicles crossing the international bridges was 2.09. Single occupant vehicles accounted for the majority of the trips at 39.8%, which is a significantly higher percentage than for the weekend trips and may be attributed to the trip purpose. **Table 6.15** and **Figure 6.10** below outline the vehicle occupancy of weekday trips.

**TABLE 6.15: WEEKDAY TRIP VEHICLE OCCUPANCY**

Occupancy Level	Surveys	Survey Frequency	Expanded Surveys	Average Occupancy	Expanded Survey Frequency	Weighted Occupancy
1	5,288	41.1%	14,111	1	39.8%	14,111
2	4,266	33.1%	12,091	2	34.1%	24,182
3	1,347	10.5%	3,722	3	10.5%	11,166
4	1,329	10.3%	3,750	4	10.6%	14,998
5	414	3.2%	1,143	5	3.2%	5,716
6 or more	237	1.8%	666	6	1.9%	3,996
TOTAL	12,881	100.0%	35,483	2.09	100.0%	74,169



2007 Cross-Border O-D Survey

**Figure 6.10****Weekday
Occupancy Level**



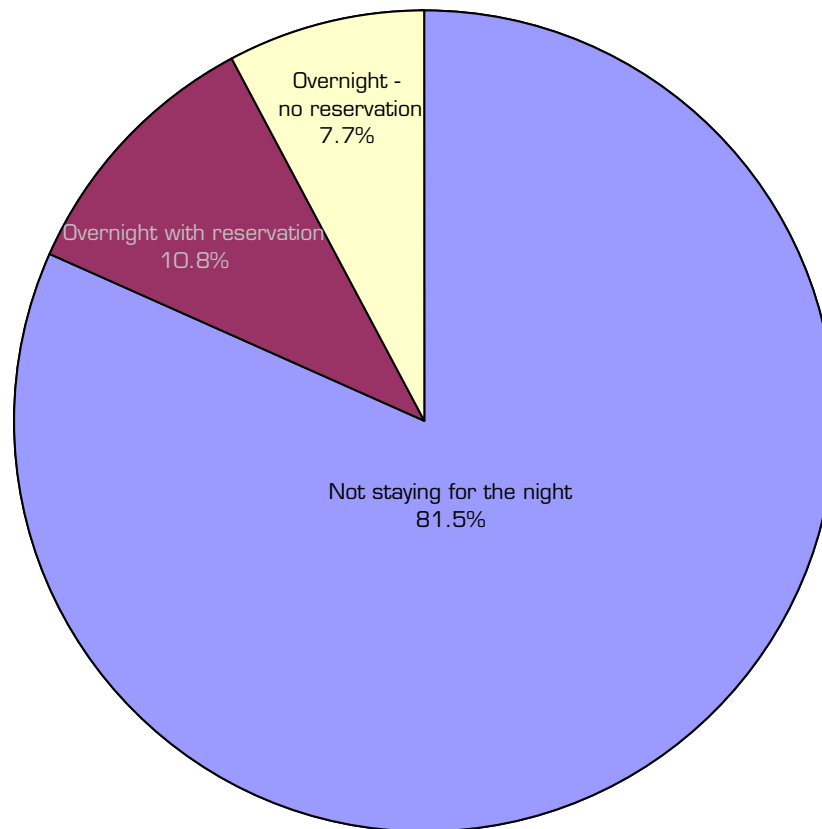
6.2.6 Weekday Trip Staying Overnight

Several questions related to tourism were included in the survey to determine what percentage of travelers intended to stay the night in their destination country and whether or not they had made a reservation.

Table 6.16 and **Figure 6.11** below indicate that about 19% of the trips crossing the bridges during the weekday survey period intended to stay at least one night and of those, approximately 58% of them indicated that they had made a reservation.

TABLE 6.16 WEEKDAY TRIPS STAYING THE OVERNIGHT IN DESTINATION COUNTRY

Stay for the Night	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
No	10,618	82.4%	28,935	81.5%
Yes with reservation	1,354	10.6%	3,828	10.8%
Yes - no reservation	909	7.1%	2,720	7.7%
TOTAL	12,881	100.1%	35,483	100.0%



2007 Cross-Border O-D Survey



Figure 6.11

**Weekday
Trips Staying Overnight**

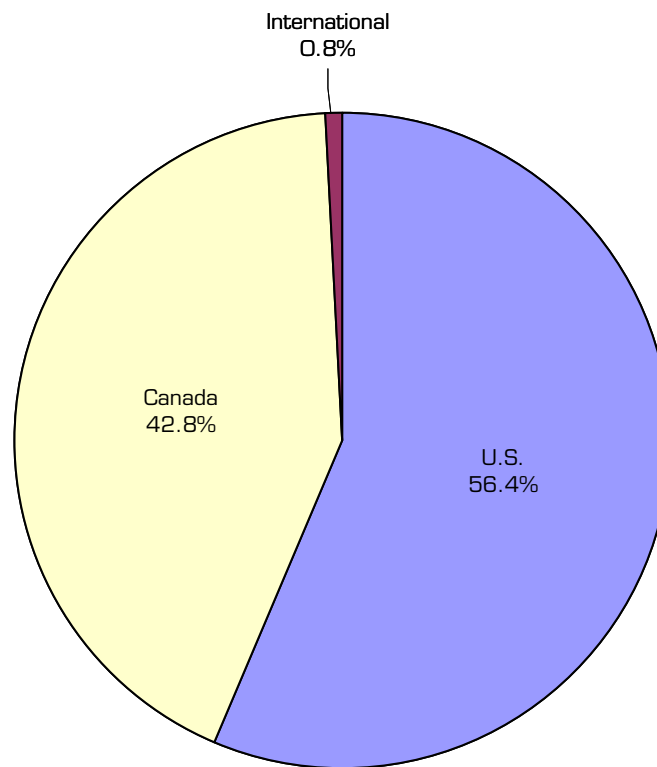


6.2.7 Home Country of Weekday Travelers

The final question on the interview dealt with the home state/country of drivers. This information is used to further determine the trips that are of a tourist nature. **Table 6.17** and **Figure 6.12** below show that less than 1% of the peak period traffic crossing the border is from countries other than Canada or the United States.

TABLE 6.17: HOME COUNTRY OF WEEKDAY TRAVELERS

Home Country	Surveys	Survey Frequency	Expanded Surveys	Expanded Survey Frequency
U.S.	7,291	56.9%	19,910	56.4%
Canada	5,425	42.3%	15,122	42.8%
International	100	0.8%	295	0.8%
TOTAL	12,816	100.0%	35,327	100.0%



2007 Cross-Border O-D Survey



Figure 6.12

**Weekday
Home Country**



6.2.8 Weekday Travel Patterns

Travel patterns between the internal and external parts of the study area for the weekday peak period trips were analyzed by bridge. In order to capture the travel patterns and to show the relationships of the bridges to these types of travel, the trips have been grouped into four categories:

- ▶ Internal zone to internal zone (local trip),
- ▶ Internal zone to external zone (intermediate length trip),
- ▶ External zone to internal zone (intermediate length trip), and
- ▶ External zone to external zone (long distance trip)

As shown in the **Table 6.18** below, trips between the internal Niagara Region and Niagara/Erie Counties zones account for the greatest percentage of traffic, 53.7%, during the week. The internal to external, external to internal and external to external trips each represent about 15% of the total travel patterns between larger study area zones.

TABLE 6.18: WEEKDAY INTERNAL/EXTERNAL TRIPS BY BRIDGE

Bridge	Internal to Internal		Internal to External		External to Internal		External to External		TOTAL
Peace	10,575	64.8%	1,572	9.6%	2,074	12.7%	2,103	12.9%	16,324
Queenston-Lewiston	2,313	28.1%	1,828	22.2%	1,938	23.5%	2,154	26.2%	8,233
Rainbow	5,455	53.9%	1,864	18.4%	1,989	19.6%	821	8.1%	10,129
Whirlpool	699	87.7%	33	4.2%	59	7.4%	6	0.8%	797
TOTAL	19,042	53.7%	5,297	14.9%	6,059	17.1%	5,085	14.3%	35,483

Table 6.18 further outlines the relationship between the bridge and the type of international travel it accommodates. At the Whirlpool Bridge, a large percentage of the trips, 87.7% are shorter length internal to internal travel and may be attributed to it serving only Nexus cardholders. The Queenston-Lewiston Bridge serves as the main crossing for long-distance external to external trips, which account for 26.2% of all the weekday peak period crossings at this bridge. The Rainbow Bridge mainly serves local international traffic; however it also accommodates a modest amount of intermediate distance travel. During this survey, it was found that more than 60% of the traffic accommodated by the Peace Bridge is local traffic, which is about 10% higher than during the weekend time period. Overall, the weekday trip patterns indicate a higher percentage of shorter length, internal to internal travel than intermediate or long distance trips.

A weekend analysis period trip matrix is provided in **Appendix E**.



Appendix A

Employment Posting

Casual Employment Available For Participation in a Travel Survey

*** Recruiting responsible individuals (preferably 18+) that speak
and write fluent English ***

Duties include roadside interviews, vehicle classifications and directing traffic
at Niagara border crossings.

Must be available for paid training on July 3 or 4 and to work for a total of 72
hours between July 10 and July 22, 2007 (approximate) on Tuesdays, Wednesdays,
Saturdays and Sundays

Three shifts available: Midnight to 8 am, 8 am to 4 pm, 4pm to midnight

Police assistance, safety vests and survey equipment will be provided.

Your own certified safety boots/footwear, hat and watch are mandatory.

(A refund of up to \$75 will be provided at end of survey for those with
satisfactory performance and appropriate receipt of purchase)

Base pay is \$12/hour. A bonus of \$3/hour, or a total salary of \$15/hr, will be paid
to all who have satisfactory attendance and performance of duties.

Persons having their own means of transportation will be given preference but
transportation by car pool may be available

Interviews will be held on June 26, 2007 at the Niagara Region offices in Thorold
(times to be arranged).

Opportunities may exist for further work associated with this survey beyond dates
listed above.

Please contact the following no later than June 19, 2007:

Darlene Cassidy
Paradigm Transportation Solutions Limited
905-381-2229 ext 8



Appendix B

Surveyor Training Manual



**2007 NIAGARA BORDER
(FOUR CROSSINGS)
ORIGIN - DESTINATION
TRAVEL SURVEY
SURVEYOR TRAINING
MANUAL**

Prepared For:
URS Canada
Ministry of Transportation Ontario

July 2007



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REMINDERS

1. SAFETY FIRST

- a. **ALWAYS** wear your safety vest
 - b. **ALWAYS** wear you arm/leg bands for night work
 - c. **ALWAYS** wear your safety shoes/boots
 - d. **BE AWARE** of the traffic
2. **Always act courteously and responsibly; you are representing the Ministry of Transportation**

DON'T FORGET

- 1. Your scheduled work days and times.
- 2. Your id badge and parking pass.
- 3. Dress appropriately for all types of weather. You will be outside for 8.5 to 9 hours and may experience cool temperatures to very hot temperatures.
- 4. A raincoat and a change of clothing in case of wet weather.
- 5. Sunscreen.
- 6. Pack refreshments such as water or juice and your meal(s).



1.0 PURPOSE AND OBJECTIVE

Paradigm Transportation Solutions Limited has been retained by URS Canada and the Ministry of Transportation Ontario to collect travel survey data and carry out an analysis of vehicular flow patterns and characteristics at the four Niagara region border crossing. A key component of the study is to conduct an analysis of and Origin-Destination (O-D) survey of passenger vehicles at the border crossings.

This study is being conducted as an initiative of the Ministry of Transportation Ontario and Niagara Region. The stakeholders potentially benefiting from the work include:

- ▲ Ontario Ministry of Transportation (MTO)
- ▲ Regional Municipality of Niagara (RMON)
- ▲ New York State

Direction for the study will be provided by a Working Committee/Project Team comprised of staff from URS Canada, Paradigm Transportation Solutions Limited, Ministry of Transportation and the Regional Municipality of Niagara.

In view of this the staff will be required to achieve the following:

1. Record the number, classification and characteristics of all vehicles passing through the survey setup during the survey period.
2. Record, by means of interview, the origins and destinations, trip purpose, extended trip information, home state/province and tourism related questions of a representative sampling of all vehicles passing through the survey setup during the survey period.

In order to achieve these objectives, survey crews ranging from four people to 16 people are required to conduct personal interviews, direct traffic flow, and classify vehicles in mid-July on Tuesday, Wednesday Saturday and Sunday during this period. The surveys will be conducted on:

- ▲ Tuesday and Wednesday – July 10, 11, 17 and 18
- ▲ Saturday and Sunday – July 14, 15, 21 and 22
- ▲ Alternate dates of Thursday July 19; Saturday, July 28 and Sunday, July 29 may be required if more survey areas are needed or if a day has been cancelled due to rain.

You will be notified where and when to meet on the first and subsequent days of the interviews.

2.0 SURVEY TEAMS

In order to successfully complete the survey, a number of people must work together in a cooperative team effort. The crews are divided into different job positions. The positions have the following responsibilities:

Team Leader/Supervisor: There will be a team leader (Paradigm staff) on each day of surveying, for each shift and direction at all survey locations. Each team leader is responsible for ensuring that all members of his/her shift are at the survey station **½ hour before** the shift begins, and if not, to



notify stand-by staff. Team leaders will be responsible for direct supervision of the other shift members, the collection of survey forms at the end of each shift, monitoring and adjusting the sampling rates, and the supervision of breaks (if required) and the use of the float crew.

- ▲ **Interviewers:** The majority of the survey staff will work as Interviewers and will be responsible for conducting the personal interviews with the auto drivers. They will be responsible for collecting accurate data.
- ▲ **Traffic Flagpersons:** These positions will typically be filled by off-duty Niagara Regional Police or Niagara Parks Commission Police. They will be responsible for selecting vehicles from the traffic stream for interviewing and ensuring that the interview positions are constantly supplied with vehicles.
- ▲ **Exit Control:** These individuals will be equipped with STOP/SLOW paddles and will be responsible for releasing vehicles after all surveys have been completed. Their secondary responsibility is the safety and security of the interviewers as they will be more aware of situations that may be developing and will alert the interviewers accordingly. In addition, exit control may be responsible for stopping vehicle for interviews where needed.
- ▲ **Traffic Classifiers:** This position will be responsible for recording the total number and type of vehicles in 15-minute intervals. Traffic classifiers will work at or near the survey station and manually record the type of each vehicle, thereby providing a count at the same time.
- ▲ **Buffer/Floater Crew:** One to two staff will be assigned to each shift in order to provide personnel to fill in for other staff. It is important for staff working in this position to familiarize themselves with the positions they could potentially fill. The floater crew will also be responsible for assisting the team leaders and on-site supervisor by verifying the completed interview forms on-site for errors and omissions and filing the forms by hour and direction.

3.0 SURVEY TRAINING

Two training sessions will be conducted: Tuesday, July 3rd, 2007 and Wednesday, July 4th 2007, both from 9:00 am to 5:00 pm. You will only be required to attend on training session and you must participate in the training session. The session will be broken down into two parts with the morning session covering classroom instruction from team leaders/supervisors and the afternoon session providing practice sessions for the interview form or traffic control.

The training for the survey positions is very important, and attendance at all scheduled sessions is mandatory. A total of 8 hours of training time will be paid per crewmember upon completion of all the surveys. Due to budget limitations, you will not be paid for the training sessions until you have successfully completed the surveys. Wages will also not be paid for incomplete work or shifts, except in the event of a rainout, or administrative reasons, where 2 hours pay is guaranteed.

4.0 SURVEY LOCATIONS AND REPORTING

The survey locations and dates are provided in Table 1 below. The proposed survey setup designs are also attached to this manual. It is imperative for you to arrive 30 minutes before the beginning of the shift in order that vests, id badges, survey forms and additional safety equipment can be



distributed prior to starting the surveys. If you haven't arrived 30 minutes before your scheduled shift begins your team leader or on-site supervisor will contact a stand-by staff member to come and replace you. However, it is very important to the success of the survey to have all positions filled, so if due to sickness or emergency you are unable to make your shift, please contact your Paradigm supervisor (Table 2 below) at least **four hours** prior so that a replacement can be arranged.

TABLE 1: SURVEY DATES AND LOCATIONS

2007 CROSS-BORDER SURVEY SCHEDULE					
DAY	DATE	DAY OF WEEK	LOCATION ID	LOCATION	DIRECTION
1	10-JUL	TUESDAY	1A	QUEENSTON	CANADA BOUND
			2A	RAINBOW	
2	11-JUL	WEDNESDAY	1B	QUEENSTON	US BOUND
			2B	RAINBOW	
3	14-JUL	SATURDAY	1A	QUEENSTON	CANADA BOUND
			2A	RAINBOW	
4	15-JUL	SUNDAY	1B	QUEENSTON	US BOUND
			2B	RAINBOW	
5	17-JUL	TUESDAY	3A	PEACE	CANADA BOUND
			4A	WHIRLPOOL	
6	18-JUL	WEDNESDAY	3B	PEACE	US BOUND
			4B	WHIRLPOOL	
7	21-JUL	SATURDAY	3A	PEACE	CANADA BOUND
			4A	WHIRLPOOL	
8	22-JUL	SUNDAY	3B	PEACE	US BOUND
			4B	WHIRLPOOL	

NOTE: Whirlpool bridge operates 7 am to 11 pm only



TABLE 1: PARADIGM STAFF CONTACT INFORMATION

Location	July 10		July 11	
	12a to 12p	12p to 12a	12a to 12p	12p to 12a
Queenston - Lewiston	Scott	Jill	Scott	Jill
Rainbow	Adam	Matt	Adam	Matt
	July 14		July 15	
	12a to 12p	12p to 12a	12a to 12p	12p to 12a
Queenston - Lewiston	Scott	Jill	Scott	Jill
Rainbow	Adam	Matt	Adam	Matt
	July 17		July 18	
	12a to 12p	12p to 12a	12a to 12p	12p to 12a
Peace	Matt	Jill	Matt	Jill
Whirlpool	Scott: 7a to 11p both days			
	July 21		July 22	
	12a to 12p	12p to 12a	12a to 12p	12p to 12a
Peace	Adam	Jill	Adam	Jill
Whirlpool	Scott: 7a to 11p both days			

Supervisor	Cell Number
Jill Juhlke	905-520-6096
Matt Brouwer	519-897-7555
Scott Catton	905-928-2007
Adam Makarewicz	905-929-3724

All staff should report to the Paradigm Supervisor at the prearranged meeting point to obtain last minute instructions and obtain vests, forms and additional safety equipment. Unless otherwise notified, you are required to report to the survey site **regardless** of the weather. In the case of inclement weather, you will be notified approximately one hour before you are due to report to the site.

It is very important for the success of the survey that everyone act in a responsible manner to show up on time and complete the survey diligently. If everyone helps out and cooperates, the survey will be an enjoyable experience for all.

5.0 SURVEY EQUIPMENT

Due to the close contact we will have with the public over the course of the project. It is **very** important for all members of the survey crew to be properly attired. You are required to wear the t-shirts provided by Paradigm which readily identifies you as survey staff. Shorts are acceptable as long as they are Bermuda or dress style and are thigh length or longer. Blue jeans are allowed as long as they are clean, plain and do not have embellishments or holes of any kind. Cotton casual pants or dress pants are preferable. Ministry of Labour regulations require that safety shoes be worn in addition to the safety vest and reflective arm/leg bands (for night work only). It is advisable to bring a raincoat and an umbrella. For hot weather, wear light, loose fitting clothes and bring plenty of water and sunscreen.

Paradigm will be supplying all staff with a clipboard, a fluorescent safety vest, the appropriate survey forms and an HB lead pencil prior to your shift. All equipment **must be** returned at the end of your shift. **If you do not return all equipment, the cost will be deducted from your pay.**



Every staff member is required to wear their t-shirt and bring a hat for sun protection, watch, sunscreen and his or her refreshments. The classifiers, and float crew may want to bring a lawn chair with them to the survey station.

Since you will be in contact with the public as representatives of Paradigm and the participating funding agencies, it is important that you conduct yourself in a responsible, polite and business-like manner at all times, even with abusive drivers. No one is required to answer questions in the traffic survey and therefore cooperation for drivers is dependent upon our attitude and approach to requesting information. Smoking is **not permitted** while **working**.

6.0 SURVEY TECHNIQUES

The following sections describe the required information and suggested manner and code of conduct for the interviewers.

6.1 General Safety

Never compromise your own safety or the safety of others; all staff members must be alert at all times. Interviewers must take care not to step backwards into adjacent traffic lanes. Flagpersons should direct vehicles in a firm and clear manner. Drivers won't respond to your directions if they are not sure what you want. Truck, bus and trailer mirrors are a general hazard of which everyone should be aware. All staff must wear their safety vest while working and reflective arm and leg bands while working after dark.

6.2 General Surveying Information

Interview information needs to be collected as quickly as possible. However, while speed is important, do not sacrifice speed for accuracy. **If the information collected on the interview sheet is not complete, accurate and legible, it is of no value and could result in non-payment of your invoice.** Always be polite and courteous to the drivers you are interviewing. Be as brief and as practical as possible in getting the required information so that the driver can be on his/her way as quickly as possible. Most people will be willing to answer your questions. No one is under any obligation to respond to complete the survey. If a person is hesitant about answering questions, emphasize that the required information will not identify them, and all data is kept confidential and will only take a few minutes. Some drivers will not be concerned about divulging the information, but may only be annoyed at being delayed. In many cases they will have to wait for the car in front of them to be released and could respond to the survey in the meantime. Encourage reluctant drivers to respond if possible in order that the survey process can be completed efficiently. Indicate to them that the interview will prove very valuable in assisting planners in selecting and implementing improvements to the area transportation system in the future.

During periods of light traffic flow, field staff should edit their own interviews. Making the writing of hastily scribbled names clearer, and ensuring that all information on the survey form is provided. During each shift hour, the team leader/ supervisor will occasionally collect all completed forms at which point they will be reviewed before data entry.



6.3 The Interview Form

The interview form is illustrated below. It is necessary for survey staff to fill in the form neatly while conducting the interviews. To improve speed, it is likely faster to circle the appropriate answers while conducting the interview, in order that the appropriate code can be filled in after the respondent leaves. It is required to use a pencil to record information because pencils work better in damp conditions, and never run out of ink.

Some of the information on the interview form does not come from the drivers. The top and leftmost sections of the sheet should be filled in neatly in periods of low traffic flow, prior to conducting interviews - with the exception of the hour and minute of the survey. It is expected that some of this information can be recorded during the time in which you are waiting to start your shift. Some of the other information can be circled as the vehicle you will be surveying approaches (i.e. type of vehicle, license plate, number of passengers) assuming that the motorist responds. If you make a mistake on the survey form that is not easily corrected, draw a line through the form and write "VOID" and complete another form.

6.4 The Interview

Incorrect information is given by drivers most frequently because of failure to state the questions clearly. The following is a step-by-step explanation of the interview questions, and recommendations about how to phrase the questions so that accurate information is obtained:

Your opening remarks when approaching the driver should be "Good Morning" or "Good Afternoon", "Sir/Madam" (whichever is appropriate), "We are conducting a survey about travel across the international bridges. Would you mind answering a few quick questions about your trip today?"

You will be frequently asked who is responsible for the survey, and the purpose of the survey. You should respond by indicating that the survey is being conducted on behalf of the Ministry of Transportation Ontario (MTO), the Region of Niagara and area stakeholders. The survey information is being collected as part of the MTO's Niagara to GTA Corridor Planning study and will support on-going and subsequent planning initiatives.

If the driver agrees to participate, proceed to the Journey Information section, otherwise mark the form as a refusal and allow the vehicle to proceed where possible. Immediately notify the team leader and the flagperson.



Niagara Cross-Border Travel Survey Form					
Date Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>	Time Hour <input type="text"/> Minute <input type="text"/>	Surveyor <input style="width: 100%;" type="text"/>	<table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> Location <input type="checkbox"/> 1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge </td> <td style="width: 50%; vertical-align: top;"> Direction <input type="checkbox"/> 1. Into Canada 2. Into USA </td> </tr> </table>	Location <input type="checkbox"/> 1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge	Direction <input type="checkbox"/> 1. Into Canada 2. Into USA
Location <input type="checkbox"/> 1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge	Direction <input type="checkbox"/> 1. Into Canada 2. Into USA				
1. Vehicle Type <input type="checkbox"/> 1. Auto / Van / Pickup / Sport Utility 2. Car and Trailer 3. Motorcycle 4. Taxi 5. Motorhome / RV 6. Towing 7. Other <i>OBSERVE - Do not ask type of vehicle or license plate information</i>		7. What was the ACTIVITY there? <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <i>If answer is 7, 8, 9, or 10 to question 7, ask the following:</i> 7a. Did you enjoy your experience there? <input type="checkbox"/> </div>			
2. Vehicle License <input type="checkbox"/> 1. Ontario 2. New York 3. Other Canada (Specify) _____ 4. Other USA (Specify) _____		8. Where are you going NOW? _____ (City/Town) (State/Province) _____ (Intersection, Monument)			
3. Total Number of OCCUPANTS <input type="checkbox"/> Do not ask # of occupants unless unclear. Include the driver in the total number.		9. What will be the ACTIVITY there? <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <i>Note: the specific location and activity should be the IMMEDIATE destination after crossing the border. Write in specific attraction for 9 through 11.</i> </div>			
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> READ: Hello, we are conducting a short survey about travel across the international bridges. Could we ask you a few quick questions about your trip today? </div> VERY IMPORTANT – Obtain specific monument or intersection for # 4, 6, 8 and 10. If in Niagara Region or New York State, otherwise City/Town Name and State/Province OK. Do not list gas stations or restaurants on route.		10. Is that your final destination? _____ (City) (State/Province) _____ (Intersection, Monument)			
4. Where are you coming from today? _____ (City/Town) (State/Province) _____ (Intersection, Monument) <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <i>Note: the specific location and activity should be a PREVIOUS destination prior to arriving at the border. Write in specific attraction for 9 through 11.</i> </div>		11. What will be the ACTIVITY there? <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <i>If answer is 7, 8, 9, or 10 to question 5, ask the following:</i> 5a. Did you enjoy your experience there? <input type="checkbox"/> </div>			
5. What was the ACTIVITY there? <input type="checkbox"/> 1. Home 2. Work 3. Business 4. Shopping 5. School 6. Visit Friends/Relatives 7. Casino 8. Vacation 9. Tourist Attraction _____ 10. Recreation or Entertainment _____ 11. Other _____ 12. Refused		12. Will you be staying in United States /Canada for at least one night? <input type="checkbox"/> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <i>If answer to 12 is YES, ask the following question:</i> 12a. Have you made a hotel reservation ? <input type="checkbox"/> </div>			
6. Were you any where before that? _____ (City/Town) (State/Province) _____ (Intersection, Monument) <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <i>Note: Need ULTIMATE origin of trip on the side of the border they are coming from.</i> </div>		13. What is your home State/Province (Country)? _____			



6.4.1 Journey Information

The following describes in more detail the rationale behind the questions.

"Where are you coming from today?"

If the trip originated anywhere in New York State or Niagara Region ask the driver for a specific intersection, address or monument for the location. For instance, McDonald's etc., is not sufficient. More detail is required such as the closest intersection or street address. This is **VERY IMPORTANT**. If you are not sure whether a location is in the local area or not, ask the driver and refer to the map attached to the clipboard. If you are still not sure, it is better to obtain too much information than not enough.

It is very important that you obtain the proper origin of each vehicular trip. If a driver selected in one of our survey stations is going home from the casino in the evening and answers the question "Where are you coming from today?", by saying "The Esso Station on the corner of X Street and Y Avenue", the primary purpose of the trip is lost on our interview form. It is important to confirm that the driver is providing the desired information. Note: **do not** list gas stations or restaurants on route (see below). Ask them if they were coming from work, home etc at which point the driver will usually provide the proper information. When they answer "casino", they have given the activity, at which point you will need to ask the location (name of casino is sufficient as we can determine location later).

If a person was out to dinner and returning home, this is an acceptable trip origin; however ensure that you collect the name and address of the restaurant or the closest intersection. The name only of the restaurant **is not** an acceptable origin.

"What was the activity there?"

Ask this question if they haven't already provided the answer. If the driver doesn't understand the question, begin to list the activities in order to coach them. For questions 9 through 11, write the specific attraction.

"Did you enjoy your experience there?"

This question applies if they have answered 7 through 10 only for the activity of the origin. Write in Y or N for yes or no.

"Were you any where before that?"

The purpose of this question is to find out if they started their trip at work and stopped by the casino before going home. This information is crucial to capturing the extended trip information. If they indicated they were at work prior to the casino, ask for the location or the name of the company. Proceed to ask what the activity was at this location if not already provided.

If the origin for any trip is not a major destination point (home, work, shopping centre, airport, stadium, etc.) be suspicious and inquire as to what the primary purpose of the trip was. Origins which are convenience oriented such as gas or restaurants, may not reflect the primary trip. The



activity at the origination is usually revealed when asking where the trip began, but if not, clarify the activity and then circle or write in the appropriate answer.

"Where are you going now?"

Just as with the trip origin, it is important to collect specific addresses and locations of the destination if located within New York State or Niagara Region. If the destination is located elsewhere, write in the city/town and state/province. Clarify any questions regarding activity at the destination point.

For all origin/destination locations, the city, town, and state/province must be indicated. All states/provinces can be abbreviated in the customary two, three or four letter formats e.g. New York – NY, Ontario – ON, Quebec - QC. Please do not use short forms for cities or towns. Refer to the map on the clipboard for spellings if unsure.

6.4.2 Tourism Information

There are two tourism related questions near the end of the survey that apply if the destination is not home or work. They are:

1. **Will you be staying in the United States/Canada for at least one night?** – Answer with Y for yes and N for no.
2. If the answer to the above noted question is yes, ask the following: **Have you made a hotel reservation?** – Answer with Y for yes and N for no.

6.4.3 Home State/Province (Country)

The final question of the survey is: **What is your home State/Province (Country)?**

6.5 The Classification Form

A manual roadside vehicle classification count will be undertaken simultaneously with all interviews for expansion purposes. The categories will be similar to those on the survey form but may also include:

- ▲ Commercial Trucks & Vans
 - a. Delivery truck (Purolator, UPS, etc)
 - b. Beer truck
 - c. Cube Van
- ▲ Buses (School & highway coach)

There are nine vehicle classifications that must be recorded. The tally sheet is used to record the total number of vehicles each 15 minutes. You will be supplied with a manual count board to record vehicles as they pass your location. You must position yourself to provide a view of the traffic at all times. Remember from time to time traffic will queue, you should ensure that your station will not be obstructed by large vehicles etc. At no time are you to position yourself in the



traveled portion of the roadway. You should scout out a location prior to commencing the actual work. Your supervisor will help in this regard.

Niagara Cross-Border Survey Classification Form										
Date		Start Time		End Time		Surveyor	Location	<input type="checkbox"/>	Direction	<input type="checkbox"/>
Month	Day	Hour	Minute	Hour	Minute		1. Peace Bridge 2. Rainbow Bridge 3. Whirlpool Bridge 4. Queenston-Lewiston Bridge		1. Into Canada 2. Into USA	
Cars								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Sport Utility Vehicles (SUV)								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Passenger Vans								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Pickup Trucks								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Buses (School & Other)								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Motor- cycles								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Motorhome / RV								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Commercial Trucks / Vans								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	
Other								TOTAL	<div style="border: 1px solid black; width: 50px; height: 20px;"></div>	



7.0 PAYMENT

Staff participating in the surveys will be paid approximately two weeks after completion of the last survey. Make sure your name, address and phone number is listed correctly on your interviewer's self-employed claim form to ensure your cheque is sent to the correct address.

It is very important to the success of the survey that everyone who has made a commitment to participate does so in a responsible and timely manner. As indicated, if you attend **all** of your **scheduled** shifts and your work meets or exceeds Paradigm standards, a performance bonus will be paid and will include a higher hourly wage, paid training and re-imbursement of up to \$75 for CSA approved footwear with a proper receipt.

Accordingly, payment for the partial completion of a survey shift will not be provided. Also, individuals who submit survey forms that are not legible or are incomplete will not receive full payment. **Any survey materials not returned to Paradigm will be deducted from your pay.**



Appendix C

Daily Log

CROSS-BORDER SURVEY DAILY LOG

TUESDAY, JULY 10, 2007

Rainbow Bridge – Canada Bound

- Some concerns were raised by Currency Exchange (CE) and Niagara Falls Bridge Commission (NFBC) on the initial setup which was modified from the original plans. The setup was modified to allow two survey lanes on the north side of the plaza. The survey sample was extracted from the three or four most northerly customs booths. Traffic not being surveyed used the south side of the plaza. This setup seemed to resolve all concerns. The secondary inspection exit lane was not surveyed as the volumes were low and staff was used more efficiently in the primary survey area.
- The weather was very warm.
- 4,764 vehicles were recorded passing through survey area (lower than 2005) and approximately 1,930 interviews were conducted representing a 41% sample rate.
- Some large recreational vehicles and buses may not have been recorded in the classification counts as they by-pass customs booths on the south side of the plaza.

Queenston-Lewiston Bridge – Canada Bound

- CE indicated that our initial setup was interfering with their operations. This issue was addressed to the NFBC and ultimately Canada Border Services Agency (CBSA). The initial setup was modified to remove some cones near the CE entrance so that motorists would see they could still enter the CE parking area. This appeared to resolve the issue with a little more fine-tuning.
- The biggest issue after dark was associated with people destined for secondary inspection inadvertently entering the interview area, possibly due to confusion as the survey setup started after the entrance to the secondary inspection area. These vehicles were re-directed back for inspection.
- An on-site meeting with URS, Paradigm, MTO, CBSA, NFBC, Greater Buffalo Niagara Regional Transportation Council and Region of Niagara staff was held. This meeting addressed the CE issue as well as the potential for movement of heavy vehicles through the U.S. bound setup the following day.
- The weather was very warm.
- 4,524 vehicles were recorded passing through survey area and approximately 1,565 interviews were conducted representing a 34% sample rate.

WEDNESDAY, JULY 11, 2007

Rainbow Bridge – U.S. Bound

- Concerns were raised that Duty Free interview area was creating queuing issues for vehicles leaving Duty Free. This interview area was closed to correct this issue.
- Rain delay from 10:30 to 11:30 am.
- 5,390 vehicles were recorded passing through survey area and approximately 1,600 interviews were conducted representing a 30% sample rate.

Queenston-Lewiston Bridge – U.S. Bound

- Rain delay from 10:45 am to 12:15 pm.
- Deb Sutherland from CBSA visited site about 2:30 pm. She was pleased with flow through survey area. Re-iterated importance of maintaining two through lanes through survey area on the weekend.
- 3,367 vehicles were recorded passing through survey area and approximately 1,625 interviews were conducted representing a 48% sample rate.

SATURDAY, JULY 14, 2007

Rainbow Bridge – Canada Bound

- The modified survey setup worked well for the weekend.
- Rain delay between 3:15 pm and 5:15 pm, at which point surveys continued during intermittent light rain which lasted about one hour. Classification counts continued during rain period.
- At 10:00 pm rain and lightning caused surveys to be halted including classification counts. Surveys commenced at 11:00 pm until midnight.
- 6,359 vehicles were recorded passing through the survey area and approximately 2,655 interviews were conducted representing a 42% sample rate.

Queenston-Lewiston Bridge – Canada Bound

- The modified survey setup worked well. A few secondary inspection vehicles ended up in the interview area and were re-directed back for inspection.
- During the peak periods, car traffic was permitted to use the truck inspection booths as well as the primary inspection booths. These vehicles were included in the classification counts but were not interviewed as it was not feasible.
- Rain delay from 3:15 pm to 6:45 pm and from 9:30 pm to midnight. Classification counts continued during rain delay.
- 6,862 vehicles were recorded passing through survey area and approximately 1,605 interviews were conducted representing a 23% sample rate for the day.

SUNDAY, JULY 15, 2007

Rainbow Bridge – U.S. Bound

- The modified survey setup worked well
- Congestion was experienced on Fallsview Avenue and through the survey area.
- 7,930 vehicles were recording passing through the survey area and approximately 2,473 interviews conducted representing a 31% sample rate.

Queenston-Lewiston Bridge – U.S. Bound

- Niagara Regional Police did not provide an officer for the midnight to 8:00 am shift so it was cancelled. As per Paradigm policy, a minimum of two hours time was paid to contractors.
- Traffic was backed up through survey area from approximately 12:30 pm to 2:15 pm. In order to run survey properly, one traffic lane was fed through survey area and interviewed. When interviews were finished, mainline volume was stopped by traffic controller and interviewed vehicles were put back into the primary flow.
- Rain delay from 7:00 pm to 7:55 pm.
- 4,742 vehicles were recorded passing through survey area during the two survey shifts and approximately 1,920 interviews were conducted representing a 40% sample rate.

TUESDAY, JULY 17, 2007

Whirlpool Bridge – Canada Bound

- No issues were identified
- 300 vehicles were recorded passing through survey area and approximately 242 interviews were conducted representing an 81% sample rate.

Peace Bridge – Canada Bound

- The survey setup at the westerly secondary inspection area worked very efficiently. The shelter provided by the canopy resulted in good working conditions (even during light rain). The separate lane for each interviewer maximized the rate of interviews with a total of eight interviewers working (except during break periods).
- A light rain began around 7:00 pm and continued for several hours; however it did not impact the survey as the canopy provided a dry working area.
- At a few points, secondary inspection vehicles ended up in the survey area at which point the CBSA inspectors would conduct the inspection in our survey area. Both police officers and interviewers tried to identify secondary inspection vehicles before commencing survey. If they did, they would re-direct them back to secondary inspection area. This issue was addressed with Deb Sutherland with a message passed on to CBSA at Peace Bridge to tell vehicles to enter parking area before arriving at police officer.

- 8,206 vehicles were recorded passing through survey area and 3,305 interviews were conducted representing a 40% sample rate.

WEDNESDAY, JULY 18, 2007

Whirlpool Bridge – U.S. Bound

- No issues were identified
- Ministry of Labour (Charles Bell and Mark Muir) arrived onsite at approximately 10:30 am. After an inspection and conversation with onsite supervisor, Scott Catton, no orders were issued.
- 478 vehicles were recorded passing through survey area and approximately 285 interviews were conducted representing a 60% sample rate.

Peace Bridge – U.S. Bound

- Surveys began on north side of U.S. bound lanes adjacent to jersey barrier to make use of high-mast lighting during the night shift. A second survey setup was in place on south side of U.S. bound lanes for use during paving of north side shoulder.
- An agreement was reached with paving construction crews that they would begin paving on the shoulder area on the south side of U.S. bound lanes, pave the gore area at QEW/Duty Free ramp and then pave on the north side shoulder. When paving on north side shoulder, survey crew was not allowed access to building/washroom facilities to ensure no conflict between projects.
- Survey was stopped between 6:00 am and 6:25 am while police cruiser was refueled. All breaks were taken during this period.
- Ministry of Labour (Charles Bell and Mark Muir) arrived onsite at approximately 12:30 pm with Kevin Phillips from URS Canada. After an inspection and conversation with onsite supervisors, Jill Juhlke and Matthew Brouwer, no orders were issued; however they suggested that daily staffing levels should be included in Traffic Protection Plan for future surveys.
- 8,099 vehicles were recorded passing through survey area and approximately 2,970 interviews were conducted representing a 37% sample rate.

SATURDAY, JULY 21, 2007

Whirlpool Bridge – Canada Bound

- Survey was stopped from approximately 11:45 am to 12:20 pm to accommodate a parade across the bridge.
- 422 vehicles were recorded passing through survey area and approximately 250 interviews were conducted representing a 60% sample rate.

Peace Bridge – Canada Bound

- Survey setup continued to work very efficiently.

- One stall was out of service from approximately 4:45 pm to 5:00 pm due to a vehicle overheating while being interviewed.
- Very few incidents of secondary inspection vehicles arriving in our survey area. If they were identified prior to survey, they were re-directed back to secondary inspection with assistance of police officer.
- 11,571 vehicles were recorded passing through survey area and approximately 4,140 interviews were conducted representing a 36% sample rate.

SUNDAY, JULY 22, 2007

Whirlpool Bridge – U.S. Bound

- No issues were identified
- 594 vehicles were recorded passing through survey area and approximately 285 interviews were conducted representing a 48% sample rate.

Peace Bridge – U.S. Bound

- Surveys were suspended between 2:00 am and 2:15 am as police officer dealt with impaired driver.
- Surveys suspended between approximately 8:00 and 8:27 am while police officer changed vehicles.
- At approximately 1:00 pm surveys were suspended for approximately 20 minutes while police officer refueled cruiser.
- In order to help ease congestion on QEW, two through lanes were provided on QEW.
- Due to heavy traffic congestion on QEW around 1:00 pm, decided to operate one survey lane with five interviewers as this was all we could efficiently re-insert into primary traffic flow.
- At about 4:00 pm returned to operating two survey lanes with eight interviewers as congestion eased.
- Congestion lasted until approximately 7:30 pm, at which point surveys were halted for approximately ½ hour while QEW setup was returned to one lane. This was necessary in order reduce speeds to safe levels for traffic control.
- 11,630 vehicles were recorded passing through the survey area and approximately 3,125 interviews were conducted representing a 27% sample rate.

SATURDAY, JULY 28, 2007

Queenston-Lewiston Bridge – Canada Bound

- Conducted surveys during 4:00 pm to 12:00 am shift only in order to make up for lengthy rain delay on Saturday, July 14, 2007.
- No issues were identified.

- During the peak periods, car traffic was permitted to use the truck inspection booths as well as the primary inspection booths. These vehicles were included in the classification counts but were not interviewed as it was not feasible.
- 3,420 were recorded passing through the survey area and approximately 1,000 interviews were conducted representing a 29% sample rate.

SUNDAY, JULY 29, 2007

Queenston-Lewiston Bridge – U.S. Bound

- Conducted surveys during 12:00 am to 8:00 am period to make up for shift missing on Sunday, July 15, 2007.
- No issues were identified.
- 657 vehicles were recorded passing through the survey area and approximately 220 interviews were conducted representing a 33% sample rate.

SUMMARY

- Over the course of the survey period, a total of 89,300 vehicles were recorded passing through the survey areas. Approximately 31,200 interviews were conducted for an overall sample rate of 35%.
- Shift by shift summary attached, where available.



Appendix D

Database Fields

Field Name	Description
Survey Number	Unique ID assigned to each survey (pre-printed on each form)
Month	Month survey was conducted (July for all records)
Day	Day survey was conducted
Expansion Day	Day to which survey data was expanded - only applies to Q-L bridge due to make-up work
Hour	Hour in which survey was conducted (24-hour format)
Minute	Minute which survey was conducted
Surveyor	Name of individual that conducted survey
Location	Bridge where survey was conducted
Direction	Direction of travel of vehicle (into Canada or U.S.)
Vehicle Type	Type of vehicle surveyed
Vehicle License	Jurisdiction of vehicle license plate
Occupants	Number of vehicle occupants
O1 Geocode	Geocodable field of origin (address, intersection or traffic zone)
O1_City	City of trip origin
O1 State/Province	State/province of trip origin
O1 Business Name	Business name of trip origin
O1 Street Number	Street number of trip origin
O1 Street Name	Street name of trip origin
O1 Postal Code/Zip Code	Postal/zip code of trip origin
O1 Street Name 1	First street name of intersection of trip origin
O1 Street Name 2	Second street name of intersection of trip origin
O1 Other Information	Additional information regarding trip origin (store in mall, etc)
O1 Activity	Activity of trip origin
O1 Activity Attraction	Name of attraction of trip origin if tourist attraction, etc selected for activity
O1 Enjoy Experience	Yes or no field indicating if the respondent enjoyed their experience if tourist attraction or recreation & entertainment selected for activity
O2 Geocode	Geocodable field of second origin (address, intersection or traffic zone)
O2 City	City of second trip origin
O2 State/Province	State/province of second trip origin
O2 Business Name	Business name of second trip origin
O2 Street Number	Street number of second trip origin
O2 Street Name	Street name of second trip origin
O2 Postal Code/Zip Code	Postal/zip code of second trip origin
O2 Street Name 1	First street name of intersection of second trip origin
O2 Street Name 2	Second street name of intersection of second trip origin
O2 Other Information	Additional information regarding second trip origin (store in mall, etc)
O2 Activity	Activity of second trip origin
O2 Activity Attraction	Name of attraction of second trip origin if tourist attraction, etc selected for activity
O2 Enjoy Experience	Yes or no field indicating if the respondent enjoyed their experience if tourist attraction or recreation & entertainment selected for activity
D1 Geocode	Geocodable field of destination (address, intersection or traffic zone)
D1_City	City of trip destination
D1 State/Province	State/province of trip destination
D1 Business Name	Business name of trip destination
D1 Street Number	Street number of trip destination
D1 Street Name	Street name of trip destination
D1 Postal Code/Zip Code	Postal/zip code of trip destination
D1 Street Name 1	First street name of intersection of trip destination
D1 Street Name 2	Second street name of intersection of trip destination
D1 Other Information	Additional information regarding trip destination (store in mall, etc)
D1 Activity	Activity of trip destination
D1 Activity Attraction	Name of attraction of trip destination if tourist attraction, etc selected for activity
Final Destination	Yes or no field indicating if this was the final destination of trip
D2 Geocode	Geocodable field of second destination (address, intersection or traffic zone)

D2 City	City of second trip destination
D2 State/Province	State/province of second trip destination
D2 Business Name	Business name of second trip destination
D2 Street Number	Street number of second trip destination
D2 Street Name	Street name of second trip destination
D2 Postal Code/Zip Code	Postal/zip code of second trip destination
D2 Street Name 1	First street name of intersection of second trip destination
D2 Street Name 2	Second street name of intersection of second trip destination
D2 Other Information	Additional information regarding second trip destination (store in mall, etc)
D2 Activity	Activity of second trip destination
D2 Activity Attraction	Name of attraction of second trip destination if tourist attraction, etc selected for activity
Stay 1 Night?	Yes or no field indicating if respondents will spend the night in the destination country
Reservation?	Yes or not field indicating if respondents made a reservation if staying the night
Home State/Province/Country	Home state/province or country of respondent
Notes	Any notes regarding survey such as comments, internal notes regarding assumption with data, etc
MapInfo ID	Geocode ID assigned by MapInfo during geocoding
O1 Zone	Niagara Region or New York traffic zone of origin geocode
O1 SAZ	Superzone ID of trip origin
O1 Interanal/External	Identifier indicating if origin trip end is in an internal or external superzone
O1 X	UTM coordinate for trips in Niagara Region and Niagara or Erie Counties or longitude for trips outside Niagara Region
O1 Y	UTM coordinate for trips in Niagara Region and Niagara and Erie Counties or latitude for trips outside Niagara Region
O1 Census Zone	Census zone of origin trip end in southern Ontario
O2 Zone	Niagara Region or New York traffic zone of second origin geocode
O2 SAZ	Superzone ID of second trip origin
O2 Interanal/External	Identifier indicating if second origin trip end is in an internal or external superzone
O2 X	UTM coordinate for trips in Niagara Region and Niagara or Erie Counties or longitude for trips outside Niagara Region
O2 Y	UTM coordinate for trips in Niagara Region and Niagara and Erie Counties or latitude for trips outside Niagara Region
O2 Census Zone	Census zone of second origin trip end in southern Ontario
D1 Zone	Niagara Region or New York traffic zone of destination geocode
D1 SAZ	Superzone ID of trip destination
D1 Interanal/External	Identifier indicating if destination trip end is in an internal or external superzone
D1 X	UTM coordinate for trips in Niagara Region and Niagara or Erie Counties or longitude for trips outside Niagara Region
D1 Y	UTM coordinate for trips in Niagara Region and Niagara and Erie Counties or latitude for trips outside Niagara Region
D1 Census Zone	Census zone of destination trip end in southern Ontario
D2 Zone	Niagara Region or New York traffic zone of second destination geocode
D2 SAZ	Superzone ID of second trip destination
D2 Interanal/External	Identifier indicating if second destination trip end is in an internal or external superzone
D2 X	UTM coordinate for trips in Niagara Region and Niagara or Erie Counties or longitude for trips outside Niagara Region
D2 Y	UTM coordinate for trips in Niagara Region and Niagara and Erie Counties or latitude for trips outside Niagara Region
D2 Census Zone	Census zone of second destination trip end in southern Ontario
Weekday/Weekend	Indicates if the trip was made during the week or on the weekend
Expansion Factor	Number of vehicles the survey represents based on the total number of vehicles observed on the same bridge in the same hour as the survey



Appendix E

Superzone Trip Matrices

Weekend Trip Matrix

Internal Zones																External Zones																TOTALS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Internal Zones	1	7						78	1,116	74	28	98	1,717	487		4	3		2	5		9	5	37	5	41	6	23	87	32	3,839	
	2							84	363	966	159	197	1,192	402									24	20	791	18	55	1,320	979		6,585	
	3							5	158	70	23	82	512	187									11			4	6	25	2	1,086		
	4							2	59	118	14	17	119	29									20	103	9		97	47		634		
	5					2		3	94	290	90	56	290	49							6	3	8		83	5	3	79	40	1,098		
	6	2						25	105	79	29	26	236	109									2	3		71	5	16	147	65	921	
	7							7	5	28	10	19	76	7		1					3		3			18			5	3	166	
	8	4							56	19	6	88	230	66											17	3	6		27		524	
	9	101	131	13	14	34	5	7			2					127	9	8	36	14										4		539
	10	1,271	391	193	14	112	64	22	83							408	55	20	74	37	4										34	2,782
External Zones	11	78	1,293	83	97	331	69	46	35	3					1,054	285	43	163	83	6	2									21	3,653	
	12	80	220	19	22	48	62	11	15						206	32	16	37	34											2	805	
	13	138	178	66	37	65	24	4	65						74	22	1	34	27											28	765	
	14	1,584	1,015	429	147	331	193	61	250						1,648	382	70	294	243	15	7									60	6,730	
	15	630	283	115	35	70	53	6	40						157	17	38	47	66	5										26	1,587	
	16							122	408	763	178	78	1,624	145		2							2	57	31	1,223	34	43	1,549	489	6,752	
	17							8	51	187	35	31	276	30										22	9	67	13	7	157	48	942	
	18							9	13	35	12	16	50	24							3					18		5	39	3	227	
	19	5				5		38	52	162	21	31	346	26					4		6	7	51	22	275	10	385	153		1,598		
	20							2	16	76	7	25	141	11									5	18		109		49	117		576	
21								2					4											5					12	30		
22	6						5		17				3	5	6			4							14		6		20	87		
23	12														1	7			2											23		
24	19	56	8	5	17	11	4				4		5		63	15	3	37	14										2	263		
25	12	33			2	4	3	5							14	2		4											6		88	
26	47	726	18	9	33	22	12	19							847	63	28	335	171	7											2,338	
27	13	34	3		16		13								23	5	2	34	4										2		149	
28	39	35	13		2	4	2				1				58	6	2	19	4												190	
29	110	1,084	34	46	95	74	16	20		2					1,095	126	59	379	110	2	4							2	323	3,578		
30	32	656	6	22	29	45	13	7		44	28	4	5	32	75	469	52	11	119	230	21		2		9				8		2,220	
31								2	6	2	2	5	36	9											2	2		178		245	51,079	

Weekday Trip Matrix

		Internal Zones										External Zones										TOTALS												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Internal Zones	1	4								256	1,244	115	31	76	1,310	438					3					4	3	18	20	13	42	12	3,591	
	2	1	3						99	248	1,206	182	149	842	210						9			10	1	34	13	385	14	45	661	482	4,575	
	3								35	136	269	6	29	209	65										5	3							766	
	4								17	51	133	36	20	92	24										9	3	13						430	
	5								35	83	351	94	45	315	38										8		18	2	7	53	6		1,061	
	6								7	64	92	63	34	149	35										2		23	4	2	46	35		559	
	7								16		56	20	58	6											7	7	12	3					193	
	8								8	30	26	11	30	120	15																		266	
	9	292	123	33	13	10	22	10	7								78	9	3	16	9		2											641
	10	1,437	253	184	46	120	52	18	27								195	44	17	42	20													2,480
External Zones	11	101	1,026	53	125	382	122	39	35					2			337	178	24	92	41	11												2,585
	12	17	224	22	22	138	66	15	8								57	27	7	15	13		5											645
	13	65	139	20	23	65	44	11	24								65	13	10	8	12													513
	14	1,368	1,073	245	160	284	139	45	115			2					953	212	42	252	117	1												5,056
	15	488	197	57	7	35	22	3	20								38	14	11	39	22													977
	16	2								59	187	351	79	24	1,070	88	4				2			2		23	10	362	20	16	601	325	3,227	
	17								3	21	333	30	19	324	37			2							24	2	67	12	5	65	61		999	
	18								4	25	45		8	56	16												7	16	5	23	15		219	
	19								16	62	112	22	21	215	28										25	3	80	12	2	173	60		932	
	20								2	33	37	2	4	65	9										25		74	3	3	27	68		355	
Internal Zones	21	3																																3
	22	7								6	2			5			1		2	4														34
	23	1	12			1	4										3																	22
	24	19	46		8	20	6		8		2						13	29	7	18	12													202
	25	6	19	4		1			3								7		2															45
	26	16	460	5	32	33	54	7	2								438	51	14	109	74													1,300
	27	7	7	2	7	10											29	3	2	8														78
	28	17	22	3	2	2	16	5									21	4	3	2	4		1											104
	29	44	674	9	5	43	52	4	8	10	12	19	6	14	25	1	618	61	20	155	20	2	3											1,927
	30	15	641	2	8	44	56	25	6	3	7						268	35	7	108	64							3	221	8	155	7		1,778
Int		2																			2													18
TOTALS		3,901	4,935	639	458	1,193	657	182	266	572	2,210	3,156	583	473	4,857	1,021	3,127	682	170	871	424	6	45	7	171	40	1,076	311	107	1,886	1,458	0		35,483