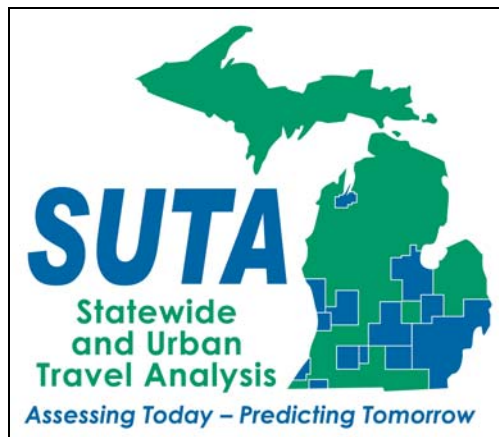




## **2009 Origin and Destination Studies International Bridge and Blue Water Bridge**

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## **INTRODUCTION**

The Michigan Department of Transportation (MDOT) conducted origin and destination (O&D) studies in June 2009 at the International Bridge in Sault Ste. Marie and at the Blue Water Bridge in Port Huron. These studies are a continuation of the Statewide and Urban Travel Analysis (SUTA) section's plan to gather statewide travel data to improve our forecasting models and provide the department and its customers with updated travel characteristics and statistics. These studies are intercept surveys of traffic, where information is gathered from the driver including trip origin and destination, trip purpose, frequency, vehicle type, and number of passengers. For commercial vehicles, the origin and destination, truck type, commodity carried, and commodity weight are captured.

Additional questions pertaining only to each site were asked at both bridges. At the International Bridge, drivers were asked if they had a Prox Card, and if not, why. The Prox Card works similar to a speed pass, where the driver can prepay an amount on a card and travel through automated booths to save time crossing the border. Also, a question was asked whether the driver is making this crossing more or less often than in the past, or if about the same. For the Blue Water Bridge, long distance travelers were asked why they chose to travel across this bridge and not through Detroit.

Including these two bridge studies; MDOT has now completed 34 intercept surveys since 2003, with nine being commercial only. MDOT's Data Collection section manually conducted the surveys and entered the information into an automated program that formats all data into a spreadsheet file. The file was then reviewed by the Statewide and Urban Travel Analysis Section, and corrections and edits were done on any erroneous records. Both sections in MDOT did a great amount of work to collect, clean, and analyze the data.

## **EXPANSION**

The interview crew at both studies captured as many vehicles as possible to record the vehicles' trip details. The crew surveyed from 6:00 a.m. until 8:00 p.m., working one direction on a Tuesday and the other direction on Wednesday. Recording trips on these days offer a better representation of the average daily traffic, as weekend traffic can be very different. The goal of the expansion process was to increase the survey data recorded at each location to correspond to the annual average daily traffic (AADT). Because traffic should be similar in different parts of the day, the studies were broken up into three time periods – AM Peak (6:00 – 9:00 a.m.), Midday (9:00 – 3 p.m.), and PM Peak (3:00 – 8:00 p.m.).

At both locations, vehicles were counted and classified manually by the study crew for each hour and for each direction. Also, classification counts from the bridge authorities were obtained. Because of the slight difference in how a vehicle may be classified at the bridge, the manual classifications were considered to be proper for expanding the studies. The percentage difference between the crew's manual count and the bridges' counts for all study hours were used to adjust the bridges' counts during the non-study hours, when no manual counts were available.

During the study hours, records were grouped by time period and direction. Each group was expanded to match the manual counts for each time period. All records were used to represent the night traffic during non-study hours, as it was deemed reasonable to expect that similar trip types also occur during non-study hours. Dividing a direction's total non-study period adjusted count by the total number of records in that direction equals the non-study period expansion factor. Adding a record's study period expansion factor with its non-study period expansion factor yields the 24-hour expansion total. Adding all records' 24-hour expansion totals equals the total traffic for that study day.

In order to portray the AADT for a study, the percentage difference was calculated between the location's AADT and the study's 24-hour volume. The AADT for each bridge was obtained by using the past year's passenger and commercial counts from the bridges and dividing by 365. The passenger vehicles 24-hour counts were multiplied by the percentage difference between the study day and the passenger vehicle AADT, and likewise for commercial vehicles. Adding all records' AADT expansion totals equals the location's total AADT. The tables and maps presented in this report are based on the AADT totals for passenger and commercial vehicles. The expansion table at the end of the report shows the calculation of expansion factors by direction and time period.

For both studies, the last year's worth of bridge crossing statistics were used to calculate the AADTs. Monthly bridge classification counts from June 1, 2008 to May 31, 2009 were used to develop the latest AADT. In past studies, the previous calendar year AADT from the MDOT Sufficiency file was used. This alternative process was done to help account for the large decrease in traffic that has resulted from the weak economy. If we used the previous calendar year AADT for the bridge locations, we would be overstating the traffic by quite a bit. This process was deemed reasonable, although if traffic continues to decline, our AADT values used at both bridges may still be a little high.

## INTERNATIONAL BRIDGE

The study was conducted on Tuesday, June 16, 2009 for inbound traffic, and Wednesday, June 17, 2009 for the outbound traffic. The inbound traffic was surveyed after customs, as they were queuing at the toll booths entering Michigan. The outbound traffic was captured in interview lines immediately after passing through the northbound toll booths, before crossing the bridge.

A total of 3,019 vehicles were interviewed at the International Bridge, 2,831 passenger vehicles and 188 commercial vehicles. The percentage of overall traffic interviewed was 86 percent of passenger vehicles, 68 percent of commercial vehicles, 84 percent overall, and was consistent by direction. The survey records were expanded to an annual average daily traffic of 4,588 passenger vehicles and 286 commercial vehicles, combining for a total of 5,874.

**Passenger Vehicles** - There is a strong relationship between Sault Ste. Marie, Michigan and Sault Ste. Marie, Ontario. Of the expanded total of 4,588 passenger vehicles, 61.6 percent travel between the two cities. Twenty nine percent of all car trips indicated shopping as one of the trip ends. This is almost entirely Canadians shopping in the United States, due to the exchange rate and a more populous Canadian Sault Ste. Marie. Other trip purposes of note were outdoor and indoor recreation. Twenty two percent of all passenger vehicle traffic had a trip end of either recreation purpose. Casinos on both sides of the bridge and the popular fishing trips of northern Ontario made up a big part of these movements.

The following tables show the top five passenger vehicle trip ends by direction for the International Bridge O&D study and the destination trip purposes by direction.

### **Top Five International Bridge Passenger Vehicle Trip Ends**

#### NORTHBOUND

Avg Trip Distance 118.42

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	984	1608.54	70.13%
BRIMLEY	28	45.83	2.00%
MACKINAW CITY	24	39.32	1.71%
KINROSS	22	35.81	1.56%
PETOSKEY	21	35.77	1.56%

DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	1133	1858.27	81.01%
SUDBURY	25	39.94	1.74%
WAWA	22	34.69	1.51%
THUNDER BAY	19	30.41	1.33%
ECHO BAY	15	24.70	1.08%

#### SOUTHBOUND

Avg Trip Distance 119.36

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	1192	1909.45	83.23%
WAWA	18	29.77	1.30%
GOULAIS RIVER	17	28.07	1.22%
SUDBURY	15	24.66	1.07%
ST JOSEPH ISLAND	15	24.00	1.05%

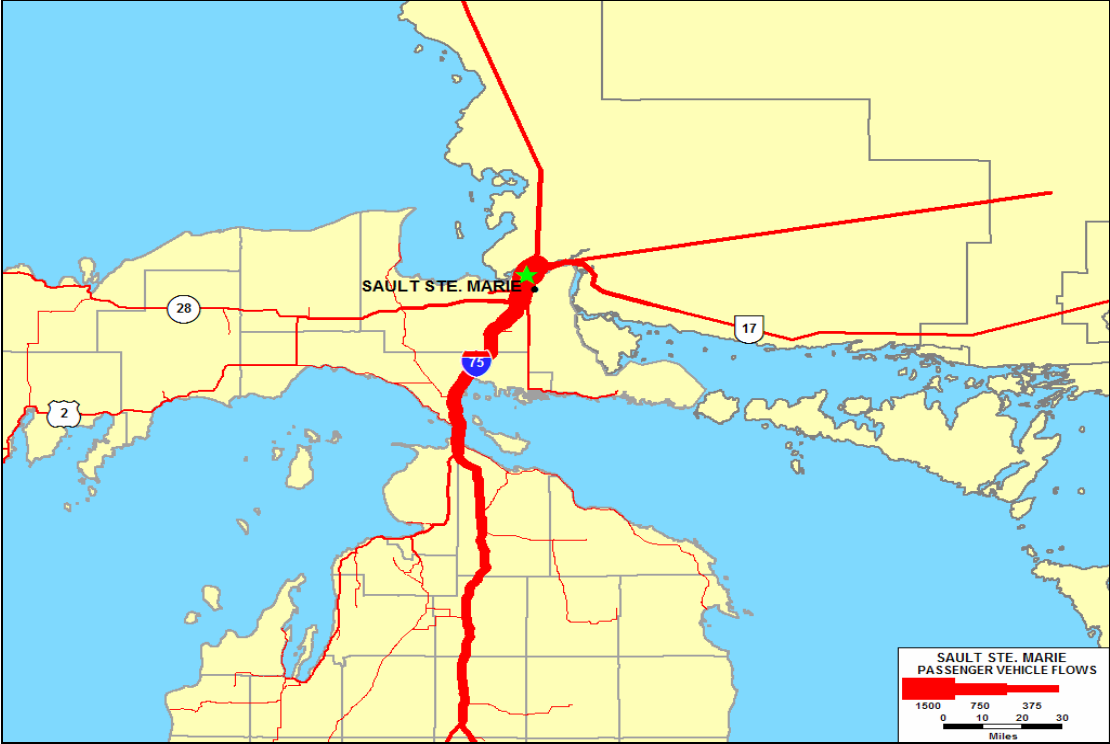
DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	935	1499.40	65.36%
BAY MILLS TWP	55	87.03	3.79%
BRIMLEY	42	66.09	2.88%
KINROSS	34	54.28	2.37%
PICKFORD	27	43.05	1.88%

As previously stated, when analyzing the following data regarding trip purposes and the previous table of city trip ends, one can see that the majority of traffic is Canadians from Sault Ste. Marie going to the United States for shopping, work, and recreation and then returning home. People from the United States traveling into Canada come from a greater distance, and the trips are more vacation/recreation oriented.

**PASSENGER VEHICLE TRIP DESTINATIONS**

<b>NORTHBOUND</b>	<b>#</b>	<b>aadt</b>	<b>pct avg trip length</b>	
Home	916	1501.74	65.47%	53.35
Work	104	167.63	7.31%	89.22
School	10	16.37	0.71%	48.42
Shopping	31	51.36	2.24%	133.29
Personal Business	57	91.33	3.98%	204.95
Outdoor Rec	95	151.82	6.62%	438.40
Indoor Rec	20	33.65	1.47%	211.70
Lodging	32	52.94	2.31%	394.94
Social/Other	98	159.24	6.94%	293.74
No Answer	40	67.67	2.95%	162.27
<b>TOTAL</b>	<b>1403</b>	<b>2293.76</b>	<b>100.00%</b>	<b>119.36</b>
<b>SOUTHBOUND</b>	<b>#</b>	<b>aadt</b>	<b>pct avg trip length</b>	
Home	254	404.02	17.61%	334.90
Work	151	232.30	10.13%	44.01
School	19	31.42	1.37%	50.89
Shopping	349	578.98	25.24%	17.11
Personal Business	139	227.28	9.91%	137.67
Outdoor Rec	196	318.24	13.87%	54.06
Indoor Rec	96	151.94	6.62%	46.72
Lodging	27	41.61	1.81%	225.16
Social/Other	157	249.42	10.87%	148.45
No Answer	40	58.90	2.57%	214.56
<b>TOTAL</b>	<b>1428</b>	<b>2294.11</b>	<b>100.00%</b>	<b>118.42</b>

The following three maps are different views of the passenger vehicle trip flows from the International Bridge traffic. The statewide model network was used to project the traffic flows and does not include much of the Ontario road network. The line heading northeast from Sault Ste. Marie is a statewide model link that shows flows starting and ending in the rural area of Algoma District in Ontario.





***Passenger Vehicle Comparison*** - A similar O&D study of passenger vehicles was done by MDOT and the Ontario Ministry of Transportation in 2000. The results from this study showed many similarities in travel for both passenger vehicles and trucks. The trip purpose questions for the two studies had different possible answers, so that makes some of the comparisons rather difficult. Two of the noticeable differences since 2000:

Less United States vacation travel – Answers in the 2000 study were coded differently, so there is not an exact match for the question. But what is noticeable is that traffic northbound for vacation, casino, recreation, and entertainment in 2000 was about 25 percent. When combining outdoor recreation, indoor recreation, and lodging, the 2009 study is about 10.5 percent for northbound traffic. This shows a large decrease in vacation travel into Canada by United States residents.

More shopping trips to the United States – In 2000, shopping trips accounted for seven percent of the trips into Canada, and 12 percent of trips to the United States. The 2009 study shows that mainly because of the weak United States dollar, Canadians can afford more in the United States and are crossing the border more to purchase goods. In 2009, shopping trips to Canada accounted for only just over two percent of International Bridge trips, while these trips from Canada to the United States rose to over 25 percent. In 2000, the strength of the United States dollar and the expense of goods in the United States were curbing the number of Canadians crossing to shop.

***Commercial Vehicles*** - Long distance trips were prevalent from the commercial vehicle surveys. Due to the remote border location, the average trip distance of over 650 miles is the longest of all O&D's MDOT has completed. Common trip ends were Sault Ste. Marie, Ontario and Quebec for Canadian cities, and a scattering of cities throughout Michigan, Wisconsin, and Minnesota in the United States. Empty trucks (25 percent) accounted for the most truck movements, while logs/lumber products (19 percent) and paper products (17 percent) were the top commodities moving across the bridge. More empties (30 percent) travel northbound into Canada than into the United States (20 percent). Primary metal products traveling southbound from the Sault Ste. Marie, Ontario steel manufacturing industry were also prevalent.

Casino buses were popular commercial vehicles crossing the bridge. Once the survey crew captured the first couple of buses, the remaining casino buses were allowed through the survey without stopping. Capturing the same driver over and over was detrimental to their business and could be potentially irritating. Thus, casino buses were understated in the study, as normally about 20 bus trips a day occur over the bridge. Likewise, a trucking firm in Brimley continued to make multiple trips across the bridge and they were allowed though after the first few stops. Therefore, Brimley should have a few more origins and destinations among the total.

The following table shows the top five commercial vehicle trip ends by direction for the International Bridge O&D study. Approximately one hundred trucks a day to and from either Sault Ste. Marie, Ontario or Quebec dominate the truck movements, more than a third of all trucks.

### Top Five International Bridge Truck Trip Ends

#### NORTHBOUND

Avg Trip Distance 589.59

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	9	13.93	9.76%
MINNESOTA (MN)	8	13.15	9.22%
BRIMLEY	8	12.38	8.68%
CHICAGO, IL	4	6.82	4.78%
MARQUETTE	3	4.79	3.36%

DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	34	55.39	38.81%
QUEBEC	16	26.36	18.47%
TORONTO	6	9.53	6.68%
ALGOMA DISTRICT	3	5.01	3.51%
ESPANOLA	2	3.62	2.54%

#### SOUTHBOUND

Avg Trip Distance 732.16

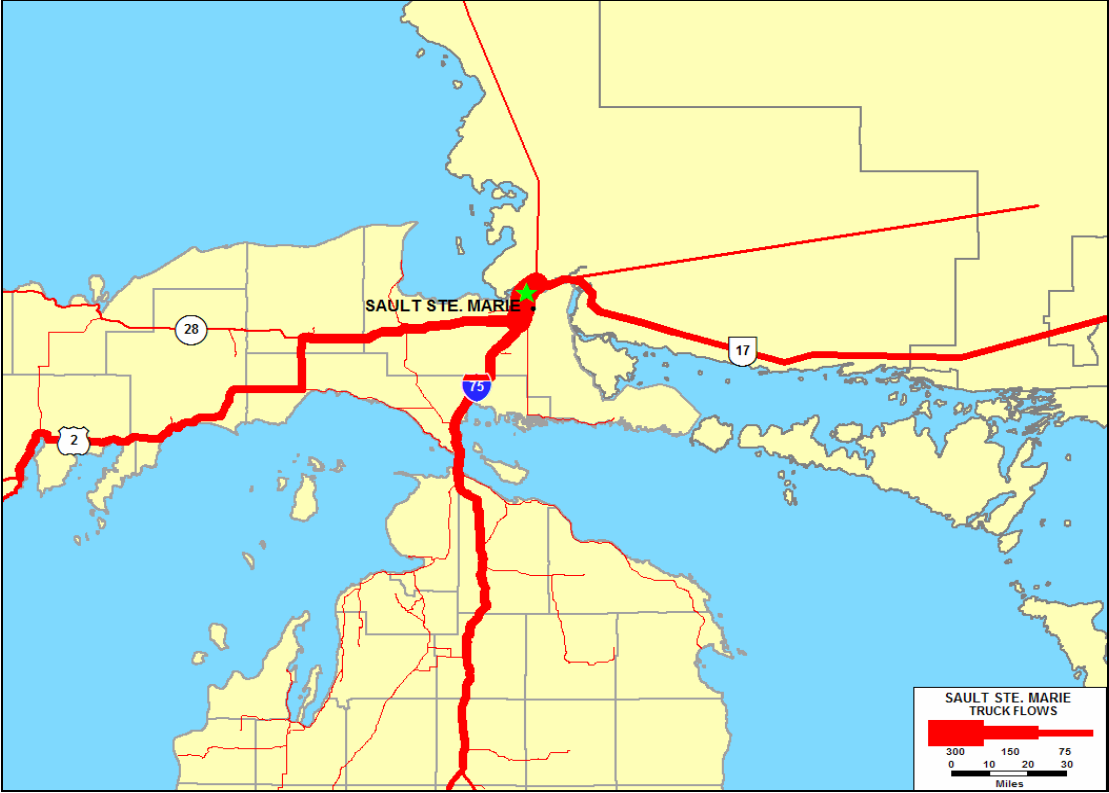
ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
SAULT STE MARIE	55	75.65	52.78%
QUEBEC	21	31.01	21.64%
SUDBURY	4	5.94	4.14%
NORTH BAY	3	4.24	2.96%
THESSALON	2	3.11	2.17%

DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
MINNESOTA (MN)	7	10.47	7.30%
GREEN BAY, WI	7	9.79	6.83%
BRIMLEY	5	6.82	4.76%
SAULT STE MARIE	6	6.52	4.55%
MARQUETTE	2	3.11	2.17%

### International Bridge Truck Movement Commodities

COMMODITY	SURVEYS	AADT EXPANDED	PERCENT	AVG TRIP LENGTH (MILES)	AVG WEIGHT (LBS)	AVG TONS
Empty	46	71.31	24.93%	324.20	N/A	N/A
Logs, Lumber or Wood Products	36	53.44	18.68%	541.35	59,635	29.82
Pulp, Paper, or Allied Products	33	49.79	17.41%	925.02	45,245	22.62
Primary Metal Products	16	23.43	8.19%	460.63	44,565	22.28
Waste or Scrap Material	10	14.96	5.23%	238.29	49,303	24.65
Food and Kindred Products	6	9.97	3.49%	1409.54	39,770	19.88
Machinery	4	6.59	2.30%	858.84	10,817	5.41
Miscellaneous Manufacturing Products	4	6.47	2.26%	644.40	10,816	5.41
Farm Products	4	6.12	2.14%	1303.13	33,355	16.68
Chemicals or Allied Products	3	5.18	1.81%	619.60	41,818	20.91
Transportation Equipment	3	4.83	1.69%	1036.09	33,285	16.64
Rubber or Misc. Plastics	3	4.58	1.60%	2005.29	12,720	6.36
Stone, Clay and Glass Products	3	4.24	1.48%	454.49	70,333	35.17
Furniture or Fixtures	2	3.41	1.19%	854.60	28,125	14.06
Printed Matter	2	3.11	1.09%	1181.44	36,500	18.25
Mixed Freight Shipments	2	3.01	1.05%	1471.29	7,959	3.98
Shipping Containers	2	2.93	1.02%	772.28	25,500	12.75
Leather Products	1	1.60	0.56%	22.75	44,031	22.02
Nonmetallic Ores, Minerals	1	1.60	0.56%	1738.84	78,000	39.00
Electrical Equipment	1	1.56	0.54%	595.61	40,000	20.00
Fabricated Metal Products	1	1.56	0.54%	1524.21	47,000	23.50
Apparel or Finished Textiles	1	1.41	0.49%	827.16	23,000	11.50
Misc Forest Products	1	1.41	0.49%	1761.52	14,000	7.00
Buses*	3	3.51	1.23%	5.42	N/A	N/A
Total	188	286.02	100.00%	652.85	35,125	17.56
Commercial Avg Daily Traffic - 286						
Commercial Avg Daily Weight - 10,046,453 lbs (5,023 tons)						
*Several casino buses were allowed through the study, making their overall total lower than actual						

The following three maps show different views of the commercial vehicle trip flows from the International Bridge traffic. The number of International Bridge truck trips going across the Upper Peninsula to and from Minnesota and Wisconsin, and those crossing the Mackinac Bridge to and from southern Michigan are very similar – about 125 trucks per day.





## **BLUE WATER BRIDGE**

The study was conducted on Tuesday, June 23, 2009 for inbound traffic, and Wednesday, June 24, 2009 for the outbound traffic. The inbound traffic was captured after customs, in interview lines before entering I-94. The outbound traffic was captured in interview lines immediately after passing through the eastbound toll booths, before crossing the bridge. An electrical storm interrupted the study about 3:00 p.m. on June 24, for 30-40 minutes.

A total of 4,511 vehicles were interviewed at the Blue Water Bridge, 3,430 passenger vehicles and 1,081 commercial vehicles. The percentage of overall traffic interviewed was 51 percent of passenger vehicles, 32 percent of commercial vehicles, and 45 percent overall. The percentage interviewed was a little higher westbound, as the eastbound survey had the electrical storm and a period in the morning with heavy queuing. Traffic needed to be let through the interview lines to alleviate the backup. The survey records were expanded to an annual average daily traffic of 8,810 passenger vehicles and 3,880 commercial vehicles, combining for a total of 12,690.

**Passenger Vehicles** – The responses for trip purposes at the Blue Water Bridge study indicate a heavy movement of Canadian residents traveling to the United States for work (18 percent) and shopping (17.5 percent). A third of the westbound movements do not go any further than the city of Port Huron, and of those trips, 45 percent is for shopping and 17 percent for work. Traveling eastbound to Canada, 53 percent of trips are to home. The casino just on the Canadian side of the bridge at Point Edward was a common destination and part of the over 7 percent of trips eastbound. Also prevalent were long distance recreation trips. Chicago, Toronto, New York, and Niagara Falls were all popular trip origins and destinations.

The following tables show the top five passenger vehicle trip ends by direction for the Blue Water Bridge O&D study and the destination trip purposes by direction.

### **Top Five Blue Water Bridge Passenger Vehicle Trip Ends**

#### **EASTBOUND**

Avg Trip Distance 232.12

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
PORT HURON	499	1496.91	33.98%
DETROIT	50	139.67	3.17%
CHICAGO, IL	40	116.07	2.64%
TROY	31	91.18	2.07%
GRAND RAPIDS	24	73.19	1.66%

DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
SARNIA	578	1729.41	39.26%
TORONTO	123	358.47	8.14%
LONDON	112	331.10	7.52%
NEW YORK (NY)	67	203.84	4.63%
NIAGARA FALLS	47	144.87	3.29%

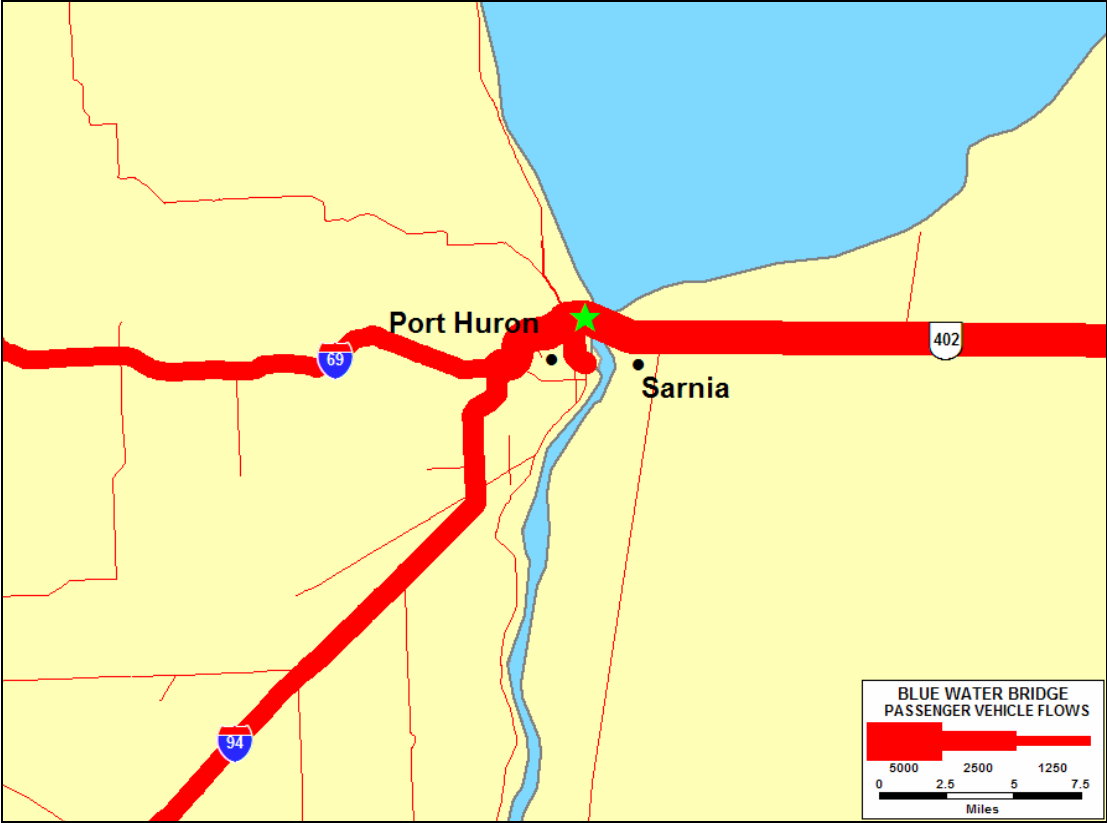
#### **WESTBOUND**

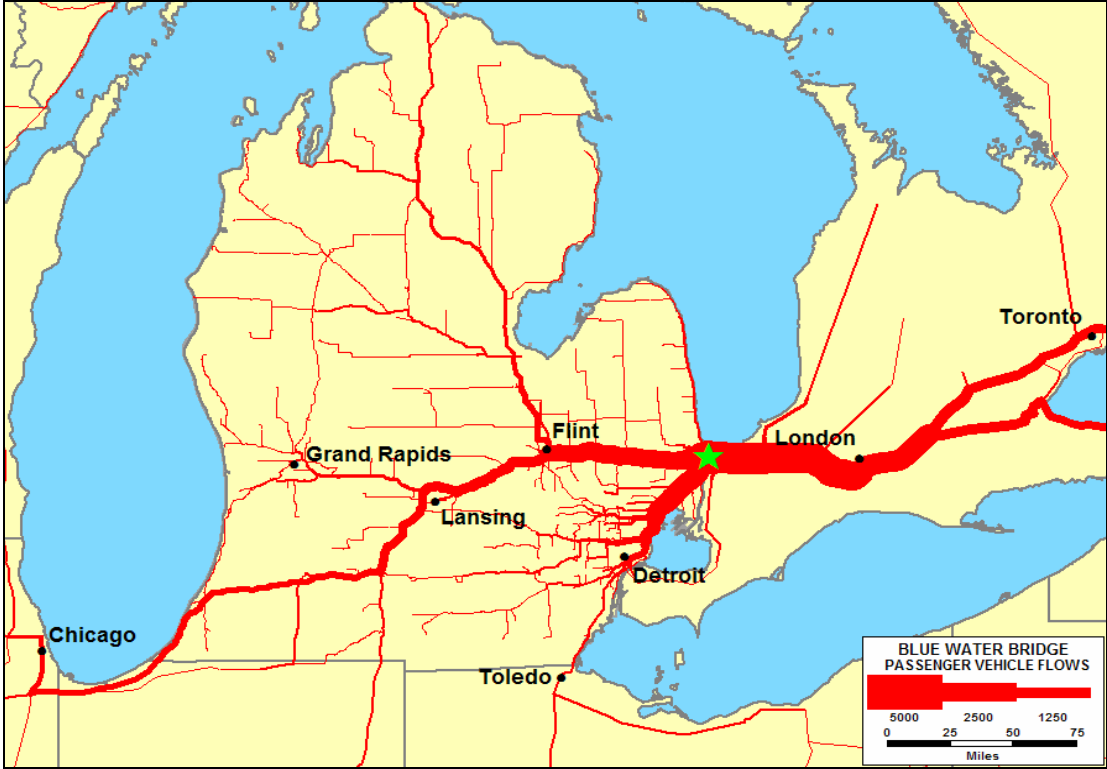
Avg Trip Distance 274.39

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
SARNIA	687	1534.07	34.83%
LONDON	207	476.40	10.81%
TORONTO	145	328.51	7.46%
NEW YORK (NY)	115	260.78	5.92%
NIAGARA FALLS	68	160.77	3.65%

DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
PORT HURON	649	1466.79	33.30%
CHICAGO, IL	71	165.22	3.75%
DETROIT	54	119.59	2.71%
GRAND RAPIDS	32	75.27	1.71%
FLINT	30	69.03	1.57%

The following three maps portray passenger vehicle flows on the road network from the Blue Water Bridge O&D study. Again, the statewide model network is sparse in Ontario, and road links may have flows to and from groups of nearby cities.





**Commercial Vehicles** – The Blue Water Bridge provides an alternative to the Ambassador Bridge for international movements traveling between the Toronto metro area and the Midwest. Several trucks opt for traveling the I-69 corridor due to speed and negating potential Detroit area congestion. The top trip ends on the Canadian side are in the Ontario manufacturing area around Toronto, cities in Quebec, and the border city of Sarnia. Trip ends common on the United States side are Chicago, Lenox Township, and Port Huron. Lenox Township is home to Pine Tree Acres landfill, the most prevalent destination for Ontario waste entering Michigan via the Blue Water Bridge.

**Top Five Blue Water Bridge Truck Trip Ends**

**EASTBOUND**

Avg Trip Distance 491.41

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
CHICAGO	47	143.77	7.41%
DETROIT	30	102.87	5.30%
LENOX TOWNSHIP	25	85.21	4.39%
PORT HURON	22	77.36	3.99%
LANSING	11	37.92	1.95%

DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
TORONTO	91	289.75	14.94%
MISSISSAUGA	50	161.18	8.31%
BRAMPTON	44	149.66	7.71%
SARNIA	41	142.08	7.32%
QUEBEC	41	128.86	6.64%

**WESTBOUND**

Avg Trip Distance 528.93

ORIGINS	SURVEYS	AADT EXPANDED	PERCENT
TORONTO	64	258.50	13.32%
QUEBEC	55	219.47	11.31%
MISSISSAUGA	35	139.00	7.17%
SARNIA	34	136.26	7.02%
LONDON	33	132.05	6.81%

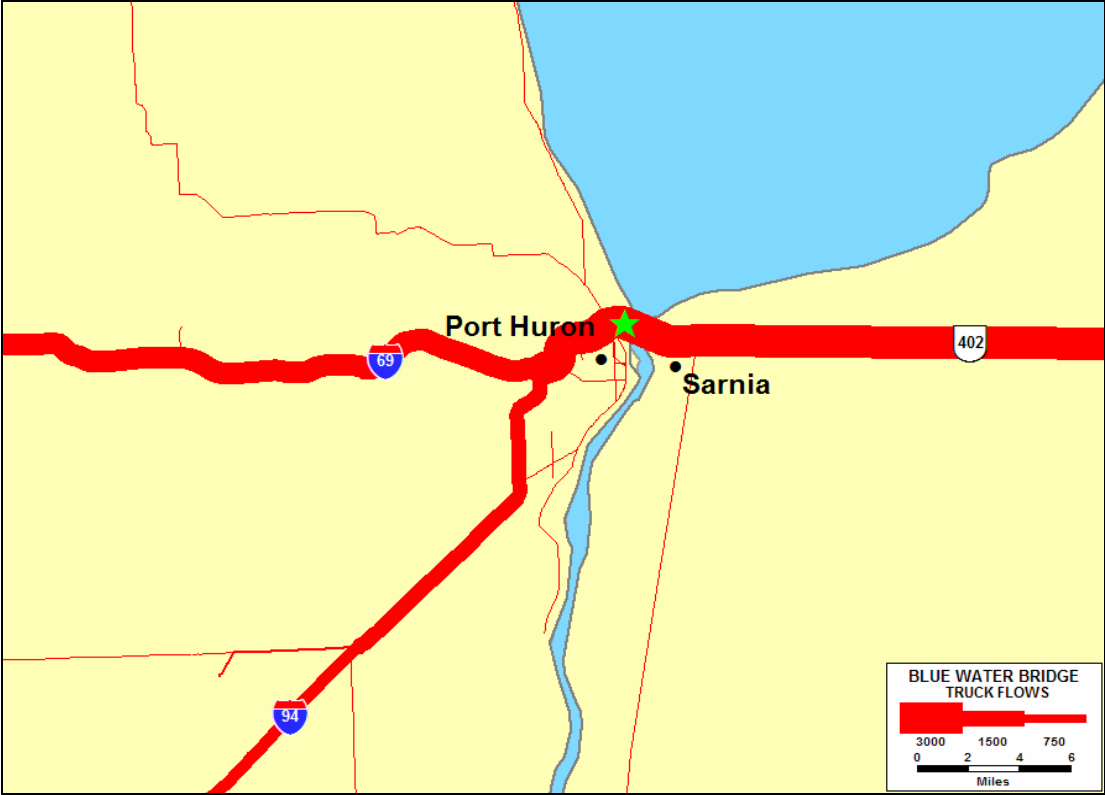
DESTINATIONS	SURVEYS	AADT EXPANDED	PERCENT
LENOX TOWNSHIP	35	146.38	7.55%
CHICAGO	33	129.24	6.66%
PORT HURON	16	64.68	3.33%
KENTUCKY (KY)	12	47.45	2.45%
MONTROSE	10	41.87	2.16%

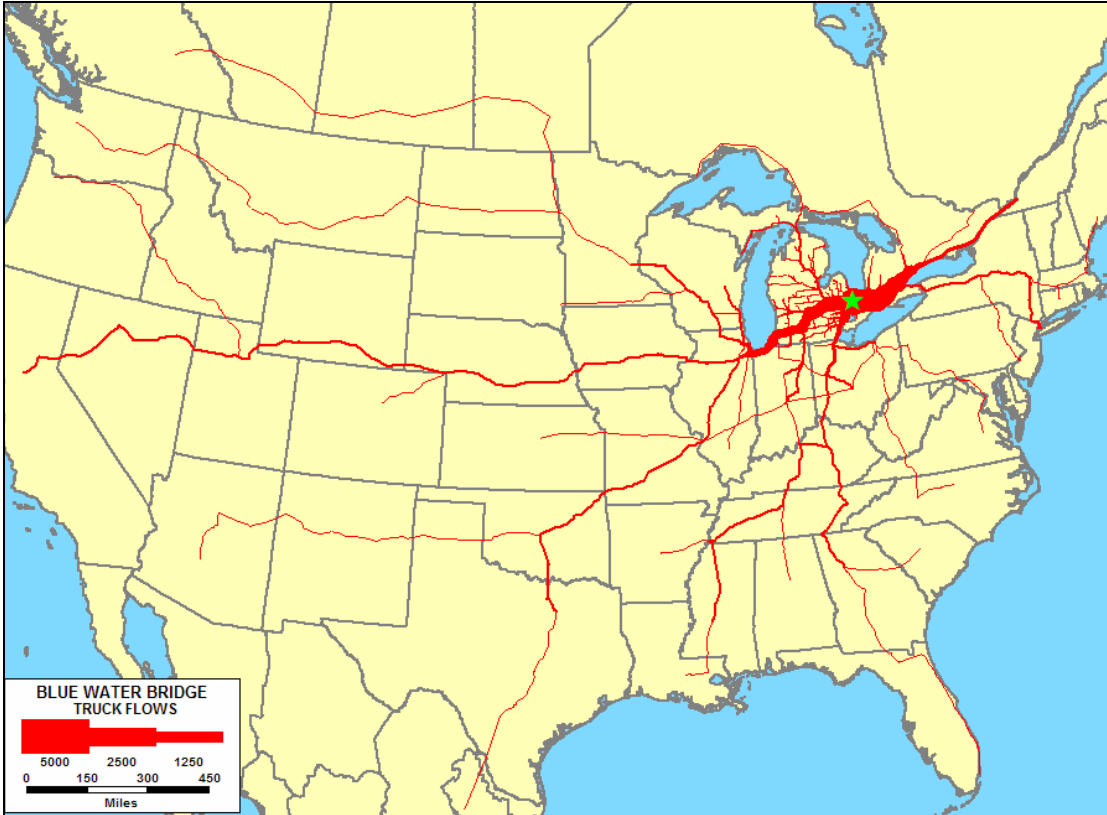
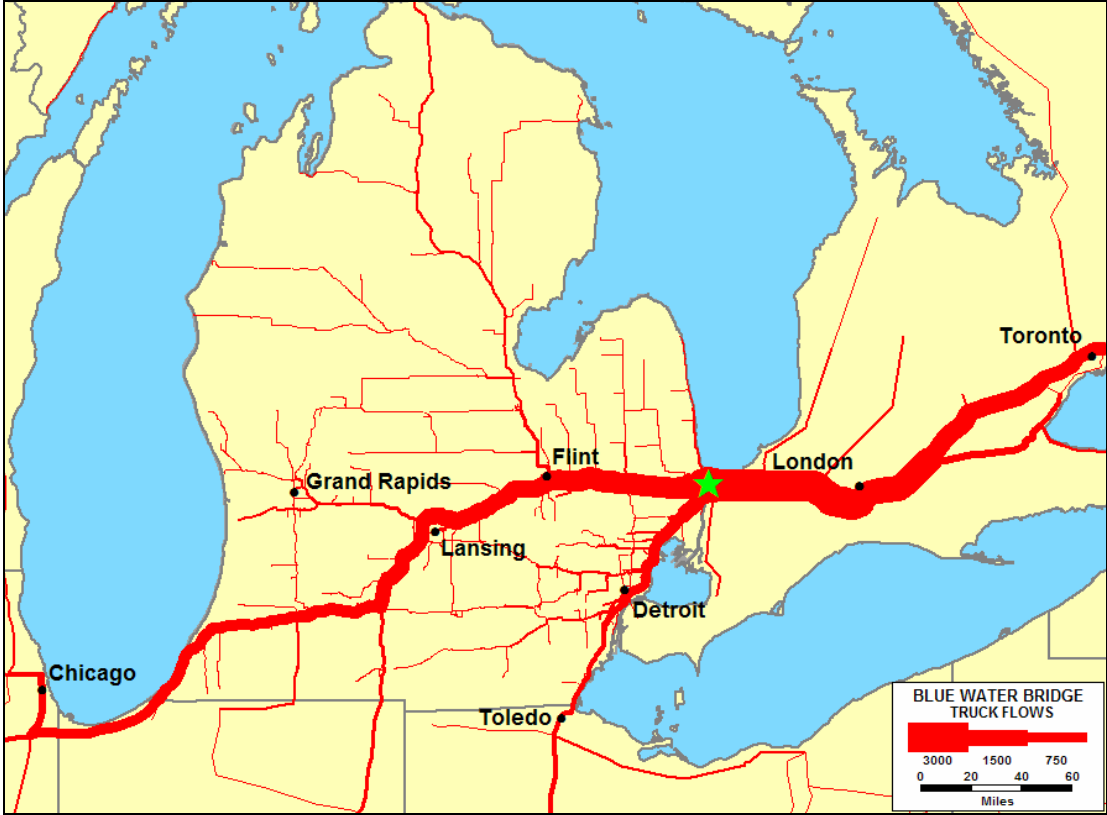
Empty movements account for about 20 percent of trucks crossing the Blue Water Bridge. While transportation equipment movements may be down from past years, the commodity still tops the list of products traveling across the bridge, followed by waste movements. The morning hours see a convoy of trucks hauling garbage from the Toronto area to Michigan landfills. Primary metal products, food products, chemicals, and plastics are the other top commodities crossing the bridge. Also prevalent are intermodal container movements of mixed freight going eastbound from Chicago to Toronto.

#### Blue Water Bridge Truck Movement Commodities

COMMODITY	SURVEYS	AADT EXPANDED	PERCENT	AVG TRIP LENGTH (MILES)	AVG WEIGHT (LBS)	AVG TONS
Empty	214	797.46	20.55%	355.86	N/A	N/A
Transportation Equipment	137	472.46	12.18%	398.32	25,597	12.80
Waste or Scrap Material	77	311.16	8.02%	285.95	65,377	32.69
Primary Metal Products	77	271.42	7.00%	536.01	53,292	26.65
Food Products	75	261.44	6.74%	591.88	36,940	18.47
Chemicals or Allied Products	61	216.57	5.58%	534.42	44,128	22.06
Plastics and Rubber	57	206.31	5.32%	779.79	28,984	14.49
Farm Products	54	188.46	4.86%	578.84	54,214	27.11
Pulp, Paper, or Allied Products	45	163.50	4.21%	621.45	39,060	19.53
Shipping Containers	40	144.96	3.74%	379.28	14,297	7.15
Mixed Freight Shipments	37	119.10	3.07%	776.70	27,675	13.84
Machinery	24	82.19	2.12%	1025.56	29,607	14.80
Logs, Lumber or Wood Products	24	78.89	2.03%	610.00	46,004	23.00
Petroleum or Coal Products	23	79.64	2.05%	476.81	54,524	27.26
Stone, Clay and Glass Products	20	71.25	1.84%	497.01	43,832	21.92
Fabricated Metal Products	19	73.41	1.89%	677.99	24,341	12.17
Miscellaneous Manufacturing Products	18	60.29	1.55%	661.32	23,137	11.57
Furniture or Fixtures	17	59.92	1.54%	677.57	22,872	11.44
Nonmetallic Ores, Minerals	14	49.50	1.28%	464.41	56,791	28.40
Electrical Equipment	14	49.39	1.27%	840.68	20,088	10.04
Hazardous Material	8	26.95	0.69%	479.82	52,100	26.05
Printed Matter	7	28.81	0.74%	359.05	24,117	12.06
Apparel or Finished Textles	4	13.44	0.35%	623.83	23,088	11.54
Misc Forest Products	2	7.43	0.19%	757.75	44,685	22.34
Instruments, Photo Equip, Optical	2	6.40	0.16%	1297.14	19,500	9.75
Service	2	6.32	0.16%	1103.15	N/A	N/A
Metallic Ores	1	4.19	0.11%	848.38	46,000	23.00
Mail or Contract Traffic	1	3.72	0.10%	511.17	5,000	2.50
Textile Mill Products	1	3.72	0.10%	1286.32	16,000	8.00
Ordnance	1	3.72	0.10%	1211.07	44,000	22.00
Buses	5	17.95	0.46%	869.28	N/A	N/A
<b>TOTAL</b>	<b>1081</b>	<b>3879.99</b>	<b>100.00%</b>	<b>510.17</b>	<b>30,881</b>	<b>15.44</b>
Commercial Avg Daily Traffic - 3,880						
Commercial Avg Daily Weight - 118,483,561 lbs (59,242 tons)						

The following three maps show different views of the commercial vehicle trip flows from the Blue Water Bridge traffic.





## SUMMARY

It has been widely noted that border crossing traffic has been decreasing due to the downturn in the economy. The International Bridge traffic peaked in 1993 at about 3.5 million vehicles. Traffic has been about 1.9 million/year from 2003 - 2008, and the projection for 2009 looks to be about 1.7 million vehicles. The Blue Water Bridge experienced its high point in 1991 with over 6.1 million crossings. Since the early 1990s, the Blue Water Bridge has seen some dips in volumes, but has remained consistently around 5.5 million. Bridge traffic in 2008 saw a decrease to below 5 million and the 2009 projection is about 4.6 million, the lowest since 1989.

It appears that much of the border crossing traffic depends on the exchange rate of the Canadian and United States currencies. Traffic has decreased some from its peak in the early 1990s due to less Canadian travelers shopping in the United States for increasingly expensive products. The past two years now have seen less American travel due to the economic recession. There is less money for discretionary travel for recreation and shopping. High gas prices and the new passport rule at border crossings have also contributed to the decrease in traffic.

These O&D studies enable MDOT transportation planners to discern the types of traffic continuing to cross the border during the economic down turn. The trip records are beneficial to validation of the MDOT travel demand forecasting models and provide statistics to transportation planners and the public. MDOT hopes to conduct an Ambassador Bridge O&D study in the future. All forecasts are showing an increase in border crossings in the future, especially in truck movements.

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## **APPENDIX**

## Expansion Calculation

Passenger Vehicles		AM (6am-9am)			MID-DAY (9am-3pm)			PM (3pm-8pm)			Study Hours Manual Counts	Study Hours Bridge Counts	Study Hours Manual-to-Bridge %	Non-Study Bridge Count	Adjusted Non-Study Counts	Adjusted 24-Hour Counts	Total Interview Counts	Non-Study Hours Expansion Factor
		Interview	Manual	Expansion Factor	Interview	Manual	Expansion Factor	Interview	Manual	Expansion Factor								
Sault Ste Marie	Northbound	129	143	1.109	716	785	1.096	558	709	1.271	1637	1613	1.015	452	459	2096	1403	0.327
	Southbound	288	302	1.049	597	792	1.327	543	557	1.026	1651	1694	0.975	191	186	1837	1428	0.130
Port Huron	Eastbound	182	325	1.786	645	1776	2.753	653	1363	2.087	3464	3486	0.994	588	584	4048	1480	0.395
	Westbound	340	494	1.453	842	1618	1.922	768	1098	1.430	3210	3154	1.018	455	463	3673	1950	0.237
Commercial Vehicles		AM (7am-9am)			MID-DAY (9am-3pm)			PM (3pm-8pm)			Study Hours Manual Counts	Study Hours Bridge Counts	Study Hours Manual-to-Bridge %	Non-Study Bridge Count	Adjusted Non-Study Counts	Adjusted 24-Hour Counts	Total Interview Counts	Non-Study Hours Expansion Factor
Study	Direction	Interview	Manual	Expansion Factor	Interview	Manual	Expansion Factor	Interview	Manual	Expansion Factor								
Sault Ste Marie	Northbound	17	21	1.235	42	59	1.405	28	47	1.679	127	121	1.050	54	57	184	87	0.651
	Southbound	15	15	1.000	45	75	1.667	41	61	1.488	151	149	1.013	27	27	178	101	0.271
Port Huron	Eastbound	156	318	2.038	219	878	4.009	221	679	3.072	1875	1906	0.984	653	642	2517	596	1.078
	Westbound	107	362	3.383	185	630	3.405	193	554	2.870	1546	1529	1.011	618	625	2171	485	1.288

# SINGLE STATION O-D STUDY

MDOT 1757 (05/09)

COUNTY NUMBER	<input type="text" value="2"/> <input type="text" value="3"/>	STATEWIDE NUMBER	<input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/>	HOUR PERIOD ENDING	<input type="text" value="8"/> <input type="text" value="9"/>	DIRECTION	<input type="text" value="10"/>	DAY OF TRAVEL	<input type="text" value="11"/>	MO.	<input type="text" value="12"/> <input type="text" value="13"/>	DATE	<input type="text" value="14"/> <input type="text" value="15"/>	INTERVIEWER'S NAME
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Interview Number	Veh. Type	Occupants	ORIGIN 1. Coming from now 2. Originally			Purpose	DESTINATION 3. Going to now 4. Final location			Purpose	Frequency	VEHICLE LICENSE (State)	HOME IF NOT 1-4	COMMODITY (LOAD)		
			City,	Twp,	County		City,	Twp,	County					WEIGHT LBS		
			1)				3)								1	3
			2)				4)								2	4
			1)				3)								1	3
			2)				4)								2	4
			1)				3)								1	3
			2)				4)								2	4
			1)				3)								1	3
			2)				4)								2	4

- |   |  |   |
|---|--|---|
| <p><b>VEHICLE TYPE</b></p> <ol style="list-style-type: none"> <li>1. Auto/Van/Pickup/Sport Utility</li> <li>2. Auto/Van/Pickup/Sport Utility with Trailer</li> <li>3. Motorcycle</li> <li>4. Motorhome/RV</li> <li>5. Single Unit Trucks</li> <li>6. Semi Trucks</li> <li>7. Multiple Trailer</li> <li>8. Buses</li> <li>9. Others</li> </ol> | <p><b>PURPOSE</b></p> <ol style="list-style-type: none"> <li>1. Home</li> <li>2. Work-primary</li> <li>3. Work-related</li> <li>4. Elem. Sec. school</li> <li>5. College/University</li> <li>6. Personal business</li> <li>7. Shop frequently</li> <li>8. Shop infrequently</li> <li>9. Dining out</li> <li>10. Service passenger</li> <li>11. Social visit</li> <li>12. Outdoor recreation</li> <li>13. Indoor/event recreation</li> <li>14. Recreational driving</li> <li>15. Cottage, motel, bed &amp; breakfast</li> </ol> | <p><b>FREQUENCY</b></p> <ol style="list-style-type: none"> <li>1. Daily</li> <li>2. Weekly</li> <li>3. Monthly</li> <li>4. 4 X a year</li> <li>5. 2 X a year</li> <li>6. Once a year</li> <li>7. One time only</li> <li>8. refused</li> </ol> |
| <p><b>PROX CARD - NO</b></p> <ol style="list-style-type: none"> <li>1. Cost</li> <li>2. Need to go to office</li> <li>3. content with cash</li> <li>4. Loss of attendant jobs</li> <li>5. Unaware of program</li> <li>6. No reason-other</li> </ol>   | <p><b>TRAVEL</b></p> <ol style="list-style-type: none"> <li>1. Exchange rate</li> <li>2. Backup &amp; delay</li> <li>3. U.S. customs</li> <li>4. Canada customs</li> <li>5. New passport</li> <li>6. Employment/income change</li> <li>7. Other</li> </ol>   |   |